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QUANTIFICATION OF COSTS AND BENEFITS

OF AMENDMENTS TO THE EU PLANT HEALTH REGIME

Framework Contract for evaluation
and evaluation related services - Lot 3: Food Chain

FINAL REPORT

Food Chain Evaluation Consortium (FCEC)
Agra CEAS Consulting - Civic Consulting
Van Dijk Management Consultants
Arcadia International

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FINAL REPORT

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Acronyms

AGPM:	Association Générale des Producteurs de Maïs
AH:	Animal Health
AI:	Avian Influenza
AIPH:	International Association of Horticultural Producers
ALB:	Asian Longhorned Beetle
APHIS:	Animal and Plant Health Inspection Service (USA)
AQIS:	Australian Quarantine and Inspection Service
BIP:	Border Inspection Post
Bt:	*Bemisia tabaci*
BMVEL:	Bundesminsiterium für Verbraucherschutz, Ernährung Und Landwirtschaf
BPC:	British Potato Council
BPOA:	British Protected Ornamentals Association
BZ:	Buffer Zone
B2B:	Business to business
B2C:	Business to consumer
CA(s):	Competent Authority (ies)
CAHP:	Community Animal Health Policy
CAP:	Common Agricultural Policy
CBA:	Cost Benefit Analysis
CEPF:	Confederation of European Forest Owners
CIRCA:	Communication & Information Resource Centre Administrator
CLB:	Citrus longhorned beetle
CN:	Combined nomenclature
COPA-COGECA:	Committee of Professional Agricultural Organisations- General Committee for Agricultural Cooperation in the European Union
COPHs:	Chief Officers Plant Health
CPHR:	Common Plant Health Regime
CRL(s):	Community Reference Laboratory (ies)
CRSS:	Cost and Responsibility Sharing Scheme
DA:	Demarcated Area
DG/s:	Directorate General
DG AGRI:	Directorate-General of the European Commission for Agriculture and Rural Development
DG ENT:	Directorate-General of the European Commission for Enterprise and Industry
DG ENV:	Directorate-General of the European Commission for the Environment
DG RTD:	Directorate-General of the European Commission for Research & Innovation
DG SANCO:	Directorate-General of the European Commission for Health and Consumers
DOM:	Département d'outre-mer (overseas department)
COM:	European Commission
EFSA:	European Food Safety Authority

EID:	Electronic Identification
ELISA:	Enzyme-linked immunosorbent assay
EP:	European Parliament
EPPO:	European and Mediterranean Plant Protection Organization
ESA:	European Seed Association
EU:	European Union
EU-RLs:	European Union Reference Laboratory (ies)
EUSTAFOR:	European State Forest Association
FADN:	Farm Accountancy Data Network
FAO:	Food and Agriculture Organisation
FCEC:	Food Chain Evaluation Consortium
FEFPEB:	Fédération Européenne des Fabricants de Palettes et Emballages en Bois
FEPEX:	Federación Española de Asociaciones de Productores Exportadores de Frutas, Hortalizas, Flores y Plantas Vivas
FERA:	Food and Environment Research Agency
FMD:	Foot and Mouth Disease
FO :	Federal Order
FNPPPT:	Fédération Française de Producteurs de Plant de Pommes de Terre
FP:	Framework Program
FPS:	Federal Public Service
FVO:	Food and Veterinary Office
GAP(s):	Good Agricultural Practices
GM:	Gross Margin
HO/s:	Harmful Organism/s
IA:	Impact Assessment
IAS:	Invasive Alien Species
ISSG:	Global Invasive Species Specialist Group
IPPC:	International Plant Protection Convention
ISPM:	International standards for phytosanitary measures
LTO:	Land- en Tuinbouw Organisatie Nederland (Dutch Organisation for Agriculture and Horticulture)
LUCAS:	Land Use/Cover Area frame Survey
MPB:	Mountain Pine Beetle
MS:	Member States
NGOs:	Non-Governmental Organizations
NMS:	New Member States
NPPO/s:	National Plant Protection Organisation/s
NWGs:	Non-wood Goods
OIE:	World Organisation for Animal Health
PCN:	Potato Cyst Nematode
PepMV:	Pepino Mosaic Virus
PEQ:	Post-entry quarantine
PFA:	Pest Free Area
PH:	Plant Health

PHRAME:	FP6 research project "Plant health risk and monitoring evaluation"
PO/s:	Private Operator/s
PP:	Plant Passport
PPV:	Plum Pox Virus
PPPs:	Plant Protection Products
PR:	*Phytophthora ramorum*
PRA/s:	Pest Risk Analysis
PTSVd:	Potato Spindle Tuber Viroid
PV:	Present Value
PVY:	Potato Virus Y
PWN:	Pine Wood Nematode
PZ/s:	Protected Zone/s
RAPRA:	Risk analysis for *Phytophthora ramorum*
R&D:	Research & Development
RPW:	Red Palm Weevil
SCM:	Standard Cost Model
SCPH:	Standing Committee on Plant Health
SG:	Steering Group
SME:	Small and medium enterprises
SP:	Surveillance Plans
SPS:	Sanitary and Phytosanitary Standards
S&PM:	Seed and Plant Propagating Material
TCs:	Third Countries
TF:	Task Force
ToR:	Terms of Reference
TYLCV:	Tomato Yellow Leaf Curl Virus
UNECE:	United Nations Economic Commission for Europe
USDA:	United States Department of Agriculture
VDMC:	Van Dijk Management Consultants
WG:	Working Group
WPI:	Wood Processing Industries
WPM:	Wood Packaging Material
WTO:	World Trade Organization
ZP:	Zona Protecta

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Key messages

The aim of this study was to provide supplementary economic data on impacts of amendments to the current EU plant health regime and to support the development of the impact assessment accompanying the legislative proposal of the Commission on the future EU plant health law. The key conclusions of the study are as follows:

- The total annual costs for the EU and MS of introducing **mandatory general intra-EU surveillance** (*Task 1*) for ten potential priority Harmful Organisms (HOs) were estimated at € **€23.4 million** per year if surveillance is carried out at fixed 'best practice' levels (*"EU surveillance requirements" option),* of which **€9.4 million** are **additional** to the current estimated EU 27 surveillance expenditure. Under the *"EU surveillance facilitation" option* (i.e. without fixed levels) the estimated costs range from **€14 million** (current levels of expenditure) to **€16.8 - €21 million,** of which **€2.8 – €7 million** are **additional** to the current estimated EU 27 surveillance expenditure.
- The costs of introducing compulsory **post-entry quarantine (PEQ)** in the import regime for a limited number of high risk ornamental plants for planting (*Task 2*) would largely fall on private operators (POs) and this measure may result in some rationalisation in the sector. The highest component are costs of building new facilities at the required biosecurity level (implementing the newly adopted ISPM34), which are estimated at ca. **€1,000/m^2** or **up to €1 million** in total for a standard facility (up to 1,000 m^2). Administrative costs for MS Competent Authorities (CAs) are to be fully recovered through fees charged to POs (inspection costs estimated at ca. €5,000 per facility in total over a PEQ period of 2 years), while the expected impact for the COM is likely to be minimal.
- The rationale and structure of the animal health financing could be applicable as a model for plant health to compensate for direct PO costs and losses, but the model will need to be adjusted to the specificities of plant health and the wide diversity of sectors affected, with a view to prioritisation and seeking a balance between public and private (commercial) interests. The financial impact of expanding the EU solidarity regime to **co-finance direct costs and losses of POs** (at 50% co-financing rate) (*Task 3*) was estimated at an additional expenditure for the EU of ca. **€5 million per year** at the current level and number of measures imposed by MS CAs on POs. This is very likely to increase the implementation of officially imposed measures by POs, and to trigger the implementation of national compensation schemes, but it is most unlikely to increase the intensity of measures taken by MS CAs.
- The financial impact of expanding the EU solidarity regime to also include **natural spread** of plant pests (*Task 4*) was estimated at additional EU expenditures of **min. €3.7 million per year** (50% co-financing), with a substantial increase in the case of inclusion of natural spread for HOs affecting the environment.
- In case of no action, the introduction, spread and establishment in the EU of regulated HOs impacting on agriculture, horticulture, forests and the environment (*Task 5*) has the potential to cause multiple **billions of Euros of economic damage** per year across the EU to sectors directly affected and upstream/downstream industries, as well as also potentially adversely affecting tourism, retail, and ecosystem values and services. The impact of an outbreak of any of the selected HOs reviewed by the study in terms of damage costs may extend to the entire value chain of the sector/s affected, with potentially very significant knock on effects on employment and the wider economy.
- Whatever approach is considered for solving the current lack of coherence in listing HOs between the seed or plant propagating material (S&PM) *acquis* and the EU plant health regime (*Task 6*), **impacts of aligning the two regimes** are likely to be **negligible**. Merging the visual inspection based plant passports (PPs) of the plant health regime with the sampling and laboratory testing based health certificates of the S&PM regime would lead to a cost reduction of about €1.5 million but, as several MS have already implemented this approach, the total benefit would be less. Delegation of tasks would help alignment to the approach of Regulation 882/2004/EC which is based on results to be obtained and not on how it should be done (current logic of the plant health regime).

- The **modifications to the plant passport (PP) system** (that would be issued in a larger number of cases than at present and/or in a more harmonised format; Task 7) have a **negligible financial impact** on POs. The required information is already present in their ICT system (used e.g. for stock keeping and invoicing), and the cost of possible modifications to formats of reports, labels, tags and the like (hence also PP), can be split over many users of the specific software packages in use.
- If mandatory surveillance targets for **protected zones (PZs)** (*Task 8*) are introduced, the cost of surveillance is increased (in the order of several thousand to millions of Euros, depending on PZ); where economic benefits of maintaining a PZ could be estimated, such **benefits clearly outweigh the costs of surveillance** even if this is carried out at an increased 'best practice' level. The costs of mandatory surveillance do not currently appear to be always shared between MS CAs and POs, and there is a need to reinforce the implementation of EU plant health regime provisions to collect mandatory fees for cost recovery of the inspections and sampling/testing in PZs. Immediate delisting of an infested PZ would no longer allow protection, thus possibly reducing the potential to eradicate while increasing the cost; on the other hand, immediate benefits may result for non-PZ MS in terms of saving high inspection and eradication costs to export to the PZ. Delisting an infested PZ after 2 years allows the time that is technically considered necessary for the eradication programme to run its course while enhancing the transition towards reinforced measures to maintain the integrity of the PZ, more in line with the Pest Free Area concept under the IPPC.
- The introduction of mandatory requirements for the prevention and control of IAS plants within the EU plant health regime may result in an increase in management costs across the EU as a whole. Although the total cost for absent or largely absent IAS plants is currently expected to be relatively moderate on the basis of the known level of presence and distribution and provided that EPPO guidelines on prohibitions of import/trade/planting are effectively introduced, **if in future these IAS plants become more widespread**, as is currently the case of *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides*, then the surveillance and control/eradication costs likely to require funding under Directive 2000/29/EC could become **very significant**. Given the widespread presence of some of these IAS plants and the fact that natural spread is by definition an important factor in their distribution, future eligibility for EU co-financing of measures against natural spread related outbreaks could have very significant impacts on the EU budget (per IAS plant, potentially €1.5-€3.0 million annually for surveillance and €10-€30 million for eradication and containment).

Executive summary

The aim of this study, which was carried out by the Food Chain Evaluation Consortium (FCEC) in 2011, is to support the development of the impact assessment accompanying the legislative proposal of the European Commission (COM) on the future EU plant health regime (EU PH regime). The purpose is to provide supplementary economic data on impacts which form part of the analytical and descriptive inputs necessary for COM to complete its impact assessment and to fill existing knowledge gaps. The study investigates the potential impacts of various options to amend the EU PH regime, based on the conclusions and recommendations of the CPHR evaluation (FCEC, 2010).

The study has followed a highly targeted analytical approach, with a specific methodology developed for each of the 9 Tasks. To allow a more in-depth analysis, each Task has focused on a representative selection of HOs of high impact for the range of sectors potentially affected. The analysis is based on a range of scenarios and assumptions that serve as the working hypothesis for deriving the required quantitative and qualitative estimates. The development of these working hypotheses, as well as data collection, is based on extensive consultation with the relevant organisations (including inputs received from the various COM services; Member States (MS) Competent Authorities (CAs) and stakeholders) and four Task Forces (TFs) set up to support the COM in the review of the EU PH regime.

Task 1: costs of introducing mandatory general intra-EU surveillance

The objective of Task 1 has been to estimate the costs of introducing mandatory general intra-EU surveillance for 10 potential priority harmful organisms (HOs)[1] and the impact on the costs of EU co–financing of such surveillance. The selection of HOs includes those currently considered to represent the greatest threat for the EU, on the basis of data on interceptions, provisional emergency measures, control Directives, and the requirements of Council Directive 2000/29/EC. For some of these HOs[2] mandatory surveillance is currently foreseen by EU legislation. The analysis undertaken was required to:

1.1 Determine an <u>appropriate level of surveillance</u> from best practices among MS and by comparison with known surveillance levels for other important HOs, including potato pests.

The appropriate level of surveillance was established on the basis of existing information on current surveillance methodologies in use in the MS and best practices were identified in part by means of a comprehensive survey of the EU27 MS CAs (to which 25 MS responded). The 'best practices' identified in this way were used as the basis for the cost calculations and reflect expert views as to what constitutes the most realistic combination of science and

[1] *Anoplophora chinensis, Bursaphelenchus xylophilus, Erwinia amylovora, Guignardia citricarpa, Phytophthora ramorum,* Potato Spindle Tuber Viroid, *Rhynchophorus ferrugineus, Synchytrium endobioticum, Thrips palmi, Xanthomonas axonopodis pv. citri.*

[2] For 5 HOs mandatory surveillance is already currently foreseen under emergency measures for *Anoplophora chinensis*, *Bursaphelenchus xylophylus, Phytophthora ramorum, Rhynchophorus ferrugineus,* Potato Spindle Tuber Viroid (PSTVd), and in one case (*Erwinia amylovora*) under Protected Zones and buffer zones in place; although the remaining HOs are not currently subject to mandatory surveillance rules (*Guignardia citricarpa, Synchytrium endebioticum*, *Thrips palmi, Xanthomonas axonopodis pv. citri.*), voluntary plans are in place in some MS.

economic considerations rather than a technical gold standard[3]. Indeed, current National Plant Protection Organisation (NPPO) decision-making when planning and prioritising surveillance is a combination of what is practical and possible - given resource constraints - and achieving a balance between the need to address a number of potentially extensive HO threats and the economic interest in those sectors the NPPO is called on to protect. For example, on the basis of the information provided by the MS, inspections in nurseries generally tend to be combined for HOs affecting ornamental plants. Also in many cases, where data availability allows this, the level of sampling and testing is undertaken on the basis of suspected cases only.

1.2 Estimate total annual costs for the MS and the EU of introducing mandatory surveillance at fixed surveillance levels (at 50% co-financing)

On the basis of the identified 'best practices' in terms of surveillance methodology, the total costs of introducing mandatory surveillance across the EU-27 at these levels, were estimated at **€23.4 million** per year for the 10 potential priority HOs. This includes visual inspections in production places and the environment (40% and 34% respectively of total costs), sampling and testing (24%), and awareness-raising campaigns (2%). On the basis of the results of the CPHR evaluation (FCEC, 2010), the current EU 27 expenditure on surveillance for the 10 HOs is estimated at €14 million (see also Task 1.3). Therefore, the **additional costs** of introducing compulsory surveillance at fixed levels would be **€9.4 million.** The additional costs **for the EU**, given that currently there is co-financing of these surveillance costs, are estimated at 50% of the global figure of €23.4 million, i.e. at **€11.7 million.**

HO	Visual inspections/ production places	Visual inspections/ environment	Sampling	Information campaigns	Total
Production places - nurseries	€ 9.3 million		€ 2.5 million	€ 81,000	**€ 11.8 million**
Forestry/open environment		€ 8.0 million	€ 1.9 million	€ 243,000	**€ 10.6 million**
Other production places			€ 1.2 million	€ 123,000	**€ 1.4 million**
Total (10 potential priority HOs)	**€ 9.3 million**	**€ 8.0 million**	**€ 5.6 million**	**€ 485,000**	**€ 23.4 million**
% of total	***40%***	***34%***	***24%***	***2%***	***100%***

(a) Estimates based on average EU fee rate
Source: FCEC calculations

1.3 Estimate total annual costs for the MS and the EU of introducing mandatory surveillance for the selected HOs without fixed surveillance levels (at 50% co-financing).

The underlying assumption under this option is that the EU would facilitate surveillance, but MS apply those levels of surveillance they consider appropriate. Under this assumption, the availability of EU funding could result in:

a. *'Status quo'*: MS continue at current levels of surveillance on the basis of their current priorities and budget availability. They therefore use EU funding to match the total funding they currently provide for surveillance. In this case the annual cost for the EU

[3] Defining 'best practices' on a scientific basis is an exercise beyond the scope of Task 1.

is estimated at ca. **€7 million** (at 50% co-financing); this is new expenditure since surveillance costs are not currently co-funded;

b. *'Dynamic scenario'*: this assumes that a higher budget would be available if there was EU co-financing at 50% as MS may decide to increase surveillance levels, to reach what they currently consider to be their needs (i.e. an increase of 20-50%), as indicated by MS by means of the MS survey In this case, the total annual cost for the EU and the MS is estimated at ca. **€8.4-€10.5 million** each (at 50% co-financing). For the EU, this is new expenditure since surveillance costs are not currently co-funded.

In summary, therefore, the costs and additional costs of the various options are as follows:

Scenario	Total (100 %)	EU (50%)
Current expenditure (FCEC, 2010)	*€14.0 million*	-
At fixed surveillance levels (Task 1.2)		
	€23.4 million	€11.7 million
Additional to current expenditure	**€9.4 million**	**€11.7 million**
Without fixed surveillance levels (Task 1.3)		
a. 'Status quo'	€14.0 million	€7.0 million
Additional to current expenditure	-	**€7.0 million**
b. 'Dynamic scenario'	€16.8– €21.0 million	€8.4 – €10.5 million
Additional to current expenditure	**€2.8– €7.0 million**	**€8.4 – €10.5 million**

Task 2: costs of introducing compulsory post-entry quarantine (PEQ) for a limited number of plants for planting

The objective of Task 2 has been to estimate the costs of introducing compulsory post-entry quarantine (PEQ)[4] for non European latent HOs which cannot be immediately detected by visual inspection or via appropriate laboratory testing within the timeframe of normal import procedures, but which pose a latent risk of infection. This option concerns a limited number of high risk ornamental plants for planting, in particular palm trees (risk of *Rhynchophorus ferrugineus*); and, trees of the *Acer* species and bonsai (all species), imported from East Asia (risk of a number of HOs including *Anoplophora chinensis).*

From our analysis and expert consultation (MS CAs, stakeholders, COM, TF3, and European and Mediterranean Plant Protection Organization (EPPO)) the following conclusions on the impact of this option can be drawn:

- The largest impact will be felt by Private Operators (POs) importers of the selected categories of plants;
- As PEQ facilities would be based on PO premises, there would be a need to build/upgrade current PO facilities, as these are currently considered largely inadequate, in terms of biosecurity. In other words there is a need to adjust to the requirements arising from the recently adopted ISPM34 – i.e. at least biosecurity level 2, and possibly also in terms of capacity (to allow all imports of the selected plant categories to be placed into PEQ);

[4] PEQ is different from post-entry inspections which are already possible today, after the consignment has been released for the internal market. Post-entry quarantine (PEQ) implies that the consignment is released for free movement only after an official quarantine period within which the consignment is held or planted under quarantine conditions and subject to official inspections and testing.

- In terms of costs for MS CAs, the administrative costs of setting up and implementing PEQ are to be fully recovered, through fees charged to POs for registration, regular inspections and sampling;
- The expected impact (in terms of administrative costs) for the European Commission is likely to be minimal, although there will be a need to: hold further consultations with MS and to steer the process of setting up and reviewing the system, e.g. in terms of the appropriate requirements for bio-security (implementation of ISPM34); and, to ensure that MS implement the PEQ requirements correctly.

The costs involved in building/upgrading and maintaining facilities to the appropriate biosecurity level (i.e. at least level 2) are estimated at ca. **€1,000/m^2** or **€300,000 - €1,000,000** in total for a standard 300 m^2-1,000 m^2 facility. In addition administrative costs (registration, regular inspections and sampling fees to be paid to MS CAs on the basis of full cost-recovery) are estimated at ca. €4,480 – €5,040 per facility during a PEQ period of 2 years (on the basis of an estimated 32-36 inspections).

The above costs are considered to be relatively high, particularly for businesses with a high turnover trading small plants and therefore a relatively high number of low unit value commodities. It is therefore expected that this measure would result in some rationalisation in this sector. Although, in terms of business disruption, the impact is expected to be zero to minimal after the first 2 years (i.e. when products are released from quarantine), it is nevertheless considered that PEQ may not be a viable economic option in those cases where the costs exceed plant value (e.g. small *Acer* species), as this would effectively mean that the costs would outweigh the value of the plants put into quarantine.

It is noted that third country (TC) trading partners, e.g. Australia and New Zealand also have PEQ obligations on imports of certain plants into their territory. The Australian model, for example foresees specifically dedicated and high bio-security level facilities run exclusively in PEQ stations appointed by the Australian Quarantine and Inspection Service (AQIS), and importers bear the full cost of the measures for the officially imposed minimum quarantine periods and at officially set fees.

Tasks 3 and 4: financial impact of applying the EU solidarity regime to co-finance direct costs and losses of POs; and to include natural spread

The objective of Task 3 was to analyse the financial impact of applying the EU solidarity regime to co-finance not only costs of MS CAs but also direct costs and losses of POs pursuant to official measures imposed.

3.1 To clarify the extent to which the rationale and structure of animal health financing is applicable, as a model, for establishing a similar structure for plant health to compensate for such costs

The study has found that the rationale and structure of the animal health (AH) financing could be applicable as a model for establishing a similar structure for plant health (PH) to compensate for direct PO costs and losses, but the model will need to be adjusted to the specificities of PH and the diversity of sectors affected, for which a more in-depth feasibility study would be recommended. The diversity of HOs and affected sectors covered by the PH regime makes it unlikely that it will be possible to find a model capable of addressing all scenarios and all sectors. To achieve this there is need for prioritisation, based on the significance and impact of plant pests at EU level and for the different sectors. It is further noted that the balance between public and private (commercial) interests needs to be fully taken into account in any model to be developed and in assessing the relative importance of individual HOs for different groups of beneficiaries, the purpose of compensation, and the relative weight of the public versus private good component of such compensation.

Regarding the <u>potential for cost-sharing</u>, a key principle of the ongoing cost and responsibility sharing schemes (CRSS) being developed in AH, is that direct costs should be partly covered by public resources (up to maximum ceilings), while for the compensation of non-covered direct losses and consequential losses, POs should assume primary responsibility through the development of private insurance schemes/mutual funds. PO liability - a key component in relation to Food Law - for helping mitigate risks through appropriate action is seen as an important element for future CRSS, as long as this does not result in a disproportionate administrative burden. The availability of support could be linked to compliance with statutory action, analogous to the “three tier approach”[5] which is being developed by the COM/MS for contingency planning/minimum mandatory action. In practice, for a very limited number of EU priority pests, pest-specific contingency plans should be developed, with strong involvement of stakeholders. Contingency plans could thus include both preventative measures taken by POs and PO response/cooperation in the event of an outbreak. In such cases the co-financing of the eradication measures by the EU should be very substantial given the high importance of the pests and the fact that the actions are mandatory.

Stakeholders’ views were found to be quite divergent and generally the need for public intervention with solidarity funding appears to correlate with the interests of the more fragmented sectors. In broad terms, the arable sector appeared to favour reliance on Common Agricultural Policy (CAP) support in relation to funding, arguing that the funding for plant health solidarity should not affect the overall funding for CAP, while the horticultural and forestry sectors were more interested in compensation.

3.2 *To estimate in global terms (order of magnitude) the direct costs of POs associated with the officially imposed measures that would be eligible for compensation.*

This analysis was carried out for a representative selection of HOs affecting the different sectors[6]. The FCEC estimates are summarised according to eligibility under three headings:

(i) <u>Already eligible direct costs and losses</u>: these are currently covered by solidarity i.e. costs of removal, destruction, disinfection, sampling and testing. These were estimated at the range of €19.3 - €44.8 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (i) are estimated at €32 million per year**;

(ii) <u>Currently non eligible direct costs and losses</u>: these are the costs not covered currently by solidarity i.e. loss of plant/production value for POs. These were estimated at

[5] 1. Detection of a new listed/non-listed pest in new areas (minimum mandatory action – no contingency plan);
2. Detection of a listed pest of EU importance (generic EU contingency plan);
3. Detection of a listed pest of priority EU importance (EU pest-specific contingency template with minimum mandatory actions and national contingency plans).

[6] *Diabrotica vv, Ralstonia solanacearum, Clavibacter michiganensis ssp. Sepedonicus, Bemisia tabaci, Erwinia amylovora,* Potato Spindle Tuber Viroid, *Bursaphelenchus xylophilus, Anoplophora chinensis, Anoplophora glapripennis, Rhynchophorus ferrugineus*

€6.7 - €13.4 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (ii) are estimated at €10 million per year**;

(iii) Currently non eligible indirect costs and losses: these are the costs that go beyond the scope of Task 3, i.e. consequential losses from movement bans for POs. These were estimated at €15.3 - €19.4 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (iii) are estimated at € 17.4 million per year**.

3.3 *To estimate the costs for the EU and MS CAs of expanding the solidarity regime to co-finance direct costs of POs, under two different scenarios: at current level of checks (scenario 1: static scenario); at increased level of checks (scenario 2: dynamic scenario)*

A priori, it is noted that the current legal basis in principle already provides the framework for compensation of certain costs/losses of POs when these are directly related to the implementation of officially imposed phytosanitary measures; this has however not yet been fully implemented. The impact on EU solidarity funding should therefore in principle be considered as neutral on this basis, as an increase in the required funding would relate to the full implementation of the current provisions. Nonetheless, in practice, full implementation of these provisions will carry an additional cost for the solidarity funding when compared to the current implementation.

Under the *static scenario*, on the assumption that all the MS where outbreaks occur introduce solidarity requests and all the dossiers submitted by MS are eligible[7], all direct costs and losses would be covered by the EU at 50%[8]. The additional EU expenditure required for funding under solidarity if direct losses are made eligible (heading (ii)), at 50% co-financing rate, would therefore amount to ca. **€5 million per year**. This expenditure would be **additional** to the estimated expenditure to cover the already eligible direct costs (heading (i): €16 million per year of EU co-financing at 50%).

The inclusion of direct costs and losses under solidarity funding may have an impact of the level and intensity of measures imposed on the POs, and therefore impact on the overall solidarity funding (*dynamic scenario*). Over the last five years, a total amount of **€29 million** was paid in 10 MS to compensate costs and losses of POs following outbreaks of HOs, i.e. an average **€5.9 million per year.** By extrapolating to the whole EU, this would result in potential compensation at EU level of some €11 million per year[9]. In the absence of any further evidence, it is **not possible to quantify** the impact of the introduction of the coverage of costs and losses of POs on the level of measures imposed on the POs and co-financed by MS and therefore by the solidarity regime. On a qualitative basis, the availability of compensation for direct PO costs and losses incurred by the officially imposed measures is likely to trigger the implementation of national compensation schemes the legal basis for which currently exists in MS, but which have not been so far activated, very likely to increase the implementation of officially imposed measures by POs, and mostly unlikely to increase the intensity of measures taken by national authorities.

[8] Compensation rate by MS is 100%.

[9] It includes all costs and losses. It is noted that this calculation does not take into account specificities in MS in terms of current cost sharing arrangements, and focus on particular HOs and sectors of national relevance, but it is simply based on the current French compensation model.

Task 4: *To estimate the impacts for the EU and the MS of expanding the Solidarity Regime so as to also cover prevention measures for natural spread.*

Only 7 MS (out of the 25 MS that responded to the FCEC survey) indicated they would submit a dossier for outbreaks caused by natural spread. The **total cost** of these dossiers, as indicated by MS (only 5 MS provided figures), would reach **at least €7.3 million per year**. On the basis of 50% co-financing, the **impact on the EU solidarity budget** would therefore be **at least €3.7 million per year**.

The figures provided by MS indicate that the increase in solidarity, although **not significant** in most cases, **would become substantial** in the case of inclusion of natural spread **for HOs affecting the environment**, as the case of *Rhynchophorus ferrugineus* indicates. This is due to the high eradication costs of these HOs, as shown in the analysis for Task 3, particularly if direct losses (heading ii) are also to be covered. It is also evident that the HOs with the highest potential for natural spread are also those with the most significant potential costs from the control measures taken in the case of outbreaks.

Task 5: economic impact of harmful organisms

The objective of Task 5 has been to estimate the potential economic impact arising from the spread of HOs, by focusing on specific HOs affecting a range of sectors (agriculture, horticulture, forestry, public/private green spaces).

The economic analysis undertaken primarily covers the actual or potential damage to the sector/s concerned (damage costs). The assessment of these is conducted drawing on the best available evidence from past outbreaks as existing studies and literature including pest risk assessments (MS, EU, EPPO Pest Risk Analyses) and cost benefit analysis (CBAs) of pest management. It is to be noted in this context that ultimately, the impact of an outbreak in terms of damage costs may extend to the entire value chain of the sector/s directly affected by the introduction, spread and establishment of the HO. This has potentially very significant indirect and knock on effects on employment, as well as on other dependent sectors and the wider economy.

The available evidence from past outbreaks and studies indicates that, if no action is taken, the introduction, spread and establishment in the EU of the HOs under review has the potential to cause multiple **billions of Euros worth of economic damage per year** across the EU to both those sectors directly affected and upstream/downstream sectors (including input suppliers, food processing and the wood working industries), as well as also potentially adversely affecting tourism, retail and other services, and ecosystem values and services.

The FCEC analysis and findings highlight the need to distinguish between the potential impacts of pests affecting the agricultural, horticultural and nursery sectors in terms of yield and quality losses, and the impacts of pests affecting forestry and private/public green spaces. For the latter, impacts are both more complex and long lasting in effect, while there are less possibilities and considerably higher costs involved in replacing destroyed or susceptible plants than is the case for agricultural crops. In addition to longer term commercial impacts arising from harvest losses, there are significant potential adverse impacts on biodiversity, amenity, landscape and other environmental values (including broader environmental objectives such as the reduction of CO_2 emissions), which are generally very difficult to monetarise. We particularly note that as these functions of forestry and private/public green spaces have yet to be fully identified or quantified, the complete value of ecosystem services is always likely to be underestimated (European Commission, 2008a). Moreover, since the global impacts of pests and diseases are both complex and impossible to capture in their entirety, the estimates provided must also be considered to under-represent the entirety of the impacts.

In the forestry sector, several of the HOs reviewed have the potential to cause severe damage to EU forests, in terms of economic and landscape value, as indicated by the FCEC estimates below. The range of losses depends on the underlying scenarios and assumptions, including the extent of the infestation, anticipated timber harvest and the extent of yield losses in the affected area, and producer prices in the various markets. For example, the results indicate that in the worst case scenario for a single pest the cost could reach somewhere in the range of €42.6-€89.2 billion (*Anoplophora*) or €39-€49.2 billion **(***Bursaphelenchus xylophilus)* in terms of the commercial value of the susceptible lost timber. Such losses could also have significant effects on employment: extrapolating on available evidence in the case of *Bursaphelenchus xylophilus*, some 11,040 jobs in the forestry and wood cutting sectors could be directly affected under the worst case scenario. Many more jobs would be at risk in the downstream sectors; the EU27 forestry and forest-based industries employ an estimated 2.4-3 million workers. Moreover, it would take at least 20-30 years for the lost forests to be replanted and mature to the point of generating new income from harvested timber.

	Estimated potential impact of key HOs affecting EU-27 forestry, in case of 'no action' (a)
***Bursaphelenchus xylophilus* (PWN)**	Threatened area: 10-13 million ha of coniferous forests (assumed 50-90% mortality rate); Productive forestry value loss: **€0.9-€1.7 billion** (scenario 1: PWN widespread in current area: PT) **to €39-€49.2 billion** (scenario 4: PWN widespread in EU27); Export value loss: €174 million (worst case scenario: TC ban on EU imports).
***Anoplophora* (ALB/CLB) (b)**	Threatened area: loss of 30% hardwood forest in the EU; Productive forestry value loss: **€19.6-€39.2 billion** (scenario 1: *Anoplophora* widespread in currently infested MS) **to €42.6-€85.2 billion** (scenario 2: *Anoplophora* widespread in EU27);
Phytophthora ramorum	Threatened area: loss of 20% hardwood forest in the EU high risk area (EU PRA); Productive forestry value loss: at least **€4.2-€9.1 billion**, plus threat to EU cork industry.
***Dendroctonus ponderosae* (MPB)**	Threatened area: not yet present in EU; if introduced, 100% of susceptible area in medium/ high risk regions (77% mortality rate), or 11.6 million ha coniferous (*Pinus sylvestris*) forest; Productive forestry value loss: **€31.8 - €45.5 billion**

(a) Impacts on the sectors directly affected by the indicated pests.
(b) *Anoplophora chinensis* (CLB) and *Anoplophora glabripennis* (ALB)

Source: FCEC estimates

The potential loss in value indicated above refers to harvested timber only, and excludes other forest landscape, recreational and environmental values which, as forestry data demonstrates, are much more significant. Based on estimates by UK Forest Research (2010) for specific UK tree species, the landscape/ recreational value and the biodiversity /carbon sequestration value of EU27 forests could roughly be valued at ca. **€56 billion (FCEC extrapolation)**. Other estimates (PRATIQUE) provide a landscape value of trees susceptible to *Anoplophora glabripennis* at €287.6/tree.

According to data reported by MS to Forest Europe, some **4.4 million ha of the EU27 forest area** (ca. 3% of the total forestry area) **is already damaged by insects and diseases**, which are the most significant damaging agents within EU forests and far more significant than the damage caused by wildlife and forest fires. The total area damaged by insects and diseases in the EU27 may affect the production of an estimated annual felling volume of 12.3 million m^3 of roundwood with an estimated value of €492 million. In addition, in the damaged area, such damage may affect the provision of non-wood goods (NWGs) (estimated value: €74 million) and of services (estimated value: €34 million). Taking these factors together therefore, the total loss of value from damage caused to date by insects and diseases may have already reached an estimated **annual loss of ca. €600 million in terms of income** generated from wood, NWGs and services provided by the affected forestry resource.

In the agricultural sector, the HOs under review can cause significant production and trade losses, as indicated by the FCEC estimates below (the range of losses depends on the underlying scenarios and assumptions, as noted for forestry pests):

	Estimated potential impact of key HOs affecting EU-27 agriculture, in case of 'no action' (a)
Maize	*Diabrotica virgifera virgifera:* Crop value loss: €472 million per year; up to € 6.1 billion over 25 years (FCEC, 2009); Export value (under threat): extra-EU exports of €336 million per year (2008-2010 average)
Potatoes	High risk from a range of HOs (b), for 3 of which EU Control Directives are in place: Crop value loss: yield losses can vary from 20%-80% depending on the HO; on this basis, PCN could cause losses of up to **€8 billion**, ring rot up to **€3 billion**, and brown rot up to **€4 billion**; Export value (under threat): extra-EU exports of €413 million per year (2008-2010 average)
Tomatoes	High risk from several HOs (c): Crop value loss: **€6.6 - €9 million** (scenario 1: PSTVd spreading in previously infested MS) to **€93-€127 million** (scenario 2: PSTVd spreading throughout the EU27); Export value loss: from *Tuta absoluta* outbreak (US and Canada restrictions on EU imports) estimated at ca. €11.5 million per year

(a) Impacts on the sectors directly affected by the indicated pests.
(b) Including *Clavibacter michiganensis spp. sepedonicus* (potato ring rot); *Globodera* (potato cyst nematodes - PCN); *Ralstonia solanacearum* (potato brown rot); Potato Spindle Tuber Viroid (PSTVd).
(c) Including Potato Spindle Tuber Viroid (PSTVd); Pepino Mosaic Virus (PepMV); *Tuta absoluta*

Source: FCEC estimates

Even at the level of direct impacts, it is difficult to put a monetary value on the production loss due to a plant pest, since a range of factors including pre-outbreak agricultural and forestry management practices and other preventive action will affect the extent of the damage likely to be caused by a specific pest, while the lost production value will depend on the prevailing market prices at the time the commodity concerned would have been produced and/or sold. Market prices are difficult to obtain in many cases (there is generally significant lack of data on prices, while in most sectors there is no 'EU price', making it complex to extrapolate at EU level). Furthermore, prices also fluctuate considerably depending on a range of factors, including in many cases the prevailing supply and demand in international markets. Such effects are compounded by the fact that outbreaks themselves may affect the level of market prices if they result in significant and drastic losses of production.

Other costs of 'no action', which have not been investigated here, include the impact that the spread and establishment of a HO could have on the functioning of the internal market if MS are forced to adopt measures which may affect the free circulation of goods within the EU.

By comparison, in the US, it is estimated that plants and plant pathogens cause annual damage of the order of $64.1 billion, of which $21 billion consist of crop losses caused by plant pathogens, $13.9 billion of crop losses caused by insects and mite pests, $4.2 billion consist of loss of forest products and $24 billion are estimated to be caused by crop weeds; of these figures, 40%-65% is due to introduced pests, pathogens and weeds (Pimentel et al., 2005). In the UK, a study carried out in 2010 estimated the total current annual cost of invasive non native pests to the British economy at approximately €1.9 billion.

The common conclusion that emerges from all available studies and the FCEC estimates is that, although the total annual costs (to both industry and government) of prevention and current (early response) measures may be significant, the potential benefits to be obtained by excluding the pest or containing/eradicating as early as possible are several times the order of magnitude of the cost of the measures taken.

Task 6: improving the coherence between the EU Plant Health Regime (CPHR) and the EU Seed and Plant Propagating Material Regime (S&PM)

The objective of Task 6 has been to address the coherence between the EU Plant Health Regime and the EU Seed and Plant Propagating Material (S&PM) *acquis.* The analysis undertaken was required to:

6.1 Determine the <u>appropriate positioning of HOs</u> in the CPHR and the S&PM regimes and estimate the economic impacts (costs and administrative burden for MS and EU authorities as well as for POs) of moving regulated HOs from one regime to the other according to the following three options:

- <u>Status quo (with cleaning up of double listing)</u>. Costs for cleaning the different legislative texts are considered as marginal. It consists of a desk review of the texts, a contact with NPPOs to secure that all HOs are considered and then cleaning-up of the texts;
- <u>All HOs to be moved from the S&PM regime to a separate Annex in the CPHR (but retaining their provisions and requirements).</u> Impacts of moving all HOs listed in the S&PM Regime to the CPHR are limited to impacts linked to the mandatory import control measures. However as the large majority of host species for the HOs to be considered for transfer are plants for planting which are already inspected at import, and as all plants for planting entering the EU are already controlled by at least a visual control of each consignment, the costs for import control will not increase. Costs would however increase significantly if laboratory testing would be a mandatory part of the inspection. For illustrative purposes, applying one laboratory test to each consignment of ornamental plants would cost €6.8 - €23.4 million for EU 27 MS;
- <u>All HOs pertinent to seed or plant propagating material to be moved from the CPHR to the S&PM regime</u>. As the S&PM regime shall apply "*without any prejudice to the Plant Health regime*", any S&PM certified material shall already comply with the provisions of Directive 2000/29/EC and therefore no cost impacts are anticipated. As certain species are not covered under the S&PM regime, some host crops (e.g. tobacco) and related HOs will be de-regulated under this option but with marginal impacts as these crops are not of high European economic value and pest diseases to be considered are not of high risks.

6.2 Assess the impacts of <u>merging the plant passport and certification schemes</u> and more particularly:

The analysis of the costs and benefits for MS CAs and for POs of merging the visual inspection based PPs of the CPHR with the sampling and laboratory testing based health certificates of the S&PM Regime. Currently none of the current CPHR and S&PM regimes are a barrier to the merger of field inspection services. For S&PM, field inspections can be done under official supervision and in the case of CPHR some operational tasks can be delegated to bodies other than the official NPPO. Costs can be reduced by asking the S&PM inspectors to control holdings in the context of the PP obligations. In case all inspections for PP were carried out by S&PM inspectors, total yearly savings can be estimated at less than €1 million per year. The total benefit of moving from a non-integrated approach to a coordinated joint inspection would lead to a cost reduction of about €1.5 Million but as several MS have already implemented this approach the total benefit would be less.

- The analysis of the economic impacts for POs and for CAs (CPHR and S&PM) of upgrading the PP requirements for propagating material to the level of the S&PM regime. We consider that upgrading PP requirements to the level of the S&PM regime requirements does not lead to any impact as there is no additional requirements to be implemented as they already exist. Inconsistency exists only in the legislative texts from which they have to be removed.
- The analysis of the economic impacts of merging the new PP document (logo) and the certificate document. Adding a logo on these labels will have a nearly zero cost as the only thing to be done would be to add this logo on the label format.

6.3 Determine the role of the private sector in the CPHR regime and delegation of tasks.

The different evaluations and other studies that have been performed during the last three years in the areas of S&PM and PH have all highlighted the demand by a majority of stakeholders and CAs of delegation of tasks that should be understood in two different ways:

- Delegation of tasks from the official NPPO to other official bodies (as already implemented in some MS for PP controls carried out by certification bodies);
- Delegation of tasks directly to POs (e.g. certification under official supervision in S&PM).

Conclusions of this analysis show a low level of consensus regarding this possibility of delegating tasks.

MS CAs in favour of delegation of tasks (i.e. FR) have highlighted that further delegation would help to align to the approach of the Regulation 882/2004/EC which is based on results to be obtained and not on how it should be done (current logic of the CPHR regime). In that context any tasks related to the monitoring of compliance of businesses with CPHR obligations may be delegated e.g. inspections, sampling and analysis etc. However, delegation of responsibility for taking action where infringements are found is prohibited. The COM retains the possibility to restrict further the types of tasks that may be delegated.

Apart from using private laboratories in the context of CPHR, stakeholders and CAs consider that any other controls, and especially visual controls, related to general surveillance and implementation of control and emergency measures should remain an official task that should not be delegated.

Task 7: impact of options on possible modifications to the existing plant passport system

The objective of Task 7 has been to evaluate the impact of six different options concerning possible modifications to the existing PP system:

7.1 Obligation to have PP accompanying the smallest unit in trade in the business to business (B2B) chain
In principle there is no impact, since such an obligation is already in place, through the issuance of replacement PPs, as foreseen under the present regulation, especially in the case that a large passported consignment is split in several smaller ones.

7.2 Obligation to have PP accompanying the smallest unit in trade in the business to consumer (B2C) chain, meaning that all plant material (for which at present a passport is needed), sold in nurseries and garden centres to a final consumer, would have to be passported
With the exception of individually sold bulbs, all other plant material (seeds, seedlings, ornamental plants, etc.) already carry some type of tag or label; adding information to these can be done either by the garden centres or by their furnishers, at a negligible extra cost. Note that final buyers who need large quantities of a given species will not buy from garden centres (B2C) but from nurseries (B2B), and thus already receive a PP if this is required for the species.

7.3 Dropping the existing distinction between sales (of passported plant material) inside or outside a protected zone (PZ)
Although such a distinction is foreseen under the present regulation (with sales outside a PZ not needing a PP), business practice today is already such that POs do not distinguish, and thus issue PP for all their consignments of species needing a PZ passport, even those not sold inside a PZ; this is also an indication that the cost of issuing plant PPs in cases where this is strictly spoken not compulsory, is not an issue.

7.4 All plant material (traded in the B2B chain) should carry a passport (this option does not extend to the B2C chain)
The implementation of this option would lead to an increase in the number of passports, the gross unit cost of which can be estimated at below 10 eurocent per consignment (the average value of a consignment in the B2B chain is not known, but is probably at least €100, so the increase is less than 1 ‰); the net unit cost can be still lower, if the "passport" information can be added to already existing documents such as invoices or transportation document (as is usual business practice, with the consent of the CAs).

Note that in that case, all operators will have to be authorised to issue PPs; such authorisations do not lead to an extra cost in the large majority of the MS, the necessary inspections being combined with normal phytosanitary inspections.

7.5 The existing formats, which cover a wide variety, should be harmonised, while keeping the existing data fields
This option would obviously have no impact for POs who fill in the PP by hand. For POs using a computer system, the impacts will be limited to minor modifications to the existing software packages (adapting the layout of documents to be printed); note that most operators

use a package developed by specialised software companies, and that consequently the cost of its modification can be split over a large number of users (and will probably be considered to be part of the normal updating/upgrading that is included in the licence, and so will not be invoiced separately by these software companies to their users).

7.6 The existing formats should not only be harmonised but also simplified, so that they could take the form of a label.
The impact would be the same as for 7.5: none for POs who still fill in the passports by hand; a limited impact (modification of software packages) for the ones who use a computer system, since the cost can be split over many users of such packages.

Task 8: costs and benefits of introducing mandatory surveillance targets and mandatory de-listing procedures for infested protected zones

The objective of Task 8 was to analyse the costs and benefits of introducing mandatory surveillance targets and mandatory de-listing procedures for infested PZs, by focusing on specific examples of PZs[10]. The selected PZs provided a balanced representation of the various types of HOs and the different situations in MS with regard to the implementation of measures for the maintenance of PZ status, and of the challenges, added value and the costs for MS to maintain PZs in place.

8.1 Identify best practices of surveillance targets for each HO for the selected PZs
The improvement of surveillance targets within the PZs was recommended by the CPHR evaluation (FCEC, 2010) as one of the options for improving the current system of PZs and reinforcing their credibility, as the concerns with the current system of PZs stem from implementation issues. The ongoing work of a dedicated DG SANCO/MS TF also highlighted the need to introduce at EU level minimum levels of surveillance within PZs in order to provide a degree of harmonisation in the approach followed across the EU. For this Task, appropriate surveillance levels were identified on a case by case basis, to the extent this was possible, and applied to the selected case studies (PZ/HO).

8.2 (a) Estimate the costs of introducing mandatory surveillance at identified surveillance level versus benefits

<u>Costs:</u> The current costs of surveillance in PZs are generally lower than in the case of Buffer Zones (BZs) established within infested non-PZs. This is due to the fact that in PZs, in the absence of infestation, intensified surveillance levels are not generally applied. In the case of host plants and sectors with high economic value for the MS, the costs of surveillance in BZs could be from 2.5 to up to 10 times higher, as the number of controls needed to guarantee the same level of protection would need to be increased substantially. If current surveillance levels are considered insufficient to justify/ensure freedom from the HO, these would need to be raised and this would result in a higher cost. If mandatory surveillance targets are introduced at the level of 'best practice' (as defined for the purposes of Task 8 and indicated Task 8.1 results), the cost of surveillance is increased, as these levels generally result in higher inspection and/or sampling intensity. This increase may concern the level of visual inspections, with an intensity increase of 100% (e.g. *Erwinia amylovora*) in certain cases, and/or the level of sampling, with 10% additional sampling applied (e.g. *Globodera pallida*)

[10] *Erwinia amylovora* – IT, LV; *Bemisia tabaci* (European populations) – UK, FI; *Ips amitinus* – IE, EL; *Cryphonectria parasitica* – CZ, SE; *Globodera pallida* – SK.

or even higher increases, in the range of 100% or more (e.g. from symptomatic cases only to established levels of sample/ha in the case of *Erwinia amylovora*).
Benefits: Evidence of the benefit of PZs is generally scarce; in most cases, there are currently no CBAs to support already established PZs (with the notable exception of *Bemisia tabaci*). In this regard, it needs to be considered whether carrying out a CBA should become a formal requirement in future for the establishment of PZs. In those cases where economic benefits could be estimated (i.e. *Bemisia tabaci*, *Erwinia amylovora*, and *Globodera pallida*, and in general for HOs affecting plants with a commercial value), it can be concluded that such benefits clearly outweigh the costs of surveillance even if this is carried out at an increased level. Thus, for example where the economic sector is highly important at national level, e.g. apple and pear production in IT, where the sector generates some €1.1 billion in terms of annual production value, the value of production in those regions where the bulk of production is concentrated will amount to several hundred million Euros. In other words potential production losses are very substantial indeed compared to surveillance costs at increased levels amounting to hundreds of thousands of Euros. The same holds true in the case of the potato sector in SK, where the costs of the order of thousands of Euros of increased surveillance are far outweighed by the benefits of the protection of a sector with a value of €34 million.

Results of costs and benefits for the PZs selected for the purpose of this exercise are presented in the table below:

<table>
<tr><th>HO for which PZ is in place</th><th colspan="2">Surveillance costs at ‘best practice’ levels (a)</th><th>Benefits (value of protected sector)</th></tr>
<tr><td>Globodera pallida</td><td colspan="2">SK: € 41,000</td><td>SK: €33.8 million</td></tr>
<tr><td>Erwinia amylovora</td><td>PZ:
IT (two regions): €54,800

IT (est.): €4.2 million
LV: €85,900</td><td>BZ:
IT (two regions):
€ 264,960</td><td>IT (two regions): €180 million

IT: €1.1 billion

LV: €3.2 million</td></tr>
<tr><td>Bemisia tabaci</td><td colspan="2">FI: €331,700</td><td>€48.9 million (tomatoes only)
Cost - benefit ratio estimated at 0.93-1.99 over 30 years (at current levels of surveillance)</td></tr>
<tr><td>Ips aminitus</td><td colspan="2">SE: €4,200
CZ: €19,000 - €33,400</td><td>Environmental value (non quantifiable)</td></tr>
<tr><td rowspan="2">Cryphonectria parasitica</td><td colspan="2" rowspan="2">EL: €55,010

IE :€ 5,800</td><td>Economic value:
Export value of coniferous round and sawn wood
EL: €1.5 million
IE: €62.6 million</td></tr>
<tr><td>Environmental value
(non quantifiable)</td></tr>
</table>

. (a) ‘Best practices’ defined in accordance with methodology followed in the study (Task 8.1).

(b) Recommendation on the appropriate sharing of the costs of mandatory surveillance between MS CAs and POs

The analysis highlighted several cases where the costs of mandatory surveillance do not currently appear to be appropriately shared between MS CAs and POs. In particular, although mandatory fees are foreseen by the EU plant health regime for the cost recovery of the inspections and sampling/testing carried out by the MS CAs in the PZs, in several cases this provision is not being implemented and fees are only partly collected or not collected at all. This issue was also identified in the evaluation of the CPHR (FCEC, 2010). There is therefore a need to reinforce the implementation of these provisions.

8.3 Estimate the economic impact of mandatory de-listing of the selected PZs (a) immediately, or (b) after two years

Eradication efforts are pursued in PZs for as long as it is economically, as well as technically, justified. During the eradication period (i.e. up to 2 years according to EU legislation) POs benefit from the continued status of a PZ, but also bear the higher costs of intensified inspections and eradication. The balance between these costs and benefits will determine the degree to which MS pursue their efforts to eradicate in order to maintain PZ status.

(a) In case of immediate revoking of PZ status, it is no longer possible to protect the area while engaging in an intensive eradication effort. Free trade immediately occurs, thereby potentially placing the area at higher risk and possibly reducing the potential to eradicate while increasing the cost of eradication. It can also be expected that surveillance will have to be intensified in this case, as the requirements on imported material can no longer be imposed. Therefore the impact is in all cases the immediate loss of the benefits from the protection that a PZ offers (as described above). On the other hand, there could be immediate benefits for non-PZ MS which today may have to maintain costly (i.e. intensified) inspection and eradication systems to export to the PZ, if these requirements no longer need to exist;

(b) Delisting after 2 years offers certain advantages to an infested PZ under eradication, compared to immediate delisting in that: a) it allows the time that is technically considered necessary for the eradication programme to achieve its objectives; and, b) where the PZ faces difficulty in achieving the objectives of the eradication programme, it allows the possibility of a smooth transition of that PZ towards alternative measures for maintaining some protection of non-infested territories within the PZ, via the establishment of BZs.

Task 9: costs of including in the *EU plant health regime* five Invasive Alien Species (IAS) plants

The objective of Task 9 has been to estimate in global terms, the costs for the EU of including in the EU plant health regime five IAS plants (weeds)[11]. All of the selected IAS plants have a high probability of entry, establishment and spread in the EU27 and very significant potential impacts, as documented in the main literature[12].

By definition, the inclusion of any new HOs in the EU plant health regime will entail some costs for the EU and MS associated to the obligation to adopt management measures for their prevention, and in the event of introduction, for their control and eradication. While the

[11] *Polygonum perfoliatum, Pueraria lobata, Hydrocotyle ranunculoides, Eichhornia crassipes* and *Ambrosia artemisiifolia.* The aim of this particular selection has been to cover the following key criteria: geographic impact and distribution of IAS plants across the EU27 (north/south; east/west); presence and distribution of the plants within EU, i.e. absent/locally present/established in some MS; range of plants' habitats (land/water); affected sectors (agriculture/environment).

[12] Including, EPPO PRAs (available for *Polygonum perfoliatum, Pueraria lobata, Hydrocotyle ranunculoides* and *Eichhornia crassipes*) and, in the case of *Ambrosia artemisiifolia*, EUPHRESCO.

general assumption has been that the IAS plants under review would be dealt with in the same way as currently regulated HOs (i.e. under Council Directive 2000/29/EC), ultimately the costs would depend on the specific measures to be followed. Such measures include control at import, surveillance, eradication and containment, as well as, where relevant, movement within the EU (PP system). The identification of the measures that would be most suitable for each of the examined IAS is an exercise beyond the scope of the study. Thus, in order to estimate costs, the FCEC has developed hypotheses on the measures that might be appropriate in each case, based on the information currently available in the reviewed literature and by means of expert consultation. It is also noted that, *a priori*, it is not clear at present whether any of the reviewed IAS would fulfil the eligibility criteria for co-financing under the EU solidarity budget[13].

From this analysis and extrapolations of each of the selected IAS plants, the following key conclusions can be drawn.

For four of the selected IAS plants[14], the main pathway appears to be intentional introduction through imports of ornamental plants. Consequently, EPPO recommends the prohibition of imports, sale, movement and planting (of *Pueraria lobata*, *Hydrocotyle ranunculoides; Eichhornia crassipes*) or controlled imports only (*Polygonum perfoliatum*). The implementation of the **EPPO recommendations on imports** would appear the simplest and most cost-effective control option that would be available under Directive 2000/29/EC; nonetheless, taking account of WTO-SPS obligations, similar restrictions would also apply to intra-EU movements and the obligation to eradicate and contain outbreaks.

The absolute scale, as well as relative share, of the costs of prevention, control and management measures that could be pursued under Directive 2000/29/EC, will depend on the **current status and distribution** of each of the selected IAS plants. A distinction can be made between two groups:

1. For IAS plants absent (*Polygonum perfoliatum*) or largely absent (*Pueraria lobata*, *Eichhornia crassipes*) from the EU27, the potential costs will be mainly in terms of preventive action, including import controls and surveillance. These costs are generally expected to be significantly lower in order of magnitude than for the second group, as long as no new outbreaks of these IAS plants occur. On this basis, for these plants, the additional cost of **general (preventive) surveillance** is expected to be **relatively moderate**. This cost might become **more significant if specific intensive surveillance** in the context of control and eradication plans is to be required, indeed very significant the more infestations become widespread and the scale of the surveillance expands, but cannot be estimated with the information available. As an indication, the cost for more specific intensive surveillance of *Pueraria lobata* in forestry in the affected and high risk areas could be up to the estimated costs for the surveillance of *Bursaphelenchus xylophilus* in forestry (**€656,000**).

   The potential **control and eradication costs** for these pests in the event of pest introduction could be **significant**, as has been seen in the case of the control and

[13] This is particularly questionable for *Ambrosia artemisiifolia*, for which 'natural' (i.e. not man-assisted) spread is a significant risk factor; it could also be questioned for the other IAS as, by definition, all IAS plants owe their invasiveness to their intrinsic ability for natural spread.
[14] In particular, those currently absent (*Polygonum perfoliatum*) or largely absent from the EU (*Pueraria lobata*, *Eichhornia crassipes*), as well as for the more widely present *Hydrocotyle ranunculoides*.

eradication costs for *Eichhornia crassipes*, i.e. ca. **€3 million** per year (according to documented cases in ES and the US; average annual expenditure over 3 years in ES and 10 years in the US). **At EU level**, therefore, the **total cost is expected to be lower for this first group** of pests (compared to the second group), as long as they are absent or largely absent from the EU[15].

2. For IAS plants that are already <u>widely present/distributed</u> in the EU (*Ambrosia artemisiifolia*, *Hydrocotyle ranunculoides*), the total potential costs are likely to be **significantly higher** in order of magnitude than for the first group.

   In this case, the available evidence suggests that the **cost of surveillance** could be **very significant**, as this would certainly be required within control and eradication programmes. The cost could therefore approach the order of magnitude of HOs affecting the open environment, estimated under Task 1 at ca. **€1.5 - €3 million** per pest per year[16].

   Furthermore, the potential **control and eradication costs** for these pests could be **very significant**. As an indication, the control and eradication costs in the case of *Hydrocolyte ranunculoides* have been ranging from ca. **€1 - €2 million** per MS per year (according to documented cases in BE, NL and the UK). Given the currently already widespread distribution of these IAS plants, this implies that **at EU level**, individual IAS plants may require **€10 - €30 million** per year for eradication and containment. **At EU level, therefore, the total cost is expected to be higher for this second group of pests** (compared to the first group)[17].

In conclusion, the introduction of mandatory requirements for the prevention and control of IAS plants within the EU plant health legislation may result in an increase in management costs across the EU as a whole. **With the exception of *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides*,** the **total cost** for the other selected IAS plants is expected to be **<u>relatively moderate</u>**, **under the following two conditions**:

i. This global assessment is made on the basis of the **current known level of presence and distribution** within the EU27 of these IAS plants. If the presence and distribution proves to be different than what is currently known from the available literature or any of these IAS plants becomes established and spreads, this would immediately affect the level of surveillance and control and eradication costs that might be incurred;
ii. **EU-wide prohibitions of import/trade/planting of ornamental plants and/or susceptible material** are introduced, in accordance with EPPO guidelines and recommendations, as this is assessed to be the main pathway for the introduction and/or further distribution of *Pueraria lobata*, *Hydrocotyle ranunculoides*, *Eichhornia crassipes* and *Polygonum perfoliatum* in the EU27.

[15] As indicated above, it is also noted that not all of this cost is expected to be eligible for solidarity compensation under current rules, for example the current restrictions for outbreaks due to natural spread.
[16] This order of magnitude corresponds to earlier estimates provided under the CPHR evaluation on the basis of data submitted by MS CAs, which had estimated that for the 10 HOs covered by emergency measures annual surveillance costs amounted at ca. €18.6 million i.e. on average ca. €1.86 million per HO.
[17] Again, it is also noted that not all of this cost is expected to be eligible for solidarity compensation under current rules, for example in the context of the current restrictions for outbreaks due to natural spread.

In this sense, the estimates made here reflect the impact of known pest risk and action taken to avoid introduction or further spread, rather than hazard analysis which is effectively the worst case impact. However, if in future the above conditions change, and these **IAS plants become** more **widespread**, as for example *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides* below, then the surveillance and control/eradication costs likely to require funding under Directive 2000/29/EC could become **very significant**.

The case of ***Ambrosia artemisiifolia***, and to a certain extent also that of ***Hydrocotyle ranunculoides***, sets these apart from the other IAS plants examined here. Due to the wide distribution of these plants throughout the EU, the introduction of mandatory requirements for the control of these IAS plants under Directive 2000/29/EC could result in a **very significant impact** on the plant health budget. In any case, given their widespread distribution and the fact that natural spread is an important factor in their distribution, it is not clear at present which of the current measures available under the Directive would be applicable for the management of these IAS plants. It is therefore impossible with the information available to date to make a meaningful estimate of the global cost of including these IAS plants in the future EU PH regime[18]. For *Ambrosia artemisiifolia*, at present, prevention (through early detection and eradication) of new populations is considered the best measure for halting further spread, while full eradication is currently largely considered impossible[19].

[18] The likely impact of the various management options for the control of *Ambrosia artemisiifolia* is expected to become clearer after the completion of a study recently launched by DG ENV which aims to assess the epidemiology, effects and control costs of this pest in the EU27.
[19] Guidelines for management of common ragweed, *Ambrosia artemisiifolia* - Results of the EUPHRESCO project Strategies for Ambrosia control 2008-2009. See also EPPO datasheet and PL PRA 2001.

1. Introduction

1.1. Objectives of the study

DG SANCO has launched this study to support the development of the impact assessment (IA) accompanying the legislative proposal of the European Commission (COM) on the future EU plant health regime (EU PH regime). This study is intended to supplement the evaluation of the CPHR (Common Plant Health Regime), which was carried out in 2009-2010, by providing a quantification of the costs and benefits of several potential amendments to the EU PH regime. These potential amendments are based on the conclusions and recommendations of the CPHR evaluation, which was carried out by the Food Chain Evaluation Consortium (FCEC).

The purpose of the study is to provide supplementary economic data on impacts which form part of the analytical and descriptive inputs necessary for DG SANCO to complete its IA and to fill existing knowledge gaps.

Before proceeding to the presentation of results, it is worth summarising some of the key elements on which the FCEC methodology is based:

- The aim of the study is not to define the policy options as such, but **to guide, with the impact analysis provided, the COM and consultation process** in their selection of the most appropriate policy options;
- The study has followed a **highly targeted analytical approach**, with a specific methodology developed for each of the 9 Tasks;
- To allow more in-depth analysis, each Task (with the exception of Tasks 6 and 7) has focused on a **representative selection of harmful organisms (HOs) of high impact for the range of sectors** potentially affected;
- The objective of the study has been to provide **an assessment of economic impacts** in quantitative and qualitative terms, which will in turn provide the required inputs to the policy making process as such. To achieve this, under each Task, we have based the analysis on a **range of scenarios and assumptions that serve as the working hypothesis** for deriving the quantitative and qualitative estimates required by the study. The development of these working hypotheses is based on consultation with the relevant organisations (including DG SANCO; inputs received at the inception phase from other COM services including DG Budget, DG Trade and DG Environment; selected Member States (MS) Competent Authorities (CAs) and stakeholders) and the Task Forces (TFs) 1-4 specifically set up to support the COM in the review of the PH regime;
- In order to identify further data and information sources, beyond those used during the CPHR evaluation, we have **tailored the selection of tools used to the data collection needs of each Task**. In most cases, a complementary range of data collection tools has been used to ensure that all relevant data are collected for the purposes of the study.

As agreed during the Inception meeting, the FCEC methodology and approach would be **simplified where possible for each Task**, in view of the number and complexity of Tasks, in order to make effective use of the relatively tight timeframe and resources available for this assignment.

1.2. HO/sector coverage

The selection of HOs is summarised in **Table 1** for all relevant Tasks (i.e. except Tasks 6 and 7 for which an HO selection was not relevant). **Table 2** presents the selection of HOs across Tasks, thus indicating the synergies between Tasks in terms of the analysis and estimation of impacts.

The study has been targeted to specific HOs of high impact covering the range of sectors potentially affected. Depending on the HO, the range of potentially affected sectors, as illustrated in the table, can include the commercial private sector (i.e. the seed industry; farmers / growers in agriculture, horticulture, forestry; traders of plants and plant products; logistic / transport companies transporting plants or plant products or using wood packaging material to transport other products; the wood packaging industry), private as well as public landscape managers, citizens, environmental NGOs, competent MS PH and forestry authorities and third countries (TC). Impacts for the COM were also investigated.

Table 1: Selection of HOs on which to focus the analysis under each Task, and affected sectors

Task*	Objective	Focus of the analysis (HOs)		
		Criteria for selection:	**HOs *:**	**Affected host plants/sectors ****
Task 1	Estimate costs of introducing mandatory intra-EU surveillance for priority HOs and costs of EU-financing of such surveillance, based on best practices among MS and known surveillance levels for other important HOs, including potato pests under Control Directives (brown rot, potato ring rot and potato cyst nematodes)	- Selection of 10 HOs provided by the ToR (Annex 5).	1. *Anoplophora chinensis* 2. *Bursaphelenchus xylophilus* (PWN) 3. *Erwinia amylovora* 4. *Guignardia citricarpa* 5. *Phytophthora ramorum* 6. Potato Spindle Tuber Viroid 7. *Rhynchophorus ferrugineus* 8. *Synchytrium endobioticum* 9. *Thrips palmi* 10. *Xanthomonas axonopodis pv. citri*	1. Several plant species including apple and pear trees; 2. Forestry (pine wood); WPM; 3. Fruit trees; ornamental/amenity plants; 4. Citrus trees; 5. Woodlands and garden plants; 6. Potatoes; tomatoes; 7. Palm trees; 8. Potatoes; 9. Ornamentals and vegetable crops (*Solanaceae*, *Cucurbitaceae*); 10. Citrus trees
Task 2	Estimate the costs of introducing post-entry quarantine in the import regime	- Representative selection of 10 cases of regulated HOs/plants/origin.	Host plant approach followed – relevant HOs: 1. *Rhynchophorus ferrugineus* 2. Several HOs including *Anoplophora chinensis* 3. Several HOs including *Anoplophora chinensis*	Selected host plants: 1. Palm trees 2. Bonsai plants (several species) 3. *Acer* species trees
Task 3	Estimate the financial impact of expanding the solidarity regime to co-finance losses of private operators (in addition to current co-financing of costs of MS CAs)	- High impact HOs; - Representative for all affected sectors (agriculture, horticulture, seed industry, forestry, wood industry); - Ensure link with Task 4.	• *Diabrotica vv;* potato diseases*;* • *Bemisia tabaci; Erwinia amylovora;*Potato Spindle Tuber Viroid*;* • *Bursaphelenchus xylophilus*; *Anoplophora chinensis* and *Anoplophora glapripennis; Rhynchophorus ferrugineus*	• Agriculture*;* • Horticulture*;* • Ornamental plants; • Forestry/public green*;* • Wood / WPM industry
Task 4	Estimate the financial impact of expanding the solidarity regime to also include natural spread of plant pest	- HO for which co-financing was not accepted in the past; - Predictions on high risk/high impact future outbreaks; - Ensure link with Task 3.	1. *Anoplophora chinensis* 2. *Anoplophora glabripennis* 3. *Bursaphelenchus xylophilus* (PWN) 4. *Diabrotica virgifera virgifera* 5. *Gibberella circinata* 6. *Phytophthora ramorum*	1. Several plant species including apple and pear fruit trees; 2. Trees in urban areas (poplar willow, elm and maple trees); 3. Forestry (pine wood); WPM 4. Maize;

			7. *Rhynchophorus ferrugineus*	5. *Pinus* spp.; 6. Woodlands and garden plants; 7. Palm trees
Task 5	Estimate costs and benefits of CPHR (i.e. controls costs vs. damage costs)	- High impact HOs - Representative for all affected sectors (agriculture, horticulture, forestry/ landscape, and natural ecosystems/biodiversity); - Representative of main types of HOs (insects, nematodes, fungi, bacteria, viruses)	*1. Anoplophora chinensis* *2. Anoplophora glabripennis* *3. Bursaphelenchus xylophilus (*PWN*)* *4. Dendroctonus ponderosae* *5. Diabrotica virgifera virgifera* *6. Rhynchophorus ferrugineus* *7. Phytophthora ramorum* *8. Ralstonia solanacearum* *9. Clavibacter michiganense* ssp. *sepedonicus* 10. *Globodera* spp. 11. Potato Spindle Tuber Viroid 12. Pepino Mosaic Virus *13. Thrips palmi*	1. Several plant species including apple and pear fruit trees; 2. Trees in urban areas (poplar willow, elm and maple trees); 3. Forestry (pine wood); WPM 4. Forestry (pine trees); 5. Maize; 6. Palm trees; 7. Woodlands and garden plants; 8-11: Potatoes 11-13: Tomatoes
Task 8	Estimate the costs and benefits of amendments to the protected zones system	DG SANCO selection – see Task 8 description	*1. Bemisia tabaci (*European populations*)* – UK, Finland *2. Ips amitinus* – Ireland, Greece 3. *Cryphonectria parasitica* – Czech Republic, Sweden *4. Erwinia amylovora* – Italy, Latvia *5. Globodera pallida* - Slovakia	1. Vegetables & ornamental plants; 2. Forest trees; 3. Forestry (chestnut trees); 4. Fruit trees; ornamental/amenity plants; 5. Potatoes
Task 9	Estimate the costs of introducing specific categories of IAS plants in the scope of the CPHR	- Representative selection of 5 cases of IAS plant species.	*1. Polygonum perfoliatum* *2. Pueraria lobata* *3. Eichhornia crassipes* *4. Ambrosia artemisiifolia* *5. Hydrocotyle ranunculoides*	1. Land plant; economic and environmental impact 2. Land plant; economic and environmental impact 3. Water plant; economic and environmental impact 4. Land plant; economic and human health impact 5. Water plant; environmental impact and non-plant-health economic impact

* For Tasks 6 and 7, HOs and sectors covered are discussed in the detailed description of these Tasks
** Lists only sectors directly affected (primary sector/production linked to host plants).

Table 2: Coverage of HOs across Tasks

Harmful Organism	Funded under Solidarity	Task 1	Task 2	Task 3	Task 4	Task 5	Task 8	Task 9
Ambrosia artemisiifolia								√
Anoplophora chinensis	√	√	√	√	√	√		
Anoplophora glabripennis	√			√	√	√		
Bemisia tabaci	√			√			√	
Bursaphelenchus xylophilus	√	√		√	√	√		
Clavibacter michiganensis ssp. sepedonicus	√			√		√		
Cryphonectria parasitica							√	
Dendroctonus ponderosae						√		
Diabrotica virgifera	√			√	√	√		
Erwinia amylovora	√	√		√			√	
Eichhornia crassipes								√
Globodera pallida & G. rostochiensis				√		√	√ (*G. pallida*)	
Gibberella circinata					√			
Guignardia citricarpa		√						
Hydrocotyle ranunculoides								√
Ips aminitus							√	
Pepino Mosaic Virus						√		
Phytophthora ramorum		√		√	√	√		
Polygonum perfoliatum								√
Potato Spindle Tuber Viroid	√	√		√		√		
Pueraria lobata								√
Ralstonia solanacearum	√			√		√		
Rhynchophorus ferrugineus	√	√	√	√	√	√		
Synchytrium endobioticum		√						
Thrips palmi		√				√		
Xanthomonas axonopodis pv. citri	√	√				√		

1.3. Overall methodology

Our methodology has involved: an extensive literature review including MS solidarity dossiers, relevant Pest Risk Analysis (PRAs) and other studies such as on the Cost Benefit Analysis (CBAs) of various policy measures targeting plant pests around the world; extensive consultation and data collection from stakeholders, including those participating in the Advisory Group on the Food Chain, Animal and Plant Health; data collection through a survey targeting the EU27 MS CAs and extensive follow-up and specific interviews with MS CAs; extensive consultation with the relevant COM services and TFs; and, the development of baseline scenarios and assumptions for extrapolation to the cost calculations and economic impacts as presented in this Report.

The FCEC methodology has aimed to respond to the **considerable challenges** of the study, notably to build realistic scenarios and assumptions for the very extensive range of HOs and sectors affected by the EU PH regime, and the difficulty of compiling and using data from a very diverse range of sources (and in many cases trying to fill data gaps). A central challenge has been that, while this is an economic study, to be well founded and evidence based it has had to be built on a technical analysis far beyond the scope of this exercise.

In carrying out the complex analysis required by this study, the aim of the FCEC has been to establish a **transparent calculation framework**. In presenting our findings and results, we therefore outline the assumptions and scenarios on which the calculations are based, as well as the baseline facts and figures, and sources, from which the assumptions and scenarios have been derived.

The FCEC has applied **sensitivity analysis** to the estimations carried out by this study, through the following measures:

- In each and every case, the data used come from a combination of sources and are cross checked and calibrated to ensure consistency. Our sources have included the data provided in the range of MS solidarity dossiers approved over the reference period for the various HOs, data from the surveys and interviews undertaken for the study, data from existing literature and desk research (e.g. PRAs, CBAs, academic publications and research articles from the EU and TCs etc), MS reports, Food and Veterinary Office (FVO) and European and Mediterranean Plant Protection Organisation (EPPO) reports, and other COM and MS documents available through CIRCA[20];
- The range of scenarios and assumptions used as the basis for the calculations are working hypotheses developed on the basis of the available evidence and in consultation with the COM, the TFs for the IA, relevant MS CAs and stakeholders;
- In most cases, a range of values have been assigned to the parameters used in the calculations, to reflect the potential differences in epidemiological situations, risk factors (i.e. exposure to risk), and cost structures that prevail between MS;
- Parameters, particularly those subject to greater uncertainly, have been adjusted where the final calculations appear to be highly dependent on the values initially assigned, and appropriate notes have been provided to underline any such issues where they exist.

[20] Communication & Information Resource Centre Administrator

Further detail on the FCEC methodology, as applied specifically to each Task, is described in the Report on each Task in the following sections.

2. Analysis of the costs of introduction of mandatory intra-EU surveillance for priority harmful organisms and costs of EU-financing of such surveillance (Task 1)

2.1. Executive summary

The objective of Task 1 has been to estimate the costs of introducing mandatory general intra-EU surveillance for 10 potential priority HOs[21] and the impact on the costs of EU co–financing of such surveillance. The selection of HOs includes those currently considered to represent the greatest threat for the EU, on the basis of data on interceptions, provisional emergency measures, control Directives, and the requirements of Council Directive 2000/29/EC. For some of these HOs[22] mandatory surveillance is currently foreseen by EU legislation. The analysis undertaken was required to:

1.1 Determine an <u>appropriate level of surveillance</u> from best practices among MS and by comparison with known surveillance levels for other important HOs, including potato pests.

The appropriate level of surveillance was established on the basis of existing information on current surveillance methodologies in use in the MS and best practices were identified in part by means of a comprehensive survey of the EU27 MS CAs (to which 25 MS responded). The 'best practices' identified in this way were used as the basis for the cost calculations and reflect expert views as to what constitutes the most realistic combination of science and economic considerations rather than a technical gold standard[23]. Indeed, current National Plant Protection Organisation (NPPO) decision-making when planning and prioritising surveillance is a combination of what is practical and possible - given resource constraints - and achieving a balance between the need to address a number of potentially extensive HO threats and the economic interest in those sectors the NPPO is called on to protect. For example, on the basis of the information provided by the MS, inspections in nurseries generally tend to be combined for HOs affecting ornamental plants. Also in many cases, where data availability allows this, the level of sampling and testing is undertaken on the basis of suspected cases only.

1.2 Estimate total annual costs for the MS and the EU of introducing mandatory surveillance at <u>fixed surveillance levels</u> (at 50% co-financing)

On the basis of the identified 'best practices' in terms of surveillance methodology, the total costs of introducing mandatory surveillance across the EU-27 at these levels, were estimated at **€23.4 million** per year for the 10 potential priority HOs. This includes visual inspections in production places and the environment (40% and 34% respectively of total costs), sampling

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[21] *Anoplophora chinensis, Bursaphelenchus xylophilus, Erwinia amylovora, Guignardia citricarpa, Phytophthora ramorum,* Potato Spindle Tuber Viroid, *Rhynchophorus ferrugineus, Synchytrium endobioticum, Thrips palmi, Xanthomonas axonopodis pv. citri.*

[22] For 5 HOs mandatory surveillance is already currently foreseen under emergency measures for *Anoplophora chinensis, Bursaphelenchus xylophylus, Phytophthora ramorum, Rhynchophorus ferrugineus,* Potato Spindle Tuber Viroid (PSTVd), and in one case (*Erwinia amylovora*) under Protected Zones and buffer zones in place; although the remaining HOs are not currently subject to mandatory surveillance rules (*Guignardia citricarpa, Synchytrium endebioticum, Thrips palmi, Xanthomonas axonopodis pv. citri.*), voluntary plans are in place in some MS.

[23] Defining 'best practices' on a scientific basis is an exercise beyond the scope of Task 1.

and testing (24%), and awareness-raising campaigns (2%). On the basis of the results of the CPHR evaluation (FCEC, 2010), the current EU 27 expenditure on surveillance for the 10 HOs is estimated at €14 million (see also Task 1.3). Therefore, the **additional costs** of introducing compulsory surveillance at fixed levels would be **€9.4 million.** The additional costs **for the EU**, given that currently there is co-financing of these surveillance costs, are estimated at 50% of the global figure of €23.4 million, i.e. at **€11.7 million.**

HO	Visual inspections/ production places	Visual inspections/ environment	Sampling	Information campaigns	Total
Production places - nurseries	€ 9.3 million		€ 2.5 million	€ 81,000	**€ 11.8 million**
Forestry/open environment		€ 8.0 million	€ 1.9 million	€ 243,000	**€ 10.6 million**
Other production places			€ 1.2 million	€ 123,000	**€ 1.4 million**
Total (10 potential priority HOs)	**€ 9.3 million**	**€ 8.0 million**	**€ 5.6 million**	**€ 485,000**	**€ 23.4 million**
% of total	***40%***	***34%***	***24%***	***2%***	***100%***

(b) Estimates based on average EU fee rate
Source: FCEC calculations

1.3 Estimate total annual costs for the MS and the EU of introducing mandatory surveillance for the selected HOs without fixed surveillance levels (at 50% co-financing).

The underlying assumption under this option is that the EU would facilitate surveillance, but MS apply those levels of surveillance they consider appropriate. Under this assumption, the availability of EU funding could result in:

c. *'Status quo'*: MS continue at current levels of surveillance on the basis of their current priorities and budget availability. They therefore use EU funding to match the total funding they currently provide for surveillance. In this case the annual cost for the EU is estimated at ca. **€7 million** (at 50% co-financing); this is new expenditure since surveillance costs are not currently co-funded;

d. *'Dynamic scenario'*: this assumes that a higher budget would be available if there was EU co-financing at 50% as MS may decide to increase surveillance levels, to reach what they currently consider to be their needs (i.e. an increase of 20-50%), as indicated by MS by means of the MS survey In this case, the total annual cost for the EU and the MS is estimated at ca. **€8.4-€10.5 million** each (at 50% co-financing). For the EU, this is new expenditure since surveillance costs are not currently co-funded.

In summary, therefore, the costs and additional costs of the various options are as follows:

Scenario	Total (100 %)	EU (50%)
Current expenditure (FCEC, 2010)	*€14.0 million*	-
At fixed surveillance levels (Task 1.2)		
	€23.4 million	€11.7 million
Additional to current expenditure	**€9.4 million**	**€11.7 million**
Without fixed surveillance levels (Task 1.3)		
a. 'Status quo'	€14.0 million	€7.0 million
Additional to current expenditure	-	**€7.0 million**
b. 'Dynamic scenario'	€16.8– €21.0 million	€8.4 – €10.5 million
Additional to current expenditure	**€2.8– €7.0 million**	**€8.4 – €10.5 million**

2.2. Objectives and methodology

The objective of this Task was to estimate, in order of magnitude, the costs of introduction of mandatory general intra-EU surveillance for potential priority HOs and the impact on EU co–financing of such surveillance.

In particular, this Task required, for 10 selected HOs:

- To determine an appropriate level of surveillance from best practices among MS and by comparison with known surveillance levels for other important HOs, including potato pests (**Task 1.1**);
- To estimate total annual costs for the MS and the EU of introducing mandatory surveillance at fixed surveillance levels (at 50% co-financing) (**Task 1.2**);
- To estimate total annual costs for the MS and the EU of introducing mandatory surveillance for the selected HOs without fixed surveillance levels (at 50% co-financing) (**Task 1.3**).

The analysis of Task 1 is focussed on 10 'priority' HOs. The selection includes what is currently representing the greatest threat for the EU, on the basis of data on interceptions, provisional emergency measures, control Directives, and the requirements of Council Directive 2000/29/EC. In some cases, mandatory surveillance is already currently foreseen, for 5 HOs under emergency measures[24], and in one case (*Erwinia amylovora*) under Protected Zones (PZs) and buffer zones (BZs) in place; the remaining HOs[25] are not currently subject to mandatory surveillance rules although voluntary plans are in place in some MS.

A targeted survey of MS CAs (Annex 8) was carried out with the aim to understand the rationale behind MS' definition of current levels of surveillance, the key factors and principles considered by MS in their surveillance strategy, and to collect details of the surveillance methodology and associated costs[26]. On this basis, where possible, appropriate surveillance levels were established (Task 1.1) and were used to develop the cost calculations (Tasks 1.2 and 1.3) according to the analytical framework presented in Annex 3.

To extrapolate from the base levels (case study MS) to the rest of the EU-27, MS were clustered according to certain key criteria. These criteria included: status of the HO in the MS (past outbreaks); susceptibility due to environmental/climatic conditions; distribution of host plants; economic importance of the sector, according to levels of risk as identified by the MS in the reply to this specific question in the survey.

[24]Mandatory surveillance according to emergency measures: *Anoplophora chinensis, Bursaphelenchus xylophylus, Phytophthora ramorum, Rhynchophorus ferrugineus,* Potato Spindle Tuber Viroid (PSTVd).
[25] *Guignardia citricarpa, Synchytrium endebioticum, Thrips palmi, Xanthomonas axonopodis pv. citri.*
[26] For background, the initial approach to Task 1 was to analyse the example of any MS currently carrying out general surveillance and then extrapolate for the EU-27 from the general data that might be available for these case study MS. An effort to identify such MS was made, based on the information from the CPHR evaluation. FR was consulted as one potential example, however, it appears that the plan is broader than what could have been used as a basis for the purposes of Task 1 (i.e. not covering only phytosanitary risks), and in addition it is new and not yet (fully) implemented. No further MS that could serve as general case studies were identified.

2.3. Impact analysis

2.3.1. Task 1.1: Identification of 'best practices'

<u>Objective:</u> to determine an appropriate level of surveillance from best practices among MS and by comparison with known surveillance levels for other important HOs, including potato pests.

The aim has been to determine **an appropriate level of surveillance on which to base the calculations** required for this Task. The appropriateness of surveillance was established on the basis of existing information on the actual surveillance methodology and implementation in the MS, to identify 'best practices'. Where appropriate, in particular in the case of HOs affecting agricultural crops, the analysis has drawn from a comparison with known surveillance levels for other important potato pests (potato brown rot and potato ring rot). In the identification of 'best practices', the FCEC has also consulted with DG SANCO and TF3.

The identification of 'best practices' amongst MS was carried out through a comprehensive survey of current surveillance practices as well as costs of the EU27 MS CAs (to which 25 MS responded). The dataset collected through this survey was supplemented with other relevant data from other sources (in particular: FVO reports based on MS surveys of the specific HOs covered by Task 1; data on the numbers of Private Operators (POs) and area of susceptible species in the MS), literature review (including relevant MS surveillance plans), and in some cases specific follow up with MS CAs, to estimate the total annual costs under Task 1.2.

The 'best practices' taken as the basis for the calculations are presented (for ease of reference) in Task 1.2. They reflect what is largely considered by the consulted experts as a realistic combination of science and economic considerations. Defining 'best practices' on an appropriate scientific basis is an exercise beyond the scope of Task 1 (indeed this is the subject of ongoing work at expert level in various networks).

In any case, it is noted, that the parameters defined under Task 1 to assume '**best practices' across the EU can only be a guideline** because 'best practices' have multi-dimensional criteria; it is therefore **unlikely that one size fits all MS** and all prevailing situations. Also, the level of surveillance needed depends on the aim of the surveillance, i.e. if the aim is to study how common a pest is or in which parts of the country it occurs, a rather low level may be sufficient, whereas if the aim is to find and eradicate all infestations, a much higher level is needed. For a pest that is not expected to cause symptoms, the level of surveillance needed is very high.

Current NPPO decision-making when planning and prioritising surveillance is a combination of what is practical and the number and potential extent of HO threats involved from multiple invasions, all of which are competing for relatively limited available NPPO resources.

NPPO prioritisation will depend also on the value of the sector the NPPO is called to protect (which may also vary across time, depending on particular economic and political interests): for example, Scandinavian MS will focus the bulk of their efforts to protect their forest resources, while other MS with traditionally important agricultural sectors will focus their efforts on their specific sectors of interest.

It is noted that the selection of "best practices" below is based on the current levels of surveillance applied by MS, and therefore reflect the increased level of risk in some cases, e.g. PWN in ES and PT, *Phytophthora ramorum* in the UK, IE, and the NL. The extrapolations below therefore reflect the current distribution of the selected HOs in MS and the EU27 as a whole.

The current prioritisation of HOs is reflected in the classification provided by the MS NPPOs to the survey. Results are presented in **Table 3** below:

Table 3 Level of risk of HOs as indicated by MS in the survey

HOs/Risk level:	High	Medium	Low
Anoplophora chinensis	13	9	3
Bursaphelenchus xylophilus	16	6	3
Phytophthora ramorum	9	12	4
Rhynchophorus ferrugineus (a)	7	1	17
Erwinia amylovora	18	6	1
Potato Spindle Tuber Viroid	11	11	3
Synchytrium endobioticum	10	7	8
Guignardia citricarpa (a)	4	2	18
Thrips palmi	6	10	9
Xanthomonas axonopodis pv. citri (b)	1	3	17

(a) 1 MS did not reply
(b) 4 MS did not reply

Source: FCEC 2011 survey

For *Guignardia citricarpa* and *Xanthonomas axonopodis pv. citri*, the majority of MS indicated that these HOs represent a low risk, mostly because of the absence of host plants (in both cases citrus) from their territories. Further information from the survey also reveals that:

- With regard to *Guignardia citricarpa:* four MS carry out surveillance for this HO, among which one MS in the context of quality inspections; all of these MS are key citrus producing countries. Thirteen MS indicate that there is no specific surveillance in place, and six further clarify that they only carry out inspections at imports;

- With regard to *Xanthomonas axonopodis pv. citri:* two MS carry out surveillance for this HO, among which one MS in the context of quality inspections; all of these MS are key citrus producing countries. Fifteen MS indicate that there is no specific surveillance in place, and four further clarify that they only carry out inspections at imports.

2.3.2. Task 1.2: Estimation of costs at fixed surveillance levels

<u>Objective:</u> to estimate total annual costs for the MS and the EU of introducing mandatory surveillance at fixed surveillance levels (at 50% co-financing)

2.3.2.1. Visual inspections

On the basis of the information provided by MS, for estimating inspection costs, we distinguish between the following groups of HOs:

1. ***Anoplophora chinensis***; ***Bursaphelenchus xylophylus, Phytophthora ramorum***; ***Rhynchophorus ferrugineus***. For these pests inspections are carried out at:

    a. Nurseries/garden centres;
    b. Forestry and/or public/private green.

    For these pests, MS have indicated in the survey that inspections in nurseries are combined; on this basis, we have grouped these pests together to calculate the costs of inspections and sampling in nurseries. In addition, inspections for these pests in forestry and/or public/private green are detailed separately per pest.

    In the case of ***Erwinia amylovora*,** inspections on ornamental plants are combined with the above inspections in nurseries/garden centres. In addition there are inspections in orchards[27] and in the open environment[28], but the information available does not allow estimating the cost involved for these two types of sites.

    In the case of ***Thrips palmi***, inspections on ornamentals plants are combined with the above inspections in nurseries/garden centres. In addition there are inspections at production level for the susceptible fresh vegetable species, and this mostly takes place in indoor production. The information available does not allow estimating the cost involved, as no best practice could be identified.

    In the case of **Potato Spindle Tuber Viroid**, inspections on ornamentals plants are combined with the above inspections in nurseries/garden centres. In addition there are inspections at production level for potatoes (detailed separately).

2. In the case of ***Synchytrium endobioticum*** and **Potato Spindle Tuber Viroid** in potatoes[29]: as inspections are already carried out in fields for other potato pests, in particular ring rot and brown rot (this is already the case in several MS, as reported in the survey), the assumption is made that these inspections can be combined. The aim has therefore been to define the additional inspection costs, related to additional time needed for these inspections and additional cost for sampling;

3. In the case of ***Guignardia citricarpa*** and ***Xanthomonas axonopodis pv. citri***: For MS where there is citrus production (ES, IT, EL, PT, CY, FR, MT), the inspections for these HOs are combined with the inspections carried out for other citrus pests, e.g. Citrus

[27] It is indicated that these may/could take place in the context of phytosanitary inspection under quality certification schemes.
[28] The potential surveillance cost for *Erwinia amylovora* in the open environment could not be estimated as no data are available, either in existing literature or through the FCEC 2011 survey. Some MS have indicated they follow a combined approach with other HOs for surveillance of forestry/public green, or that they survey within PZs only. As an indication, the cost of surveillance of *Erwinia amylovora* in a best practice scenario (Slovenia) is indicated in Task 8.
[29] It is assumed that inspection of PSTVd in ornamental plants in nurseries is combined with the inspections for group 1 HOs, as reported by some MS.

Tristeza Virus. The additional cost estimated here concerns sampling/testing. For MS where there is no production of citrus, additional surveillance may/could be carried out in the context of national fruit and vegetable quality certification inspections; additional costs would be on sampling/ testing on symptomatic cases only, but this cost is not estimated here as there was no basis for this estimation.

2.3.2.2. Sampling/testing

Sampling and testing is of crucial importance for detection and identification of HOs where visual inspection is not enough, e.g. in the case of viruses and nematodes, bacteria and fungi. In the case of insects, e.g. for *Anoplophora chinensis* and RPW, it appears that visual inspection is sufficient in most cases, unless in case of first time outbreak where the DNA identification of specific pathway might be required.

The level of sampling applied in this exercise for the different HOs has been determined where data allowed so, as it is noted that **in many cases sampling and testing is undertaken on the basis of suspected cases only**. With regard to the type of tests in use, MS indicated in their replies a variety of test methods used across MS and HOs. This reflects the fact that there is no standard best practice today. EPPO has been developing diagnostic protocols for some HOs, however, generally PRAs and EPPO pest risk management reports do not provide specific indication or guidance on the appropriate tests to be carried out for detection. Furthermore, the appropriate tests to be used are not specifically prescribed in EU legislation today, unlike the case of animal health and food contaminants. In the case of HOs affecting agricultural crops, the sampling and testing methodology is currently defined in detail for potato ring rot and brown rot, and this has been taken as a guide for such crops where appropriate. The unit costs of tests, as applicable per HO, have been adapted as appropriate to an EU27 average.

2.3.2.3. Information and awareness raising campaigns

A key element of surveillance is citizens' information and awareness raising campaigns. As an indication of the costs involved, on average from €1,000 to €25,000 has been spent on such campaigns in MS, for the range of selected HOs. In 4 cases, however, the budgets have been much more significant than this figure. These were all connected with exceptional outbreaks as follows: PT for *Bursaphelenchus xylophylus* at €720,000 (cumulative for several recent years); IT for *Rhynchophorus ferrugineus* at €200,000 (in one year); and IT, NL for *Anoplophora chinensis* at €70,000 and €40,000 respectively. Details of the budgets spent on this by MS are provided in Table 10 (source: FCEC survey, 2011).

2.3.2.4. Combined surveillance in nurseries/garden centres

<u>Visual inspections</u>

Given that inspections for some HOs are assumed to be combined at this level (as explained above, see Group 1), up to the total current number of registered POs for Plant Passport (PP) issuing purposes may be liable to such inspections. This assumption is based on 'best practices' currently identified from the survey where some MS have indicated they currently survey ca. 50% of the PP registered POs[30]; the assumption is therefore made that for the combined set of HOs to be covered by these inspections, the number of inspected POs can be

[30] E.g. FR for *Anoplophora chinensis*.

50%-100% of the PP registered POs. This assumption is a realistic scenario, given the lack of specific data on the number of nurseries/garden centres that are involved in the production and trade of susceptible host plant species for each of the specific HOs for which inspections are combined[31], and the significant potential overlap within the same nurseries/garden centres in the production and trade of susceptible host plant species for the range of HOs covered here.

The estimated costs are in terms of inspection time x frequency of the inspection visits x cost of inspectors time. All data are based on the responses of MS to the survey. In terms of the frequency of visits, we have taken a scenario of 2 visits/year.

Given the wide variations in fee rates for inspectors across the EU (as reported by MS in the survey), costs have been estimated in two scenarios: i) at the actual reported fee rates for each MS; ii) at an average EU fee rate (€40/hour)[32].

In the case of RPW, the element of the inspection costs in retail establishments was not possible to quantify due to lack of data. The FVO notes that there is currently no systematic approach in surveillance of plants for sale in retail shops (FR, ES, IT, PT, CY): in particular, retail shops are not always registered, consequently not all are inspected; in most cases, inspections are carried out 1-2/year, and not quarterly as appears to be recommended.

Sampling/testing

In terms of sampling/testing costs, on the basis of the information provided by MS on mandatory surveillance practices and costs for emergency HOs (FCEC 2010 survey), the ratio of samples/inspection can be determined at 0.43; this ratio is used for the extrapolation. The costs of tests can vary considerably between MS and in addition cover in this case a wide range of HOs; the average cost including laboratory time is calculated at €100/test.

Table 4 Estimated costs of surveillance in nurseries and garden centres, combined inspections (a)

	At MS fee rate	At EU 27 average fee rate
Visual inspection	€ 11.9 million	€ 9.3 million
Sampling	€ 3.2 million	€ 2.5 million

(a) *Anoplophora chinensis*; *Bursaphelenchus xylophylus*, *Phytophthora ramorum*; *Rhynchophorus ferrugineus; Erwinia amylovora; Thrips palmi;* Potato Spindle Tuber Viroid

It is noted that the frequency of surveillance in nurseries would depend on the following factors:

- Turnover and volume of activity;
- Relevance of the HO in each MS;

[31] Such data only exist for a very limited number of HOs, e.g. *Anoplophora chinensis* (FVO report)
[32] The calculation at MS fee rates was only possible in this case, as detailed data were available for number of registered POs by MS which could be combined with the individual fee rates by MS; it has been included here for completeness. It has not been possible to do this calculation for the other cases as the susceptible areas or sites are in most of these cases available for the EU27 total; therefore in all other cases the EU27 average fee rate was used.

- Whether a reduced inspections scheme may be in place, e.g. on a bonus-malus basis and in combination with voluntary inspections (acting as a type of pre-screening), or combined with a certification scheme coupled with routine and random inspections. Therefore these costs could be reduced, and improve the target base of the inspections. There could be incentive schemes to encourage the industry to do this.

2.3.2.5. Surveillance in forestry and public/private green

Best practices identified by the FCEC 2011 MS CA survey and FVO report on MS survey results are used as the basis for the calculation as follows.

The cost for inspections is calculated on the basis of hourly rates quoted by MS (FCEC 2011 survey), and 2 hours/inspection. The cost for sampling/testing is calculated on the basis of average cost for the range of tests used per HO and across the EU 27[33], as quoted by MS (FCEC 2011 survey).

Bursaphelenchus xylophilus

Assumptions (best practices):

Visual inspections

a. Surveillance in forests

- Surveillance rate in high risk zone (Mediterranean region): same level as current level in ES[34]: 5 inspections/10,000 ha of susceptible forest area;
- Surveillance rate in medium/low risk zone (remaining countries/continental EU): same level as current EU 27 average[35]: 0.7 inspections/10,000 ha of susceptible forest area;

On the basis of this, the estimated number of inspections is **1.6 times higher** than the current ("*increase factor"*).

b. Surveillance in other (risk locations and Wood Processing Industry):

- Surveillance rate increases from current number of inspected sites to full number of identified site (i.e. for risk locations: from 82% to 100%; for Wood Processing Industries (WPI): from 70% to 100%), ("*increase factor"*).

Sampling

- Applied same increase factors from current to projected levels as indicated above for number of inspections on the basis that as inspections increase, the level of sampling and testing intensifies. (Includes sampling in forestry, risk locations, nurseries and WPI).

[33] The FCEC 2011 survey has revealed a large range of test methods are available for each HO and there can be significant differences between MS in the method applied and the laboratory staff rates.
[34] Susceptible forest area: FVO report on MS survey (2009, latest), FCEC 2011 survey, EUROSTAT data on coniferous forest; number of inspections/10,000ha from FVO survey and FCEC 2011 survey.
[35] According to FVO report of MS annual surveys, surveillance in forestry is not carried out in SE, FI, UK, IE, therefore it is assumed 0 for these MS.

The cumulative increase factor for the total sampling is **1.5**.

Table 5 Cost of surveillance for *Bursaphelenchus xylophilus*

	Cost (€) (a)
Visual inspections	
- Forestry	656,000
- Risk locations	1.3 million
- Wood Processing Industry	375,000
Total visual inspections	**2.3 million**
Sampling	
- Forestry	390,000
- Risk locations	160,000
- Wood Processing Industry	152,000
Total sampling	**702,000**
Total cost of PWN surveillance	**3.0 million**

(a) Costs of inspections and sampling/testing in nurseries are included in the global estimates for combined surveillance in nurseries.

A key element of surveillance for *Bursaphelenchus xylophilus* is citizens' information and awareness raising campaigns. As an indication of the cost involved, on average from €1,000 to €3,000 has been spent on this; the only exceptional budget on such campaigns has been that for PT (cumulative over several years) at €720,000).

Anoplophora chinensis

Assumptions (best practices):

Visual inspections

Surveillance in forest

- Surveillance rate for the total susceptible EU land area[36]: same level as in FR: 7 inspections/ 10,000 ha of susceptible forests[37]. On the basis of our calculations, the total susceptible EU land area is **1.8** times higher than the current total susceptible area reported by MS to FVO.

Surveillance in public green

- Total number of public green sites[38] * 1 inspection/site.

Sampling

Not applicable.

[36] Total susceptible EU area estimated on the basis of declared susceptible area (FVO report of MS survey 2009/2010), over total land area in key MS (FR, DE, PL, RO) = 6% (excludes FI and SE, currently identified as non susceptible in forestry, UK PRA 2006).
[37] FCEC 2011 survey.
[38] FVO survey 2009/2010

Table 6 Cost of surveillance for *Anoplophora chinensis*

	Cost (€) (a)
Visual inspections	
- Forestry	1.1 million
- Public green and gardens	409,000
Total visual inspections	**1.5 million**

(a) Costs of inspections and sampling/testing in nurseries are included in the global estimates for combined surveillance in nurseries.

A key element of surveillance for *Anoplophora chinensis* is citizens' information and awareness raising campaigns, as an indication of the cost involved, on average from €1,000 to €10,000, but has reached higher figures in two affected countries (NL: €45,000; IT: €70,000).

Phytophthora ramorum

Assumptions (best practices):

Visual inspections

Surveillance in forest

- Surveillance rate in high risk zone (EU RAPRA: MS with findings in forestry): same level as current level in the UK: 6 inspections/10,000 ha of susceptible forest area[39];
- Surveillance rate in medium/low risk zone (remaining countries): same level as current EU 27 average[40]: 1.4 inspections/10,000 ha of susceptible forest area;
- Above surveillance rated corrected in some cases with current level of surveillance, as calculated on the basis of the FVO report on MS survey results.

On the basis of this, the estimated number of inspections is **2.4 times higher** than the current ("*increase factor*").

Surveillance in public green

- Surveillance rate in high and medium risk zone (EU RAPRA: MS with findings in forestry and public green): same level as current level in the UK: 2 inspections/10,000 ha of total land area[41];
- Surveillance rate in low risk zone and MS with no findings in forestry/public green (EU RAPRA): same level as current EU 27 average[42]: 0.16 inspections/10,000 ha of total land area.

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[39] EUROSTAT data on hardwood forest; number of inspections/10,000ha from FVO survey 2010 and FCEC 2011 survey.
[40] For SE, FI, UK, IE: assumed 0 in forestry as is current practice (FVO report of MS annual surveys)
[41] EUROSTAT data.
[42] Excluding UK, that currently has the highest rate and accounts for half of the total EU 27 inspections in public green. (Source: FVO Report on MS survey results, 2010).

On this basis, the estimated number of inspections is **3.2 times higher** than the current ("*increase factor"*).

Sampling

- Applied same increase factors from current to projected levels as indicated above for number of inspections on the basis that as inspections increase, the level of sampling and testing intensifies. (Includes sampling in forestry, public green and nurseries).

The cumulative increase factor for the total sampling is **2.2**.

Table 7 Cost of surveillance for *Phytophthora ramorum*

	Cost (€) (a)
Visual inspections	
- Forestry	1.6 million
- Public green	1.6 million
Total visual inspections	**3.2 million**
Sampling	
- Forestry	366,000
- Public green	82,000
Total sampling	**1.2 million**
Total cost of surveillance *P. ramorum*	**4.4 million**

(a) Costs of inspections and sampling/testing in nurseries are included in the global estimates for combined surveillance in nurseries.

In addition, surveillance would include citizens' information and awareness raising campaigns. As an indication of the cost involved for *Phytophthora ramorum*, this has ranged on average from €300 to €2,000 in MS.

Rhynchophorus ferrugineus

There are no rules defined for the surveillance of RPW in the open environment[43]. The FCEC survey (2011) identifies variable practices followed by MS. This is due to the nature of this HO, whereby the total susceptible area and sites are difficult to define, and intensity levels will be determined by the concentration of palms, which is highly variable, not quoted in any source (no data available). If it would be possible to make an inventory of susceptible sites, and/or number of palms, then an estimation of costs would be possible[44].

MS currently carry out surveillance according to available budgets and priorities, which are usually defined once a problem is identified, but also in some cases pro-actively. The surveillance involved (public green spaces in urban environment where palms are situated,

[43] Commission Decision 2007/365/EU define the obligation of MS to conduct annual surveys. The coverage includes nurseries, garden centres, public green sites and forestry sites. There is no further definition of principles or targets.
[44] FCEC estimates of the total susceptible area in the susceptible MS (Mediterranean region) is ca. 6 million ha (this is the total residential/urban land cover in these MS, which is ca. 5% of the total land area).

and private gardens; visual inspections are not sufficient due to the latent development of this disease and the lack of visual symptoms in the early phases of the disease) is complex and costly. The current resources and funding available are therefore in most cases considered to be inadequate (as also confirmed by MS responses to the FCEC survey)[45].

Taking into account the total number of inspected sites as reported to the FVO in 2009, and on the basis of MS current survey practices (frequency of inspections), the cost of surveillance in the open environment (including visual inspections, traps and trap monitoring) is estimated at **€1.0 million**.

A key element of preventive surveillance for RPW is citizens' information and awareness raising campaigns. As an indication of the cost involved, on average €1,000 to €10,000, but has reached in one case (IT) €200,000.

The costs of inspections and sampling/testing in nurseries are included in the above global estimates for nurseries.

Potato diseases

As many MS CAs indicate that the survey of these HOs is already combined with the survey for ring rot and brown rot, the costs calculated within this exercise concern the additional costs for MS for costs of sampling and analysis.

For reference, the total surveillance costs for the three potato diseases covered by control Directives (potato brown rot, ring rot and PCN) were estimated on the basis of the FCEC 2010 survey in the previous CPHR evaluation at **€9.1 million**.

Assumptions:

Sampling/testing

- For PSTVd: sampling rate at the same level as current level in FR: 478.5 ha/sample (number of total samples/total area of potatoes)
- For *Synchytrium endobioticum*: sampling rate for high and medium risk MS: 500 ha/sample (ware potatoes) and 10 ha/sample (seed potatoes); for low risk MS: 5,000 ha/sample (ware potatoes) and 100 ha/sample (seed potatoes)[46].

Table 8 Sampling/testing costs in potatoes for PSTVd and *Synchytrium endobioticum*

HO	**Cost (€)** (a)
PSTVd	€ 592,000
Synchytrium endobioticum	€ 448,000

[45] The FVO notes that limited resources, the need for effective cooperation between municipalities and the plant health services, and problems to access private property mean that there are no comprehensive surveys throughout the entire territory of most of the affected MS (FR,PT,ES) (FVO conclusions, on the basis of mission carried out to all MS affected by RPW).
[46] Adjusted downwards from the sampling rates for potato brown rot and ring rot, on the basis that *Synchytrium endobioticum* is considerably less widespread and involves a smaller number of MS.

(a) Costs of visual inspections assumed to be combined with the survey for other potato diseases.

In addition, surveillance would include citizens' information and awareness raising campaigns. Only few MS have run such campaigns to date, and the cost in the most significant 3 cases (BE and IT for PSTVd; DE for *Synchytrium endobioticum*) has ranged from €6,000 to €20,000.

Citrus pests

Assumptions (best practices):

The information provided by MS CAs in the context of the survey does not allow to identify a best practice for these HOs. Therefore, sampling levels are based on data of surveys for potato HOs (*Clavibacter michiganensis* sp. *sepedonicus* and *Ralstonia solanacearum*).

Sampling/testing

A level of sampling = 500 ha/sample is assumed for *Guignardia* c*itricarpa* and *Xanthonomas axonopodis pv. citri*[47]. However, it has been suggested that more intensive surveillance could be carried out for citrus pests, at 100ha/sample and even 10ha/sample, in which case the costs indicated below could reach five to fifty times the order of magnitude.

Table 9 Sampling/testing costs for *Guignardia citricarpa* and *Xanthonomas axonopodis pv. citri*

HO	**Cost (€)** (a)
Guignardia citricarpa	€ 105,549
Xanthonomas axonopodis pv. citri	€ 73,842

(a) These are sampling/testing costs. Costs of visual inspections assumed to be combined with those carried out for other citrus pests, e.g. Citrus Tristeza Virus; also in the context of quality certification schemes.

2.3.3. Task 1.3: Estimation of costs without fixed surveillance levels

Objective: to estimate total annual costs for the MS and the EU of introducing mandatory surveillance for the selected HOs without fixed surveillance levels (at 50% co-financing).

Under this option, EU co-financing (at 50%) is introduced without establishing fixed surveillance levels. The underlying assumption is that the EU would facilitate surveillance, whereas MS will apply the levels they consider as appropriate. Under this assumption, the availability of EU funding could result in the following:

a. '*Status quo'*: MS continue at current levels of surveillance on the basis of their current priorities and budget availability, therefore use the 50% EU funding to meet the total

47 FVO report on Surveys in the EU for *Clavibacter michiganenesis* spp. *sepedonicus* and *Ralstonia solanacearum*, 2008/2009 season – Final summary of the situation. The density of sampling for laboratory analysis considered in this analysis is taken in the basis of sample density for these HOs for Group 3 (group where the HO has never occurred).

100% of the funding currently provided for surveillance →total current budget stays the same;

b. '*Dynamic scenario*': MS continue to invest the same funding as current, i.e. MS use the 50% EU funding to match the currently available MS funds, therefore resulting in 100% increase in total funds available for surveillance.

In the context of the CPHR evaluation, the cost of surveillance of HOs regulated under the Community emergency measures and for the control of potato pests was calculated. This cost is the baseline for calculations under this scenario.

Under the **status quo**, the cost for the EU and the MS will be ca. **€14 million**[48], as adjusted to exclude the four HOs not included in this analysis[49] and to include the additional HOs which were not included in this figure, therefore resulting in a total annual cost for the EU and the MS of ca. **€7 million** respectively.

Under the **dynamic scenario**, assuming that a higher budget would be available if there was EU co-financing at 50%, MS may decide to increase surveillance levels (both in terms of visual inspections and sampling) to reach what they currently consider to be their own needs.

Several MS have indicated in their replies to the survey that the current levels of surveillance are considered to be inadequate in some case, and they have provided estimated of the needed increase in inspections[50]. In most cases these estimated increases varied between 20% and 50% (**Table 10**). Assuming an increase of 20%-50% on the current MS surveillance levels, this would result to €**16.8-€21.0 million**, therefore a cost to the MS and EU (50:50) of **€8.4-€10.5 million**.

[48] Excluding the surveillance costs for the control Directives (potatoes), being €9.1 million (CPHR evaluation).
[49] Pepino mosaic virus, *Dryocosmus kuriphilus, Gibberella circinata and Diabrotica.*
[50] Question 1.5 of the questionnaire: *Is the level of surveillance (i.e. inspection and sampling intensity) currently applied in your country, per HO, considered to be sufficient to address your needs? If not, what level of surveillance would be considered necessary and reasonable (i.e. technically justified for the particular reasons for which you carry out surveillance in your country, as identified in Q 1.1)?*

Table 10 Surveillance levels – estimated increases

HO	Estimated needed range of increase in inspections (%)	Estimated needed increase in sampling (%)
Anoplophora chinensis	10% - 60% (8 MS)	CY: 10% - 60% (6MS)
Bursaphelenchus xylophilus	10% -100% (9 MS)	CY: 5% – 100% (9 MS)
Phytophthora ramorum	10%-50% (5 MS)	DE: 30%-50% (3 MS)
Rhynchophorus ferrugineus	50% (3 MS)	50% (1 MS)
Erwinia amylovora	25% - 50% (4 MS)	20% - 30% (2 MS)
Potato Spindle Tuber Viroid	10-50% (6 MS)	20% - 100% (5 MS)
Synchytrium endobioticum	10% - 30% (8 MS)	10% - 30% (2 MS)
Guignardia citricarpa	30% - 60% (3 MS)	30% - 60% (2 MS)
Thrips palmi	20% - 100% (5 MS)	20% - 60% (4 MS)
Xanthomonas axonopodis pv. citri	50% - 100% (3 MS)	50% - 60% (2 MS)

*Surveillance is not sufficient due to the threat of introduction of HO from other MS as surveillance based on risk is not possible when trade pattern is unknown in the EU internal market.
**Surveillance considered sufficient but the MS replies that it should cover all palms present in the country, in particular *P. canariensis*

Source: FCEC 2011 Survey (25 MS)

Table 11 Costs of information campaigns

HO/number of MS responding	Range of costs (€)	No. of responding MS
Anoplophora chinensis	€100 - €70,000	12
Bursaphelenchus xylophylus	€100 - €720,000	9
Erwinia amylovora	€100 - €10,000	9
Phytophthora ramorum	€300 - €2,100	7
Potato Spindle Tuber Viroid	€6,200 - €20,000	2
Rhynchophorus ferrugineus	€130 - €200,000	5
Synchytrium endobioticum	€300 - €14,000	5
Thrips palmi	€401	1
Xanthomonas axonopodis pv. citri	€5,000	1
Clavibacter michiganenensis ssp. sepedonicus	€300 - €10,400	8
Ralstonia solanacearum	€300 - €10,000	8
Clavibacter michiganensis, *Ralstonia solanacearum*, Potato Spindle Tuber Viroid, *Synchytrium endobioticum*	€12,743	1

Source: FCEC 2011 Survey

2.4. Conclusions

The overall results of the analysis are summarised in **Table 12** and **Table 13** below.

Table 12 Estimated annual costs of surveillance, at fixed 'best practices' surveillance levels, EU 27 (a)

HO	Visual inspections/ production places	Visual inspections/ environment	Sampling	Information campaigns	Total
Production places - nurseries:					
Anoplophora chinensis*; *Bursaphelenchus xylophylus*, *Phytophthora ramorum*, *Rhynchophorus ferrugineus*, Erwinia amylovora *Thrips palmi* *Potato Spindle Tuber Viroid	€ 9.3 million		€ 2.5 million	€ 81,000	**€ 11.8 million**
Forestry/open environment:					
Anoplophora chinensis		€ 1.5 million	n.a. (c)	*€ 41,000*	**€ 1.6 million**
Bursaphelenchus xylophilus		€ 2.3 million	€ 703,000	*€ 41,000*	**€ 3.1 million**
Phytophthora ramorum		€ 3.2 million	€ 1.2 million	*€ 41,000*	**€ 4.8 million**
Rhynchophorus ferrugineus		€1.0 million (b)	n.a. (d)	€ 120,000	**€ 1.1 million**
Other production places:					
Synchytrium endobioticum	*n.a. (e)*		€ 448,000	€ 41,000	**€ 489,000**
Potato Spindle Tuber Viroid	*n.a. (e)*		€ 592,000	€ 41,000	**€ 633,000**
Guignardia citricarpa	*n.a. (f)*		€ 105,000 (g)	€ 41,000	**€ 146,000 (g)**
Xanthonomas axonopodis pv. citri	*n.a. (f)*		€ 74,000 (g)	€ 41,000	**€ 114,000 (g)**
Total (selected HOs)	**€ 9.3 million**	**€ 8.0 million**	**€ 5.6 million**	**€ 485,000**	**€ 23.4 million**
% of total	***40%***	***34%***	***24%***	***2%***	***100%***

(a) Estimates based on average EU fee rate. 'Best practices' defined in accordance with methodology followed in the study (Task 1.1).
(b) Includes trapping costs
(c) Only in suspicious cases
(d) Not applied for *Rhynchophorus ferrugineus*
(e) Included in surveillance of other key potato pests, as indicated by several MS (see detailed analysis)
(f) Included in surveillance of citrus diseases
(g) For citrus pests, it has been suggested that more intensive surveillance could be carried out, in which case the costs indicated could reach five to fifty times the order of magnitude.

Source: FCEC calculations

In summary, therefore, the costs and additional costs of the various options are as follows:

Table 13 Estimated annual costs of co-financing mandatory surveillance

Scenario	Total (100 %)	EU (50%)
Current expenditure (FCEC, 2010)	*€14.0 million*	-
At fixed surveillance levels (Task 1.2)		
	€23.4 million	€11.7 million
Additional to current expenditure	**€9.4 million**	**€11.7 million**
Without fixed surveillance levels (Task 1.3)		
a. 'Status quo'	€14.0 million	€7.0 million
Additional to current expenditure	-	**€7.0 million**
b. 'Dynamic scenario'	€16.8– €21.0 million	€8.4 – €10.5 million
Additional to current expenditure	**€2.8– €7.0 million**	**€8.4 – €10.5 million**

3. Analysis of the impacts of introducing post-entry quarantine in the import regime (Task 2)

3.1. Executive summary

The objective of Task 2 has been to estimate the costs of introducing compulsory post-entry quarantine (PEQ)[51] for non European latent HOs which cannot be immediately detected by visual inspection or via appropriate laboratory testing within the timeframe of normal import procedures, but which pose a latent risk of infection. This option concerns a limited number of high risk ornamental plants for planting, in particular palm trees (risk of *Rhynchophorus ferrugineus*); and, trees of the *Acer* species and bonsai (all species), imported from East Asia (risk of a number of HOs including *Anoplophora chinensis).*

From our analysis and expert consultation (MS CAs, stakeholders, COM, TF3, and EPPO) the following conclusions on the impact of this option can be drawn:

- The largest impact will be felt by PO importers of the selected categories of plants;
- As PEQ facilities would be based on PO premises, there would be a need to build/upgrade current PO facilities, as these are currently considered largely inadequate, in terms of biosecurity. In other words there is a need to adjust to the requirements arising from the recently adopted ISPM34 – i.e. at least biosecurity level 2, and possibly also in terms of capacity (to allow all imports of the selected plant categories to be placed into PEQ);
- In terms of costs for MS CAs, the administrative costs of setting up and implementing PEQ are to be fully recovered, through fees charged to POs for registration, regular inspections and sampling;
- The expected impact (in terms of administrative costs) for the COM is likely to be minimal, although there will be a need to: hold further consultations with MS and to steer the process of setting up and reviewing the system, e.g. in terms of the

[51] PEQ is different from post-entry inspections which are already possible today, after the consignment has been released for the internal market. Post-entry quarantine (PEQ) implies that the consignment is released for free movement only after an official quarantine period within which the consignment is held or planted under quarantine conditions and subject to official inspections and testing.

appropriate requirements for bio-security (implementation of ISPM34); and, to ensure that MS implement the PEQ requirements correctly.

The costs involved in building/upgrading and maintaining facilities to the appropriate biosecurity level (i.e. at least level 2) are estimated at ca. **€1,000 /m^2** or **€300,000 - €1,000,000** in total for a standard 300 m^2-1,000 m^2 facility. In addition administrative costs (registration, regular inspections and sampling fees to be paid to MS CAs on the basis of full cost-recovery) are estimated at ca. €4,480 – €5,040 per facility during a PEQ period of 2 years (on the basis of an estimated 32-36 inspections).

The above costs are considered to be relatively high, particularly for businesses with a high turnover trading small plants and therefore a relatively high number of low unit value commodities. It is therefore expected that this measure would result in some rationalisation in this sector. Although, in terms of business disruption, the impact is expected to be zero to minimal after the first 2 years (i.e. when products are released from quarantine), it is nevertheless considered that PEQ may not be a viable economic option in those cases where the costs exceed plant value (e.g. small *Acer* species), as this would effectively mean that the costs would outweigh the value of the plants put into quarantine.

It is noted that TC trading partners, e.g. Australia (AUS) and New Zealand (NZ) also have PEQ obligations on imports of certain plants into their territory. The Australian model, for example foresees specifically dedicated and high bio-security level facilities run exclusively in PEQ stations appointed by the Australian Quarantine and Inspection Service (AQIS), and importers bear the full cost of the measures for the officially imposed minimum quarantine periods and at officially set fees.

3.2. Objectives and methodology

The aim of this Task has been to estimate the costs of introducing compulsory PEQ[52] for non European latent HOs which cannot be immediately detected by visual inspection or via appropriate laboratory testing within the timeframe of normal import procedures, but which pose a latent risk of infection.

The consulted experts (MS CAs, COM, TF3, and EPPO[53]), and the CPHR evaluation including the analysis of data on interceptions (source: FVO) and outbreaks (i.e. pest introduction not identified on import), all suggest that the highest risk category of latent infections are imports of ornamental plants for planting, in some cases from specific origins. It was therefore concluded that post-entry quarantine would be recommended for a **limited number of high risk ornamental plants for planting**. The plants identified are as follows:

1. Palm trees (for *Rhynchophorus ferrugineus*);
2. Trees of *Acer* species, imported from East Asia (in particular China);
3. Bonsai trees (all species), imported from East Asia (in particular China).

[52] PEQ is different from post-entry inspections which are already possible today, after the consignment has been released for the internal market. PEQ implies that the consignment will be released for free movement only after an official quarantine period within which the consignment is held or planted under quarantine conditions and subject to official inspections and testing.
[53] EPPO has launched a study on the risks of imports of plants for planting, the aim of which is to develop a screening process for identifying the plants that could be subjected to PEQ. The study is due to be complete in June 2011, with first results presented in conference in April, and in this context, our study has benefitted from consultation with EPPO to conclude its above selection of high risk plants for planting.

(relevant HOs for the latter two categories include *Anoplophora chinensis*)

In terms of quantifyting the total annual costs for the MS, the EU and the private sector of the introduction of compulsory PEQ for the selected cases (Task 2.2), the FCEC has set out the type of costs involved and the sectors affected in **Table 14**.

The introduction of compulsory PEQ for the selected plants for planting is expected to have a significant impact for POs, as importers would have to accept a considerable delay (generally from 6 months to 2 years[54]) before the material can be moved within the internal market, as well as bear the costs for maintaining the plants during the quarantine period and the costs of official inspections and testing. This explains some MS reluctance to introduce PEQ as a matter of principle. The argument of opponents to this option has been that PEQ effectively represents a transfer or reversal of the burden currently imposed on exporters to ensure that material exported to the EU is safe[55], to EU importers, and it should therefore only be considered in exceptional cases. These concerns have already been addressed in that the assumption taken here is that PEQ would be applied only in a limited number of cases where the application of current pre-export quarantine and inspections has not been effective in halting the introduction of the HOs, and in circumstances where no other less restrictive measure is available. In this context, it is noted that PEQ represents a less restrictive measure than a complete ban on imports of high risk material[56].

Table 14: Task 2 - post entry quarantine: type of costs

Type of costs	MS CAs	POs	EU
Start up	administrative costs (a): setting up the system, inspections	administrative costs: establishment, authorisation, inspections	administrative costs (c): in view of the limited scale and role, likely to be **minimal**
		costs of building/upgrading PEQ facilities (b)	
Maintenance	administrative costs (a): running the system, inspections, sampling/testing	administrative costs: inspections, sampling/testing	Idem - **minimal**
		staff costs	
		costs of maintaining PEQ facilities (b)	
		business disruption (turnover loss) in the period of quarantine	
		business loss due to destructive sampling (d)	
		cost of treatment/ destruction of infected material (d)	

(a) MS CAs expected to recover the full administrative costs through fees paid by POs.

54 The conclusion of the TF3 meeting is that PEQ relates to situations in which plant material is held in quarantine for prolonged periods (generally 0.5-2 years), and the exact period will need to be defined by the HO biology.

55 As is the case with mandatory pre-export quarantine and inspections, for example under emergency measures for *Anoplophora chinensis*.

56 This is currently the case with imports of *Acer* spp. from China, which is prohibited until 30 April 2012 under Commission Decision 2010/380/EC (emergency measures against *Anoplophora chinensis* Forster).

(b) According to ISPM34: *PEQ stations may consist of one or more of the following: a field site, screen house, glasshouse, laboratory, amongst others. The facilities should be determined by the type of imported plants and the quarantine pests that may be associated with them.*

(c) Staff costs for the establishment and review of the requirements

(d) These costs are not calculated as they would be incurred in any case at some point in the trade

In order to estimate the potential costs of introducing PEQ in those cases, the FCEC has collected data from other cases in which PEQ is currently applied[57]. These are:

- The only commercial trade cases where PEQ should be currently applied in the EU are imports of palm trees for *Rhynchophorus ferrugineus* (according to Decision of 25 May 2007, imported plants must be grown in quarantine prior to intra-EU movement, which can be 1 year in a third country + 1 year in a MS or 2 years in a MS). It has been suggested during interviews that there are some PEQ activities on imports of derogated bonsai plants of specific genera and species from Japan and Korea[58].

  The implementation of PEQ in these cases was further investigated in relevant MS (for imports of bonsai and *Acer* spp.: FR, NL, IT, ES; for imports of palm trees: ES, FR, IT);

- The application of PEQ on intentional imports into the EU of small quantities of plants used for research and scientific purposes[59]. The implementation of PEQ in these cases was investigated in two MS: the UK and FR[60]; and,

- The application of PEQ on commercial imports in TCs. The implementation of PEQ in these cases was investigated in AUS and NZ, both of which have a long history of applying PEQ on their imports along a wide range of plants and plant products.

A number of factors need to be taken into consideration when estimating the potential impact on PEQ costs, and these are discussed below:

- **Customs surveillance**

One factor in assessing costs is whether PEQ will take place under customs surveillance or not. Once the material to be imported is customs cleared then it is under the full responsibility of the MS NPPO, before customs clearance (i.e. during customs surveillance) MS customs authorities are also involved. This could have repercussions on costs, as material under customs supervision would also have to be inspected under customs rules and procedures by customs officers, which might add to costs. On the other hand, the period during customs

[57] A number of MS was contacted for information on this. The MS indicated below are the ones on which further investigations were made due to data availability and the fact that they were involved in some PEQ activity.

[58] Derogations on imports of certain coniferous bonsai (naturally or artificially dwarfed plants of *Chamaecyparis* Spach, *Juniperus* L. and *Pinus* L.) originating in Japan and Korea exist since 2002. Following reports presented by the Commission on the results in 2009 and 2010 of MS imports under derogation from Japan and Korea, in late 2010 it was proposed to extend the derogation until 31 December 2020 subject nonetheless to annual reviews of the situation by the Commission and MS.

[59] In accordance with Commission Directive 2008/61/EC of 17 June 2008 establishing the conditions under which certain harmful organisms, plants, plant products and other objects listed in Annexes I to V to Council Directive 2000/29/EC may be introduced into or moved within the Community or certain protected zones thereof, for trial or scientific purposes and for work on varietal selections.

[60] ANSES (Agence Nationale de la Securité Sanitaire), Laboratoire de la Santé des Végétaux, Station de Clermont-Ferrand, Unité de Quarantaine, France.

surveillance offers the advantage that material remains under the responsibility of the exporter, whereas once it is customs cleared it becomes the responsibility of the importer.

MS participating in TF3 were asked for feedback on this. The results of this consultation have highlighted that PEQ should be conducted under custom surveillance, but a kind of ‘light’ as well as uniform custom system might be needed to make it feasible in practice.

Two practical issues with holding plant material for a prolonged period of time (i.e. up to 2 years) under customs surveillance were identified: a) collection of customs duty would need to be postponed until customs clearance, as during the quarantine period when the plants are placed under customs surveillance all duties and taxes are suspended (information from some MS suggests that this issue could be addressed), and b) it would need to be decided where the plant material will be stored while under customs surveillance. Feedback from MS suggests that, with regards to this second issue, in practice different situations may arise across the EU and these can have an impact on costs. For example, while MS generally indicated that the current customs procedure is to keep the PEQ plants in customs storage, and that the site of the PEQ may be either the customs warehouse or an approved importer's premises or another suitable location, there may be differences in practice in the requirements on these facilities. The exact specifications of such facilities, which under the current system may have to be decided in consultation with Customs authorities as these provide final approval on the facilities to be used for customs storage, will determine the cost involved. Keeping plants under storage in a locked customs approved warehouse may not be a realistic option for nursery material in view of the volumes involved and the prohibitive costs. On the other hand, keeping plants under storage in approved PO premises would be a more feasible option.

In principle, therefore, the consensus is that while PEQ should be conducted prior to custom clearance, a uniform as well as ‘light’ custom system might be needed to make PEQ under customs surveillance feasible in practice. One option suggested has been to allow PH and customs clearance following a point of entry inspection, with plants held under a statutory notice in a PH approved quarantine facility for a specified period of time (thus ensuring no release prior to completion of the quarantine). This option is similar to the current UK and NL requirements for derogated bonsai plants imported from Japan and Korea. The feedback from MS suggests that these practical issues may need some more consultation at MS and COM level, but can be addressed.

- **Technical specifications of PEQ facilities**

Another significant factor to consider in estimating the potential costs is whether PEQ will be established in the form of quarantine stations in a limited number of points of entry (PoE) (i.e. as is the case with animal quarantine) or in the form of dedicated facilities at any PoE or Point of Destination (PoD) (PO premises). As discussed also under the previous point, assigning these facilities at approved premises at the point of destination appears to be the expressed preference of MS. The facilities may be set up by POs, but the use of public facilities should also be possible. Facilities should be registered, authorised (requiring 2 inspections) and officially supervised.

This point is also connected with the level of bio-security required for plant health quarantine facilities. There are currently international standards on this. EPPO has a standard on confinement conditions (which is valid when the plants are maintained in quarantine in case they are infected/infested). In 2010 the IPPC adopted ISPM 34[61], which lays down a list of general operational, technical and staff requirements on PEQ facilities. ISPM34 is a new standard that has not yet been put into practice, and the general requirements laid down therein could be made more specific depending on the type of plant and type of pest (Annex 1 of ISPM34 provides specifications for PEQ stations based on the biology of five broad types of quarantine pests). Developing such detailed specifications for the two HOs covered here is outside the scope of this study, and all MS agree that there is a need for further consultation and consideration of how these specifications could be developed. In the absence of such specifications, this study relies on: current implementation in practice of PEQ where this already exists (e.g. for *Rhynchophorus ferrugineus* in nurseries in ES; for *Anoplophora chiensis* in nurseries in NL, FR and the UK); and the current level of biosecurity followed in research and experimental stations importing high risk material for scientific purposes (several MS).

3.3. Impact analysis

The analysis of the cost estimates for each type of costs outlined in **Table 14** is provided below.

3.3.1. Costs of building/upgrading and maintaining PEQ facilities

The cost of building/upgrading PEQ facilities is very difficult to estimate at this point in time. The reason is that this cost will depend on i) the current state of existing facilities, ii) the kind and the number of the selected imported plant categories, and ii) the level of bio-security and the quarantine duration to be imposed. Some of these elements are only known at a general level, while others are not known:

- There are **no official data on the total volume or value of imports** of the selected plant species into the EU[62], but only estimates based on some official NPPO records[63] and trade sources; in any case current restrictions (e.g. the ban on imports of *Acer* spp. from China) do not allow a full picture on the potential volume and value of imports if current trade restrictions were replaced by PEQ.
- The quarantine duration can be assumed at 6 months to 2 years. For the selected plants, our consultation with the experts has suggested that **2 years** would appear to be the appropriate quarantine period for these plants.
- The bio-security levels are not yet determined at any level. At the level of the consulted MS NPPOs, there is either no reflection yet or discussions are still at an early phase, as to **how the ISPM34 requirements might be implemented in practice**. It would appear that for the HOs covered here, bio-security level 1 (e.g.

[61] ISPM 34: Design and operation of post-entry quarantine stations for plants; adopted by the Commission on Phytosanitary Measures in March 2010.

[62] There are no dedicated customs codes to these categories of plants. In EUROSTAT external trade data, imports for these categories is grouped together with other categories under ‘live plants’ with further breakdown into ‘potted plants’ and ‘coniferous and hardy perennial plants’, and are provided in tonnes and value but not in numbers of plants. These data can therefore not be used in the analysis here.

[63] A difficulty with getting this number from NPPO records is that import volumes are usually registered per botanical species, so it is very difficult to estimate the number of imported palms or bonsai, because these product groups cover many different botanical species.

providing insect-proof windows in greenhouses) might be sufficient as a starting point, but at least bio-security level 2 would probably be the most appropriate[64].

In terms of **existing PEQ facilities** for commercial imports of the identified high risk plants for planting, from our consultation it can be concluded that:

- There are currently no PEQ facilities at PoE (i.e. maintained by the CAs) that would be capable to undertake the PEQ function. In any case all of the consulted MS CAs agree that the PEQ should be held at PO (PoD) level, in facilities registered, inspected and approved for this purpose by MS NPPOs (see above analysis);
- There are **currently very limited and basic PEQ facilities at PoD** (i.e. maintained by POs). In terms of imports of *Acer* spp. and bonsais, only a very small number of POs (estimated at less than a handful of importers in some MS only), have some basic facilities, such as an insect-proof greenhouse[65]. In terms of imports of palms, there is a larger number of importers[66] who currently have some basic facilities.
- The bio-security level of the current facilities at PO level can generally be described as fairly low (i.e. **≤ bio-security level 1**) and in any case not complying with the suggested requirements of ISPM34.

Therefore, it can be concluded that **building and upgrading PEQ facilities would be necessary** for the implementation of PEQ requirements up to ISPM34 requirements. As discussed above this is assumed to be ≥ bio-security level 2.

This cost would be borne by POs, as the position of all MS CAs is that this would be the most appropriate location for PEQ. It might be possible, however, that a transitional period is provided to POs to adjust to these requirements, during which their current facilities may continue to operate subject to official NPPO inspections and approval.

Our estimated costs for building/upgrading PEQ facilities are therefore an indicative range in order of magnitude. The bottom of the range represents estimated costs of building/upgrading current facilities (greenhouses) equivalent to PEQ bio-security level 1; the top of the range represents estimated costs equivalent to PEQ bio-security level 3, on the basis of the current **costs of government-run PEQ facilities importing under the current derogations for experimental purposes**[67]. These estimates are presented below.

	Cost of building/upgrading PEQ facilities
Average cost per m^2: (a)	
• **biosecurity level 1**	€100 /m2
• biosecurity level 2	**€1,000 /m2**
• ***biosecurity level 3 (c)***	*€5,000 /m2*
Total cost per PO (300-1,000 m^2): (b)	

[64] The exact specifications of each bio-security level will need to be formally agreed and uniformly applied.

[65] For example, in the UK <10 companies currently have 'PEQ' facilities and only 3 nurseries import *Anoplophora* host material (derogated bonsais) from Japan and Korea for which there is a PEQ requirement - in this case, there is no detailed description of what PEQ should involve and measures tend to vary to a degree. In FR the nurseries currently holding some 'PEQ' capacity are described as 'very few'. In the NL, 3 POs have PEQ facilities for such imports (≤ biosecurity level 1).

[66] In ES, which is the most significant EU importer of palms, ca. 50 importers import palms and have some 'PEQ' facilities (source: FEPEX). Data are not available for IT.

[67] PEQ according to Directive 2008/61/EC (prohibited plants for research purpose only)

• **biosecurity level 1**	€30,000 - €100,000
• biosecurity level 2	**€300,000 - €1,000,000**
• ***biosecurity level 3 (c)***	*€1,500,000 - €5,000,000*

(a) Average cost estimated on the basis of costs provided by the consulted MS, in particular FR, NL (MS NPPO) and ES (PO).
(b) Average size estimated on the basis of nursery sector in the various MS (interviews with POs and MS NPPOs). For example, the average size of PEQ facilities in the 3 POs currently having PEQ in the NL is 300 m^2 (on the basis of current imports of derogated material only); assuming that these POs enlarge this operation to accommodate more imports they could implement PEQ for about 5-10% of the average total size of the greenhouse facilities of a larger importer in the NL (est. at 10,000 – 20,000 m^2).
(c) This biosecurity level will most likely not be required for the selected plants (this level is valid today only for **laboratories** of experimental research stations importing plant material for scientific purposes), and is only included here for completeness.

For POs to build facilities to required standard (ISPM34), they would probably face up to this level of costs. This level is very significant for POs and it is expected that only very few companies would be able to carry the cost of this investment (indeed, these companies are likely to see a business opportunity that makes this investment worthwhile).

It is reasonable to assume some further annual costs for the maintenance of these facilities and for making them operational (including staff costs) but there are no data on this.

3.3.2. Administrative (inspection) costs

In view of the relatively limited number of importers currently holding some ‘PEQ’ capacity for imports of plant material currently subject to PEQ (i.e. derogated *Anoplophora* host material), and the above costs for building/upgrading facilities to the required standard, MS do not expect to see more importers involved in such imports should PEQ be introduced on a compulsory basis for imports of *Acer* spp. and bonsai plants. In the case of palms imports, where a larger number of importers is involved, upgrading to higher bio-security level PEQ facilities is expected to result in a reduction in the number of POs.

On this basis, **additional staff resources needed for the MS CAs** to inspect and approve PO facilities for carrying out PEQ and to monitor the implementation of PEQ **would not be significant**.

In any case, the **cost of the MS CA inspections is due to be recovered from POs through fee charging**. For example, although in the UK the cost of these inspections is not yet charged to POs, given that the general policy orientation of the UK government is now to move to cost recovery of official inspections (such as those carried out in the context of Regulation (EC) No 882/2004), the cost of inspections carried out by the NPPO (FERA) for PEQ inspections is most likely to be recovered from POs. Similar intentions have been expressed by other MS.

PEQ facilities run by POs should be registered, authorised and officially supervised by the MS NPPOs[68]. The inspections to be required in relation to PEQ implementation are therefore most likely to involve the following[69]:

[68] The analysis here only involves phytosanitary inspections in accordance with the conclusions reached in the context of TF3 on inspections carried out under customs surveillance (as discussed above). It is assumed that customs inspections are kept to a minimum under this analysis.

- **1 inspection for registration** (could be combined with general importer registration for new ones, or be an update of existing registration);
- **2 inspections for authorisation** to run PEQ facilities;
- Regular inspections of material in quarantine. The frequency of regular inspections will depend on the HO biology and time of year/ climatic conditions. On the basis of current practices reported by MS, for both *Anoplophora chinensis* and *Rhynchophorus ferrugineus*, the general rule is few inspections during winter (1/month or 1/2 months) but more inspections during summer (2/month). On the basis that for both *Anoplophora c*. and *Rhynchophorus ferrugineus* 2 years in PEQ would probably be required, this results in **32-36 routine inspections during the total PEQ duration (16-18 inspections/year)**. The time needed per inspection will depend on the size of the nurseries and number of plants in PEQ: the assumption used here is **2 hours/inspection** on average, in common with the approach taken on this under Tasks 1 and 3.

The estimated costs are presented below.

	Cost of official inspections for PEQ (a) (b)
Estimated cost per m^2 (on the basis of the total cost of inspections) for 2 years (c)	***€5-€16/m^2***
Inspections for:	**Average size of PEQ facility: 300m^2**
• **PEQ registration: 1**	€140 /PO (one-off cost)
• **PEQ authorisation: 2**	€280 /PO (one-off cost)
• **Routine during PEQ: 16-18**	€2,240 - €2,520 /PO/year
For 2 years PEQ duration: 32-36	*€4,480 – €5,040 /PO/ 2 years*

(a) All costs are average per PO (on the basis of a PEQ facility of 300m^2). Actual costs will vary depending on PO size, number of plants in PEQ, and frequency of imports (new consignments coming into PEQ). One MS indicated that inspection costs could be on average €2,000 per consignment (including inspections and sampling). The larger the number of consignments (irrespective of their size) the higher may be the frequency of inspections, therefore the cost.
(b) On the basis of an average cost of €70/hour, which is the average of 6 MS that account for the bulk of imports of selected plants and with current PEQ facilities at PO level (range of cost varies from €30/hour to €123/hour). Average cost for inspections across EU27 is €40/hour, but this includes several MS with no imports of the selected plants for planting and no PEQ facilities at present. Source: FCEC survey 2011.

In addition to the cost of these inspections, POs will carry the cost of their own time spent for the inspections and administration involved; this again will depend on the size of the PO business and number of plants in PEQ and is roughly estimated at ca. 4 hours/week, or ca. 25 staff days in total for the year.

[69] In addition there may be some sampling costs, but as the unit costs of such tests are generally low for insects (e.g. morphological visual identification tests cost around €20-€30/sample on average), the **total sampling cost is not expected to be significant**. Destructive sampling would have been done at PoE, so no or minimal additional destructive sampling is expected during PEQ. It is noted that some R&D work is currently under way in the UK on using acoustics to detect latent infections of larvae for *A. chinensis* – if demonstrated to work (equipment has been successfully used in IT, and waiting for confirmation of research results in the UK by end of this year), it would reduce the need for destructive sampling and can cut down also the time needed for PEQ.

3.3.3. Business disruption

During the PEQ period, POs cannot move the products placed under PEQ (which is taking place under customs surveillance, as noted above). This entails a business disruption, which may last up to 2 years (i.e. the maximum assumed duration of the PEQ). Following this period, and once the plants are released following MS NPPO approval and customs clearance, the PO will be able to run business as usual. Therefore, the impact in terms of business disruption will be incurred in the first 2 years of establishing the PEQ, and it can be assumed that in subsequent years the PO will be recovering the income due from this disruption by being able to move and sell the released plants. After the first 2 years, the **impact on business disruption will therefore be zero to minimal**.

The potential value of the business disruption during the first 2 years would depend on the volume and value of imports. As noted above, it has been difficult to identify the potential volume and value of imports of the selected plants for planting in the various MS. The estimates below are made on the basis of data collected from MS CAs and POs.

Generally, such imports are concentrated in a relatively small number of MS (from which the plants are re-exported to the rest of EU-27). The PEQ location therefore is likely to be concentrated in these importing MS. In the case of palms, the bulk of imports are currently taking place through ES and (to a lesser extent) IT; the actual import volume is not available. In the case of plants of *Acer* spp. and of bonsai plants, imports are taking place mainly in the NL, DE, the UK and FR. On the basis of NL industry estimates[70], prior to the ban on imports of *Acer* spp. from China, on average 50% of this category of plants (ranging per species: 30 – 70 %) or 1.6-2 million plants were imported into the EU from China, Japan and Korea via the Netherlands; the total EU volume of such imports was estimated at ca. 3.2-4 million plants, but is considerably less following the ban on imports of plants of *Acer* spp. from China.

No further figures are available on the total current volume (number) of imports of bonsai plants and palms. According to data provided by the ES industry association, imports into ES have fallen significantly in recent years from a peak of over 20,000 tonnes per year in the period 2003 to 2006, to less than 5,000 tonnes in 2008 and 2009.

The value of imported *Acer* spp. varies greatly depending on plant size, species and origin. Average value of *Acer* plants: €2-€3/plant[70] (imports from SE Asia); €20-€45/plant (imports from other origins e.g. NZ; source: UK industry)[71].

The value of imported palms also varies greatly depending on plant size, species and origin. Average value of palms: €50-€100/unit (source: ES industry).

These prices are average wholesale import value: actual prices can vary significantly per species and age of plants (in the case of palm trees, prices can vary up to €500 or more; in the case of *Acer* and bonsai plants, prices can vary up to hundreds of €). Prices are also higher at point of sale, therefore the above prices are likely to be underestimates of real and full impact in terms of turnover loss.

[70] Source: NL PRA on Anoplophora chinensis, 2008.
[71] This is the case, for example, in AUS/NZ (fee charged is €39-73 per plant if ≤4 plants in quarantine).

It has been impossible to estimate the turnover for these plants, or the average annual turnover per importer (which would depend on the average annual volume of imports and plants held in PEQ). This makes it impossible to estimate the value affected by PEQ restrictions, either in total, or per PO. In any case, as noted above, this does not concern a loss of value *per se*, but a delay in revenue during the 2 years that plants are placed under PEQ.

Impacts on individual POs are generally expected to be higher for plants with a quick, therefore high, turnover (e.g. bonsai plants, including small *Acer* species often imported in bundles without soil and potted in the EU) and lower for larger trees (e.g. palm trees and *Acer* species trees, in soil) where the turnover is lower. From the analysis above, it can be concluded that **PEQ would not be a viable economic option in cases where the costs of PEQ exceed plant value** (e.g. small *Acer* species), as the costs may easily outweigh the value of plants put in quarantine.

3.3.4. Comparison with the PEQ implemented in selected third countries

In AUS and NZ, PEQ is commonly applied for a range of plants and plant material, including fruit propagating material and seeds.

The implementation of EU PEQ arrangements for the selected plants, as described above, is a more ‘open’ or flexible model than the one currently followed by some TC trading partners. It is also less fully developed at present than AUS and NZ who have long standing experience in applying this measure. The Australian model foresees **specifically dedicated and high bio-security level facilities** (currently undergoing total re-design to higher standards and a coordinated approach across all sectors), and **importers bear the full cost** of the officially imposed quarantine measures at the foreseen minimum quarantine periods and officially set fees[72].

PEQ in Australia

In Australia, the PEQ operation is compulsory for certain types of plants and sets minimum requirements e.g. in terms of the time period during which plants will have to stay in quarantine and the inspections and tests that will have to be performed. Quarantine periods vary according to the type of plant. Many ornamental plants require a 3-month quarantine period, while many fruit trees require 6 months to 2 years in quarantine[73]. These periods may be extended if a disease or pest is suspected to be present.

The PEQ program is run exclusively in PEQ stations appointed by AQIS, and operates on a full cost-recovery basis, aiming to recover the cost of the PEQ operation from importers. This system has three basic types of charge fees:

1. Fees for care and maintenance of plants in quarantine (set per M^2 per day);
2. Fees for disease screening and/or testing; and,
3. Fees for any other services relating to the management of plants while in quarantine.

[72] The NZ PEQ is also quite similar to the AUS model.
[73] For example, Pome fruit budwood is classified as high security due to the risk of the introduction of fireblight (caused by *Erwinia amylovora*) and other exotic pests & diseases. This material can only enter Australia through one of four appointed PEQ stations. The PEQ period for this material was set at 4 years but, following a review of the pome fruit budwood importation protocols in February 2002, it was decided to reduce the PEQ time to 15 months.

The level of fees charged to importers is derived from a calculation of an all-inclusive cost, which includes the use of the facilities, staff and inspection time. The level at which this is set (estimated at €800/year) appears to be in the order of magnitude of the above estimated cost of building a bio-security level ≥1 in the EU plus the estimated costs of inspections.

In particular, the total fee charged in Australian PEQ is set as follows:

No of Plants	Price (a) (b)
1-4 plants requiring a 3 month quarantine period	AUS$52.80 (€38.8) /plant
1-4 plants requiring a 9 month quarantine period	AUS$99.00 (€72.7) /plant
> 4 plants (or seedlings)	AUS$3.30 (€2.4) /m^2/day, with a minimum chargeable unit of 1m^2/day (c)

(a) All prices are GST (tax) inclusive.
(b) Plants which fail to establish in quarantine, or die within the first 3-month period, are charged at the full three month rate. Seedlings which fail to germinate may be replanted once at no extra charge; however, the 9-month charging period will commence from the time of the first planting.
(c) On this basis, for 1 calendar year the fee would equal an estimated €876/m^2

Extension of the PEQ period beyond the periods indicated above is charged on a pro-rata basis of the initial total shipment costs.

AQIS is currently working on a scoping study for future PEQ arrangements. The study extends across all sectors (animal and plant health), including options for building new plant quarantine facilities[74]. The investment[75] will respect a number of criteria developed in consultation with biosecurity experts, industry stakeholders and interested parties to identify the potential future location and site. In particular, the location should be:

- Large enough to allow all the final elements to fit on the site/s with space for future growth should it be needed;
- Outside any current or likely biosecurity risk exclusion zone;
- Away from populations of species in quarantine;
- Within easy reach of an international airport;
- Geographically appropriate for species in quarantine with minimum requirement to create artificial environments;
- Accessible to appropriate skills and support facilities (access to academic and research institutions and appropriate industry and communities).

For plants and plant material, the following specifications and biosecurity requirements are being set in particular:

[74] There are currently 5 leased sites for PEQ (all sectors); leases expire during the period 2010 – 2015. AQIS is using this as an opportunity to comprehensively plan for Australia's long term future post-entry quarantine needs. The plan is to reach a final decision on this, following stakeholder consultation and a formal public works approval process, after mid 2011. The options examined by the scoping study range from fully Commonwealth owned and operated, to public-private partnership arrangements, to fully-privatised arrangements. They are based on information provided by facility users, stakeholders, interested parties and operators of existing post-entry quarantine facilities, as well as biosecurity experts from the public and private sectors.
[75] The total scale of the investment is not known. However, it is subject to a three-stage government approval process which is an obligation for all investments exceeding AUS$30 million (€22 million).

			Biosecurity Requirements
Plants	Greenhouse Area	2 x 100 sqm	QC3
	Greenhouse Area	22 x 100 sqm	QC2
	Screen house Area	4 x 450 sqm	
	Laboratory		QC3
	Laboratory		QC2

Detailed technical specifications for the PEQ station for plants/plant material have been developed. In particular, the PEQ area for plants consists of:

a. A **greenhouse area** where plants and material for use in the plant quarantine facility are received. This area needs to be at QC2 level. Areas to support this function include:

- A staff change area with appropriate storage to allow staff to change into clean lab/nursery clothing before entering the facility and access to staff amenities and lunch rooms;
- An area where "dirty" material is receipted into the facility and where initial inspection and treatment is carried out. This area contains offices and bench spaces with supporting wet services and plant including fume hoods and access to an autoclave.

b. A **laboratory** which is predominantly a QC2 space but which contains a smaller QC3 laboratory and includes the following spaces:

- Microscope Room for light and electron microscopes;
- Culture room for isolating and incubating plant pathogens;
- Tissue culture laboratory for manipulating tissue culture and preparation of specialist media;
- Tissue culture growth rooms for growing tissue culture in appropriate environments;
- Disease reference collection housing disease slides, DNA etc;
- QC3 Laboratory for examination, identification and storage of high risk specimens;
- Reference library;
- General diagnostic laboratory for general plant extractions for ELISA/Wet laboratory;
- Specialist equipment room containing weigh station, fume hood, water distillation unit, centrifuges, bench top macerator and ice maker;
- Molecular laboratories for PCR preparation, PCR mix suite and PCR equipment suite.

c. A **Glass House Complex** consisting of green houses (QC2 and QC3) and screen houses (QC1), preparation areas, external growing areas (i.e. outside the greenhouses) and supporting storage and handling areas as follows:

- QC2 green houses;
- QC3 greenhouses;
- QC1 screen houses;
- Mother block area consisting of a field area for growing plants and a machinery shed;
- Potting area for propagation and potting of plants with ready access to potting media, pots, etc;
- Potting media bay for receipt and storage of potting and propagation media;
- Dispatch area for release of plants
- Chemical preparation and separate chemical storage area;
- Wash bay;
- Waste bins
- Workshop and covered vehicle and plant storage area for tractor, sprayers etc

3.4. Conclusions

From our analysis and expert consultation, the following overall conclusions on the impact of the introduction of compulsory PEQ requirements for imports of the selected categories of plants (plants of rplanting presenting a high risk of latent infections) can be drawn:

- The largest impact will be felt by POs importers of the selected categories of plants;
- As PEQ facilities would be based on PO premises, there will certainly be a need to build/upgrade current PO facilities, in terms of biosecurity (to adjust to requirements on recently adopted ISPM34 – i.e. at least biosecurity level 2), and possibly also in terms of capacity (to allow all imports of the selected plant categories to be placed into PEQ);
- Although, in terms of business disruption, the impact will be zero to minimal after the first 2 years (i.e. when products are released from quarantive), PEQ might not be a viable economic option in cases where the costs exceed plant value (e.g. small *Acer* species), as the costs may easily outweigh the value of the plants put in quarantine;
- In terms of costs for MS CAs, the expressed aim is to fully recover the administrative costs of setting up and implementing PEQ, through fees charged to POs for registration, regular inspections and sampling;
- The expected impact (administrative costs) for the COM is likely to be minimal, although there will be a need to: hold further consultations with MS and steering while setting up and reviewing the system, e.g. in terms of the appropriate requirements for bio-security levels (implementation of ISPM34); and, overseeing that MS correctly implement the PEQ requirements.

The high costs involved in building/upgrading and maintaining facilities to the appropriate bio-security level, as well as in administrative costs (registration, regular inspections and sampling fees to be paid to MS CAs on the basis of full cost-recovery by the latter), are expected to result in some rationalisation in this sector. The following impacts are possible:

- That some POs invest to adjust to the compulsory PEQ requirements, while others close down or shift to alternative business. In many cases (e.g. ES palm imports; several MS bonsai imports) there is a number of relatively small scale nurseries specialising exclusively in this type of trade. It is difficult to predict what business decisions these will make. In general, it is expected that the longer standing business with a strong market position and significant investment already made in this trade will decide to invest in PEQ, while many others operating on a more opportunistic basis (information from MS suggests that there are several such examples) will move out of this market;
- That imports (therefore the availability) of the selected categories of plants will be reduced altogether. There is no information or basis from which to estimate the potential scale of this reduction;
- That final consumer prices for these plants will increase, both due to the reduction in supply (availability) and due to the most likely transfer of the additional import costs to the final consumer price.

Third country trading partners, e.g. AUS and New Zealand also have PEQ obligations on imports of certain plants into their territory. The analysis shows that the Australian model foresees specifically dedicated and high bio-security level facilities run exclusively in PEQ stations appointed by AQIS, and importers bear the full cost of the measures at the officially imposed minimum quarantine periods and officially set fees.

4. Analysis of the financial impact to the Solidarity Regime of covering direct costs and losses of private operators and cases of natural spread (Task 3 and Task 4)

4.1. Executive summary

The objective of Task 3 was to analyse the financial impact of applying the EU solidarity regime to co-finance not only costs of MS CAs but also direct costs of POs pursuant to official measures imposed.

Task 3.1 To clarify the extent to which the rationale and structure of animal health financing is applicable, as a model, for establishing a similar structure for plant health to compensate for such costs

The study has found that the rationale and structure of the animal health (AH) financing could be applicable as a model for establishing a similar structure for PH to compensate for direct PO costs and losses, but the model will need to be adjusted to the specificities of PH and the diversity of sectors affected, for which a more in-depth feasibility study would be recommended. The diversity of HOs and affected sectors covered by the PH regime makes it unlikely that it will be possible to find a model capable of addressing all scenarios and all sectors. To achieve this there is need for prioritisation, based on the significance and impact of plant pests at EU level and for the different sectors. It is further noted that the balance between public and private (commercial) interests needs to be fully taken into account in any model to be developed and in assessing the relative importance of individual HOs for different groups of beneficiaries, the purpose of compensation, and the relative weight of the public versus private good component of such compensation.

Regarding the potential for cost-sharing, a key principle of the ongoing cost and responsibility sharing schemes (CRSS) being developed in AH, is that direct costs should be partly covered by public resources (up to maximum ceilings), while for the compensation of non-covered direct losses and consequential losses, POs should assume primary responsibility through the development of private insurance schemes/mutual funds. PO liability - a key component in relation to Food Law - for helping mitigate risks through appropriate action is seen as an important element for future CRSS, as long as this does not result in a disproportionate administrative burden. The availability of support could be linked to compliance with statutory action, analogous to the “three tier approach”[76] which was discussed between the COM/MS in TF4 for contingency planning/minimum mandatory action. In practice, for a very limited number of EU priority pests, pest-specific contingency plans should be developed, with strong involvement of stakeholders. Contingency plans could thus include both preventative measures taken by POs and PO response/cooperation in the event of an outbreak. In such cases the co-financing of the eradication measures by the EU should be very substantial given the high importance of the pests and the fact that the actions are mandatory.

Stakeholders’ views were found to be quite divergent and generally the need for public intervention with solidarity funding appears to correlate with the interests of the more

[76] 1. Detection of a new listed/non-listed pest in new areas (minimum mandatory action – no contingency plan);
2. Detection of a listed pest of EU importance (generic EU contingency plan);
3. Detection of a listed pest of priority EU importance (EU pest-specific contingency template with minimum mandatory actions and national contingency plans).

fragmented sectors. In broad terms, the arable sector appeared to favour reliance on Common Agricultural Policy (CAP) support in relation to funding, arguing that the funding for plant health solidarity should not affect the overall funding for CAP, while the horticultural and forestry sectors were more interested in compensation.

Task 3.2: To estimate in global terms (order of magnitude) the direct costs of POs associated with the officially imposed measures that would be eligible for compensation.

This analysis was carried out for a representative selection of HOs affecting the different sectors[77]. The FCEC estimates are summarised according to eligibility under three headings:

(i) Already eligible direct costs and losses: these are currently covered by solidarity i.e. costs of removal, destruction, disinfection, sampling and testing. These were estimated at the range of €19.3 - €44.8 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (i) are estimated at €32 million per year**;

(ii) Currently non eligible direct costs and losses: these are the costs not covered currently by solidarity i.e. loss of plant/production value for POs. These were estimated at €6.7 - €13.4 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (ii) are estimated at €10 million per year**;

(iii) Currently non eligible indirect costs and losses: these are the costs that go beyond the scope of Task 3, i.e. consequential losses from movement bans for POs. These were estimated at €15.3 - €19.4 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (iii) are estimated at € 17.4 million per year**.

3.4 *To estimate the costs for the EU and MS CAs of expanding the solidarity regime to co-finance direct costs of POs, under two different scenarios: at current level of checks (scenario 1: static scenario); at increased level of checks (scenario 2: dynamic scenario)*

A priori, it is noted that the current legal basis in principle already provides the framework for compensation of certain costs/losses of POs when these are directly related to the implementation of officially imposed phytosanitary measures; this has however not yet been fully implemented. The impact on EU solidarity funding should therefore in principle be considered as neutral on this basis, as an increase in the required funding would relate to the full implementation of the current provisions. Nonetheless, in practice, full implementation of these provisions will carry an additional cost for the solidarity funding when compared to the current implementation.

Under the *static scenario*, on the assumption that all the MS where outbreaks occur introduce solidarity requests and all the dossiers submitted by MS are eligible[78], all direct costs and losses would be covered by the EU at 50%[79]. The additional EU expenditure required for funding under solidarity if direct losses are made eligible (heading (ii)), at 50% co-financing

[77] *Diabrotica vv, Ralstonia solanacearum, Clavibacter michiganensis ssp. Sepedonicus, Bemisia tabaci, Erwinia amylovora,* Potato Spindle Tuber Viroid, *Bursaphelenchus xylophilus, Anoplophora chinensis, Anoplophora glapripennis, Rhynchophorus ferrugineus.*

[79] Compensation rate by MS is 100%.

rate, would therefore amount to ca. **€5 million per year**. This expenditure would be **additional** to the estimated expenditure to cover the already eligible direct costs (heading (i): €16 million per year of EU co-financing at 50%).

The inclusion of direct costs and losses under solidarity funding may have an impact of the level and intensity of measures imposed on the POs, and therefore impact on the overall solidarity funding (*dynamic scenario*). Over the last five years, a total amount of **€29 million** was paid in 10 MS to compensate costs and losses of POs following outbreaks of HOs, i.e. an average **€5.9 million per year.** By extrapolating to the whole EU, this would result in potential compensation at EU level of some €11 million per year[80]. In the absence of any further evidence, it is **not possible to quantify** the impact of the introduction of the coverage of costs and losses of POs on the level of measures imposed on the POs and co-financed by MS and therefore by the solidarity regime. On a qualitative basis, the availability of compensation for direct PO costs and losses incurred by the officially imposed measures is likely to trigger the implementation of national compensation schemes the legal basis for which currently exists in MS, but which have not been so far activated, very likely to increase the implementation of officially imposed measures by POs, and mostly unlikely to increase the intensity of measures taken by national authorities.

Task 4: *Objective: to estimate the impacts for the EU and the MS of expanding the Solidarity Regime so as to also cover prevention measures for natural spread.*

Only 7 MS (out of the 25 MS that responded to the FCEC survey) indicated they would submit a dossier for outbreaks caused by natural spread. The **total cost** of these dossiers, as indicated by MS (only 5 MS provided figures), would reach **at least €7.3 million per year**.

On the basis of 50% co-financing, the **impact on the EU solidarity budget** would therefore be **at least €3.7 million per year**.

The figures provided by MS indicate that the increase in solidarity, although **not significant** in most cases, **would become substantial** in the case of inclusion of natural spread **for HOs affecting the environment**, as the case of *Rhynchophorus ferrugineus* indicates. This is due to the high eradication costs of these HOs, as shown in the analysis for Task 3, particularly if direct losses (heading ii) are also to be covered. It is also evident that the HOs with the highest potential for natural spread are also those with the most significant potential costs from the control measures taken in the case of outbreaks.

4.2. Objectives and methodology

The objective of this **Task 3** was to analyse the financial impact of applying the EU solidarity regime, to co-finance not only costs of MS CAs but also direct costs of POs. In particular, this task required:

[80] It includes all costs and losses. It is noted that this calculation does not take into account specificities in MS in terms of current cost sharing arrangements, and focus on particular HOs and sectors of national relevance, but it is simply based on the current French compensation model.

- To clarify the extent to which the rationale and structure of AH financing is applicable, as a model, for establishing a similar structure for PH to compensate for such costs (**Task 3.1**);
- To estimate (quantify) in global terms (order of magnitude) the direct costs of POs associated with the officially imposed measures that would be eligible for compensation. The analysis was carried out for a representative selection of HOs affecting the different sectors (**Task 3.2**);
- Estimate (quantify) the costs for the EU and MS CAs of expanding the solidarity regime to co-finance direct costs of POs, under two different scenarios: at current level of checks (scenario 1: static scenario); at increased level of checks (scenario 2: dynamic scenario) (**Task 3.3**).

The objective of **Task 4** was to estimate the impacts for the EU and the MS of expanding the Solidarity Regime so as to also cover prevention measures for natural spread.

In order to proceed with this analysis, the FCEC has identified the need to define '*direct costs and losses*', at least as a working hypothesis for the purposes of the cost calculations involved. This is needed due to the currently open interpretation of the relevant Article of Council Directive 2000/29/EC[81] on the costs and losses that might be covered by solidarity.

In this context, and maintaining consistency with the approach and principles followed with respect to the compensation of direct costs and losses in the AH field, the FCEC established a correspondence (**Table 15**) between the cost elements covered under 'direct costs and losses' in the context of AH emergency and control measures (as foreseen in Article 3 of Council Decision 2009/470/EC) and what would be the equivalent under current PH measures (Council Directive 2000/29/EC).

Table 15 differentiates between the broad categories of direct costs and indirect costs and losses, in accordance with the approach followed in the AH field. On this basis, the FCEC has gathered data and estimated the costs for the various categories of costs and losses indicated in **Table 15**, so as to provide to the COM a broad evidence base from which conclusions can be drawn.

[81] The current legal framework includes compensation for the costs and financial losses resulting directly from official measures (without distinguishing whether these are borne by MS CAs or POs) of up to 50%, and for 'loss of earnings'[81] of up to 25% and subject to certain conditions. It is not clear at present whether the loss of the value of destroyed material is considered under this heading (the CPHR evaluation recommends the extension of the current scope of the Solidarity Regime to cover the losses of destroyed material, i.e. to compensate growers for the lost value of material that had to be destroyed because of official phytosanitary measures (Recommendation 9).) In practice, MS can not include the value of destroyed plant material, except in the case of clear cut belts (e.g. in the case of PT dossier, on the basis of Article 23.6 of Directive 2000/29/EC).

Table 15 Comparison of costs/losses of POs, animal health and plant health

Measures	Animal Health (a)	Plant Health (b)
General provision:	**MS to provide swift and adequate compensation of the livestock farmers, to cover costs of:**	**To cover costs and compensate for financial losses resulting directly from the following measures:**
	<u>'Direct costs and losses'</u>	

destruction	• Slaughter of animals*, and their destruction;
	• In some cases, value of destroyed animal products (AI, FMD)**
	• Destruction of contaminated feed and equipment (where the latter cannot be disinfected)
		• *Destruction of plants, plant products or other objects:*
		  ○ *constituting the consignment(s)*
		  ○ *grown from plants in the consignment(s);*
		• *Destruction of growing media/land;*
		• *Destruction of production, packaging, wrapping and storage material, storage or packaging premises and means of transport, in contact with the above*

disinfection	• Cleaning, disinsectisation and disinfection of holding/equipment	• *Disinfection, disinfestation, sterilisation, cleaning or any other treatment carried out, on the above listed objects/material*
	<u>'Indirect costs and losses'</u>	
	Current legal framework does not appear to cover business losses resulting from:	***By way of derogation, to compensate for loss of earnings resulting directly from any of the following measures:***
protection/ prevention of further spread	• *Establishment of protection zones;* • *Imposition of suitable measures to prevent the risk of spread of infection, including trade interruption, restrictions on movements;* • *Establishment of a waiting period to be observed after slaughter before re-stocking of the holding;* • *Restrictions imposed on the marketing of livestock products or loss of animal value (abortions) as a result of vaccination* (except for FMD***)	*Prohibitions or restrictions in respect of the use of growing substrates, cultivable areas or premises, as well as plants, plant products or other objects - other than material from the consignment(s) in question or grown thereof - where they result from official decisions taken on the grounds of plant-health risks related to the HO introduced*

<u>Note</u>: costs in italics are currently either not foreseen by legislation or not covered in practice

(a) On the basis of Article 3 of Council Decision 2009/470 (50 % of the costs incurred by MS in compensating owners; owner compensation rate is not fixed). Implementation varies by MS and disease;
(b) On the basis of Article 23 of Council Directive 2000/29 (50% of the costs incurred by MS of implementing measures; 25 % of the costs incurred by MS in compensating owners for loss of earnings; the latter option has not yet been implemented)

* Includes slaughter of infected animals/herd and pre-emptive slaughter of contact animals/herds.
** In the case of AI: value of the eggs destroyed. In the case of FMD: destruction of milk.
*** In the case of FMD the following losses can be compensated: losses incurred by farmers as a result of restrictions imposed on the marketing of livestock and pasture-fattened animals as a result of the reintroduction of emergency vaccination (Article 50(3) of Directive 2003/85/EC).

The estimation of direct costs and losses incurred by POs in the different sectors is a <u>highly complex exercise</u>, which depends on several factors, including among others the intensity and the stage (early or advanced) of the outbreak, the number of POs likely to be affected, and the value of plants and/or plant material that need to be destroyed. The cost of an outbreak will be also be affected by the production structure of the sector and the intensity of the official measures imposed on POs. These estimates will therefore be highly variable from year to year and between MS (due to different price levels).

To overcome this issue, the FCEC has proceeded as follows: first, the **average ('standard') cost of a typical outbreak** (or typical range of outbreaks) was calculated; second, extrapolations were made from this 'standard' cost based on the historical number of outbreaks and other epidemiological information. The estimations were made on the basis of yearly averages, and were subject to sensitivity analysis and data calibration in relation to actual outbreak costs and losses, as reported in literature and in MS solidarity dossiers submitted and approved during 2001-10.

A more simplified approach was followed in cases where necessary data to estimate 'standard' costs were lacking (e.g. *Bemisa tabaci*, PSTVd), and generally for outbreaks in nurseries, which are more difficult to model. This approach is consistent with cases reported in literature. Estimates in literature generally extrapolate on the basis of past outbreaks, assuming, for simplicity, an average cost to estimate *ex ante* the impact of such outbreaks on a larger scale, as a more precise estimate would require complex modelling to take into account all influencing factors[82].

The FCEC extrapolations in the context of Task 3 are made on the basis of an epidemiological analysis that reviewed the number of historical outbreaks. The final figures obtained by this extrapolation are dependent on the number of outbreaks that have occurred in the EU-27 in recent years, and this parameter has been very difficult to determine. Our basis has been MS notifications of outbreaks to the COM, supplemented where necessary/appropriate by the results of MS annual surveys as reported to the FVO. The assumption has been that only outbreaks notified in a timely manner to the COM qualify for solidarity funding as is the current rule.

In the context of the current exercise, POs have been invited to provide further data and the request has been followed up by interviews with selected PO. However, the data provided have been very limited, both with regard to geographical coverage and sectors covered[83]. The data provided by POs have been complemented by data from literature review, and extrapolated on the basis of epidemiological data (FVO reports), adjusting the extrapolations with the adequate data, such as differences in gross margin and size of the sector. The aim of

[82] For instance, Williams *et al.* (2010), reported that "*a single outbreak of Thrips palmi* [in the UK] *in 2004 cost one landowner £56,000 (£70,646 today) (MacLeod et al. 2004). This was considered to be a very large outbreak, with associated high costs. Due to the limited amount of information available concerning the costs of dealing with outbreaks of controlled pests, it is assumed that each outbreak costs the same to deal with, with an estimated cost of £40,000 (reduced from the high cost of £70,500 for the melon thrips outbreak discussed above).*" On the basis of the outbreaks of agricultural and horticultural quarantine in 2009, the study estimates an annual cost of eliminating outbreaks of agricultural and horticultural pests at £2,360,000. As for the UK forestry sector, assuming that there are 10 additional outbreaks of quarantine pests to control each year, and assuming an average cost per outbreak of £50,000, the annual cost for the UK of controlling quarantine forestry pests is estimated in the same study at £1,000,000.

[83] It is noted that the extent of the impact of outbreaks on POs was previously investigated in the context of the CPHR specific cost survey and interviews. Although the data provided by POs were very scarce, the available data indicated that the costs and losses incurred by POs can be very large as illustrated with the following cases:

- PWN in PT (1999-2008): almost €40 million spent by land owners;
- PSTVd in NL (2006): between €5 and €7 million spent by 60 growers for destruction of plants;
- *Ditylenchus dipsaci* (Tulip Nematode) on tulip bulb in NL (every year): €2 million on average spent for national cost survey, crop destruction and disinfection;
- *Erwinia amylovora* on fruit trees in NL: up to €20,000 per producer for the destruction of plants.

this exercise is to provide, on the basis of costs of past outbreaks and on the basis of historical trend of outbreaks, an estimated figure for the EU 27, which could provide an indication of the order of magnitude of such costs and losses in case they were to be included in the solidarity regime.

4.3. Impact analysis

4.3.1. Task 3.1: Plant health financing model

Objective: to clarify the extent to which the rationale and structure of animal health financing is applicable, as a model, for establishing a similar structure for plant health to compensate for such costs.

As noted in the methodology section, the FCEC has started the analysis of direct costs and losses (as opposed to indirect or consequential losses) incurred by POs following official measures taken, by establishing a correspondence table between current legal provisions for the coverage of these costs and losses in the AH and PH field (**Table 15**).

Regarding the potential for cost-sharing it is important to follow and draw from the experience of the ongoing revision of Council Directive 2009/470/EC (ex Directive 90/424/EC) on expenditure in the veterinary field and the development of a harmonised framework for costs and responsibility sharing schemes (CRSS) for animal diseases.

A key principle of the ongoing CRSS development in AH, with a view to providing the right balance of incentives, is that direct costs should be partly covered by public resources (up to maximum ceilings[84]), while for the compensation of non-covered direct losses and consequential losses, POs should assume primary responsibility through the development of private insurance schemes/mutual funds. The CPHR evaluation also draws a distinction between: direct costs and losses, i.e. costs and losses directly incurred from the official control measures taken to address an outbreak; and, indirect or consequential business losses, i.e. losses indirectly accrued to the sector and related industries as a result of the measures in place[85].

From the preliminary results of the ongoing CRSS feasibility study in the AH field the following conclusions can be drawn:

- The direct PO costs and losses could be covered by a harmonised EU CRSS scheme but indirect or consequential losses are more difficult to establish and estimate and this is due *inter alia* to the fact that these are only established post outbreak and therefore may not represent the actual extent of the losses[85];

- The level of these losses in terms of culled animal value loss can be clearly established on the basis of unique at EU level unit values per type of animal, unlike the PH field,

[84] In the animal health field, the Council WP of CVOs of 22 February 2008 has concluded that, in considering the development of a harmonised framework on CRSS for compensation of direct losses, public resources should not exceed maximum ceilings, to be defined on the basis of the categorisation of diseases or other relevant criteria (including the ability of farmers to affect the risk of diseases occurring).

[85] It is noted that the definitions of 'direct' versus 'indirect' losses does not necessarily include the same coverage under each field. In the animal health field, indirect or consequential losses includes the cost of movement/restrictions and secondary indirect spill over and ripple effects.

where there is significant variation between the MS unit values[86], not only of plant material but also of direct costs currently co-funded by the solidarity regime[87];

- In this context, it would be useful for DG SANCO to proceed to a feasibility study of establishing a CRSS scheme in the PH sector. This would follow up on similar studies currently pursued by MS as well as draw on the full and final results of the feasibility study on CRSS in the AH field.

The analysis on the potential for cost-sharing in the PH field involved also consultation with TF4, MS and stakeholders. Discussion is ongoing on the balance in the use of public funds for measures targeting HOs that are primarily causing significant environmental impact (i.e. where there is public good component) versus HOs that are primarily of commercial impact. The position in this debate differs between sectors and MS, depending on the level of fragmentation in the organisation of each sector in each MS. Our selection of HOs under Task 3 has therefore aimed to ensure that we have captured the balance between 'commercial' and 'environmental' pests and between sectors and MS.

Consultation with MS highlighted that, given the **complex and extensive landscape of HOs and affected sectors covered by the PH regime**, it would be unlikely to achieve a single solution to fit all scenarios and all sectors. The balance between the public and private (commercial) interests should be taken into account in the model to be developed, in assessing the relative importance of individual HOs for different groups of beneficiaries, as well as the purpose of the compensation. In Australia[88], for instance, the relative importance of individual HOs for different groups of beneficiaries has been analysed and used as the rationale for deciding on how to model cost sharing in advance of outbreaks. Within this model, the balance between public and private (commercial) interests varies considerably, particularly where the primary concern is the impact on the wider environment. When considering the beneficiaries of such payments (compensation), the system should also take into account the 'polluter-pays' principle for defining responsibilities, e.g. in the agricultural sector; this principle may need to be applied in a different manner in the case of private garden owners, where compensation is in certain cases already granted at MS level to cover damage costs.

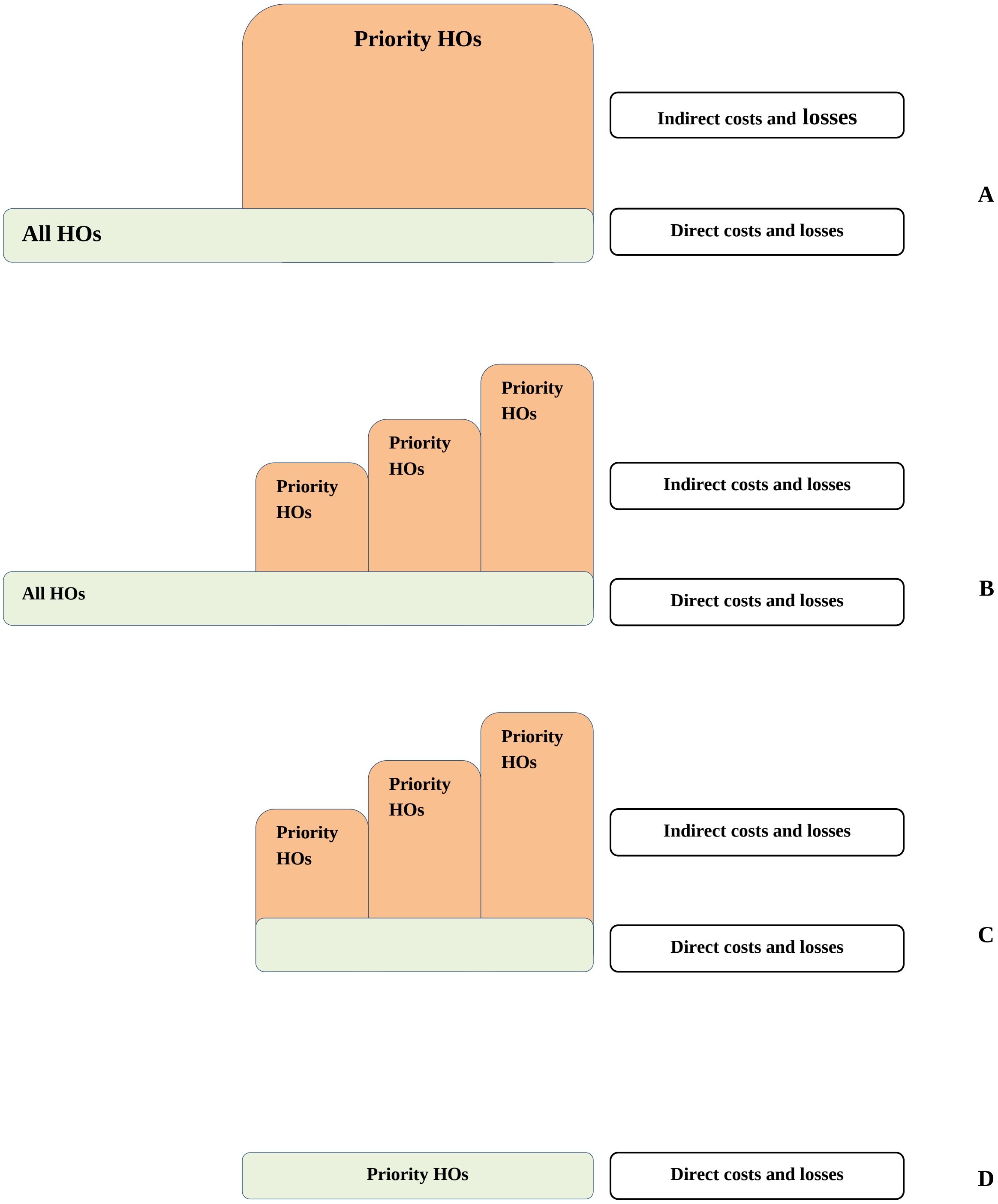
The previous evaluation has concluded on the need for **prioritisation** in terms of the significance and impact of plant pests at EU level and for the different sectors (in particular making the distinction between the environment/public green and commercial agriculture and forestry). This discussion has been ongoing in the COM and with the MS (e.g. Informal Chief Officers Plant Health (COPHs) meeting in Budapest, May 2011). In this discussion, the Australian model and process of prioritisation has also been examined. The conclusions of this discussion to date can be summarised in the following graph. A number of potential models for prioritisation appear to be emerging from the discussion, in particular: a) the coverage of direct costs and losses only for all HOs under Directive 2000/29/EC, with potential inclusion of other costs and losses for a limited number of priority HOs; b) as in a),

[86] For example, for ornamental plants, the value of plants of *Acer* spp. can range from €80 to €1,500, depending on plant size (nursery wholesale basis; source: industry data); for palm trees in the open environment for grown palms €1,000-€ 3,000 (excluding landscape value or high value palm trees), nursery prices of young palm trees from €25 to €100 (source: industry data).
[87] To some extent this can be explained by the difference of actions taken but there is no systematic approach to assess this.
[88] http ://www.planthealthaustralia.com.au/go/phau/epprd

but with a graduation in the extent of inclusion of priority HOs, depending on their priority level; c) coverage of costs and losses (direct and possibly also some indirect) for a more extensive number of priority HOs with a graduation again depending on their priority levels, and d) coverage of direct costs and losses only for a more extensive number of priority HOs:

Figure 1: Discussion on prioritisation models for funding under the EU PH regime

(Note: Priority level is defined in terms of relative weight of private versus public good)



In terms of principles, it was noted that there should be a reflection on whether the availability of compensation would act as an incentive in encouraging positive behaviour - such as the timely notification of the presence of pests, rather than a perverse incentive in terms of encouraging phytosanitary risk taking (or fraudulent behaviour) by providing a safety net for potential risk-takers. TF4 stressed that any recommendation in any of this sense would need evidence to support the rationale behind it. It was also noted, in relation to the improvement of notification of pest presence by POs, that the level of technical expertise required to identify plant pests meant that it was unlikely that POs would necessarily be able to identify a problem in all situations.

In terms of eligibility for funding, extending payments for costs incurred beyond the commercial sector or wider in the distribution chain, including indirect costs and losses, clearly has significant budgetary implications, particularly in relation to tackling threats to the wider environment. It was noted that there were already some examples of payments made by some MS in respect of action taken in private gardens. No clear conclusions were reached on this issue other than it would need to be addressed, probably at political level. Ultimately the deciding factor would be the amount of funding available.

From the consultation with stakeholders, the views expressed at the Advisory Group of the Food Chain, Animal Health and Welfare – PH on the 18 February 2011, revealed once again differences among the sectors[89]. In broad terms, the arable sector appeared to favour reliance on CAP support in relation to funding, arguing that the funding for PH solidarity should not affect the overall funding for CAP, while the horticultural and forestry sectors were more interested in compensation. The distinction between sector positions appears to confirm the observation made above that the need for public intervention with solidarity funding appears to correlate with the interests of the more fragmented sectors.

It can also be concluded that the availability of support could be linked to compliance with statutory action, in analogy with the three tier approach being envisaged for contingency planning/minimum mandatory action. The TF on Emergency Measures and Solidarity set up by DG SANCO and composed of DG SANCO services and MS concluded in its meeting in October 2010 that there could be three levels of minimum mandatory actions or contingency planning:

1. Detection of a new listed/non-listed pest in new areas (minimum mandatory action – no contingency plan);
2. Detection of a listed pest of EU importance (generic EU contingency plan);
3. Detection of a listed pest of priority EU importance (EU pest-specific contingency template with minimum mandatory actions and national contingency plans).

In relation to the third level, the TF approach has been that for a very limited number (5-10) of EU priority pests, pest-specific contingency plans should be developed[90]. In such cases the co-financing of the eradication measures by the EU should be very substantial considering the importance of the pests and the mandatory actions. The TF considered that such pest-

[89] Similar variations in MS position have already been evident at the consultation held during the FCEC CPHR evaluation (FCEC, 2010).

[90] These pest-specific contingency plans could be similar to current control directives and contain, besides administrative, logistical and transparency requirements, specified minimum mandatory actions such as pest-specific eradication measures, identification protocols and survey details. Such pest-specific contingency plans would lay dormant until the pest is detected.

specific contingency templates with minimum mandatory requirements would have to be developed at EU level. At national level, contingency plans would need to be developed to allow for a more tailor-made eradication programme reflecting local conditions.

The TF also concluded that the development of pest-specific contingency plans would need the strong involvement of stakeholders in order to improve the applicability of the measures and to advocate the importance of 'EU priority pests'. The acceptability of pest-specific contingency plans could be improved through industry participation in their development.

Contingency plans could thus include both preventative measures taken by POs and PO response/cooperation in the event of an outbreak. Extending this concept might include the establishment and operation of phytosanitary 'management plans' by individual POs; indeed, PO liability for helping mitigate risks through appropriate action is seen as an important element for future CRSS, as long as this does not result in a disproportionate administrative burden. The concept of PO liability was however seen as an important issue in securing partnership working as a key element of a strengthened regime. It was noted that this approach was a key component in relation to Food Law. The COM could draw on this a parallel from the AH approach in relation to links between compensation and compliance with bio-security requirements.

The FCEC analysis therefore concludes that the rationale and structure of the animal health financing could be applicable as a model for establishing a similar structure for plant health to compensate for direct PO costs and losses, but the model will need to be adjusted to the specificities of plant health and the diversity of sectors affected, for which a more in-depth feasibility study would be recommended.

4.3.2. Task 3.2: Estimation of direct costs and losses of private operators

Objective: to estimate (quantify) in global terms (order of magnitude) the direct costs of POs associated with the officially imposed measures that would be eligible for compensation (analysis carried out for a representative selection of HOs affecting the different sectors).

The results of the FCEC estimations of the direct costs and losses, as presented in detail in **Table 16**, are summarised according to eligibility under the following headings:

(i) Already eligible direct costs and losses: these are currently covered by solidarity i.e. costs of removal, destruction, disinfection, sampling and testing. These were estimated at the range of €19.3 - €44.8 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (i) are estimated at €32 million per year**;

(ii) Currently non eligible direct costs and losses: these are the costs not covered currently by solidarity i.e. loss of plant/production value for POs. These were estimated at €6.7 - €13.4 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (ii) are estimated at €10 million per year**;

(iii) Currently non eligible indirect costs and losses: these are the costs that go beyond the scope of Task 3, i.e. consequential losses from movement bans for POs. These were estimated at €15.3 - €19.4 million per year, reflecting the various scenarios used in the calculations. As an average between all scenarios, **the costs of heading (iii) are estimated at € 17.4 million per year**.

For the 10 HOs covered by this analysis, the total costs and losses of POs that are currently non eligible/not covered by solidarity refer to the direct loss of plant/production value from the official measures taken (heading ii) and are estimated to reach a total of **€6.7 - €13.4 million per year.**

It is noted that for certain of the pests affecting the open environment, e.g. *Rhynchophorus ferrugineus*, the FCEC estimates in category (i) above includes costs of destruction for plants in private gardens, which can be roughly estimated at 50% of the total cost indicated here. To date, however, it is our understanding that solidarity funding has only covered destruction costs in public green, therefore the remaining 50% of this estimated cost is included in (ii).

Table 16 Summary of results for Task 3

Harmful organism	Costs considered in the analysis (a)	(i)Direct costs/losses already eligible (€)	(ii)Direct costs/losses currently non eligible (€)	(iii)Indirect costs and losses currently non eligible (€)	Average annual payments (2001-10) EU solidarity (€) 50% EU co-funding
Anoplophora chinensis	Destruction costs	€600,000 to €2 million			€893,000
	Replacement of trees	€2,700 to €8,900			
	Extra costs for inspections	€62,000			
	Value of destroyed material (destructive sampling at inspections)		€326,000		
	Losses deriving from prohibition to movement			€2.4 million	
	Loss of trade			€3.8 million	
	Loss of market			€2.4 million	
Anoplophora glabripennis (b)	Destruction costs	€377,000 to €1.3 million			€100,800
	Replacement of trees	€7,400 to €12,400			
Bursaphelenchus xylophilus	Destruction of trees	€4.6 million to €27.7 million			€4.0 million
	Replacement of trees	€1.5 million			
	Loss of owners (compensation for removed wood) (c)		€1.4 million to €8.1 million		
	One off cost heat treatment (d)	€8.6 million			
Rhynchophorus ferrugineus	Destruction costs (e)	€1.1 million	€1.1 million		€217,600
	Value of destroyed material (at average nursery price) (f)		€218,000		

	Treatment	€95,000			
Diabrotica vv.(g)	Pesticide treatment	€821,000			**€368,000**
	Crop rotation			€630,000	
Bemisia tabaci	Costs and losses	€434,000 (not possible to differentiate)			**€68,900**
Ralstonia solanacearum	Destruction of detected lots	€571,000			**€186,000**
	Other costs (tracing and sampling)	€148,000			
	Downgrading of probably infested lots			€3.5 million	
	Consequential losses			€1.6 million	
Clavibacter michiganensis ssp. sepedonicus (h)	Destruction of detected lots	€241,000			**€ 36,000**
	Other costs (tracing and sampling)	€20,000 to €148,000			
	Downgrading of probably infested lots			€489,000 to €3.5 million	
	Consequential losses			€597,000 to €1.7 million	
PSTVd (i)	Lost value		€3 million		**€343,800**
Erwinia amylovora (j)	Direct costs (k)	€160,000			**€80,400**
	Lost value		€640,000		
Total		**€19.3 - €44.8 million**	**€ 6.7- €13.4 million**	**€15.3 - €19.4 million**	**€6.3 million**

(a) The significance of the units can be very different from case to case. For example, a standard unit might be based on area, but even then the potential impact on a hectare of field is different from the impact on a hectare of glasshouse production. These differences need to be taken into account if comparing between the impacts of different HOs.

(b) All the available studies on *Anoplophora glabripennis* concern impacts on the open environment, therefore impacts on nurseries (direct/indirect) are not included in this analysis. In the event of an outbreak of this HO in nurseries, costs could be extrapolated from *A.chinensis*.
(c) Based on figure of the average market 'stumpage' price for pine logs (€/m^3) as reported by some MS, and an average yield of m^3/tree. The figure calculated on the basis of data in the solidarity dossier for ES is €5/tree, but this is considered too low as the forests concerned are considered to be of low commercial value.
(d) Based on figure in the solidarity dossier submitted by Portugal in 2010 (based on industry data and calculations); the audit of the European Commission has been followed up by a request to the MS of a corrected value for this cost, which is considered to be too high. Given the lack of information on heat treatment costs from other sources the figure has been used for the calculations in this study, and it can be modified in due course in case new evidence comes to light.
(e) The number of palms considered is the estimated number of destroyed palms covered by solidarity (up to 1,000 trees over the last 2 years) rather than the total number of destroyed palms, which is 95,000 palms (average: 25,000 palms destroyed/year in the last 3 years).
(f) On an average price of €50-100/palm tree, assuming that up to all trees are compensated. Otherwise, it would concern only a fraction of this, i.e. nurseries.
(g) Calculations relate only to new outbreaks, not to containment in buffer zones or suppression in infested MS.
(h) The lower figures exclude PL, please see related section. The information available today on notifications only allows us to extrapolate to this level. If however, new evidence comes to light on the full picture of new outbreaks, the costs and losses could be estimated. In order to take into account this factor, an upper range of the figure is given, assumed at the same level as *Ralstonia solanacearum* (higher figure of the range).
(i) The outbreak in the NL is considered to be exceptional, therefore we assume an outbreak like this every 2 years.
(j) This data is on a historical basis, as it is not possible to extrapolate to future scenarios, given the high variability in values of the plants that could be affected by the HO. On the basis of data on outbreaks (in PZs - FVO source) it is not possible to determine the intensity of the outbreaks (i.e. in terms of the number of plants affected), nor the sites concerned (i.e. differences in value of destroyed plants in nursery and orchards). These values are provided in the text. On the basis of various sources; in theory solidarity only applies to PZs, therefore only these MS considered in the analysis. Based on information provided by MS, the bulk of this represents loss of value.
(k) Destruction costs estimated at 20% of total historical average cost.

4.3.3. Task 3.3: Financing of directs costs and losses of private operators

Objective: to estimate (quantify) the costs for the EU and MS CAs of expanding the solidarity regime to co-finance direct costs of POs, under two scenarios: at current level of checks (scenario 1: static scenario); at increased level of checks (scenario 2: dynamic scenario).

4.3.3.1. Static scenario (1)

A priori, it is noted that the current legal basis (Article 23, point 3 of Directive 2000/29/EC) in principle already provides the framework for compensation of certain costs/losses of POs when these are directly related to the implementation of officially imposed phytosanitary measures. This has not yet been fully implemented[91], with the exception of the EU co-financing of direct costs when these have been compensated by MS and claimed under EU solidarity[92]. The impact on the EU solidarity funding should therefore in principle be considered as neutral on this basis, as an increase in the required funding would relate to the full implementation of the current provisions. Nonetheless, in practice, full implementation of these provisions will carry an additional cost for the solidarity funding when compared to the current implementation. The FCEC has provided the full typology of costs and losses and the calculation of each of those from which the cost of full implementation could be deduced.

In deducing from these calculations the order of magnitude of the potential expenditure under solidarity funding, some further factors have to be taken into account. These are: the minimum threshold needed in order to submit a dossier (€10,000 from 2011); the percentage sharing between the EU and MS, which may vary for the various typologies of costs; the administrative costs and effort associated with the submission of a dossier, which for dossiers of relatively small scale is reported to act as a disincentive for submission; and, finally, budget constraints in MS which may affect the availability of funds for MS to provide their contribution to the total budget required by the measures. With regard to the last point, it is noted that in the period 1998 – 2010, a total of 11 MS applied for financial contribution to the EU; some MS with known cases of outbreaks of HOs covered by the EU PH regime have no experience of submitting solidarity dossiers. The presented costs do not necessarily imply that all of these costs will qualify for solidarity payments. The CPHR evaluation indicated that "*based on data provided by 18 MS CAs[93], the total costs incurred by MS for this obligation amounts to € 133,504.335 over the period 1993-2008 (or from the data of accession for the NMS). In addition, 4 MS have indicated that they have provided*

[91] Art. 23 (3) "*By way of derogation [...]* ***an implementing Regulation*** *may specify cases in which compensation for loss of earnings shall be considered to be expenditure directly relating to necessary measures subject to the conditions specified in this respect in paragraph 5 as well as the time limitations applicable to those cases, with a maximum of three years*."

[92] It is noted also that the two legal bases for financial support on agriculture in principle foresee compensation for farmers' costs and losses arising from EU standards, including phytosanitary measures. Council Regulation (EC) No 1698/2005 (on support for rural development by the European Agricultural Fund for Rural Development (EAFRD)) foresees in Article 31.1 that standards (including on plant health) impose new obligations on farmers and consequently support should be provided to help cover partly the additional costs or income foregone arising from these obligations. Council Regulation (EC) No 73/2009 (establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers) foresees that MS have the option to contribute financially to the premiums farmers pay for crop, animal and plant insurance as well as to the financing of compensation for certain economic losses in the event of animal or plant diseases and environmental incidents through mutual funds.

[93] The calculations are made with the data available, and are therefore not exhaustive.

compensation to producers for a total amount of € 9,191,780. A number of MS have also received reimbursement through the Solidarity Regime, for a total amount of € 29,257,732"[94].

Furthermore, the inclusion of direct costs and losses under solidarity funding may have an impact of the level and intensity of measures imposed on the POs, and therefore impact on the overall solidarity funding (dynamic scenario).

Therefore, when considering the impact of the inclusion of costs as estimated in Task 3.2, the above outlined factors should be taken into account. On a qualitative basis, these factors would operate in the following directions of impact:

	Impact on solidarity fund
Minimum threshold for the submission of a dossier	↓
Administrative burden	↓
Compensation for direct costs	=
Compensation for direct losses	↑

On a quantitative basis, in order to provide an overall figure, the FCEC has made the following assumptions:

- All direct costs and losses are included in the solidarity funding and they are covered by the EU at 50%;
- The compensation rate by MS is 100%;
- All the MS where outbreaks occurred introduce solidarity requests;
- All the dossiers submitted by MS are eligible.

On the basis of the costs and losses estimated under Task 3.2 and the above assumptions, the additional EU expenditure required for funding under solidarity if direct losses are made eligible (heading (ii)) amounts to ca. **€5 million per year**. This expenditure would be in addition to the estimated already eligible direct costs (heading (i): €16 million per year).

Table 17 Impact on EU expenditures for solidarity funding from the inclusion of coverage of direct costs and losses of POs (static scenario, Task 3.3)

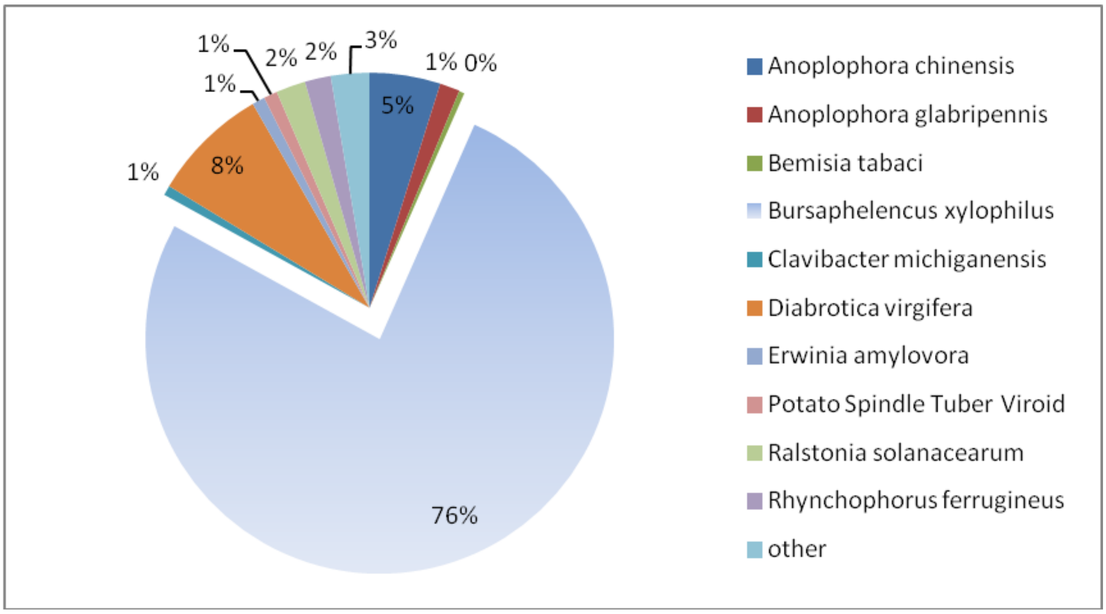
Harmful organism	***(i)Direct costs/losses already eligible (€)***	***(ii)Direct costs/losses currently non eligible (€)***	***(iii) Indirect costs/losses currently non eligible (€)***
Anoplophora chinensis	684,000	163,000	4.3 million
Anoplophora glabripennis	413,000		
Bursaphelenchus xylophilus	13.1 million	2.4 million	
Rhynchophorus ferrugineus	593,000	654,000	
Diabrotica vv.	410,000		315,000
Bemisia tabaci	217,000		
Ralstonia solanacearum	360,000		2.5 million
Clavibacter michiganensis ssp. sepedonicus	163,000		1.6 million
PSTVd		1.5 million	
Erwinia amylovora	80,000	320,000	
Total	**16 million**	**5 million**	**8.7 million**

[94] See section 3.11.4.1 of CPHR Evaluation Final Report – Part 1. The survey did not inquire on the level of funding requested by MS.

Note: The above figures are the results of the FCEC extrapolation which is based on the analysis of past outbreaks for each HO. Where baseline calculations (Task 3.2) provided a range of estimates, average figures are considered in this calculation.

It is noted that the distribution of the EU solidarity funding between the various HOs during the 1999-2010 period has been as follows:

Figure 2: EU solidarity funding per HO, 1999-2010



4.3.3.2. Dynamic scenario (2)

The aim of this scenario is to assess the impact that the availability of EU funding as such might have on influencing the intensity of the design and implementation of the measures imposed and co-financed by MS on POs.

The current availability of funding to cover such costs and losses at national MS level is an indication of the extent to which this has an impact on the intensity of measures taken by MS CAs. The specific cost survey conducted in the context of the CPHR evaluation provided an overview of the national compensation schemes existing in the MS to cover direct costs and losses incurred by POs following outbreaks of HOs (see section 3.11.7.2 of CPHR evaluation and **Annex 7** for an overview of the compensation systems developed in the different MS). The results can be summarised as follows:

- 12 MS have state funded compensation schemes;
- 1 has a public scheme funded by compulsory fees from producers;
- 1 private scheme made public, 1 private with some initial government backing;
- 7 have no compensation schemes.

In the context of the current exercise a specific follow up has been undertaken in order to understand the size of payments by HOs in the past years and the mechanism in place to co-finance the costs and losses, and to investigate the potential for increase in the level of intensity in measures imposed where such funding is available.

Ten MS[95] provided further information on their system of national compensation; the main points arising from these replies are the following:

- Some MS participate to solidarity funds for a specific HO, contributing by 50% to 65% of the costs of eradication;
- In two cases MS compensate up to 85-90% of the market price for potatoes;
- In one case the compensation concerns specific HOs and foresees values per plant/tree destroyed, representing different percentages of the total costs/losses: 20% (horticultural crops), 75% (agricultural crops), and 30% - 60% (forestry).

The total yearly compensation varies significantly, both by year and between MS, from €40,000, to €600,000 to €2.5 million, depending on the HOs concerned and the number and extent of outbreaks in the year, as well as on the availability of funding. The data provided by the FR CA, for instance, show an average yearly Government expenditure in the last five years of **€2.2 million** (apart from DOM), the bulk of which are payments for Plum Pox Virus and for *Diabrotica*. The share of funding of the State to the French solidarity funds is 50% for *Diabrotica.* It is planned to be 65% for Plum Pox Virus from 2011. In 2012, in accordance with the regulation 73/2009/EC, the French authorities envisage to raise the public participation to 65 % for the losses linked to HOs subject to the creation of mutualisation funds by the professionals. According to internal FR CA estimates, depending on the year the Government funds cover 12% to 43% of the financial impact for POs due to mandatory destruction, treatment or detention measures, which are in an order of €5.3 million to €11.4 million on a yearly basis (estimate available for 2005 to 2007 only). France accounts for 20% of the total value of EU 27 crop production, by simple extrapolation therefore this would result in a potential compensation at EU level of some €11 million/year[96].

Over the last five years, a total amount of **€29 million** was paid in 10 MS to compensate costs and losses of POs following outbreaks of HOs, i.e. an average **€5.9 million/year.** This figure represents an underestimate of the actual costs and losses of POs, as only a percentage of the total is compensated. On the basis of information on the percentage covered, which is variable by MS and HO, it is estimated that the total costs and losses for the period 2006-2010 in these 10 MS would amount to ca. €45.3 million, i.e. an average €9 million/year. It is noted that mechanisms of compensations in these MS cover different costs and losses and it is not possible to differentiate between direct costs, lost value and indirect losses, which are covered to varying degrees in each case.

For some MS the information is not complete, however, the 10 MS represent the majority of the MS that have mechanisms of compensation in place. Under the dynamic scenario, we assess the impact in case the availability of additional funding at EU level would result in a higher allocation of resources at national level, i.e. in stricter measures imposed on POs and in higher resources for these measures at national level.

[95] BE, CY (does not have a system in place), DE (legislation exists but never implemented), ES, FI, FR, HU, LT, PL, PT, SI.
[96] It is noted that this calculation does not take into account specifities in MS in terms of current cost sharing arrangements, and focus on particular HOs and sectors of national relevance, but it is simply based on the current French compensation model.

The FCEC has established through specific inquiry on this with MS CAs and POs that the availability of compensation for direct PO costs and losses incurred by the officially imposed measures is **likely to result in some increase in the level of expenditure on these measures**. In particular, it has been inquired whether it is likely to act as an incentive for:

- Implementation of national compensation schemes the legal basis for which currently exists in MS, but which have not been so far activated;
- Increase in the intensity of measures taken by national authorities;
- Increase in the implementation of officially imposed measures by POs.

The results of this inquiry are presented in the table below (qualitative):

	Potential impact of availability of EU funding (a)
Incentive for MS to implement national compensation schemes	Likely (e.g. DE)
Intensity of measures imposed by MS CAs	Mostly unlikely (some exceptions: e.g. DE)
Improvement in the implementation of measures by POs	Very likely (b)

(a) On the basis of 11 MS who have replied to these specific points.
(b)This was also the conclusion of the CPHR evaluation in 2010 and the solidarity evaluation

In the absence of any further evidence, it is **not possible to quantify** the impact of the introduction of the coverage of costs and losses of POs on the level of measures imposed on the POs and co-financed by MS and therefore by the solidarity regime.

4.3.4. Task 4: Inclusion of natural spread (estimated costs)

Objective: to estimate the impacts for the EU and the MS of expanding the Solidarity Regime so as to also cover prevention measures for natural spread

Under the present regulations, MS can only introduce solidarity dossiers for outbreaks that are '*human-assisted*', but not for outbreaks caused by '*natural spread'*[97]. In order to estimate the increase to be foreseen in the EU budget in case also outbreaks due to '*natural spread'* would become eligible, it was agreed to follow a looking-back approach, by trying to evaluate what would be the "standard cost" of an outbreak for MS CAs, and the number of outbreaks that might have arisen due to natural causes.

The FCEC has sought to understand the extent to which MS would apply for solidarity funding, and the likely size of the funding to be requested, in case *'natural spread'* would be eligible, by looking back at the likely dossier introductions for (recent) past outbreaks of HOs that were due to *'natural spread'*.

In this context, the specific survey addressed to the EU 27 MS CAs included questions on the expected increase in MS applications for solidarity dossiers, in case natural spread was to be included in the solidarity regime. The results of the survey are summarised in Table 18.

Out of the 25 MS that responded to the survey, only 7 MS indicated they would submit a dossier for outbreaks caused by natural spread. The **total cost** of these dossiers, as indicated by MS (only 5 MS provided figures), would reach **at least €7.3 million per year**. On the basis of a 50% co-financing, the **impact on the EU solidarity budget** would therefore be **at least €3.7 million per year**.

The figures provided by MS indicate that the increase in solidarity **would not be significant** in most cases, **but would become substantial** in the case of inclusion of natural spread **for HOs affecting the environment**, as the case of *Rhynchophorus ferrugineus* indicates. This is due to the high eradication costs of these HOs, as shown in the analysis for Task 3, particularly if direct losses (heading (ii)) are also to be covered. It is also evident that the HOs with the highest potential for natural spread are also those with the most significant potential costs from the control measures taken in the case of outbreaks.

[97] Both terms are quoted here in inverted commas as the ones commonly used, but we note that there continues to be significant variation in understanding and discussion on the use of these terms between experts, for many of which the distinction between natural spread and human intervention is an artificial one.

Table 18 Value of MS dossiers which would have been submitted in case natural spread was included in the solidarity regime, 2008-2010

HO	2008	2009	2010
Erwinia amylovora	€46,800		€67,150
Erwinia amylovora* + *Ralstonia solanacearum		€215,500	
Diabrotica	1 new outbreak – 1 dossier	3 new outbreaks –1 dossier	2 new outbreaks -1 dossier
Rhynchophorus ferrugineus		€300,000	€500,000
***A. glabripennis* on packaging wood, PSTVd**	€10,000		
***Anoplophora glabripennis*, Pear decline phytoplasma, *Meloidogyne fallax*, Insect pests on packaging wood**			€40,000
Anoplophora glabripennis			€400,000
Monilinia fructicola		€10,000	
Diabrotica virgifera		€200,000	
Rhynchophorus ferrugineus			€6.2 million
CTV, *Toxoptera, Erwinia, Flavescence dorée, Rhynchophorus, Gibberella*	Not specified	Not specified	Not specified
CTV, *Toxoptera, Flavescence dorée, Rhynchophorus, Gibberella*			
CTV, *P. ramorum, Toxoptera; Flavescence dorée, Gibberella, Rhynchophorus*; PSTVd.			
Rhynchophorus ferrugineus* *Tuta absoluta* Povolny *Monilinia fructicola		€6,800 €15,833 €14,333	€3,000 €31,433 €35,333
***Paysandisia archon* *Scirrhia acicola* (pinus)**	Not specified		
Total	**(at least) €57,000**	**(at least) €762,000**	**(at least) €7.3 million**

(a) Excluding 2 MS
Source: FCEC survey results (responses from 25 MS)

4.4. Conclusions

The results of the FCEC estimations of the direct costs and losses (Task 3.2, **Table 16**), are summarised according to eligibility under three headings: (i) Already eligible direct costs and losses: these are currently covered by solidarity i.e. costs of removal, destruction, disinfection, sampling and testing (as an average between all scenarios, estimated at €32 million per year); (ii) currently non eligible direct costs and losses: these are the costs not covered currently by solidarity i.e. loss of plant/production value for POs (as an average between all scenarios, estimated at €10 million per year); (iii) currently non eligible indirect costs and losses: these are the costs that go beyond the scope of Task 3, i.e. consequential losses from movement bans for POs (as an average between all scenarios, estimated at €17.3 million per year).

For the 10 HOs covered by this analysis, the total costs and losses of POs that are currently non eligible/not covered by solidarity refer to the direct loss of plant/production value from the official measures taken (heading (ii)) and are estimated to reach a total of €6.7 to €13.4 million per year**,** reflecting the various scenarios used in the calculations. As an average between all scenarios, the costs of heading (ii) are estimated at **€10 million per year.**

A priori, it is noted that the current legal basis in principle already provides the framework for compensation of certain costs/losses of POs when these are directly related to the implementation of officially imposed phytosanitary measures; this has however not yet been fully implemented. The impact on EU solidarity funding should therefore in principle be considered as neutral on this basis, as an increase in the required funding would relate to the full implementation of the current provisions. Nonetheless, in practice, full implementation of these provisions will carry an additional cost for the solidarity funding when compared to the current implementation.

Under the *static scenario*, on the assumption that all the MS where outbreaks occurred introduce solidarity requests and all the dossiers submitted by MS are eligible[98], the additional EU expenditure required for funding under solidarity if direct losses are made eligible (heading (ii)) amounts to ca. **€5 million per year**. This expenditure would be in addition to the estimated expenditure to cover the already eligible direct costs (heading (i): €16 million per year).

The inclusion of direct costs and losses under solidarity funding may have an impact of the level and intensity of measures imposed on the POs, and therefore impact on the overall solidarity funding (*dynamic scenario*). Over the last five years, a total amount of **€29 million** was paid in 10 MS to compensate costs and losses of POs following outbreaks of HOs, i.e. an average **€5.9 million per year.** By extrapolating to the whole EU, this would result in potential compensation at EU level of some €11 million per year[99]. In the absence of any further evidence, it is **not possible to quantify** the impact of the introduction of the coverage of costs and losses of POs on the level of measures imposed on the POs and co-financed by MS and therefore by the solidarity regime. On a qualitative basis, the availability of

[98] Further assumptions are that all direct costs and losses are included in the solidarity funding and they are covered by the EU at 50% and that compensation rate by MS is 100%.
[99] It includes all costs and losses. It is noted that this calculation does not take into account specificities in MS in terms of current cost sharing arrangements, and focus on particular HOs and sectors of national relevance, but it is simply based on the current French compensation model.

compensation for direct PO costs and losses incurred by the officially imposed measures is likely to trigger the implementation of national compensation schemes the legal basis for which currently exists in MS, but which have not been so far activated, very likely to increase the implementation of officially imposed measures by POs, and mostly unlikely to increase the intensity of measures taken by national authorities.

Only 7 MS (out of the 25 MS that responded to the FCEC survey) indicated they would submit a dossier for outbreaks caused by **natural spread**. The **total cost** of these dossiers, as indicated by MS (only 5 MS provided figures), would reach **at least €7.3 million per year**.

On the basis of a 50% co-financing, the **impact on the EU solidarity budget** would therefore be **at least €3.7 million per year**.

The figures provided by MS indicate that the increase in solidarity, although **not significant** in most cases, **would become substantial** in the case of inclusion of natural spread **for HOs affecting the environment**, as the case of *Rhynchophorus ferrugineus* indicates. This is due to the high eradication costs of these HOs, as shown in the analysis for Task 3, particularly if direct losses (heading ii) are also to be covered. It is also evident that the HOs with the highest potential for natural spread are also those with the most significant potential costs from the control measures taken in the case of outbreaks.

5. Analysis of the economic weight of harmful organisms impacting on agriculture, horticulture, forests and the environment (Task 5)

5.1. Executive summary

The objective of Task 5 has been to estimate the potential economic impact arising from the spread of HOs, by focusing on specific HOs affecting a range of sectors (agriculture, horticulture, forestry, public/private green spaces).

The economic analysis undertaken primarily covers the actual or potential damage to the sector/s concerned (damage costs). The assessment of these is conducted drawing on the best available evidence from past outbreaks as existing studies and literature including pest risk assessments (MS, EU, and EPPO PRAs) and CBAs of pest management. It is to be noted in this context that ultimately, the impact of an outbreak in terms of damage costs may extend to the entire value chain of the sector/s directly affected by the introduction, spread and establishment of the HO. This has potentially very significant indirect and knock on effects on employment, as well as on other dependent sectors and the wider economy.

The available evidence from past outbreaks and studies indicates that, if no action is taken, the introduction, spread and establishment in the EU of the HOs under review has the potential to cause multiple **billions of Euros worth of economic damage per year** across the EU to both those sectors directly affected and upstream/downstream sectors (including input suppliers, food processing and the wood working industries), as well as also potentially adversely affecting tourism, retail and other services, and ecosystem values and services.

The FCEC analysis and findings highlight the need to distinguish between the potential impacts of pests affecting the agricultural, horticultural and nursery sectors in terms of yield and quality losses, and the impacts of pests affecting forestry and private/public green spaces. For the latter, impacts are both more complex and long lasting in effect, while there are less possibilities and considerably higher costs involved in replacing destroyed or susceptible plants than is the case for agricultural crops. In addition to longer term commercial impacts arising from harvest losses, there are significant potential adverse impacts on biodiversity, amenity, landscape and other environmental values (including broader environmental objectives such as the reduction of CO_2 emissions), which are generally very difficult to monetarise. We particularly note that as these functions of forestry and private/public green spaces have yet to be fully identified or quantified, the complete value of ecosystem services is always likely to be underestimated (European Commission, 2008a). Moreover, since the global impacts of pests and diseases are both complex and impossible to capture in their entirety, the estimates provided must also be considered to under-represent the entirety of the impacts.

In the <u>forestry sector</u>, several of the HOs reviewed have the potential to cause severe damage to EU forests, in terms of economic and landscape value, as indicated by the FCEC estimates below. The range of losses depends on the underlying scenarios and assumptions, including the extent of the infestation, anticipated timber harvest and the extent of yield losses in the affected area, and producer prices in the various markets. For example, the results indicate that in the worst case scenario for a single pest the cost could reach somewhere in the range of €42.6-€89.2 billion (*Anoplophora*) or €39-€49.2 billion (*Bursaphelenchus xylophilus)* in terms of the commercial value of the susceptible lost timber. Such losses could also have significant effects on employment: extrapolating on available evidence in the case of *Bursaphelenchus xylophilus*, some 11,040 jobs in the forestry and wood cutting sectors could be directly affected under the worst case scenario. Many more jobs would be at risk in the downstream sectors; the EU27 forestry and forest-based industries employ an estimated 2.4-3 million workers. Moreover, it would take at least 20-30 years for the lost forests to be replanted and mature to the point of generating new income from harvested timber.

	Estimated potential impact of key HOs affecting EU-27 forestry, in case of 'no action' (a)
***Bursaphelenchus xylophilus* (PWN)**	Threatened area: 10-13 million ha of coniferous forests (assumed 50-90% mortality rate); Productive forestry value loss: **€0.9-€1.7 billion** (scenario 1: PWN widespread in current area: PT) **to €39-€49.2 billion** (scenario 4: PWN widespread in EU27); Export value loss: €174 million (worst case scenario: TC ban on EU imports).
***Anoplophora* (ALB/CLB) (a)**	Threatened area: loss of 30% hardwood forest in the EU; Productive forestry value loss: **€19.6-€39.2 billion** (scenario 1: *Anoplophora* widespread in currently infested MS) **to €42.6-€85.2 billion** (scenario 2: *Anoplophora* widespread in EU27);
Phytophthora ramorum	Threatened area: loss of 20% hardwood forest in the EU high risk area (EU PRA); Productive forestry value loss: at least **€4.2-€9.1 billion**, plus threat to EU cork industry.
***Dendroctonus ponderosae* (MPB)**	Threatened area: not yet present in EU; if introduced, 100% of susceptible area in medium/ high risk regions (77% mortality rate), or 11.6 million ha coniferous (*Pinus sylvestris*) forest; Productive forestry value loss: **€31.8 - €45.5 billion**

(c) Impacts on the sectors directly affected by the indicated pests.
(d) *Anoplophora chinensis* (CLB) and *Anoplophora glabripennis* (ALB)

Source: FCEC estimates

The potential loss in value indicated above refers to harvested timber only, and excludes other forest landscape, recreational and environmental values which, as forestry data demonstrates, are much more significant. Based on estimates by UK Forest Research (2010) for specific UK tree species, the landscape/ recreational value and the biodiversity /carbon sequestration value of EU27 forests could roughly be valued at ca. **€56 billion (FCEC extrapolation)**. Other estimates (PRATIQUE) provide a landscape value of trees susceptible to *Anoplophora glabripennis* at €287.6/tree.

According to data reported by MS to Forest Europe, some **4.4 million ha of the EU27 forest area** (ca. 3% of the total forestry area) **is already damaged by insects and diseases**, which are the most significant damaging agents within EU forests and far more significant than the damage caused by wildlife and forest fires. The total area damaged by insects and diseases in the EU27 may affect the production of an estimated annual felling volume of 12.3 million m^3 of roundwood with an estimated value of €492 million. In addition, in the damaged area, such damage may affect the provision of non-wood goods (NWGs) (estimated value: €74 million) and of services (estimated value: €34 million). Taking these factors together therefore, the total loss of value from damage caused to date by insects and diseases may have already reached an estimated **annual loss of ca. €600 million in terms of income** generated from wood, NWGs and services provided by the affected forestry resource.

In the agricultural sector, the HOs under review can cause significant production and trade losses, as indicated by the FCEC estimates below (the range of losses depends on the underlying scenarios and assumptions, as noted for forestry pests):

	Estimated potential impact of key HOs affecting EU-27 agriculture, in case of 'no action' (a)
Maize	*Diabrotica virgifera virgifera:* Crop value loss: €472 million per year; up to € 6.1 billion over 25 years (FCEC, 2009); Export value (under threat): extra-EU exports of €336 million per year (2008-2010 average)
Potatoes	High risk from a range of HOs (b), for 3 of which EU Control Directives are in place: Crop value loss: yield losses can vary from 20%-80% depending on the HO; on this basis, PCN could cause losses of up to **€8 billion**, ring rot up to **€3 billion**, and brown rot up to **€4 billion**; Export value (under threat): extra-EU exports of €413 million per year (2008-2010 average)
Tomatoes	High risk from several HOs (c): Crop value loss: **€6.6 - €9 million** (scenario 1: PSTVd spreading in previously infested MS) to **€93-€127 million** (scenario 2: PSTVd spreading throughout the EU27); Export value loss: from *Tuta absoluta* outbreak (US and Canada restrictions on EU imports) estimated at ca. €11.5 million per year

(d) Impacts on the sectors directly affected by the indicated pests.
(e) Including *Clavibacter michiganensis spp. sepedonicus* (potato ring rot); *Globodera* (potato cyst nematodes - PCN); *Ralstonia solanacearum* (potato brown rot); Potato Spindle Tuber Viroid (PSTVd).
(f) Including Potato Spindle Tuber Viroid (PSTVd); Pepino Mosaic Virus (PepMV); *Tuta absoluta*

Source: FCEC estimates

Even at the level of direct impacts, it is difficult to put a monetary value on the production loss due to a plant pest, since a range of factors including pre-outbreak agricultural and forestry management practices and other preventive action will affect the extent of the damage likely to be caused by a specific pest, while the lost production value will depend on the prevailing market prices at the time the commodity concerned would have been produced and/or sold. Market prices are difficult to obtain in many cases (there is generally significant lack of data on prices, while in most sectors there is no 'EU price', making it complex to extrapolate at EU level). Furthermore, prices also fluctuate considerably depending on a range of factors, including in many cases the prevailing supply and demand in international markets. Such effects are compounded by the fact that outbreaks themselves may affect the level of market prices if they result in significant and drastic losses of production.

Other costs of 'no action', which have not been investigated here, include the impact that the spread and establishment of a HO could have on the functioning of the internal market if MS are forced to adopt measures which may affect the free circulation of goods within the EU.

By comparison, in the US, it is estimated that plants and plant pathogens cause annual damage of the order of $64.1 billion, of which $21 billion consist of crop losses caused by plant pathogens, $13.9 million of crop losses caused by insects and mite pests, $4.2 billion consist of loss of forest products and $24 billion are estimated to be caused by crop weeds; of these figures, 40%-65% is due to introduced pests, pathogens and weeds (Pimentel et al., 2005). In the UK, a study carried out in 2010 estimated the total current annual cost of invasive non native pests to the British economy at approximately €1.9 billion.

The common conclusion that emerges from all available studies and the FCEC estimates is that, although the total annual costs (to both industry and government) of prevention and current (early response) measures may be significant, the potential benefits to be obtained by excluding the pest or containing/eradicating as early as possible are several times the order of magnitude of the cost of the measures taken.

5.2. Objectives and methodology

The objective of Task 5 has been to indicate the potential economic impact of selected HOs affecting a range of sectors (agriculture, horticulture, forestry, public and private green).

The economic analysis aimed to cover mainly the actual or potential damage on the sector/s concerned (**damage costs**). Ultimately, the impact of an outbreak in terms of damage costs can extend to the entire **value of the sector/s directly** at stake by the introduction, spread and establishment of the HO, with potential significant **indirect and knock on effects on employment, other dependent sectors and the wider economy**.

In particular:

- Based on the available literature, in the case of no action, an HO is expected to eventually spread and establish across the EU. The full impact will be felt over a number of years, depending of the biology/epidemiology of the HO and environmental/climatic conditions.
- The nature and extent of the damage will depend on the type of potential impacts and the sector/s affected, including market and trade losses, biodiversity losses, and wider socio-economic and environmental impacts[100]. In terms of market and trade losses, HO spread/establishment would result in losses in present or future production or resource values, due for example to yield/quality losses, and/or increased production costs, due for example to treatment costs. Losses can also include the temporary loss of export markets, due to stricter import measures imposed by TC trading partners – which may be justifiable or not justifiable - including import bans, compulsory quarantine pre/post import, additional phytosanitary declarations; such measures lead to increased administrative costs affecting export competitiveness and can be as severe as making it impossible to export to these markets.
- These damage costs are expected to increase as the HO spreads/establishes across the EU, which would be the case if no action is taken over time. Ultimately, the full impact will be the total destruction of the directly affected sectors and severe indirect impacts on adjacent sectors and the wider economy; this is the worst case scenario reflecting the consequences of taking no action[101].

[100] The estimation of wider impacts, the further we move from direct to indirect and wider society/environmental impacts, becomes more difficult and less certain, given the last number of risk factors that need to be modelled in the analysis and the generalised lack of appropriate data or indicators to measure such impacts. In this context, there is significant effort currently, in particular through the PRATIQUE project and potential follow up work, to improve the estimation of such impacts. Where available, estimates of such impacts are quoted in this analysis.

[101] Risk assessment takes into account the likelihood of entry and of subsequent establishment, the extent of spread within a defined time period (assuming entry and establishment jointly occurred), and any existing management that might reduce the full impact of the pests. In a worst case scenario, hazard assessment in effect assesses what the impact would be if the pest entered, established and spread to its full extent, and no action is taken. Hazard assessment is therefore the worst case scenario of risk assessment.

- These impacts have been investigated for the selected HOs to the extent they are relevant (e.g. for EU exports of affected plant materials) and information is available from existing literature and the industry.

The cost of the measures taken in the event of an outbreak (**containment/ eradication costs**) are also an indicator of the potential impact of pests and diseases, moreover, their significant potential increase if action is taken too late highlights the benefits of prevention and early response.

In particular:

- For every HO, a range of measures are available to contain/eradicate outbreaks, as already foreseen in EU legislation, either at a general level (Directive 2000/29/EC) or specifically detailed for some HOs (e.g. emergency measures and control Directives). Existing studies and evidence estimate the cost of available phytosanitary control/eradication options that can be followed under different scenarios, and do not necessarily reflect what is required in EU legislation. These costs have been reviewed for the selected HOs, and to the extent information is available from existing literature and the industry, it is clarified whether the costs relate to EU specific measures or other measures that may be taken.
- These costs are expected to increase the more an HO spreads and establishes across the EU. Therefore, the impact at a certain point in time of the 'no action' scenario ultimately includes the higher costs for containment/eradication that may be incurred if action is taken at a later (therefore more advanced) phase of outbreaks.
- Conversely, the benefits at a certain point in time of the 'action' scenario are the savings in potential damage costs to the industry (compared to the 'no action' scenario) and in higher control/eradication costs if such measures are taken at a later (therefore more advanced) phase of outbreaks. The balance, at a certain point in time, between control/eradication costs and damage costs highlights therefore the cost versus the benefit of action taken to address outbreaks. This approach is consistent with the latest outcomes of the development by PRATIQUE of a methodology on the cost: benefit analysis of phytosanitary action[102].

The analysis has been carried out by means of case studies, specific to the characteristics, pest management and available empirical evidence for each of the selected HOs. The data collection was based mainly on literature review, supplemented by expert and CA interviews, and a structured data request distributed to stakeholders attending the Advisory Group meeting of 18 February and industry interviews. Baseline data (epidemiological and economic data) were obtained from a variety of sources, specific to each HO and sector affected, and available literature including PRAs and cost-benefit analysis, (sources indicated per use). The FCEC extrapolations were made on the basis of the available literature and collected data, and are subject to the constraints and assumptions inherent in these studies (indicated as applicable). The range of the estimates is also determined by the base data available, and can be wide depending for example of the range of producer prices and incomes across the EU for the different crops. In this context, it is noted that there are currently significant data gaps as well as differences in classification and product coverage between the consulted databases, resulting in significant differences in data provided by the various sources.

[102] Breukers et al, 2011.

5.3. Impact analysis

5.3.1. HOs affecting forestry, floriculture and the open environment

A number of HOs examined under Task 5 can have very significant impacts on the EU forestry and forest-based industries, and/or floriculture and the open environment). Such HOs include *Bursaphelenchus xylophilus* (PWN); *Anoplophora chinensis* (CLB); *Anoplophora glabripennis* (ALB); *Phytophthora ramorum* (PR); and *Dendroctonus ponderosae* (MPB). Out of the 250 HOs currently regulated under the EU PH regime, about **10% are forest pests**.

5.3.1.1. Economic value of the EU forestry sector and forest-based industries

Forests are a multi-functional resource offering landscape and amenity functions, a significant environmental role (including in the context of EU initiatives such as Natura 2000 and climate change mitigation targets), as well as supplying wood as a raw material to a range of downstream industries. As such, the potential impacts of HOs affecting forests can be immense.

The total forest and wooded land area in the EU27 is 178 million ha, corresponding to 42% of the total EU land area. About 73% of the total forest area is available for wood supply, and of this, only 60-65% of the net annual increment is currently harvested in the EU, which is why EU forests are accumulating growing stock but also ageing. The estimated standing timber volume of EU forests is estimated at ca. 27 billion m³ and annual timber growth or net annual increment is estimated at ca. 610 million m³ (EUROSTAT, 2009; Forest Europe, 2011)[103].

The EU27 **forest-based industries**, with a **production value** of **€365 billion**, and an **added value** of **€120 billion** account for more than **3 million jobs** in **344,000 enterprises** (DG ENT)[104]. In addition to their economic weight, many parts of these industries play an essential role in maintaining sustainable employment in rural areas, and in the woodworking and printing sectors, SMEs are particularly present.

In recent years, total EU27 wood production has ranged at ca. 400 million m^3 of roundwood per year, consistently maintaining its position as one of the main roundwood producers in the world, and ca. 100 million m^3 of sawnwood per year (source: EUROSTAT). In 2010, the EU27 **annual roundwood production** was roughly valued at ca. **€16.1 billion**[105]; (Forest Europe, 2011).

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[103] Source: JRC, forest data and information systems. Note: differences in data between sources due to classification and data collection methodology. Forest Europe indicates that in 2010 total EU27 forest and other wooded land was 157 million ha accounting for 38% of total land area, of which 85% were available for wood supply (133 million ha); the average felling rate (as percent of net annual increment) was 64% (Forest Europe: State of Europe’s Forests 2011). Therefore, in practice, less than 55% of the total EU forest area is actually harvested for wood.

[104] Note: differences in data quoted between sources due to different sub-sector coverage. Data from UNECE: €221 billion/year; 365,000 companies; 2.4 million workers (there are also many more full-time and part-time jobs in micro-enterprises, which are not counted in the official statistics). Data from CEI-Bois: annual turnover of €270 billion (of which: €130 billion in furniture industry); 380,000 companies (of which: 150,000 in furniture industry); 3 million workers.

[105] At an average value of €40/m^3 across all categories of roundwood (source: Forest Europe). Prices of roundwood and sawnwood vary considerably between MS and year on year depending on market conditions. According to EUSTAFOR, it would be difficult to make comparisons across the EU, as supply and demand

In addition, NWGs are an important source of income and their share of the total economic value generated by forests is increasing. In 2010, Christmas trees, fruits and berries, and cork were the most important NWGs. The total annual value of **marketed NWGs** represents ca. 15% of the roundwood value (or €**2.4 billion**)[106]. The annual value of total **marketed services**[107] represents ca. 7% of the roundwood value (or **€1.1 billion**)[106]. In total, therefore, EU forests supply primary goods and services valued at nearly **€20 billion per year**.

The protection of the EU27 forestry sector from PH threats is relevant to a range of industries downstream the forestry sector as such. Indeed, the availability of wood as a raw material at a competitive price is a determining factor for the performance and potential added value generated by many EU industries. Wood is the highest cost component in most downstream sectors (in paper making more than 30 % of total costs are for wood; in the sawmill industry 65 to 70%). The **price of wood**[105] can fluctuate considerably depending on prevailing supply and demand conditions which are *inter alia* influenced by plant pests and diseases and their impact on the availability of wood at the required quality.

The **woodworking industries** (excluding furniture sector) have a **turnover** of **€134 billion** and generate an **added value** of **€37 billion**, employing **1.3 million** people in **197,000 enterprises** (DG ENT[104]). Most companies are small or medium-sized; the only exception are the wood-based panel sub-sector and a handful of sawmills having large enterprises. Together the **woodworking and furniture industry** has am estimated **production value of ca. €240-€260 billion** and is dominated by 5 MS (DE, IT, FR, UK, ES), which together account for €170 billion or two thirds of the EU27 output value.

With regards to the **wooden pallet and packaging industry**[108], 3 billion pallets circulate and 450 million pallets are manufactured annually in the EU; 90 % of all trade flows use Wood Packaging Material (WPM) in some form. The WPM is also significant for the wood sector in that 22-25% of all sawn timber are used for WPM and the industry is also a major employer (directly and indirectly), especially in rural areas (source: FEFPEB).

Trade of forest-based products is very important, particularly within the EU27: in recent years imports (intra-EU and extra-EU) have reached circa €100-€110 billion and exports circa €110-€120 billion. The EU is a net importer of forest-based products from TCs (2009: extra-EU imports worth €6.3 billion and exports worth €3.2 billion).

On average, **13% of forest areas in the EU-27 have protective functions**; however, most forests have many functions and may be protective without being officially designated as such[109] (source: EUROSTAT, 2009).

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factors are very specific in each MS market. The subject has been extensively discussed at the Advisory Committee on forestry and forest based industries of DG ENT, with price data presented by EUSTAFOR as follows: FI average price of roundwood (pine and spruce logs) at €55/ m^3 (standing or 'stumpage'; 2009); AT average price of roundwood (spruce and beech) at €75/ m^3 (at roadside; 2009/10).

[106] On the basis of countries reporting these values.

[107] The reported marketed services are forest-dependent or mainly forest-related and include social services (e.g. hunting or fishing, recreation and tourism), ecological services (such as environmental functions as well as infrastructure and managed natural resources), biospheric services (e.g. related to functions provided by protected and conservation sites).

[108] Types of Wood Packaging Material: pallets: 75%, industrial packaging 20%, light weight packaging 4 %, dunnage 1 % (Source: FEFPEB).

[109] Certain stands are protected, e.g. in national parks, where the trees themselves are protected as well as all the habitats they provide for other plants and animals. Other stands have protective functions, e.g. for water

From an environmental viewpoint, forests and forest-based industries have a **strategic role in climate change mitigation**. Forests act as carbon sinks by capturing carbon dioxide from the atmosphere and storing it in wood, thus reducing the climate-changing effect of this greenhouse gas. Carbon storage in harvested wood products can extend the carbon sequestration benefits provided by forests; their role in mitigating climate change is therefore important. The available data (EUROSTAT, 2009) show that at least 9,580 million tonnes of carbon are stored in the EU27 woody forest biomass; additional amounts are stored in the forests' deadwood (in addition, carbon is stored in similar biomass on other wooded land, but this has only been estimated in certain MS).

The **wider benefits of forests** have been estimated in some studies. For example, in the UK, in earlier studies (Willis et al, 2003), the social/environmental benefits of British forests (ca. an area of ca. 2.8 million ha) were estimated at over £1 billion (€1.2 billion) per year. Evidence from more recent studies suggests benefits are considerably higher than this figure. Estimates from DEFRA 2010 Forestry CBA for the National Forest project (forest area covering 52,000 ha) value these benefits at £228 million (€263 million) in present value (PV) over a 20 year period. The landscape/recreational value, and the biodiversity/carbon sequestration value have been estimated by the UK Forest research (2010) for specific tree species: e.g. oak (*Quercus* spp.): £240 million (€270 million) and £750 million (€844 million) per year, respectively; Corsican pine: £42 million (€47 million) and £28 million (€32 million) per year, respectively. The high values of these environmental benefits of forests in one MS point to the extensive wider environmental value of forests in the EU27 as a whole; the total UK coniferous and broadleaved area accounts for ca. 2% of the total EU27 forestry area[110]. By simple extrapolation on these UK estimates, the landscape/recreational value and the biodiversity/carbon sequestration value of EU27 forests could therefore be valued at ca. €56 billion.

According to data reported by MS to Forest Europe, some **4.4 million ha of EU27 forest area** (ca. 3% of the total forestry area) **are damaged by insects and diseases**, which is the single most significant damaging agent of EU forests, well ahead of damage caused by wildlife and forest fires. In south Europe, 13.4% of the area is subject to damage by insects and diseases, while in the rest of the EU27 less than 5% of the respective forest area is affected; the highest proportions of forest area damaged by insects and diseases are reported by PT (20%), RO (20%) and IT (10%). The total area damaged by insects and diseases in the EU27 may affect the production of an estimated annual felling volume of 12.3 million m^3 of roundwood, at an estimated value of €492 million; in addition, in the damaged area, it may affect the provision of NWGs (estimated value: €74 million) and of services (estimated value: €34 million). Therefore, the total loss of value from damage caused to date by insects and diseases may have already reached up to an estimated **annual turnover of ca. €600 million** from wood, NWGs and services provided by the affected forestry resource.

resources or to prevent erosion (soil, water and other ecosystems functions) and to prevent landslides and avalanches in mountainous areas (infrastructure and managed natural resources functions). Forests growing on very steep slopes can thus protect other forests growing below them, settlements, roads and railways in ways that would be very expensive to replace by manmade structures.

[110] Oak comprises 23% of the broadleaf area in Britain (223,000 ha); pine comprises almost 30% of the conifer growing area in Britain (409,000 ha).

5.3.1.2. Economic value of the EU ornamental plants sector

The total EU27 land area of flowers, ornamental plants and nursery plants is estimated at 195,000 ha in 2009. Production is highly concentrated in 5 MS: NL (43,200 ha); FR (27,200 ha); DE (26,400 ha); IT (24,520 ha), and PL (15,900 ha), which together account for 58% of the total EU27 area. During last decade the area devoted to this production has been declining, except in the case of the NL. In 2007, there were ca. 124,000 holdings producing plants and flowers, and the number has been steadily declining during last decade (from nearly 165,000 in 2003) (source: EUROSTAT/DG AGRI).

The EU is the largest world producer of **potted plants and flowers**, valued at **€10.8 billion**, accounting for 41% of the world production estimated at €26.2 billion (source: AIPH/Union Fleurs, 2010)[111]. The top 5 producers (NL, FR, DE, IT, and PL) have a share exceeding 80% of the total EU27 production of plants and flowers by volume and over 90% by value. In addition, the **tree nursery production** is valued at **€5.3 billion**.

Imports from TCs represent 17% of total imports or 430,000 tonnes in 2009. Of this total volume of imports, 74% were cut flowers and cut foliage, 20% potted plants, 4% bulbs and corms, and 2% conifers and hardy plants. The total value of these imports was estimated at €1.5 billion in 2009 (source: EUROSTAT COMEXT).

Exports to TCs have been growing steadily in the past decade in volume, with 518,000 tonnes in 2009 or 19% of total EU export trade. Of this total volume, 31% are potted plants, 31% are bulbs and corms, 23% conifers and hardy perennial plants, and 16% cut flowers and cut foliage. The value of these exports was estimated at €1.5 billion in 2009 (source: EUROSTAT COMEXT).

***Bursaphelenchus xylophilus* (PWN)**

Epidemiological analysis (PWN):

risk of introduction: moderate/high (WPM/wood: low due to treatment obligation ISPM 15; live plant/bonsai imports high)

risk of spread: high (high risk of natural spread; but mitigated risk of spread through WPM due to ISPM 15)

risk of establishment: high in S Europe / low in N Europe

The pinewood nematode (PWN), *Bursaphelenchus xylophilus*, the causal agent of pine wilt disease (PWD), is a serious pest and pathogen of forest tree species, in particular among the genus Pinus. According to literature, PWN is a serious threat worldwide to forest ecosystems (Mota and Vieira, 2008).

The available literature indicates that many favourable factors collude for the introduction, spread and establishment of PWN in the EU. *Monochamus* spp (the vector of PWN) is considered present in most EU regions, therefore expected that in the long term PWN will

[111] In this sector too, there are significant differences in the data provided by the various sources, due to classification: according to EUROSTAT/DG AGRI, the total EU27 production value of plants and flowers is estimated at €19.5 billion in 2009. The product group definition is, however, different than AIPH/Union Fleurs: EUROSTAT/DG AGRI 'plants and flowers' includes ornamental plants and flowers + nursery plants + Christmas trees and plantations. This figure, therefore, includes some of the NWGs value quoted in the previous section on forestry.

become established in the EU (EU PRA, PHRAME). PWN has already affected significantly two MS (ES[112] and PT), and has been the subject of several studies, including a review of options for the management of PWN by the FCEC for the COM in 2008.

Impact on production

The total EU27 coniferous forest area extends over 79.6 million ha. According to PHRAME, some 12-16% of the total EU27 coniferous forest area (10-13 million ha) can be classified as high risk due to medium-high mortality rates reaching 50-90% of trees (regions with average temperature >20°C during July/August (high risk) period, i.e. extending over the south-west and Mediterranean region); in the remaining 84-88% of the EU regions (i.e. 68-71 million ha) mortality rates can be medium-low (with lowest risk regions in north EU attributed a 2.5% mortality rate, e.g. the UK and Scandinavian countries). At present, MS with findings of PWN (PT, ES; source: FVO) account for 6.8 million ha of coniferous forest, or 52-68% of the total EU 'high risk' coniferous forest area; this area includes the most susceptible species (*Pinus* spp. and other coniferous species), which increases the risk of PWN exposure/spread.

Based on prices in representative EU markets[113], the total productive value of EU27 coniferous forest area is estimated at €71.7 billion; the value of the above area at high risk from PWN is estimated at €12.8-€23 billion; similarly, the productive value of the total coniferous forest area in the MS already affected by PWN (ES and PT) is estimated at €12 billion.

The FCEC has extrapolated on this basis to estimate the potential loss of forestry value under four scenarios of no action taken against PWN. Depending on the extent of the PWN spread, the **potential loss of forestry value could reach from €0.9-€1.7 billion** (scenario 1: no action – PWN widespread in PT) **to €39.0-€49.2 billion** (scenario 4: no action – PWN widespread in EU27). The assumption is that, given the high risk of introduction in new areas, spread and establishment, no action for PWN will result in gradual spread over the entire EU (i.e. at least scenario 3), as has occurred over several decades in Asia[114].

Table 19: FCEC extrapolations on potential loss of forestry value from PWN outbreaks if no action taken (Task 5)

	50% mortality	**90% mortality**
scenario 1: PWN widespread in current area (PT)	€0.9 billion	€1.7 billion
scenario 2: PWN spreading in PT and ES	€4.6 billion	€12.0 billion
scenario 3:PWN spreading in high risk area of Southern Europe	€12.8 billion	€23.0 billion
scenario 4: PWN widespread in EU 27	€39.0 billion	€49.2 billion

Notes: Scenarios 1-3 include only regions/MS with medium-high mortality rates (50-90%). Scenario 4 includes regions/MS with low-medium mortality rates (20%). The above range of estimates in each scenario depends on mortality rate (lowest: 50%; highest: 90%), and includes forestry value only (i.e. excludes impacts on wood-working/furniture, WPM and adjacent sectors).

[112] ES only had 2 outbreaks, however with big local impacts from the eradication measures.

[113] Based on an estimated average value of pine trees (productive value) of €900/ha (estimated on the basis of average €55/m^3 'stumpage' price, i.e. net of cutting and transport costs, average yield of 6.7 trees/ m^3, and average density of 109 trees/ha). See also section on forestry industry key figures.

[114] One of the most notable PWN epidemics in Asia has occurred in Japan, where pine wilt disease is estimated to have caused the destruction of some 26 million m^3 of timber since WWII.

In considering the costs and benefits of taking action, the benefits are calculated in terms of the potential damage of no action taken, as indicated above. The extent of the potential losses as we move towards scenario 4 indicates the benefit of taking effective action to address outbreaks in earlier phases of PWN spread, even though the cost of this action may be considered high in absolute terms (see results of Task 3).

Impact on trade and the wider economy

In terms of potential export losses, the FCEC 2008 analysis of the socio-economic and environmental impacts of banning or not banning the movement of susceptible wood products from Portugal for stopping the spread of PWN had already provided some estimates of impacts under various scenarios for the EU as a whole. It was concluded that, in a worst case scenario where TC trading partners are reluctant to import from the EU altogether (or use PWN concerns as a justification to block exports), the total current EU exports might be affected. In this case, the impact could result in a loss of some €174 million in export value and put 11,040 jobs at risk[115]. The worst affected MS would be DE, SE and FR, which together account for 50% of EU27 export of the EU export value. These would be the primary effects only on the susceptible wood and WPM; secondary effects on industries using WPM, transport and logistics and the wider economy would also be expected (source: FCEC, 2008). In this case there will be further jobs at risk among the forest-based industry (in total the forest-based industries (including all wood sectors and types of products/activities) employs an estimated 2.4 - 3 million people.

Anoplophora chinensis (CLB) *and glabripennis* (ALB)

Epidemiological analysis (CLB):

risk of introduction: high (main pathway: imports, live woody plants of Acer spp from SE Asia)

risk of spread: moderate / high (detection difficult; can be asymptomatic)

risk of establishment: high (host plants and suitable habitats are widespread in the EU; the endangered area is the whole EU, with the exception of the most northern area)

Epidemiological analysis (ALB):

risk of introduction: low/moderate (due to WPM treatment obligation ISPM 15)

risk of spread: moderate / high (difficult to detect; symptoms >1.5 above ground)

risk of establishment: high (wide range of host trees)

Anoplophora chinensis (CLB) *and A. glabripennis* (ALB) have a wide range of potential host species, with *Acer* spp. the most commonly infested in the EU27. CLB has already affected

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115 In the scenario for this calculation (FCEC, 2008), it was assumed that EU exports to third countries would not be affected, because the ISPM15 currently applied for all extra-EU exports will continue to apply. As the ISPM15 standard is currently applied for all extra-EU exports (source: FEFPEB), it is assumed that this would be sufficient to continue to guarantee the quality of EU exports. However, there could be a worst case scenario where TC trading partners are so reluctant to import from the EU altogether (or use PWN concerns as a justification to block exports) that the total current EU exports might be affected. In this case the impact could result in a loss of some € 174 million in export value and put 11,040 jobs at risk. These would be the primary effects only on the susceptible wood and WPM; secondary effects on industries using WPM, transport and logistics and the wider economy would also be expected but could not be estimated.

mixed areas, and although not yet forests as such, it is monitored for presence. ALB has affected mixed areas, hardwood forests (broadleaved species), nurseries, as well as urban areas. The main affected trees species in the EU *Acer, Betula, Salix, Aesculus, Fagus, Carpinus, Populus* (Haack et al., 2010).

The probability of entry for ALB is considered high through imports of live woody plants; the probability of establishment is considered high for both CLB and ALB due to widespread presence of host plants and suitable habitats in the EU (various sources, including: EPPO; NL PRA, 2008; Haack et al, 2010). In southern Europe, the impact of CLB may be higher than that of ALB due to the broader host range. The climate in northern Europe is possibly more favourable to ALB than to CLB (Macleod et al, 2002), therefore, the impact of CLB there may be lower despite the wider host range of plants susceptible to CLB.

Impacts

The NL PRA (2008) on CLB reported that, on the basis of previous studies[116], the potential economic and environmental impact of both CLB and ALB is high to massive. In its native range, ALB has killed millions of trees in China, whereas the greatest economic losses from CLB in Asia have occurred in fruit-tree plantations, especially citrus (Haack et al., 2010). Outside their native range, both ALB and CLB have caused tree mortality and are ranked as high-risk. In terms of the potential mortality rate, the only other parallel that can be drawn is from ALB US experience (urban damage)[117].

Impacts on production

CLB can have significant negative effects on crop yield in its current area of distribution, although no data are available in literature on percentage yield losses. It is known to cause damage in *Citrus* orchards in China and Japan (citrus, apple, and pear). The PRA reports that "*A. chinensis is regarded as one of the most destructive cerambycid pests of fruit trees, especially Citrus in lowland areas of China, where economic losses can be substantial*"[118]. Furthermore, "*in a survey of Citrus orchards in Japan, 66% of the trees were found with exit holes*".

With regard to the potential impact of CLB in the EU, the PRA reports that *"A. chinensis can have a large negative effect on crop yield in various fruit orchards. A. chinensis attacks many deciduous tree species and can also have large negative effects on tree nurseries. It may not have a direct effect on yield only but also indirectly since customers may avoid buying plants that are frequently attacked by A. chinensis".*

[116] Anonymous, 2001; MacLeod et al, 2002; Dumouchel, 2004; Baker & Eyre, 2006.
[117] CLB can kill trees, especially small trees; also large trees can die when many larvae infest them. Trees that do not die directly from the infestation are weakened and are susceptible to secondary pest. Mortality has only been investigated in citrus trees Asia (China, Japan) where it can reach 30-60%. In Europe, only from IT experience. *Acer saccharinum* trees are heavily attacked and usually die either due to secondary infections or directly due to the high number of larval tunnels in the wood. Other *Acer* spp. and *Fagus* sp. are also heavily attacked often leading to the death of the tree but only when they have (many) roots surfacing above the ground. In terms of mortality rate, the only other parallel that can be drawn is from ALB US experience (urban damage).
[118] CABI, 2007.

Cultivation of fruit orchards in the EU concerned a total area of 1.4 million ha in 2007, of which 572,000 ha of citrus, with a total production of 18.6 million tonnes and an economic value of **€ 8.6 billion**, of which **€ 3.7 billion** of citrus (2009 data).

If no action is taken in the EU, the impact of CLB may endanger the above sector: yield losses may result in increase in production costs to an extent which is not possible to estimate in quantitative terms, due to lack of specific data. Yield losses in orchards may also lead to increase in prices of fruit, but again there have been no documented cases of such impacts.

Impact on EU trade and nurseries

The total EU tree nursery area is approximately 100,000 ha, with a total **production value of €5.3 billion**, and 13,516 holdings involved in this sector[119], with IT, DE, FR and the NL accounting for a large share (70%) of the total. The total value of EU **exports of nursery stock is €965 million** (2009)[120]. The majority of this trade occurs within Europe (intra-EU: 82%; and to the rest of Europe: 13%).

Potential barriers to trade may be imposed by TCs in case of establishment of CLB and ALB in the EU. This would result in losses for the concerned sector, ranging from increased production costs (e.g. in the case pre- and post-entry quarantine is made compulsory for all susceptible host plants and products, or additional declarations on the phytosanitary certificate is requested) to loss of the market in case of import bans. In both the case of CLB and ALB, it is noted that the USA have recently reviewed their rules for imports of host material for these HOs into the USA. The Federal Order (FO), issued on April 2011[121], reviews the FO of January 2009 adding three host genera of plants for planting, and modifying the requirements for importation of plants for planting from the EU MS "*because the status and distribution of A. chinensis and A. glabripennis in these countries is not sufficiently known*". It is not possible to estimate the impact of such measures on the EU exports, given the lack of specific data on the susceptible species which are concerned. As an indication, in 2009, the total value of EU exports to the USA of ornamental plants amounted to **€23.3 million**, and the export of nursery stock to a further **€2 million**[122].

According to industry sources, an estimated 3.2 to 4 million plants of *Acer* spp. are imported in the EU27, of which on average 50% (ranging per species: 30-70%) are imported via the NL. The total value of these imports is estimated at €6- €12 million[123]. By comparison, the costs of controls of this volume of imports is estimated[124] at: €64,000 - €120,000 (cost of destructive sampling)[125], plus €548,000 (cost of post-entry inspections).

The cost of control measures (i.e. destructive sampling, post-entry inspections, and destruction costs in case of findings) as well as of other PO costs (from restriction of movement) and business losses will increase the more the pest is spread. Therefore, destructive sampling applied early and leading to early detection may lead to less destruction

[119] Source: AIPH/Union Fleurs, 2010, date relate to various years.
[120] Source: AIPH/Union Fleurs, 2010.
[121] http://www.aphis.usda.gov/import_export/plants/plant_imports/federal_order/
[122] Source: AIPH/Union Fleurs, 2010.
[123] On the basis of wholesale value of €2-€3/plant (NL industry quote).
[124] FCEC extrapolations based on NL 2007 outbreak (Westlands) (source: NL PRA 2008).
[125] Aim is to identify a 1% infestation rate with a 95% probability of detection (ratio recommended by ISPM 31, but adapted for small quantities to avoid destroying the entire consignment).

costs and business costs and losses compared to sampling applied late and leading to late detection (pest might be more widespread). The benefit: cost ratio of control and eradication costs will therefore be higher the earlier these are applied (source: NL PRA 2008, NL CA).

Previous outbreaks in the EU27 have shown the extent of potential costs and losses of importers and nurseries following an outbreak of CLB. For example, in one large scale outbreak in the NL, destruction costs (through sampling) were estimated at €0.8-€1.2 million, the costs of movement restrictions at €10 million, and consequential **business losses at €10-20 million** plus another **€10 million in subsequent loss of markets** (due to lost market confidence) for the sector; it is noted that the action taken to contain this outbreak affected total nursery stock rather than susceptible host species.[126]

This outbreak concerned a particular area in the Netherlands – Boskoop area – with a concentrated nursery production in some 2,000 ha; however, it showed the severity of damages in case of CLB outbreak, particularly in relation to trade losses, both immediate and subsequent (in the following year). The nursery stock sector in the Netherlands has a total production value equal to **€600 million**, for a total area of nursery stock production of 17,000 ha and a total number of 3,700 nurseries. The export value is **€440 million**, of which 88% concerns intra-EU trade[127]. If no action was taken, it is clear that the total value of the sector and intra-EU trade would have been affected by this single outbreak.

Impact on forestry and the open environment

Outbreaks of ALB and CLB can result in high economic impacts also in forestry and the open environment. EPPO notes that it may take several decades before the impact of CLB and ALB in the open environment becomes known, because the pest will probably have a life cycle of 2-3 years in large parts of the EU, it will spread slowly by natural means and it will take time before large populations have been built up. It also usually takes 5-10 years before a tree will die due to attack by the pest or due to secondary infections.

According to a UK study[128], assuming a 25% infestation rate (i.e. ALB becomes established) over the country, affecting some 297,750 ha of GB hardwood forest, the potential damage of widespread infestation was estimated to have the potential to reach £1.32 billion (€1.52 billion) in terms of lost timber crop value.

The total EU27 area of hardwood forests extends over 52.1 million ha[129]. The total hardwood forest area in MS with ALB findings (currently infested MS, according to FVO, EPPO: AT, FR, DE, IT, PL) covers 24.2 million ha. The total hardwood forest area in MS with CLB findings (currently infested MS, according to FVO, EPPO: FR, DE, IT, LT, NL, UK) covers 23.9 million ha. According to FVO survey data, the susceptible host plants for CLB are found

[126] NL 2010 Boskoop outbreak: 85,000 plants destroyed through sampling at 1%; 17 plant species were subjected to intensive monitoring across an estimated 350 nurseries. In most cases, controls were performed on other host species than Acer spp.; range of estimates at an average value of €9-€14 per plant (source: LTO Noord). Plants were not allowed to move for a 4-8 week period from the nurseries; this was the period when nurseries realise the bulk of their annual sales (autumn/winter).
[127] Data 2010: Productschap Tuinbouw; PHH.
[128] Williams et al., 2010.
[129] Excludes mixed forest areas which account for 12.4% of total EU27 forestry area.

on an area of 21,216,378 ha, of which 11,938,033 ha present a higher risk, due to suitable environmental conditions[130].

Assuming a mortality rate of up to 30% (as in US case), if in the hardwood forest area of the currently infested MS no action was taken (scenario 1), up to **7.2 million ha** could be lost; the total damage in terms of economic losses for the EU industry would be in the range of **€19.6 billion** to **€39.2 billion[131]**, estimated as the lost timber crop value, assuming that 50%-100% of the endangered and lost tree area is productive forest. If the total EU27 hardwood forest area was to be affected (scenario 2), some 15.4 million ha would be lost, with a total estimated damage, if no action was taken, in the range of **€42.6 - €85.2 billion**, under the same assumptions.

Table 20: FCEC extrapolations on potential loss of forestry value from ALB/CLB outbreaks if no action taken (Task 5)

	50% productive forest	**100% productive forest**
scenario 1: ALB/CLB widespread in current infested MS	€0.9 billion	€1.7 billion
scenario 2: ALB/CLB widespread in EU 27	€39.0 billion	€49.2 billion

Notes: All estimates assume 30% mortality rate (as in US case). Low range assumes up to 50% of the endangered and lost tree area is productive forest; higher range assumes up to 100% is productive forest

Furthermore, in terms of landscape value, the ornamental value of trees susceptible to ALB is calculated by Breukers et al. (2011) at €287.6/tree[132]. According to their estimates[133], in 4 years all susceptible trees in an infested area could be colonized. It is not possible to extrapolate further to a total figure as the total number of trees that might be affected is not known, nor can it be readily estimated, given the wide range of potentially susceptible trees. As an indication, in Berlin alone (DE), the estimated total potential loss for the most preferred host plant, *Acer* spp., including costs for replanting, was estimated at €96 million (Balder, 2003)[134].

Outbreaks of CLB in the open environment have also shown to result in high **eradication and containment costs**. In one case, the costs of eradication action followed by the MS[135] have reached €11.2 million over 6 years, including tree destruction (€4.5 million), tree replanting (€470,000), and other costs (includes surveillance, research and awareness raising campaigns). These are considered conservative estimates as in most cases, both in public and private properties, many historical trees of high value were found infested with CLB; this value has been impossible to estimate[136].

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130 Source: FVO report on annual surveys of MS for *Anoplophora chinensis.*
131 Assuming the same yield and timber value as in Williams et al., 2010.
132 "*The temporary loss of the ornamental function of trees is estimated based on the market value of an ornamental tree of medium-large size (€ 585.2). This value has been calculated by asking local tree nurseries in Lombardy (IT). As the loss of the function is about half of the expected lifetime for an ornamental tree in the area (40-50 years), the temporary loss of the tree function is estimated to be 50% of the market value, i.e. € 287.6*" (Source: Breukers et al., 2011).
133 On the basis of the high rate of spread of the beetle of 1.5 km per year (Haack et al., 2010).
134 This figure includes eradication costs. The data provided in this article do not allow any extrapolation.
135 IT Lombardy outbreak, costs since start of 2004 to date. The EU solidarity co – funded €1.3 million of eradication costs in 2009 and 2010, at 50%, i.e. €656,000.
136 These costs are therefore average estimates, and can be considered underestimates of actual costs. To avoid cutting these high value trees, the control of the pest using insecticides was also tested and used.

An application of the recently developed Breukers et al. 2011 protocol in the case of ALB in Italy concluded that the **benefit-cost ratio** over the 10 year period considered by the analysis is **82:1** (in PV). This ratio was determined by comparing the costs incurred for eradication with the financial benefits resulting from eradication and exclusion, i.e. the commercial value of trees saved from infestation.

A comparison with other data on the impact of ALB outbreaks is also useful.

In the US, the estimated maximum potential **damage costs** (value loss over 9 large US cities), assuming that ALB could destroy up to 35% of total canopy cover and result in 30.3% tree mortality (1.2 billion trees), was estimated at US$668 billion (€467 billion). These costs did not include decreased values of properties due to a decreased landscape-value, decreased quality of environment etc. (GAO, 2006).

On the other hand, cumulative costs (1998-2008) of the US total state and federal ALB **eradication** program, including research and development, have reached US$373 million (€261 million); these costs varied widely among the States infested with ALB, depending on the number and size of infestations, the length of time since discovery, and the types of treatments employed (Haack et al, 2010, USDA). The US Animal and Plant Health Inspection Service (APHIS) estimates the total cumulative eradication costs during 1998-2006 at US$249 million (€174 million), including the costs for survey and detection, tree removal, public outreach, and preventive treatment of landscape trees, for an eradication effort of mixed success (Smith et al. 2009). APHIS's official ALB eradication plan foresees an investment of $48 million (€34 million) per year in order to eradicate the pest nationwide by 2014 or $30 million (€21 million) per year in order to eradicate the pest nationwide by 2020;

In Canada, ALB **eradication** costs through 2008 were estimated at CAN$23.5 million (€17.2 million) (Haack et al, 2010, USDA).

Phytophthora ramorum

Epidemiological analysis (*P. ramorum*):

risk of introduction: high (very wide pathway range)

risk of spread: high (favourable climate; host range of PR in Europe is very wide: >130 plant species potentially affected)

risk of establishment: high (host plants widely distributed and traded throughout EU)

Phytophthora ramorum affects oak and other species of tree (e.g. beech and *Larix* in Europe) and has had devastating effects where it has established, for example on the oak populations in the USA (California and Oregon). *P. ramorum* also infects a great number of other plant species, in particular Rhododendron and many ornamental plants; such plants can act as a source of the inocolum for the disease. Because ornamental plant movement can be a way of transmission of *P. ramorum*, outbreaks can have an impact on the international trade in ornamental plants.

An EU PRA for *P. ramorum* was conducted in 2009 (Sansford et al., 2009). According to this assessment, *P. ramorum* is currently reported in 19 MS under official control[137], while the potential EU area at risk of *P. ramorum* is very wide[138]. The common model of disease spread shows a lag phase, an exponential increase in infection followed by a slowing down; the length of the lag phase is uncertain and could be months, years or decades. Evidence/expert knowledge suggests that, e.g. in the UK, *P. ramorum* is in the lag stage at present but likely to move into the exponential phase in the near future (source: Friend, 2008).

In this study, we have assumed that *P. ramorum* will eventually also spread onto and kill European oaks and beeches, as it is doing in the US with American tree species.

Impacts

Although impacts of *P. ramorum* in the EU PRA were only assessed in qualitative terms (no impacts have been monetarised), the study provides an overview of the current situation and risks in the EU. The EU PRA (Sansford et al., 2009) points out that "*in Europe the HO has a direct effect on the quality of nursery stock as well as the quality of plants in managed parks, gardens and public greens. Shrubs and trees in woodlands have become locally affected with some tree death in the UK and the Netherlands. In the USA the major impact has been environmental, arising from massive tree death in coastal California and part of Oregon; the US and Canadian nursery trades have also subsequently become affected*."

Earlier literature (Kehlenbeck, 2005) summarised a list of potential impacts and examples of host plants of *P. ramorum*:

Table 21 Examples for important host plants of *Phytophthora ramorum* in Europe and potential impacts

Host plants (examples)	Impacts mainly occur in:	Potential impacts
Calluna vulgaris Rhododendron Viburnum Camellia	Nurseries Home gardens	Direct losses in production Additional plant protection products Trade restrictions
Rhododendron Camellia	Public gardens and parks	Loss of valuable plants Loss of special recreation areas and hobbies
Arbutus unedo *Castanea sativa* *Fagus sylvatica* *Laurus nobilis* *Pieris* spp. *Quercus* spp.	Forests, heathland and maquis Public green Home gardens Nurseries	Direct losses in wood production Additional plant protection measures Losses in international trade of wood/plant material Changes in use-values Changes in biodiversity Loss of human recreation areas

Source: Adapted from Kehlenbeck (2005)

[137] PR is currently reported in 19 EU MS, under official control: BE, CZ (eradicated nursery finding), DK, EE, FI, FR, DE, IE, IT, LV, LT, LU, NL, PL, PT, SI, ES, SE, UK. Of these, 10 MS (BE, DK, FR, DE, IE, LU, NL, SI, ES, UK) reported findings of PR outside nurseries (managed parks, gardens, public green, forests). In 5 MS (UK, FR, DE, IE, NL) findings in natural environment (mainly UK and NL) (source: Sansford et al., 2009). Those areas that are climatically favourable are only at risk where there are susceptible host plants (broadleaved trees) capable of supporting sporulation (a notable example being rhododendron).

[138] Using CLIMEX data, area at highest risk identified as n-w ES, n PT, s-w UK, and parts of IT; larger parts of the UK, IE, FR, BE, NL, w DE, IT, w EL, SI, e BG, medium risk (source: Sansford et al., 2009).

The total EU27 area of hardwood forests extends over 52,086,712 ha[139], while the total hardwood forest area at risk of *P. ramorum* [140] covers 39,832,812 ha. Within this, it is possible to differentiate by level of risk as follows:

Cumulative total 'at risk' EU, ha share of EU total (%):	**39.8 million ha 76.5%**	**EU area according to susceptibility to PR risk (EU RAPRA):**
- *medium/high risk regions* *share of EU total (%):*	15.7 million ha 30.2%	current findings in natural environment (5 MS): UK, NL, FR, DE, IE
- *low/medium risk regions* *share of EU total (%)*	6.2 million ha 11.9%	current findings in managed public green but not natural environment (5 MS): BE, DK, LU, SI, ES
- *minimal/low risk regions* *share of EU total (%)*	17.9 million ha 34.4%	current findings in nurseries only (9 MS: 3 Baltics, FI, SE, PL, CZ, PT, IT)

The EU RAPRA concludes that PR can have **significant environmental** and **economic** impacts on EU **nurseries** and **managed gardens** and **forests/woodlands**.

Impact on nurseries

At nursery level, at present, an estimated 5% of EU nurseries are affected to some extent by *P. ramorum* (source: Sansford et al., 2009; current situation, based on national surveys carried out in MS). In case of no action, i.e. if phytosanitary controls are lifted globally, the EU PRA estimates that the increase in production costs will principally fall on nurseries producing hardy ornamental nursery stock, and managed gardens. The EU PRA clarifies that, with respect to susceptible hosts of cultivated shrubs and trees in nurseries, the whole EU area is potentially endangered wherever these occur because the pathogen is favoured by certain nursery practices.

The additional costs are considered to be '**major**', and would include costs such as diagnoses and consultancy advice (grower, managed gardens), loss of symptomatic plants (grower, managed gardens), purchase of replacement plants to fulfil sales contracts (grower), change in species grown or planted (grower, managed gardens); additional control costs; implementation of production of healthy certified stock by the use of certification schemes; research and development costs (national government and levy bodies).

Furthermore, according to the Sansford et al., 2009, without any control measures, the impact that *P. ramorum* is likely to have on yields/quality of cultivated ornamental species in nurseries in the EU is likely to be '**major**'**.**

On this basis, and in absence of past evidence or experience, it is not possible to quantify further such impacts. It is, however, noted that the production value of the EU 27 floriculture sector was **€10.8 billion** in 2009, with 36,450 holdings, and the production value of tree nursery production **€5.3 billion**, with 13,516 holdings.

The potential economic impact for the nursery trade in the EU 27 is also estimated by the EU PRA as '**high**'.

The UK IA assumes **50%** of this value could be lost if *P. ramorum* outbreaks result in loss of confidence in export markets[141]. The EU 27 value of exports (extra–EU trade) of ornamental

[139] Excludes mixed forest areas which account for 12.4% of total EU27 forestry area.
[140] EU area according to susceptibility to PR risk (as established by Sansford et al., 2009).

plants was €287.6 million in 2009, whereas the export value of rose plants was €22.6 million. Assuming trade restrictions would impact the entire EU27 at the same level, the potential losses for the sector at EU level would amount to **€11.3 million.**

In case of no action, the EU PRA reports that *P. ramorum* has the potential to spread further in the trade network and could potentially expand its host-range, which is already very wide. The loss of exports may increase if TCs maintain requirements for imports of ornamental plants from the EU.

The case of the USA below (California and Oregon), where the nursery industry has been strongly affected by *P. ramorum*, provides an indication of the potential effects an outbreak of *P. ramorum* could have on nursery trade[142].

In 2004, surveys detected *P. ramorum* in two large southern California nurseries that had shipped potentially infected plants to over 1,200 nurseries in 29 states. This finding led to 15 states imposing quarantines on nursery stock from California, resulting in estimated losses of **US$4.3 million** (€3 million) to the nursery industry in California **in the first month alone** (Frankel, 2008). The California Association of Nurseries and Garden Centers estimated that California nurseries lost **US$25 million** (€17.4 million) in sales in spring 2004 when other states prohibited nursery shipments from California (US GAO, 2006). Furthermore, APHIS spent approximately US$20 million (€14 million) to trace and destroy all suspect stock from the two nurseries (Frankel, 2008). Some of the financial impacts of *P. ramorum* in the nursery industry result from enforcement of regulations and other disease management practices to control pathogen spread. In fiscal year 2006, USDA APHIS estimated spending approximately $6.35 million in *P. ramorum* nursery activities in California.

In the Washington state, losses for the nursery industry derived both from the implementation of phytosanitary obligations and loss of markets. As for the for the first, quarantine measures entailed some 17,000 containerized nursery plants destroyed at 32 nurseries[143], with an estimated retail value of $423,043 and mean loss per nursery estimated at $11,188 in 2004 and $11,798 in 2005. In terms of loss of markets, in 2001, Canada closed its markets to most plant crops from the states of Oregon and California. Without reopened market access, Oregon nurseries alone faced losses in sales to Canada of **$15 - $20 million** (€11-€14 million) (Frankel, 2008).

The total potential costs and losses to the nursery industry and forests in Oregon from *P. ramorum* were estimated to be **$81 - $310 million** per year[144]. To comply with federal quarantine regulations, the Oregon Department of Agriculture (ODA) has spent about $3.2 million over a 5-year period (2001 through 2006) on surveys of nurseries for *P. ramorum*. In

[141] The annual average value of UK exports of susceptible species (currently mainly rose plants) is estimated at £355,000 (€408,000).
[142] In 2006, the U.S. domestic production of nursery crops was valued at about $12.9 billion. Imports for these crops were $341 million and exports were $287 million. The U.S. ornamental nursery industry is valued at over $13 billion annually, ranking as the third-highest-value crop in the United States. California is the industry's leading producer of horticultural plants, valued at $2 billion a year. Oregon's industry is ranked fifth nationally and ranks second in the production of woody plants; in 2006, the wholesale value of nursery stock sold in Oregon was $966 million (Kliejunas, 2010).
[143] Dart and Chastagner (2007).
[144] Cusak et al 2009, Griesbach 2008, Kanaskie et al 2008b, Oregon Invasive Species Council 2008 as quoted in Kliejunas, 2010. This figure includes the costs of direct control, management, and regulatory compliance costs, plus loss of markets (no breakdown by type of costs and losses is available).

2007, the ODA needed to inspect over 1,450 nurseries to comply with the quarantine rules (Frankel 2008).

Impact on managed gardens

The EU PRA concludes that the impact that *P. ramorum* is likely to have on the quality of cultivated plants in managed gardens (especially heritage plants in gardens involved in tourism) in the EU without control measures is likely to be '**massive but on a local-scale**'; overall, therefore, the impact is likely to be '**moderate**'.

Furthermore, in case of no action, environmental impacts may become '**locally major**' but this may take some time (possibly decades) as this relies on further spread of the pathogen.

There will be further impacts if, as a result of damage to plants in managed gardens, visitor numbers are affected, ultimately also affecting the tourism industry, where such gardens are part of the wider rural economy.

The PRA considers also the potential impact on the costs borne by NPPOs if, in the case of delayed action, increased phytosanitary controls are recommended in an effort to reduce further spread to the environment; however, some control costs could be partly offset by environmental benefits generated by the action taken[145].

In the UK, the annual loss of income in managed public green was estimated at a minimum **£2.4 million** (€2.8 million) in terms of loss of income from entrance fees and other income generated[146]. It is not possible to extrapolate from this basis to the EU as a whole, as entrance fees and income generated from such sites are significantly different across Europe.

Impact on forests/woodlands

The potential economic and environmental impact of *P. ramorum* on forests and the open environment was assessed at EU level by a study (Kehlenbeck, 2008), which concluded that for the '***northern European tree system***' the impact is '**moderate**', while for **'*southern European tree system*'** it is currently '**minimal**' as *P. ramorum* has not been detected yet in the natural environment **but could shift to 'major' if *P. ramorum* was introduced**[147].

The EU PRA concludes that habitats at risk to become affected by *P. ramorum* include heathland in northern Europe, as well as evergreen oak woodlands and laurel forests (laurisilva) and maquis/matorral habitats in southern Europe[148], with potential knock-on

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[145] Such environmental benefits would be generated if controls focus on removal of foliar sporulating hosts that are invasive species such as *R. ponticum.*
[146] Assuming 10% reduction in visits; on the basis of annual income of only 45 gardens in an area managed by UK National Trust.
[147] In the 'northern European tree system' (trees with stem cankers, in association with infected rhododendron e.g. NL and UK) the environmental impact is currently limited to few areas only; unlikely to change unless there is a dramatic change in the presence of infected foliar hosts that sporulate sufficiently to provide inoculum to infect tree stem hosts. In the 'southern European tree system', a hypothetical system based upon the presence of the infected foliar host Q. ilex (holm oak), currently the impacts are minimal (zero) as *P. ramorum* has not been detected there in the natural environment; however, if the pathogen was introduced, the impact would shift to major because the environment is considered to be highly favourable to the establishment of PR.
[148]Only where they contain susceptible host species that are capable of sporulating and favourable conditions for the pathogen.

effects on the ecology of the area in case it became infested. To date, no timber plantations have been affected by the HO in the EU, therefore potential economic losses caused by *P. ramorum* have not been quantitatively estimated**.** However, in case *P. ramorum* affected timber plantation, the EU PRA concludes that if no action was taken the impact could be in the long-term '**minor to moderate**'. If *P. ramorum* were to become established in timber plantations in the EU, there is a potential risk of tree death of a range of species including beech (*Fagus sylvatica* L.) and oak (*Quercus* spp.), as trees of these species have died from the pathogen in the UK and NL. Based on climatic conditions similar to California and Oregon, the areas most likely to become affected are northwest ES, northern PT, southwest UK, and parts of IT.
Economic impacts would include direct losses in wood production, losses in international trade with wood or plant material, whereas environmental impacts would include loss of human recreation areas and changes in biodiversity.

On the basis of a tree loss of 20% (as has been the US experience indicated below; on this study we assume that the same will happen in due course in the EU as concerns European oaks and beeches), the potential damage of the above EU high risk area[149] could reach at least **€4.2 -€9.1 billion** total loss in production value. It is also noted that a potential host for the HO is the *Quercus suber*, cultivated in ES, PT, FR and IT, and source of an important part of the forest economy. The European cork industry produces 300,000 tonnes of cork a year, with a value of **€1.5 billion** and employing 30,000 people.

In comparing with actual impacts, the US can provide the best indication as it has experienced significant impacts of *P. ramorum* also on forestry and the open environment. In California, the HO has had major effects on coastal forests, with mortality of tanoak, coast live oak, and California black oak: an estimated 235,678 trees (12,650 m^2 tree basal area) were killed by *P. ramorum* in the Big Sur ecoregion (79,366 ha study area) (Meentemeyer et al., 2008), i.e. about a **20% loss of available host trees**. California oak woodlands (*Quercus* spp.) were estimated to contain about 142 million m^3 of wood with a stumpage value over US$275 million, and over US$500 million in terms of forest products (Kliejunas, 2003). Oak products exported from California during 1996-2000 averaged almost $50 million per year (USITC, 2005). In the USA as a whole, the export market value of red oak logs and lumber in 2002 was over US$300 million (USITC, 2005). The economic value of Eastern US timber species would be significantly reduced if *P. ramorum* were to become established there. It was estimated that if oaks and other tree species in the eastern deciduous forests of the US became affected by *P. ramorum*, the potential cost to commercial timber production in the US was likely to be in excess of US$30 billion (Klieujunas, 2003).

The major impact of *P. ramorum* in forests of the US has occurred in the mixed-evergreen and redwood-tanoak forests of coastal central California. In Oregon, potential losses of **at least $100 million per year** in stumpage value (lost harvest) are estimated if eradication is not successful and *P. ramorum* spreads uncontrolled in southwest Oregon (Kanaskie et al.,2008, as quoted in Kliejunas, 2010).

Besides the potential damage on timber value, eradication and control costs to address outbreaks of *P. ramorum* are also significant; existing studies point therefore to the benefits of prevention and early response. In the UK, the cost of a five-year programme to combat *P.*

[149] Based on California experience to date and considering total broadleaved area of the countries mostly at risk according to the Sansford et al. 2009.

ramorum launched in April 2009 is c. £25 million (€29 million) over 5 years[150] (source: DEFRA; Forestry Commission Scotland). A study specific to the UK (Friend, 2008), examines the cost-benefit over 20 years of two options for the control of *P. ramorum* [151] including in the open environment (option 1: minimum EU control requirements; option 2: intensified surveillance (including rhododendron clearance)). Although option 2 (intensified surveillance) carries a higher cost (an additional £10.5 million or €12.1 million), it also has a higher benefit (an additional £24.4 million or €28.1 million), resulting in a net benefit over 20 years estimated at £13.9 million (€16 million) (all figures are PV). The most significant cost component under option 2 is rhododendron clearance, which is estimated at £4.3 million (€5 million) over the 20 year period. Benefits of option 2 are calculated in terms of reduced loss of social/environmental benefits of woodlands, the biodiversity benefits of rhododendron clearance, and the cost savings of clearance and maintenance of historic gardens and of outbreak controls in nurseries (these costs are lower in option 2 compared to option 1, by some £9.3 million (€10.7 million) and £1.8 million (€2.1 million) respectively). Rhododendron clearance is an important dimension of the UK IA study, as the costs of this action account for 40% of all costs[152], while its value in terms of the resulting increase in biodiversity is equivalent to 70% of the cost of clearance (i.e. beyond its benefits in addressing PR, this action brings biodiversity benefits of €0.7 for every €1 spent).

According to UK Forest Research (February 2011), an estimated 1,600 ha of larch trees (mainly *Larix kaempferi*) have already been felled in England and Wales to contain and prevent disease spread, which equate to c. 340,000 m^3 of timber volume.

Beyond the economic damage and costs to the timber industry, the existing literature points to the significant potential environmental and social impacts of *P. ramorum*.

Oak woodlands yield important benefits, including water and watershed protection, grazing, wildlife food and habitat, recreation, and wood products. Oak species are part of forest and savanna woodland ecosystems in Europe (Global Invasive Species Specialist Group, 2006). Many of the foliar hosts of *P. ramorum* have ecological significance.

In Europe, any significant loss of oak species to *P. ramorum* could impact soil erosion, hydrology, biodiversity, tourism, and cultural history[153], whereas other hosts of *P. Ramorum*, such as European beech (*Fagus sylvatica* L.) and sweet chestnut (*Castanea sativa* Mill.) are important high forest and plantation trees in Europe.

The reduction of oak and tanoak populations in the US (California) forests is reported to have altered the forest stand structure and composition (Meentemeyer et al., 2008). The USDA PRA (Kliejunas, 2003) pointed out that heavy loss of oaks, or of related susceptible genera, owing to *P. ramorum* infection could result in significant ecological effects, including changes in forest composition, loss of wildlife food and habitat, increased soil erosion, and a significant increase in fuel loads in heavily populated urban-forest interfaces.

The order of magnitude of **environmental and social impacts** is significantly higher than the value of the timber industry as such. The environmental and social values provided by

[150] Excludes costs covered by the forestry sector.
[151] The UK programme and the UK study quoted here cover both PR and PK (*Phytophthora kernoviae*).
[152] Assumed average cost in UK IA is £8,000/ha - actual range is £7,000-£10,000/ ha.
[153] Global Invasive Species Specialist Group 2006, Sansford et al. 2009.

woodlands/forests include open access to recreation activities, landscape amenity, biodiversity, and carbon sequestration (Sansford et al, 2009). The estimated social and environmental benefits of **UK forests** (based on estimated values of the recreational and biodiversity benefits, landscape value, and carbon sequestration) are ca. **£1.0 billion** (€1.1 billion) per year (2003 figures); this compares with an estimated timber value of UK forests of ca. £36 million (€40 million) (2003 figures)[154] (Sansford and Woodhall, 2007).

Rhynchophorus ferrugineus (RPW)

Epidemiological analysis (RPW):

risk of introduction: high in susceptible zone / low elsewhere

risk of spread: high (natural spread; host plants widely distributed in susceptible zone; difficult to manage risk in private gardens**)

risk of establishment: high (idem)

Rhynchophorus ferrugineus (RPW) is a major economic pest of a wide range of both productive and ornamental palm trees. The rate of spread is considered high; during the last 3 years (2007 – 2010) there has been a significant increase in the number of outbreaks in the EU (source: FVO). According to experts and literature review, the susceptible zone in the EU27 comprises mainly South Europe areas where palm trees are grown outdoors. Several factors make pest management difficult: the pest is a strong flyer (flight up to 1km uninterrupted); in early stage of infestation symptoms are hardly visible; and, access to private palm owners is a problem.

Impacts

It is not possible to make projections on the potential threatened value of palm trees in the EU 27, as the total number of palm trees situated in public green spaces (or private gardens) is not known by any source. Assuming an average number of 5,000-10,000 palm trees in public spaces in a metropolitan city in South Europe[155], the minimum value of these trees if they were all irreversibly affected by RPW would be at least €10- €30 million. It is noted that these figures are underestimates of the potential damage that can be inflicted by RPW[156], as they exclude the landscape aspects of high-value palm trees (e.g. century old trees situated close to historical monuments or in protected UNESCO sites e.g. Elche world heritage palm forest in the Valencia Region in ES[157] and the Vai natural palm forest in Crete, EL (made up of Cretan Date Palm, *Phoenix theophrasti*).

To date, the actual impact of RPW in the EU-27 is estimated to have reached at least ca. €50-€52 million[158] in containment/eradication costs for the MS CAs alone and to have involved the destruction of at least 65,000 palm trees (to 2009), which is only a fraction of those infested (all figures are 2005-09; in 2010 the impact has continued in the same order of

[154] Sansford and Woodhall (2007)
[155] This is a reasonable average estimate; for example one source indicates that some 7,000 palm trees are estimated to be present in public spaces in Rome.
[156] Based on ex-nursery values for mature trees of €1,000-€3,000/tree.
[157] There are 200,000 date palms within the township of Elche and another 250,000 which are growing in the city's various nurseries.
[158] This figure excludes the impact in IT, for which full figures have not been received.

magnitude)[159]. On the basis of the destroyed palms alone, the value of trees lost to RPW is estimated at **€65-€195 million**; on the basis of the infested palms, the value of trees lost to RPW is estimated at **€96-€288 million**[160]. Again, these figures are underestimates of the actual loss in value as they exclude high-value trees.

ES has been one of the hardest hit MS, with at least 47,000 palms destroyed during 2005-09 and total containment/eradication costs of €44.5 million (excluding the value of the trees). At nursery level, in continental ES Valencia nurseries have suffered particularly from the outbreaks; the yearly volume of business (turnover) for palms in this region is estimated at €40 million (more than 60% of the total trade), 150 professional nurseries (some of them are very big 20ha, some are small: 1ha; the business is mostly on a family basis).

Examples of the impact of RPW include the following MS:

	Number of infested palms (2005-09)	**Cost of containment/ eradication (2005-09)**
ES	ca. 47,000	€44.5 million
ES (Canary islands)	ca. 700	€2.0 million
EL	ca. 7,500	€1.5 million
FR	ca. 1,300	€1.3 – €3.9 million
IT (Sicily)	ca. 39,500	n.a.
EU27	**ca. 96,000 (at least)***	**ca. €50 - €52 million (at least)**

Notes: Total figure can be considered as an underestimate, as there have been impact of RPW outbreaks also in CY and MT, for which total figures are not available (n.a.); also, full reply of IT not received.

Dendroctonus ponderosae (MPB)

Epidemiological analysis (MPB):

risk of introduction: low (not present currently - ISPM 15 can protect from import risk)

risk of spread: moderate – high; in Europe, *Pinus sylvestris* is a suitable host, and abundant - given extensive N-S distribution of MPB in N. America, climate is unlikely to be a barrier over large portions of Eurasia; high potential of natural spread

risk of establishment: moderate - high (as above)

This pest is not yet present in Europe but expert analysis suggests that, if introduced, conditions would be favourable for its spread and establishment.

In Europe, the key host species Scots pine (*Pinus sylvestris L.*) is the most widely distributed conifer, its range extending to large areas of the continent, covering a wide variety of environmental conditions within this natural range[161]. Although unevenly distributed, *Pinus sylvestris* stands contribute to a large proportion of European forests; according to literature,

[159] The data on the number of infested palms come from different sources, i.e. the FVO reports of annual surveys of MS, FVO inspection reports in the affected MS, solidarity dossiers, and presentations of MS CAs at the conference held in 2010 on RPW. In some cases data are not comparable, e.g. CY and MT report the number of outbreaks rather than number of infested palms, FR reports the number of municipalities inspected and infested etc. there has been significant effort to compare the data in order to derive the total numbers for EU27 used for the calculations of Task 3 and Task 5.
[160] On the basis of an average unit value of €1,000-€3,000/tree.
[161] The species extends as far north as 70 °N on the Norwegian coast, reaching 37 °N at its southern limit in the Sierra Nevada of Spain; the longitudinal range covers most of Europe, spreading over Siberia as far as 138 °E.

this forest type now exceeds 20% of the productive forest area of the EU27[162]. Forest growth of this species is already under pressure with climate change (Magnani et al, 2009). Traditionally, a distinction has been drawn between a small area of native pinewoods with high conservation value in some parts of the EU and the younger plantations to be found in many parts of Europe. The latter have been primarily managed for timber although they are now expected to meet multipurpose objectives, including enhanced biodiversity (FAIR concerted action, 1999).

Impacts

The FCEC has extrapolated to estimate the potential impact of MPB if it was introduced in the EU. The total EU27 area at risk (*Pinus sylvestris* host plants) is estimated at 30.1 million ha (about a fifth of the total EU27 forest area). Within this, it is possible to differentiate by level of risk as follows:

Cumulative total 'at risk' EU, ha share of EU total (%):	**30.1 million ha 20.0%**	**EU area according to susceptibility to MPB risk:**
- *medium/high risk regions share of EU total (%):*	15.0 million ha 10.0%	pinus sylvestris area with favourable climate conditions for development of MPB
- *low/medium risk regions share of EU total (%)*	15.0 million ha 10.0%	pinus sylvestris area with unfavorable climate conditions for development of MPB

Notes: rough estimates based on distribution of host plants in the EU27 (source: EUFORGEN); risk regions defined on the basis climate and host species.

The potentially susceptible area in the EU is similar in total size as the affected area in Canada, but far more spread across MS territory (the area affected is highly concentrated in Canada). Therefore, the costs for MPB control and eradication are likely to be far higher in the EU than in Canada.

The FCEC has extrapolated on this basis to estimate the area and timber volumes likely to be affected, total timber value loss, under a no action scenario whereby MPB affects 100% of the total susceptible area in medium/high risk regions with 77% mortality rate. This would potentially affect some 11.6 million ha of coniferous (*Pinus sylvestris*) forest, leading to a loss of productive value of some €31.8 - €45.5 billion (depending on the anticipated timber harvest from this land). The potential loss in value calculated here refers to harvested timber only, therefore excluding other forest landscape and recreational values which, as the forestry overall data demonstrate, are much more significant. These elements point to the significant benefits of taking action, particularly in the early phases of outbreaks.

Table 22: FCEC extrapolations on potential impact of MPB outbreaks in EU27 if no action taken (Task 5)

	Estimates
Scenario: MPB introduced and spreads in EU, affecting 100% of total area in medium/high risk regions with 77% mortality rate	
• Affected area, ha	11.6 million ha
• Volume affected, m^3	579 – 827 million m^3
• Production value losses, €	€ 31.8 - €45.5 billion

Notes: Range of volume and value estimates depends on the anticipated timber harvest from this land.

[162] With significant MS differences: e.g. comprising almost 65% of the total forest cover of FI, about 10% of all high forests in GB and 9% of the forested area of FR.

The devastation that MPB has caused in **Canada**[163] is also an indicator of the potential scale of impacts should this pest arrive and establish in Europe.

In Canada, since the current infestation began (late 1990s), authorities in British Columbia (BC) estimate that the cumulative area affected by MPB to some degree has reached 16.3 million ha (an area larger than an average size MS such as BE). They estimate that the MPB has now killed a cumulative total of 750 million m^3 of timber (of which over 90% is red- and grey-attack, i.e. second and third phases of infection); this is equivalent to 10-15 years of harvest in BC or 3–5 years harvest for all of Canada. The authorities predict that nearly 80% of the province's pine volume will be killed by the time the infestation subsides (or >1 billion m^3 by 2020), leading eventually to the closure of 16 major sawmills and the long-term decline of forest industry. Experts anticipate that it would also affect the availability of raw material for the construction industry in Canada and in the US, while it is predicted to result in lumber shortage in the US by 2018 (Carroll, 2010). The extent of the damages has justified significant direct control costs: in 2006, the Canada Federal budget provided $400 million over two years to combat the MPB infestation, including industry support.

Beyond BC, the Alberta area in Canada has also been affected by MPB. Authorities currently estimate the area at risk of MPB infestation at 6 million ha of forest containing pine stands, of which ca. 4.5 million ha are within areas available for commercial timber harvest, or ca. 15% of the total forested land in Alberta. More than 60% of Alberta's pine trees are mature trees aged 80 to 120 years, the age-class favoured by MPB as the BC case has shown[163]. Alberta's pine forest is a significant resource for the province's total forest industry, and several forest companies depend almost exclusively on pine for the products they make; Alberta's forest industry employs 38,000 people and contributes to an annual production value estimated at about $10 billion (source: Government of Alberta).

A 2010 simulation study (Schneider et al., 2010) of an MPB outbreak in Alberta, suggests that the current rate of softwood harvest cannot be maintained if Alberta's MPB infestation follows a trajectory similar to the outbreak in BC. According to the study simulations, maintaining current harvest levels after the MPB attack would lead to a general collapse in the softwood timber supply in 60–70 years (forestry companies would not be able to compensate for the pine loss by using non-pine species as they would have to do this to levels that would not be sustainable)[164].

Earlier simulation studies in BC indicated the potential extent of economic damage inflicted by MPB to sectors well beyond the timber industry as such. A computable general equilibrium framework was employed for the purpose of simulating future economic indicator levels for the two regions that are experiencing the highest impact from MPB

[163] The extent of the MPB impact in BC is due to a number of factors including insufficient surveillance at the start of the outbreak, anthropogenic disturbances in forests, and the age structure of the pine forests. Trees most susceptible to MPB are between 80 and 160 years old; at start of outbreak (≈1990), majority of pine forests were susceptible; 100 years ago, less than one third of Canadian pine forests were susceptible (Carroll, 2010).
[164] The study simulated two management scenarios, conventional harvest and a pine-reduction strategy modelled on a component of Alberta's MPB management strategy. The pine strategy seeks to reduce the number of susceptible pine stands by 75% over the next 20 years through targeted harvesting by the forest industry. The simulations showed that the pine strategy could not be effectively implemented, even if the onset of the MPB outbreak was delayed for 20 years. When the outbreak occurred in each scenario, sufficient pine remained on the landscape for the beetle to cause the timber supply to collapse.

outbreaks[165] (Patriquin et al, 2005). For each region, a set of scenarios reflecting the impacts of recent increases in the annual allowable cut, the expected future reduction in the annual allowable cut, and hypothetical mitigation strategies involving visitor activity and increased agricultural exports were analyzed. The study concludes that, while in the shorter-term (≤15 years), the available timber supply will increase from the baseline annual allowable cut in order to capture the value of the standing dead timber, in the longer-term (≥15 years), reductions in the annual allowable cut will result from the MPB mortality and the lag time needed to regenerate the forest. In the longer-term, mitigation strategies will be required to offset any negative consequences associated with reductions in the available timber supply, including the need to re-invest capital transition to new forms of industry and employment.

In particular, after 10 to 15 years, it is anticipated that one of the two regions studied will experience a reduction of 4.6% in the allowable annual cut from the baseline, which will result, on average and without mitigation, in: a regional annual revenue drop of $27.6 million (2.6%); net regional product reduction of $16.4 million (4.1%); reduction of royalties and indirect taxes by $5.4 million (5.1%); decrease of $8.3 million (3.6%) of total labour income; and, loss of 132 (2.5%) employment positions. Similarly, after 10 to 15 years, the second region studied will experience a reduction of 15.8% in the allowable annual cut from the baseline, which will result, on average and without mitigation, in a regional annual revenue drop from the baseline and will result, on average and without mitigation, in: a regional annual revenue drop of $587.2 million (5.5%); net regional product reduction in $271.7 million (8.6%); reduction of royalties and indirect taxes paid by $84.7 million (11.5%); decrease of $98.8 million of total labour income (6.2%); loss of 2,660 employment positions (4.8%). These impacts will be only partially offset by increased export activity and visitor numbers (the latter, as a consequence of a shift from timber production into other activities). It may be possible to further mitigate negative impacts in the forestry sector by strategies to increase other existing sectors, such as mining, and through structural adjustments and the development of new products and sectors.

Beyond the economic impacts as such, there have been significant environmental impacts. Researchers from the Canadian Forest Service have studied the relationship between the carbon cycle and forest fires, logging and tree deaths: by 2020 the MPB outbreak will have released 270 megatonnes of carbon dioxide into the atmosphere from Canadian forests. That is the same amount of greenhouse gas emissions that Canada is committed to reducing by 2012 under the Kyoto Protocol, and more than "*the total average sink of all of Canada's managed forest over the last decade*". The study concluded that the impact of the MPB alone has "*converted the forest from a small net carbon sink to a large net carbon source both during and immediately after the outbreak*".

5.3.2. HOs affecting agriculture and horticulture

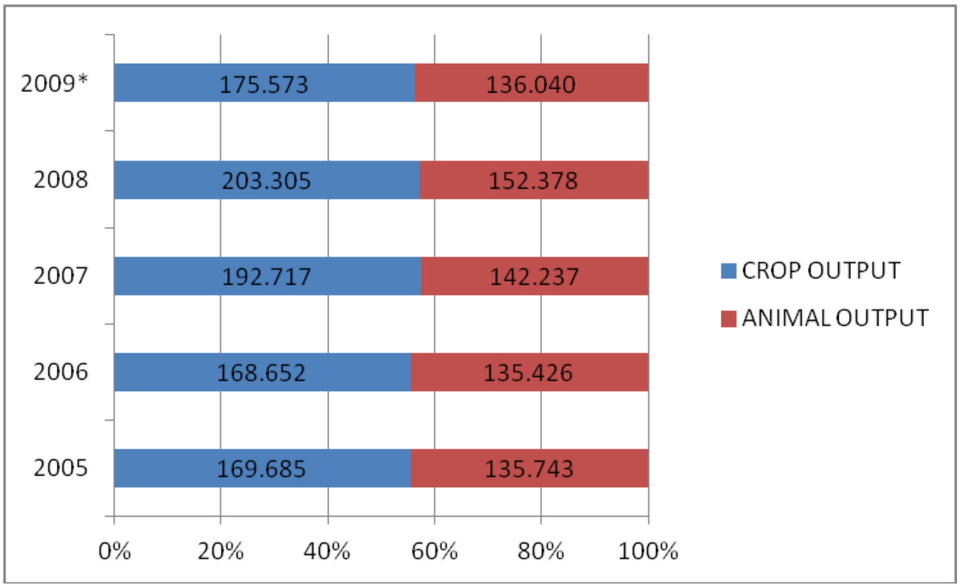
The production of plants and plant products accounts for an equal share of EU agricultural output value at that of animals and animal products. The share of plant products in EU exports is also comparable to that of animal products; in 2009, each of the sub-sectors accounted for around 20% of exports of all food products.

[165] These are the forest-dependent communities of the Northern Interior Forest Region of British Columbia: the Nadina Forest District and the Prince George Timber Supply Area.

The European seed market has a total estimated production value at over €7 billion, with an export value (2008) of €3 billion and an import value of €2.3 billion (source: ESA).

Various specific sectors are potentially affected by the introduction and establishment of plant pests; in particular, the HOs considered in this analysis have an impact on the maize, potato and tomato sectors.

Figure 3 Value of agricultural production, in billion € (current prices), 2005-2009



Source: EUROSTAT

5.3.2.1. Economic value of the EU potato sector

The EU27 is the third largest world producer of maize, after the USA and China (in some years, competing for third position with Brazil). The total EU27 maize area is ca. 13 million ha, of which grain maize is 8.9 million ha (2008/09). The total maize area in five MS represents 70% of the total EU27 area sown with maize: RO (28%), FR (19 %), HU (13%), IT (12%), and DE (6%) (Source: AGPM).

Total grain maize production amounts to ca. 63 million tonnes (2008); the leading producing MS were FR (15.8 million tonnes), IT (10.3 million tonnes), HU (9 million tonnes), RO (8 million tonnes), DE (5 million tonnes). Some of the yield levels in the EU (e.g. in FR and IT) are amongst the highest in the world. As production levels are strongly affected by climate factors, there can be quite substantial fluctuations from one year to the next. The total **production value** at producer prices (EU average) of the EU27 grain maize crop is estimated at ca. **€9.5 billion** (source: EUROSTAT/DG AGRI)[166].

[166] There are wide variations in maize prices year on year and also between MS (EU average taken for calculations here at ca. €150 /tonne for grain maize, 2008). Production volumes also tend to vary substantially from year to year (e.g. 63 million tonnes in 2008; 49 million tonnes in 2007; 55 million tonnes in 2006). The resulting calculations of total maize production value will therefore depend on prevailing prices and production volumes each year.

On average, total EU maize **trade** is valued at **€3.1 billion**, of which €2.8 billion is intra-EU trade (COMEXT data, average 2008-2010). Imports from TCs can be very significant depending on the internal EU supply/demand balance every year. In the 2007/08 season, with a substantial shortage of available produce because of sharp cuts in production, maize imports from TCs (e.g. Brazil and Argentina) reached 13 million tonnes. The value of exports to TCs on average in 2008-2010 was €335.8 million.

The establishment of HOs could highly affect production of maize of EU, as demonstrated by the case of *Diabrotica* (see analysis below). Effects of such HOs could also have high environmental and social effects, due to the large use of pesticides used to control spread. Furthermore, the establishment of maize HOs could have an impact on international trade. As an indication, in the USA the presence of karnal bunt on wheat is limiting 39% of wheat exports; deregulating this HO will lead to an export drop of 15%, with a negative impact of $4 billion/year for farmers income, in cash receipts (Vocke et al, 2010).

The availability of maize for use as a raw material is very important for a range of downstream food and non-food industries. Maize is used as a raw material in over 600 food and non-food uses; across the EU, animal feed is the main outlet, well ahead of starch, milling and other industrial uses.

Diabrotica v.v. (Dvv)

Epidemiological analysis (Dvv):

risk of introduction: low/moderate (due to current restrictions)
risk of spread: moderate / high (high potential for natural spread)
risk of establishment: high (all literature agrees that once established, Dvv is very hard to control.

Dvv is widely established in the EU and has been the subject of many studies, including a review of options for the management of Dvv by the FCEC in 2008, and the more recent Diabr-ACT project (Wesseler and Fall, 2010). As the impact assessment of Diabr-ACT is very complete (covers all EU27), the analysis below is based on these results.

Impacts

Diabr-ACT estimations cover a range from best case to worst case scenarios, with the most likely scenario results as follows.

Total EU damage costs, in the case of no action**,** are estimated at **€472 million per year** (best to worst case range: €143- € 2,071 million). This is compared with EU surveillance and control costs estimated at €14 million[167]. The damage is calculated over a total susceptible area of 733,132 ha, of which 491,726 ha of grain maize and 241,405 ha of green maize[168].

Damage costs are calculated on the basis of the damage inflicted on the maize crop from yield losses caused by Dvv, therefore revenue losses for maize producers in the case of no

[167] On the basis of the highest cost of surveillance and control of Dvv in IT (over 1999-2003: €700,000), the study calculates a total cost for 20 countries (assuming same cost of control and surveillance as IT).
[168] The study is done on a total land area basis. It then estimates the total suceptible land that has never been infested and then applies the resulting ratios on the maize growing area.

action[169]. Large disparities on yield losses from Dvv are reported by scientists: Diabr-ACT assumes maximum yield losses of 10-30% without Dvv control measures, in line with previous European studies; furthermore, the level of damage will vary between MS/regions, primarily depending on the number of maize fields in monoculture (continuous maize) and on climatic conditions during June-July. Average yields also vary highly between MS: for grain maize 4-12 t/ha, and for green maize 12-50 t/ha (Diabr-ACT assumes yields of 8t/ha for grain maize and 41 t/ha for green maize). Finally, there are wide variations between MS in crop prices. All these elements lead to wide variations in farm revenue from maize between MS (Diabr-ACT assumes an average maize revenue of €939, covering both grain and green maize).

According to FCEC calculations on the basis of the most likely scenario results, the above damage costs are estimated to account for circa 71% of the total EU27 maize crop production value. Under the same scenario, damage costs versus control and surveillance costs come to a 34:1 ratio. This would represent the economic benefit of controlling Dvv, expressed in terms of avoiding further damage (loss in revenue from yield losses) from continuing spread of Dvv in case of no action.

In 2008/09 the FCEC had estimated for DG SANCO the potential impact over a 25 year period for the EU27 of different options for the control of Dvv (source: FCEC, 2009). The estimates produced at the time were €6.1 billion in the case of no regulation[170], versus €3.8 - €7.0 billion in the case of regulation, depending on the type of regulation. These estimates are based on the range of options presented in the IA and are high in all cases given the widespread extent of the disease. However, even at this advanced stage, regulation was found to be less costly than deregulation.

Another study comparing costs and benefits of different scenarios for the control of Dvv concluded that enormous economic benefits (in terms of avoided production losses) can be gained by controlling further spread of Dvv (Wesseler and Fall, 2010). The most likely scenario resulted in average annual economic damage costs (therefore benefits) of €472 million for the EU as a whole. The study demonstrated that even in countries that do not currently face high damage costs from Dvv, control could be justified as this would reduce the speed of spread and generate a positive externality for other regions with higher damage costs.

5.3.2.2. Economic value of the EU potato sector

In 2009, potato production in the EU27 involved 2.1 million ha, with a production of 60.2 million tonnes and an output value at producer prices of **€10 billion**, representing 3% of EU total agricultural production value at producer prices, or 5% of EU crop production value at producer prices. A total **3.2 million holdings** in the EU27 are involved in potato production (ca. 25% of all holdings; of these 2.2 million holdings in RO and PL) (source: EUROSTAT).

[169] Assumptions underlying this calculation: speed of spread of 40 km/year (Wageningen workshop of experts), medium Dvv damage levels of 20% and a current continuous maize area of 1.3% of total land area.
[170] This was the estimated impact of Option 3 (Repeal all *Dvv* legislation at EC and MS level, leave decision on control measures to the farmers) analyzed by the study. Costs for this option consist of the costs not linked to regulation and supported by the farmers to control the *Dvv* population in the infested zones.

On average, total EU potato trade is valued at **€4.8 billion**, of which € 3.9 billion is intra-EU trade (EUROSTAT COMEXT data, average 2008-2010). This includes potatoes fresh or chilled, for a value of € 1.7 billion, and processed potatoes, for a value of € 3.1 billion[171].

The EU is a net exporter of potatoes to TCs: the average value of extra-EU exports (on the basis of the 2008-10 period) is €413 million, of which €266 million of seed potatoes; the average value of extra-EU imports is €166 million[172]. The EU is also a significant net exporter of processed potatoes: the average value of EU exports to TCs is €455.8 million (average 2008-2010), whereas extra-EU imports are €13.7 million.

The EU potato industry is very competitive and is continuously gaining market share, both within the EU and worldwide. Production is highly concentrated within the EU, with 8 MS accounting for over 80% of the total EU potato production value (DE, FR, RO, NL, UK, PL, IT, ES). On a world scale, EU businesses are especially competitive in the segments of seed potatoes and of processed products.[173] The production of seed potatoes of high value, is mainly concentrated in 4 MS, representing 68% of the cultivated acreage (32% in NL, 15% in DE, 13% in FR and 12% in UK), with a few Dutch companies being world leaders *(Nederlandse Aardappel Organisatie (NAO) – 2007).*

The EU-5 so-called 'potato' zone comprises the UK, the NL, BE, DE and northern FR, and can be considered as the most efficient and integrated area in the EU's potato business. Here, yields are significantly above the EU-25 average and local traders shape commercial relations all over the EU. Price series in these 5 MS are highly correlated and have a strong impact on the overall tendencies recorded at EU level. Furthermore, in this EU-5 potato zone, there are significant spill over effects on the processing industry, and the competitiveness of the agricultural activity reinforces the position of manufacturers and vice versa.

In the new MS (NMS), potatoes play a very important role, especially in PL and in the Baltic countries, with a high number of small holdings cultivating potatoes: whereas on average (EU 27) the share of direct labour force employed in potatoes cultivation in the EU amounts to 25%, in several of the EU NMS this share is significantly higher (85% in LT, 80% in LV, 66% in SL, 59% in EE and 55% in PL) (source: EUROSTAT, 2005).

A number of HOs examined under Task 5 are relevant for the potato sector: *Globodera* (PCN); *Clavibacter michiganensis ssp. sepedonicus* (the causative agent of bacterial ring rot in potato); *Ralstonia solanacearum* (the causative agent of bacterial brown rot in potato) and Potato Spindle Tuber Viroid (PSTVd).

The economic impact of these diseases, and more generally of potato diseases, derives not only from direct disease losses but also from loss of international export markets, long-term quarantine measures, and regulatory restrictions placed on infested areas and the BZs surrounding infested areas. In view of the significance of the potato sector in the EU, any case of outbreak of the above diseases is a financial disaster for growers as economic consequences (in terms of production losses and negative impacts on trade in case no action is taken) are large and quick to take effect, also as a result of rumours in the trading sector.

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[171] CN codes: 200410 potatoes, prepared or preserved otherwise than by vinegar or acetic acid, frozen; 200520 potatoes, prepared or preserved otherwise than by vinegar or acetic acid (excl. frozen).
[172] Source: Comext, data extracted in June 2011.
[173] World demand for seed potatoes and processed products is increasing, especially in Asia (EC, 2007).

These diseases are a particular threat to the seed potato industry with affected farms having to give up seed production. Effects of infestations range from yield losses, to rejection of certification for infested lots, destruction of infested lots, to ban of production in the infested fields for several years. These effects all impact on producer income, therefore the overall value of the sector. Such events may have significant impacts on employment, with producing farms having to abandon the sector, depending on the capacity to respond to the losses and on the persistence of the disease in following years[174]. Given that the potato cultivation is an important element of a large number of mixed farms in many NMS, also in the context of subsistence farming, the impact on these individual small farmers will be very significant[175].

Depending on the magnitude of production losses, effects may be felt on prices, with a consequent impact on consumers as well as producers. Impacts on prices may be significant, also considering that EU phytosanitary policy forbids in practice for phytosanitary reasons, in the absence of derogation[176], to import seed potatoes from all TCs except Switzerland[177].

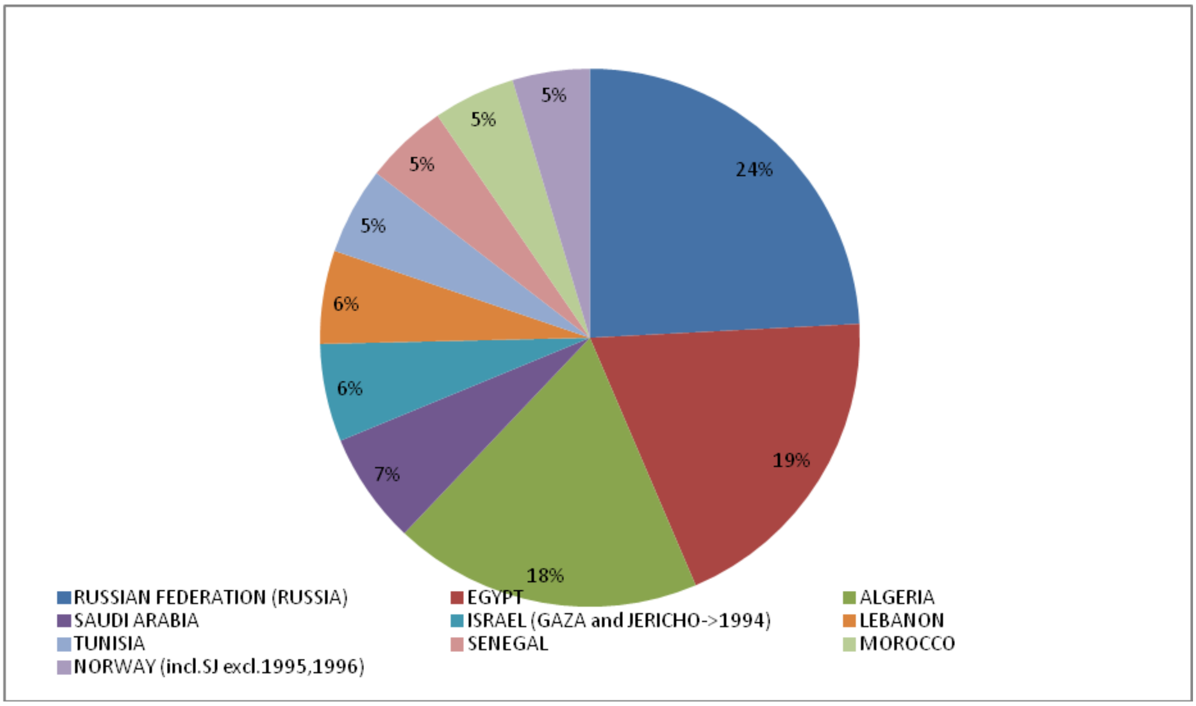
As an indication, in NZ, there are fears that the price of potatoes could rise, as farmers fight the infestation of an insect (psyllid, *Bactericera cockerelli*) that could cost up to a quarter of yield losses and loss of revenue for the $550 million potato sector, as the pest affects 60% of potatoes grown in NZ for processing into crisps and chips for fast-food outlets.

Impact on trade

In case of outbreak of these HOs in absence of any control action, the spread of these diseases could heavily affect exports, since the potato sector is subject to strict regulation worldwide. Import measures may therefore be taken by trade partners, determining, in the worst case scenario, the complete loss of the EU potato export (€413 million/year). It is also noted that the impact of a ban is likely to be high, given that EU trade flow is highly dependent on few export markets (see Figure 4), i.e. mainly Russia and North Africa, therefore an import ban imposed by one of these trading partners may immediately result in the loss of a significant part of trade.

[174] According to the latest available data, direct labour force employed in holdings producing potatoes is 1.4 million workers in the EU, excluding PL, BG, CY, RO, CZ (2003), source: EC, 2007.
[175] In PL and the Baltic countries where at least 60-80% of farms are involved in potato production, this can be considered a significant subsistence activity.
[176] Such a derogation has been granted to seed potatoes originating in certain regions of Canada.
[177] Trade of ware potatoes is normally only allowed with the EU's Mediterranean partners (Algeria, Egypt, Israel, Libya, Morocco, Syria, Tunisia and Turkey), Switzerland and other than European third countries which are either recognised as being free from *Clavibacter michiganensis ssp. sepedonicus*, or in which provisions recognised as equivalent to the Community provisions on combatting this disease have been complied with. Imports from other areas may be permitted under specific conditions laid down in a derogation. It should be noted that potatoes originating in Egypt can be imported only via a strict control system laid down in Community emergency measures because of the risk of the introduction of another devastating disease, called "brown rot", caused by *Pseudomonas solanacearum* (Commission Decision 2004/4/EC of 22 December 2003 authorising Member States temporarily to take emergency measures against the dissemination of *Pseudomonas solanacearum* (Smith) Smith as regards Egypt, as amended).

Figure 4 Extra EU exports of potatoes, main destinations



*Average values 2008-2010
Source: EUROSTAT COMEXT

The case of outbreaks of potato diseases (*Potato virus Y and Synchytrium endobioticum*) in Canada gives an indication of the damages that could arise from such diseases. In 1989, an outbreak of the *Potato virus Y* (PVYn) in Prince Edward Island (PEI) resulted in closure of the international border into the US to PEI seed potatoes for approximately two years. The PVYn outbreak was followed with the discovery of potato wart (*Synchytrium endobioticum)* in a single field, in PEI, in October 2000[178]. This led to a total ban on the export of potatoes (table and seed) into the US for approximately 6 weeks, after which the ban was lifted on table potatoes. The ban on seed exports lasted approximately nine months.

These outbreaks are considered to have disrupted traditional established links in seed potato trade between Canada and the US (Clark et al., 2008). The crop years of the two outbreaks (2000/01), exports of seed potatoes into the US fell to virtually zero. Overall, the value of PEI seed potatoes imported by the US declined from approximately $6 million before the PVYn crisis, to below $1 million by the 2004/05 crop year. The seed potato market in PEI did not recover from these market shocks. However, the PVYn and potato wart outbreaks did not result in any long term losses to the PEI potato industry. In response to the crisis, the PEI potato industry transformed from a seed and table potato producing industry to a processing

[178] Potato virus Y (PVY type species of the genus *Potyvirus*) is an economically important virus. PVY is transmitted by aphids and infects several *Solanaceae* crop species. In the case of potatoes, PVYn is particularly important in the seed potato sector because the disease can be transmitted to successive crops through seed tubers, the viral infection induces mild mottling with occasional necrotic leaves, but has little or no damaging effect on the quality of the potato tuber. It also has some minimal effect on potato yields. Potato wart is similar to PVYn in that it is not dangerous to humans but in contrast, it renders potato tubers worthless. While the potato wart discovered was limited to a single site, it can potentially have a more serious long-term impact on potatoes, lasting up to 40 years on the site where it is discovered.

and table potato producing industry, although not without other effects, such as reduced competition among the buyers of PEI potatoes since the expansion of the industry was fuelled by processing capacity expansion by two processors only.

Export restrictions may therefore have additional possible consequences on the potato sector. Low revenues may induce farms to produce more profitable crops, and force farms to quit seed potato production because their liquidity is too low. Also, as seed potato production and ware potato production are highly interrelated, it is likely that in case of severe or prolonged export losses also the ware potato sector is affected.

In important producing countries, e.g. the NL, where nearly two thirds of production is exported, even a small reduction in exports will have considerable consequences on seed-potato prices and, as production of seed potatoes and ware and starch potatoes are strongly correlated, also the prices of ware and starch potato will be affected. As reported in Breukers (2006), the decrease in potato prices will have economic consequences that are of a much higher magnitude than the short-term costs: the study estimated that lowering the seed-potato prices by €0.1/kg already results in a loss over €1 million/year.

Globodera (potato cyst nematodes - PCN)

Potato is the most important host for both *Globodera pallida* (the white potato cyst nematode) and *Globodera rostochiensis* (the yellow potato cyst nematode). However, potato cyst nematodes (PCN) also attack other solanaceous plants, e.g. tomato, aubergine.

Impacts

Damage can range from slight yield loss up to crop failure depending on infestation level. In the UK, the study for British Potato Council (BPC) by ADAS in 2008 estimated that, depending on PCN populations in the infected crops, the extent of yield loss can be from 20% to 40% with controlled PCN presence, and to 80% under extensive spread of the PCN and no control. Current control measures rely on a mix of rotation, limited use of resistant (or partially resistant) potato varieties and the application of nematicides (due to be phased out with revision of the PPP Directive). In the UK each year an estimated €10 million is spent on nematicides alone for PCN treatment (product cost only, source: BPC study). In comparison, in 2009 the UK potato sector value (at producer prices) is estimated at €949 million, with potato crop extending over some 120,000 ha (source: DG AGRI).

FCEC extrapolations on PCN are based on the analysis of a UK study on alternative PCN control methods[179], as a proxy for the total potential economic loss if there was no control at all - given that the main control measure currently applied against PCN are nematicides, while alternative risk mitigation methods such as increasing period of crop rotation, use of resistant varieties, biological control etc., would take time to materialise.

Extrapolating on the basis of the total EU27 potato area (2.1 million ha), the FCEC estimates that the impact of PCN outbreaks in terms of yield, hence revenue loss, under the scenario of no action could potentially cause a damage in production value of **€8 billion**. Such a

[179] British Potato Council study (2008/09). The study uses the BPC PCN Model (Elliott et al., 2004) which assesses the impact of different growing scenarios on PCN population dynamics and potato yield.

reduction in potato production and supply would certainly affect prices; however it is not possible in the context of this study to assess the magnitude of such impact.

A comparison with other data on the documented impact of PCN outbreaks is also useful:

In **Australia**, on average, containment/eradication measures against PCN (considered as an invasive species in Australia) were estimated to reach up to \$18.7 million (€14 million) per year over 20 years, or an estimated 4% of the annual value of ca. AUD\$500 million (€375 million) of the Australian potato industry and 3% of the combined gross value of the production for the potato, tomato, and cut-flower industries (Hodda and Cook, 2009). Although high in absolute terms, this cost was assessed to be justifiable on the basis of the ratio of market benefits to costs; indeed, the cost of these measures was assessed to be justified up to an expenditure of \$27 million (€20 million) per year. In 2007, the Australian potato production was 1.2 million tonnes over 34,100 ha (source: FAO). The Australian potato industry is small by comparison with the EU (€10 billion), the US (€2.3 billion) and Canada (€0.7 billion). On this basis, the above study concludes that the potential economic benefits of containment/eradication measures would be even greater in these regions.

Clavibacter michiganensis (potato ring rot)

Potato ring rot is widely found in the EU27. During the last decade, ring rot has been predominantly present in Scandinavia/Baltics, PL, CZ and DE. In the rest of the EU occasional outbreaks are reported in AT, BE, the NL, the UK, ES, FR, EL (Crete), and CY. The disease is reasonably under control in seed potato production in DK, FI and SE, but still occurs in ware production; DE outbreaks in seed and ware potatoes have been decreasing since 2000. The remaining MS are largely considered free of the pathogen[180] (source: FVO; literature).

Impacts

At EU level, the direct economic impact of ring rot is generally moderate, especially with modern production systems and EU controls in place. Direct economic losses are due to:

- wilt and tuber rotting; and,
- rejection/destruction of infected seed lots.

Direct damage by ring rot in the EU27 may reach up to **30%** of the crop yield (field trials show up to 50% crop loss); in practice, yield losses are low due to sporadic outbreaks and seeds generally not affected. There are further costs from the destruction, disposal and disinfection of infested plant material; due to the zero tolerance policy for this disease, a single infected tuber can lead to destruction of the entire affected and associated crops[181]. The indirect impact of ring rot, in terms of the losses incurred from restriction or prohibition of

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[180] Of the two main seed potato production areas in the EU, the disease has never been found in Scotland and has been found only in a small number of sporadic cases in the NL.

[181] For example: In the UK, in 2003, following the discovery of ring rot in Wales, the cost of control on one farm was estimated at £400,000 (€459,000), including for the destruction of 1,500 tonnes of seed potatoes, and the testing of 165,000 potato tubers. In the NL, the Dutch potato insurance scheme Potatopol paid out an estimated €460,000 between May 2002 and May 2003 for only 6 claims for losses related to ring rot outbreaks.

trade particularly for seed potatoes, and eventually the prohibition of potato cultivation in subsequent years, is higher than direct impacts (EPPO; Van der Wolf et al., 2005, BPC).

The FCEC has extrapolated on the basis of potential yield losses for the whole EU27 potato crop, with focus on MS where ring rot outbreaks were mainly reported in recent years, under three scenarios of no action taken: scenario 1: ring rot spreading in most currently infested MS: PL, RO; scenario 2: ring rot spreading in all currently infested MS: LV, LT ES, NL, DE, FI, CZ, SK, BG; scenario 3: no action taken - ring rot spreading in all EU 27.

In scenario 1, the affected MS account for 20% of the EU27 production value; in scenario 2, the affected MS account for 37% of the EU27 production value; the MS covered by both scenarios account therefore for 57% of the EU27 production value. PL (the MS accounting for >85% of findings of potato ring rot in the EU27, every year since EU accession) accounts for 8.6% of EU potato production value and 21.1% of volume.

The scenarios below indicate that **yield losses** in potato crop can cause income losses for EU farmers estimated up to **€599 million** (scenario 1) **to € 3 billion** (scenario 3).

Table 23: FCEC extrapolations on potential impact of potato ring rot outbreaks on the EU potato sector if no action taken

Scenarios	**Loss in value**
	30% reduction in crop yield
Scenario 1 (RO, PL)	€598.7 million
Scenario 2 (LV, LT ES, NL, DE, FI, CZ, SK, BG)	€1.1 billion
Scenario 3 (EU 27)	€3.0 billion

Notes: Value loss calculated on the basis of average value during 2008-2010, source: EUROSTAT

Furthermore, there could be potential losses for the EU potato **export** trade (some €413 million/year), particularly if TCs decide to impose bans on imports from the EU. As an indication, in the UK, total damage costs from potato ring rot were estimated at £2.8 -£11.4 million (€3.2 - €13.1 million) per year. Of these, trade losses in export markets have been estimated at ca. £1.6 - £8.9 million (€1.9 - €10.2 million) per year, or 7% - 35% of the annual value of ca. £25 million (€28.7 million) in export revenue from potatoes. The remaining €1.3 - €2.9 million were due to increased production costs from cultivating a larger area (thus displacing barley production) to compensate for the reduction in production volumes due to yield losses (Cook et al, UK Foresight study, 2006).

An earlier independent evaluation of the DEFRA Plant Health programme (Mumford et al, 2000) had concluded[182] that in the UK, the benefit: cost ratio of the exclusion policy for potato ring rot over a 30 year time horizon was 30:1, with a net benefit of £88.2 million (€101.2 million) in PV accrued over the period. Public control costs of the exclusion policy (cost of import inspections and surveillance costs) accrued over the period were estimated at £3.1 million (€3.6 million) (PV). The total benefits accrued over the period were £91.2 million (€104.7 million) (PV) or £10.7 million (€12.3 million) per year. In terms of the potential export losses alone, the evaluation had estimated that 20–95% of seed potato export markets, 10–50% of ware potato export markets and up to 5% of processed potato export markets would be lost if ring rot became established in the UK. The gross value of the UK

[182] Most likely scenario: assumes linear spread of PRR over 15 years.

potato industry at the time of the study averaged ca. £597 million (€685 million) per year from 6.6 million tonnes grown on roughly 160,000 ha.

In the NL, potato ring rot was reported to cause yearly economic damages estimated at €15 million, including the cost of eradication campaigns and compensation to growers; this compares against a total value of NL production of ca. €1 billion. Despite intensive inspection and testing programmes full eradication was not established (Van der Wolf et al, 2005).

Ralstonia solanacearum (potato brown rot)

Potato brown rot has also been widely found in the EU27, although incidence remains relatively low when compared to ring rot. In 2009, the FVO survey indicated findings in potatoes in 8 MS: ES, HU, SK, SE, UK, NL, FR, EL. Historically (1995 to date) the number of lots of seed and ware potatoes contaminated with brown not has remained relatively stable (FVO data).

Impacts

Ralstonia solanacearum is "*probably the most destructive plant bacterium worldwide, with various strains affecting over 50 families of plants. Direct yield losses in potato crops can be considerable, especially in warm growing areas*" (Elphinstone, 2001). Globally, brown rot has been estimated to affect 3.75 million acres in approximately 80 countries, the damage caused by infestations exceeding €800 million/year (Elphinstone, 2005 as quoted in Breukers 2006; UK DEFRA).

In important potato producing MS, brown rot prevalence may have serious consequences, e.g. "*for the Dutch potato production chain as a consequence of an elaborate sanitation policy, costly preventive regulations, and in the long term potential export bans*" and "*its establishment in the Netherlands would jeopardise the Dutch potato export market with negative effect for the Dutch economy"* (Breukers, 2006).

Little information exists on the economic impact of brown rot outbreaks, but insurance claims resulting from outbreaks in the Netherlands in 1999 exceeded €4 million (Elphinstone, 2001).

For affected farms, the economic losses related to a brown rot infection are considerable, as strict sanitation measures are imposed on the whole farm for several years.

Yield loss in the potato crop due to brown rot could be considerable. On the basis of NL estimates for example[183], yield losses could be assumed at 20-40%, i.e. the disease could potentially affect **€2 - €4 billion** of EU27 production value.

[183] For example, NL irrigation ban measures taken under EU Council Directive 98/57/EC) have impacts in terms of reduction in yield and quality losses resulting from drought stress, depending on the extent of the irrigation ban (Breukers et al, 2008). According to the Dutch research institute Applied Plant Research, drought stress can lead to yield reduction of ca 7.5% for seed potatoes, and 10% for ware and starch potatoes. In the case of seed potatoes, there could also be quality losses which, if minor, could result to a 10% reduction in price, but if serious could result altogether in downgrading to feed potatoes. Hence, the assumption of 20-40% yield losses used here.

Two extensive studies were carried out on this pest in the NL and the UK in order to assess the costs and benefits of different control options, including the application of the irrigation ban which is one of the main control measures for this disease.

In the NL, an epidemiological-economic model was applied to potato brown rot in the Dutch potato production chain to evaluate the cost-effectiveness of different control scenarios (Breukers et al, 2006). According to simulation results (table below), under the current (2006) NL control policy, the average yearly control and damage costs from brown rot outbreaks are estimated at €7.7 million, ca. 10% of which are export losses (€0.8 million). Reducing monitoring frequency (from current levels) increases the average yearly costs to €12.5 million, 60% of which (€ 7.5 million) are export losses. For comparison, the average annual cumulative income in the Dutch potato sector is estimated at ca. €330 million per year[184]. Given an average yearly supply of 1.2 million tonnes, losses in years with export restrictions (i.e. cumulative over the period) range from €4 million to €192 million.

The study shows that short-term gains of saving on monitoring and control costs could easily result in long-term losses in terms of consequential and trade losses that more than outweigh the initial savings. Results also demonstrate that the cost-effectiveness of control should always be determined on the basis of multi-year perspectives, taking into account potential future consequences, such as extreme outbreaks and trade prospects. Thus, although in individual years, the reduced monitoring scenario may more often lead to few or zero detections than the default scenario, over a period of 15 years, this "advantage" is more than offset by one or more years with a large number of detections. The study concludes that the highest benefit-cost ratio over a 20 year period is under the current, higher control scenario.

Table 24 NL simulation model results (potato brown rot), average yearly costs

	Current controls	**Reduced controls**
Total impact: control costs and damage costs, NL	€7.7 million	€12.5 million
• regular monitoring costs	€3.1 million	€0.6 million
• **control costs (irrigation ban)**	**€3 million**	**€3 million**
• damage (outbreak) costs	€0.5 million	€1.1 million
• **consequential losses**	**€0.2 million**	**€0.3 million**
• **trade losses**	**€0.8 million**	**€7.5 million**

Source: NL CBA (2008), (Breukers et al. 2007)

In the UK, results of a similar study indicate that the PV of industry and government costs during a 4-year campaign against potato brown rot[185] can reach £2.2 million (€2.5 million) or nearly £3,000 (€3,400) per ha (McLeod et al, 2006). The PV of the benefits over this period is estimated at £5.8 - £6.6 million (€6.7 - €7.6 million). The benefit/cost ration thus ranges

[184] Based on average NL farm GM for three potato categories (seed, ware and starch potatoes), for a total area of ca 158,000 ha and a total production of ca 6.7 million tonnes of all three categories.

[185] The study assesses a four year phytosanitary campaign (irrigation ban) against potato brown rot on the River Trent; the study's timeframe of four years is the minimum suggested by literature for an irrigation ban to eradicate *R. solanacearum* from watercourses. The control costs include: removal of *S. dulcamara* (ca £265,000 per year), treatment of irrigation water with disinfectants (ca £232,000-266,000 per year) and sampling costs (ca £164,000-181,000 per year). Benefits are expressed in terms of the income gain for farmers from higher yields and quality assuming the above control measures succeed and the irrigation ban is lifted (i.e. farmers would be able to use the river system to irrigate crops). Over the 744 ha potentially affected by the irrigation ban, aggregate margins of £1.5-£1.8 million would therefore be expected per year. Without irrigation (ie during the irrigation ban), margins could fall by 15 to 40 % with losses of £0.9-£1.5 million per year.

from 2.6:1 to 3.2:1 over the 4-year period. These costs and benefits relate specifically to some 744 ha potentially affected by the irrigation ban.

Potato Spindle Tuber Viroid (PSTVd)

The natural host range of PSTVd is relatively narrow. The principal hosts of PSTVd are potatoes, tomatoes and solanaceous ornamentals; other economically important crops that host PSTVd include sweet potato and aubergine. The main transmission route is considered to be via ornamentals; due to high potential damage costs (for individual growers), detecting PSTVd at a very early stage of production chain (plants for planting) is considered the most cost effective control measure.

In the EU27, in recent years, outbreaks of PSTVd have occurred in potatoes (EE, FR, PL) and glasshouse tomatoes (NL, DE, UK, BE, FR); in all cases outbreaks were reported as eradicated. Testing and certification of seed potatoes is reported to have virtually eliminated risk of PSTVd in potato crops via this route. More recently, PSTVd was also detected in ornamental solanaceous plants (e.g. NL, IT, EL, UK).

Impacts

In the **potato** sector, the general pattern of damage is a progressive decrease in yield with an increase in infection (EPPO). Severe strains in sensitive cultivars can reduce yield by up to 40% in individual plants, due to a reduction in both the size and number of tubers. In North America, it has been estimated that PSTVd causes an overall loss of 1% to the potato industry (although seemingly low in percentage terms, this is significant in absolute terms because of the large scale of potato production in the US). Losses vary with cultivar, disease strain and season, but are particularly severe under dry conditions. Yield losses as recorded in potato crops infected by PSTVd can reach up to 65% (e.g. AUS, NL). Interactions between PSTVd and other viruses may also occur (e.g. NL).

Soliman et al. (2010) used a partial budgeting model to evaluate the direct economic consequences (yield and/or quality losses and additional protection costs) on potatoes of a PSTVd invasion in the EU. The study assumes for simplicity that PSTVd will invade the whole endangered area (worst case scenario). The total endangered area considered within the EU is approximately 500,000 ha, yielding 14 million tonnes potatoes/year of a value estimated at €1.9 billion[186]. Based on the assumption of an average yield loss of 30% due to PSTVd, revenues are expected to fall by **€567 million/year**. The study estimates that the additional crop protection cost, by doubling the current level, would reach **€118 million/year**.

In the **glasshouse tomato** sector, literature/research suggests that infection rates have varied from only a few plants up to 100% of a crop, while PSTVd can spread within a crop relatively easily. Symptoms of PSTVd in tomato plants include slower growth and, eventually, plant collapse. The yield of marketable tomatoes from affected plants can be significantly reduced, varying with plant age and disease severity; losses of 10–60% have been reported and with severe strains loss of tomato yield can be 40-50% (source UK - Horticultural Development Council - HDC). The impact for an individual grower in the glasshouse production sector can therefore be severe. Generally, the overall significance in

[186] Based on an average price of 140 €/tonne.

this crop is considered to be limited, as the yearly number of registered outbreaks is very low. Nonetheless, there are examples of some severe impacts at industry level: e.g. the total cost of the 2006-07 outbreak in NL glasshouse sector reached some € 3 - € 6 million (source: LTO)[187].

The FCEC has extrapolated to estimate potential income losses from yield loss in the glasshouse tomato sector, assuming a relatively moderate yield loss of 20% for an individual grower and a 1% yield loss for the sector as a whole (as reported in literature). The approximate total volume of glasshouse production in the four previously infested MS (NL, BE, UK, DE) amounts to ca. 1.2 million tonnes or 7.1% of the EU27 total (EUROSTAT/DG AGRI). On this basis, it is estimated that in the four previously infested MS (scenario 1), total production value losses for the sector as a whole may range from **€6.6 to €9 million**. If PSTVd spread throughout the EU27 (scenario 2), it could result in losses of **€93-€127 million**, depending on producer prices in the affected markets. It is noted that, individual growers may face losses up to €68,000/ha from yield losses caused by PSTVd.

Table 25: FCEC extrapolations on potential impact of PSTVd outbreaks on the EU glasshouse tomato sector if no action taken

	Estimates
Scenario 1: PSTVd spreading in previously infested MS: NL, BE, UK, DE	
• **yield loss (%), individual grower**	**20%**
• **yield loss (%), total sector**	**1%**
• **Total value loss, individual grower (€/ha)**	**€ 68.4k /ha**
• **Total value loss, total sector (4 MS), €**	**€6.6 - €9.0 million**
Scenario 2: PSTVd spreading in all EU-27	
• **Total value loss, total sector (EU27), €**	**€93 - €127 million**

Notes: Losses per year. Range of estimates in value losses is based on low (ES) and high (NL) producer prices.

5.3.2.3. Economic value of the tomato sector

In 2009, total EU tomato production in the EU27 amounted to 16.9 million tonnes grown over ca. 293,000 ha. The total tomato production value is estimated at ca. €9.3 - €12.7 billion or 2.8-3.8% of the total EU27 agricultural production value of €329 billion (source: EUROSTAT/DG AGRI)[188]. The tomato sector accounts for an estimated 20-25% of all fruit and vegetable production value in the EU. Tomato production is concentrated in a few MS: IT accounts for 43% of production volume, ES for 28%, and EL for 10% (2007 data).

Intra-EU tomato trade is important, as 90% of tomatoes consumed in the EU are produced in the EU; during 2006-09, some 15% of production (2.5 million tonnes) per year were exported intra-EU; this trade is estimated at ca. €2.55 billion (2008). The sector is an important source of employment: for example, in ES, one of the key producing MS, the tomato sector gives direct employment to more than 100,000 people. Some 66% of total tomato imports in the NL and 38% of total tomato imports in the UK come from ES.

[187] This figure includes damage costs and control costs (no breakdown is provided).
[188] On the basis of ca. €550-750/t, calculated from average producer prices for fresh tomatoes (i.e. for direct consumption, as opposed to tomatoes for processing) quoted in recent years in key EU markets: ES (low) and NL (high). Prices fluctuate considerably year-on-year and highly variable across the EU (depending on production costs (glasshouse vs open field), but also on mix of produced varieties and qualities). Note: significantly lower prices than above range can be quoted (e.g. when produced under buyer contract). As a guide, EU entry price (imports) is 846/t for open grown tomatoes (2008/09, DG AGRI).

Two of the HOs examined under Task 5 are particularly relevant for the tomato sector: Potato Spindle Tuber Viroid (PSTVd); *Pepino Mosaic Virus* (PepMV); and, *Thrips palmi*.

In addition to the impacts caused by these HOs as outlined below, the case of *Tuta absoluta* indicates the significant potential impact that pests can have on tomato trade[189]. Following outbreaks of *Tuta absoluta* in the EU (ES), several countries imposed import requirements, which resulted in the increase in inspection costs and therefore have an impact on competitiveness of the EU products, and in some cases no longer make it possible or feasible to trade. The US for instance set strict standards for tomato imports in order to prevent *Tuta absoluta* to enter the country. Companies are only permitted to export tomatoes to the US if the shipment is accompanied by a phytosanitary certificate showing that the tomatoes originate from an area that is free from *Tuta absoluta* or that they have been grown using the growing system approved by the USA. According to Frugi Venta[190] 2009 annual report, the NL is unable to meet their requirement, and has therefore not been able to export tomatoes to the US since 1 February 2010. EU tomato exports to the US fell from ca.5,300 tonnes (average annual export volume 2007-2009) to 1,140 tonnes in 2010, i.e. from a value of €13.2 million down to €2.8 million in 2010, with exports from the NL falling from an average quantity of 4,400 tonnes to 1,140 tonnes (€12 million down to €2.8 million in value terms)[191]. Canada has also taken emergency measures to mitigate the risk of entry, establishment and spread of the HO. As of February 2010, tomato fruit exported from a country where *Tuta absoluta* is known to occur (in the EU this notification concerns FR, EL, IT, MT, NL, PT) must be accompanied by a phytosanitary certificate with an additional declaration stating *"This consignment originated from a place where Tuta absoluta is known not to occur and was inspected and found free of Tuta absoluta"*. EU exports to Canada of tomatoes fell from an average quantity of 1,400 tonnes (average 2007-2009) to 826 tonnes in 2010, i.e. from a value of €3 million to €1.9 million. The total export value loss from the US and Canada restrictions following the outbreak of *Tuta absoluta* are therefore estimated at ca. €11.5 million (Source of data on exports: EUROSTAT – COMEXT database).

Pepino Mosaic Virus (PepMV)

The main host plant at risk of Pepino Mosaic Virus (PepMV) is tomato (other important host plants: potato). PepMV is reported in 17 MS (2007-09 FVO survey), although not widely distributed, except in two key MS (NL, ES) with significant tomato production, including of tomato seedlings/plants for export, and CY. In many MS where PepMV is present, there have been significant attempts to eradicate. Due to the pest significance for the EU tomato sector, it has been the subject of an extensive collaborative project funded by the EU RTD FP.

According to the EU PEPEIRA project[192], the potential geographical distribution of PepMV is the whole of the EU27. Imported seed of tomato (*Solanum lycopersicum*) is a key pathway

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[189] Although *Tuta absoluta* was not covered by Task 5, its effects on experts are illustrative of the potential impact of any other pest affecting the tomato sector.

[190] Fruit Trade Association NL. The report also specifies that it takes a few months before an area can be declared free of *Tuta absoluta*, and only then tomato exports to America can be resumed.

[191] Source: EUROSTAT COMEXT

[192] PEPEIRA is an EU FP RTD funded activity aimed at developing an EU-wide PRA for PepMV. The project aims to investigate the epidemiology and economic impact of PepMV in order to allow a robust and scientifically-justified assessment of the risk posed by this pathogen to the EU tomato industry. The Pepeira

of high risk. Factors that contribute to this are the fact that the bulk of seed in the EU is imported, there are many interceptions from affected TCs[193], and the spread potential is high (one seed leading to infected seedling in a batch of young plants is very likely to spread PepMV to other plants and finally infect the whole crop). This pathway is believed to be an important route for introduction of PepMV into a new area or for further introduction into an existing area, or potential introduction of new variants of PepMV. Tomato trade is the second potential pathway, due to significant intra-EU trade (in volume) between affected MS. PepMV is easily transmissible mechanically within commercial tomato production.

At EU level, the overall economic impact of PepMV in terms of business losses is assessed to be highly variable between affected MS (PEPEIRA project). The main economic impact of PepMV is associated with downgrading of good quality tomato fruit (from Class I to Class II) due to symptoms caused by PepMV; to a lesser extent yield losses. The impact, however, is difficult to estimate in monetary terms due to two reasons. First, the extent of quality and yield loss is variable and difficult to predict as it depends on many factors including virus isolate, cultivation conditions including climate, and the tomato cultivar[194]. Second, the direct economic effect of this loss depends on the market prices of Class I versus Class II tomatoes, which depend on the relative supply of each class available in the market. Both aspects are highly variable amongst MS, depending on the classification system of tomatoes for marketing in a MS and internal supply/demand balance. From the results of experimental trials and observations in commercial crops, very low to very high economic damage is known to occur. Secondary, indirect effects are that PepMV has led to lack of confidence among key players in the industry and this negative effect on the sector is reported to be substantial.

FCEC extrapolations were not possible due to the limited and variable evidence available at EU level. The PEPEIRA concludes that the evidence is highly variable, which does not allow further extrapolation; an available UK study is the only documented case of significant business losses.

As indicated above, the PepMV has affected 17 MS, some of which have reported more significant business losses than others. In the case of the UK, there is evidence of significant business losses; the UK accounts for 0.5% of EU27 production volume. Other significantly affected MS (NL, ES: significant number of PepMV outbreaks) do not report the size of business losses or report low to minor losses[195]. These MS account for an important share of

research project is a collaboration between 20 laboratories and institutions involved or dealing with plant health from 17 EU MS.

193 This is despite EU emergency measures (Commission Decision 2004/200/EC), whereby seed of tomato is only allowed to enter and move within the EU if subjected to an appropriate acid-extraction method, and in addition if imported from a pest free area or place of production.

194 Evidence varies as to the economic damage caused by PepMV on tomato. In terms of quality losses, experiments in the UK (2005 PRA) have shown that the loss in quality can be significant (7%-38% of the crop); greenhouse trials (PEPEIRA 2010) in 4 MS (HU, NL, ES and UK) have shown variable quality losses of up to 15%, depending on PerMV isolate. The experience of commercial producers and scientists in most MS is that actual losses in practice are low to minimal. In terms of yield losses, experimental trials by UK/NL 2005 PRA have shown variable results. Greenhouse trials (PEPEIRA 2010) in 4 MS (HU, NL, ES and UK) have shown variable but generally low yield losses of up to 10 % are possible, depending on PerMV isolate. In Canada, yield losses are reported in the order of 5-15%.

195 E.g. NL. On this basis, the NL has recommended that consideration is given to regulating PepMV only for those affected MS where impact is high (eg UK via PZs), and not for the entire EU. This recommendation was

EU production (ES: 24%; NL; 4.4%) and two thirds of total intra-EU trade or 0.9 million tonnes each. The 17 MS that have reported findings of PepMV during 2006-08 are responsible for almost 95% of the intra-EU tomato trade and the bulk of EU production.

In the UK, business losses from PepMV were estimated to range from £3.8 million/season (best case scenario) to £37.5 million/season (worst case scenario)[196]. This would represent an unsustainable income loss for growers, given the total value of the UK industry estimated at £79 million/season. The above estimates are based on the UK marketing and price situation, whereby if fruit downgraded to Class 2 as a result of quality deterioration from PepMV, Class 2 fruit has little or no value in the UK and quality reductions represent a complete loss of income to most growers. Quality deterioration can be particularly catastrophic for individual growers: one of the largest producers in the UK requires 93% or more Class 1 fruit in order to maintain profitability. Due to the specificity of these estimates to the UK situation, it would not be safe to extrapolate on this basis for the EU as a whole.

Thrips palmi

Thrips palmi can cause damage to a wide range of glasshouse ornamental and vegetable crops, particularly plants in the families *Cucurbitaceae* and *Solanaceae*, such as cucumber, aubergine, tomato and sweet pepper. Within Europe, although the pest is not established, there have been outbreaks on crops in protected cultivation, several in the Netherlands since 1988 as well as one outbreak in south England in 2000 (also one outbreak outdoors in PT in 2004). All of these outbreaks were eradicated.

Impacts

In the UK[197], a study estimated the net PV of the economic impact of *Thrips palmi* over 10 years at £16.9-£19.6 million (€19.4- €22.5 million) depending upon the rate of pest spread (MacLeod et al, 2003). Impacts included yield and quality losses, additional research, plant health certification costs and loss of exports. Although there was uncertainty as to whether revenue from exports liable to carry *Thrips palmi* would be lost, this loss would be the most significant contributor to the overall economic impact. Excluding the loss of exports, impacts were estimated at £0.6-£3.3 million (€0.3-€3.7 million) over 10 years. Benefit: cost ratios for eradicating the outbreak and maintaining exclusion of *Thrips palmi* ranged from 4:1 to 19:1 excluding the loss of exports, and from 95:1 to 110:1 including export losses. The total glasshouse crop value of the protected host species (ornamentals, cucumbers, sweet peppers and aubergines) was estimated at £64 million (€73 million) per year.

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made on the basis that extensive regulation is not justifiable when taking into account the minor economic impact of PepMV experienced on tomato producing sites and experiments in some EU MS.

[196] If all crops in the UK became totally infected and quality reductions (average 38%) were similar on cherry, plum, beefsteak and vine tomatoes, which (in 2005) form about 40% of UK production, then total losses would be in the order of £37.5 million/season.

[197] The first UK outbreak was in a *Chrysanthemum* glasshouse in south England in 2000. Though small in scale and not damaging to the *Chrysanthemum* plants, there was concern that *Thrips palmi* might spread to nearby glasshouses growing aubergines, cucumbers and peppers. Measures were thus put in place to eradicate the pest from the flower glasshouse where it was found. The additional measures taken and associated labour costs during the eradication campaign resulted in a six-fold increase of expenditure on pest control. The estimated eradication costs for the grower exceeded £56,000 (€64,000). In total, the combined eradication costs to the NPPO and the grower were approximately £178,000 (€205,000).

5.4. Conclusions

The available evidence of past outbreaks and studies indicates that the selected HOs have the potential to cause **multiple billions of economic damage** to EU27 agriculture, forestry and upstream/downstream sectors, while also adversely affecting employment, ecosystem values and services, and the wider economy.

The analysis and findings highlight the need to distinguish between the potential impacts of pests affecting the agricultural, horticultural and nursery sectors in terms of yield and quality losses, and the impacts of pests affecting forestry and private/public green spaces. For the latter, impacts are both more complex and long lasting in effect, while there are less possibilities and considerably higher costs to substitute the destroyed or susceptible plants than in the case of agricultural crops. In addition to longer term commercial impacts from harvest loss, there are significant potential adverse impacts on biodiversity, amenity, landscape and other environmental values (including broader environmental objectives such as CO_2 emissions). These are generally very difficult to monetarise but increasing evidence, as highlighted in some cases below, suggests that their order of magnitude exceeds by far the direct market impacts of yield and quality losses.

In the forestry sector, several HOs have the potential to cause severe damage to forests, in terms of economic and landscape value, as indicated by the FCEC estimates below:

- *Bursaphelenchus xylophilus* (PWN), based on studies indicating that 10-13 million ha of coniferous forests in the EU are threatened with a 50-90% mortality rate from PWN, in the case of 'no action', the potential loss of productive forestry value could reach from €0.9-€1.7 billion (scenario 1: PWN widespread in current area: PT) up to €39-€49.2 billion (scenario 4: PWN widespread in EU27), depending on the extent of infestation and tree mortality across this area. Furthermore, in a worst case scenario where TC trading partners ban imports from the EU, it could result in a loss of some €174 million in export value and put 11,040 jobs at risk.
- *Anoplophora chinensis* (CLB) and *Anoplophora glabripennis* (ALB), affecting several host plants in the European environment, could cause the loss of 30% hardwood forest in the EU, with a loss of productive forestry value ranging from €19.6-€39.2 billion (scenario 1: ALB/CLB widespread in currently infested MS) up to €42.6-€85.2 billion (scenario 2: ALB/CLB widespread in EU27), depending on the extent to which the endangered and lost tree area is productive forest. These estimates exclude the landscape value of trees susceptible to ALB/CLB, which is estimated at €287.6/tree (PRATIQUE). There are further impacts on nurseries, including trade losses and disruption.
- If *Phytophthora ramorum* were to become established in timber plantations in the EU, there is a potential risk of tree death of a range of species including beech (*Fagus sylvatica* L.) and oak (*Quercus* spp.), as based on experience from the pathogen in the UK and NL. On the basis of a tree loss of 20% in hardwood forests (as has been the US experience), the potential damage for the EU high risk area (defined according to the EU PRA) could reach at least €4.2-€9.1 billion total loss in production value. There are potential further losses for the European cork industry from threat to *Quercus suber* spp. In addition, *P. ramorum* can have significant environmental and economic impacts on EU nurseries and managed gardens.

- *Dendroctonus ponderosae* (the mountain pine beetle - MPB) is not yet present in Europe but expert analysis suggests that, if introduced, conditions would be favourable for its spread and establishment. Under a no action scenario whereby MPB affects 100% of the total susceptible area in medium/high risk regions with 77% mortality rate, this would potentially affect some 11.6 million ha of coniferous (*Pinus sylvestris*) forest, leading to a loss of productive value of some €31.8 - €45.5 billion (depending on the anticipated timber harvest from this land).

The potential loss in value indicated above refers to harvested timber only, therefore excluding other forest landscape, recreational and environmental values which, as the forestry overall data demonstrate, are much more significant. Based on estimates by the UK Forest research (2010) for specific UK tree species, the landscape/ recreational value and the biodiversity /carbon sequestration value of EU27 forests could roughly be valued at ca. €56 billion.

Beyond the above specific estimates, according to data reported by MS to Forest Europe, some **4.4 million ha of EU27 forest area** (ca. 3% of the total forestry area) **are damaged by insects and diseases**, which is the single most significant damaging agent of EU forests, well ahead of damage caused by wildlife and forest fires. The total area damaged by insects and diseases in the EU27 may affect the production of an estimated annual felling volume of 12.3 million m^3 of roundwood, at an estimated value of €492 million; in addition, in the damaged area, it may affect the provision of NWGs (estimated value: €74 million) and of services (estimated value: €34 million). Therefore, the total loss of value from damage caused to date by insects and diseases may have already reached up to an estimated **annual turnover of ca. €600 million** from wood, NWGs and services provided by the affected forestry resource.

In the agricultural sector, the HOs under review can cause significant production and trade losses, as indicated by the FCEC estimates below:

- The substantial spread of *Diabrotica virgifera virgifera* in the EU **maize** sector has shown the high damages on crops following the introduction of HOs. The annual damage in crop value loss for the EU has been calculated at €472 million per year; whereas the EU surveillance and control costs have been estimated at €14 million. In case of no action, the economic damage of this HO could reach up to € 6.1 billion over a 25 year period.
- The EU **potato** sector has been affected by a range of pests, for three of which EU Control Directives are in place. The HOs reviewed by this analysis (in particular, potato brown rot, potato ring rot, potato cyst nematodes and also PSTVd) have the potential, if they become established, to cause significant yield reduction, therefore impacting directly on the EU27 potato production valued at €10 billion/year. In particular, yield losses can vary from 20%-80% depending on the HO; on this basis, PCN can caused losses of up to **€8 billion**, ring rot up to **€3 billion**, and brown rot up to **€4 billion**. Furthermore, if no action is taken, €413 million of exports to TCs could be a risk, given the fact that this is a highly regulated sector worldwide, and over 50% of EU potato exports are destined to three countries.
- The EU **tomato** sector valued at ca. €9.3 - €12.7 billion and accounting for an estimated 20-25% of the total EU fruit and vegetable production value has also suffered losses from a range of pests including PSTVd and PepMV. The potential income losses from PSTVd in the glasshouse tomato sector, assuming relatively moderate yield losses of 20% for an individual grower and 1% yield loss for the

sector as a whole (as reported in literature), could range from **€6.6 to €9 million** (scenario 1: PSTVd spreading in previously infested MS) up to **€93-€127 million** (scenario 2: PSTVd spreading throughout the EU27), depending on producer prices in the affected markets. Tomato pests have the potential to impact also on EU exports, as the case of *Tuta absoluta* indicates[198]. Several countries imposed import requirements on EU tomatoes, following outbreaks of this HO in the EU (ES), which resulted in the increase in inspection costs and therefore had an impact on the competitiveness of the EU products, and in some cases no longer made it possible or feasible to trade. For example, following strict standards imposed by the US, EU tomato exports to the US fell from ca.5,300 tonnes (average annual export volume 2007-2009) to 1,140 tonnes in 2010, i.e. from a value of €13.2 million down to €2.8 million in 2010, with exports from the NL falling from an average quantity of 4,400 tonnes to 1,140 tonnes (i.e. from €12 million down to €2.8 million in value terms). Canada has also taken emergency measures against *Tuta absoluta*, which have in practice resulted to EU exports of tomatoes to Canada falling from an average quantity of 1,400 tonnes (average 2007-2009) to 826 tonnes in 2010, i.e. from €3 million and €1.9 million in value terms).

Beyond the impacts on the sectors directly affected by plant pests, there are significant knock on effects on the downstream industries using agricultural and forestry products as a raw material, including the EU food processing sector, forest-based industries, tourism, and the wider economy. Again, these impacts are highlighted on a case by case basis in the analysis, to the extent such information is available from existing studies.

The agriculture, horticulture, floriculture and forestry sectors are closely linked to the rest of the economy, including the immediate downstream and upstream sectors of input suppliers, the food processing sector and the woodworking industries, but also tourism, retail and other services. Any changes in the agriculture and forestry sectors will therefore also have indirect or consequential impacts on the broader economy and employment in these sectors. There are some available studies on broader impacts, which in most cases tend to focus on particular regions, diseases and the costs/benefit analysis of alternative control strategies and courses of action. There are also dynamic impacts on the economy, for example, through the effect of reduced production and supply on increasing product prices, with potential knock-on effects on consumer demand causing secondary structural adjustments to the sectors concerned. On the other hand, the available evidence suggests that, longer term, impacts may be mitigated by substitution effects. For example, production or economic activity may shift to other sectors/activities, where this is possible, e.g. to the production of other crops, cultivation of alternative tree species in forests, or altogether shift from agricultural/forestry production to recreational activities and tourism. Thus, it may be possible to mitigate negative impacts by strategies to increase other existing sectors, such as tourism, and through structural adjustments and the development of new products and sectors. At EU level, substitution effects may also occur between regions and MS, where the reduction in production and/or exports as a consequence of a pest outbreak in one region/MS may present an opportunity for another region/MS to engage/increase this production/trade. The global impact of pests and diseases is therefore a complex exercise.

[198] Although *Tuta absoluta* was not covered by Task 5, its effects on experts are illustrative of the potential impact of any other pest affecting the tomato sector.

Furthermore, the effect of HOs on non-market values, such as the ecological functioning of an ecosystem including impacts on biodiversity and landscape value, is largely not quantifiable at present. As such functions have yet to be fully identified or quantified, the complete value of ecosystem services is always likely to be underestimated (European Commission, 2008a).

The complexity and incomplete coverage of the range of impacts in existing literature, the specificity of existing studies, and the difficulty of using and combining data from existing databases due *inter alia* to significant data gaps, make it impossible to study fully such impacts in the context of this smaller-scale exercise, where moreover the intention has been to cover the fuller range of pests/diseases and affected sectors. The focus has therefore been on capturing the broader EU macroeconomic impacts on the sectors <u>directly</u> affected by outbreaks; to the extent that available evidence and/or studies make reference to the more complex, indirect or global impacts of plant pest outbreaks, these have also been quoted in this Report. As a result, the estimates provided here are largely considered to under-represent the full impacts likely to result from plant pests and diseases.

Even at the level of direct impacts, it is difficult to monetarise the production loss due to a plant pest, since a range of factors including pre-outbreak agricultural and forestry management practices and other preventive action will affect the extent of the damages likely to be caused by a specific pest, while the lost production value will depend on the prevailing market prices at the time they would have been produced and/or sold. Market prices are difficult to obtain in many cases (there is generally significant lack of data on prices, while in most sectors there is no 'EU price', making it complex to extrapolate at EU level). Furthermore, prices also fluctuate considerably depending on a range of factors, including in many cases the prevailing supply and demand in international markets; such effects are compounded by the fact that outbreaks may result in significant and drastic loss of production to an extent that this may influence *per se* the level of market prices[199].

Other costs of 'no action', which have not been investigated here, include the impact that the spread and establishment of a HO could have on the functioning of the internal market if MS are forced to adopt measures which may affect the free circulation of goods within the EU.

By comparison, in the US, it is estimated that alien species (plants and plant pathogens) cause annual damages in the order of \$64.1 billion, of which \$21 billion crop losses caused by plant pathogens, \$13.9 billion in crop losses caused by insects and mite pests, \$4.2 billion in loss of forest products and \$24 billion caused by crop weeds; of these figures, 40%-65% is due to introduced pests, pathogens and weeds (Pimentel et al., 2005).

In the UK, a study carried out in 2010 estimated the total current annual cost of invasive non native species to the British economy at approximately €1.9 billion. The cost to the agriculture and horticulture sectors (including the effects of plant pathogens) amounts to just under two thirds of the total (i.e. ca. €1.2 billion), while significant costs were also estimated for the leisure and tourism industry (€87 million) and the construction and infrastructure sector (€237 million) (Williams et al, 2010). The analysis covered a wide range of non native

[199] Moreover, in the case of products which constitute a major raw material component for other industries (e.g. trees converted to a variety of products; maize used extensively in a number of industries), the prevailing market prices and supply/demand in those industries will affect final product market prices and the potential value of damage losses in these sectors.

species, including the costs of some HOs managed under Directive 2000/29 such as *Anoplophora chinensis*, but also many invasive species beyond the scope of current EU legislation (including aquatic weeds such as those examined under Task 9 and vertebrate pests). In total, insects and plant pathogens were estimated to have cost just over £658 million per year[200]. The above estimates are *"likely to be significantly less than the full economic cost since many indirect costs resulting from INNS, such as the damage to ecosystem services and loss of biodiversity, cannot be readily quantified"*. The study concluded that the economic impact is expected to increase as pests are becoming more widespread, including an exponential increase in the cost of control as an invasion progresses, which demonstrates the benefits of intervention at an early stage, as well as the long-term cost savings if eradication is undertaken early in the invasion process.

Several studies compare the costs of prevention and control/eradication measures against the benefits of the measures taken, in terms of reducing the current and potential impact on relevant EU sectors from HO introduction/spread. The benefits typically relate to the current and potential costs/losses that arise from the entry/spread of high impact HOs in the EU (which in extreme scenarios can be detrimental to the entire value of the affected sectors), versus the costs of preventing/containing the outbreaks. The analysis of costs and benefits of different control options in existing studies confirms that prevention and early response can minimise the costs, therefore maximise the benefits, of the phytosanitary measures taken.

The common conclusion that emerges from all available studies and the FCEC estimates is that, although the total annual costs (to both industry and the government) of prevention and current (early response) measures are large, the potential benefits to be obtained by excluding the pest or containing/eradicating as early as possible are several times the order of magnitude of the cost of the measures taken.

[200] Earlier studies by Pimentel had estimated that insects and plant pathogens cause $5 billion (£3.08 billion) of damage to crops and forests every year. However, this figure was considered to be an over estimate of real costs.

6. Analysis of the costs and benefits of amending the scope of the EU PH Regime in relation to the EU S&PM Regime (Task 6)

6.1. Executive summary

The aim of Task 6 has been to address the coherence between the EU Plant Health Regime (CPHR) and the EU Seed and Plant Propagating Material *acquis* (S&PM). The analysis undertaken was required to:

6.1 Determine the appropriate positioning of HOs in the CPHR and the S&PM regimes and estimate the economic impacts (costs and administrative burden for MS and EU authorities as well as for POs) of moving regulated HOs from one regime to the other according to the following three options:

- Status quo (with cleaning up of double listing). Costs for cleaning the different legislative texts are considered as marginal. It consists of a desk review of the texts, a contact with NPPOs to secure that all HOs are considered and then cleaning-up of the texts;
- All HOs to be moved from the S&PM regime to a separate Annex in the CPHR (but retaining their provisions and requirements). Impacts of moving all HOs listed in the S&PM Regime to the CPHR are limited to impacts linked to the mandatory import control measures. However as the large majority of host species for the HOs to be considered for transfer are plants for planting which are already inspected at import, and as all plants for planting entering the EU are already controlled by at least a visual control of each consignment, the costs for import control will not increase. Costs would however increase significantly if laboratory testing would be a mandatory part of the inspection. For illustrative purposes, applying one laboratory test to each consignment of ornamental plants would cost €6.8 - €23.4 million for EU 27 MS;
- All HOs pertinent to seed or plant propagating material to be moved from the CPHR to the S&PM regime. As the S&PM regime shall apply "*without any prejudice to the Plant Health regime*", any S&PM certified material shall already comply with the provisions of Directive 2000/29/EC and therefore no cost impacts are anticipated. As certain species are not covered under the S&PM regime, some host crops (e.g. tobacco) and related HOs will be de-regulated under this option but with marginal impacts as these crops are not of high European economic value and pest diseases to be considered are not of high risks.

6.2 Assess the impacts of merging the plant passport and certification schemes and more particularly:

The analysis of the costs and benefits for MS CAs and for POs of merging the visual inspection based PPs of the CPHR with the sampling and laboratory testing based health certificates of the S&PM Regime. Currently none of the current CPHR and S&PM regimes are a barrier to the merger of field inspection services. For S&PM, field inspections can be done under official supervision and in the case of CPHR some operational tasks can be delegated to bodies other than the official NPPO. Costs can be reduced by asking the S&PM inspectors to control holdings in the context of the PP obligations. In case all inspections for PP were carried out by S&PM inspectors, total yearly savings can be estimated at less than €1 million per year. The total benefit of moving from a non-integrated approach to a coordinated joint inspection would lead to a cost reduction of about €1.5 Million but as several MS have already implemented this approach the total benefit would be less.

- The analysis of the economic impacts for POs and for CAs (CPHR and S&PM) of <u>upgrading the PP requirements for propagating material to the level of the S&PM regime</u>. We consider that upgrading PP requirements to the level of the S&PM regime requirements does not lead to any impact as there is no additional requirements to be implemented as they already exist. Inconsistency exists only in the legislative texts from which they have to be removed.
- The analysis of the economic impacts <u>of merging the new PP document (logo) and the certificate document</u>. Adding a logo on these labels will have a nearly zero cost as the only thing to be done would be to add this logo on the label format.

6.3 <u>Determine the role of the private sector in the CPHR regime and delegation of tasks</u>.

The different evaluations and other studies that have been performed during the last three years in the areas of S&PM and PH have all highlighted the demand by a majority of stakeholders and CAs of delegation of tasks that should be understood in two different ways:

- Delegation of tasks from the official NPPO to other official bodies (as already implemented in some MS for PP controls carried out by certification bodies);
- Delegation of tasks directly to POs (e.g. certification under official supervision in S&PM).

Conclusions of this analysis show a low level of consensus regarding this possibility of delegating tasks.

MS CAs in favour of delegation of tasks (i.e. FR) have highlighted that further delegation would help to align to the approach of the Regulation 882/2004/EC which is based on results to be obtained and not on how it should be done (current logic of the CPHR regime). In that context any tasks related to the monitoring of compliance of businesses with CPHR obligations may be delegated e.g. inspections, sampling and analysis etc. However, delegation of responsibility for taking action where infringements are found is prohibited. The COM retains the possibility to restrict further the types of tasks that may be delegated.

Apart from using private laboratories in the context of CPHR, stakeholders and CAs consider that any other controls, and especially visual controls, related to general surveillance and implementation of control and emergency measures should remain an official task that should not be delegated.

6.2. Objectives and methodology

This task addresses the coherence between the EU Plant Health Regime (CPHR) and the EU Seed and Plant Propagating Material Regime (S&PM) for:

- The positioning of HOs in the CPHR and the S&PM regimes[201] (Task 6.a);
- The merger of the PP and certification schemes (Task 6.b); and;
- The role of the private sector in the CPHR regime and delegation of tasks (Task 6.c).

The description of each of these 3 sub-tasks has been subject to discussions with COM services during the inception phase of the study leading to modifications of the initial ToR. The classification of HOs has been approached during the two meetings of the TF1 that has been constituted on an informal basis, at the request of the COM and the COPHs. This TF1 aims to review the conclusions from the FCEC evaluations of the two regimes and views expressed by the COPHs, specifically in relation to the prioritisation and classification of HOs as well as to analyse options on these issues and to assist the COM in developing a draft proposal and impact assessment.

6.3. Conclusions

6.3.1. Task 6a: Positioning of HOs in the CPHR and the S&PM regime

The objective of Task 6a was to estimate the economic impacts (costs and administrative burden for MS and EU authorities as well as for POs) of moving regulated HOs from one regime to the other according to the following three options:

- Status quo (with cleaning up of double listing);
- All harmful organisms to be moved from the S&PM regime to a separate Annex in the CPHR (but retaining their provisions and requirements);
- All HOs pertinent to seed or plant propagating material to be moved from the CPHR to the S&PM regime.

Task 6.a had three sub-tasks:

- 6.a.1: Inventory of the implementation provisions of the two regimes in order to list HOs that would be moved from the S&PM *acquis* to a separate Annex of the CPHR; and validate the list of HOs that could be moved from the CPHR to the S&PM Regime;
- 6.a.2: List and quantify all possible expected costs and benefits and estimate (quantify) for each option the costs of each impact. based on a step by step approach per option;
- 6.a.3: Assess the impacts of these options – if any – on attaining the objectives of the two regimes.

The question on the appropriate positioning of HOs is raised because in the EU, two sets of legislations currently cover the range of regulated pests and diseases: the Plant Health Directive 2000/29/EC and the Marketing Directives for Seed and Plant Propagating Material (S&PM).

The Evaluation of the CPHR in 2009-10 and the Evaluation of the S&PM *acquis* in 2007-2008, both performed by the FCEC, concluded that overlaps between the two regimes exist and lack of coherence, although limited, was identified. Therefore there is a need to consider

[201] The CPHR evaluation report and the ToR for this study referred to regulated non-quarantine pests (RNQPs). SANCO has subsequently requested to drop this concept in favour of "*HOs currently regulated under the S&PM regime*".

the future positioning in the EU legislation of HOs currently regulated under the S&PM, in view of removing overlaps between S&PM and CPHR.

Both evaluations also highlighted that there is a considerable confusion amongst MS and stakeholders over the scope of each set of legislation but also over the terminology being used. Furthermore, some, although relatively minor, overlaps in coverage of pests and diseases between the two regimes currently exist leading to the need to remove them.

As an example we present the situation occurring for apricot fruit plant propagating material.

The purpose of Directive 2000/29/EC is to protect the territory, to avoid the introduction and spread of quarantine pests and therefore has a general interest. It differentiates important organisms present from important non present organisms in the EU. Obligations of inspection and control apply for import and for movements within the EU (plant passport system).

The S&PM *acquis* lists requirements for the production of fruit plants in view of marketing within the EU. Its general purpose is to secure high quality of plants and therefore guarantees loyalty of transactions which are of particular interest. Directive 92/34/EEC that will be replaced by Directive 2008/90/EC in 2012 establishes a harmonised Community regime which ensures that purchasers throughout the Community receive propagating material and fruit plants which are healthy and of good quality. This stipulates that fruit plant propagating material and fruit plants of genera and species listed in Annex I of the Directive, which are deemed to be of major economic importance, may only be marketed if they are either CAC (Conformitas Agraria Communitatis), pre-basic, basic or certified material. Each MS can then decide on how to implement these different certification schemes leading to different quality levels.

On the analysis of the above-mentioned legislative texts, the context for apricot fruit plants is as follows:

- HOs regulated under Certification scheme only:
  - Prune dwarf virus (PDV)
  - Apple chlorotic leaf spot virus (ACLSV)
- HOs regulated under the CPHR Regime only:
  - Apiosporina morbosa (Schwein) v. Arx
- HOs regulated under the TWO regimes (CPHR + S&PM):
  - Monilinia fructicola
  - Plum Pox Virus (PPV)
  - Apricot chlorotic leafroll mycoplasm

Additionally it should be mentioned that the certification scheme(s) implies stricter controls than the CPHR regime as not only the commercial production field shall be inspected but previous generations of plant multiplication (pre-basic, basic, etc.) shall be also be inspected in the case of certified seed.

Finally certified and CAC material shall comply with the provisions of Directive 2000/29/EC.

This example highlights the needs to modify the legislative texts of both the CPHR regime and the S&PM *acquis* in order to remove these overlaps that are bringing confusions and in order to ensure that inspections are not duplicated.

The review of the positioning of HOs in the two regimes can be approached by considering 3 different options:

- Status quo (with cleaning up of double listing);
- All HOs to be moved from the S&PM regime to a separate Annex in the CPHR (but retaining their provisions and requirements)
- All HOs pertinent to seed and plant propagating material to be moved from the CPHR to the S&PM regime

The detailed description of each of these options as well as their economic impacts are presented below.

6.3.1.1. Option 6.a.i: Status quo (with cleaning up of double listing)

The first sub-option consists in cleaning the double listing that is present in the current legislative texts without any transfer of HOs from one regime to the other.

Under this option, double listing would be suppressed leading to a clarification of the application of rules, to the removal of overlaps between the CPHR and the S&PM regimes. The TF1 of Nov 10, 2010 concluded that other disadvantages would remain under this option as follows:

- Case by case rather than systematic approach might entail risk of sustained legal and practical confusion on how best to position new borderline cases;
- Under this option, confusion for inspection services may lead to increase of activities, needs for training, and difficulties for organisation of the inspections;
- Reduced control of phytosanitary risks for HOs moving from PH regime to S&PM (focus on seed only and not on seed + crop production).

The cleaning of double listing will mainly consist at reviewing the current legislative texts:

- For S&PM:
    - Directive 66/402/EEC, Annex I p.6, and II, p.3
    - Directive 2002/55/EC, Annex II (2)[202] and (3)(b)
    - Directive 66/401/EEC, Annex I, p.5[203] , Annex II p.3***
    - Directive 2002/54/EC, Annex I(B)2**** and 3(c)*****
    - Directive 2002/56/EC, Annex I and Annex II.B
    - Directive 2002/57/EC, Annex II, 1. p. 5
    - Directive 68/193, Annex I, p. 3 – 5(a-c), 5.4, 5.5. and 5.6.(c)
    - Directive 93/48/EEC,
    - Directive 93/49/EEC; and
    - Directive 93/61/EEC
- For CPHR:
    - Annexes of the Directive 2000/29/EC, and
    - Community control measures.

The review of these documents is required but would not be sufficient to identify all double listed HOs as in the S&PM regime, the list of HOs is not a definitive list. For example, Directive 92/34/EEC indicated that "virus-free material" means material which has been

[202] *"Diseases and HOs which reduce the usefulness of the seed shall be at the lowest possible level"*
[203] *"HOs which reduce the usefulness of the seed shall be at the lowest possible level"*

tested […] and have been found free from symptoms of any virus or virus-like pathogen by growing season inspection. In Directive 93/49/EEC, *Malus* plants have to be inspected by visual inspection to guarantee non presence of all viruses and virus-like organisms. Therefore a contact with NPPOs will be necessary to list all HOs that are currently covered by S&PM legislations at MS levels.

Costs for cleaning the different legislative texts are considered as marginal. It consists of a desk review of the texts, a contact with NPPOs to secure that all HOs are considered and then cleaning-up of the texts.

6.3.1.2. Option 6.a.ii: All harmful organisms to be moved from the S&PM regime to a separate Annex in the CPHR (but retaining their provisions and requirements)

The review of the 13 basic Directives of the S&PM *acquis* led us to the identification of HOs that could be moved to the CPHR regime (**List A, Annex 7**).

Additional review of implementation texts, and in particular Directive 93/48/EEC, Directive 93/49/EEC, and Directive 93/61/EEC has led to the identification of more than 150 other HOs for which "*at one visual inspection*" should be carried out on specific species (**List B, Annex 7**). These directives are mainly listing individual HOs (defined HOs) but they also specify in several cases that all viruses on a specific species have to be inspected (e.g. all viruses on *Malus* in Directive 93/49/EEC) without specifying the name of these HOs (undefined HOs).

Plant species concerned by these three directives are plants for planting only and not seed. Directive 93/48/EEC concerns fruit plant propagating materials, Directive 93/49/EEC is concerning ornamental plant propagating materials, and Directive 93/61/EEC concerns vegetative plant materials.

According to COM services (S&PM sector) all these HOs are quality diseases and therefore are not covered by the CPHR regime.

Inclusion of HOs currently regulated by the S&PM regime in the EU plant health regime would lead to apply mandatory systematic import controls for all HOs listed in the Lists A and B (Annex 7). Any other obligations remain unchanged as S&PM material shall comply with the provisions of the Directive 2000/29/EC and as the ToR specify that "*downgrading the certification requirements is not acceptable and therefore does not need to be investigated for its financial impacts*".

Therefore **impacts of moving all HOs listed in the S&PM Regime to the CPHRs are limited to impacts linked to the mandatory import control measures**. The import control methodology may differ based on the nature of the phytosanitary issues that could occur and therefore inspection can take the form of visual inspection for insects and diseases where laboratory tests may be required in case of risks of latent diseases (viruses, bacteria, etc.).
On the basis of discussions with COM services, it has been agreed that impacts should be calculated based on visual inspections only and generally at reduced frequency as we do not see the logic of applying a laboratory test on quality pests when obligations as described in Directives 93/48/EEC, 93/49/EEC and 93/61/EEC are limited to *"at least one visual*

inspection". Additionally any inspections based on laboratory tests should be justified by a Pest Risk Assessment before implementation.

The large majority of host species for the HOs to be considered for transfer are plants for planting which are already inspected at import. All plants entering the EU are already controlled by at least a visual control of each consignment. Therefore the **costs for import control will not increase.**

Costs would however increase significantly if laboratory testing would be a mandatory part of the inspection.We consider important to estimate what would be the costs of applying laboratory based tests as visual control may not always be adapted to assess pest free status.

Table 26 presents our costs estimates for the EU 27 MS for 2 examples:

- Applying one laboratory test to each consignment of ornamental plants would cost €6.8 to €23.4 million;
- For *Rosa* consignments only, the costs of performing one laboratory test can be estimated at a range of €0.3 to €1.3 million.

Table 26: Annual costs of running one laboratory test on each EU imported consignment of *Rosa* plants and of ornamental plants

Rosa

	AT	BE	CZ	DE	DK	ES	FI	FR	HU	IT	NL	PL	SE	GB	Others	Total
Volumes (1,000 units)*	1	6	-	-	3 220	242	27	48	2	4 170	4 511	198	135	1 297	74	13 931
Consignments # (estimated)	1	3	-	-	1 533	115	13	23	1	1 986	2 148	94	64	618	35	6 634
Costs of 1 lab test and associated costs (e.g. sampling)																
Minimum (Euros)	50															
Maximum (Euros)	200															
Total costs for performing 1 lab test on each consignment																
Minimum (Euros)	**50**	**143**	**-**	**-**	**76 667**	**5 762**	**643**	**1 143**	**48**	**99 286**	**107 405**	**4 714**	**3 214**	**30 881**	**1 762**	**331 690**
Maximum (Euros)	**200**	**571**	**-**	**-**	**306 667**	**23 048**	**2 571**	**4 571**	**190**	**397 143**	**429 619**	**18 857**	**12 857**	**123 524**	**7 048**	**1 326 762**

Any ornamental plants

	AT	BE	CZ	DE	DK	ES	FI	FR	HU	IT	NL	PL	SE	GB	Others	Total
Value (1,000 Euros)*	662	12 680	1 000	34 685	3 300	6 558	257	8 597	911	22 225	181 138	2 199	879	8 411	4 182	287 684
Consignments # (estimated)	36	695	55	1 901	181	359	14	471	50	1 218	9 925	120	48	461	229	136 992
Costs of 1 lab test and associated costs (e.g. sampling)																
Minimum (Euros)	50															
Maximum (Euros)	200															
Total costs for performing 1 lab test on each consignment																
Minimum (Euros)	**1 814**	**34 740**	**2 740**	**95 027**	**9 041**	**17 967**	**704**	**23 550**	**2 496**	**60 890**	**496 268**	**6 025**	**2 408**	**23 044**	**11 458**	**6 849 619**
Maximum (Euros)	**7 255**	**138 959**	**10 959**	**380 110**	**36 164**	**71 868**	**2 816**	**94 200**	**9 984**	**243 562**	**1 985 074**	**24 099**	**9 633**	**92 175**	**45 830**	**27 398 476**

Source: compiled by Arcadia International based on AIPH/Union Fleurs yearly statistical book (*)

Notes: costs of one lab test and associated costs are on a wide range: from €50 to €200 as it has to consider different situations (€50 in cases when the testing can be performed easily but customs or NPPO inspectors with immediate results to €200 in case of tests have to be done in specific laboratories and when results are available only after a couple of days). These costs do not include costs customs could charge importers for each day a given consignment is blocked at customs.

For **host species that are not plants but seed (see List A, Annex 7), we consider that the costs are marginal** for the following reasons:

- Species that are concerned are legumes, cereals and oil & fibre plants species from which, according to ESA, seed import volumes are limited as they are considered as "heavy crops". "Heavy crops" means that seed production happens very close to the area where the crops is being grown as it is too expensive to transport them on a long distance. Seed that are travelling are high value crop (e.g. hybrids) and small seeds such as vegetable seeds. Legumes, cereals and oil & fibre plants species are open-pollinated species with large seeds;

- Diseases related to seed potatoes have to be placed in the actual context of importing seed potatoes in the EU. There is only one non-EU country from which seed potatoes can be imported, and that is Switzerland. Such seed potatoes need to be certified and have a phytosanitary certificate. The certification scheme (UN-ECE) is similar to the EU certification scheme and therefore seed potatoes entering the EU from CH are of the same health and quality than the ones produced within the EU. Therefore they would be no need to add additional control at import level.

6.3.1.3. Option 6.a.iii All HOs pertinent to seed and plant propagating material to be moved from the CPHR to the S&PM regime

The list of HOs that are currently present in the Annexes of Directive 2000/29/EC and that could be moved to the S&PM regime has been discussed during the initial meeting of the study with SANCO E2 and it was decided to carry out this impact analysis based on the list developed in 1992 (as provided in Annex 6 of the ToR). During that meeting, participants recognised that although the list is rather old it would not be feasible to update it within the timeframe of the present study, and the FCEC should therefore proceed with the available list (**List C, Annex 7**).

In option iii), existing systematic import requirements under Directive 2000/29/EC would be reduced for the transferred HOs to the level of obligations of the Marketing Directives. At present, these do not have systematic import requirements. However, these requirements will be adopted for the Marketing Directives as a consequence of the policy decision of SANCO to include the S&PM regulation under the umbrella of Regulation (EC) No 882/2004[204].

Additionally, import requirements for a given species would be reduced for one or several HO but not for ALL HOs. Therefore visual inspections will remain mandatory for the HOs that are not transferred leading to the conclusions that the number of consignments to be visually inspected under reduced frequency will remain equal. **No costs impacts are anticipated at import control level.**

As the S&PM regime shall apply "*without any prejudice to the Plant Health regime*"[205], any S&PM certified material shall already comply with the provisions of Directive 2000/29/EC.

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[204] The current S&PM regime under review will be brought under the scope of Regulation (EC) No 882/2004 and therefore any S&PM consignments will have to go under an import control at reduced frequency level.

[205] The following obligation : " *Harmful organisms which reduce the usefulness of the seed shall be at the lowest possible level*" is annexed to Directives 2002/55/EEC, 66/401/EEC, 66/402/EEC, 2002/54/EC, 2002/57/EC, 68/193/EEC and The following obligation : "*any propagating material which, on the basis of visible signs or symptoms, is not substantially free of HOs, shall be properly treated or, where appropriate, shall be removed*" is included in the Ornamentals Directive

This analysis would not be complete without talking about cases when moving HOs from the CPHR to the S&PM regime, obligations that are currently applied to certain HOs would disappear in cases when host plants are not included in the S&PM regime (e.g. hops for Arabis mosaic nepovirus) and for which a transfer to the S&PM regime will lead in suppressing plant health obligations. All ornamentals plant species are covered by the S&PM regulation but for all other S&PM Directives only the major European crops are included in the seeds *acquis*. For example hop or tobacco species are not subject to obligations of the S&PM regime. As these crop species are not of high EU economic importance and as the HOs that are subject to movement from the CPHR to the S&PM regime are not of high risks, we consider that impacts would be marginal when such situation occurs.

In conclusion, the following observations can be made, based on preliminary results to date.

Economic impacts (costs) for any of these three options are minimal. Significant additional costs have to be anticipated in case import control of HOs moved from the S&PM regime to the CPHR regime is based not on visual inspections but on laboratory tests. Impacts for each of the three options can be summarised as follows:

Table 27: Summary of economic impacts of the three options considered for the positioning of HOs between the CPHR and S&PM regimes (Task 6)

Impacts	Option 6.a.i: Status quo (with cleaning up of double listing)	Option 6.a.ii: All HOs to be moved from the S&PM regime to a separate Annex in the CPHR (but retaining their provisions and requirements)	Option 6.a.iii All HOs pertinent to seed and plant propagating material to be moved from the CPHR to the S&PM regime
Import control (CPHR)			
In case of visual inspections only	0	0	0
In case of laboratory tests	0	+++	0
Intra-Community trade (CPHR)	0	Not estimated	0
Certification schemes (S&PM)	0	0	0

---:Maximal decrease, -:Minimal decrease, 0:Neutral/marginal, +:Minimal increase, +++:Maximal increase

Any costs impacts are linked to obligations of controls and therefore **all costs presented above can be considered as being administrative costs.**

The possible impacts of the three proposed options on attaining the objectives of the two regimes have been discussed during the TF meetings and during interviews with NPPOs. It appears that in two cases plant health and quality are at risk as follows:

- Import control via visual inspection at reduced frequency for HOs moved from the S&PM regime to the CPHR regime do not offer a complete protection against further introduction of HOs, especially in cases of new strains of viruses and bacteria already listed;

- Moving HOs from CPHR to S&PM regime may lead in dropping field inspection requirements in cases host plants of the given HOs are not regulated under S&PM.

6.3.2. Task 6b: Costs and benefits of merging the plant passport and certification schemes

The objectives of Task 6b were:

- To analyse the costs and benefits for MS CAs and for POs of merging the visual inspection based PPs of the CPHR with the sampling and laboratory testing based health certificates of the S&PM Regime.
- To analyse the economic impacts for POs and for CAs (CPHR and S&PM) of upgrading the PP requirements for propagating material to the level of the S&PM regime.
- To analyse the economic impacts of merging the new PP document (logo) and the certificate document.

Task 6.a had six sub-tasks:

- 6.b.1 Identification of the species/crops concerned by PH and S&PM inspections, and identification and classification of the required actions;
- 6.b.2 Identification of the relevant costs parameters and choice of data sources;
- 6.b.3 Data collection;
- 6.b.4 Estimation (quantification) of the costs for the MS CAs and POs of moving from the current system of three controls to a system of two controls
- 6.b.5 Estimation (quantification) of the costs of upgrading the PP requirements for propagating material to the level of the S&PM regime
- 6.b.6 Estimation (quantification) of the costs of merging the new PP document (logo) and the certificate document.

Historically, the CPHR and S&PM sets of regulation were managed independently by the MS, from an administrative and operational point of view, with two distinct official inspection bodies in each MS. During the last 10 years, resources dedicated to carry out CPHR and S&PM related activities by officials have significantly decreased in a large number of MS and optimisation of resources is being sought. In some MS, services have been merged in order to reduce costs.

Visual inspections and inspections of holdings are obligations in the two regulatory frameworks as follows:

- In the plant health regime, holdings and plants are controlled and inspected in the context of the obligations of the PP. It is "*an official label which gives evidence that the provisions of related to PH standards and special requirements are satisfied"* and it therefore specifies that the material originates from a registered and officially inspected place of production.
- In the S&PM regime, visual inspections are carried out in the context of official certification that should control identity of the variety and consistent high seed quality to farmers as well as to allow free movement within the EU.

None of these two obligations apply to all plants for planting or S&PM. PP obligations are mainly addressing plant propagating plants (e.g. ornamentals, fruit plants), while mandatory certification mainly addresses seeds and not plants.

It should also be highlighted that when requirements regarding PPs are similar over crop species, the Marketing Directives impose different certification obligations. Each seed species or group of species has a specific certification scheme and therefore visual inspection programmes are crop specific. Overall, certification schemes can be grouped in three major categories as follows:

Table 28: Certification schemes in the different crop species or group of crops

	Description of certification scheme
Seed	Directives 66/401/EEC (fodder plant seed), 66/402/EEC (cereal seed), 2002/54/EC (beet seed), 2002/56/EC (seed potatoes) and 2002/57/EC (seed of oil and fibre plants) require the multiplication of seed through a prescribed generation sequence, including the production of basic seed and certified seed (minimum of 2 generations corresponding to around 2 years of control). The crop to produce each generation must be shown on examination to meet prescribed minimum standards. The seed harvested from the crops must be sealed, labelled, sampled and tested to ensure it also meets prescribed minimum standards. The certification system is designed to guarantee seed quality in the respects of varietal identity, varietal purity, analytical purity, germination capacity, weed and other crop seed content, seed-borne diseases. Rules in respect of sampling, sealing and labelling of seed aim to ensure that seed identity is clear and seed does not become contaminated. Compared to the certification of other seeds, the certification of seed potato is mainly a phytosanitary certification (with a large panel of quarantine and non-quarantine plant diseases). Vegetable seed Directive (2002/55/EC) provides that the seed can be marketed under the categories ‘certified’ or ‘standard’. This last qualifier is largely the most common. In this case, the words "*standard seed, EC rules and standards*" is marked either directly on the packaging or on the commercial label and there is no official label. Only post-control examinations of variety identity and purity are being officially checked by authorities.
Propagating material	The vegetable plants Directive 92/33/EEC and the ornamental Directive 98/56/EC require statutory control during the production process as well as accreditation of the operators but no mandatory official certification. The large majority of these products are therefore not subject to any official visual inspection in the context of the S&PM regime. Anyhow it should be mentioned that in some MS, some dedicated plant species are being produced under official certification (e.g. rosa plants in Spain) but based on national initiatives as official certification adds values to commercial plants. The vine Directive 68/193/EEC and the fruit Directive 2008/90/EEC authorise the production of two types of propagating material: • <u>Certified material</u>, which must comply with obligation comparable to the ones applicable for certified seeds. • <u>Standard material (vine)</u> which is examined ex-post as regards the varietal identity and purity and <u>CAC material (fruit)</u> which must satisfy minimum conditions.
Forest reproductive material	Directive 1999/105/EC on the marketing of forest reproductive material stipulates that forest reproductive material may not be marketed unless it is of one of four categories specified by the Directive (source-identified, selected, qualified, tested) and that only approved basic material may be used for its production if the material is to be marketed. After harvesting, a master certificate of identity (with indication of the country and region of provenance) must be issued for all reproductive material derived from approved basic material.

In conclusion, double visual inspections happen only on several crops (highlighted in bold) as follows:

Table 29: Overlap in visual inspections carried out under the PH and S&PM regimes for the different crop species or group of crops

	Plant Health PP obligations	S&PM mandatory certification	S&PM certified material (%)	S&PM standard/CAC material
Vegetable species	No	No	<5%	>95%
Potato seeds*	***Yes***	***Yes***	***100%***	
Fodder plants	No	Yes	100%	
Cereals seeds*	No	Yes	100%	
Beet seed	No	Yes	100%	
Seed of oil and fibre plants	No	Yes	100%	
Vine plants	***Yes***	***No***	***<15%***	>85%
Fruit plants	***Yes***	***No***	***<15%***	>85%
Ornamentals	Yes	No	<2%	>98%

(*): Farm saved seed volumes not included

Finally, it is noted that delegation of tasks for certification purposes (including visual inspections) are already in place in some MS, as the seed Directives allow the sampling and testing of all categories of seed and the field inspection to be carried out either officially (certification under official examination) or by licensed personnel under official supervision (certification under official supervision). In the case of certification under official supervision, a proportion of 5% of seed lots are checked by official authorities for correct implementation of measures as regards field inspection, and seed testing.

None of the current CPHR and S&PM regimes are a barrier to the merger of field inspection services. For S&PM, field inspections can be done under official supervision and in the case of CPHR some operational tasks can be delegated to bodies other than the official NPPO.

During the evaluation of the S&PM *acquis* performed by the FCEC in 2008, a case study was developed in order to analyse the advantages/disadvantages of merging inspection services. That case study concluded that the main advantages are as follows:

- Move to an improved crop quality approach;
- Reduce costs (limited costs reduction);
- New pests will be monitored better;
- Inconsistencies between the 2 regime would become more visible and then would lead to national and European discussions to overcome these issues;
- Reinforce traceability from suppliers to farmers;
- Introduce more consistency in the regulation implementation;

Costs can be reduced by asking the S&PM inspectors to control holdings in the context of the PP obligations. On average holdings are inspected once a year by each service and therefore the "PP inspection" carried out by the S&PM inspectors would lead to a reduction in the number of inspections. Instead of two inspection visits at a given holding, the two inspections would be done during the same unique visit.

However the impacts would be limited as:

- Delegation of tasks would only concern seed potatoes, fruit plants and wine plants producers; and
- Some countries have already "technically"[206] delegated these tasks to the S&PM inspection forces. In the NL, PP inspections are being carried out by the Naktuinbouw. In FR, the GNIS[207] is involved in PP inspections for seed potatoes, the CTIFL[208] for fruit plants that are certified, and FRANCEAGRIMER for vine plants. In DK, inspections related to PP requirements are also delegated to the S&PM inspection services for seed potatoes.

Our estimation of the costs reduction for seed potatoes for which statistics are available is as follows:

Table 30: Cost savings when PP inspections are carried out by S&PM inspection services

	Production (in Ha - 2007)	Number of producers	Unit cost of inspection (in Euros)	Total costs by 2 inspection services (1 inspection from each inspection service)	Total costs if the 2 inspections are done by the S&PM inspectors
DE	16 301	1 087	200	434 693.3	217 346.7
FR	14 503	967		386 746.7	193 373.3
IT	266	18		7 093.3	3 546.7
LU	431	29		11 493.3	5 746.7
NL	35 905	2 394		957 466.7	478 733.3
BE	2 541	169		67 760.0	33 880.0
UK	13 671	911		364 560.0	182 280.0
IE	1 589	106		42 373.3	21 186.7
DK	4 654	310		124 106.7	62 053.3
EL				-	-
ES	2 821	188		75 226.7	37 613.3
PT				-	-
AT	1 528	102		40 746.7	20 373.3
FI	1 276	85		34 026.7	17 013.3
SE	1 158	77		30 880.0	15 440.0
12 NMS	14 600	973		389 333.3	194 667
Total	*111 244*	*7 416*		*2 966 506.7*	*1 483 253.3*
			Potential savings (yearly)		*1 483 253.3*
			Actual savings (yearly)		*749 093.3*

Potential yearly savings are estimated at about €1.5 million but in reality the **actual savings for seed potatoes would be of €0.7 million maximum** as inspections are already carried out by S&PM inspections services in FR, DK and NL.

[206] Responsibility remains with the NPPO but the operational aspects of the tasks are delegated under the responsibility of the NPPOs.
[207] GNIS: Groupement National Interprofessionnel des Semences
[208] CTIFL: Centre Technique des Fruits et Légumes

For fruit plants and for vine, we have not been able to calculate savings as statistics are not available to date. However we can consider that **costs are minimal** as the number of producers of certified fruit plants is rather low (e.g. in France, only 61 POs are producing certified plants – others are producing CAC plants on which S&PM inspection does not occur). For vine, the number of plants producers is also low and the volumes traded are limited.

In conclusion, we can consider that in the case when all inspections for PP are being carried out by S&PM inspectors, total yearly savings can be estimated at less than €1 million.

During the discussions that did occur during the last months, it has been highlighted that in several cases the certification schemes implies usually stricter controls than the CPHR regime. This has been perceived as an inconsistency by CAs[209]. Therefore it may be justified to upgrading PP requirements to the level of the S&PM regime requirements leading to the need to estimate (quantify) the costs of upgrading the PP requirements for plant propagating material to the level of the S&PM regime.

We consider that upgrading PP requirements to the level of the S&PM regime requirements do not lead to any impact as there is no additional requirements to be implemented as they already exist. Inconsistency exists only in the legislative texts from which they have to be removed.

The merger of the new PP document (logo) with the S&PM certificate has to be considered for species for which these requirements exist. It would only apply then to seed potatoes, fruit plants and vine plants. This approach would lead to print a logo on each official certification label. To date all these labels are being produced by official authorities in a central place and distributed to S&PM producers. Therefore **adding a logo on these labels will have a nearly zero cost** as the only thing to be done would be to add this logo on the label format.

6.3.3. Task 6c: Development of options for the role of the private sector

The objective of this Task was the identification of different options related to the delegation of tasks in the CPHR including implementation of the controls for issuance of the new health document (logo on certification labels).

Task 6.c had four sub-tasks:

- 6.c.1 Identification of tasks that could be delegated;
- 6.c.2 Identification of options;
- 6.c.3 Data collection regarding impacts (qualitative assessment);
- 6.c.4 Qualification of the impacts of each option.

The different evaluations and other studies that have been performed during the last three years in the areas of S&PM and PH have all highlighted the demand by a majority of stakeholders and CAs of delegation of tasks.

[209] Examples can be found in the vine sector (Annex I (5) of the Council Directive on the marketing of material for the vegetative propagation of the vine and in the apricot case presented in introduction of this chapter.

Provisions regarding the possibility of delegation of tasks are already present in the S&PM *acquis* as well as in the CPHR regime, as follows:

- For S&PM, official controls are implemented at key stages of the multiplication processes (certification) to secure high quality of the product and to control the correct identity of the variety under multiplication. The certification system is designated to guarantee seed quality in respects of varietal identity, varietal identity, analytical purity, germination capacity, weed and other crop seed content, seed-borne diseases. At its simplest, the system certifies that a bag or box of seed meets certain minimum quality criteria meaning that it is true to identity, high in varietal purity and germination capacity and free from major pests and diseases.

  Certification schemes are crops or group of crops specific as they have been adapted based on the multi-generations multiplication scheme defined for each crop. In general terms, certification obligations apply only to agricultural crops and neither to vegetables nor ornamental crops.

  Many factors have changed since the Community legislation was introduced, notably fewer, larger seed companies and improved seed cleaning and agricultural equipment. As a result, seed production has become more sophisticated and more reliable leading to the delegation of certain tasks to the private sector that already started about 20 years ago.

  Directives allow the testing and sampling of categories of seed and the field inspection of certified seed to be carried out either officially (certification under official examination) or by licensed personnel under official supervision (certification under official supervision). In the case of certification under official supervision, a proportion of 5% of seed lots are checked by authority services for correct implementation of measures as regards field inspection, and seed testing.

  Compared to the certification of other seeds, the certification of seed potatoes is mainly a phytosanitary certification with a large panel of quarantine and non-quarantine plant disease. Certification under official supervision does not apply to seed potatoes.

  Not all MS have implemented the possibility to carry out field inspection of certified seed by licensed personnel under official supervision, as presented in the following table (Table 31):

Table 31: Implementation of certification under official supervision in the MS

MS in which certification under official supervision is implemented	MS in which certification under official supervision is NOT implemented
AT, BE, CZ, DE, DK, EE, FI, FR, IT, NL, PL, PT, RO, SE, SK, UK	BG, CY, ES, GR, HU, IE, LT, LU, LV, MT, SI

Source: Evaluation of the S&PM acquis – FCEC 2008 (EC, 2008d)

  These data have to be considered carefully as they do not indicate if the delegation of tasks under official supervision has been fully or only partly implemented in all S&PM sectors that require certification.

The analysis of the breakdown of costs between certification under official examination and certification under official supervision shows that only 2 MS have fully implemented the certification under official supervision whenever possible (i.e. FR, UK). All other MS have only partly implemented (less than 20% of tasks).

- Council Directive 2000/29/EC indicates in its Recital 26 that "*To ensure more effective application of the Community plant health regime in the internal market, it must be possible to use, for the purpose of plant health checks, available official manpower other than that of MS' official plant protection services, whose training should be coordinated and supported financially by the Commission"*. This is translated in the Article 1(4) of the Directive 2000/29/EC as "*the single authority may be authorised to assign or to delegate tasks of coordination or contact, insofar as they relate to distinct plant health matters covered by this Directive, to another service*" and in Article 2(1g) of the same Directive which stipulates that "*the responsible official bodies in a MS may, in accordance with national legislation, delegate that tasks provided for in this Directive to be accomplished under their authority and supervision to any other legal person, whether governed by public or by private law, which under its officially approved constitution is charged <u>exclusively</u> with public functions, provided that such person, and its members, has no personal interest in the outcomes of the measures it takes*".

  Therefore delegation of tasks is possible but the responsibility remains with the NPPO. This delegation of tasks has been implemented in several MS when it relates to inspection of producers regarding intra-Community trade (PP obligation). As presented in Task 6.b, efficiency is gained when PP controls are delegated to the structure carrying out certification controls.

This presentation of the current situation highlights that:

- Delegation of tasks should be understood in two different ways:
    - Delegation of tasks from the official NPPO to other official bodies (as already implemented in some MS form PP controls carried out by certification bodies);
    - Delegation of tasks directly to POs (e.g. certification under official supervision in S&PM).

- Under the S&PM regime, even if delegation of tasks to POs is possible for all crops for which certification is mandatory with the exception of seed potatoes, only two MS (FR and the UK) have fully used this opportunity. The main advantages are reported to be a better efficiency in the multiplication process rather than costs savings;

- Under the CPHR regime, only a limited number of MS have used the opportunity to merge inspection activities related to PP controls between CPHR and S&PM inspection bodies.

The interviews that have been carried out in the context of this study have highlighted that a large number of stakeholders are in favour of taking more responsibilities from officials and for the following reasons:

- Delegation of tasks of the CPHR is leading to alignment of CPHR and S&PM obligations and therefore further implementation of certification under official supervision. This would reduce the double inspections by clearly formalizing the possibility of delegation of tasks based on the principles of Regulation 882/2004/EC which considers delegation of inspection via self-inspection based on an accredited system;

- Business operations and especially logistic will be facilitated and not time dependent from the inspection services that too often are slowing down the shipment of plant products at EU import and EU export;

- While cost savings are limited, flexibility is gained in intra-Community trade;

- More delegation of tasks, and especially in the field of the CPHR regime, would allow a better alignment of the two regimes and a simplification of the understanding of the needs by the producers;

- Operators would take advantages of the complementarities between the industry quality processes and the official supervision.

However, stakeholders are also very much aware that delegation of tasks may have negative impacts, as follows:

- Delegation of tasks would lead to further integration of the two regimes (S&PM and CPHR) and therefore may lead to more difficulties when new obligations need to be implemented;

- Delegation of tasks would mean for needs for training of operators that may lead to reduced efficiency in implementing obligations, and especially in highly segmented sectors such as horticulture (how to provide knowledge to producers?);

- POs consider that potentially business could lose credibility for trade outside the EU as inspections would not be done by neutral official inspectors. PH is being seen as strategic by traders all around the world and delegation of tasks may lead to new equilibrium in term of liability and responsibility sharing between business operators;

- Additionally, business operators and growers have indicated that the system of inspection is cost-effective and therefore there is no fundamental need to modify it as it may lead to confusion for growers and traders;

- More delegation would profit more to big holdings and large traders and would add burden on small ones.

CAs (LV, HU) that have been interviewed in the context of this study and that not in favour of delegation of tasks have mentioned the same disadvantages. They have also highlighted that in their country, stakeholders are not requiring for delegation and that they are not ready to self-implement the requirements. However, they are not against other MS delegated tasks but they consider that it is too “early” for their own country to move to delegation.

MS CAs in favour of delegation of tasks (e.g. FR) have highlighted that further delegation would help to align to the approach of the Regulation 882/2004/EC which is based on results to be obtained and not on how it should be done (current logic of the CPHR regime). For example, Regulation (EC) No 882/2004 introduces the term “control bodies” which are independent or non-governmental organisations to which the CA has delegated specific tasks. Generally, these are likely to be privately owned laboratories undertaking analysis of official samples. In delegating the task, the CA retains ultimate responsibility for the work. In this approach, any privately-owned laboratory used by a CA to undertake chemical analysis or microbiological examination are considered as a ‘control body’ under the Regulation. This could be the case for any laboratory tests required at e.g. EU import controls and for complying with intra-Community trade obligations.

In the context of Regulation (EC) No 882/2004, any tasks related to the monitoring of compliance of businesses with CPHR obligations may be delegated e.g. inspections, sampling and analysis etc. However, delegation of responsibility for taking action where infringements are found is prohibited. The COM retains the possibility to restrict further the types of tasks that may be delegated.

There are specific conditions for delegating tasks as mentioned in article 5 of Regulation (EC) No 882/2004. In summary, there must be an accurate description of the task and proof that the control body has the necessary expertise etc., and that it is impartial and free from conflict of interest in respect of the particular task. Control bodies must meet appropriate and specified European standards and there must be procedures in place to ensure that results of any controls are communicated to the CA. In addition, the CA must arrange audit or inspection of the control body and, if it finds that the control body is not meeting the specified conditions, the delegation must be withdrawn.

During the interviews several additional practical cases of delegations have been discussed:

- Vegetable seed industry is facing difficulties when importing seed to the EU as it has observed that number of situations when seed material is being blocked at the EU border is increasing. Additionally, administrative controls are taking more time than in the past, delays are observed in running the tests and therefore these obstacles are creating timing and logistic issues for seed companies. Reliability of the tests performed by official laboratory is also questioned by the seed companies that have mentioned that they have to perform the test a second time before using the seed. In this case, seed companies would welcome that they are allowed to run the test for EU import control under official accreditation in order to avoid a second testing. This approach would be in line with application of Regulation (EC) No 882/2004 to the CPHR and S&PM regimes;

- Further delegation of the inspections to certification organisms for the PP on the basis of the 882/2004 approach by clearly formalising how it should be done and by making the certification label valuable for PP in such cases;

- If testing can be performed by private laboratories, it seems logical that sampling could be done by POs too.

Apart from using private laboratories in the context of CPHR, stakeholders and CAs consider that any other control, and especially visual controls, related to general surveillance and implementation of control and emergency measures should remain an official task that should not be delegated.

7. Analysis of costs and benefits of amendments to Plant Passport system (Task 7)

7.1. Executive summary

The objective of Task 7 has been to evaluate the impact of six different options concerning possible modifications to the existing PP system:

7.1 Obligation to have PP accompanying the smallest unit in trade in the B2B (business to business) chain
In principle there is no impact, since such an obligation is already in place, through the issuance of replacement PPs, as foreseen under the present regulation, especially in the case that a large passported consignment is split in several smaller ones.

7.2 Obligation to have PP accompanying the smallest unit in trade in the B2C (business to consumer) chain, meaning that all plant material (for which at present a passport is needed), sold in nurseries and garden centres to a final consumer, would have to be passported
With the exception of individually sold bulbs, all other plant material (seeds, seedlings, ornamental plants, etc.) already carry some type of tag or label; adding information to these can be done either by the garden centres or by their furnishers, at a negligible extra cost. Note that final buyers who need large quantities of a given species will not buy from garden centres (B2C) but from nurseries (B2B), and thus already receive a PP if this is required for the species.

7.3 Dropping the existing distinction between sales (of passported plant material) inside or outside a protected zone
Although such a distinction is foreseen under the present regulation (with sales outside a protected zone not needing a PP), business practice today is already such that POs do not distinguish, and thus issue PP for all their consignments of species needing a PZ PP, even those not sold inside a PZ; this is also an indication that the cost of issuing PPs in cases where this is strictly spoken not compulsory, is not an issue.

7.4 All plant material (traded in the B2B chain) should carry a passport (this option does not extend to the B2C chain)
The implementation of this option would lead to an increase in the number of passports, the gross unit cost of which can be estimated at below 10 eurocent per consignment (the average value of a consignment in the B2B chain is not known, but is probably at least € 100, so the increase is less than 1 ‰); the net unit cost can be still lower, if the "passport" information can be added to already existing documents such as invoices or transportation document (as is usual business practice, with the consent of the CAs).

Note that in that case, all operators will have to be authorised to issue PPs; such authorisations do not lead to an extra cost in the large majority of the MS, the necessary inspections being combined with normal phytosanitary inspections.

7.5 The existing formats, which cover a wide variety, should be harmonised, while keeping the existing data fields
This option would obviously have no impact for operators who fill in the PP by hand. For operators using a computer system, the impacts will be limited to minor modifications to the existing software packages (adapting the layout of documents to be printed); note that most operators use a package developed by specialised software companies, and that consequently

the cost of its modification can be split over a large number of users (and will probably be considered to be part of the normal updating/upgrading that is included in the licence, and so will not be invoiced separately by these software companies to their users).

7.6 The existing formats should not only be harmonised but also simplified, so that they could take the form of a label.
The impact would be the same as for the previous option: none for POs who still fill in the passports by hand; a limited impact (modification of software packages) for the ones who use a computer system, since the cost can be split over many users of such packages.

7.2. Objectives and methodology

The objective of this Task was to estimate the costs and benefits of amendments to the PP system. In particular, Task 7 had three sub-tasks:

- Estimate (quantify) the financial impacts on POs and MS CAs of several amendments to the scope of the current PP system (Task 7.a);
- Investigate the feasibility and financial impacts (costs, benefits, administrative burden) for POs and MS CAs of replacing the current PP (status quo option) with a fully harmonised label (option i) or a new EU PP logo (option ii) (Task 7.b);
- Estimate (quantify) the financial impact of a possible introduction of a liability inversion provision (Task 7.c).

A description of the sector affected by Task 7 is attached in **Annex 6.**

The CPHR evaluation has concluded that in only two MS (PL and EO) PPs are issued by the national CAs, whereas in all other MS, this responsibility is split between the CAs and POs who have been authorised to issue PPs. This implies that in the majority of MS, national CAs have only very limited statistical and other information about PPs.

The following table gives the number of POs presently authorised to issue PPs.

Table 32 Number of POs presently authorised to issue PPs

MS	POs authorised to issue PP	Source or comments
AT	659	CPHR evaluation survey
BE	1,310	Impact survey
BG	0	Impact survey
CZ	1,087	Impact survey
CY	22	Impact survey
DE	3,826	Impact survey
DK	ca. 600	Impact survey
EE	74	Impact survey
ES	1,903	CPHR evaluation survey
FI	600	Impact survey
FR	ca. 5,300	Impact survey
GR	?	Not communicated
HU	285	Impact survey
IE	443	CPHR evaluation survey
IT	4,190	Impact survey
LV	48	Impact survey
LT	90 à 100	Impact survey
LU	?	Not communicated
MT	16	Impact survey
NL	ca. 4,500	Impact survey
PL	0	Impact survey
PT	ca. 2,500	Impact survey
RO	0	CPHR evaluation survey
SI	181	Impact survey
SK	288	Impact survey
SE	120	Impact survey
UK	888	Impact survey
TOTAL (27 MS)	**ca. 29,000**	

Following on from this observation, our data collection for Task 7 has aimed to cover two sources: first, we collected – through the general survey – information from the national authorities of all MS, and second, we contacted – either through a visit on site or by means of specific surveys – a number of individual POs or their professional representative organisations. For the latter, two types of survey were used : one for individual POs with questions through which they could describe their own situation; and one for the representatives of the professional representative organisations, which were asked to give their opinion on a number of statements. This approach enabled us to verify the representativeness of the individual POs that were contacted, as their number inevitably – due to budget constraints – had to be kept to a minimum; for the same reasons, individual contacts were limited to BE and the NL.

7.3. Current practices for issuing Plant Passports

Before analysing the impact of the possible modifications to the existing PP system, it is useful to describe the way in which POs (up to garden centres) label their products, or more generally issue documents that accompany their products during the trade chain.

The majority of large POs use software allowing them to manage the different aspects of their business as follows: registering orders received; issuing picking lists to assemble the order to be sent out; issuing invoices; issuing transportation documents for the consignment, etc. Also incoming consignments are registered.

Species can be flagged in the computer system as needing a PP, either in all cases, or only in the case of consignments sent to a PZ. In the latter case, two ways of working can be observed: either the PO issues a PP indeed only in the case that the consignment of the species is to be sent to a PZ, or the PO anyhow issues a PP, even if the consignment is not sent to a PZ (more specifically: some systems only check if a species is to be passported or not; other – more sophisticated – systems also check the destination; in the latter case, the check is done at the level of a country, but not of zones demarcated within a country; this means that the term “PZ” is, as far as the issuance of a PPs is concerned, understood as “protected MS”). Within the framework of the survey, it could not be established what is the proportion of operators issuing a PZ passport anyhow, or issuing it only if a MS has (at least) one PZ. This question might however not be very relevant: POs who always issue a PZ passport, even when this is not necessary, do not seem to attach any importance to the extra cost associated with it, which is an indication that this cost is, in fact, very limited, not to say negligible.

It can also be noted that the status of the buyer (PO in the B2B trade chain or a (big) final buyer) is not a criterion to issue, or not, a PP. In other words, nurseries normally will not sell directly to final customers, unless the number of plants ordered is large enough and higher than the minimum orders they would accept (such can be the case of big land owners, but also of green services of municipalities, buying large quantities of plants). In these cases, if the species requires it, PPs will be issued even though this is not requested for final buyers under the present regulations. Here too, it can be concluded that POs do not seem to attach any importance to the extra cost associated with the issuance of a PP in these “unnecessary” cases.

The trade of plants involves generally splitting larger lots into smaller ones when going down the B2B trade chain. In the case of passported plants, replacement PPs should be issued each time the owner of the consignment changes, whether the lot is split or not; in practise, as it appears from the answers to the questionnaires, this does not always seem to be the case: some POs admit they would only do so if the lot is indeed split into smaller ones, keeping thus the original PP when this is not the case – other POs indeed always issue a replacement PP, because they do not want to reveal the origin of the plants to their buyers for commercial reasons. Here too, it was impossible to estimate the proportion of cases where (replacement) PPs are indeed issued, even when a lot is not split into smaller ones. Anyhow, within the framework of this impact study, this “extension” can be left aside, since already under the present regulations, replacement PPs should be issued when going down the B2B chain. In other words, the option “issue a PP for the smallest unit used in the B2B trade” as foreseen in the terms of reference, at least theoretically, is a confirmation of the existing – though not always correctly applied in practice – EU rules regarding replacement PPs.

The situation is different when considering the final link of the B2C chain, i.e. sales to a private customer, mostly through garden centres. As already said, in the case of big quantities, the private customers will not buy from such garden centres, but will buy directly from a nursery (which is used to issue a PP if the species requires one – whatever the status of the buyer). For sales in smaller quantities through garden centres, general practice is that all plant material sold carries some form of tag or label with different types of information. There is a variety of formats in use for these tags or labels used in the B2C trade:

- Seeds are sold in small (paper) packages with e.g. the identification and a picture of the grown-up plant, some seeding tips, a price or price code, a bar code, the origin, etc. It would generally not be a problem to add information that might still be missing to convert such packages into a PP intended for the private customer;

- Bulbs are generally sold in a package of e.g. 10, 20, 40 etc. units, and here too, the package contains information about the species, planting tips, a price or price code, etc.;

- Bulbs are also sometimes sold individually (i.e. in bulk), allowing the final buyer to assemble a mixture of different species and/or colours; in this case, information is provided at the level of the box or crate in which the bulbs are presented for sale, but no individual package (i.e. per bulb) is foreseen. One could imagine a system where the customer would have to use a (paper or plastic) bag, provided by the garden centre, on which the necessary information would be printed. Such a solution is only feasible if all the bulbs would come from the same supplier, or if the garden centre would be allowed to issue replacement PPs for bulbs, but both these cases would not be the general rule. In other words, extending the obligation of PPs to all types of bulbs sold in bulk would be very complicated, and the technical feasibility would have to be determined first before it would be possible to estimate its financial impact;

- Ornamental plants are often sold in plastic or other types of pots, and the label or tag can take different forms: a plastic label can be attached to the stem or one of the branches, containing at least the name of the species and a bar code for the cashier; an alternative is a sticker attached to the plastic pot containing the same information; still another alternative is a little plastic stick put into the soil with the same type of information.

Depending upon the type of plant material and hence, the format of the tag or label, the latter are either printed by the garden centres themselves, using adapted software, or they are already fixed on the plant material or its packaging by the PO who supplied it to the garden centre. In the latter case, some POs offer the possibility to “personalize” these tags or labels at the request of the garden centre, meaning that these labels, although printed by the supplier, carry the name of the garden centre and sometimes even its price or price code.

Whatever the format of the tags or labels used, it can be concluded that – with the notable exception of individually sold bulbs (in bulk) – nearly all plant material sold in a garden centre already carries one, so that adding some additional information to transform such a tag or label into the equivalent of a PP is not only very well feasible, but should not generate a particularly high cost.

In this respect, it should be noted that nurseries and garden centres use the modern information and communication technologies in two ways:

- Either (and this is the most frequent case) they use a software that has been developed by a software company, especially for the B2B trade or the B2C trade in plants. The nurseries or garden centres pay a monthly licence, and in turn can use the program and are entitled to updates/upgrades. Since the cost of such updates/upgrades can be spread over a multitude of users, the cost charged to an individual user – when a modification is needed by many users, which would be the case e.g. when the format of the PP would be harmonised – can be low, or in some cases nil, when the software house considers this as being part of the normal updating/upgrading of its product.

  Although the user needs to personalize the software, this involves input in data fields and not adapting the software as such (e.g. in the case that the software foresees a module for the issuance of PPs, the user will have to input the species and destinations for which this is compulsory and that are part of his assortment).

  The number of different software houses offering such packages could not be established within the framework of this study, but it is also rather irrelevant. What is relevant, is that each package will issue PPs in a given format (which can be adapted, within certain limits, to the needs of the user, e.g. by adding his identification), which will typically be different from the format used by another package. When a more uniform format would be imposed, the software houses will – as already said – be obliged to modify their programs, but because the cost can be split over a large number of users, the cost per user should be negligible, and probably no rise in the licence cost has to be foreseen (given the fact that the new uniform format will be in use for a given number of years in the future).

- Or, in some cases (but these are more the exception) POs have developed their own computer system; this is obviously the case for bigger market players, who are anyhow used to issue PPs, and for which the extensions foreseen under this study would not make much of a difference (see further).

There are, of course, still examples, in the B2B chain as well as in the B2C chain, where the parties concerned either do not use a computer system at all, or at least do not use it for the issuance of PPs. In practise, this means (in the B2B chain) that such PPs, if required, are filled in by hand, mostly by using a format that is prescribed by the national CAs (exception: cases where all PPs are issued by the CAs, i.e. PL and RO), and which often takes the form of a sticker that can be attached on the documents accompanying the plants or on the package used for their transport and sale. Evidently, in the case that the labels should be better harmonised throughout the EU, these formats will change, but the cost of filling them in by hand would be unaffected.

7.4. Impact analysis

According to the ToR, the impact of several possible extensions to the existing PP system has to be evaluated. These extensions fall into two categories: modifications in the format of the PPs; and; modifications in their scope.

7.4.1 Impact of changing the format of the existing PPs

It can be concluded from the above analysis of current practices in issuing PPs, that changing the format of a PP in view of better harmonisation is expected to have limited **impact** on the cost of a PO in the following cases:

- When POs fill in the PPs manually, which is typically the case for smaller POs; moreover, when using a document supplied (mostly for free) by the national CAs, the impact on the cost is nil;

- When POs use a licensed computer software to issue the PPs, changes to this software will in the first instance be borne by the software developers and then charged to the POs through the licence fee that users pay for keeping the software up-to-date; this would not lead to a significant increase in the cost of this licence, especially since this cost can be split over several users *and* several years (it can be reasonably expected that once the new format has been determined, it will be in use for several years);

- When POs have developed a computer system in-house, they will have to bear the cost of modifying the format of the PPs themselves, but since the intention is to harmonise the PP formats (i.e. without adding new data fields) and also, if possible, to simplify the PP format (*a fortiori* without adding new data fields, quite the contrary), these modifications can be expected to be minor (order of magnitude : a couple of hours for a computer programmer ?); anyhow, the cost is one-off, and since POs with a computer system developed in-house can be expected to be big market players, the cost per PP issued should be negligible.

Consequently, it is reasonable to assume that the cost of adapting the format of the PPs (as long as no new data fields have to be foreseen) will be **negligible**.

7.4.2 Impact of extending the obligation of passporting up to the smallest unit used in the B2B trade chain

In principle, the existing regulations foresee that replacement PPs should be issued each time a consignment changes hands over the B2B trade chain, whether or not it is thereby split into smaller lots. So theoretically, the impact of extending the obligation of passporting up to the smallest unit used in trade should be nil, since this way of working should already be in place. In practice, however, POs admit that such replacement PPs are not always issued, especially when the incoming lot is not split into smaller ones when selling it to the next link in the B2B chain. If, in the future, the rules for issuing replacement PPs would become more explicitly imposed or stricter, these POs will be faced with an extra cost; this, however, strictly speaking, would not result from a change in the scope of the PPs.

7.4.3 Impact of extending the obligation of passporting up to the smallest unit used in the B2C trade chain

As already noted, cases in which final customers order large quantities of plants already at present, in practice, lead to the issuance of PPs (if required for the species), because the buyers would probably not order from garden centres, but try to order more upstream (in the B2B trade chain), where PPs would anyhow be issued already.

Extending the obligations of passporting up to the final customer (B2C) can also in a way be assimilated into adapting existing formats (of tags or labels giving price information, planting instructions, etc.) that garden centres already attach to their products (or have them attached by their suppliers). The only exception would be for bulbs sold individually in bulk, for which the technical feasibility of a solution would have to be examined in detail first, before an estimate can be made on the impact on the cost.

7.4.4 Impact of extending the obligation of "ZP" passporting to all consignments of the species concerned, even those that would not be sent to a protected zone

Business practice seems to be that POs only check if a given species needs a ZP passport, but without verifying to which geographic circumscription this obligation is actually limited (to put it more clearly, once a species is on the list of ZP passported species, such a PP will be issued, even if the species are sold to a place outside the PZ). Hence, dropping this distinction would in practice hardly lead to an increase in the number of PPs issued. Moreover, the fact that POs do not make the difference is an indication that the cost of issuing a ZP passport (or any type of PP, for that matter), is not really significant, as they do not really bother about the cost of ZP passports issued without need.

7.4.5 Impact of extending the obligation of PPs to all plant material intended for planting (but limited to the B2B trade chain)

As already stated, the cost of issuing additional PPs, once a computer system is in place, is limited to the cost of extra paper and ink. Since all transactions in the trade chain are at present already accompanied by documents in various forms, and since most MS CAs accept that a PP can take the form which suits the PO best – e.g. an additional document attached to an invoice or a transportation document with the information needed to transform these combined documents into a PP – the cost of issuing larger numbers of PPs will be limited. It can be estimated at a small fraction of € 1 per lot (the cost for a plastic tag attached to a stem or a branch is about 6 c€/piece; the cost of a photocopy which includes paper and toner is about the same; hence the cost of issuing an additional PP, if it can take one of these forms, should be of the same order of magnitude).

There is, however, one cost element that could have a more significant impact. Indeed, when all plants have to be passported – even in the MS where PPs are issued by the CAs e.g. PL and RO – all POs will have to be authorised to issue PPs themselves or have this done by the CAs. The cost to obtain such an authorisation (which includes e.g. an inspection visit) is generally invoiced by the CAs to the nurseries, and thus constitutes a cost for the latter (and possibly also for the CAs, if the amount charged would not cover the full economic cost). To this cost will have to be added the cost of investments that POs who are not yet authorised to issue PPs, might have to make in order to comply with the regulations to get authorised. It is, however, impossible to make any meaningful estimate of this cost.

Note however that in most EU MS, inspection visits in order to get authorised to issue PP are combined with the normal phytosanitary inspections every operator has to undergo, whether or not he wants to get authorised to issue PPs (so there is no specific cost for the authorisation as such); furthermore, in many countries, these inspections are not charged to the operator, and when they are, the cost remains below €100.

7.5. Conclusions

Table 33 Estimated impact of options for the extension of PP

Option	Impact
Harmonise the existing formats, while keeping the existing data fields	None for operators who fill in the PP by hand – limited to minor modifications in the case operators use a computer system (adapting the layout of documents to be printed)
Harmonise and simplify the existing formats	See above
PP accompany the smallest unit in the B2B trade chain	In principle no impact, since this should already be the case through the issuance of replacement PPs as foreseen under the present regulation. Note that final customers who buy large quantities, will not buy from garden centres (B2C) but from nurseries (B2B) and already receive a PP if this is required for the species
PP accompany the smallest unit in trade in the B2C trade chain	With the exception of individually sold bulbs, all other plant material (seeds, seedlings, ornamental plants, etc.) already carry some type of tag or label; adding information to these can be done either by the garden centres or by their furnishers, at a negligible extra cost --
No distinction anymore between sales inside or outside a protected zone	Business practice today is already so that operators do not distinguish, which is also an indication that the cost of issuing PPs in cases where this is strictly spoken not compulsory, is not an issue
All plants are to be pass-ported	This will lead to an increase in the number of passports, the gross unit cost of which can be estimated at below 10 euro-cent per consignment; the net unit cost can be still lower, if the “passport” information can be added to already existing documents (as is usual business practice). In that case, all operators will have to be authorised to issue PPs; such authorisations do not lead to an extra cost in the large majority of the Member States, the necessary inspections being combined with normal phytosanitary inspections.

8. Analysis of costs and benefits of amendments to the Protected Zones system (Task 8)

8.1. Executive summary

The objective of Task 8 was to analyse the costs and benefits of introducing mandatory surveillance targets and mandatory de-listing procedures for PZs, by focusing on specific examples of PZs[210]. The selected PZs provided a balanced representation of the various types of HOs and the different situations in MS with regard to the implementation of measures for the maintenance of PZ status, and of the challenges, added value and the costs for MS to maintain PZs in place.

8.1 Identify best practices of surveillance targets for each HO for the selected PZs

The improvement of surveillance targets within the PZs was recommended by the CPHR evaluation (FCEC, 2010) as one of the options for improving the current system of PZs and reinforcing their credibility, as the concerns with the current system of PZs stem from implementation issues. The ongoing work of a dedicated DG SANCO/MS TF also highlighted the need to introduce at EU level minimum levels of surveillance within PZs in order to provide a degree of harmonisation in the approach followed across the EU. For this Task, appropriate surveillance levels were identified on a case by case basis, to the extent this was possible, and applied to the selected case studies (PZ/HO)[211].

8.2 (a) Estimate the costs of introducing mandatory surveillance at identified surveillance level versus benefits

Costs: The current costs of surveillance in PZs are generally lower than in the case of BZs established within infested non-PZs. This is due to the fact that in PZs, in the absence of infestation, intensified surveillance levels are not generally applied. In the case of host plants and sectors with high economic value for the MS, the costs of surveillance in BZs could be from 2.5 to up to 10 times higher, as the number of controls needed to guarantee the same level of protection would need to be increased substantially. If current surveillance levels are considered insufficient to justify/ensure freedom from the HO, these would need to be raised and this would result in a higher cost. If mandatory surveillance targets are introduced at the level of 'best practice' (as defined for the purposes of Task 8 and indicated Task 8.1 results), the cost of surveillance is increased, as these levels generally result in higher inspection and/or sampling intensity. This increase may concern the level of visual inspections, with an intensity increase of 100% (e.g. *Erwinia amylovora*) in certain cases, and/or the level of sampling, with 10% additional sampling applied (e.g. *Globodera pallida*) or even higher increases, in the range of 100% or more (e.g. from symptomatic cases only to established levels of sample/ha in the case of *Erwinia amylovora*).

Benefits: Evidence of the benefit of PZs is generally scarce; in most cases, there are currently no CBA to support already established PZs (with the notable exception of *Bemisia tabaci*). In this regard, it needs to be considered whether carrying out a CBA should become a formal requirement in future for the establishment of PZs. In those cases where economic benefits could be estimated (i.e. *Bemisia tabaci*, *Erwinia amylovora*, and *Globodera pallida*, and in

[210] *Erwinia amylovora* – IT, LV; *Bemisia tabaci* (European populations) – UK, FI; *Ips amitinus* – IE, EL; *Cryphonectria parasitica* – CZ, SE; *Globodera pallida* – SK.
[211] It is noted that there are certain and extrapolating from those to other cases/MS, as also described in Task 1.

general for HOs affecting plants with a commercial value), it can be concluded that such benefits clearly outweigh the costs of surveillance even if this is carried out at an increased level. Thus, for example where the economic sector is highly important at national level, e.g. apple and pear production in IT, where the sector generates some €1.1 billion in terms of annual production value, the value of production in those regions where the bulk of production is concentrated will amount to several hundred million Euros. In other words potential production losses are very substantial indeed compared to surveillance costs at increased levels amounting to hundreds of thousands of Euros. The same holds true in the case of the potato sector in SK, where the costs of the order of thousands of Euros of increased surveillance are far outweighed by the benefits of the protection of a sector with a value of €34 million.

Results of costs and benefits for the PZs selected for the purpose of this exercise are presented in the table below:

<table>
<tr><th>HO for which PZ is in place</th><th colspan="2">Surveillance costs at 'best practice' levels (a)</th><th>Benefits (value of protected sector)</th></tr>
<tr><td>Globodera pallida</td><td colspan="2">SK: € 41,000</td><td>SK: €33.8 million</td></tr>
<tr><td>Erwinia amylovora</td><td>PZ:
IT (two regions): €54,800

IT (est.): €4.2 million
LV: €85,900</td><td>BZ:
IT (two regions):
€ 264,960</td><td>IT (two regions): €180 million

IT: €1.1 billion

LV: €3.2 million</td></tr>
<tr><td>Bemisia tabaci</td><td colspan="2">FI: €331,700</td><td>€48.9 million (tomatoes only)
Cost - benefit ratio estimated at 0.93-1.99 over 30 years (at current levels of surveillance)</td></tr>
<tr><td>Ips aminitus</td><td colspan="2">SE: €4,200
CZ: €19,000 - €33,400</td><td>Environmental value (non quantifiable)</td></tr>
<tr><td rowspan="2">Cryphonectria parasitica</td><td colspan="2" rowspan="2">EL: €55,010

IE :€ 5,800</td><td>Economic value:
Export value of coniferous round and sawn wood
EL: €1.5 million
IE: €62.6 million</td></tr>
<tr><td>Environmental value
(non quantifiable)</td></tr>
</table>

. (a) 'Best practices' defined in accordance with methodology followed in the study (Task 8.1).

(b) Recommendation on the appropriate sharing of the costs of mandatory surveillance between MS CAs and POs

The analysis highlighted several cases where the costs of mandatory surveillance do not currently appear to be appropriately shared between MS CAs and POs. In particular, although mandatory fees are foreseen by the EU plant health regime for the cost recovery of the inspections and sampling/testing carried out by the MS CAs in the PZs, in several cases this provision is not being implemented and fees are only partly collected or not collected at all. This issue was also identified in the evaluation of the CPHR (FCEC, 2010). There is therefore a need to reinforce the implementation of these provisions.

8.3 Estimate the economic impact of mandatory de-listing of the selected PZs (a) immediately, or (b) after two years

Eradication efforts are pursued in PZs for as long as it is economically, as well as technically, justified. During the eradication period (i.e. up to 2 years according to EU legislation) POs benefit from the continued status of a PZ, but also bear the higher costs of instensified inspections and eradication. The balance between these costs and benefits will determine the degree to which MS pursue their efforts to eradicate in order to maintain PZ status.

(a) In case of immediate revoking of PZ status, it is no longer possible to protect the area while engaging in an intensive eradication effort. Free trade immediately occurs, thereby potentially placing the area at higher risk and possibly reducing the potential to eradicate while increasing the cost of eradication. It can also be expected that surveillance will have to be intensified in this case as the requirements on imported material can no longer be imposed. Therefore the impact is in all cases the immediate loss of the benefits from the protection that a PZ offers (as described above). On the other hand, there could be immediate benefits for non-PZ MS which today may have to maintain costly (i.e. intensified) inspection and eradication systems to export to the PZ, if these requirements no longer need to exist. When outbreaks in a PZ are not appropriately eradicated, PZ protection can no longer be justified on technical grounds and economic/commercial considerations appear to prevail[212];

(b) Delisting after 2 years offers certain advantages to an infested PZ under eradication, compared to immediate delisting in that: a) it allows the time that is technically considered necessary for the eradication programme to achieve its objectives; and, b) where the PZ faces difficulty in achieving the objectives of the eradication programme, it allows the possibility of a smooth transition of that PZ towards alternative measures for maintaining some protection of non-infested territories within the PZ, via the establishment of BZs.

8.2. Objectives and methodology

The objective of this Task was to analyse the costs and benefits of introducing mandatory surveillance targets and mandatory de-listing procedures for infested PZs, by focusing on specific cases of PZs. In particular the sub-tasks of this exercise required:

- to identify MS **best practices** of surveillance targets for each HO for the selected PZs (Task 8.1);
- to quantify (estimate) the total **costs of introducing mandatory surveillance at that level vs. benefits**, and to provide a recommendation on the appropriate sharing of the costs of mandatory surveillance between MS CAs and POs (Task 8.2);
- to estimate (quantify) the **economic impact of mandatory de-listing** of the selected PZs under two scenarios (immediate delisting; delisting after 2 years) (Task 8.3).

To this end, the analysis was conducted for a <u>representative selection of current PZs</u>, as follows:

  - *Erwinia amylovora* – IT, LV

[212]The CPHR evaluation concluded that "*From a narrow (individual MS) perspective, PZs are seen to offer an economic advantage for local growers in the PZ areas when exporting from the PZ, but to result in additional costs for traders in the non-PZ areas to prepare and check that correct documentation is attached to the plants and plant products imported into or moving through the PZ*".

- *Bemisia tabaci* (European populations) – UK, FI
- *Ips amitinus* – IE, EL
- *Cryphonectria parasitica* – CZ, SE
- *Globodera pallida* – SK

This selection offered a good representation of the various types of HOs, and the different situations in MS with regard to the implementation of measures for the maintenance of PZ status. The aim has been to provide a coherent and full picture of the challenges, added value and the costs for MS to maintain PZs in place.

In particular:

- *Erwinia amylovora*: IT and LV represent two cases that can be described as being 'on the edge', as they have had several outbreaks in the past years. EU legislation allows two years' time to eradicate, however this objective is not fully achieved and it is very difficult to reduce the risk for this HO to spread (there is potentially high risk of natural spread for this HO). It is therefore appropriate to study more in depth the situation in these two MS, to understand the costs of maintaining high levels of surveillance and benefits of the established PZs;
- *Bemisia tabaci*: FI (and SE) have had repeated outbreaks, mostly from propagating material, but in a closed (controlled) environment (glasshouses), so in all cases outbreaks have been fully eradicated;
- *Ips amitinus*: This HO is a forestry insect. EL is also currently at a critical position with regards to maintaining this PZ.A FVO inspection was conducted in January 2011 in order to investigate the situation[213].
- *Globodera pallida:* SK was selected because it is also 'on the edge' whether to keep or withdraw the PZ status.

Table 34 PZs and MS under Task 8

MS	HO	Other MS with PZ	Identified best practices	Stakeholders
IT, LV	*Erwinia amylovora*	EE, FI, FR (part), PT, ES, UK (part), IE, SK, LT, SI	SI FR (Corsica) IE and UK	• Apples and pears producers (nurseries and orchards) in the PZs and in the non PZs
UK, FI	*Bemisia tabaci* (European populations)	IRE, PT (part), SE	UK	• Producers and importers of commercial salad crops • Producers and importers of ornamental plants (mainly poinsettia)
IE, EL	*Ips amitinus*	UK, FR (part)	UK	• Forestry authorities • Land owners
CZ, SE	*Cryphonectria parasitica* (Chestnut blight)	IE, UK	CZ SE UK	• Forestry authorities • Land owners
SK	*Globodera pallida*	SI, FI, LV	SI	• Producers and importers of potatoes

[213] DG (SANCO) 2011-8974 - MR FINAL.

It is noted that in the course of the study, further consultations within the TF and between SANCO and MS have taken place. It is suggested that future amendments to the system could be as follows (presented at COHPs in Budapest):

- Upon outbreaks in a PZ, an official Demarcated Area (DA) needs to be created and communicated to the COM and the other MS. Movement prohibitions/restrictions would be required from the DA into free parts of PZ, as for non-PZ plant material. Sellers and buyers would have to be informed on the exact borders of the PZ and the DA maps;

- After two years, the outbreak is either eradicated (DA again becomes a normal part of the PZ) or not (PZ is redefined within the DA; vote in SCPH);

- In case of an outbreak, it would be up to the MS to decide whether they immediately exclude the DA from the PZ, or try to eradicate the outbreak during two years.

For each of the sub-Tasks of Task 8, the methodology has been as follows:

Task 8.1: costs of establishing mandatory surveillance targets for the selected PZs

The improvement of surveillance targets within the PZs was recommended by the CPHR evaluation as one of the options to improve the current system of PZs and their credibility. The reports of TF2 also highlighted the need to introduce minimum levels at EU level in order to provide a degree of harmonisation for surveillance.

The definition of "*mandatory surveillance targets*" is technically difficult and encounters the same constraints described for Task 1 for the definition of "technically *justified levels of surveillance*". Several factors that are specific to the area to be surveyed have to be taken into account for the definition of such a level, i.e. the density and concentration of plants, the agricultural/forestry practices and the structure of production (e.g. *a priori* the more production is scattered, the more efforts are needed to conduct surveillance), the climatic conditions (e.g. in the case of *Erwinia amylovora*, the Baltic countries are not suitable for the development of the disease, whereas these natural factors play a role in FR, IT, ES, SI) etc. Beyond technical factors as such, setting such mandatory targets is an exercise outside the scope of Task 8, as the purpose here has been to illustrate the cost/benefit ratio of the current and increased levels of surveillance. Our approach therefore has been to analyse costs and benefits on the basis of identified best practices of surveillance, as in the case of Task 1.

Specific to each HO best practices have been identified through consultation with DG SANCO and the TF. These provided our working hypothesis to define and calculate costs for the purpose of this study.

The analysis of best practices has been carried out through:

- Review of annual reports on these PZs, as submitted by MS to DG SANCO;

- Focused interviews/consultation by means of a specific written inquiry with the NPPOs in the selected 'best practices' MS for these PZs (as detailed in Table 34). The aim of these inquiries was to understand the rationale behind a defined level of surveillance, the level of confidence expected and the key principles to be considered. They aimed also at collecting relevant cost data on the current resources dedicated to surveillance, as well as on the benefits (actual and perceived) of having the PZs in place. Where available, data on costs of control and eradication of outbreaks in the PZs were collected, as well as information on the sharing of costs (and responsibilities) with stakeholders;

- Surveillance levels were defined, where possible, on the basis of the above identified best practices, in particular in terms of inspection intensity (number of inspections/ha) and sampling density, where applicable (number of samples/ha);

- Interviews were carried out with the NPPOs in most cases (or, where relevant, with the regional plant protection services[214]) of the selected case study PZ/MS (Table 34) to gather information:

    - on the current levels and costs for the surveillance in PZs;
    - on the costs of control and eradication of outbreaks in the PZs;
    - on the benefits of the PZs;
    - on the forms of compensation and cost-responsibility sharing currently in place[215];
    - other available data[216].

Extrapolations from the base levels ("best practices") were made to calculate the costs from applying the 'best practice' levels to the case study PZ/MS covered by Task 8. The costs for carrying out surveillance in the PZ/MS considered to be a best practice was extrapolated to the PZ/MS under review on the basis of the size of the areas of the PZ and adjusted with cost of labour, where possible, on the basis of data from the survey carried out in the context of Task 1[217].

Task 8.2: estimate of the overall economic benefits of the selected PZs

(*in comparison to their theoretical deregulation*)

The main purpose of the system of PZs is the protection of a territory from the introduction of a HO which is already widely established in the EU. The protection of the territory has a positive influence on the health of host plants (i.e. forests and parks), but in most cases the main reason is the protection of an endangered area where the HO could cause important economic damage. Therefore, the benefit of keeping the status of PZ is that it ensures a quarantine status for the HO, as long as costs of survey and measures are lower than the value of protected plants.

The benefits of having a PZ in place for a specific HO are therefore avoiding the potential costs that would result from HO introduction, and the added value of maintaining freedom

[214] In the case of IT, competence is at regional level, therefore interviews were carried out with two relevant regions: Emilia Romagna and Veneto.

[215] This will be relevant for sub-Task 8.3 and will help ascertain the degree to which those who are considered to be the main beneficiaries of the policy share the costs of increased protection. Growers could be asked to pay a subscription or surveillance fee to help cover the costs of maintaining the surveillance information needed to demonstrate that a PZ was in fact free of specified pests. A review of the existing practices will be undertaken and the potential options will be investigated in the course of the interviews held with the CAs.

[216] Finland conducted a cost benefit analysis for maintaining the status of PZ and concluded that it would not be optimal to revoke it (Heikkilä, 2008).

[217] In some cases such extrapolations were not possible due to the lack of data.

from the relevant HO for the host plants/crops, i.e. in terms of protecting the sector's value (production, exports) and the profit margins of producers. It is assumed that freedom from the HO would imply reduced costs of production and higher yields, and may offer a competitive advantage in terms of ensuring exports from the PZ. Therefore the main beneficiaries of PZs are the local growers, who may benefit from healthy plants, better quality of produce and therefore export facilitation, as well as from reduced costs of control. However, producers also bear costs of control and eradication (in this case, the cost could be also on the government, if compensation is in place) in the case of HO findings[218]. Cost of surveys are generally supported by the government, unless a certification system is in place. Furthermore, the costs of issuing PPs for PZs must also be taken into account.

In principle, the PZ should apply only for HOs identified as priorities for the MS in which they are located, i.e. where there is a strong threat to the economy or environment of the areas considered. Evidence of the benefits of having a PZ should therefore be provided and compared against the costs of surveillance and the evidence of freedom from the HO.

In order to estimate the costs of revoking the status of PZ (and therefore, the current benefits of the policy in place), estimates on the potential spread of the HO and the related reduction in yields and increased costs of production are needed. The recent cost-benefit analysis conducted in the UK for *Bemisia tabaci* [219] points out the limitations of this approach, given the high number of uncertainties involved in such a calculation. The estimate of benefits here was therefore undertaken by identifying the indicators related to the economic weight of the protected plants, in terms of value and the trade flows, as in general, assuming this is an effective control measure, the benefits can be quantified in terms of protecting the sector (avoiding the economic impact of the introduction of the HO in the PZ/MS). When available, this approach has been supplemented by more precise indications of the benefits, i.e. where those were readily available from existing studies or provided by the MS CAs interviewed.

Currently, there is concern that the partial implementation of the PZ requirements could result in distorted competition between POs inside and outside the PZ. This might happen when the HO for which the PZ was created has spread into the PZ, while the PZ is retained. POs inside an infested PZ can freely move their plants and plant products inside that PZ and into other PZ, while POs outside the PZ cannot.

In addition to the above data collection, in order to estimate costs and benefits for importers and producers of the protected crops, the FCEC distributed a questionnaire at the Advisory Group on the Food Chain of 18 February. Only one response was received by the nursery stock growers in the NL, regarding BZs for *Erwinia amylovora*, and the data were used in the analysis for this HO.

Task 8.3: Economic impact of introducing mandatory de-listing procedures for infested PZs

This is examined under two scenarios:

[218] It could also be the case, as for *Bemisia tabaci*, that producers and importers of ornamental plants (the main pathway for the HO) bear the costs of controlling and eradicating the HO, and therefore to maintain the PZ, whereas producers of commercial salads benefits the most (i.e. they do not need to import cuttings of potentially infested host plants) but contribute in a limited scale to the cost of maintaining the PZ.
[219] The UK is currently holding a stakeholders consultation to consider whether or not retain their status of PZ for *Bemisia tabaci*.

(a) When infestations have not been fully eradicated after 2 years:

The economic impact has to be considered against the costs of eradication of the outbreaks; versus the costs of the loss of protection to the sector, which are likely to be less that in (b) if an adaptation period of two years is considered;

(b) Immediately: Lack of protection for the sector starts immediately.

In principle, revoking the status of PZ would mean the removal of the special requirements to prevent the movement and spread within the EU as well as the import restrictions. The general requirements, if any, will still apply.

In both cases, the costs of de-listing PZs will be the loss of benefits for the POs in those PZs:

- the reduced export facilitation and
- the potentially increased control costs to be borne by the POs.

On the other hand, the benefits of de-listing PZs will be the (potential) reduction of costs associated to:

- the eradication of outbreaks in the PZs (although this requirement would still be in place, it might be carried out at a reduced intensity, therefore lower cost);
- the intensity of surveillance; and
- the issuing of PPs for the PZ by operators outside those zones. This would include the elimination of more intensified control costs in BZs in non-PZ MS, in case BZs are no longer needed to be in place in response to the delisting of the PZs .

In scenario (a), the economic impact of de-listing the PZ would have also to take into consideration the eradication costs for the two years, as these activities would be maintained with a potentially uncertain return on the investment[220]. This is the current status quo.

In scenario (b), there would be zero implementation costs, but the loss of PZ status and therefore of the benefits would be immediate. In case of immediate revoking of the status, the possibility for putting on hold the PZ status while engaging in an intensive eradication effort is lost. Free trade immediately occurs, therefore putting the country or the area at higher risk and possibly reducing the potential while increasing the cost to eradicate (assuming that surveillance will have to intensify in this case as the requirements on imported material can no longer be imposed). Therefore the impact is in all cases the immediate loss of the benefits as calculated in scenario (a). On the other hand, there would be immediate benefits for non-PZ MS which today have to maintain costly (i.e. intensified) inspection and eradication systems in BZs; if these BZs no longer need to exist (in response to the delisting of the PZs), these costs would disappear immediately in scenario b.

These estimates were carried out on the basis of the data and the information collected in the interview phase with CAs and POs in the case study PZs.

[220] There may still be a return in this case in that producers may benefit from the PZ status, i.e. can impose requirements on imports and may be able to gain access to export markets. However, in view of the outbreaks , it is not certain that these benefits would materialise.

In the case of *Erwinia amylovora*, it is assumed that the de-listed PZ has the possibility to establish BZs within the previously protected area. In this context, we have compared costs against current BZs in the EU.

8.3. Impact analysis

8.3.1. Globodera pallida

Globodera pallida, the white potato cyst nematode (PCN), is currently present in the EU, with the exception of SI, FI, LV and SK, which are recognised PZs for the HO.

8.3.1.1. Costs of establishing mandatory surveillance targets

SI was indicated as a case of best practice for surveillance for this HO; the country is free from white PCN, and this status is confirmed on the basis of an official survey[221] carried out since 1997. In SI, the average total area of arable land (2000-2009) is 498,276 ha. Within the PCN survey, a 5 % (259 ha) of the average total area of arable land is sampled[222]. Most of the fields are used for potato production.

An annual plan for the detection survey of *Globodera pallida* is prepared in the spring and coordinated with the authorised diagnostic laboratory and the phytosanitary inspection service. The program determines a timetable for checks and sampling, the terms of reporting on the results of observations, laboratory testing and collecting the necessary information from various sources.

Plant health checks are carried out in plantations of ware potatoes and some other field crops (beet, maize), in permanent crops such as fruit nurseries and cutting nurseries and in areas where yellow PCN (*Globodera rostochiensis*) has already been found. The checks include visual checks during vegetation and soil sampling. Besides, checks are also carried out at import and movement of potato and other planting material (points of entry, storehouses and points of unloading). Sampling is random. It includes soil from fields (field sampling), soil substrates (in trade) and the soil that accompanies potato consignments and other planting material and is introduced into SI from other countries. The soil from the fields is sampled at the time of harvesting or soon after. In areas where the presence of yellow PCN has already been established, net sampling is applied. Every year, 300 soil samples are taken in average from different types of arable soils, ware houses and distribution centres in SI, mostly from the fields of ware potato[223].

Samples are analysed to PCN species (especially to *G. rostochiensis* and *G. pallida*). Beside official PCN survey, the potato seed production fields are also systematically sampled in a

[221] The official survey is carried out in accordance with the Rules on measures for preventing spread and for eradication of potato cyst nematodes (Official Gazette of the Republic Slovenia, No. 49/2010) implementing Council Directive 2007/33/EC, the Phytosanitary Program of the Republic of Slovenia, approved by the Minister for Agriculture, Forestry and Food for a period of 3 years and detailed survey plan, prepared by a coordinator of a survey and approved by director of Phytosanitary administration RS (single authority).

[222] Average 2000-2009.

[223] A sample is composed (50 penetrations with the probe from various sampling points) and represents the area of 0.5 ha or less. The number of samples taken in the area depends on the homogeneity of the land examined (soil type). One sample represents the land with a homogenous soil type, equal environmental conditions and uniform plant production (uniform aeromechanics, one plant species).

frame of official certification scheme. Annually the following sampling scheme is planned for total around 300 samples[224].
In SK the PZ for *Globodera pallida* is the entire territory of 49,034 km^2, or around 2,430,683 ha of agricultural land[225].

Potatoes are grown on 4,185 ha (3,625 ha of ware potatoes and 560 ha of seed potatoes). In 2010, 255 inspections were carried out and 771 samples (*Globodera* spp.) were collected.

On the basis of the surveillance levels in SI, costs of surveillance for SK, in case mandatory surveillance targets were introduced, are calculated.

Table 35 Surveillance levels for *Globodera pallida*, SK and SI

	Agricultural land	Area of potatoes	Area sampled	Area sampled/ total area	Number of inspections	Area sampled/ potato production area	Number of samples	Sample density (ha/ sample)
SI	498,276 ha	6,974 ha	259 (a)	0.05%	n.a.	3.7%	250 (b)	1
SK	2,430,683 ha	4,185 ha	1,258 ha (c)	0.05%	255 (d)	30%	1,134	1.1

(a) Average 2000 – 2010 (Source: information submitted by MS CA, 2011)
(b) It excludes 50 samples from Demarcated Area for *Globodera rostochiensis*
(c) 2009 PZ Survey Report submitted to the COM (as available in CIRCA)
(d) Data for 2010, provided by MS CA

Source: FCEC compilation based on data provided by MS

As shown in the table above, the areas sampled in the two MS are comparable, therefore the surveillance targets applied for the purpose of this exercise concern only sampling. By applying the same sampling density as in the case of the SI PZ, the number of samples to be tested in the SK PZ would rise to 1,258, i.e. 10% increase. The cost of surveillance, as estimated by applying this level of sampling is as follows:

Table 36 Annual costs of surveillance in SK for *Globodera pallida* with mandatory surveillance targets

	Cost
Inspections and sampling	€ 31,000 (a)
Testing	€ 10,064 (b)
Total	**€ 41,064**

(a) Data for 2010. Figures provided by MS CA
(b) Cost of laboratory analysis is calculated at the unit cost: €8/sample, as estimated from the information provided by the MS CA, 2011

Source: FCEC compilation based on data provided by MS

- [224] BIPs, ware houses and distribution centres: 10 samples
- Fields with arable crops: 120 samples
- Ware potato fields (at the time of harvesting): 80 samples
- Demarcated areas (*G. rostochiensis*): 50 samples
- Nurseries: 10 samples
- Hops: 30 samples

[225] Source: Slovakia Statistical Office, data provided by the MS CA

8.3.1.2. Overall economic benefits

The main advantage of having a PZ status is the guarantee of the quality of the material, which provides a commercial competitive advantage for POs where a PZ is in place. When propagating material comes from PZs it provides certainty that is free of a HO, whereas when propagating material originates outside the declared PZ it would require an intensive and increased testing of samples to reach the same certainty and to declare the absence of the HO. The PZ status is a guarantee for maintaining MS free from the HO and provides benefits to PH status of potatoes. Furthermore, as noted by the SK CA, farmers are aware of the status of a PZ, which indirectly encourages them to greater co-responsibility for PH of imported planting material and also greater responsibility and quality requirements in case of production of reproductive material of their production.

Outbreaks of the HOs can lead to serious economic losses, as the HO can cause a major yield loss in potato crops (at least 10% annually in the UK). To give an indication of the value of the protected sector, the value of production in 2008 (source: EUROSTAT) in Slovakia was €33.8 million (€22.7 million in SI). The value in SK considering the area indicated is €13.7 million, considering a yield of 17.19 tonnes/ha. In case of loss of the PZ status, and estimating introduction and spread of the HO within the total potato production area, the loss in value could be equal to **€1.3 million annually.** This loss in value does not take into consideration a potential fall in demand due to loss of competitive advantage as described above, and consequential price effects.

Furthermore, after infestation with PCN a field is not suitable for cultivation of host plants. Since no nematicides are in use after the finding of PCN in soil only long-term crop rotation (10 years) is available as corrective measure, as no resistant variety of potatoes is known for *Globodera pallida.*

8.3.1.3. Economic impact of introducing mandatory de-listing procedures for infested protected zones

The economic impact is assessed in two scenarios:

(a) when infestations have not been fully eradicated after 2 years; and,
(b) immediately

In case of delisting of the PZ, there would be a simplification of the movement of goods, which may lead to reduction of required phytosanitary conditions, and therefore could result in easier and faster introduction of HOs into areas where they are still not present. As can be derived from the previous section, the importance of protecting the sector lies in the commercial advantage, and therefore the economic impact of withdrawing the PZ status, and therefore has to be analysed in the context of this overall value.

1. Delisting the PZ after two years of eradication, would have the impact on the CAs and the POs of:

    a. Costs of intensified surveillance.

Costs of intensified surveillance are incurred during the two years that eradication[226] is carried out, but during this period the protection from the risk of imported contaminated material which is offered in the context of a PZ enhances MS potential to target more effectively the eradication campaign.

2. An immediate withdrawal of the PZ status would have the following effects:

   b. Loss of markets for products/drop in price;
   c. Loss of value due to reduction in yield in case of introduction of the HO;
   d. Increase of surveillance cost.

Table 37 Economic impact of de-listing procedure for *Globodera pallida* in SK

	Cost
Scenario 1	
Cost of surveillance (one additional visual inspection/year x2 years) *	€ 1,520
Scenario 2	
Loss of markets for products/drop of price	Not possible to estimate with the currently available data
Loss of value (from yield reduction)	€1.3 million/year (loss of production due to the fact that crop rotation over 10 years is the only measure available)
Cost of intensified surveillance: assumption of 2 visual inspections and 2x level of sampling	€ 82,000/year

* The official phytosanitary authority is responsible for carrying out the supervision when the phytosanitary measure is imposed. This control is one additional visual inspection (source: MS CA, 2011)

8.3.2. Erwinia amylovora

<u>IT:</u> a major part of the territory is recognised as PZ for *E. amylovora*: fifteen regions[227] and, until 31 March 2010[228] Apúlia, Emilia- Romagna (the provinces of Parma and Piacenza), Lombardy (except the province of Mantua), Veneto (except some areas[229]). Therefore only the autonomous region of Trentino-Alto Adige, and the parts listed above within Emilia-Romagna, Lombardy and Veneto are not recognised as PZ. Some parts of these regions have progressively lost their status of PZ, most recently the province of Venice in 2010[230], due to the failure for three years to eradicate *Erwinia amylovora* from this province[231].

An inspection of the FVO in IT in 2009[232] reported that *"the survey is carried out within the protected zone with the help of a network of laboratories and control measures are applied*

[226] The costs of eradication are not included in the analysis, as it is assumed that these would be incurred in any case in the context of current MS obligations for the eradication of *Globodera pallida*.
[227] Abruzzo, Basilicata, Calabria, Campania, Friuli-Venezia Giulia, Lazio, Liguria, Marche, Molise, Piedmont, Sardinia, Sicily, Tuscany, Umbria, Valle d'Aosta.
[228] According to Commission Regulation (EU) No 17/2010 of 8 January 2010
[229] Except the provinces of Rovigo and Venice, the communes Castelbaldo, Barbona, Piacenza d'Adige, Vescovana, S. Urbano, Boara Pisani and Masi in the province of Padova and the area situated to the South of highway A4 in the province of Verona.
[230] Commission Regulation (EU) No 17/2010 of 8 January 2010
[231] In terms of production, in 2007 IT had 55,224 hectares of dessert apple trees (11% of the total acreage for the European Union (EU)) and 32,075 hectares of dessert pear trees (29% of the total acreage for the EU) (source EUROSTAT). The main regions of production of dessert apples are Veneto (12% of the total acreage of Italy – 6,627 ha.), Piemonte (10% - 5,522 ha.) and Emilia-Romagna (7% - 3,866 ha.). The main region of production of dessert pears is Emilia-Romagna (63% of the total acreage of Italy- 34,791 ha, 18% of the total acreage of the EU) (source EUROSTAT).
[232] FVO Inspection Report 2009-8179

and the control of internal movement of host plants is well organised, except for the occasional checks which need to be extended to retail shops. However E. amylovora is not controlled efficiently within the protected zone in Veneto and can be considered as established at least in certain parts of this region". In particular the report found that survey methodology differs according to the regions, regarding the timing and the frequency of the visual inspections[233]. Furthermore, it stated that *"Only one inspection a year in autumn as it is practiced in Veneto bears the risk of allowing the disease to spread throughout the growing period. This questions the protected zone status in the areas concerned. Also the reporting to the Commission of the survey results is incomplete and made with significant delay. This makes a global and up to date assessment of the situation of the protected zone in Italy difficult."*

LV: Regulation 690/2008/EC recognises the whole territory of Latvia as a PZ. The first focus of *E. amylovora* occurred in LV in 2007, other focuses were found in 2008.

The report of an FVO inspection conducted in LV in 2009[234] stated that "*The results of the survey for E. amylovora are reliable because the survey is performed following an accurate working plan by experienced and well trained staff. Also, the communication to the public and the local authorities and stakeholders is very good. Consistent market control is in place, and control measures are duly applied. However, in certain specific situations, eradication measures and measures to avoid the spread of the disease are not sufficient. The conditions for the status of protected zone for E. amylovora are complied with*".

8.3.2.1. Costs of establishing mandatory surveillance targets

The costs of establishing mandatory surveillance targets for *Erwinia amylovora* were estimated on the basis of a combination of best practices identified for this HO from two other PZs: SI and IE.

In SI, an annual plan for the detection survey of *Erwinia amylovora* is prepared in the spring and coordinated with the authorised diagnostic laboratory, the phytosanitary inspection service and the forestry service. The program defines a timetable for checks and sampling, the terms of reporting on the results of observations, laboratory testing and collecting the necessary information from various sources. Visual PH checks of host plants are carried out at least twice a year: once in the period July/August and once in the period September/October. In addition, in the foci of infection and in orchards in infected or buffer areas, first PH checks are done at the time of flowering (April/May) on the basis of prognosis of symptoms by the Maryblyt model[235].

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[233] Generally, one or several host plants are marked off and checked every year within each 5 km^2 square according to a risk assessment (presence of nurseries or orchards, or previous outbreaks). Often this base is adapted in the regions. In Friuli-Venezia Giulia, in the areas considered as sensitive (close to the highways, or to the border with SI), routes have been defined along which the host plants are observed. In Lazio, the survey is carried out following specific routes only, because host plant orchards are rare in this region. In Campania, Emilia-Romagna, Lazio and Lombardy, two inspections are systematically carried out every year, the first after blossoming period (June or July) and the second in September or October. In Friuli-Venezia Giulia, one inspection is carried out in June, with an additional inspection being possibly added in autumn within the areas considered as risky. In Veneto one inspection is carried out annually in September or October while in Abruzzo the inspection is in May or June.

[234] FVO Report 2009-8166.

[235] Frequency of checks: active foci of infection – at least 3 times during vegetation:

- during flowering

As for sampling and testing, a sample is taken in the event of suspicion or for testing for latent infection. Testing for latent infection is obligatory in the case of nurseries in the neutral area or nurseries in a 5 km buffer area of isolated foci. Testing for latent infection at registered producers is carried out from the 1st decade of September until the 1st decade of October at the latest. Testing of samples for suspicion is carried out considering the necessary samplings that depend on various factors (e.g. weather conditions, degree of infection and valid delimitation).

In IE, all registered nurseries with host material are inspected at least twice during the period late-June until Mid-October. Garden centres and public green areas throughout the country, on a risk basis, i.e. particularly locations where positives were found in previous years, are also inspected at this time. The sampling schedule is determined by the number of nurseries, garden centres and previous positive findings per county over the past few years.

Best practices were identified on the basis of the analysis of the implementation of surveillance in the above countries, as follows:

- Visual checks in places of production of host plants for planting twice/year (June; August/September) ;
- Visual checks in commercial orchards and public green once/year (July or August);
- Samples assumed at 1/ha in nurseries;
- Samples assumed at 5% of total area in orchards and public green.

On this basis, costs for the PZs for *Erwinia amylovora* in IT and LV were estimated for the total areas under PZs in these countries:

Table 38 Estimated cost of surveillance for *Erwinia amylovora* in IT and LV in case mandatory targets were introduced

MS	**Area of the PZ**	**Costs** (a)
IT	Nurseries: ca. 3,000 ha (est.) Orchards: 58,523 ha (b)	Visual inspections: €3.9 million Testing: €296,307
	Veneto Nurseries: 179 ha	Visual inspections: €32,220 Testing: €8,950
	Emilia Romagna: monitoring points: 200	Visual inspections: €13,600
LV	Nurseries: 28 ha Orchards and public green: 1,375 ha (c)	Visual inspections: €84,100 Testing: €1,820

(a) Cost of visual inspections assumed at €90/ha (IT) in nurseries and €57.50 in orchards and public green (ca. 65%, according to FCEC survey 2011). Cost of testing assumed at €50/sample in IT (source: interview Veneto CA) and €18.8/sample in LV (source: FCEC 2011 survey)

- in the period July/August, and
- in the period September/October.

foci of infection during dormancy – at least 2 times during vegetation;
infected areas – at least once during vegetation, at least in endangered areas (orchards), in particular in the foci of infection abolished in the last three years;
neutral areas – at least 2 times during vegetation on selected observation points;
pest-free areas, except in active foci of infection and dormant foci of infection, during vegetation, randomly and on selected observation points.

(b) Area of fruit trees, 2007, ha, EUROSTAT, Orchards survey. For IT, it excludes Emilia-Romagna and Lombardia and includes 179 ha for Veneto (area under PZ, as indicated by MS CA).
(c) Based on current areas inspected, total susceptible area not available.

8.3.2.2. Overall economic benefits

The main advantage of the PZ status is the phytosanitary guarantee it provides to buyers of plant material originating in these PZs (buyers are located within or outside the PZ) and the improved export possibilities for operators inside the PZ, to destinations within and outside the EU (such as potentially higher price levels; less trade restrictions).

Propagating material that originates from other areas requires more intensive sampling and testing to reach the same certainty levels in order to be able guarantee absence of the HO. Plants for planting originating in PZ or BZ can be moved elsewhere, also in other pest-free areas (PFA) within and outside the EU. This translates into a comparative advantage towards export markets, as in most cases the PP PZ is required by buyers as a phytosanitary guarantee. This is a requirement both of EU MS and TCs, and also of areas which used to be but are no longer PZs (within the EU and the same MS, e.g. it is the case in IT).

This comparative advantage is not easy to calculate as it is expressed mainly in terms of market access. In addition, the material originating in a PZ tends to attract a price premium of roughly 20% (the price for plants with PP PZ is about €1/plant higher than non PP PZ plants, on a total average price of €5-6/plant).

Furthermore, it is noted that growers assume responsibility for maintaining the status of the PZ, by ensuring the phytosanitary status of imported planting material, and also greater responsibility and quality requirements for of their own production of reproductive material.

Veneto is an important centre for production of apples and pears and of plants for planting. The favourable production conditions (among which the guarantee of absense of phytosanitary risk in the PZ) attracted in the past a number of nurseries in this area (and in particular in Rovigo and Verona provinces) for the production of plants for planting.The total estimated value of production in the region is **€80 million**; today, however, only 179 ha are PZ, whereas 652 ha are in BZs.

In Emilia Romagna, the value of the protected sector is approximately **€100 million**. However, in this Region the area under PZ corresponds to 1% of the overall value of the sector – one of the most important regions of Italy in terms of apple and pear production – whereas the bulk of the production takes place outside the PZ (in particular, nurseries are in BZs).

In terms of the overall value of the sectors that benefit from the PZs, an indication is given by the data in **Table 39**, indicating the significant annual value of production of dessert apples and pears and of intra and extra EU trade for the selected MS.

Table 39 Production and trade of apples and pears in selected EU MS, value (million €), 2009

	Production value (basic price)	Intra EU trade	Extra EU trade
Dessert apples			

EU 27	3,397	1,293	475
IT	**657**	**390**	**89**
LV	**3**	**0.2**	**1**
SI	31	3	6
Dessert pears			
EU 27	1,541	619	183
IT	**415.8**	**133**	**12**
LV	**0.2**	**0.2**	**0.4**
SI	3.5	0.5	3.2

Source: EUROSTAT

The relatively limited costs of surveillance, when compared to the economic importance of the sectors, indicate the cost-benefit ratio of the PZ as a management option for this HO. It is noted that in SI, for instance, the equivalent of annual survey costs for *Erwinia amylovora* (€125,330) represents the production value of 11 ha of commercial apple orchards, or 7 ha of commercial pear orchards, or nearly 50,000 apple plants for planting.

Furthermore, the status of PZ brings benefits also to MS CAs which are not traditionally big producers of plants for planting. In SK, for instance, according to information provided by the biggest PO of plants for planting, the possibility to put in place a PZ gave new MS the opportunity to improve the quality of production, given the high competitiveness of products produced in other EU MS. The common market, while eliminating obstacles to free movement of goods, also led to an in increased demand of quality products of phytosanitary safe status. This led to a need for improving in the quality of products, which included the strengthening of critical points in production and exploring the possibilities of improving processes, innovation, increasing the share of certified material without the presence of viruses, purchasing specialized equipment to nurseries and investment to build a specialized warehouse for storage of the produced planting material in winter months. In this context, the importance of some specific guarantees of phytosanitary requirements increased, and the declaration of the origin of these plants in PZ is perceived as a great advantage and is considered highly important by producers in PZs. Furthermore, this PO reported that an essential condition for participating in investment projects with foreign partners is to maintain the status of PZ and if this advantage was lost, they would become a less attractive partner for investors.

In SI the majority of orchards and nurseries are still in the PZ. As reported by the MS CA, according to a cost-benefit analysis performed for the area in the country where the HO is established, the protection of mainly natural environment with relatively limited agricultural production does not justify costs of official surveillance and control measures against the HO (on the basis of lower economic value; other values, such as natural heritage, biodiversity, recreation, tourism etc. were not taken into account in the analysis).

An indication of the economic losses due to the introduction and spread of the HO in a PZ is provided by data on compensation paid by the selected MS CAs in case of HO outbreaks. Generally, compensation schemes cover the value of destroyed plants following the obligation to destroy infested material, therefore can be considered a measure of the damage incurred by the POs:

- In the period 2003-2010 SI paid out a total amount of **€359,535** in compensation to POs for loss of value of destroyed material. The values differ by year depending on the number of plants destroyed, i.e. €234,465 were paid in 2003 and 383 € in 2009 for 154,435 (in 778 locations) and 91 (in 29 locations) plants destroyed in 2003 and 2009 respectively;
- In the period 2000-2003, Veneto Region compensated growers for costs and losses incurred for eradication. The total amount compensated for the period was **€1,000,000**[236];
- In LV **€235,415** in 2007 and **€94,430** in 2008 were allocated to private persons in compensation for control measures. The difference in the amounts paid per year is explained by the higher number of outbreaks that occurred in 2007 compared to those in 2008 (Source: FVO report).

8.3.2.3. Economic impact of introducing mandatory de-listing procedures for infested protected zones

The economic impact is assessed in two scenarios:

(a) when infestations have not been fully eradicated after 2 years; and,
(b) immediately

The loss of PZ status would reduce the phytosanitary requirements currently imposed on imported products, which may result in easier and faster introduction of HOs into areas where they are not yet present. Without the PZs it would be difficult to contain or slow down the spread of HOs, because plants for planting and movement of bee hives are important pathways for the infection of new regions with this HO. It is furthermore noted that for HOs like *Erwinia amylovora*, where no effective eradication measures are available, preventive phytosanitary measures are the best non-chemical plant protection practice. As in the previous cases, the importance of protecting the sector lies in the commercial advantages offered by the PZ status, and therefore the economic impact of withdrawing the PZ status has to be analysed in the context of the overall value of the protected sector.

Furthermore, withdrawing the PZ status would lead to the establishment of more intensive surveillance levels, therefore would most likely result in higher costs for the government (and for the POs, in case a cost-sharing mechanism is put in place) for inspections.

1. Delisting the PZ after two years of eradication, would have the impact on the CAs and the POs of:

   a. cost of eradication measures;
   b. cost of intensified surveillance.

As for (a), in case the status is withdrawn after two years, additional costs would be borne by the CAs and POs in order to eradicate the HO, but would give the possibility to the MS to keep the protection for the susceptible plants. As reported in the previous paragraph, costs for eradication are highly variable and depend on the number of outbreaks and plants destroyed; average values are reported in Table 41.

[236] Source: Veneto Phytosanitary Service.

As for (b), an indication of the economic impact of delisting is suggested by the case of LV, where after the occurrence of the outbreaks in 2007 and 2008, quarantine zones (1km radius from the outbreak) and BZs (3 km around the external border of the quarantine zone) were demarcated. In the quarantine zone situated in the villages where several concentrated focuses were found in 2007, the survey programme included one inspection during the June-August period of all private gardens. Within the isolated outbreak areas, 4 inspections were randomly carried out in public or wild areas and private gardens from June to August. During the same period, 5 inspections were carried out per month in public or wild areas and private gardens within the buffer zones of the outbreaks[237]. The inspected area following an outbreak intensified by 20.4 times in 2007 (4,235 ha inspected) and by 10.4 times in 2008 (2,166 ha) compared to the average area inspected in 2004-2006 (208 ha). The number of samples collected and tested increased by 10 times when compared to peacetime. By applying the same costs, this results in an estimated additional cost of **€ 368,000** for visual inspections and **€33,035** for testing for the years 2007-2008.

2. An immediate withdrawal of the PZ status would have the following effects:

   c. Loss of markets for products/drop in price;
   d. Loss of value due to reduction in yield in case of introduction of the HO;
   e. Increase in surveillance costs.

It is not possible to quantify with the currently available data the impact on (c) and (d), which ultimately will also depend on the rate and speed of spread of the HO, and on the intensity and efficacy of the measures put in place in (e).

It is also likely that, if alternative measures (i.e. BZs) are put in place, the effects of (c) and (d) would be temporary, and production/market access will recover after a first phase of adjustment of the sector. In Emilia Romagna, for instance, which originally had a PZ status for the whole region, the negative impact of delisting was perceived by POs in the first years in terms of reduced market access. In order to maintain production for such an important sector, BZs for the production of plants for planting were created and these involved relocation costs for those POs that relocated, as well as an increase in overall costs of production due to increased controls within the BZ.

As for (e), an indication of the economic impact of delisting is provided by the case of the provinces in Veneto and Emilia Romagna for which the status was lost. The status of PZ in the province of Venice was lost after three years' attempts to eradicate the HO, during which same locations have progressively abandoned this status; in Emilia Romagna progressively infested provinces gave up the status. The main reason behind the decision to abandon the status of PZ was the fact that the HO was not eradicated, and therefore it was not considered as appropriate to impose phytosanitary obligations on POs for destruction of infested material. The change occurred mostly for orchards, whereas for nurseries three BZs in Veneto and twelve in Emilia Romagna were created for the production of plants for planting material with the PZ PP[238]. The change entailed:

- Removal of the phytosanitary obligation to eradicate and destroy affected plants for growers outside the PZ. Consequently, the HO is dealt with by growers by keeping it

[237] Source: FVO Report 2009-8166
[238] The BZs follow the requirements laid down in Commission Directive 2003/116/EC.

at low levels. This entails a reduction of production costs for growers in the non protected area.

- In the BZ, production costs are higher, as the level of controls is higher: in Veneto, in the PZ surveillance is done once per year and samples are taken only on symptomatic plants, whereas in the BZs, the phytosanitary risk being perceived as higher, controls are performed twice/year and a number of samples is taken not only on symptomatic cases but more widely (in 2010, in the BZs ca. 150 samples were taken). The cost of surveillance in the PZ is €90/ha, whereas in the BZs it is €230/ha (two annual visual inspections, one sample/ha at the estimated cost for testing of €50-60/sample). In Emilia Romagna, the cost for one inspection in PZ is €34 and they are performed twice/year, for a total cost of €13,600; in the BZs surveillance costs amount to €115,000, with an estimated intensity 10 times higher;

- The higher costs of production in the BZ are at the moment not fully recovered through the fees charged by authorities to POs[239]. Changes to the current system of fees aimed at a higher cost-sharing with POs are currently not envisaged due the economic crisis which affected the private sector; however, considering the turnover of the sector and current restrictions to public budgets, it is increasingly considered that the sector could take on a higher degree of cost sharing.

It is noted therefore that in the case of these two regions the loss of status of the PZ has had the effect of an increase in surveillance costs, as BZs were established. In the case the PZ status was lost and these were not established, POs would have lost the possibility to access markets, and would have therefore faced higher economic consequences.

Table 40 Cost of surveillance of *Erwinia amylovora* in PZ and in BZ, in IT and the NL

	Veneto (IT)		**Emilia Romagna (IT)**		**The NL**
	Protected Zone	*Buffer zone*	*Protected Zone*	*Buffer zone*	*Buffer Zone (a)*
Area	179 ha	652 ha	200 inspection points	860 ha	5,600 ha (est.) (b)
Production value	€80 million (c)			ca. €100 million	€200 million
Number of nurseries	70	80			Number of nurseries: 352
Surveillance Cost	€ 16,110 (est.) (d)	€ 149,960 (est.) (e)	€13,600	€115,000	€ 650.000 (paid by POs)
Eradication cost	ca. €250,000/year				ca. € 100.000/year (f)

(a) 12 BZs, 2009 data.
(b) Total nursery stock production area: 17,000 ha (source: LTO). The buffer zones account for 33% of the production.
(c) Whole region, Protected Zone and Buffer Zone.
(d) On the basis of cost: €90/ha.
(e) On the basis of cost: €230/ha.
(f) Value of destroyed material excluding consequential loss of earnings due to loss of market.

Source: compiled by FCEC on the basis of data provided by MS CAs and stakeholders

[239] Producers pay an annual fee to issue a PP, and there is only a difference (€50) between the tariff for the normal PP and PP for PZ. At the moment, the fee does not cover the costs of inspections, which are largely borne by the CA only.

Table 41 Economic impact of de-listing procedure for *Erwinia amylovora* in IT and LV

	Cost
Scenario 1	
Eradication of an outbreak	SI: ca. 45,000/year Veneto (IT): ca. 250,000/year LV: ca. 165,000/year
Cost of surveillance	LV: €401,035 (est.) for 2 years
Scenario 2	
Loss of markets for products/drop of price	Not possible to estimate
Loss of value	Not possible to estimate
Cost of intensified surveillance	Veneto: 2.5 times higher than in PZ Emilia Romagna: 10 times higher than in PZ

8.3.3. Bemisia tabaci

FI, IE, SE, the UK and certain areas of PT are currently free of *Bemisia tabaci*, a HO regulated because of the many viruses it may transmit; these MS maintain PZ status against this HO.

The HO is currently not established in FI and in the UK, in part due to unfavourable climatic conditions, but it could establish in protected environments, where it has the potential to be a major pest and a vector for HOs of harmful viruses, particularly of glasshouse salad crops such as tomato and cucumber.

In the case of this HO, the requirements of the PZ and the economic impacts in terms of surveillance/control costs and benefits of the PZ affect differently various stakeholders, i.e. the poinsettia growers and the glasshouse tomato and cucumber producers: the ornamentals sector suffers most outbreaks and costs, but the edible crops sector is the main beneficiary of the PZ. Both FI and the UK have yearly outbreaks of the HO in ornamentals (particularly planting material of poinsettia), which are all eradicated, but the HO has never been found in greenhouse vegetable production. As for the other MS which have a high production of host plants for the viruses carried out by the HO, DK withdrew the status of PZ in 2000 with no effect to date on salad crops, whereas in the NL (which never had a PZ for Bt), is the only northern MS that reported an outbreak of a Bt transmitted virus, which was eradicated.

DK decided in 2000 to withdraw the PZ status for *Bemisia tabaci*. As explained by the MS CA, despite several efforts to avoid new introductions of *Bemisia tabaci*, the HO continued to be introduced with many infested consignments. It seemed that not all actors in the chain (producer-plant protection services-wholesalers) did fulfill their obligations to ensure that marketed consignments were free from *Bemisia tabaci*. This had been the situation for several years before DK gave up its PZ status. The official decision to withdraw the PZ status was supported by strong arguments from the growers organization that the burdens and obligations of being a PZ could not be justified, due to the imbalance created by continuous violation of the PZ requirements. The situation implied a lack of security against introduction of *Bemisia tabaci* with propagation material from other MS.

The MS CA judged that there was not a phytosanitary argument in a continued protection, if the industry did not want to maintain the extra protection given by the PZ status.

Part of the problem was caused by incidents where plants for planting were delivered to the PZ by a supplier in a later marketing phase, after first having been marketed to non-PZs from the producer (i.e. the plants have been produced or inspected at the place of production but not at a level considered to be adequate to ensure approval for delivery to a PZ).

In the UK, FERA launched a consultation of stakeholders as part of the review of the current UK policy of maintaining PZ status for *Bemisia tabaci*, which was concluded in April 2011. A CBA of the current status of PZ for *Bemisia tabaci* accompanied the consultation[240]. In Finland, a CBA was performed in 2008, concluding that it was economically sound to keep the status of the PZ. Data used for the purpose of this exercise are taken mainly from those two studies.

8.3.3.1. Costs of establishing mandatory surveillance targets

The UK report to the COM on surveys carried out for the PZ, revealed that there were 19,784 visual inspections for *Bemisia tabaci* in 2009, and 22,740 in 2008. This figure includes also TCs and EU imports and it is not possible to determine exactly how many were on material imported, as confirmed by the MS CA.

As reported in the annual survey to the EC, in FI inspections include monitoring of host plants in greenhouses and market control of propagation and planting material. As the potential pathway of introduction are host plants coming from outside FI and most of the infestations have been on poinsettias, greenhouses growing poinsettias are given priority when selecting premises to be inspected. The survey is targeted to the main commercial greenhouse premises located around the country. These consist of producers of ornamental plants and vegetables and plant nurseries. The annual number of inspections, which is proportioned regionally to the volume of production, is planned to cover all the enterprises in production of planting material of ornamentals and vegetables. With regard to enterprises producing pot plants, cut flowers and vegetables the inspections are to cover 20% and 5% respectively. The greenhouses that produce poinsettias, *Euphorbia pulcherrima*, are inspected

[240] FERA, 2010. A Previous CBA was carried out in 2000 from ADAS/Imperial College and estimated a 3:1 benefit-cost ratio in favour of exclusion.

every year. Inspections are also done to plants imported from other MS (marketing control) and from TCs.

According to the survey reports submitted to the EU, FI carried out surveillance at the following levels in the years 2008-2010:

Table 42 Surveys for the PZ for *Bemisia tabaci* in FI, 2008-2010

	2008	**2009**	**2010**
Inspection visits	796 (of which 67 market control inspection)	870 (of which 127 market control inspection)	808 (of which 123 market control inspection)
Samples	788	562	524

Source: Annual MS reports to the EC

In FI, there are 169 greenhouses producing poinsettia, and the production and imports of poinsettia are reported in **Table 43**.

Table 43 Production and import of poinsettia in FI, units, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Number of imports	226,175	1,086,875	1,262,225	1,736,425	1,232,500	1,471,860	1,687,700	1,332,448
Number of domestic production		2,323,000	2,333,000	2,218,000	2,295,000	2,235,000	2,142,000	

Source: Evira reports

As information for the UK on the number of holdings and volume of imports is not available, it is not possible to compare the levels of surveillance in the two selected MS and to identify surveillance targets on the basis of the above information. An estimate of the cost increase could however be made by increasing the level of surveillance by different intensity factors, i.e. 2 or 3 times higher. By applying an intensity factor equal to 2, and considering the average cost of surveillance in FI over the period 2000-2007, this would result in **€331,718** for surveillance (all costs included, assuming that a higher level of inspections would result in a higher number of findings and therefore in a higher number of compensation cases to handle).

Table 44 Breakdown of cost of surveillance, FI PZ for *Bemisia tabaci*, 2000-2007 (in €)

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Tracing and procedure follow-up	30,223	33,737	11,941	37,398	24,703	33,932	91,772	112,560
Mapping/surveying *Bemisia t.*	37,548	35,824	39,404	43,518	37,586	42,360	39,305	43,608
Laboratory work	8,524	7,527	6,764	10,900	13,313	20,434	32,356	58,473
Handling compensation decisions	4,117	3,544	1,209	2,696	1,474	3,691	2,977	11,165
Total	**80,412**	**80,632**	**59,316**	**94,512**	**77,076**	**100,416**	**166,410**	**225,806**

Source: Evira

There is no basis from which to calculate such a cost in the case of the UK, because, as highlighted by the MS CA, inspection visits are usually combined for a number of HOs, therefore it is not possible to identify surveillance costs for this specific HO.

8.3.3.2. Overall economic benefits

The impact of this HO is the damage caused to ornamentals, but furthermore and mostly the impact has to be considered in relation to the high number of viruses for which it is a vector (it is estimated that more than 60 viral pathogens transmitted by *Bt* naturally infect tomato; cucumber and pepper crops are also at risk). The PZ status has been considered beneficial to the UK and FI mainly because of the potential impact on the edible crops sector. An indication of the overall value of the sectors involved (ornamental and glasshouse vegetables) is provided in Table 45 for FI and in Table 46 for the UK.

Table 45 Volume and value of protected sectors in 2007, FI

	Firms	**Production**	**Production area, ha**	**Producer price**	**Value at constant prices (million €)**
Tomato	642	38,7 (1,000 tons)	116.5	1.3643€/kg	48.9
Glasshouse cucumber	431	29,3 (1,000 tons)	73.0	1.2247€/kg	
Poinsettia	167	2,142,000 pieces	10.7	N/A	

Source: Ministry of Agriculture and Forestry information centre; EUROSTAT

Table 46 Volume and value of protected sectors in 2007, the UK

	Firms	**Production**	**Production area, ha**	**Gross margin (£)**	**Value at constant prices (million €)**
Tomato		85,6 (1,000 tonnes)	144.5	20,037	106.9
Cucumber		49,4 (1,000 tonnes)	143.1	10,479	
Poinsettia		1,900,000 pieces	n.a.	n.a.	

Source: Glasshouse Survey 2007, England, FERA, 2010; FERA, 2010.

The benefits of the PZ status are the avoided potential impacts of the introduction and spread of this HO on the affected sectors, on the other hand, de-listing the PZs would have the potential following effects:

Table 47 Impacts of de-listing the PZs for *Bemisia tabaci*

Impact	Affected sector
Reduction of costs for checks on intra- EU trade	MS CA
Reduction of cost of surveillance (and follow up actions) in ornamentals	MS CA
Increase of surveillance costs in vegetable glasshouses	MS CA
Reduction of costs of eradication and control measures	Ornamental importers and producers
Reduction of costs of statutory destruction of host material	Ornamental importers and producers
Potential economic losses due to customer imposed penalties	Ornamental importers and producers
Potential spread of vectored viruses and consequential control costs	Glasshouse vegetable producers[241]
Potential crop losses and quality reduction	Glasshouse vegetables producers

Source: Adapted from FERA, 2010

In terms of the potential losses due to *Bemisia tabaci* transmitted viruses, FERA (2010) indicates that these in some cases have reportedly led to a complete failure of a crop. However, the report also notes that "*the extent to which Bemisia tabaci and associated viruses are likely to affect UK salad producers is difficult to ascertain, as most of the reports of significant crop losses and damage are from southern European MS where the climate and production practices are more suitable to the pest establishment in the wider environment. In the UK the climate is not suitable for B. tabaci to establish outdoors, and the few outbreaks that have occurred to date have all been under glass. In other Northern European countries that have reported outbreaks the situation is similar. The Netherlands, who have never had a PZ, are the only Northern European Member State to report a relatively restricted outbreak of a Bemisia tabaci transmitted virus (TYLCV), which was subsequently eradicated. The rate of spread onto protected salad crops of Bemisia tabaci in the Northern European Member States appears relatively low, but the situation is highly dynamic with emerging resistant biotypes and new diseases, so there is no guarantee that the status quo will remain.*"

Taking into account all of the above, benefits (calculated as avoided negative impacts) are difficult to estimate as they require making assumptions on the rate and spread of the HO. In order to overcome this, the CBAs carried out in the UK and in FI compared costs and benefits according to different scenarios and on the basis of current costs of maintenance of the PZ. Costs for FI are reported in Table 48.

[241] UK CBA (2010): *In certain countries that currently live with the presence of B. tabaci such as France, the onus for controlling the pest is on the commercial salad producers who operate crop destruction thresholds for the pest. This reflects that there is a direct correlation between the numbers of B. tabaci present and the likelihood of a vectored disease being present. Such a scenario in the UK would mean producers of commercial salad crops would have to consider the control of a pest, with only a limited range of control options, which previously had not been present within this sector of the industry. The control options available to commercial producers of salad crops are, due to the nature of the end product, more restricted compared to those available to ornamental producers.*

Table 48 Costs of maintenance of the PZ for *Bemisia tabaci* in FI, 2000-2007, €/year

	2000	2001	2002	2003	2004	2005	2006	2007
Administration and producers	147,965	132,388	65,353	132,056	91,379	155,887	157,795	378,586

Source: Heikkilä, 2008

The scenarios and results of the analysis are reported in Table 49 and Table 50 for the UK and in Table 51 and Table 52 for FI.

Table 49 Impact scenarios of *Bemisia tabaci* (and transmitted viruses) on protected salad crops, UK

Impact scenario	Scenario description	Loss in yield (range)	Increase in Pest management (or variable) costs (range)
A	Low level of outbreak of Bt without the introduction of any vectored diseases. Rapidly eliminated by additional sprays	2% (0-5%)	10%
B	High levels of Bt resulting in a prolonged campaign to eradicate the pest and prevent further spread	25% (10-30%)	100%
C (i)	Limited outbreak of TYLCV quickly eliminated by roguing and spraying	5%	10%
C (ii)	Severe outbreaks of TYLCV requiring destruction and removal of (all of?) the crop (s) and the implementation of a sanitary regime to avoid further spread	50%	300% or more?

Source: FERA, 2010

Table 50 Cost benefit ratios of the impact scenarios of *Bemisia tabaci* (and transmitted viruses) impacts on protected salad crops (per 0.1 ha), UK

Scenario	Cucumbers	Tomatoes
A	1: 1.2	1: 1.2
B	1: 12.3	1: 14.4
C (i)	1: 2.7	1: 2.9
C (ii)	1: 30.7	1: 28.8

Source: FERA, 2010

For the UK, cost benefit ratios range from 1:1.2 to 1:30 depending on the scenario and crop; these results supported therefore maintenance of the PZ. The analysis concluded that "*although the total annual costs (to both industry and the government) of eradicating Bemisia tabaci are large, they are considerably less than the potential benefits obtained by excluding the pest (for the envisaged scenarios). The potential impact of the pest (and vectored diseases) in terms of crop losses in salad crops potentially much more important that the effect of the pest in terms of increasing the costs associated with controlling it.*"

This analysis noted however that the main area of uncertainty concerns the extent of the benefits as a result of maintaining the PZ. For example, uncertainties related to the potential rate of spread and impact of the pest – and any vectored diseases – on salad crops. The analysis further highlights that estimate of costs are more accurate in certain areas than others, but generally are much better than estimates of benefits, which rely on predictions of future impacts.

Heikkilä (2008) uses simulated discounted costs (Table 51) for keeping the PZ status over 30-years based on three different scenarios:

- Scenario 1: The annual number of cases remains in the average of 2006-2007 (about 50 cases a year);
- Scenario 2: The annual number of cases about doubles from 2007 by 2038 (2% annual increase from 50 cases to 91 cases a year);
- Scenario 3: The annual number of cases about triples from 2007 by 2038 (4.5% annual increase from 50 cases to 187 cases a year).

And simulated discounted costs for withdrawing the status of PZ (Table 52) over 30-years based on two different scenarios:

- Scenario A: *Bemisia tabaci* spreads in about 6 years to all poinsettia and in 30 years to 17% of cucumber and 16% of tomato.
- Scenario B: *Bemisia tabaci* spreads in about 6 years to all poinsettia and in 30 years to 17% of cucumber and 48% of tomato.

Table 51 Simulated discounted cost of maintenance of the PZ for *Bemisia tabaci* in FI over a 30 years period

	Scenario 1	***Scenario 2***	***Scenario 3***
Administration (€)	5,017,413	6,291,978	8,702,520
Producers (€)	312,212	404,372	578,671
TOTAL (€)	5,329,624	6,696,350	9,281,191

Source:Heikkilä, 2008

Table 52 Simulated discounted cost of withdrawing the PZ for *Bemisia tabaci* in FI over a 30 years period

	Scenario A	***Scenario B***
Administration (€)	0	0
Producers total (€)	8,595,477	10,603,328
of which		
- tomato	4,235,218	6,243,069
- cucumber	989,955	989,955
- poinsettia	3,370,305	3,370,305
TOTAL (€)	8,595,477	10,603,328

Source: Heikkilä, 2008

By considering current levels of surveillance and costs of maintenance of the PZ (three scenarios for maintaining the PZ), and the two scenarios for giving up the PZ, the Finnish study concluded that the benefit-cost ratios (over 30 years) of the PZ are as follows:

	BCR A1	***BCR A2***	***BCR A3***	***BCR B1***	***BCR B2***	***BCR B3***
Benefit cost ratio	1.61	1.28	0.93	1.99	1.58	1.14

Note: A1 is Scenario A versus Scenario 1, A2 is Scenario A versus Scenario 2, etc.

Source: Heikkilä, 2008

As it can be noted form the tables above, in all but one case the ratio is above 1, meaning that giving up the PZ would be more expensive than continuing with it. The CBA (Heikkilä, 2008) concludes therefore that the PZ seems economically sensible for FI. However, it also specifies that the monetary benefits of the PZ are only visible after 10-20 years, because it would take some time for the HO to spread. In the short term (next two years), giving up the PZ would make economic sense, but in the longer term, maintaining the PZ is an economically sound policy.

The data provided in the CBA analysis for FI in the case of withdrawal of the PZ can be compared against the cost of surveillance, as calculated in the previous paragraph. Taking the same assumptions as in the study, even in case of an increased cost of surveillance, the benefits for the sector would be higher than the costs.

8.3.3.3. Economic impact of introducing mandatory de-listing procedures for infested protected zones

The economic impact is assessed in two scenarios:

(a) when infestations have not been fully eradicated after 2 years; and,
(b) immediately

Delisting the PZ after two years of eradication, would have the impact on the CAs and the POs of incurring the cost of implementing eradication measures. This would give the possibility to the MS to keep the protection for the susceptible plants. Costs for eradication are highly variable and depend on the number of outbreaks and plants destroyed, as described in Task 3. An indication of costs of eradication measures can be derived from the amount of compensation paid in FI to the producers, as they are reported in Table 58. Data show that POs incurred costs and losses due to outbreaks of *Bemisia tabaci* of at least **€1.2 million** for the period 2000-2010 (ca. €111,000/year).

An immediate withdrawal of the PZ status would have the opposite effects from those described in the previous paragraph, leading to a higher risk for vectored viruses to enter and spread in the MS, with the economic impacts as described above.

8.3.4. Cryphonectria parasitica

Cryphonectria parasitica, the chestnut blight fungus, is a plant pathogen which affects chestnut throughout the natural range of this tree. *C. parasitica* was introduced into North America from the Far East at the end of the nineteenth century and spread within the next five decades throughout all the main chestnut areas. In 1938, the pathogen was first discovered in Europe as an isolated focus near Genova, II. The fungus spread very rapidly and many countries in the EU where chestnuts are cultivated are currently affected by the pathogen[242] (source: EPPO).

At present, CZ, IE, EL (Crete and Lesvos), SE and the UK (except Isle of Man) are recognised as PZs for this HO. For the purpose of this analysis, the CZ and SE were investigated as case studies. The UK was consulted as an example of best practice.

[242] AT, BE, FR, DE, EL, ES, HU, IT, PL, PO, SK, SI.

8.3.4.1. Costs of establishing mandatory surveillance targets

Inspections take place in nurseries, garden centres, public green sites and forestry sites. The two selected MS can be both considered as examples of best practices, as the annual reports submitted to the EU show in the last five years the absence of this HO from the territory or isolated only outbreaks (CZ, 2009 and 2006) which were eradicated.

SE: The diffusion of *Castanea sativa* in SE is of limited extent: there are only single trees standing in parks and mostly planted as amenity trees in coastal areas of southern SE. There is an increasing interest for use of this species in city plantations.

Plants, fruit or wood of *Castanea sativa* are not commercially produced in SE (there is no production of plants for planting nor any production in orchards). Most of the surveillance is done in garden centres selling *Castanea* at the same time as other inspections. In the past years the levels have been the following:

- 2010: 25 garden centres;
- 2009: 4 garden centres;
- 2008: 3 garden centres

Samples are taken on symptomatic cases and in the three years no samples have been taken as there have not been any symptoms. On the basis of the above information and of data provided in the survey of MS CAs, the cost of surveillance is estimated at **€4,200** in 2010.

CZ: All the CZ territory is considered PZ for the HO, i.e. 7,900,000 ha. Chestnut trees are grown mainly in parks and public gardens as cultivated plants; there are few forest stands with sweet chestnut. Surveillance is conducted in nurseries, garden centres and forestry sites, with an average number of inspections equal to 560/year. Samples are taken on symptomatic cases only, and in the last years they were 6 (2008), 9 (2009) and 1 (2010).

The total costs of surveillance for the HO amounted for the period 2004-2008 to **€19,000/year**. This surveillance is carried out in parallel with other surveys, i.e. those for plants of *Castanea* and the survey of *Dryocosmus kuriphilus*[243].

From the information above, it is not possible to estimate appropriate mandatory surveillance targets for this HO, nor whether the current levels of surveillance are considered to be satisfactory in the selected MS[244]. The review of PZs surveys carried out by other MS which have a PZ for this HO, IE and the UK, did not provide any other best practice to adopt in surveillance. In the UK, in 2010, a total of 17 sites points were inspected (Great Britain Northern Ireland, Guernsey) for the host plants *Castanea* spp[245]. For reference, the cost of this surveillance is estimated by the MS CA at £1,200/year (€1,345). In Ireland the report for PZs of forestry HOs (2009) reported that fixed observation points are not in place for *Cryphonectria parasitica* as the host species are currently not significant plantation species

[243] Commission Decision 2006/464/EC.

[244] There are no FVO inspection reports available for CZ; results of inspections in SE show adequate levels of design and implementation, but given the particular distribution of host plants in SE, there are no principles which could be extended to other MS.

[245] Source: Consultation with MS CA. The total susceptible area in the UK is 24 million ha (the whole area of UK).

and surveys are based on visual observations of forestry plantings and where they occur in the general landscape.

Alternatively, estimates could be carried out by making appropriate assumptions, on the basis of risk analysis, i.e. by considering an increase in the number of inspected nurseries/public green sites if it was considered that the highest risk is from these sites. As a matter of example, if a mandatory surveillance target would be established setting the inspection at 50% of susceptible nurseries, this would result in a cost for the CZ equal to **€14,364**[246]. However, it is noted that there is no evidence to suggest that the current levels of surveillance are not adequate.

8.3.4.2. Overall economic benefits

The overall economic benefits of the selected PZs lie mostly in the protection of the current environmental and recreational values of the protected areas.

In SE, the reason for the maintenance of the PZ is to save *Castanea* as species in a special environment. It is difficult to estimate in monetary terms the benefits related to this protection: cost savings for not having to replace trees of *Castanea* contaminated by *Cryphonectria parasitica* with other species could be regarded as an estimate of the economic benefit. However, as specified by the MS CA, it is difficult to estimate the value of these benefits, as this would ultimately depend on the size/age of the tree and the value of the location where it is placed.

In CZ, locations where chestnut trees are present are distributed quite evenly over the territory of the country, in approximately 300 sites, which are part of areas under Natura 2000. The importance of the PZ lies in the protection of the main host plant, *Castanea sativa*, for their ornamental value, as trade in wood and bark of chestnut is minimal in the CZ, whereas the trade of chestnut plants is much more frequent[247]. As further highlighted by the CZ NPPO, the direct financial benefits of maintaining the PZ of *Cryphonectria parasitica* are equal to zero, whereas the potential benefits of prevention can be estimated as "*very high*", although it is not possible to estimate them as they are dependent on the further behaviour of the pathogen in case of introduction[248.]

It is noted that the HO can have a dramatic impact on the host plants, as shown by the US case: between 1904 and 1950, *C. parasitica* caused almost complete destruction of *Castanea dentata* in the eastern USA (Hepting, 1974), as reported in EPPO (2003). There has also been extensive spread on *C. sativa* in Europe from Italy since 1938.

8.3.4.3. Economic impact of introducing mandatory de-listing procedures for infested protected zones

The economic impact is assessed in two scenarios:

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[246] Considering the total number of nurseries for host plants to be equal to 2,052 (2010), and the estimated time (2 hours) needed for an inspection, and combining by the salary fee rate (data available from FCEC 2011 MS CA Survey).
[247] Source: CZ NPPO consultation.
[248] It is not yet clarified the question of the harmfulness of the pathogen in its transition to the oaks, currently attacked only at high infection pressure. This does not preclude in the view of CZ a change in properties, especially in pathogenicity, of the HO.

(a) when infestations have not been fully eradicated after 2 years; and,
(b) immediately

An immediate withdrawal of the PZ status would put at higher risk the host plants for the HO, as described in the paragraphs above, therefore causing losses in terms of their environmental value in the MS concerned, as well as costs for replanting with non-susceptible species.

In case the status is withdrawn after two years, additional costs would have been borne by the CAs in order to eradicate the HO, but would give the possibility to the MS to keep the protection for the endangered plants. In Sweden, no outbreaks of the HO have occurred since the establishment of the PZ, therefore there are no figures available to estimate control costs. An estimate of intensified surveillance costs is also not possible, given the distribution of host plants in the country: the *Castanea* trees are often planted as singular trees so there would not be any *Castanea* trees around.

In CZ, outbreaks occurred in 2004, 2006 and 2009. All the outbreaks were eradicated. The costs of eradication in the CZ for the period 2004-2008 were **€135,000**, the bulk of which was spent to eradicate the HO in the outbreak of 2004 in a large forest nursery, for an amount of €118,000.

8.3.5. Ips amitinus

Ips amitinus is an insect which affects coniferous trees; host trees of this HO include *Picea* (the main host, *Picea abies*), *Abies*, and *Larix* and *Pinus* (CFIA, 2007). It *mostly infects damaged spruce trees, but can also damage healthy trees as well.* It is present in the EU[249], mainly found in mountain areas of Central Europe (over 1,000 m). FR (Corsica), EL[250], IE and the UK are currently a PZ for this HO.

8.3.5.1. Costs of establishing mandatory surveillance targets

In EL the current area of the PZ is approximately 1,427,000 ha of host plants (plants of *Abies* Mill., *Picea* A. Dietr., *Pinus* L. *Pseudotsuga* Carr etc.)[251]. According to the current methodology (2011), the level of surveillance[252] is as follows:

- number of permanent observation points: 315
- total number of traps: 315
- number of samples which will be tested: 1,400.

In 2009, an inspection of the FVO in EL found that *"No formal national procedures have been established in Greece for carrying out and reporting on surveys for harmful organisms for which Greece has been recognised as a protected zone. Some of these harmful organisms, relevant for forestry areas, have never been systematically surveyed".* In 2010 a follow up

[249] DE, AT, BE, BG, ES, EE, FI, FR (except Corsica), HU, IT, LT, PO, CZ, RO, SK, SI.
[250] Until 31 March 2010, according to Commission Regulation (EC) No. 690/2008.
[251] Data records from inventory of the year 1992, as provided by MS CA.
[252]For the group of HOs *Dendroctonus micans*, *Ips amitinus*, *Ips cembrae* and *Ips duplicates.*

mission found that the MS has taken measures to address the recommendations of the previous mission, but concern remained over some implementation issues[253].

In IE the official surveys for forestry HOs[254] are carried out by the Forest Service, Department of Agriculture, Fisheries and Food. In accordance with Article 1(4) of Commission Directive 92/70/EEC a network of observation points is in place following a systematic grid covering the PZ area. In 2009, visual inspections were carried at 49 of the fixed observation points to determine the presence of signs or symptoms of the HOs of concern; 77 laboratory analyses were also carried out. In general the surveys for the bark beetle species (among which *Ips amitinus*), are combined. In relation to the bark beetle PZ species, coniferous bait log traps are in place at the monitoring points[255].

It is also reported that an ongoing day-to-day visual survey for HOs is carried out throughout the national forest estate by the Forest Service (Forestry Inspectorate)[256]. Within the PZ area there are 17 forestry districts covering the entire country. This work brings the Inspectorate into constant contact in the field with all stages of forestry operations throughout the national forest estate. Where visual inspections are inconclusive, samples are taken for laboratory analysis. Furthermore, a free national pest and disease diagnostic and advisory service to forest owners and members of the public is in place, funded by the Forest Service. This is an important survey component to enable the early detection of introduced PZ and other HOs. The Forest Service encourages tree owners to report unusual signs and symptoms and promotes the importance of maintaining the national PZ status and general health status.

In the UK, a total of 41 permanent study plots have been set up[257] for a range of forestry HOs surveyed, supported by a programme of pheromone traps located at major ports and sawmills around the country.

According to the information above, it is not possible to identify best practices/mandatory surveillance targets which could be extended to the MS selected for the purpose of this exercise. Comparing the number of observation points with the area of susceptible host plants (the coniferous area in the MS is taken as an approximation[258]), the following surveillance levels are applied in the MS:

- EL: 1 observation point/4,760 ha;
- IE: 1 observation point/9,415 ha;

[253] *"Since the last FVO mission on protected zones Greece has made significant progress. The Single Authority (SA) has put in place a general system for co-coordinating, planning the official surveys and compiling their results which were duly notified to the Commission and the other Member States. Nowadays, this system is based on an adequate methodology, and supported by laboratory analyses. However, the fact that a minority of Prefectures have not implemented or have only partly implemented the survey plan means that the national survey did not confirm that the relevant harmful organisms are not endemic or established in certain areas of the protected zone. In addition, the movement of articles within the protected zone is still not always in compliance with EU legislation*¨ FVO Report DG (SANCO) 2010-8609

[254] Coniferous bark beetle species, including*: Ips amitinus, Ips cembrae, Ips duplicatus, Ips sexdentatus, Ips typographus, Dendroctonus micans*.

[255] The bait log traps consist of two felled trees cut into lengths and stacked. A pheromone lure for *Ips typographus* is attached to the billets. In addition, the observation points incorporate a Theysohn bark beetle trap with pheromone dispenser.

[256] One Forestry Inspector is assigned to each district and the inspectors are authorised officers under Council Directive 2000/29/EC.

[257] 41 in Great Britain, 74 in Northern Ireland, 3 in the Isle of Man, 11 in Jersey and 7 in Guernsey.

[258] Source: EUROSTAT

- UK: 1 observation point/37,900 ha.

On this basis, it is considered appropriate to estimate the costs of surveillance on the basis of the current levels.

It is reported by EL that the total cost of surveillance in the PZ is not available. The total cost of laboratory testing for surveys (2011) for the group of the HOs *Dendroctonus micans*, *Ips amitinus*, *Ips cembrae*, *Ips duplicates* amounts to **€19,100**. Assuming that each point of observation is a single inspection, it is estimated that the cost of visual inspections (for the group of HOs) is equal to **€35,910**.

For Ireland, the cost of visual inspections (<u>assuming visual inspections are carried out once per year</u>) is estimated at **€1,176**, and the cost of laboratory analysis is estimated at **€4,620**, on the basis of data from the FCEC 2011 MS CAs survey.

For reference, the estimated cost of surveillance in the UK is £20,540 (**€ 23,015**).

8.3.5.2. Overall economic benefits

Ips amitinus possibly can cause significant damage by itself or by adding to damaging effects by *I. typographus* during outbreaks (EPPO/CABI, 1990; Økland and Skarpaas, 2008). In particular, the introduction of *I. amitinus* may potentially increase the frequency of bark beetle outbreaks due to a possible interaction effect with *I. typographus* (Økland and Skarpaas, 2006). The significances of direct and indirect losses are uncertain as they depend on climatic development and interactions with another species. Okland and Skarpaas note that cases of tree-killing by *I. amitinus* are reported from areas with a warmer climate than Norway (Jurc & Bojović 2004), while this species is not regarded as a tree-killer in the northern distribution area (the Baltic states, Finland, Russian Karelia and Murmansk). However, a warmer future climate may increase the risk of tree-killing by *I. amitinus* in northern areas as well.

Effects of *I. typographus* and *I. amitinus* may have a negative impact on forest economy.

As reported in the Global Invasive Species Database[259] (2009), the economic damage of *Ips typographus* is represented by "*a decrease in value of the host affected, for instance, by lowering its market price, increasing cost of production, maintenance, or mitigation, or reducing value of property where it is located. In addition, this species may cause loss of markets (domestic or foreign) due to presence and quarantine significant status."* Further damage can be caused by the fact that *"adults carry a number of associated fungi such as Ceratocystis polonica, which is highly virulent and can kill healthy spruce trees. In addition, this fungus stains the wood with blue streaks, which reduces its commercial value. Attacked trees die faster than would be expected by solely phloem girdling due to larval feeding."*

Økland and Skarpaas (2008) estimated the direct economic consequences of introducing *I. Amitinus* in Norway, concluding that these may potentially be significant. An outbreak of *I. typographus* in Norway which occurred in 1971–1981 killed the equivalent of 5,000,000 m^3

[259] www.issg.org, consulted in May 2011.

of spruce timber (Bakke 1989), which amounts to approximately €199,281,600[260]. As reported in the study "*the average loss per year by I. typographus alone is estimated at approximately €2,615,000[261]. In a hypothetical worst-case scenario, where I. amitinus is fully expressing its potential economic consequences, the frequency of outbreak periods is increased by 45% due to the interaction effect between I. typographus and I. amitinus, which gives an average increase in yearly loss of about €1,208,000[262]. A smaller part of the loss may be subtracted, because some of the killed trees might be utilized as raw material for pulp or fire wood. On the other hand, the losses may also be higher due to the volume of spruce killed directly by I. Amitinus".*

As an indication of the size of the protected sector, the production volumes and trade volumes and values for the two MS are provided below:

Table 53 Production and trade of coniferous wood, EL and IE, 2008

	EL	**IE**
Coniferous round wood		
Removals (m^3)	440,400	1,994,000
Export volume (m^3)	3,000	247,000
Export value (€)	974,000	9,807,000
Coniferous sawn wood		
Production (m^3)	67,700	696,000
Export volume (m^3)	2,800	387,400
Export value (€)	575,000	52,805,000

Source: EUROSTAT, 2009

In addition to the economic damage, the HO could cause significant direct environmental effects, such as extensive ecological disruption as" *the killing of a large number of trees during outbreaks causes major ecological disruptions resulting in change of tree species composition to non-host trees and increased fuel for high intensity wildfires*."

This aspect reflects the main benefits related to the PZ, which lie in the environmental and landscape value of the host plants for the HO (coniferous trees). It is not possible to estimate these benefits in economic terms, also due to the lack of scientific literature on the impact of *Ips amitinus* and the damage it may cause. In EL there has not been a CBA for keeping in place the PZs for the HO (and for the other coniferous bark beetles *Dendroctonus micans*, *Ips cembrae*, *Ips duplicates*). However, an indication of the importance of this aspect can be derived, particularly for EL, by the data on the forestry areas with protected and protective function in the MS:

Table 54 Protected and protective areas in forestry (1,000 ha)

	Protected area (2005)	**Protective area (2005)**	**Natura 2000 (2008)**
EL	1,898.8	6,520	981.1
IE	6.5		28

Source: EUROSTAT, 2009

[260] 1,600,000,000 NOK in 2006 price. In 2006 (year without outbreaks) the total harvest of spruce in Norway was 5,515,000 m^3 with an average price of 320 Norwegian kroner (NOK) per m^3 (www.ssb.no).
[261] 21 million NOK.
[262] 9.7 million NOK.

8.3.5.3. Economic impact of introducing mandatory de-listing procedures for infested protected zones

The economic impact is assessed in two scenarios:

(a) when infestations have not been fully eradicated after 2 years; and,
(b) immediately

An immediate withdrawn of the PZ status would put at higher risk the host plants for the HO, as described in the paragraphs above, therefore causing losses in terms of environmental value in the MS concerned, as well as costs for replanting with non-susceptible species.

In case the status is withdrawn after two years, additional costs would have been borne by the CAs in order to eradicate the HO, but would give the possibility to the MS to keep the protection for the endangered plants. There is no evidence of costs of eradication in the event of outbreaks, as no outbreaks of *Ips amitinus* have occurred in EL or in IE.

8.4. Conclusions

<u>*Objectives:*</u>
- *to identify MS best practices of surveillance targets for each HO for the selected PZs;*
- *to quantify (estimate) the total costs of introducing mandatory surveillance at that level vs. benefits, and to provide a recommendation on the appropriate sharing of the costs of mandatory surveillance between MS CAs and POs;*
- *to estimate (quantify) the economic impact of mandatory de-listing of the selected PZs under two scenarios (immediate delisting; delisting after 2 years)*

Our consultation with MS confirms that the PZ (or alternative regionalisation concepts) is a principle that is favoured and should be maintained, in order to allow effective protection for those areas of the EU that are not yet infested. This confirms the findings of the CPHR evaluation, where MS have argued that the loss of PZ status would lead to significant economic damage in the region/s concerned.

Nonetheless, there is a **need for improvements to the system to enforce better implementation**, as also highlighted in the conclusions and recommendations of the CPHR evaluation, and the ongoing work of TF2. In particular, such improvements would require reinforcing requirements for establishing PZ, including:

- Introduction of mandatory surveillance under harmonized provisions;
- Mandatory minimum actions for eradication under harmonized provisions;
- In case of PZ under eradication, definition of BZs and special measures of eradication for trade to other PZs.

In this context, from the analysis undertaken in Task 8 the following conclusions can be drawn:

<u>Identification of 'best practices' (Task 8.1):</u>

- As in the case of general surveillance (Task 1), the approach has been to analyse costs and benefits on the basis of identified **'best practices'** of surveillance amongst the selected case study PZs **for the purposes of the cost/benefit analysis** required by this Task rather than to set "*technically justified levels*" which depend on a range of factors and constitute an exercise outside the scope of this study.

- In practice, 'best practices' for surveillance in PZs are determined on a case-by-case basis, and current practices and implementation differ significantly between MS/PZs and by HO. Therefore, as in the case of Task 1, due to the multi-dimensional criteria of 'best practices' for surveillance, it is **unlikely that one size fits all MS** and all prevailing situations. In the context of the current exercise, best practices for the selected HOs have been identified as follows:

HO for which PZ is in place	Inspections	Testing
Globodera pallida	0.05% area inspected/total area 3-30% area inspected/potato area	1 ha/sample
Erwinia amylovora	Places of production of host plants for planting: twice/year; Commercial orchards and public green: once/year.	5% of total area in orchards and public green; 1/ha in nurseries.
Bemisia tabaci	n.a.	n.a.
Ips aminitus	Not possible to identify a best practice, range: 1 observation point/ 4,760 ha - 37,900 ha	Not possible to identify best practice
Cryphonectria parasitica	Not possible to identify best practice	On symptomatic cases

<u>Costs and benefits of mandatory surveillance (Task 8.2):</u>

- The current costs of **surveillance** in PZs are generally lower than in the case of BZs established within infested non-PZs. This is due to the fact that PZs do not generally apply intensified surveillance levels in the absence of infestation. If current surveillance targets are considered insufficient to justify freedom from the HO, these would need to intensify and this would result in a higher cost, in some cases 2.5 or 10 times higher than in the PZ.
- The results of FCEC estimations indicate that if **mandatory surveillance targets** are introduced **at 'best practice' level** (defined within the purposes of Task 8, as indicated above)**, the cost of surveillance is increased,** as these levels generally result in higher inspection and/or sampling intensity. This increase may concern the level of visual inspections, with an intensity increase at 100% (e.g. *Erwinia amylovora*) in certain cases, and/or the level of sampling, with 10% additional sampling applied (e.g. *Globodera pallida*) or higher increases, in the range of 100% or more (e.g. from symptomatic cases only to established levels of sample/ha in the case of *Erwinia amylovora*).
- Evidence of the benefit of PZs is generally scarce, despite the intensive effort to collect such data from stakeholders and MS CAs. However, in the cases where economic benefits could be estimated (i.e. *Bemisia tabaci*, *Erwinia amylovora*, and *Globodera pallida*), it can be concluded that such **benefits clearly outweigh the costs of surveillance** even if this is carried out at an increased level. Where the economic sector is highly important at national level, e.g. in the case of apple and pear production in IT, with a sector worth at national level €1.1 billion, in the regions where the bulk of production is concentrated the value of production is in the order of magnitude of hundreds of million of Euros, compared to surveillance costs at increased levels in the

order of hundreds of thousands of Euros. The same proves true in the case of the potato sector in SK, where costs of increased surveillance outweigh benefits of the protection of a sector of a value of 33.8 million, compared to costs in the order of thousands of Euros.

HO for which PZ is in place	Surveillance costs at 'best practice' levels (a)	Benefits (value of protected sector)
Globodera pallida	SK: € 41,000	SK: €33.8 million
Erwinia amylovora	PZ: IT (two regions): €54,800 IT (est.): €4.2 million LV: €85,900 BZ: IT (two regions): € 264,960	IT (two regions): €180 million IT: €1.1 billion LV: €3.2 million
Bemisia tabaci	FI: €331,700	€48.9 million (tomatoes only) Cost - benefit ratio estimated at 0.93-1.99 over 30 years (at current levels of surveillance)
Ips aminitus	SE: €4,200 CZ: €19,000 - €33,400	Environmental value (non quantifiable)
Cryphonectria parasitica	EL: €55,010 IE :€ 5,800	Economic value: Export value of coniferous round and sawn wood EL: €1.5 million IE: €62.6 million
		Environmental value (non quantifiable)

. (a) 'Best practices' defined in accordance with methodology followed in the study (Task 8.1).

- The analysis revealed several cases where the costs of mandatory surveillance do not appear to be appropriately shared currently between MS CAs and POs. In particular, although mandatory fees are foreseen by the EU PH regime for the cost recovery of the inspections and sampling/testing carried out by the MS CAs in the PZs, in several cases this provision is not implemented and fees are only partly collected or not collected. This issue was also identified in the evaluation of the CPHR (FCEC, 2010). There is a need therefore to reinforce the implementation of these provisions.

<u>Economic impact of mandatory de-listing (Task 8.3):</u>

- **Eradication** efforts are pursued in PZs for as long as it is economically, as well as technically, justified. During the eradication period (i.e. up to 2 years according to EU legislation) POs benefit from the continued status of a PZ, but also bear the higher costs of instensified inspections and eradication. The balance between these costs and benefits will determine the interest of MS to pursue their efforts to eradicate in order to maintain the PZ status.
- As in the case of surveillance, tthe intensity of the eradication effort will need to be determined on a case-by-case basis as current practices and implementation differ significantly between MS/PZs and by HO. If current eradication measures are considered insufficient to pursue effective freedom from the HO, **minimum mandatory action** should be introduced and this is expected to result in a higher cost.

Such actions may for instance require the establishment of BZs and special measures for trade to other PZs (e.g. that the same restrictions in movement of plant material from the infested part of the PZ apply as for material originating in non-PZ).

- In the case of important economic sectors, **delisting a PZ will not immediately lead to complete deregulation** and alternative measures may be pursued. Such a measure is the establishment of BZs within the previous PZ; these will involve higher surveillance intensity, therefore inspection costs, and also in the first years some adjustment costs (e.g. relocation). On the other hand, they would maintain production and market access for POs, therefore the benefits outweigh the higher costs involved.
- In the context, it can be concluded that delisting after 2 years offers certain advantages to an infested PZ under eradication, compared to immediate delisting in that: a) it allows the time that is technically justified as necessary for the eradication programme to achieve its objectives; and, b) where the PZ faces difficulties in achieving the objectives of the eradication programme, it allows the possibility for a smooth transition of that PZ into alternative measures for maintaining some protection of non-infested territories within the PZ, via the establishment of BZs.

In any case, it is noted that, as identified in the 2010 CPHR evaluation (FCEC 2010) and this follow-up study, the concerns with the current system of PZs stem over implementation issues. The improvements to the PZ system, along the lines highlighted above in the context of the ongoing discussion between COM/MS, aim to achieve the current shortcomings. In this context, the conclusions of our analysis under Task 8 confirm that such improvements are a step to the right direction, provided that correct and full implementation is also pursued.

A relevant further recommendation here relates to the current lack of CBA to appropriately justify the establishment of existing PZs. In most cases, there are no CBA at present to support the established PZs (with the notable exception of *Bemisia tabaci*). In the absence of such studies, the analysis of this Task involved significant collection of primary data from MS NPPOs and POs and the development of scenarios and assumptions to calculate impacts. The FCEC would therefore recommend that carrying out a CBA becomes a formal requirement in the future for the establishment of PZs.

9. Analysis of the costs of including specific categories of invasive alien species in the scope of the EU plant health regime (Task 9)

9.1. Executive summary

The objective of Task 9 has been to estimate in global terms, the costs for the EU of including in the EU PH regime five IAS plants (weeds)[263]. All of the selected IAS plants have a high probability of entry, establishment and spread in the EU27 and very significant potential impacts, as documented in the main literature[264].

By definition, the inclusion of any new HOs in the EU PH regime will entail some costs for the EU and MS associated to the obligation to adopt management measures for their prevention, and in the event of introduction, for their control and eradication. While the general assumption has been that the IAS plants under review would be dealt with in the same way as currently regulated HOs (i.e. under Council Directive 2000/29/EC), ultimately the costs would depend on the specific measures to be followed. Such measures include control at import, surveillance, eradication and containment, as well as, where relevant, movement within the EU (PP system). The identification of the measures that would be most suitable for each of the examined IAS is an exercise beyond the scope of the study. Thus, in order to estimate costs, the FCEC has developed hypotheses on the measures that might be appropriate in each case, based on the information currently available in the reviewed literature and by means of expert consultation. It is also noted that, *a priori*, it is not clear at present whether any of the reviewed IAS would fulfil the eligibility criteria for co-financing under the EU solidarity budget[265].

From this analysis and extrapolations of each of the selected IAS plants, the following key conclusions can be drawn.

For four of the selected IAS plants[266], the main pathway appears to be intentional introduction through imports of ornamental plants. Consequently, EPPO recommends the prohibition of imports, sale, movement and planting (of *Pueraria lobata*, *Hydrocotyle ranunculoides; Eichhornia crassipes*) or controlled imports only (*Polygonum perfoliatum*). The implementation of the **EPPO recommendations on imports** would appear the simplest and most cost-effective control option that would be available under Directive 2000/29/EC; nonetheless, taking account of WTO-SPS obligations, similar restrictions would also apply to intra-EU movements and the obligation to eradicate and contain outbreaks.

[263] *Polygonum perfoliatum, Pueraria lobata, Hydrocotyle ranunculoides, Eichhornia crassipes* and *Ambrosia artemisiifolia.* The aim of this particular selection has been to cover the following key criteria: geographic impact and distribution of IAS plants across the EU27 (north/south; east/west); presence and distribution of the plants within EU, i.e. absent/locally present/established in some MS; range of plants' habitats (land/water); affected sectors (agriculture/environment).

[264] Including, EPPO PRAs (available for *Polygonum perfoliatum, Pueraria lobata, Hydrocotyle ranunculoides* and *Eichhornia crassipes*) and, in the case of *Ambrosia artemisiifolia*, EUPHRESCO.

[265] This is particularly questionable for *Ambrosia artemisiifolia*, for which 'natural' (i.e. not man-assisted) spread is a significant risk factor; it could also be questioned for the other IAS as, by definition, all IAS plants owe their invasiveness to their intrinsic ability for natural spread.

[266] In particular, those currently absent (*Polygonum perfoliatum*) or largely absent from the EU (*Pueraria lobata*, *Eichhornia crassipes*), as well as for the more widely present *Hydrocotyle ranunculoides*.

The absolute scale, as well as relative share, of the costs of prevention, control and management measures that could be pursued under Directive 2000/29/EC, will depend on the **current status and distribution** of each of the selected IAS plants. A distinction can be made between two groups:

3. For IAS plants absent (*Polygonum perfoliatum*) or largely absent (*Pueraria lobata, Eichhornia crassipes*) from the EU27, the potential costs will be mainly in terms of preventive action, including import controls and surveillance. These costs are generally expected to be significantly lower in order of magnitude than for the second group, as long as no new outbreaks of these IAS plants occur. On this basis, for these plants, the additional cost of **general (preventive) surveillance** is expected to be **relatively moderate**. This cost might become **more significant if specific intensive surveillance** in the context of control and eradication plans is to be required, indeed very significant the more infestations become widespread and the scale of the surveillance expands, but cannot be estimated with the information available. As an indication, the cost for more specific intensive surveillance of *Pueraria lobata* in forestry in the affected and high risk areas could be up to the estimated costs for the surveillance of *Bursaphelenchus xylophilus* in forestry (**€656,000**).

   The potential **control and eradication costs** for these pests in the event of pest introduction could be **significant**, as has been seen in the case of the control and eradication costs for *Eichhornia crassipes*, i.e. ca. **€3 million** per year (according to documented cases in ES and the US; average annual expenditure over 3 years in ES and 10 years in the US). **At EU level**, therefore, the **total cost is expected to be lower for this first group** of pests (compared to the second group), as long as they are absent or largely absent from the EU[267].

4. For IAS plants that are already widely present/distributed in the EU (*Ambrosia artemisiifolia, Hydrocotyle ranunculoides*), the total potential costs are likely to be **significantly higher** in order of magnitude than for the first group.

   In this case, the available evidence suggests that the **cost of surveillance** could be **very significant**, as this would certainly be required within control and eradication programmes. The cost could therefore approach the order of magnitude of HOs affecting the open environment, estimated under Task 1 at ca. **€1.5 - €3 million** per pest per year[268].

   Furthermore, the potential **control and eradication costs** for these pests could be **very significant**. As an indication, the control and eradication costs in the case of *Hydrocolyte ranunculoides* have been ranging from ca. **€1 - €2 million** per MS per year (according to documented cases in BE, NL and the UK). Given the currently already widespread distribution of these IAS plants, this implies that **at EU level**, individual IAS plants may require **€10 - €30 million** per year for eradication and

[267] As indicated above, it is also noted that not all of this cost is expected to be eligible for solidarity compensation under current rules, for example the current restrictions for outbreaks due to natural spread.
[268] This order of magnitude corresponds to earlier estimates provided under the CPHR evaluation on the basis of data submitted by MS CAs, which had estimated that for the 10 HOs covered by emergency measures annual surveillance costs amounted at ca. €18.6 million i.e. on average ca. €1.86 million per HO.

containment. **At EU level, therefore, the total cost is expected to be higher for this second group of pests** (compared to the first group)[269].

In conclusion, the introduction of mandatory requirements for the prevention and control of IAS plants within the EU PH legislation may result in an increase in management costs across the EU as a whole. **With the exception of *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides*,** the **total cost** for the other selected IAS plants is expected to be <u>**relatively moderate**</u>, **under the following two conditions**:

iii. This global assessment is made on the basis of the **current known level of presence and distribution** within the EU27 of these IAS plants. If the presence and distribution proves to be different than what is currently known from the available literature or any of these IAS plants becomes established and spreads, this would immediately affect the level of surveillance and control and eradication costs that might be incurred;

iv. **EU-wide prohibitions of import/trade/planting of ornamental plants and/or susceptible material** are introduced, in accordance with EPPO guidelines and recommendations, as this is assessed to be the main pathway for the introduction and/or further distribution of *Pueraria lobata*, *Hydrocotyle ranunculoides*, *Eichhornia crassipes* and *Polygonum perfoliatum* in the EU27.

In this sense, the estimates made here reflect the impact of known pest risk and action taken to avoid introduction or further spread, rather than hazard analysis which is effectively the worst case impact. However, if in future the above conditions change, and these **IAS plants become** more **widespread**, as for example *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides* below, then the surveillance and control/eradication costs likely to require funding under Directive 2000/29/EC could become **very significant**.

The case of ***Ambrosia artemisiifolia***, and to a certain extent also that of ***Hydrocotyle ranunculoides***, sets these apart from the other IAS plants examined here. Due to the wide distribution of these plants throughout the EU, the introduction of mandatory requirements for the control of these IAS plants under Directive 2000/29/EC could result in a **very significant impact** on the PH budget. In any case, given their widespread distribution and the fact that natural spread is an important factor in their distribution, it is not clear at present which of the current measures available under the Directive would be applicable for the management of these IAS plants. It is therefore impossible with the information available to date to make a meaningful estimate of the global cost of including these IAS plants in the future EU PH regime[270]. For *Ambrosia artemisiifolia*, at present, prevention (through early detection and eradication) of new populations is considered the best measure for halting further spread, while full eradication is currently largely considered impossible[271].

[269] Again, it is also noted that not all of this cost is expected to be eligible for solidarity compensation under current rules, for example in the context of the current restrictions for outbreaks due to natural spread.
[270] The likely impact of the various management options for the control of *Ambrosia artemisiifolia* is expected to become clearer after the completion of a study recently launched by DG ENV which aims to assess the epidemiology, effects and control costs of this pest in the EU27.
[271] Guidelines for management of common ragweed, *Ambrosia artemisiifolia* - Results of the EUPHRESCO project Strategies for Ambrosia control 2008-2009. See also EPPO datasheet and PL PRA 2001.

9.2. Objectives and methodology

The aim of Task 9 has been to estimate in global terms, in order of magnitude, the costs for the EU of including in the EU PH regime five selected IAS plant species[272]. The aim of this particular selection has been to cover the following key criteria: geographic impact and distribution of the IAS plants across the EU27 (north/south; east/west); presence and distribution of the plants within EU, i.e. absent/locally present/established in some MS; range of plants' habitats (land/water); affected sectors (agriculture/environment).

The methodology has been based on a review of data related to the characteristics of the IAS plants and affected sector(s), the availability of prevention, control and management measures and their associated costs[273]. Existing literature was reviewed and analysed to this end, including of the most recent reports and pest risk analysis or impact assessment on IAS, as prepared by some MS[274] and the EPPO. This was supplemented by consultation with relevant experts including from the COM services and TF3, as well as existing policies and management costs for the selected IAS plant species in TCs (in case of IAS not yet present in the EU or for which control strategies are relatively limited at present). The analysis has also relied on data on the costs of measures for other HOs (e.g. for surveillance: estimates of Task 1), and on the data available from the specific cost survey carried out in the CPHR evaluation. Based on these data, qualitative and quantitative analysis was undertaken.

The objective has been to assess the potential global costs of including the reviewed IAS plants on the basis of the measures currently available by the regime (Council Directive 2000/29/EC). By definition, the inclusion of any new HOs in the EU PH regime will entail some costs for the EU and MS associated to the obligation to adopt management measures for their prevention, and in the event of introduction, for their control and eradication. It is noted that while the general assumption has been that the considered IAS plants would be dealt with in the same way as currently regulated HOs (i.e. inclusion in the relevant Annexes of Council Directive 2000/29/EC), ultimately the costs would depend on the specific measures to be followed. The identification of the measures that would be most suitable for each of the examined IAS is an exercise beyond the scope of the study.

Thus, in order to estimate costs, the FCEC has developed certain hypotheses on the measures that might be suitable to follow in each case, based on the information currently available in the reviewed literature and expert consultation.

In particular, costs include measures such as costs for control at imports, costs for surveillance, and costs of eradication and containment, as well as, where relevant, costs related to the movement within the EU (PP system). *A priori*, as discussed also in Tasks 3, 4 and 5, the more an infestation spreads and establishes, the higher the costs, as there is a need

[272] Identified by DG SANCO. Selection confirmed during Inception Phase of the study.
[273] This has included consultation of an extensive body of literature currently available in databases managed at national and international organisation level (including DAISIE, EPPO etc.). The information contained in these databases tends to be mostly technical or qualitative, and there are very few cases of specific quantitative impacts and costs associated with the management of the listed IAS. A review of the databases was provided recently by the JRC (Online information systems with alien species occurrence records in Europe, 2011).
[274] Examples include: UK: F. Williams, R. Eschen, A. Harris, D. Djeddour, C. Pratt, R.S. Shaw, S. Varia, J. Lamontagne-Godwin, S.E. Thomas, S.T. Murphy, 2010, The Economic Cost of Invasive Non-Native Species on Great Britain; FR: Ministère de l'agriculture et de la pêche, Direction générale de l'alimentation, sous direction de la qualité et de la protection des végétaux, 2010: Liste de plantes exotiques envahissantes à prendre en comte de manière prioritaire pour le CPHR révisé.

to move from prevention and early detection measures, such as import and internal surveillance, to the higher cost measures of eradication and control.

The analysis below is based on the currently available evidence on the distribution of these IAS plants in the EU27, and the management options and costs available more generally.

9.3. Impact analysis

Objective: to estimate the potential costs, in order of magnitude, for the EU of including in the EU plant health regime the selected five IAS plant species.

As noted above, in order to estimate costs, the FCEC has developed certain hypotheses on the measures that might be suitable to follow for each of the selected IAS, based on the information currently available in the reviewed literature and expert consultation.

To this end, each of the selected IAS plants was analysed in a case study, drawing from the experience of current control and management methods in the EU27 (for those plants that are already present within the EU), or extrapolating from TCs (for those plants that are absent in the EU, or where significant documented analysis currently exists on impacts in TCs that have the potential to be repeated in the EU27). An overview of the current status, control and management measures and range of impacts of the selected IAS is presented in **Table 1**.

9.3.1. Cost of import controls

For four of the selected IAS plants, in particular those currently absent (*Polygonum perfoliatum*) or largely absent from the EU (*Pueraria lobata*, *Eichhornia crassipes*), as well as for the more widely present *Hydrocotyle ranunculoides*, the main pathway appears to be intentional introduction through imports of ornamental plants. Consequently, a key EPPO PRA recommendation[275] is the prohibition of imports, sale, movement and planting of plants (*Pueraria lobata, Hydrocotyle ranunculoides;* also *Eichhornia crassipes* [276]) or controlled imports only (*Polygonum perfoliatum*[277]). This would appear the simplest and most cost-effective measure that would be available under Directive 2000/29/EC. The implementation of such prohibitions would need to be effectively monitored through the applied import inspections and internal EU surveillance.

Furthermore, this option is supported by evidence of the relatively low or minor commercial significance of imports of these plants, which suggests that such a measure would have minor adverse effects on commercial interests. The only exception to this is the case of *Eichhornia crassipes*, which appears to be currently more widely traded as well as produced for ornamental purposes in some MS (although the volume and value of this trade and production activity is not available). It is noted that in several cases there are currently restrictions on the import, planting and trade of some of the reviewed IAS plants, e.g. for *Hydrocotyle ranunculoides* in several MS including the NL, UK and BE.

[275] Reference is also made to the application of EPPO Standard PM 3/67 'Guidelines for the management of IA plants or potentially IA plants which are intended for import or have been intentionally imported'.
[276] Specific measure adopted at EPPO in 2008 through PM9 to restrict or prohibit the deliberate introduction, sale, export, import and trade, planting, possession, and transport of *E. crassipes*.
[277] In this case, the EPPO PRA (2007) recommends imports from pest free areas (PFAs) or pest free places of production, or of plants free from soil/growing media or of plants in containers with sterilised growing media.

In the case of *Ambrosia artemisiifolia*, one of the pathways is contaminated birdseed. Imports of contaminant-free bird seed could therefore be imposed on importers; it is noted that the process to ensure birdseed selection/separation appears to be relatively low-cost.

In terms of the costs of mandatory import controls, the additional cost of inspections for the above IAS is expected to be **negligible**[278], as no adaptation to current practices is required (e.g. no special detection methods or diagnostics required; visual inspection of trained and informed inspectors appears to be sufficient). As already investigated under the CPHR evaluation, the cost of these checks in recovered in most cases by MS CAs through fees charged to POs; the additional impact on these fees is therefore expected to be **negligible**.

9.3.2. Cost of surveillance

A priori, it is not clear at present whether any of the reviewed IAS could be classified as 'EU priority' for the purposes of the EU budget for co-funding MS general (preventive) or more intensive (following outbreaks) surveillance costs. The costs of surveillance are extrapolated on the basis of the analysis undertaken in Task 1, as an indication of the likely costs to be involved, should such co-funding be decided for any of the reviewed IAS plants.

As discussed in Task 1, surveillance comprises a range of measures, including visual inspections, sampling and testing, and awareness raising campaigns. The most appropriate measures, and the level of intensity to be applied for each measure, will be decided on a case by case basis, depending on the epidemiology of the pest and its current status and probability of entry/spread/establishment.

The EPPO PRAs undertaken for four of the five IAS plants under review (*Polygonum perfoliatum, Pueraria lobata*, *Hydrocotyle ranunculoides* and *Eichhornia crassipes*) all prescribe monitoring and surveillance as a key prevention measure for pest introduction in a new area or to halt further spread. In the case of *Ambrosia artemisiifolia*, prevention (through early detection and eradication) of new populations is currently considered the best measure for halting further spread.

Surveillance costs will depend on the scale and intensity of the surveillance to be followed. Generally, for those pests that are currently absent (or not known to be present), surveillance might be intensive at the start followed by regular updates in subsequent years; alternatively, it might be relatively limited at the start, followed by intensified monitoring in the case of suspicious findings. The surveillance strategy to be followed will need to be developed for each IAS plant in the particular context of each MS and as part of an overall coordinated EU strategy for the fight against these pests, which is beyond the scope of this study.

For those **pests that are currently absent or largely absent** from the EU27, the introduction and effective implementation of a ban on imports/trade/planting (see previous section on import controls) is expected to introduce the need for some **surveillance, hence additional associated costs**. In this case:

- In those MS where the IAS plant is absent, surveillance through visual inspection (both in the open environment and in nurseries) could be incorporated in the general

[278] The total costs associated with imports controls (external borders and final destination) for the 250 HOs currently covered by Directive 2000/29/EC were estimated under the CPHR evaluation at €8.5 million (EU-24).

combined surveillance plan of MS (as discussed in Task 1), at an additional cost, bearing in mind that surveys in the open environment will to some extent need to target completely new locations[279]. At the level of nurseries, it could be combined with regular PH inspections for other HOs and/or inspections conducted for the purposes of issuing PPs. Overall, therefore, the additional costs for surveillance of these IAS plants is expected to be relatively moderate. This would be the case in all MS for *Polygonum perfoliatum*, and in most MS for *Pueraria lobata* and *Eichhornia crassipes*;

- Where the IAS plants are present in some MS (*Pueraria lobata*, *Eichhornia crassipes*), more specific surveillance will be required in the context of a control and eradication policy, with substantially enhanced visual inspection in high risk zones. The extent of the infection appears to be very localised at present for *P. lobata* and *E. crassipes*, therefore these inspections are expected to be incorporated in existing surveillance plans for other pests in these zones at a more significant additional cost, both for the open environment and in nurseries (for which, inspections could be combined with regular plant health inspections for other HOs and/or inspections conducted for the purposes of PP issuing, as discussed in the previous case).

- If more intensive or larger scale surveillance needs to be followed for these specific pests (*Pueraria lobata*, *Eichhornia crassipes*) in the open environment, the cost could become even more significant. In this case, it is impossible to estimate on the basis of the information available at present the potential surveillance costs involved for these specific IAS[280]. However, as also discussed under Task 1, surveillance costs depend on the scale and intensity of the surveillance; and the tools to be used (in this case, the available literature suggests that visual inspections only would be sufficient). In terms of the scale and intensity of the surveillance that might be needed, the more extensive the IAS have the potential to spread the higher the cost. In this case, therefore, the potential additional cost could become very significant.

Indeed, if any IAS plants become established and start to spread more **widely**, such as has been the case with *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides*, the need for surveillance and the associated **costs are expected to be considerably higher**. In particular:

- For *Hydrocotyle ranunculoides*, the introduction and effective implementation of a ban on imports/trade/planting of this ornamental plant[281] should halt further introduction of this plant in new areas in the EU27. Nonetheless, this plant is already widely distributed throughout the EU27, and the significant current size of susceptible areas[282] implies that surveillance costs are likely to be very significant, in

[279] It is possible that some surveillance may need to be done on other targets than those included in the current general surveillance programmes. If the scope/target proves to be significantly different, then the impact might be more significant. However, with the information available to date, it is not possible to estimate this cost. In any case, for these plants the analysis makes the following two assumptions: a) that they are currently and will continue to be absent from the EU27; and b) that the ban on imports/trade/planting (see section 9.3.1) would minimise the need for surveillance.
[280] Only figures for the eradication and control of these IAS plants are available (**Table 57**).
[281] According to EPPO PRA 2009, the most important pathway for *Hydrocotyle ranunculoides* are imports as an ornamental aquatic plant particularly on the internet, but also direct retail sales. The plant is no longer imported, but it is still produced and traded within EPPO region (although volumes are considered low).
[282] According to CORINE land cover data the susceptible area in the EU includes 1.08 million ha of inland marshes, 808,000 ha of water courses and 3.07 million ha of water bodies.

the order of magnitude of the range of costs estimated under Task 1 for HOs affecting the open environment.

- For <u>*Ambrosia artemisiifolia*</u>, available evidence[283] suggests that the costs involved for the surveillance of this pest are likely to be <u>highly significant</u> as the potential diversity of crops and habitats to be surveyed is very large. In this case, therefore, it is most likely that surveillance costs will reach higher than the order of magnitude of the range of costs estimated under Task 1 for HOs affecting the open environment, given the current large scale spread of *Ambrosia artemisiifolia* across the EU-27.

On this basis, for those pests that are currently absent (***Polygonum perfoliatum***) or largely absent from the EU27 (***Pueraria lobata, Eichhornia crassipes***), the additional cost of **general (preventive) surveillance** is expected to be **moderate**. The cost might become **significant if specific intensive surveillance** in the context of control and eradication plans is to be required. Although, in this case, the cost cannot be calculated with the current information available it is expected to be in the range of cost estimates in Task 1; as an indication, the cost for more specific intensive surveillance of *Pueraria lobata* in forestry in the affected and high risk areas could be up to the estimated costs for the surveillance of *Bursaphelenchus xylophilus* in forestry (€656,000)[284].

In the case of the more widely distributed ***Hydrocotyle ranunculoides*** and ***Ambrosia artemisiifolia*** where available evidence suggests the cost of surveillance could be **very significant**, i.e. at the very minimum in the order of magnitude of the range of costs estimated for the pests of Task 1. These costs for HOs affecting the open environment were estimated under Task 1 at ca. €1.5 - €3 million per year[285]; this order of magnitude corresponds to earlier estimates provided under the CPHR evaluation on the basis of data submitted by MS CAs, which had estimated that for the 10 HOs covered by emergency measures annual surveillance costs amounted at ca. €18.6 million[286] i.e. on average ca. €1.86 million per HO[287].

It is noted that, at present, in most cases **authorities other than plant health inspectorates** are involved in the surveillance and control of some of the IAS plants under review. While this suggests that MS will apply for EU co-financing under the PH regime to cover

[283] Poland PRA (2001) describes a detection method covering all Ambrosia spp. which consists of: visual inspections of all seeds and fruits of weeds similar to achenes and siconia of *Ambrosia* spp. and in case of doubt laboratory identification testing (microscope analysis). Surveys for the detection of *Ambrosia* plants should be conducted especially in: different crops (cereals, maize, soya bean, sunflower, root crops etc.), waste lands, lawns, places near roads, railway tracks, warehouses, surroundings of oil mill and grain processing factories, fodder industry factories based on imported commodities. In 2000, the (annual) survey covered ca. 97,000 of crop fields, 43,000 of orchard and vegetable crops, and nearly 6,000 of the other susceptible sites. In addition, ca. 1,900 warehouses, 800 grain elevators and 4,700 means of transport were inspected as this pathway is considered very important for the distribution of this pest (all figures rounded).

[284] In such cases, the main expenditure is the cost of time to inspect forest sites, which would be similar to any surveillance in general. Where there are no intensive, expensive laboratory tests needed (which are generally not needed to identify easily visible weed infestations or many insects) these costs are likely to be similar.

[285] On the basis of Task 1 estimates for the following HOs: *Bursaphelenchus xylophilus, Anoplophora chinensis* and *Phytophthora ramorum*.

[286] This cost includes both general and intensified surveillance and in many cases the general surveillance covers a number of HOs in addition to the ones indicated.

[287] It is possible, however, that this cost will not be incurred (or will only be partly incurred) if this HO can be covered by current surveillance of other pests in forestry and the open environment which are already covered by emergency measures, e.g. *Phytophthora ramorum*.

potentially significant expenditure as incurred by a wider range of authorities, an opportunity also exists to explore existing partnerships and knowledge to combine and better target surveillance as well as for **cost-sharing** amongst the various interested parties, i.e. between the authorities involved in the different fields and at national/regional/local level, POs in the affected sectors and private citizens:

- In the case of aquatic plants (*Eichhornia crassipes* and *Hydrocotyle ranunculoides*), evidence from MS suggests that water bodies/authorities are already in some cases actively surveying for the presence of these pests and/or taking measures for their control and eradication. The surveillance costs are incorporated in the general budget of these authorities and no separate data are available. For example, British Waterways spent £6.8 million on vegetation management in 2009 (BW annual report 2010), on the 2200 miles of canal and river navigation; of this, it is estimated that over £1.5m per year is spent to target invasive species including *Hydrocotyle ranunculoides* and *Fallopia japonica*.
- In the case of land plants (*Ambrosia artemisiifolia*, *Pueraria lobata* and *Polygonum* spp.[288]) local government and municipal authorities, as well as private citizens are involved[289].

For all of the reviewed IAS plants, EPPO and the other documented literature also prescribe **awareness raising campaigns**. This is considered a key and very cost-effective measure for prevention and early detection of these pests. The costs of this action can be extrapolated from our estimations under Tasks 1 and 3, and may range from €40,000 - €120,000 per year (depending on the priorities and needs identified for this course of action).

9.3.3. Costs of eradication and containment

A priori, in line with the previous analysis, it is not clear at present whether any of the reviewed IAS would fulfil the criteria for the purposes of the EU solidarity budget co-funding MS eradication and control costs. This is particularly questionable for *Ambrosia artemisiifolia*, for which ‘natural’ (i.e. not man-assisted) spread is a significant risk factor, but could also apply to all IAS, which by nature have a strong capacity for natural spread.

As discussed in Task 3, such costs comprise a range of measures, including intensified sampling and testing, removal/destruction of contaminated material, and in some cases chemical treatment or biological controls. The most appropriate measures, and the level of intensity to be applied for each measure, will be decided on a case by case basis, depending on the epidemiology of the pest, its current status and probability of spread/establishment, and the available knowledge and tools for eradication and control.

The costs currently available in existing studies (either within the EU or in TCs) **are too ad hoc to allow consistent analysis and extrapolation at EU level**. Even in the case of the most widely distributed *Ambrosia artemisiifolia*, the ongoing study for DG ENV points to the significant knowledge gaps that exist in this field. Our approach here therefore has been to present the best documented cases of data from the existing literature.

[288] We refer here to *Polygonum perfoliatum* which is extensively present in the UK.
[289] This is currently taking place either in the context of compulsory (regulatory obligations) or of voluntary schemes.

On this basis, examples of control and eradication costs are presented in **Table 55**. These indicate the potential scale of costs, particularly in the advanced stages of infestation, as is the case with some of the IAS plants currently present in some MS (*Eichhornia crassipes*) and those that are already widespread (*Hydrocotyle ranunculoides*, and particularly *Ambrosia artemisiifolia*). In these cases control and eradication costs are very significant, ranging from hundreds of thousands to multiple million of € per year and per country, depending on the IAS plant, the extent of the infestation and the intensity of the control and eradication programmes. For example, current evidence points to costs ranging from €15-€30 million for *Eichornia crassipes* in ES and Florida (US), and €2 million per MS per year for *Hydrocotyle ranunculoides* (i.e. an equivalent of €10- €20 million per year for the EU-27). Furthermore, existing literature suggests that these costs are for the most part underestimates, as many internal costs in the control authorities and stakeholders involved, including staff time, material costs and the cost of applied phytosanitary products, are often not included.

The costs indicated in the Table below involve mainly classical weed management such as mechanical and chemical clearance methods. Although in many cases a very detailed breakdown of the costs indicated in the Table is not given in the literature, these may include some elements of preventive and/or intensive surveillance (e.g. awareness campaigns; sampling and testing).

It is noted that for all of the selected IAS plants, infestation is seldom totally eradicated, except when detected in early phases; thus continuous monitoring and management is considered to be the best option for prevention of "new" populations to halt the spread of these plant species. For example, in BE and NL, eradication of *Hydrocotyle ranunculoides* is now considered impossible; only early detection of further spread through visual inspection is considered successful.

As indicated at the start of this section, these costs would not necessarily qualify for solidarity payments under the current regime (particularly in the case of *Ambrosia artemisiifolia*, for which ‘natural’ spread is a significant risk factor), while they would qualify in case natural spread is fully covered in future. As also discussed under Task 3, on the basis of data received by the CPHR evaluation, the total reimbursement under the solidarity regime received by MS CAs over the period 1993-2008 was estimated at about 20.5% of the total ‘eradication and control’ costs that MS CAs have indicated to have incurred during this period[290]. Furthermore, one of the most significant elements of the costs indicated above is herbicide treatment, which is largely restricted in MS both in forestry and in aquatic ecosystems (although this may result in higher costs if alternative control methods such as clearance and destruction are higher cost/less cost-effective compared to chemical treatment).

[290] As indicated in the CPHR specific cost survey (FCEC, 2010), the total costs incurred by MS CAs during 1999-2008 (on the basis of 18 MS CA responses received) amounted to €133.5 million plus €9.2 million paid in compensation to producers. Only a fraction of these costs were presented to the EC for solidarity funding contribution; MS CAs indicated they were reimbursed €29.3 million from EC solidarity payments.

Table 55: Control and eradication costs for the selected IAS plants

	Documented control and eradication measures and costs
Polygonum perfoliatum	Measures: Classical weed management: clearance, herbicides application, and replanting of affected plant species. Use of herbicides in forestry may be restricted in MS. Costs: US: **€41-€345/ha/year** (includes: site preparation, weed management e.g., herbicides, burning, and labour to replant seedlings).
Pueraria lobata	Measures: As in the case of *Polygonum perfoliatum* Costs: US: ≥ **€310/ha/year** (five year programme: includes chemical control costs (€55/ha/year).
Eichhornia crassipes	Measures: Classical weed management: mechanical control (manual cleanup operations), and herbicide application. Herbicides are usually prohibited in aquatic ecosystems. Costs: ES: **€14.7 million** spent in 3 years for cleaning (along 75 km of river Guadiana); another source indicates **€3.35 million/year** for a total risk area of ca. 2,700 ha. **US**: ≥ **€30 million** spent **during a decade** in Florida; another source indicates annual costs of €347,000-€2.1 million.
Hydrocotyle ranunculoides	Measures: As in the case of *Eichhornia crassipes*. **Control and eradication costs:** BE: In Flanders, **€1.5 million/year** (programme of 3 years>2009). NL: **€1 million** spent in **1 year**. In addition, water boards spent ca. **€1.8 million** over and above normal operating costs for this pest (total figure not available). UK: **€2.2 million/year** (estimate, not actual cost)
Ambrosia artemisiifolia	Measures: A range of measures are applied currently, but there are **significant gaps in knowledge** (DG ENV study launched on this). Chemical, mechanical or even thermal methods can be used to control spread, but efficacy is limited, due to the plant's capacity for re-growth after weed treatment and the extremely long lifespan of seeds in the soil. Costs: FR: Rhône-Alpes department (regional expenditure only) **€528,000 a year**, In the greater Lyon area total cost estimated at €11.2 million over 13 years.

Source: FCEC compilation based on existing studies (full detail in **Table 57**).

9.3.4. Plant passport costs

Amongst the IAS plants reviewed here, the PP obligation would be relevant in the following cases[291]:

- In the case of *Polygonum perfoliatum*, for plants for planting with growing media (e.g. Rhododendron stock, forestry trees), particularly from countries where the pest occurs;
- In the case of *Ambrosia artemisiifolia*, for seeds of sunflower (for the risk this might be contaminated with seeds of *Ambrosia artemisiifolia*).

[291] It is assumed that, to prevent the entry or further spread of *Pueraria lobata*, *Hydrocotyle ranunculoides* and *Eichhornia crassipes* imports of these ornamental plants will be prohibited for import or trading within the EU; in any case, the PP obligation will not be relevant as the plants are the pests.

In both cases, under the cost analysis conducted by the CPHR evaluation and Task 7, the total cost related to the issuance of PPs is borne by the POs. In terms of the additional impact on the average annual administrative cost per PO, this is expected to be **negligible**[292] given the relatively limited scale of these additional requirements on PPs. Similarly, the administrative costs borne by MS CAs, if any, are expected to be **negligible**.

9.4. Conclusions

From this analysis and extrapolations of each of the selected IAS plants, the following key conclusions can be drawn:

- All of the selected five IAS plants have high probability of entry, establishment and spread in the EU27 and very **significant potential impacts**, as documented by EPPO PRAs (available for *Polygonum perfoliatum*, *Pueraria lobata*, *Hydrocotyle ranunculoides* and *Eichhornia crassipes*) and in the case of *Ambrosia artemisiifolia* by EUPHRESCO.

- For four of the selected IAS plants, in particular those currently absent (*Polygonum perfoliatum*) or largely absent from the EU (*Pueraria lobata*, *Eichhornia crassipes*), as well as for the more widely present *Hydrocotyle ranunculoides*, the main pathway appears to be intentional introduction through imports of ornamental plants. Consequently, **EPPO recommends the prohibition of imports**, sale, movement and planting of plants (*Pueraria lobata, Hydrocotyle ranunculoides; Eichhornia crassipes*) **or controlled imports** only (*Polygonum perfoliatum*). This would appear the simplest and most cost-effective control option that would be available under Directive 2000/29/EC, although it is noted that intra-EU movements will also need to be restricted because of the WTO-SPS Agreement and outbreaks will need to be eradicated / contained in the same way as currently done for pests and pathogens covered by the EU plant health regime.

- The absolute scale, as well as relative share, of the costs of prevention, control and management measures that could be pursued under Directive 2000/29/EC, will depend on the current status and distribution of each of the selected IAS plants. A distinction can be made between two groups:

  1. For IAS plants **absent** (*Polygonum perfoliatum*) **or largely absent** (*Pueraria lobata*, *Eichhornia crassipes*) from the EU27, the potential costs will be mainly in terms of preventive action, including import controls and surveillance. These costs are generally expected to be significantly lower in order of magnitude than for the second group, as long as no new outbreaks of these IAS plants occur. On this basis, for these plants, the **additional cost of general (preventive) surveillance** is expected to be **relatively moderate**. This cost might become **more significant if specific intensive surveillance** in the context of control and eradication plans is to be required, indeed very significant the more infestations become widespread and the scale of the surveillance expands, but cannot be estimated with the information available. As an indication, the cost for more

[292] The CPHR evaluation estimated this cost at €1,018 per PO. This includes the cost of four obligations related to PPs, including registration, authorisation to issue PPs and keeping of records. In the case of *Ambrosia artemisiifolia*, there is scope to combine the import inspection requirement for seed with certification, as discussed under Task 6.

specific intensive surveillance of *Pueraria lobata* in forestry in the affected and high risk areas could be up to the estimated costs for the surveillance of *Bursaphelenchus xylophilus* in forestry (**€656,000**).

The potential **control and eradication costs** for these pests in the event of pest introduction could be **significant**, as has been seen in the case of the control and eradication costs for *Eichhornia crassipes*, i.e. ca. **€3 million** per year (according to documented cases in ES and the US; average annual expenditure over 3 years in ES and 10 years in the US). **At EU level**, the **total cost is expected to be lower for this first group** of pests (compared to the second group), as long as they are absent or largely absent from the EU. It is also noted that not all of this cost is expected to be eligible for solidarity compensation under current rules, for example the current restrictions for outbreaks due to natural spread.

2. For IAS plants that are already **<u>widely present/distributed</u>** in the EU (*Ambrosia artemisiifolia, Hydrocotyle ranunculoides*), the total potential costs are likely to be **significantly higher** in order of magnitude than for the first group.

In this case, the available evidence suggests that the **cost of surveillance** could be **very significant**, as this would certainly be required within control and eradication programmes. The cost could therefore approach the order of magnitude of HOs affecting the open environment, estimated under Task 1 at ca. **€1.5 - €3 million** per pest per year[293].

Furthermore, the potential **control and eradication costs** for these pests could be **very significant**. As an indication, the control and eradication costs in the case of *Hydrocolyte ranunculoides* have been ranging from ca. **€1 - €2 million per MS** per year (according to documented cases in BE, NL and the UK). Given the currently already widespread distribution of these IAS plants, this implies that **at EU level**, individual IAS plants may require **€10 - €30 million** per year for eradication and containment. **At EU level, therefore, the total cost is expected to be higher for this second group of pests** (compared to the first group), as they are widely present/distributed in the EU. In this context, it is noted that not all of this cost is expected to be eligible for solidarity compensation under current rules, for example the current restrictions for outbreaks due to natural spread; this is particularly questionable for *Ambrosia artemisiifolia* for which 'natural' (i.e. not man-assisted) spread is a significant risk factor, but could also be questioned for the other IAS plants. Any future eligibility of natural spread related costs for EU co-financing might however result in exceptionally high costs for IAS plants.

- Available evidence on the potential impacts (damage costs) of the selected IAS indicate that the benefits of including these in the scope of the regime can be substantial in terms of enabling prevention, early detection and better management of these pests. As also noted under Task 5, not all impacts can be captured in quantitative terms, especially when these pertain to the protection of biodiversity and safeguarding the environment, public health and the wider economy; therefore, in most cases the

[293] This order of magnitude corresponds to earlier estimates provided under the CPHR evaluation on the basis of data submitted by MS CAs, which had estimated that for the 10 HOs covered by emergency measures annual surveillance costs amounted at ca. €18.6 million i.e. on average ca. €1.86 million per HO.

indicated values, as also noted in the background literature, are underestimates of the full benefits. Compared to the costs associated with introducing compulsory prevention and management measures, benefits are therefore considerably higher in all cases.

In conclusion, the introduction of mandatory requirements for the prevention and control of IAS plants within the EU PH legislation (Directive 2000/29/EC) may result in an increase of management costs across the EU as a whole. **With the exception of *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides*,** the total cost for the other selected IAS plants is expected to be **relatively moderate**, under the following two conditions:

i. This global assessment is made on the basis of the **current known level of presence and distribution** within the EU27 of these IAS plants; if the presence and distribution proves to be different than what is currently known from the available literature or any of these IAS plants becomes established and spreads, this would immediately affect the level of surveillance and control and eradication costs that might be incurred;
ii. **EU-wide prohibitions of import/trade/planting of ornamental plants and/or susceptible material** are introduced, in accordance with EPPO guidelines and recommendations, as this is assessed to be the main pathway for the introduction and/or further distribution of *Pueraria lobata*, *Hydrocotyle ranunculoides*, *Eichhornia crassipes* and *Polygonum perfoliatum* in the EU27.

In this sense, the estimates made here reflect the impact of known pest risk and action taken to avoid introduction or further spread, rather than hazard analysis which is effectively the worst case impact. However, if in future the above conditions change, and these **IAS plants become** more **widespread**, as for example *Ambrosia artemisiifolia* and *Hydrocotyle ranunculoides*, then the surveillance and control/eradication costs likely to require funding under Directive 2000/29/EC could become **very significant**.

It is noted that some MS already have a budget and activities related to the management of IAS plants, so the inclusion of the selected IAS plants will result in many cases only in additional costs. There could also be a redistribution or reallocation of costs, if some competences are transferred or integrated within different national CAs (for example, in the case of aquatic plants between water authorities and plant health authorities; in the case of land plants, between municipal authorities/local government and central government).

The expected long term benefit of this action will be significant cost savings (in terms of potential eradication and control, as well as damage costs) from preventing the entry or further spread of these IAS plants. Benefits represent the counterfactual of not having protection in place, i.e. as the impacts associated with the introduction and spread of the selected IAS plants in the EU, compared to the costs associated with introducing compulsory prevention and management measures. The actual and potential impact of the selected IAS plants, as documented in available literature is presented in Table 1.

The case of ***Ambrosia artemisiifolia***, and to a certain extent also that of ***Hydrocotyle ranunculoides***, sets these apart from the other IAS plants examined here. Due to the wide distribution of these plants throughout the EU, the introduction of mandatory requirements for the control of these IAS plants under Directive 2000/29/EC could result in a **very significant impact** on the PH budget. For example, despite the wide diffusion of *Ambrosia* *artemisiifolia* in Europe[294], and its significant impact on public health as documented in several studies, only few countries have legal obligations currently in place or include it in their quarantine regulations[295].

In any case, given the widespread distribution and the fact that natural spread is an important factor in the distribution of these IAS plants, it is not clear at present which of the current measures available under the Directive would be applicable for the management of these IAS plants. It is therefore impossible with the information available to date to make a meaningful estimate of the global cost of including these IAS plants in the future EU plant health regime[296]. For *Ambrosia artemisiifolia*, at present, prevention (through early detection and eradication) of new populations is considered the best measure for halting further spread, while full eradication is currently largely considered impossible[297].

[294] In Hungary, for instance, almost 80 % of the arable land is infested and ragweed has become the most important agricultural weed during the last 20 years.
[295] As reported by Buttenschøn, R., 2010: "*in Hungary the landowners are legally obliged to prevent common ragweed in flowering, whereas in other European countries e.g. Germany and Austria control is based on recommendations and is, thus, voluntary. In Italy and France, where the IAS is widespread regionally, no effective legal mandates can help to control it"*. In Australia *Ambrosia artemisiifolia* has been declared a notifiable weed under the Noxious Weeds Act 1993 in several states, there are compulsory requirements for private citizens to control and eradicate this pest. In FR, since 2000, the legal framework obliges destruction of *Ambrosia artemisiifolia* by the person in whose land this is found.
[296] The likely impact of the various management options for the control of *Ambrosia artemisiifolia* is expected to become clearer after the completion of a study recently launched by DG ENV which aims to assess the epidemiology, effects and control costs of this pest in the EU27. The study aims to fill the significant existing knowledge gaps as regards the direct and indirect negative impacts of *Ambrosia artemisiifolia* on the wider environment or on different economic sectors. The objective is to review and develop protective measures to control the introduction and the spread of *Ambrosia artemisiifolia* in the EU. In addition, this study also aims at quantifying the current and potential future, direct and indirect harmful effects of this pest on animal and public health, biodiversity, the wider environment and production systems in the most affected MS, and estimate the potential future costs if the spread were to reach other MS.
[297] Guidelines for management of common ragweed, *Ambrosia artemisiifolia* - Results of the EUPHRESCO project Strategies for Ambrosia control 2008-2009. See also EPPO datasheet and PL PRA 2001.

Table 56: Current status, existing control/eradication measures and documented impacts of the selected IAS plants

Polygonum perfoliatum	**Current status:** Absent from the EU27. According to Climex Match Index analysis, EU27 MS most likely at risk are in central-south EU: AT, BE, FR, DE, ES, IT, NL, PL, PT, RO, SI (climatic prediction was not run for MED region) (source: EPPO PRA, 2007)
	Main host plants or habitats: Land plant - humid habitats, river banks, forest margins, roadsides, wastelands
	Control and eradication measures: Classical weed management: clearance, herbicides application, and replanting of affected plant species. Use of herbicides in forestry may be restricted in MS and is high cost as there is need for multiple herbicide application due to prolonged persistence of *P. perfoliatum* seeds in the soil (capable to survive and germinate >4 years). Existing management practices (continuous tillage and herbicide use) for other pests may limit the negative effects of this weed. **Control and eradication costs:** In the US, in commercial forest areas where the weed has affected regeneration, costs of US$60-$500/ha **(€41-€345/ha) per year** are incurred for site preparation, weed management (e.g., herbicides, burning), and labour to replant seedlings (source: USDA).
	Impacts *: <u>Overview</u>: in its alien range, this weed invades a wide range of habitats including disturbed spaces e.g. roadside etc.; capable of causing significant damage to freshwater ecosystems and to commercial forest areas under low management systems (≤ 1 maintenance per year, e.g. Christmas tree farms); serious threat to commercial/natural forest regeneration and ecosystems as it has the ability to outgrow other species (source: EPPO PRA, 2007).

* In the case of *Polygonum perfoliatum*, which is currently absent from the EU27, the costs likely to be incurred upon establishment <u>cannot be estimated</u> from those for the already widely established close relative *Polygonum cuspidatum* (*Fallopia japonica*), as the two pests appear to affect different habitats and areas. As an indication, in the UK where *Fallopia japonica* is a major problem, the total annual costs of managing this weed are estimated at £165.6 million (€187.9 million), of which an estimated £432,000 (€490,000) are control costs and advice provided to citizens by local public authorities (Williams et al: The economic cost of INNS in GB, November 2010); *Fallopia japonica* is currently recognised as one of the 100 world's worst invasive alien species.

Pueraria lobata	**Current status:** Largely absent from EU (localised presence in central-southern MS). Established in IT; present in early phases in FR and DE (localised presence in low altitude close to Alps). Risk area: areas with high temperatures and high rainfalls. Southern parts of the EPPO region at greatest risk due to favourable climatic conditions and abiotic factors (source: EPPO PRA, 2006)
	Main host plants or habitats: Land plant - pastures, woodlands, riverbanks, road/rail networks, gardens, wastelands, abandoned farm land where sunlight is abundant
	Control and eradication measures: Classical weed management: mechanical control (clearance), herbicides application, and replanting of affected plant species. Use of herbicides in forestry may be restricted in MS. **Control and eradication costs:** In the US, control costs exceed US$450/ha **(€310/ha) per year** for a five year programme; chemical control costs amount to US$80 (€55) per ha per year.
	Impacts: <u>Overview</u>: Impact will depend on the potential use of the land in the affected areas. Forest management and forest industry income could be impacted (e.g. USA below). Significant potential environmental and biodiversity impacts as this weed smothers existing flora in the open environment (managed forests/ parks) (documented in the US); in the EU similar potential environmental and biodiversity impacts are predicted (EPPO PRA, 2006). <u>Specific cases</u>: In the US, about 2.8 million ha of forestry are overgrown by *P. lobata*, and the losses in commercial forestry sector from decrease in productivity are estimated at US$340 million **(€235 million) per year**. Further spread rates of 48,000 ha/year are predicted for the US, with consequent productivity, therefore income, losses estimated at an additional €4 million per year.

Eichhornia crassipes	**Current status:** Known distribution: ES, PT and IT (established); distribution limited in central-north EU (transient in FR, the NL, BE, UK - at present the climate in these MS is not suitable for pest persistence in the open environment); suitable climate for pest establishment in the whole MED area (source: EPPO PRA, 2008). On the other hand, evidence of significant distribution currently as ornamental plant in the EU27. Significant quantities could be traded in the EU27: 100s to 1000s of plants traded in one MS in one month (EPPO research). Additionally, the plant is cultivated in reportedly significant volumes in the NL, and is widely grown under glasshouse conditions in UK for horticulture and in ornamental ponds in summer (UK RA, 2007).
	Main host plants or habitats: Aquatic plant - waterways, humid habitats
	Control and eradication measures: Measures to prevent further spread and to control *E. crassipes* were adopted at EPPO level in 2008 through PM9 to restrict or prohibit the deliberate introduction, sale, export, import and trade, planting, possession, and transport of this plant. Where established, the main control options are: mechanical control (manual cleanup operations), herbicide application (but herbicides are usually prohibited in aquatic ecosystems) and biological control (hyacinth-eating insect controls). Infestation with *E. crassipes* is seldom totally eradicated; instead, the situation must be continually monitored and managed. **Control and eradication costs:** **ES:** the removal of nearly 200,000 tonnes of *E. crassipes* from the Guadiana River (along 75 km) cost **€14.7 million (during 2005-08)**; this represented 65,723 working days and necessitated the use of high cost crane trucks (Cifuentes et al. 2007). Another source indicates comparable figures: the control/ eradication of *E. crassipes* during 2005–2007 cost **€3.35 million/year** (Andreu et al. (2009). The total risk area is about 2,700 ha. **PT:** the management actions carried out by the Municipality of Agueda cost **€278,000 from December 2006 to May 2008**; this included the purchase of the mechanical harvester and its monthly running costs, as well as almost 1,800 labour hours and three persons were employed for this purpose in 2006 and 2007, and one during 2008 (Laranjeira, 2008). Other reports are that **during 1999 to 2004 €470,000** were spent near Leziria Grande de Vila Franca de Xira for an integrated management programme. **US**: Florida spent over US$43 million **(€30 million) during 1980-1991**, to suppress *E. crassipes* (Schmitz et al. 1993); according to other reports, annual costs for *E. crassipes* management ranged from US$500,000-$3 million (€347,000-€2.1 million) (Mullin et al. 2000). The largest infestations of E. crassipes in the USA occur in Louisiana where the Department of Fisheries treats about 25,000 acres of *E. crassipes* with herbicides per year, at an annual cost of US$2 million (€1.4 million/year).
	Impacts: <u>Overview</u>:. Recognized as one of the world's 100 worst invasive alien species. Major negative impact on freshwater bodies and ecosystems, including aquatic biodiversity, where *E. crassipes* is able to establish (see above). It has immense potential economic impacts: a threat to agriculture (via affected irrigation systems; impacts reported on rice production), environment, public safety, recreation activities, water quality and quantity and human health (reservoir of vectors of insect borne diseases). (source: EPPO PRA, 2008; UK RA, 2007). <u>Specific cases</u>: In ES and PT, impacts in fisheries, recreation water sport, boat navigation, and tourism (no quantitative estimates available). The most important impacts of *E. crassipes* on crop yields are caused by water loss (due to evapo-transpiration, increase in water loss from documented worldwide cases is estimated at 2.7-3.2 higher than normal levels).

Hydrocotyle ranunculoides	**Current status:** widely present in parts of EU - western and central MS most affected. Established: widespread in NL, UK, BE. Localised presence (early stages) in FR, DE, IT. High capacity to spread observed in the UK, BE, NL and more recently in DE (e.g. in the UK river systems, native vegetation could be displaced in <2 years) (source: EPPO PRA, 2009).
	Main host plants or habitats: Aquatic plant - waterways, humid habitats
	Control and eradication measures: Measures to prevent further spread and to control *H. ranunculoides*: EPPO recommends total prohibition of imports, trade, propagation, and use/planting. Several MS (e.g. NL, BE, UK) have in place such restrictions. Where established, the main control options are: mechanical control (although identified as a cause of spread because of potential plant re-growth from fragments), herbicide application (but herbicides are usually prohibited in aquatic ecosystems; also need for continuous applications can be high cost). Infestation is seldom totally eradicated, unless if at early phases; the situation must be continually monitored and managed. Biological control through introduction of *Listronotus elongatus* weevil considered in some cases (but research is still in early phases). Temporary dry out of aquatic environment could also be implemented where appropriate (but very costly). In BE/NL as a whole, eradication is now considered impossible; only early detection of further spread through visual inspection is considered successful. **Control and eradication costs:** **BE**: In Flanders, the cost for managing *H. ranunculoides* is estimated at **€1.5 million/year** (programme of 3 years>2009). **NL**: control costs recorded in 2000 amounted to **€ 1 million/year**. In addition, from a survey of water boards in 2007, some 11 water boards reported to have spent ca. **€1.8 million** on the management of *H. ranunculoides* over and above normal operating costs for this pest (total figure not available). **UK***: total current costs for management of *H. ranunculoides* estimated at £1.9 million **(€2.2 million)/year** (Williams et al, 2010).
	Impacts: <u>Overview:</u> In its introduced range, can cause major problems in nature reserves and recreation areas as well as in intensely managed waterways; it can displace native flora through competition, and fauna by habitat modification. The impact on biodiversity and ecosystems is enormous: an EPPO expert WG concluded that in most sites, 100% cover is often observed over large distances (25 km). Significant direct and indirect effects (including loss of aesthetic value, tourism, increased cost of drainage and flood prevention). <u>Specific cases</u>: **BE**: *H. ranunculoides* observed to reduce by >50% the number of native aquatic plant species and up to 100% submerged species; native cover reduced from 50% to 10% (Nijs et al, 2009). Experts expect similar potential impacts for: UK, FR, NL. **UK**: total current impact in terms of the effect on tourism *H. ranunculoides* is estimated at £23.5 million (€26.6 million/year). Comparing against the management costs quoted above in the UK, suggests a **cost: benefit ratio of 1:12** at current value. The projection on impacts is considered to a conservative estimate as many other potential damage costs (e.g. from flooding) could not be quantified. (Williams et al, 2010).

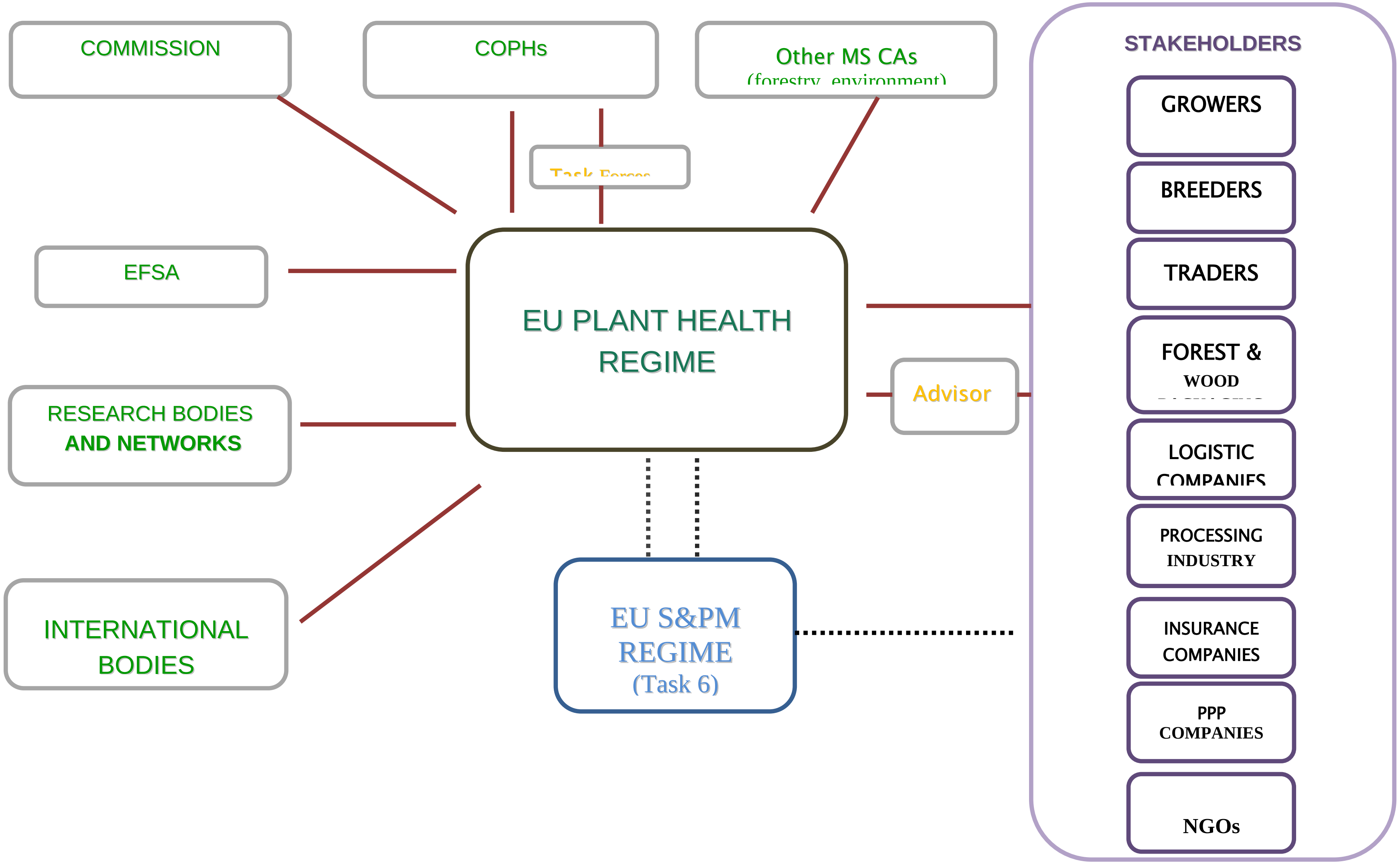
* Other costs quoted (Williams et al, 2010): the Environment Agency (EA) estimate they have spent £510,000 (€578,000) on control of approximately 300 linear km of *H. ranunculoides* in London in 2009; the cost of implementing a localised control strategy at Pevensey Levels was estimated at £150,000 (€170,000) per year for the first five years. Natural England paid farmers in 2008 to remove *H. ranunculoides* from ditches at a total cost of £35,000 (€40,000) for an infestation along 45 km (10% of ditches affected).

Ambrosia artemisiifolia	**Current status:** Widely present in the EU: AT, HU, FR, IT most affected; also, CZ, DE, LT, LU, PL, PT, RO, SK, SE, UK. The rate of spread has been accelerating during last decade and capacity for sustaining further spread is very significant (1 year of seeding - 7 years of weeding) (source: EUPHRESCO, 2009).
	Main host plants or habitats: Land plant – very wide range of habitats in agriculture, forestry, rural areas and wider open environment
	Control and eradication measures: A range of measures are applied currently, but there are significant gaps in knowledge. Chemical, mechanical or even thermal methods can be used to control spread, but efficacy is limited, due to the plant's capacity for re-growth after weed treatment and the extremely long lifespan of seeds in the soil. Thus, prevention of "new" populations is the best means of halting the spread of this species. Generally *Ambrosia a.* is considered difficult/impossible to eradicate at advanced stages, but relatively easier to control at the early stages of infestation in comparison with other IAS plants the fight against which is considered much more complex (e.g. *Polygonum* spp.). DG ENV has just launched study on management and control tools for *Ambrosia a.* including associated costs. **Control and eradication costs:** **FR**: typical expenditure in the Rhône-Alpes department (regional expenditure only) amounts to **€528,000 a year**, of which €8,000 for communication, €15,000 for a free call number to report findings, and the rest in the use of control methods (€400,000 in greening operations*, and €105,000 in mowing operations along roadside etc.). In the greater Lyon area after 13 years of action against *Ambrosia a.* the total cost was estimated at €11.2 million (including greening and mowing operations), and in addition €175,000 in public awareness campaigns. These are underestimates as many internal costs in the control authorities including staff time, as well as material costs and the cost of applied phytosanitary products have not been included.
	Impacts: <u>Overview:</u> *Ambrosia artemisiifolia* is economically among the most damaging IAS weeds in Europe affecting human health, agriculture and biodiversity**. The public health impact if very significant with allergies generated by this plant estimated to affect some 12-16% of the population depending on the area (rising to up to 60% in HU). Its development in natural environments (river banks, crops, alongside roads and railway tracks or on fallow land) can be spectacular. Currently considered as the worst hay fever plant in the world, the BBC reported recently that *"If our [UK] climate warms by 0.5 C per decade as predicted, by 2050 southern England will have a climate similar to SE France and Ragweed will persist"*. <u>Specific cases</u>: **FR**: In the Rhône-Alpes department alone (one for the hardest hit by *Ambrosia a.*) the total medical costs were estimated (on the basis of medical insurance data) at ca. €5.7-€8.7 million (first estimate includes highly susceptible people; second includes high and average susceptibility), of which 40% in medicines, 30% in medical consultations, 5% in testing, and 20% in absence from work due to the allergy. The cost per affected patient is €50-53. The total expenditure is equivalent to 62-95% of some types of reimbursement of the Dept of Rhône-Alpes during the period Aug-Oct 2008. **DE**: The cost caused by illness triggered by *Ambrosia artemisiifolia* was estimated at ca. €32 million. **EU**: The total impact for Europe from *Ambrosia artemisiifolia* was estimated at €225.4 million (on the basis of extrapolations from existing studies in DE, FR and SE) (DG ENV IAS study, IEEP, 2009).

* *Ambrosia artemisiifolia* greening operations in FR have involved the use of 10 different methods to improve natural ecologic resilience.
** See also Bohren, C. 2008: *Ambrosia artemisiifolia* – a motivation for European-wide control.
Source: FCEC, based on literature review

ANNEXES

ANNEX 1: Organisations covered by consultation process of this study



ANNEX 2: EU solidarity funding for the HOs covered by Task 3 and 4

EU solidarity funding for the HOs analysed under Task 3 and Task 4, 1999-2010

	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
Anoplophora chinensis											1,068,039	717,966	**1,786,005**
Italy											692,641	717,966	**1,410,607**
Lombardia (Gussago area)											135,941	510,267	**646,208**
											7,700		**7,700**
Lazio (Roma area)											549,000	207,699	**756,699**
The Netherlands											375,398		**375,398**
Anoplophora glabripennis								32,277	12,127	0	112,146	347,273	**503,823**
Germany								32,277	12,127			22,295	**66,699**
Baden-Württemberg												22,295	
Italy											112,146	324,978	**437,124**
Lombardia (Corbetta area)											105,321	46,570	**151,891**
											6,825		**6,825**
Veneto (Cornuda area)												278,408	**278,408**
Bemisia tabaci				83,147					54,631				**137,778**
Finland				83,147					54,631				137,778
Bursaphelenchus xylophilus			425,124	662,793	518,007	366,064		8,417,849			11,680,204	5,901,400	**27,971,441**
Portugal			425,124	662,793	518,007	366,064		8,417,849			10,276,063	5,612,217	26,278,117
Spain											1,404,141	289,183	1,693,324
Clavibacter michiganensis	45,128	26,899									174,262		**246,289**
France	5,437	26,899											32,336
Champagne, Picardy, Nord Ile-de-France		26,899											
Greece	30,885												30,885
Spain	8,806												8,806

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
The Netherlands											174,262		174,262
Diabrotica virgifera					259,104	210,485	689,449	69,146	627,515	433,203	506,133	149,926	**2,944,961**
Belgium						210,485	89,430	69,146	33,665				402,726
France					259,104		481,591		435,774				1,176,469
Germany										339,567	506,133	149,926	995,626
Baden-Württemberg										240,908	156,609		397,517
Bavaria										98,659			98,659
Bayern											349,524		349,524
Baden-Württemberg, rural districts of Ortenaukreis and Bodenseekreis												102,893	102,893
Baden-Württemberg, rural districts of Emmendingen, Lörrach, Konstanz (year 1 of measures) and Ravensburg (year 2 of the measures)												47,033	47,033
The Netherlands							118,428		158,076	93,636			370,140
Erwinia amylovora	3,652	91,858	71,375	154,890									**321,775**
Austria		17,103	71,375	57,873									146,351
Tyrol		17,103											17,103
Spain	3,652	74,755		97,017									175,424
Catalonia		71,013											71,013
Castille-La Mancha		3,742											3,742
G. pallida & G. rostochiensis	3,821												**3,821**
France	3,821												**3,821**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Potato Spindle Tuber Viroid										343,803			**343,803**
The Netherlands										343,803			343803
Ralstonia solanacearum	163,295	5,168	133,500	441,945									**743,908**
France				377,571									377,571
Greece	1,467												1,467
Italy	18,365	5,168											23,533
Emilia Romagna	8,780	1,072											9,852
Veneto	9,585	4,096											13,681
Portugal	137,819		133,500										271,319
Spain	5,644												5,644
The Netherlands				64,374									64,374
Rhynchophorus ferrugineus		86,518									354,613	211,583	**652,714**
Cyprus												24,653	24,653
France												186,930	186,930
Malta											354,613		354,613
Spain		86,518											86,518
Andalusia		86,518											86,518
Total	**296,610**	**497,481**	**861,894**	**1,344,247**	**858,454**	**576,549**	**689,449**	**8,519,272**	**694,273**	**871,953**	**14,071,287**	**7,342,161**	**36,623,630**

ANNEX 3: Task 1 – analytical framework and sources of data

Analytical framework and sources of data (Task 1)

By Harmful Organism	Data requirements	Sources of information
Sites to be surveyed (HO specific)	Ha. of host plants No. of nurseries No. of garden centres Ha. of public green	
	HOs subject to emergency measures	Annual survey reports EUROSTAT data (including FADN)
	HOs for which surveillance is carried out in PZs and BZs *Erwinia amylovora*	Partly in annual survey reports EUROSTAT data on number of orchards (2007 data) No. of total registered operators (cost survey)
	HO for which no surveillance is in place	EUROSTAT data No. of total registered operators (cost survey)
Elements of survey (HO specific):		
Information campaign	Lump sum (total costs) Campaign scope and components (individual costs)	FCEC 2011 MS CAs Survey
Inspections	Frequency of inspection (ha. inspected/total ha. of host plants; nurseries inspected/total no. of nurseries)	
	HOs subject to emergency measures	Annual survey reports FCEC 2011 MS CAs Survey Analysis of best practices, by HO
	HOs for which surveillance is carried out in PZs and BZs *Erwinia amylovora*	FCEC 2011 MS CAs Survey Analysis of best practices, by HO Task 8 results
	HO for which no surveillance is in place	Analysis of best practices, by HO FCEC 2011 MS CAs Survey
Sampling	Frequency of sampling (samples by ha./nursery)	(see inspections)
Testing	Test in use	FCEC 2011 MS CAs Survey
Traps	No. of traps; frequency of monitoring	FCEC 2011 MS CAs Survey
Risk category	HO situation in the MS (free, under eradication)	FCEC 2011 MS CAs Survey Literature review
Unit cost		
Inspection cost (time x fee)	Salary costs (for inspections of private operators for registration)	FCEC 2011 MS CAs Survey

By Harmful Organism	Data requirements	Sources of information
Forestry Non forestry		
Sampling cost (time x fee): Sampling Test /analysis		FCEC 2011 MS CAs Survey
Pheromone Traps: Cost of traps Monitoring		FCEC 2011 MS CAs Survey

ANNEX 4: Tasks 3 to 5 - balance of HOs and sectors under review

HO	Sector	Share of solidarity funding (1999-2010) (a)	Key MS	
			Main solidarity fund's beneficiaries	**Key producers (% total EU production (b)(c))**
Diabrotica vv	Maize	8.0%	FR (1.1 million €) DE (996k €) BE (400k €) NL (370k €)	FR (25%) IT (15%) HU (14%) RO (12%) DE (8%)
Potato diseases: • brown rot • ring rot • PSTVd	Potatoes	 2.0% 0.7% 0.9%	 FR (377k €), PT (271k €) NL (174k €) NL (344 k €)	PL (21%) DE (14%) FR (12%) UK (11%) NL (10%) RO (7.4%) BE (6%)
Bemisia tabaci	Tomatoes	0.4%	FI (138k €)	IT (39%) ES (24%) EL (9.5%) PT (6.5%) FR (4.8%) NL (4.5%)
Erwinia amylovora	Apple and pear trees and other members of *rosaceae* including ornamentals	0.9%	ES (175k €) AT (146k €)	Apples: PL (23%) IT (18%) FR (16%) Pears: IT (31%) ES (20%) BE (10%) NL (9.6%)
PWN		76.4%	PT (26.2 million €) ES (1.7 million €)	SE (28.4 million ha.; 17% roundwood production) FI (22 million ha.; 12%) PL (9.2 million ha.7.8%) DE (6.5 million ha.; 16%)
Rhynchophorus ferrugineus		1.8%	MT (355k €) FR (187k €) ES (86k €) CY (25k €)	ES IT EL
Anoplophora chinensis ***Anoplophora glabripennis***	deciduous trees: Acer* Citrus, Malus, Pyrus trees	4.9% 1.4%	IT (1.4 m €), NL (375k €) IT (437k €), DE (67k €)	Citrus: ES (51%) IT (37%) EL (10%) Tree nurseries: IT, DE, NL (see also Task 7)

(a) The HOs indicated here account for nearly all of the funding during this period (€36.6 million).
(b) 2008 data (tomatoes and wood production: 2007). Source: DG AGRI
(c) For wood: total roundwood production (2007 data)

* *Acer* is the most commonly infested tree genus in Europe, followed by *Betula*

ANNEX 5 Tasks 3 and 4 - detailed calculation of costs and sources of data

In order to establish the potential increase in solidarity funding when the direct costs and losses incurred by POs are included, the approach followed has been to estimate the costs and losses for the different components of each outbreak, in order to understand the relative proportion and the order of magnitude of the costs involved, for the different HOs. The result is an estimate of the standard costs and losses of the management of one outbreak, which has then been extrapolated in order to estimate the total cost for the EU on the basis of the data of reported outbreaks in the past three years, or for a longer period when data are available[298].

Note: *The analysis of the standard costs of the management of an outbreak which was undertaken by the FCEC includes the costs of intensified monitoring and inspections (in nurseries and/or open environment), in order to provide a total view of the costs involved, which is useful for the purposes of Task 4. Currently monitoring is funded under the solidarity dossiers; in the case solidarity funding was extended to include costs for outbreaks deriving from natural spread, the costs for intensified monitoring would be covered, and the cost for the management of one outbreak should be considered in total. The cost for this item has been estimated based on the figures in the solidarity dossiers. This point is valid for all the HOs with risk of natural spread that are analysed here.*

Anoplophora chinensis

Key model parameters

- Demarcated area: 1,335 ha/outbreak
- 3 scenarios (a.1 in environment; b.1, b.2: in nurseries);
- 2 infestation levels (low: 1.5%; high: 5% of trees affected within DA, for scenarios a.1).

Extrapolation scenarios

- Historical: 5.5 outbreaks/year (season)

Type of measures and costs

The costs considered for the analysis of the standard cost of a solidarity dossier in the case of Anoplophora chinensis are:

a. Monitoring;
b. Destruction (it includes felling, chipping and transport of infected material);
c. Replacement of trees;
d. Destruction of infested plants in nurseries;
e. Replacement of plants in nurseries;
f. Additional inspections for nurseries in the demarcated area;
g. Destructive sampling of material;
h. Costs deriving from prohibition to movement[299].

[298] As reported in CIRCA.

[299] Other costs relevant to *Anoplophora chinensis* are the costs for treatment and physical protection (netting) in nurseries. Due to insufficient evidence on unit values as basis to use for extrapolations, these costs were not

Anoplophora chinensis has an impact of POs operating in the chain of production and trade of the susceptible host plants in the demarcated area. In the case of an outbreak, POs have to destroy the infected material. Furthermore, plantation of plants species that are among the preferred hosts for *A. chinensis* is forbidden and trade and movements of trees and plant species that are potential hosts for the pest are forbidden within the quarantine area, unless they carry a PP for *A. chinensis*. Additional inspections, which include destructive sampling, are carried out at the POs premises with a frequency estimated at four times higher[300] than the situation in peacetime in the first year of the outbreak[301]. The costs of destruction of infested plants have been assumed as being equal to those born in the broader environment. The costs (additional inspections and destructive sampling) have been estimated mostly on the basis of the data provided by the industry in the Netherlands, which refer to the outbreak of *Anoplophora chinensis* in Boskoop in 2010 (area with a high concentration of nurseries involved in the trade of susceptible plants). It is noted however that the value of destroyed material can be highly different (€1 - €100, to high value plants which rare and old mother plants which are irreplaceable).

The outbreak in the Boskoop area represents an exceptional case, due to the high concentration of production nurseries in the area. In order to assess the costs and losses associated with a general outbreak, consultation has been launched with the MS CA and POs in Italy to determine the costs and losses associated with the outbreak in Lombardia. Information provided by the MS CA indicate that in the demarcated area 5 nurseries were infested, and that €150,000 were allocated by the Government to cover damages for the destruction of plants following the implementation of compulsory phytosanitary measures. The MS CA also specified that the order of magnitude of indirect costs deriving from the prohibition to movement and quarantine were by far more significant, and in the order of magnitude of millions of Euros, as confirmed through the interview with the biggest nursery affected. No further data have been provided by POs to estimate this impact more accurately.

Destruction of infected plants is paid by CAs in the case destroyed trees are in the public green, whereas in case of private garden and nurseries the owner of the tree and POs have to bear the cost for destruction and removal in the majority of the cases, unless there is co-sharing of this cost with the owners in private gardens or the cost is supported by the phytosanitary service (e.g. IT). This item is currently paid in the solidarity dossiers for some countries.

The replacement of trees is considered as a direct cost operators have to support. In nurseries POs have to replace plants with non susceptible plants, with a consequential cost to restart trade. It is assumed this could take some time and adaptation, with an impact on their income (not investigated in this analysis).

Losses for operators deriving from the prohibition to move the host plants have been estimated on the basis of the same source. In this analysis is also estimated the loss of trade and market deriving form an outbreak (in the subsequent year and/or due to cancel of orders).

calculated. Another cost particularly relevant for CA is the cost of tracing back. In the absence of detailed data and basis for extrapolation, this cost was not calculated.

[300] Based on data provided by the industry in the NL, concerning outbreak of 2010.

[301] Twice higher in the three following years (source: LTO communication). The impact on the following years is not taken into account in this analysis.

These figures are provided in order to give a comparison between the magnitude of the direct costs and losses and the indirect losses derived from an outbreak.

Scenarios and assumptions

A challenge for modelling impact of *Anoplophora chinensis* is the wide variation between MS and within MS of the areas of susceptible plants and of the production structure.

In the outbreak in Boskoop in 2010, circa 400 nurseries were confronted with extra inspection costs; their total area was about 1,100 ha, i.e. 55% of the total area of nursery stock in Boskoop and 6.5% of the total nursery stock production in the country. In the outbreak in Lombardia, Italy, 5 nurseries (6% of the nurseries selling host plant in the demarcated area and 0.25% of the nurseries in the Region) were affected.

In order to take this into account, the costs for one standard outbreak have been estimated considering three different scenarios:

- Scenario a.1: in the demarcated area 5% are susceptible plants (in two situations: low and high infestation, with a 1.5% and a 5% of infested susceptible plants respectively);
- Scenario b.1: in the demarcated area there is a number of 10 nurseries;
- Scenario b.2: in the demarcated area there is a number of 150 nurseries.

Results

The cost of one outbreak varies between €287,000 (1.5% infestation) and €756,000 (5% infestation) for the management of the outbreak in the environment and between €1 million and €14.1 million for the outbreak in nurseries, reflecting the different importance of this commercial activity in various parts of the EU. It is noted that the direct costs and losses for a nursery can be significant; however, the highest cost for outbreaks in nurseries is represented by the loss of income deriving from the prohibition of movement, the loss of trade and market. This figure can reach the amount of €**13.5 million** in the worst case scenarios of a high number of nurseries affected.

In order to estimate the impact the inclusion of such cost would have on solidarity funding based on the historical number of outbreaks of *Anoplophora chinensis* in the EU in the years 2008 – 2010[302], the scenario is that a yearly number of 5.5 outbreaks occur in the EU. Based on the distribution of findings of these outbreaks in the different sites, it is assumed that the outbreaks would be distributed among the above scenarios as follows:

- 3 outbreaks in scenario a.1;
- 2 outbreaks in scenario b.1;
- 0.5 outbreaks in scenario b.2[303].

This will result in a total cost (including monitoring) for the EU of **€624,000** to **€1.3 million**, depending on the degree of infestation in the environment[304].

[302] Source: FVO report on MS surveys.
[303] Considering this is modelling an exceptional outbreak, i.e. the NL Boskoop.
[304] Indirect losses in nurseries not considered.

Cost for destruction of trees is **€600,000** to **€2 million**, and cost of replacement of trees (assuming 15% of trees is replaced) ranges between **€2,700** and **€8,900**.

With regards to impacts on nurseries, in the scenario of 2.5 outbreaks/year, cumulative costs of additional inspections would amount to **€62,000**, the value of destroyed material would amount to **€326,000**, and the indirect losses would amount to **€8.6 million**.

Anoplophora glabripennis

Key model parameters

- Demarcated area: 1,335 ha/outbreak
- Scenario of 5% of susceptible plants;
- 2 infestation levels (low: 1.5%; high: 5% of trees affected within DA).

Extrapolation scenarios

- Historical: 2 outbreaks/year.

Type of measures and costs

The costs considered for the analysis of the standard cost of a solidarity dossier in the case of Anoplophora glabripennis are:

a. Monitoring;
b. Destruction (it includes felling, chipping and transport of infected material);
c. Replacement of trees.

Destruction of infected plants is paid by CAs in the case destroyed trees are in the public green, whereas in case of private garden and nurseries the owner of the tree and POs have to bear all the cost for destruction and removal, unless co-sharing of this cost with the owners in private gardens is foreseen (e.g. IT). This item is currently paid in the solidarity dossiers for some countries; therefore this cost will constitute an additional cost rather than a new cost for the solidarity fund.

All the available studies on *Anoplophora glabripennis* concern impacts on the open environment, therefore impacts on nurseries (direct/indirect) are not included in this analysis. In the event of an outbreak of this HO in nurseries, costs could be extrapolated from *Anoplophora chinensis.*

Scenarios and assumptions

The standard cost of management of one outbreak has been estimated, considering a 5% area of susceptible plants, under the two scenarios of 1.5% and 5% infestations.

The cost of one outbreak varies between €531,000 (1.5% of susceptible plants infested) and €1 million (5% of susceptible plants infested) for the management of one outbreak.

In order to estimate the impact the inclusion of such cost would have on solidarity funding based on the historical number of outbreaks of Anoplophora glabripennis in the EU in the years 2008 – 2010[305], it is assumed that a yearly number of 2 outbreaks occurs in the EU.

Results

Extrapolating on the basis of the above scenarios and assumptions will result in a total cost for the EU equal to €1 million – €1.9 million. Within this cost, destruction of trees amounts to **€377,000 – €1.3 million** and replacement of trees amounts to **€7,400 – €12,400**.

Bursaphelenchus xylophilus

Key model parameters
- Demarcated area: 125,600 ha/outbreak
- 3 scenarios (based on forestry/non forestry land mix);
- 2 density levels (low: 50 pine trees/ha; high: 300 pine trees/ha).

Extrapolation scenarios
- Historical: 3 outbreaks/year.

Type of measures and costs

The costs considered for the analysis of the standard cost of a solidarity dossier in the case of Bursaphelenchus xylophilus are:

a. Monitoring;
b. Destruction (it includes felling, chipping and transport of infected material) of trees;
c. Replacement of trees;
d. Compensation of owners of trees for the destroyed material;
e. One-off cost or heat treatment of Wood Packaging Material (WPM).

These costs have been funded under the solidarity dossiers so far, including the felling of trees in a clear cut area in Portugal and Spain. Also compensation of trees for destroyed material has been paid under solidarity funding in the case of Portugal in 2006 under the art. 23(6). In 2010, Portugal requested and received funding from the EU also to support the costs sustained by the industry in order to comply with the obligation of heat treatment of wood packaging material.

Scenarios and assumptions

A challenge for modelling impact of PWN is the wide variation between MS and within MS of the areas of susceptible forest land and systems. In order to take this factor into account, as well as whether the outbreak has occurred in the core of a forestry area or in its periphery, these costs have been estimated in three different scenarios. The scenarios considered are:

305 Source: Notifications to the EC – CIRCA.

- Scenario 1: the area of the outbreak is constituted for 30% by forestry and 70% by non forestry;
- Scenario 2: the area of the outbreak is constituted for 10% by forestry and 90% by non forestry;
- Scenario 3: the area of the outbreak is constituted for 80% by forestry and 20% by non forestry.

In all the scenarios, the different conditions of low (10-50 pine trees/ha) and high density (100-400 pine trees/ha) of trees are considered.

Results

On the basis of the above model parameters and assumptions, the cost of one outbreak is estimated to range between €**657,000 and €26.6 million**.

The one off cost per MS for the heat treatment of WPM is estimated at €8.6 million for a number of 20 million pallets (10 million new pallets and 10 million old pallets). This figure is based on the cost of €0.43/pallet, as reported in the solidarity dossier submitted by Portugal in 2010 (based on industry data and calculations); the audit of the COM has been followed up by a request to the MS of a corrected value for this cost. Information on heat treatment costs from other sources indicates that it can reach up to €2/pallet[306]. The figure of €0.43/pallet has been used for the calculations in this study, as it represents a cost already funded by the EU solidarity budget, and seems to reflect the EU case.

Outbreaks of PWN have been reported in the last years in PT and ES. The estimate on the impact on the solidarity funding if the direct costs and the cases of natural spread were included in the eligible costs is done by considering a scenario of three outbreaks, each of them under one of the different scenario.

Under this assumption, the direct costs and losses result to be as follows:

- Cost for felling and destruction of trees will range from **€4.6 million** to **€27.7 million**;
- Cost of replacement of trees is **€1.5 million**;
- Cost of compensation of owners of trees ranges from **€1.4 million** to **€8.1 million**.

Solidarity funding has to date paid the above costs related to the above items for felling and replacement of trees (ES, PT). As for the other costs:

- Compensation of owners of trees for felling was paid to PT in 2006. This was on an exceptional basis, funded under Article 23 (6) of Directive 2000/29/EC[307]. Compensation was paid to owners by PT in order to increase timely felling of trees and the performance of the cutting system. The mechanism in place included payment to companies partly for the activities themselves and partly by the value of the cut

[306] E.g. India at R85-R125 (€1.3-1.9) per pallet (source: Capital Pest Control, India); US at $1 per pallet (source: Texas Forest Service).
[307] "*In the light of the development of the situation in the Community, it may be decided, […], that further action will be implemented or that measures taken or planned by the Member State concerned will be made subject to certain requirements or additional conditions, if these are necessary for the achievement of the objective in question*"

wood, and to compensate the value of the wood by a fixed sum given to the owner of the wood. The MS decided to pay the land owners directly, instead of paying the same amount to the company doing the cuttings, provided that the company would have had to pay the owner for the wood value in any case.

- As for the payment of heat treatment for pallets, this item was paid to PT in 2010 and a request has been made by ES in 2011 for funding of this cost. It is noted that there is an ongoing debate on the appropriateness and the rate of funding of this cost by the EU solidarity fund, and whether it should be paid to all EU MS. The current study provides an estimate of costs in case this measure was funded with the current rules and at current level of co-funding.

Rhynchophorus ferrugineus

Key model parameters

- Demarcated area: 31,463 ha/outbreak
- 1 scenario;
- 3 density levels (low: 0.2 palm trees/ha; medium: 1 palm tree/ha; high: 2 palm trees/ha).

Extrapolation scenarios

- Historical: 21 outbreaks per year.

Type of measures and costs

The costs considered in the analysis of the standard cost of a solidarity dossier for Rhynchophorus ferrugineus are:

- Monitoring of traps;
- Inspection of palm trees;
- Inspections at nurseries and sites;
- Treatment costs;
- Destruction costs;
- Value of destroyed material.

Destruction costs concern the nurseries involved in the production and trade of the palm trees, and furthermore it is a relevant item for private citizens, considering that this HO affects palm trees in public and private gardens. Currently this cost is paid by the government (and covered by solidarity funding) in the case of palms destroyed in the public green, but it is borne by the private citizens and POs in case of infestation of palms in their gardens/nurseries. In some MS there are forms of compensation for the destruction of trees for citizens. This cost appears to be particularly relevant in the case of private gardens, as private owners refuse taking measures therefore causing delays in eradication, as highlighted in a recent report from the FVO regarding the implementation of eradication measures for PWN in the MS.

Value of destroyed palm trees can be variable, depending on the average value, which is difficult to estimate, given the wide variation in the age, type, location and ornamental landscape value of the affected trees. In this analysis an average value of €1,000-€3,000/palm tree is considered, it is noted that this is an underestimate of high value trees.

The costs for the different items have been estimated based on the figures in the solidarity dossiers and from interviews with the sector.

Scenarios and assumptions

Based on the unit costs as detailed or estimated through the solidarity dossiers, the standard cost of management of one isolated outbreak and the relative cost of each cost component has been estimated, under three different scenarios:

- Scenario 1: the demarcated area has a low density of palm trees (0.2 palms/ha.);
- Scenario 2: the demarcated area has a medium density of palm trees (1 palm/ha.);
- Scenario 3: the demarcated area has a high density of palm trees (2 palms/ha.);

The rates of infestation in the focus area and in the buffer zone are assumed at 50% and 3% respectively. The cost of the management of one outbreak is estimated to range from €793,000 to €2.4 million[308].

Results

The estimate on the impact on the solidarity funding if the direct costs and losses were included in the eligible costs is done by considering a scenario of twenty one outbreaks, evenly distributed under the different scenarios.

This will result in a total cost for destruction of trees equal to **€2.2 million**, cost for treatment is **€95,000[309],** and loss of value of destroyed trees is **€218,000.** As for the last item, an average price of €50-€100/palm is considered, assuming that up to all trees are compensated. Otherwise, it would concern only a fraction of this, i.e. trees in nurseries.

Bemisia tabaci

Type of measures and costs

The analysis has been mostly based on the data from the recent CBA for the PZ of Bemisia tabaci carried out by FI (2008) and the UK (2010), complemented by the data in the solidarity dossiers submitted by FI in 2002 and 2007.

[308] Other costs that could be considered under this analysis are those related to the chemical treatment of the plant in nurseries, aimed at preventive action against the infestation. Although some data on these costs have been provided by the industry in ES, these costs have not been taken into account, as it is impossible to extrapolate from this basis due to the fact that the number of palms that might be subject to treatment is unknown. As an indication, the ES nursery sector has indicated that treatment costs amount to an average €40/plant, and that the estimated cost (cumulative to date) is estimated at ca. €40 million in nurseries and ca. €30 million in public/private green (source: FEPEX, ES).

[309] Assuming 90% of palm trees in the focus area are treated. Cost considered is €75/palm (MT solidarity dossier).

It is highly difficult to estimate the costs associated with the outbreaks of *Bemisia tabaci* in glasshouses, as the number of lots, plants and glasshouses involved may vary considerably. Furthermore, yields and costs differ very much and the losses incurred by producers depend on the assortment, varieties and the growth stage of the product[310]. Also, it is not possible to estimate the area involved in each outbreak and to have sufficiently detailed statistics on the number and the dimensions of glasshouses producing the relevant ornamental host plants.

Costs and losses have been reported in the cost benefit analysis of the UK to be in a range of £2,500 and £49,000 per greenhouse per outbreak. Data related to compensation for outbreaks of *Bemisia tabaci* in FI indicate a range of €1,510 to €7,400 per outbreak.

Therefore, the approach taken in this exercise has been to extrapolate the costs and losses as reported in FI to the cases of outbreaks of the HO in the other MS with PZs, in the period 2005-2009 (for the number of outbreaks in PZs, see Table 59). However, this is a rough estimate, as these figures apply to FI and cannot probably be generalised. Also, **this data does not allow a differentiation among the categories of costs and losses**.

In total in the last decade **€1.2 million** were paid in compensation for outbreaks of *Bemisia tabaci*, with an annual average of €111,000. Although compensation is paid at 100% (FI CA communication), as noted in the study Heikkilä (2008), these figures are an underestimate of the costs of eradication, as not all the producers apply for compensation. For instance in 2000 - 2007 there were 190 cases of *Bemisia tabaci*, and there were 126 compensation payments within this period, i.e. nearly one third of the cases do not get any compensation. Additionally, only professional producers were entitled to compensation.

Table 57 Number of outbreaks and compensation in FI for *Bemisia tabaci*, 2000-2010

	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
Number of cases	25	12	8	12	20	13	50	50	109	83	25
Number of compensation payments	18	15	5	11	6	15	12	44	27	90	60
Compensation payments(€)[311]	133,740	47,390	4,623	33,520	9,093	50,464	31,154	135,882	154,427	199,362	266,351
EU payments for FI (€)[312]	83,147	0	0	0	0	0	54,631	0			
Total (€)	**218,930**	**49,418**	**6,638**	**35,546**	**11,123**	**52,497**	**87,853**	**137,983**	**156,571**	**201,544**	**268,446**

Source: Finnish Food Safety Authority Evira's control reports 2000-2008; Heikkilä (2008)

In terms of compensation per case, i.e. costs of a single outbreak, Heikkilä (2008) reports average figures; these are illustrated in Table 58.

Table 58 Average compensation for *Bemisia tabaci* outbreaks, FI, 2000-2007

[310] In the NL, the production value of glasshouse crops range between € 50/m2 and € 150/m2 (source: LTO).
[311] Compensation payments can relate to the current year's losses as well as to losses in the previous year.

[312] Solidarity funding

	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*
Compensation per observed case	5,350	3,949	578	2,793	455	3,882	623	2,718
Compensation per compensated case	7,430	3,159	925	3,047	1,516	3,364	2,596	3,088
Compensation/observed case, 2-yr average		4,895	2,601	1,907	1,332	1,805	1,296	1,670
Compensation/compensated case, 2-yr average		5,489	2,601	2,384	2,507	2,836	3,023	2,983

Source: Heikkilä (2008)

These figures include compensation for the following losses:

- disinfection, control and eradication costs from following the eradication order given by the authority, and the cost of material damaged in these procedures;
- economic damage or cost that arises from an order by the authorities that forbids the sale, release, transport or use of material;
- economic damage or cost that arises from the suspension of production activity, based on an order from an authority.

From the above, it is not possible to differentiate direct costs from the direct and indirect losses consequential to the outbreak. A rough estimate based on the solidarity dossier of Finland submitted in 2007, would suggest a breakdown of direct costs, on the basis of the number of glasshouses involved in the outbreak:

Treatment cost/greenhouse	€ 905 (est.)
Destruction cost/greenhouse	€ 865 (est.)
Disinfection cost/greenhouse	€ 585 (est.)

However, it is not possible to use this data for the purpose of extrapolations, as it is based on specific conditions for the outbreak, and it is preferred to use an average figure based on a longer timeframe (Table 58). An estimate based on the average of **€2,544** per outbreak (average yearly compensation per observed case) has been therefore considered in this analysis.

Results

On the basis of the above, an average yearly value of costs and losses of **€434,000/year** is estimated for the EU 27 (MS with PZs) for *Bemisia tabaci*.

Table 59 Number of outbreaks, by MS in PZs

MS	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
FI	15	50	50	109	81	25
UK	23	50	41	12	47	n.a.
SE	n.a.	50	43	56	56	13
PT			5	3	5	n.a.
IE	n.a.	16	2		7	n.a.
Total	**38**	**169**	**141**	**180**	**196**	**38**

Source: Annual MS surveys of PZs

Diabrotica virgifera virgifera

Key model parameters

- Demarcated area: 31,714 ha./outbreak
- 4 scenarios (different presence of susceptible crop/different crop value)
- Cost of the management of one outbreak calculated over three years time.

Extrapolation scenarios

- Historical: 10 outbreaks/year

Type of measures and costs

The costs considered in the analysis of the standard cost for the management of an outbreak of Diabrotica vv. Over three years are[313]:

a. Monitoring;
b. Insecticide treatment;
c. Crop rotation.

Currently monitoring is funded under the solidarity dossiers, whereas insecticide treatment is funded by the MS in case of outbreaks (and funded under solidarity dossiers) in most but not all the cases: Germany and France received funding for covering these measures whereas the cost is borne by the POs in the Netherlands. Other differences at national level may apply, and the extent of coverage of these costs by MS has not been systematically investigated in the scope of this exercise.

Crop rotation is currently not funded under the solidarity regime, and the cost of undertaking this compulsory obligation is currently borne by the stakeholders only. In France a scheme for solidarity between the Government and POs (Association Générale des Producteurs de Maïs - AGPM) has recently been introduced[314].

Other direct costs associated with the control of Diabrotica vv. concern the destruction of material and clearance. This cost appears to be minor, and there has been no indication from stakeholders contacted on the amount this could represent.

Scenarios and assumptions

Based on the unit costs as detailed or estimated through the solidarity dossiers, the standard cost of management of one isolated outbreak and the relative cost of each cost component has

[313] The calculations relate only to new outbreaks, not to containment in buffer zones or suppression in infested MS.

[314] « Caisse de solidarité interprofessionnelle » introduced in 2009 (funded by the State and POs 50/50) vin order to compensate costs related to eradication: crop rotation : on the basis of a maximum amount of 350 €/ha, obligatory treatments: max : 80 €/ha for larvicide, 150 €/ha for adulticides, with 100% costs covered in focus zone and 40-80% in safety zone.

been estimated[315]. In order to take into account of the different productive systems and economic weight of maize in the EU MS, these costs have been estimated in four different scenarios. This approach reflects the one taken in the earlier study of the FCEC on Diabrotica, and it has been further elaborated. The scenarios considered are:

- Scenario 1: the area of the outbreak is cultivated with 10% of maize of low value[316];
- Scenario 2: the area of the outbreak is cultivated with 10% of maize of high value;
- Scenario 3: the area of the outbreak is cultivated with 70% of maize of low value[317];
- Scenario 4: the area of the outbreak is cultivated with 70% of maize of high value.

These percentages aim at taking into account the variation on the costs of inspection and insecticide treatments (based on the size of the land to be inspected/ treated) and crop rotation (based on the value of the crop).

The cost of management of one outbreak over three years varies between €165,000 and €2.5 million, reflecting the different threat the HO can represent to areas where a high proportion of the surface is cultivated with low maize value or at the opposite of the spectrum with monoculture with high value maize types.

In order to estimate the impact the inclusion of such cost would have on solidarity funding, based on the historical number of outbreaks of Diabrotica vv. in the EU in the last three years, it is assumed that a yearly number of 10 outbreaks occurs in the EU.

It is assumed that the outbreaks would be distributed among the above scenarios as follows:

- 3 outbreaks in scenario 1;
- 4 outbreaks in scenario 2;
- 2 outbreaks in scenario 3;
- 1 outbreak in scenario 4.

Results

This will result in total direct cost for the EU equal to €2.5 million for insecticide treatment and €1.9 million for crop rotation, for the management of new outbreaks of the HO. As these costs are related to a three year management of the outbreak, a third of these is considered, i.e. **€821,000** for insecticide treatment and **€630,000** for crop rotation.

Ralstonia solanacearum and *Clavibacter michiganensis ssp. sepedonicus*

Type of measures and costs

The costs considered in the analysis for *Ralstonia solanacearum* are:

315 These costs relate only to eradication of new outbreaks, not to suppression in infested countries or to measures in the buffer zone.
316 The isolated outbreaks occur in non-intensive areas in which maize cultivation can be replaced with another crop without any significant impact.
317 The isolated outbreaks occur in highly specialised maize type and induce large economic and social impacts.

- Direct costs (destruction of infected lots);
- Direct losses (Downgrading of probably infested lots);
- Other costs (tracing and sampling);
- Consequential losses.

Cost of an outbreak of potato diseases can highly affect operators in the production chain. Breukers (2007) estimates these costs in two scenarios, under a baseline monitoring level of inspections (as applied in the NL), and at reduced level of monitoring.

The study estimated yearly costs for the NL as summarised in **Table 60**; the value of production of potatoes in the NL is over €1 billion.

Table 60 Costs of outbreaks of *Ralstonia solanacearum* in the NL

Damage (outbreak) costs	€0.5 million avg yearly - current controls €1.1 million avg yearly - reduced controls	Costs incurred following outbreaks. This includes destruction and intensified monitoring, i.e.: destruction of detected lots; downgrading of probably infected lots; tracing of other lots; increased sampling on quarantine farms.
Consequential losses	€0.2 million avg yearly - current controls €0.3 million avg yearly - reduced controls	Losses incurred by affected farmers as a result of restrictions to potato production in the years after detection of an infected lot - minimum required crop rotation of potatoes in the Netherlands is 1:3, so a field quarantine period of three or more years will lead to extra losses.
Trade losses	€0.8 million avg yearly - current controls €7.5 million avg yearly - reduced controls	Losses in years with export restrictions

Source: Breukers (2007)

Further indications on the direct costs and losses for POs can be derived by the amounts paid by the mutual fund Potatopol (see box) in the Netherlands in the past five years:

- **€445,000** in 2010 (the total damage reported at €636,000), for 6 claims (4 outbreaks of brown rot in seed potatoes; 2 outbreaks of ring rot in consumption potatoes) =€106,000/case;
- **€188,000** (the total damage reported at €461,000) in 2009, for 3 claims (2 outbreaks of brown rot; 1 outbreak of ring rot) = €154,000/case;
- **€249,000** in 2008, for 3 claims = €83,000/case;
- **€75,000** in 2005, for 3 claims[318]= €25,000/case;
- **€1.47 million** in 2004 for 44 claims = €33,400/case.

Scenarios and assumptions

The costs and losses have been estimated on the basis of data in the study Breukers (2007) and combined with the data of outbreaks as notified by MS to the EC.

As emphasised in Breukers (2007), the incidental costs (damage costs and consequential losses in **Table 60**) are directly related to the number of detections. Furthermore, total

[318] Source: Potatopol yearly Reports, consulted in April 2011, www.potatopol.nl.

incidental costs in a particular year depend on the number, size, and category (seed, ware, or starch) of detected lots, the number of farms involved, and the potato production characteristics of these farms. As these factors strongly vary per year, so do the incidental costs. The estimate of costs for these HOs is done therefore on a yearly average, but could vary substantially from year to year.

As costs in Breukers (2007) are calculated according to the structure of the sector and the economic parameters for the Dutch context (i.e. in terms of revenue, gross margin, destruction costs), these values are extrapolated to the EU context adjusting for the difference in gross margins in the different countries, and assuming the gross margins in the Netherlands as the base parameter.

Results

Ralstonia solanacearum

On the basis of this analysis, based on the historical trend, direct costs and losses for POs for the EU are estimated at:

- Direct costs (destruction of infected lots): **€571,000**;
- Direct losses (Downgrading of probably infested lots): **€3.5 million;**
- Other costs (tracing and sampling): **€148,000**;
- Consequential losses: **€1.6 million**.

Clavibacter michiganensis ssp. sepedonicus:

In the case of *Clavibacter michiganensis ssp. sepedonicus*, it has been difficult to extrapolate on the basis of the information currently available on the number of outbreaks as reported by MS to the EC. This is because the information available from the other source used (FVO report on annual surveys conducted by MS), which provides the number of positive lots found every year in the MS, suggests that the picture may be quite different from the number of notifications made to the EC. In several cases there are differences between the number of findings reported in these surveys and the number of notifications of outbreaks made to the EC. The most notable difference is in the case of PL, where 1,000-2,000 findings (positive lots) have been reported per year in recent years[319]. The PL NPPO indicated that the number of cases for the 2009/2010 season is estimated for ca. 900[320], i.e. ca. 80% of the findings indicated in the FVO survey report.

Figures for costs and losses incurred by POs due to *Clavibacter michiganensis ssp. sepedonicus* findings were not available/ provided. As an indication, according to data provided by the PL NPPO, a total of €400,000 in the last 5 years has been paid to seed potato producers in compensation related to *Clavibacter michiganensis ssp. sepedonicus*, which covers both direct costs (decontamination treatment) and 80% of losses deriving from degrading of value. The bulk is used for the loss of value (PL NPPO communication).

[319] As agreed with the EC, Poland does not notify to EC other than the annual surveys to the FVO.
[320] Estimated by PL NPPO on the basis of extrapolation of results of bacterium findings in season 2009/2010 to data from previous seasons

In order to calculate the impact of *Clavibacter michiganensis ssp. sepedonicus* at EU level, extrapolations on the same basis as for *Ralstonia solanacearum* have been undertaken for the EU MS, excluding PL, and any other similar cases for which no notifications are available[321]:

- Direct costs (destruction of infected lots): **€77,000**;
- Direct losses (downgrading of probably infested lots): **€489,000;**
- Other costs (tracing and sampling): **€20,000;**
- Consequential losses: **€208,000**.

In the case of PL, even considering the number of cases as indicated by the PL NPPO, it is unclear whether all these outbreaks would qualify for solidarity funding, also considering the high percentage of mixed farms involved in potato production in this country. Therefore, for this MS, on the basis of average figures of destruction costs indicated in Breukers et al. (2006)[322], as adjusted for gross margin in PL, and the value of destroyed material (on the basis of gross margin) have been calculated as an average for the last five years[323]. This would amount to additional destruction costs of **€164,400**, and of losses of destroyed material ranging from **€388,000 to €1.4 million** (depending on gross margin: low value all costs considered, high value only base costs considered). It is not possible to estimate the losses related to downgrading of probably infested lots; as an indication, it is suggested that these losses could be up to the level of *Ralstonia solanacearum* (€3.5 million).

On the basis of the above, EU costs and losses for *Clavibacter michiganensis ssp. sepedonicus*, including PL, would be as follows:

- Direct costs (destruction of infected lots): **€241,000**;
- Direct losses (downgrading of probably infested lots): **€489,000 to €3.5 million[324];**
- Other costs (tracing and sampling): **€20,000 to €148,000[325];**
- Consequential losses: **€597,000 to €1.7 million**.

Table 61 Number of outbreaks of *Clavibacter michiganensis* ssp. *sepedonicus* in the EU, *2006-2010*

	2006	2007	2008	2009	2010	*Total*
ES			1 (seed)	2 (ware)	2 (ware)	***5***
BG	1 (ware and seed)				1 (ware) (b)	***2***
NL			2 (seed)	1 (ware)	1 (seed)	***4***
DE				1		***1***
IT				1 (seed)		***1***
SK	2 (ware and seed)	1 (ware)				***3***

[321] Another relevant cost for this HO is disinfection. However, given the approach adopted for calculation of costs for potato diseases (i.e. estrapolations on the basis of existing studies) and the fact that no solidarity dossiers have been submitted for this HO in recent years (which could provide unit costs), the inclusion of this cost has not been possible.
[322] Loss of destroyed material: gross margin for average table potatoes in PL: €258/ha (all costs), €964/ha (base costs only). Destruction costs for ware potatoes: €2,250/ha. Assuming average lot of ware potatoes (NL), 2.47 ha, destruction cost: €911/ha, adjusted for PL to €109/ha (on the basis of ratio of gross margin PL/NL).
[323] Based on number of findings as reported in FVO reports, considering 80% of cases.
[324] Assumed the same as for *Ralstonia solanacearum*
[325] Assumed the same as for *Ralstonia solanacearum*.

Total (a)	**3**	**1**	**3**	**5**	**4**	**16**

(a) As explained in the text above, PL notifies yearly the number of findings to the FVO.
(b) 3 according to letter of notification, 1 according to overview report for 2010.

Source: CIRCA

Table 62 Number of findings of *Clavibacter michiganensis* ssp. *sepedonicus* in the EU, *2006-2009*

	2006	**2007**	**2008**	**2009**	***Total***
Nb of lots of seed potatoes contaminated	16	24	32	51	***123***
Nb of lots of ware potatoes contaminated - without PL	278	385	252	125	***1,040***
Nb of lots of ware potatoes contaminated - with PL	2,502	2,135	1,645	1,222	***7,504***
Total – without PL	**294**	**409**	**284**	**176**	**1,163**
Total – with PL	**2,518**	**2,159**	**1,677**	**1,273**	**7,627**

Source: FVO Report on annual survey of MS

The **Potato Pol** scheme in the NL is a mutual insurance for Brown Rot and Ring Rot (and since the 2008 crop season for PSTVd), which run since 1997, after two years of government funded outbreak control, aimed at improving sanitation behaviour to prevent outbreaks (not irrigating from infected water).

It is a voluntary scheme (88%, 38%, 73% of seed, ware, starch growers in 2009, with a total number of 3,552 subscribers in 2009/10, representing 95,000ha).

It insures the risk of damage from accidental introduction or the unforeseen occurrence of brown rot, ring rot and PSTVd infections in potatoes. The scheme foresees the payment of a premium per ha, differentiated by breeding material/seed potatoes/consumption and starch potatoes. Three parallel funds for seed, ware and starch potato sectors are in place.

Potatopol ensures a fixed amount, which should cover the destruction and damage costs and ensure the survival of the business. There are three levels of insurance (Standard; +/- 30%), fee is pro rata**: Standard protection €7,500, €5,500, €2,750 for seed, ware, starch /ha**

- Base fees (€26.00 seed; €4.19 ware; €1.65 starch per ha)
- 10% excess and required management obligations
- Claims based on Government declaration of infection, 1st year only
- €250,000 government contribution, small compared to total fund
- €2.2 million EU required capital fund, collects about €1million per year

Potato Spindle Tuber Viroid

PSTVd is a Viroid that could largely affect a variety of plants, and in particular potato and tomato. Some ornamental plants (e.g. *Solanum jasminoides* and *Brugmansia* spp.) are host plants for the HO. In this analysis we consider direct costs and losses for the ornamental sector. Also in this case the estimate of costs and loses is highly dependent on the number of plants destroyed and the companies affected, as they differ depending on the stage of chain affected.

The NL experienced an outbreak of PSTVd in 2006, which involved a total **of 35 companies**[326] (137 lots, over two thirds of all lots in the NL) growing *Brugmansia* spp. and *Solanum jasminoides*. The total loss of the above outbreak cost € 3 to € 6 million to the sector (LTO Communication Growth Service). On the basis of data provided by the sector, the direct costs and losses incurred by the sector have been estimated at **€2.6 million**, with an average cost for each company estimated at **€60,000**.

On the basis of data on outbreaks as reported by MS and available in CIRCA, we consider a number of 3.7 outbreaks per year for the all EU. However, given the exceptional nature of the outbreak occurred in the NL, we consider the frequency of this outbreak 0.5/year. The estimates are based on the costs and losses of the outbreak in the Netherlands, adjusting the costs and losses of the outbreaks with the value of the sector[327] in the countries where outbreaks were reported.

The estimate of direct costs and losses for the all EU would be at **€3 million**.

Erwinia amylovora

Type of measures and costs

In the case of a positive finding of *Erwinia amylovora*, the main measure is destruction of infected plants, usually by burning, and the following replanting of destroyed plants. Therefore, direct costs and losses of the application of phytosanitary obligations are related with:

- Destruction and incineration cost in the nurseries;
- Loss of value of the destroyed material; and
- Replacement of destroyed material.

In several countries (e.g. Latvia, Italy, Slovenia), there are mechanisms in place for compensation of POs following outbreaks of this HO. An indication of compensation paid to POs for *Erwinia amylovora* is provided in Task 8. These mechanisms aim at reimbursing POs of the value of destroyed material, on the basis of parameters which are highly different according to the type and the age of the plants and orchards destroyed. As an indication of the variability of such costs, Table 63 reports the values of destroyed material compensated by Slovenia in the case of outbreaks.

The main costs are those related to the loss of material, the loss of trade and income for the years the new orchards will be productive.

It is highly difficult to estimate the direct costs and losses incurred by operators in the case of an outbreak of *Erwinia amylovora*, given the variability of the size of an outbreak and the

[326] The number of nurseries growing *Brugmansia* spp. and *Solanum jasminoides* in the NL is not exactly known. It differs between 20 and 100, depending on the market (source: LTO).
[327] AIPH/Union Fleurs data for flowers and pot plants production, 2010

number and variety of plants which are destroyed. On the basis of data on outbreaks (in PZs - FVO source) it is not possible to determine the intensity of the outbreaks (i.e. in terms of the number of plants affected), nor the sites concerned (i.e. differences in value of destroyed plants in nursery and orchards). This data is therefore on a historical basis, as it is not possible to extrapolate to future scenarios, given the high variability in values of the plants that could be affected by the HO.

On the basis of historical data, it is annual costs and losses of *Erwinia amylovora* are estimated to €800,000, considering only MS where PZs are in place, under the assumptions that only outbreaks in these areas would qualify for solidarity funding. Based on information provided by MS, the bulk of this represents loss of value, therefore we assume 20% are destruction costs, i.e. **€160,000** would be direct costs whereas **€640,000** would be lost value.

Table 63 Scales used in SI for calculation of value of plants in case of destruction for implementing compulsory phytosanitary obligations

Nursery material (value at official destruction)		
	EUR/plant	
Rootstocks	2008	
Apples, pears; M9, MA	0.98	
	June	October
	EUR/plant	EUR/plant
1-year old plants		
Apples	2.16	2.23
Pears	2.45	2.52
Pears on intermediate (quince)	3.15	3.22
2-year old plants		
Apples	2.53	2.61
Pears	2.87	2.94
1-year old plants in containers		
Apples	3.08	3.18
Pears	3.26	3.36
Pears on intermediate (quince)	3.70	3.79

Apple orchard (value at official destruction)			
	Value / plant (€)		
Age of plants (year)	3.5 x 1.2 m 2500 trees/ha 40.000 kg/ha	3.2 x 0.8 m 4000 trees/ha 45.000 kg/ha	2.8 x 0.7 m 5200 trees/ha 50.000 kg/ha
1	7.05	5.86	5.73
2	7.85	5.68	5.51
3	7.37	5.34	5.18
4	6.89	5.00	4.84
5	6.41	4.66	4.51
6	5.93	4.33	4.17
7	5.45	3.99	3.83
8	4.98	3.65	3.50
9	4.50	3.31	3.16
10	4.02	**2.98**	2.83

11	3.54	2.64	2.49
12	3.06	2.30	2.16
13	2.58	1.96	1.82
14	2.10	1.62	1.49
15	1.63	1.29	1.15
16	1.15	0.95	0.81
17-21	0.67	0.61	0.48
22 <	0.33	0.30	0.24

Pear orchard (value at official destruction)		
Value / plant (€)		
Age of plants (year)	33.5 x 1.2 m 2500 trees/ha 40.000 kg/ha	3.2 x 0.8 m 4000 trees/ha 45.000 kg/ha
1	8.67	7.30
2	9.71	7.51
3	9.32	7.34
4	8.75	6.94
5	8.19	6.54
6	7.62	6.14
7	7.06	5.74
8	6.49	5.34
9	5.93	4.94
10	5.36	**4.55**
11	4.80	4.15
12	4.23	3.75
13	3.67	3.35
14	3.10	2.95
15	2.54	2.55
16	1.97	2.15
17-21	1.41	1.76
22 <	0.70	0.88

Source: Agricultural institute of Slovenia

Table 64 Sources of data for calculations in Task 3

Harmful organism	Costs considered in the analysis	Unit costs considered (€) for extrapolation	Source	Method of extrapolation: scenarios
Anoplophora chinensis	Destruction costs	€400/tree	Lombardia (IT) solidarity dossier	Scenario: 5.5 outbreaks/year (source: FVO report on MS annual surveys, because of lack of clarity on findings/outbreaks, the number of dossiers for extrapolation was assumed taking into account the number of dossiers submitted yearly)
	Replacement of trees	€30/tree	Breukers et al., 2011	
	Extra costs for inspections	162.5/inspection (*4 inspections)	LTO	
	Value of destroyed material - nurseries (destructive sampling at inspections)	€9 - €14/plant	LTO	
	Costs deriving from prohibition to movement	€25,000/nursery	Estimated on the basis of data provided by LTO	
	Loss of trade	€40,000/nursery	Estimated on the basis of data provided by LTO	
	Loss of market	€25,000/nursery	Estimated on the basis of data provided by LTO	
Anoplophora glabripennis	Destruction costs	€400/tree	Lombardia (IT) solidarity dossier	Scenario: 2 outbreaks/year (source: MS notifications to COM, as available in CIRCA)
	Replacement of trees	€30/tree	Breukers et al., 2011	
Bursaphelenchus xylophilus	Destruction of trees	€110/tree	ES solidarity dossier	Scenario: 3 outbreaks/year (Based on historical number of outbreaks)
	Replacement of trees	€7.2/tree	ES Action Plan 2012	
	Loss of owners (compensation for removed wood)	€8/tree	Estimate on the basis of ES solidarity dossier (€18.6/m3; €30/tree for ornamental trees) and PT solidarity dossier (€20/ton)	
	One off cost heat treatment	€0.43/pallet	PT solidarity dossier	

Rhynchophorus ferrugineus	Destruction costs	€1,000/palm tree	Average of data from solidarity dossiers and costs from other sources of data (Range: 185-2,300 FR:€2,000-€2,300/palm (solidarity dossier) MT: €194.80/palm (solidarity dossier) IT:€900-€1,000/tree (press) GR:€750/tree (FVO Report))	Scenario: 21 outbreaks/year (2010 data, taken as basis given the increase in outbreaks observed in the past years; source: MS notifications to COM, as available in CIRCA and FVO report on annual surveys of MS)
	Treatment costs	€75/palm tree	MT solidarity dossier	
	Value of destroyed material	€50 - €100 /palm tree	Final value selected in consultation with DG SANCO Interview with UNION FLEURS: Value of a new palm: €25 Value of a full grown palm: €1000-€3000	
Diabrotica vv.	Pesticide treatment	€65/ha.	Average cost from solidarity dossiers	Scenario: 10 outbreaks/year (source: MS notifications to COM, as available in CIRCA)
	Crop rotation	€50/ha. (low value crops)	FCEC, 2009	
		€300/ha. (high value crops)	FCEC, 2009	
Bemisia tabaci	Direct losses	€2,544/outbreak/greenhouse	Calculated from Heikkila, 2008 (average yearly compensation per observed case)	Number of outbreaks in PZs (5 MS), 2006-2009 (source: MS annual reports as available in CIRCA)
Ralstonia solanacearum	Destruction of detected lots	Yearly cost for the NL: € 70,000	Breukers , 2007 adjusted to take into account differences in gross margin (source: Brookes, 2009)	Number of outbreaks, 2006-2010 (source: MS notifications to COM, as available in CIRCA)
	Other costs (tracing and sampling)	Yearly cost for the NL: € 18,000		
	Downgrading of probably infested lots	Yearly cost for the NL: € 440,000		
	Consequential losses	Yearly cost for the NL: € 192,000		

Clavibacter michiganensis spp. sepedonicus	Destruction of detected lots Other costs (tracing and sampling) Downgrading of probably infested lots Consequential losses	Assumed the same as for *Ralstonia solanacearum*	Breukers, 2007	EU (excl. PL) Number of outbreaks, 2006-2010 (source: Notifications to COM, as available in CIRCA).
	Destruction of detected lots (for PL)	€2,250/ha	Breukers et al., 2006 adjusted to take into account differences in costs/gross margin (source: Brookes, 2009)	PL: % of cases/findings (in FVO reports) as calculated on the number of cases estimated by PL NPPO
	Consequential losses	Gross margin PL	Brookes, 2009	
Potato Spindle Tuber Viroid	Direct costs and losses	€ 60,000/nursery	Estimated from NL solidarity dossier	Number of outbreaks, 2008-2010 (source: FVO summary of annual MS reports)
Erwinia amylovora	Direct costs and losses	€800,000/year	Compensation paid in last years in MS (source: MS consultation, FVO report, consultation nursery stock growers NL)	Historical data

ANNEX 6: Task 6 – list of HOs considered under the various options

List A: Option 6.a.ii – List of HOs to be considered under option ii (transfer to PH regime) based on analysis on S&PM Basic Directives

Note: based on analysis on S&PM basic Directives only. HOs listed in Directive 93/48/EEC, Directive 93/49/EEC, and Directive 93/61/EEC are listed in Table below

List of HOs listed in annexes of the S&PM Directives for which a treshold is required

The following obligation : " Harmful organisms which reduce the usefulness of the seed shall be at the lowest possible level" is annexed to Directives 2002/55/EC, 66/401/EEC, 66/402/EEC, 2002/54/EC, 2002/57/EC, 68/193/EEC
The following obligation : "any propagating material which, on the basis of visible signs or symptoms, is not substantially free of Hos,shall be properly treated or, where appropriate, shall be removed" is included in the Ornementals Directive
The following obligation: "The presence of harmful organisms which reduce the usefulness of the propagation material shall be at the lowest possible level" Grapevine Directive (68/193/EEC)

	Latin Name	Common Name	Type of HO	S&PM Directive	Crops/hosts	Treshold
1	*Acanthoscelides obtectus* Sag.	Bean weevil	Live insects	Vegetables (2002/55/EC) - Annex II.3.b (i)	legumes crops	"Seed shall not be contaminated by live insects"
2	*Bruchus affinis* Froel.		Live insects	Vegetables (2002/55/EC) - Annex II.3.b (i)	legumes crops	"Seed shall not be contaminated by live insects"
3	*Bruchus atomarius L.*		Live insects	Vegetables (2002/55/EC) - Annex II.3.b (i)	legumes crops	"Seed shall not be contaminated by live insects"
4	*Bruchus pisorum L.*		Live insects	Vegetables (2002/55/EC) - Annex II.3.b (i)	legumes crops	"Seed shall not be contaminated by live insects"
5	*Bruchus rufimanus* Boh.		Live insects	Vegetables (2002/55/EC) - Annex II.3.b (i)	legumes crops	"Seed shall not be contaminated by live insects"
6	*Acarinia spp*		Live insects	Vegetables (2002/55/EC) - Annex II.3.b (i)(ii)	all vegetables crops	"Seed shall not be contaminated by live *Acarina* "
7	*Claviceps purpurea*		Fungi	Cereal seeds (Directive 66/402/EEC) - Annex II.3	Cereal crops	"Higher than zero tolerance" (different treshold according to seed categories)
8	*Ustligineae ssp*		Fungi	Cereal seeds (Directive 66/402/EEC) - Annex I.4	Cereal crops	"shall be at the lowest possible level"
	Phoma spp	Blackleg	Fungi	Potato seeds (Directive 2002/56/EC)- Annex I.1 and 2	Seed potatoes	<2% for basic seed, < 4% for certified seed
		mild or severe virus	virus	Potato seeds (Directive 2002/56/EC)- Annex I.1 and 2	Seed potatoes	<4% in basic and <10% in certified seed. Light mosaics merely causing discoloration and not leaf deformation shall be ignored
	Heterodera rastochiensis Woll		Fungi (present in the soil)	Potato seeds (Directive 2002/56/EC)- Annex I.5 + Annex II	Seed potatoes	"the soil must not be infected"
	Synchytrium endobioticum (Scilb) Perc.		Fungi	Potato seeds (Directive 2002/56/EC)- Annex I.6 + Annex II	Seed potatoes	Zero tolerance
	Corynebacterium sepedonicum (Spieck et Kotth) Skapt and Burkh		Fungi	Potato seeds (Directive 2002/56/EC)- Annex I.6 + Annex II	Seed potatoes	Zero tolerance
	Pseudomonas solanacearum		Fungi	Potato seeds (Directive 2002/56/EC) - Annex II	Seed potatoes	Zero tolerance
	Pseudomonas syringae pv. glycinea,		Bacteria	Oil and fibre plants (Directive 2002/57/EC) - Annex I.4	Cotton	"at lowest at possible" but not Zero tolerance
	Diaporthe phaseolorum var. caulivora and var. sojae,			Oil and fibre plants (Directive 2002/57/EC) - Annex I.4	Cotton	"at lowest at possible" but not Zero tolerance
	Phialophora gregata	Brown Stem Rot				
	Phytophthora megasperma f.sp. glycinea.		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex I.4	Cotton	"at lowest at possible" but not Zero tolerance
	Botrytis spp		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	several crops	Not zero tolerance
	Alternaria spp		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	several crops	Not zero tolerance
	Ascochyta linicola (syn. Phoma linicola)		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	Fax seed	Not zero tolerance
	Collecotricum lini		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	several crops	Not zero tolerance
	Fusarium spp		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	several crops	Not zero tolerance
	Pectinophora gossypiella		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	several crops	Not zero tolerance
	Sclerotinia sclerotorium		Fungi	Oil and fibre plants (Directive 2002/57/EC) - Annex II.4	Oil seeed rape, mustard, sunflower, *Sanapsis alba*	Not zero tolerance
		grapevine fanleaf virus (GFLV)	virus	Vine (Directive 68/193/EEC) - Annex I	*Vine*	ZT
		Arabis mosaic virus (ArMV)	virus	Vine (Directive 68/193/EEC) - Annex I	*Vine*	ZT
		Grapevine leafroll-associated virus 1 (GLRaV-1)	virus	Vine (Directive 68/193/EEC) - Annex I	*Vine*	ZT
		Grapevine leafroll associated virus 3 (GLRaV-3)	virus	Vine (Directive 68/193/EEC) - Annex I	*Vine*	ZT
		Grapevine fleck virus (GFkV)	virus	Vine (Directive 68/193/EEC) - Annex I	*Vine*	ZT
		Several	all types	Ornementals (Directive 98/56/EEC) - Article 5	*Ornementals*	
				Fruit plants (2008/90/EC) - Article 1(3)	Fruit plants	This Directive shall apply without prejudice to the plant health rules laid down by Directive 2000/29/EC Member States shall ensure that in the case of the appearance, on the premises of a supplier, of a harmful organism listed in the Annexes to Directive 2000/29/EC or referred to in the specific requirements established pursuant to Article 4 of this Directive at a level higher than the level allowed in these specific requirements, the supplier reports it to the responsible official body without delays, notwithstanding any reporting obligations under Directive 2000/29/EC and carries out any measures imposed by that body
				Fruit plants (2008/90/EC) - Article 6(2)	Fruit plants	

List B: Option 6.a.ii – List of HOs listed in Directive 93/48/EEC, Directive 93/49/EEC, and Directive 93/61/EEC on which visual inspection should "at least" apply

COMMISSION DIRECTIVE 93/48/EEC of 23 June 1993 setting out the schedule indicating the conditions to be met by fruit plant propagating material and fruit plants intended for fruit production, pursuant to Council Directive 92/34/EEC

Species	Insects, mites and nematodes at all stages of their development	Fungi	Bacteria	Viruses and virus-like organisms
Citrus aurantifolia (Christm) Swing.	Aleurothrixus floccosus (Mashell)	Phytophthora spp		Citrus leaf rugose
Citrus Limon L. Burm. F	Meloidogyne spp.			Diseases that induce psorosis-like young leaves s as: psorosis, ring spot, cristacortis, impietratura, c
Citrus paradisi Macf	Parabemisia myricae (Kuwana)			Infectious variegation
Citrus reticulata Blanco	Tylenchulus semipenetrans			Viroids such as exocortis, cachexiaxyloporosis
Citrus sinensis (L.) Osbeck				
Corylus avellana	Epidiaspis leperii	Armillariella mellea	Agrobacterium tumefaciens	Apple mosaic virus
	Eriophis avellanae	Chondrostereum purpureaum	Xanthomonas campestris pv. corylin	Hazel maculatura lineare MLO
	Pseudaulacaspis pentagona	Nectria galligena		
	Quadraspidiotus perniciosus	Phyllactinia guttata		
		Verticillium spp		
Cydonia Miller	Anarsia lineatellaGenus or species Specific harmful organisms and diseases	Armillariella mellea	Agrobacterium tumefaciens	All
Pyrus communis	Eriosoma lanigerum	Chondrostereum purpureum	Pseudomonas syringae pv. Syringae	
	Scale insects, in particular:	Nectria galligena		
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Phytophthora spp.		
		Rosellinia necatrix		
		Verticillium spp		
Fragaria x ananassa duch	Aphelenchoides spp.	Phytophthora cactorum		Strawberry green petal MLO
	Ditylenchus dipsaci	Verticillium spp		
	Tarsonemidae			
Juglans regia L	Scale insects, in particular:	Armillariella mellea	Agrobacterium tumefaciens	Cheery leaf roll virus
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Nectria galligena	Xanthomonas campestris pv. jugland	
		Chondrostereum purpureum		
		Phytophthora spp		
Malus Miller	Anarsia lineatella	Armillariella mellea	Agrobacterium tumefaciens	All
	Eriosoma lanigerum	Chondrostereum purpureum	Pseudomonas syringae pv. syringae	
	Scale insects, in particular	Nectria galligena		
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Phytophthora cactorum		
		Rosellinia necatrix		
		Venturia spp.		
		Verticillium spp		

COMMISSION DIRECTIVE 93/48/EEC of 23 June 1993 setting out the schedule indicating the conditions to be met by fruit plant propagating material and fruit plants intended for fruit production, pursuant to Council Directive 92/34/EEC

Species	Insects, mites and nematodes at all stages of their development	Fungi	Bacteria	Viruses and virus-like organisms
Olea europea	Eusophera pinguis	Verticillium dahliae	Pseudomonas syringae pv. Savastanoi	All
	Meloidogyne spp.			
	Saissetia oleae			
Pistacia vera		Verticillium sp		All
Prunus domestica L.	Aculops fockeui	Armillariella mellea	Agrobacterium tumefaciens	Prune dwarf virus
Prunus salicina	Capnodis tenebrionis	Chondrostereum purpureum	Pseudomonas syringae pv. mors prunorum	Prunus necrotic ringspot virus
	Eriophyes similis	Nectria galligena	Pseudomonas syringae pv. syringae	
	Meloidogyne spp.	Rosellinia necatrix		
	Scale insects, in particular:	Verticillium spp		
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus			
Prunus armeniaca (L.)	Anarsia lineatella	Armillariella mellea	Agrobacterium tumefaciens	Prune dwarf virus
Prunus amygdalus Batsch	Capnodis tenebrionis	Chondrostereum purpureum	Pseudomonas syringae pv. mors prunorum	Prunus necrotic ringspot virus
Prunus persica (L.) Batsc	Meloidogyne spp.	Nectria galligena	Pseudomonas syringae pv. Syringae	
	Scale insects, in particular:	Rosellinia necatrix		
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Taphrina defortnans		
		Verticillium spp		
Prunus avium L.	Capnodis tenebrionis	Armillariella mellea	Agrobacterium tumefaciens	Prune dwarf virus
Prunus cerasus	Meloidogyne spp.	Chondrostereum purpureum	Pseudomonas syringae pv. mors prunorum	Prunus necrotic ringspot virus
	Scale insects, in particular:	Nectria galligena	Pseudomonas syringae pv. syringa	
	Epidiaspis leperii, Pseudaulacaspis pentagona,	Rosellinia necatrix		
	Quadraspidiotus perniciosus	Verticillium spp		
Ribe	Aphelenchoides spp.	Armillariella mellea	Agrobacterium tumefaciens	Black currant reversion
	Cecidophyopsis ribis	Nectria cinnabarina		Black currant Infectious variegation agent
		Rosellinia necatrix		
		Verticillium sp		
Rubus	Aceria essigi	Armillariella mellea	Agrobacterium rhizogenes	Raspberry bushy dwarf virus
		Didymelia applanata	Agrobacterium tumefaciens	Raspberry leaf curl virus
		Peronospora rubi	Rhodococcus fascians	
		Phytophthora fragariae var. rubi		
		Verticillium spp		

COMMISSION DIRECTIVE 93/49/EEC of 23 June 1993 setting out the schedule indicating the conditions to be met by ornamental plant propagating material and ornbamental plants pursuant to Council Directive 91/682/EEC

Species	Insects, mites and nematodes at all stages of their development	Fungi	Bacteria	Viruses and virus-like organisms
Begonia x hiemalis	Aleurodidae, in particular Bemisia tabaci	Powdery mildew	Erwinia chrysanthemi	Leafcurl disease
Fotsch	Aphelenchoides spp.	Stem rot pathogens (Phytophthora	Rhodococcus fascians	Tospoviruses (Tomato spotted wilt virus, Impatiens
	Ditylenchus destructor	and Rhizoctonia spp.)	Xanthomonas campestris pv. begoniae	necrotic spot virus)
	Meloidogyne spp.			
	Myzus ornatus			
	Otiorrhynchus sulcatus			
	Sciara			
	Thysanoptera, in particular			
	Frankliniella occidentalis			
Citrus	Aleurothrixus floccosus (Mashell)	Phytophthora spp.		Viroids such as exocortis, cachexia-xyloporosis
	Meloidogyne spp.			Diseases that induce psorosis - like young leaves
	Parabemisia myricae (Kuwana)			symptoms such as:
	Tylenchulus semipenetrans			psorosis, ring spot, cristacortis, impietratura, concavegum
				Infectious variegation
				Citrus leaf rugose
Dendranthema x Grandiflorum	Agromyzidae	Fusarium oxisporum spp. chrysantl	Agrobacterium tumefaciens	Chrysanthemum B mosaic virus
(Ramat) Kitam	Aleurodidae, in particular Bemisia tabaci	Puccinia chrysanthemi	Erwinia chrysanthemi	Tomato aspermy cucumovirus
	Aphelencoides spp.	Pythium spp.		
	Diarthronomia chrysanthemi	Rhizoctonia solani		
	Lepidoptera, in particular	Verticillium spp.		
	Cacoecimorpha pronubana,			
	Epichoristodes Acerbella			
	Thysanoptera, in particular			
	Frankliniella occidentalis			
Dianthus Caryophyllus L.	Agromyzidae	Alternaria dianthi		Carnation etched ring caulimovirus
and hybrids	Aleurodidae, in particular	Alternaria dianthicola		Carnation mottle carmovirus
	Bemisia tabaci	Fusarium oxisporum f. spp. dianthi		Carnation necrotic fleck closterovirus
	Thysanoptera, in particular	Mycosphaerella dianthi		Tospoviruses (Tomato spotted wilt virus, Impatiens
	Frankliniella occidentalis	Phytophthora nicotiana spp. parasitica		necrotic spot virus)
	Lepidoptera, in particular	Rhizoctonia solani		
	Cacoecimorpha pronubana, Epichoristodes acerbella	Stem rot: Fusarium spp. and Pythium spp.		
		Uromyces dianthi		
Euphorbia pulcherrima	Aleurodidae, in particular Bemisia tabaci	Fusarium spp.	Erwinia chrysanthemi	Tospoviruses (Tomato spotted wilt virus, Impatiens
(Wild ex Kletzch)		Pythium ultimum		necrotic spot virus)
		Phytophthora spp.		
		Rhizoctonia solani		
		Thielaviopsis basicola		
Gerbera L.	Agromyzidae	Fusarium spp.		Tospoviruses (Tomato spotted wilt virus, Impatiens
	Aleurodidae, in particular	Phytophthora cryptogea		necrotic spot virus)
	Bemisia tabaci	Powdery mildew		
	Aphelenchoides spp.	Rhizoctonia solani		
	Lepidoptera	Verticillium spp.		
	Meloidogyne			
	Thysanoptera, in particular			
	Frankliniella occidentalis			
Gladiolus L.	Ditylenchus dipsaci	Botrytis gladiolorum	Pseudomonas marginata	Aster yellow mycoplasm
	Thysanoptera, in particular	Curvularia trifolii	Rhodococcus fascians	Corky pit agent
	Frankliniella occidentalis	Fusarium oxisporum spp. gladioli		Cucumber mosaic virus
		Penicillium gladioli		Gladiolus ringspot virus (syn. Narcissus latent virus)
		Sclerotinia spp.		Tobacco rattle virus
		Septoria gladioli		Other harmful organisms
		Urocystis gladiolicola		Cyperus esculentus
		Uromyces trasversalis		

COMMISSION DIRECTIVE 93/49/EEC of 23 June 1993 setting out the schedule indicating the conditions to be met by ornamental plant propagating material and ornbamental plants pursuant to Council Directive 91/682/EEC

Species	Insects, mites and nematodes at all stages of their development	Fungi	Bacteria	Viruses and virus-like organisms
Lilium L.	Aphelenchoides spp.	Cylindrocarpon destructans	Erwinia carotovora subsp. carotovora	Cucumber mosaic virus
	Rhyzoglyphus spp.	Fusarium oxisporum f. sp. lilii	Rhodococcus fascians	Lily symptomless virus
	Pratylenchus penetrans	Pythium spp.		Lily virus x
	Rotylenchus robustus	Rhizoctonia spp.		Tobacco rattle virus
	Thysanoptera, in particular	Rhizopus spp.		Tulipbreaking virus
	Frankliniella occidentalis	Sclerotium spp.		Other harmful organisms
				Cyperus esculentus
Malus Miller	Anarsia lineatella	Armillariella mellea	Agrobacterium tumefaciens	All
	Eriosoma lanigerum	Chondrostereum purpureum	Pseudomonas syringae pv. syringae	
	Scale insects, in particular	Nectria galligena		
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Phytophtora cactorum		
		Rosellinia necatrix		
		Venturia spp.		
		Verticillium spp.		
Narcissus L.	Aphelenchoides subtenuis	Fusarium oxysporum f. sp. narcissi		Tobacco rattle virus
	Ditylenchus destructor	Sclerotinia spp.		Narcissus white streak agent
	Eumerus spp.	Sclerotium bulborum		Narcissus yellow stripe virus
	Merodon equestris			Other harmful organisms
	Pratylenchus penetrans			Cyperus esculentus
	Rhizoglyphidae			
	Tarsonemidae			
Pelargonium L.	Aleurodidae, in particular Bemisia tabaci	Puccinia pelargonii zonalis	Rhodococcus fascians	Pelargonium flower break carmovirus
	Lepidoptera	Stem rot pathogens (Botrytis spp.,	Xanthomonas campestris pv. pelargonii	Pelargonium leaf curl tombusvirus
	Thysanoptera, in particular Frankliniella occidentalis	Verticillium spp.		Pelargonium line pattern virus
				Tospoviruses (Tomato spotted wilt virus, Impatiens
				necrotic spot virus)
Phoenix	Thysanoptera	Exosporium palmivorum		All
		Gliocladium wermoeseni		
		Graphiola phoenicis		
		Pestalozzia Phoenicis		
		Pythium spp.		
Pinus nigra	Blastophaga spp.	Ophodermium seditiosum		All
	Rhyacionia buoliana			
Prunus L.	Capnodis tenebrionis	Armillariella mellea	Agrobacterium tumefaciens	Prune dwarf virus
	Meloidogyne spp.	Chondrostereum purpureum	Pseudomonas syringae pv. mors prunorum	Prunus necrotic ringspot virus
	Scale insects, in particular	Nectria galligena	Pseudomonas syringae pv. syringae	
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Rosellinia necatrix		
		Taphrina deformans		
		Verticillium spp.		
Pyrus L.	Anarsia lineatella	Armillariella mellea	Agrobacterium tumefaciens	All
	Eriosoma lanigerum	Chondrostereum purpureum	Pseudomonas syringae pv. syringae	
	Scale insects, in particular	Nectria galligena		
	Epidiaspis leperii, Pseudaulacaspis pentagona, Quadraspidiotus perniciosus	Phytophthora spp.		
		Rosellinia necatrix		
		Verticillium spp.		
Rosa	Lepidoptera, in particular	Chondrostereum purpureum	Agrobacterium tumefaciens	Apple mosaic virus
	Epichoristodes	Coniothyrium spp.		Arabis mosaic nepovirus
	acerbella, Cacoecimorpha pronubana	Diplocarpon rosae		Prunus necrotic ringspot virus
	Meloidogyne spp.	Peronospora sparsa		
	Pratylenchus spp.	Phragmidium spp.		
	Tetranychus urticae	Rosellinia necatrix		
		Sphaeroteca pannosa		
		Verticillium spp.		

COMMISSION DIRECTIVE 93/61/EEC of 2 July 1993 setting out the schedules indicating the conditions to be met by vegetable propagating and planting material, other than seed pursuant to Council Directive 92/33/EEC

Species	Insects, mites and nematodes at all stages of their developr	Fungi	Bacteria	Viruses and virus-like organisms
Allium ascalonicum	Delia spp.	Botrytis spp.		All, but especially Onion yellow dwarf virus
	Ditylenchus dipsaci	Peronospora destructor		
	Thysanoptera, but especially Thrips tabaci	Sclerotium cepivorum		
Allium cepa	Delia spp.	Botrytis spp.	Pseudomonas spp.	All, but especially Onion yellow dwarf virus
	Ditylenchus dipsaci	Fusarium oxysporum f. sp. cepae		
	Meloidogyne spp.	Peronospora destructor		
	Thysanoptera, but especially Thrips tabaci	Sclerotium cepivorum		
Allium fistulosum	Delia spp.	Sclerotium cepivorum		All
	Ditylenchus dipsaci			
	Thysanoptera, but especially Thrips tabaci			
Allium porrum	Delia spp.	Armillariella mellea	Pseudomonas spp.	All, but especially Arabis mosaic virus and Turnip mosaic virus
	Ditylenchus dipsaci	Verticillium spp.		
	Thysanoptera			
Solanum melongena	Aleyrodidae	Fusarium spp.		All, but especially Cucumber mosaic virus, Eggplant mosaic virus,
	Aphididae	Leveillula taurica f. sp. cynara		Potato virus Y and Tobacco mosaic virus
	Hemitarsonemus latus	Rhizoctonia solani		Celery mosaic virus
	Leptinotarsa deceml ineata	Pythium spp.		
	Meloidogyne spp.	Sclerotinia sclerotiorum		
	Tetranychidae	Verticillium spp.		
	Thysanoptera, but especially Frankliniella occidentalis	Cercospora foeniculi		
		Phytophthora syringae		
		Sclerotinia spp.		
Lactuca sativa	Aphididae	Botrytis cinerea		All, but especially Lettuce big vein, Lettuce mosaic virus and Lettuce
	Meloidogyne spp.	Bremia lactucae		ring necrosis
		Pythium spp.		
Lycopersicon lycopersicum	Aphididae	Pseudomonas syringae pv. tomato	Alternaria solani	All, but especially Cucumber mosaic virus, Potato virus X, Potato virus Y, Tobacco mosaic virus, Tomato mosaic virus and Tomato yellow leaf curl virus
	Aleyrodidae		Cladosporium fulvum	
	Hauptidia maroccana		Colletotrichum coccoides	
	Meloidogyne spp.		Didymella lycopersici	
	Tetranychus spp.		Fusarium oxysporum	
	Thysanoptera, but especially Frankliniella occidentalis		Leveillula taurica	
	Vasates lycopersici		Pbytophthora nicotianae	
			Pyrenochaeta lycopersici	
			Pythium spp.	
			Rhizoctonia solani	
			Slerotinia sclerotiorum	
			Verticillium spp.	
Rheum spp.		Agrobacterium tumefaciens	Armillariella mellea- Verticillium spp.	All, but especially Arabis mosaic virus and Turnip mosaic virus
		Erwinia rhapontici		
Solanum melongena	Aleyrodidae		Fusarium spp.	All, but especially Cucumber mosaic virus, Eggplant mosaic virus,
	Aphididae		Leveillula taurica f. sp. cynara	Potato virus Y and Tobacco mosaic vi rus
	Hemitarsonemus latus		Rhizoctonia solani	
	Leptinotarsa deceml ineata		Pythium spp.	
	Meloidogyne spp.		Sclerotinia sclerotiorum	
	Tetranychidae		Verticillium spp.	
	Thysanoptera, but especially Frankliniellao ccidentatis			

List C: Option 6.a.iii – list of HOs to be considered under option iii (transfer to S&PM regime)

List of HOs considered in 1992 as candidates for transfer from CPHR to S&PM Directives

	Latin Name	Common Name	Type of HO	Hosts (Source EPPO)	Annex CPHR	EPPO
1	*Aphelenchoides besgeyi* Christie	rice white tip nematode, strawberry crimp disease nematode	Insects, mites and nematodes, at all stages of their development	Strawberry Rice Several ornemental plants	II/A1 for rice and II/A2 for strawberry	A2 List (122)
2	*Ditylenchus destructor* Thorne	Potato tuber nematode, potato rot nematode	Insects, mites and nematodes, at all stages of their development	Potatoes (mainly) Other 70 species (ornamentals)	II/A2	A2 list (123) deleted in 1981
3	*Ditylenchus dipsaci* (Kühn) Filipjev	stem nematode, stem and bulb eelworm, onion bloat	Insects, mites and nematodes, at all stages of their development	> 450 all type of crops (vegetables, cereals, maize)	II/A2	A2 List (174)
4	*Clavibacter michiganensis* ssp *michiganensis* (Smith) Davis et *al.*	Bacterial canker, bird's eye	Bacteria	Tomatoes	II/A2	A2 List (50)
5	*Erwinia chrysanthemi* pv. *Dianthicola* (Hellmers) Dickey		Bacteria	vegetables and ornamentals	II/A2	A2 List (53) 5 other pathovars listed
6	*Pseudomonas caryophylli* (Burkholder) Starr et Burkholder	bacterial wilt, bacterial stem crack	Bacteria	Carnation	II/A2	A2 List (55)
7	*Xanthomonas campestris* pv. *Phaseoli* (Smith) Dye	common blight, fuscous blight	Bacteria	*Phaseolus vulgaris, P. lunatus, Vigna aconitifolia , V. radiata. Lablab purpureus , Mucuna deeringiana*	II/A2	A2 List (60/61)
8	*Xanthomonas campestris* pv. *Vesicatoria* (Doidge) Dye	bacterial spot, bacterial scab, black spot	Bacteria	Tomatoes, *Capsicum*	II/A2	A2 list (15)
9	*Xanthomonas fragariae* Kennedy et King	angular leaf spo	Bacteria	Strawberry, *Fragaria ananass*	II/A2	A2 List (135)
10	*Xylophilus ampelinus* (Panagopoulos) Willems et *al.*	bacterial blight	Bacteria	Vine	II/A2	A2 List (133)
11	*Colletitrichum acutatum* Simmonda	Anthracnose, black spot (of strawberry), terminal crook disease (of pine), leaf curl (of anemone and celery), crown rot (especially of anemone and celery)	Fungi	Strawberries, apples, eggplant, celery, olives, tomatoes	II/A2	??
12	*Didymella ligulicola* (Baker, Dimock et Davis)	ray (flower) blight of chrysanthemu	Fungi	Mums, endive, lettuce	II/A2	A2 List (66)
13	*Phialophora cinerescens (Wollenweber) van Beyma*	phialophora wil	Fungi	Carnation	II/A2	A2 List (77)
14	*Phytophtora fragariae* Hickman var. *fragariae*	Red core, red stele, Lanarkshire disease	Fungi	Strawberries, rapsberry	???	A2 List (7)
15	*Plasmopara halstedii* (Farlow) Berl. Et de Toni	mildew	Fungi	Sunflower		
16	*Puccinia horiana* Hennings	White rust	Fungi	Chrysanthemums	II/A2	A2 List (80)
17	*Arabis mosaic nepovirus*	Arabis Mosaic Virus	Viruses and viruslike organisms	Srawberries, hops, Vitis spp., ras	II/A2	??
18	*Chrysanthemum stunt virus*	Chrysanthemum stunt viroid (CSVd)	Viruses and viruslike organisms	Dendranthema × grandiflorum	II/A2	A2 List (92)
19	Raspberry ringspot nepovirus	George raspberry yellow blotch diseas	Viruses and viruslike organisms	Raspberrie	II/A2	A2 List (98)
20	Strawberry crinkle cytorhabdovirus	Strawberry crinkle virus	Viruses and viruslike organisms	Species of Fragaria	II/A2	EPPO code: SYCXX
21	Strawberry latent ringspot 'nepovirus'	Strawberry latent ringspot virus	Viruses and viruslike organisms	Strawberries and raspberries	II/A2	EPPO code: SYLRSX
22	Strawberry mild yellow edge disease	Strawberry mild yellow edge virus	Viruses and viruslike organisms	Strawberry	II/A2	EPPO code: SYMYA
23	Tomato black ring nepovirus	Tomato black ring virus	Viruses and viruslike organisms	Tomatoes	II/A2	EPPO code: TMBRXX
24	Tomato spotted wilt tospovirus	Tomato spotted wilt virus, Spotted wilt, bronze lea	Viruses and viruslike organisms	Tomatoes	I/B and II/A2 (this designation, dating back to 1992 and not revised since, could be considered to extend at least to INSV).	A2 list (290)

ANNEX 7: Task 7 - description of the affected sectors

The analysis carried out indicates that the sector mainly concerned with PP obligations is horticulture (including bulbs, bedding plants, flowering pot plants, foliage pot plants forest plants as well as vegetable plants). Based on statistics produced by the AIPH, the production of such plants mainly takes place in DE, UK, FR, NL as well as IT as regards tree nurseries, as summarized in the three following tables:

Flowers and pot plants (including cut flowers): area of land (ha), production values and number of holdings

MS	Total Area (land protected + open)	Year	Production value (million EUR)	Holdings (No)	Year
AT	305	2009	160	855	Prod. 2009, hold. 2004
BE	1.480	2006	254	1.831	Prod. 2008, hold. 2009
CZ	226	2007	71	1.000	2009
DK	580	2008	323	493	2008
FI	200	2009	98	717	2009
FR	5.942	2009	956	4.500	2005
DE	7.167	2008	1.574	8.591	2008
GR	1.094	2007	172		2006
HU	640	2009	95	850	2006
IE	61	2007	18		2007
IT	5.299	2007	1.408	6.357	Prod. 2008, hold. 2007
NL	7.560	2009	3.780	5.372	2009
PL	4.593	2005	186		1995
PT	1.036	2002	457	1.475	Prod. 2005, hold. 2002
SP	3.413	2007	412	3.969	Prod. 2006, hold. 2007
SE*	135	2009	95	501	2008
UK**	6.113	2009	304	9.400	2009, hold. 1998
Total	**45.844**		**10.363**	**45.911**	

*SE: vegetable cuttings included
** UK: tree nurseries included

Source: AIPH/Union Fleurs, 2010

These figures also consider the production of cut flowers, currently not subject to the PP obligation. IT and SP also appear as major producers but such production seems mainly to be dedicated to cut flowers. Finally, figures provided for PL are also high but, as they date back to 1995, they cannot form a reliable basis.

Bulbs: area of land, production values and number of holdings

MS	Area of land (ha)	Production value (million EUR)	Holdings (No)	Year
AT				
BE	15	1,5	203	, prod. 02, hold.99
CZ				
DK				
FI				
FR	1.156			
DE	230		298	2008
GR				
HU				
IE	81		481	prod. 07, hold. 01
IT				
NL	23.561	535	1790	2009
PL				
PT				
SP				
SE				
UK	5.400	37		9
Total	**30.443**	**573,5**	**2772**	

Source: AIPH/Union Fleurs, 2010

Tree nurseries: area of land, production values and number of holdings

MS	Area of land (ha)	Production (million EUR)	Holdings (No)	Year
AT	1.952	34	225	2009/hold. 04
BE	3.392	277	975	2009/value 08
CZ	1.087	15	150	2001
DK	2.070	91	130	2008*
FI	488		184	2009
FR	966	806	2.000	Hold. 05/09
DE	22.597	1.079	3.035	2008
GR	957			2007
HU	1.900	40	500	09/value, hold.06
IE	540	47	210	2005
IT	29.033	1.435		07/value 08
NL	17.139	592	4.844	2009
PL	4.393	225		2005
SP	5.843	101	1.136	2007
SE**	470	57	127	2008
UK***	6.200	535	2.826	2009, hold. 1998
Total	**112.717**	**5.300**	**19.924**	

*Nurseries with at least 2 ha
**Sweden: included are 55 ha container area
*** UK: No holdings : see flowers and pot plants

Source: AIPH/Union Fleurs, 2010

ANNEX 8: Typology of national compensation schemes (Task 3)

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
AS	Insurance scheme: 'multi peril' insurance applicable to arable crops and covered Hail, storm, frost, flood, rain, drought, drift, sprouting, pests, etc.					
BE	Solidarity fund for producers of potatoes	State aid N° 270/2004: Royal decree of 5 December 2005 fixing the contributions to be paid by the potatoes producers for the indemnification of the losses incurred as a follow-up to measures ordered for phytosanitary control	Federal Public service Health, Food Chain Safety and Environment.	1) Direct losses due to the destruction or treatment of potato's (excluding the loss of earnings) 2) Additional costs due to the treatment or processing of potato's in conditions of quarantine (excluding costs for destruction)	The fund is financed by the obligatory financial contribution of the producers of seed potatoes (€20 per ha) and ware potatoes (€10 per ha). The contributions temporarily stop in case reserves achieve the ceiling of €1,5 million	*Ralstonia solanacearum* *Clavibacter michiganensis ssp sepedonicus* *Meloidogyne chitwoodi et al;* *Meloidogyne fallax* *Synchytrium endobioticum* Potato spindle tuber Viroid
BG	Ad hoc compensation paid by Government to producers	Ordinance nr 1 for phytosanitary control, article 48: expenses for the limitation and eradication of outbreaks of quarantine harmful organisms and for the reimbursement of owners who have suffered losses due to obligatory phytosanitary measures shall be paid totally or partially with funds of the budget or as financial aid from the European community paid under the provisions of article 23 of Directive 2000/29.	Ministry of agriculture and Forestry.	Costs covered: 1) Costs of destruction of plants and plant products; 2) Costs for treatment of the contaminated plots; warehouses and agricultural machinery 3) Partial compensation of the farmers.	State budget	*Clavibacter michiganensis ssp sepedonicus* *Synchytrium endobioticum*
CY	Ad hoc compensation paid by Government to producers	National legislation on Plant Health	Ministry of Agriculture, Department of Agriculture	Not communicated.	State budget	*Clavibacter michiganensis ssp sepedonicus*
CZ	Public scheme	Act No. 326/2004 Coll. on plant health, as amended;(§ 76) - Decree No. 330/2004	State Phytosanitary Administration	1) Costs of one-off destruction of plants, plant products and other objects contaminated or suspected	Provision in the State budget	*Clavibacter michiganensis ssp sepedonicus* *Diabrotica virgifera*

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
		Coll. (§ 29)	and Ministry of Agriculture	of contamination by harmful organisms and their treatment; 2) Costs of one-off disinfestations, disinfection or other treatment of fields, warehouse, operation areas, machinery, transport vehicles, facilities, equipment, tools or other objects; 3) Value of destroyed materials. The value of the destroyed materials is mostly determined from the current market price of the product (selling price of the producer): local common price, own calculation of direct costs or average common price.		*Erwinia amylovora* *ESFY* *Globodera rostochiensis* *Mycosphaerella pini* *Pear decline* *Puccinia horiana* *Plum pox virus* *Colletotrichum acutatum* *Cryphonectria parasitica* *TSWV*
DE	Compensation exists in Plant Health legislation but is not used.					
DK	1) Mandatory mutual fund 2) Voluntary independent insurance scheme	Not communicated	1) Board representing farmers, the Danish Potato Council and government 2) A group of insurance companies	1) Costs associated with the lost crop and destruction costs of potato growers (seed and ware potatoes) but no replacement of seed. Costs borne in the initial year only. 2) By 2004, a group of insurance companies offered additional insurance to potato growers to cover the proportion of the loss from 60% up to 90% of the first year costs, and including the costs for buying new seed in the following year.	1) Growers pay a compulsory levy of approximately 0,54 € per tonne of potatoes sold, collected by the firms that buy potatoes. The fund raises about 540 000 € a year on approximately one million tonnes of production. 2) The insurance costs 20€ per ha of potatoes (at least 10% of potato farmers have taken out this insurance).	*Clavibacter michiganensis subsp. sepedonicus* *Ralstonia solanacearum*
ES	Public scheme	Ley 43/2002 de 20 de noviembre, de sanidad vegetal Real Decreto 1190/1998, de 12	Competent authority from the Autonomous	1) Cost of inspection and testing 2) Cost of destruction, disinfection, disinfestation or other treatment	Provision in the State budget	Harmful organism listed in the Annexes I and II of the Council Directive 2000/29/EC and new

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
		de junio, por el que se regulan los programas nacionales de erradicacción or control de organismos nocivos de los vegetales aún no establecidos en el territorio nacional	Communities	3) Financial losses other than loss of earnings (i.e. production costs)		harmful organisms introduced in any area of the Spanish territory
FI	Public scheme	Plant Health Act (702/2003), 30 §	Ministry of Agriculture and Forestry	1) Costs of disinfection, prevention or disposal that follow directly from the implementation of an order given in the prevention decision, or the value of the property that is disposed of or damaged due to the prevention measure; 2) Financial damage or cost due to the prohibition to sell, supply, transport or use goods based on a prevention decision or a similar restriction; and 3) Financial damage or cost that follows from discontinuation of plant production based on an order given in the prevention decision.	Provision in the State budget	Harmful organism listed in the Annexes I and II of the Council Directive 2000/29/EC and harmful organisms for which Commission's decisions concerning emergency measures are applied. Costs are covered in principle only for harmful organisms that can still be eradicated
FR	national solidarity funds (Private scheme taken over by a public one)	Article 1251-9 du code rural	Professionals	The compensation covers completely or partially the financial loss resulting from 1) the destruction of plants and plant products, 2) all direct costs incurred by the measures against the HO <u>Potatoes </u>: Covers maximum 2/3 of 80% of the damage. Maximum volume of 3000 tons per beneficiary.	Producers that want to be eligible for this fund should pay a fee to the manager of the professional solidarity fund. In case of outbreak, the managing organization(s) ask(s) for a State contribution. (Potatoes: minimum 50% of the covered losses of income and 100% of the costs of destruction and	*Pseudomonas solanacearum* and *Clavibacter michiganensis* on seed potatoes (*Solanum tuberosum*) (since 2002) *Diabrotica virgifera virgifera* on Zea maize (since 2009) Plum Pox Virus on Prunus: under development

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
					disinfestation; maize: the level of participation to the control costs paid by the manager of the professional solidarity fund is identical to the amount of contributions paid by the Government through public funds)	
GR	No support mechanism					
HU	Public scheme	Act 35 of 2000 on Plant Protection, Decree 7/2001 (I.17.) FVM on the rules of the implementation of phytosanitary measures	Central Agricultural Office Until 31 December 2006: Ministry of Agriculture and Rural Development	1) Costs of destruction and treatment of plants 2) Price of pesticide 3) Value of destroyed materials (plants, irrigation system, etc). The value of indemnification may not exceed 90% of the market value for propagating and planting material, 80% for other plants, 70% for plant products and other objects.	Provision in the State budget	Organisms harmful to potatoes: *Ralstonia*, *Clavibacter*, *Stolbur phytoplasm* Organism hamful to plums: *Xanthomonas arabicola pv. pruni*
HU	Insurance scheme: one all-risk (MPCI) insurance, the 'Yield insurance of arable crops' applicable to several arable and horticultural crops to cover risks associated to storm, hail, fire, snow break, ice break, drought, insects, sandblast, soil alligatoring, frost riving, sore, thunder stroke, landslip, flood, standing water, snow pressure.					
IR	Costs are normally borne by the affected businesses, however there have been a few limited cases where DAFF has aided the removal and destruction of affected material, e.g. a following the finding of Brown rot in 2007 and also in a number of limited cases of *Phytophthora ramorum*					
IT	Several insurance schemes exist to cover plant disease risks, as follows: · Crops single-risk: risks covered are hail, wind, black and hoar frost, flood, excess rain, drought, plant · diseases · Crops combined risks: risks covered are two or more of the events covered by single-risk insurance · Crops multi-peril (yield): risks covered are hail, wind, black and hoar frost, flood, excess rain, drought, plant · diseases These insurance types apply to all crops, fruit trees, shrubs and nurseries, trees for wood and seed plants. Insurance products are also structure specific (Structures combined risks) : they apply to greenhouses with metal framework,					
LT	Public scheme	2003-12-31 Resolution of the Government of the Republic of Lithuania No. 1706 "On the rules of partial reimbusement for application	State Plant Protection Service and Ministry of Agriculture	Costs of destruction or treatment of contaminated plants or plant products. Max 90% of the value of the destroyed plant materials. The	Provision in the State budget. Annual budget is decreasing from 430.000€ in 2006 to 116.000€ in 2010.	*Clavibacter* *Erwinia amylovora* *Globodera pallida* *Ditylenchus destructor* *Synchytrium endobioticum*

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
		of Phytosanitary measures"; updated on the 31st of October of 2006 by another Resolution No.1092.		standard prices are reviewed and approved annually in consideration of the potato market in Lithuania. Therefore, the size of compensation is different each year.		*Ralstonia solanacearum* *Plum pox virus* *Sharka*
LV	Public scheme	Regulation of the Cabinet of Ministers No 178 of 2009.02.24. "Order on allocation of the compensations for the enforcement of the phytosanitary measures"			Between 0,06 and 67,20 € per plant, depending from the host plant species and size	*Erwinia amylovora*

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
LV	Public scheme	Not communicated	The inspections before providing compensation are carried out by the plant protection services. The money is paid by the rural support service.	Compensatory aid will be granted in amount of market price for destroyed potatoes in purpose to buy resistant seed material. The support is paid out: 1) for acquisition of certified seed potatoes to the amount sufficient for planting of not more than 50% of the area being under potatoes that year when potato ring rot was found; 2) for the output of seed potatoes which have undergone field inspection, to the amount of 50% of documented losses incurred by selling seed potatoes as table or forage potatoes, or destruction of these potatoes, paid to farms where potato ring rot was found the preceding year; 3) for purchased and utilised disinfectants and disinfection carried out on the farm on 100% scale. 2) and 3) are paid to farms where potato ring not was found the preceding year. Losses incurred due to destruction or sales of potatoes as table or forage potatoes are calculated on the basis of the total forecasted price of seed potatoes, minus income from sold potatoes (if any).	Provision in the State budget	*Clavibacter michiganensis ssp sepedonicus*
LU	No data available					
MT	Although industry covers a proportion of the costs associated with the control of pests in case of an outbreak, in Malta there is no official cost-sharing scheme.					

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
NL	Voluntary independent insurance scheme 'PotatoPol'	Not relevant	Private insurance company (founded in 1997) – initiative of the Dutch Agriculture and Horticulture Organization (LTO) in cooperation with the Arable Farmers Union.	Contribution to the direct damage to the crop plus the costs of destruction. Any identified infected lot and all related lots to an infected one are destroyed. Additional restrictions: - Prohibition to plant potatoes in infected field for 6 years (normal crop rotation is 3 years); - All equipment must be cleaned carefully according to a described procedure; - All storage places must be cleaned. Farmers received fixed premiums to cover these costs if they have subscribed to the insurance scheme.	Voluntary participation of producers 2006: 4200 members to cover 66% of potato acreage (100 000 ha): - 92% of seed potato acreage (high valuable crop, highest return to farmers) - 45% of ware potato acreage - 75% of starch potato acreage Yearly voluntary subscription: - advance payment of 25% of the max. premium - adjustment payment at the end of the season based on the level of damage	*Ralstonia solanacearum* *Clavibacter michiganensis ssp sepedonicus* *PSTVd (since 2008)*
NL	A very small compensation fund also exists for bulb flowers, only for tulips and daffodils: growers pay a levy, if there is an outbreak they report at the end of the year what was destroyed, and then it is calculated if the accumulated amount is sufficient to cover losses or if an additional levy is required. The levy is currently at 4,53 € per 100 m².					

MS	**Type of scheme**	**Legal basis**	**Administrator**	**Types of costs covered**	**Source of funding**	**HO**
PL	Public scheme	The law of plant health of 18.12.2003 (o.j. no. 11, pos. 94, mutatis mutandis) (a) and the regulation of the minister of agriculture and rural development of 30.05.2006 on the rates of financial aid for various entities carrying out specific tasks in agriculture (o.j. no 98, pos. 683, mutatis mutandis)(b)	(a) main inspectorate of plant health and seed inspection (b) Ministry of agriculture and rural development and main inspectorate of plant health and seed inspection	a) Cost of any measure of control and prevention of further spread (e.g. value of destroyed material, costs of destruction) or real/actual loss b) Disposal of infected plants, disinfection treatment of storage areas, cover of loss resulting from downgrading of certified potatoes, purchase of certified potato tubers (all under certain conditions)	Provision in the State budget	*Xanthomonas campestris pv. phaseoli* *Clavibacter michiganensis ssp. sepedonicus* *Synchytrium endobioticum* *Diabrotica virgifera virgifera*
PT	Public scheme	Despacho Normativo 10/2006	Directorate General for Agriculture and Rural Development	Costs due to destruction: *Citrus tristeza virus:* Citrus tree : Nursery : 2€/plant On site : 15€/plant *Erwinia amylovora:* Apple tree and pear tree: Nursery: 1€/plant Culture: 7,5 €/plant *Ralstonia:* Solanacea: culture: 3000€/ha	Provision in the State budget	*Citrus tristeza virus* *Ralstonia solanacearum* *Erwinia amylovora*
RO	No data available					
SE	Possibility of compensation exists in Plant Health legislation but is not been used since 1995.					
SK	Possibility of compensation exists in Plant Health legislation but is not been used in the last 10 years					

MS	Type of scheme	Legal basis	Administrator	Types of costs covered	Source of funding	HO
SI	Public scheme	Plant Health Act (OJ RS No. 23/05) Rules on compensation in the area of plant health (OJ RS No. 27/03, 33/05)	Phytosanitary Administration of the Republic of Slovenia	1) Costs of value of destroyed materials 2) for the perennial plants (e.g. fruit, vine,…) also loss of yield for the next two years	Provision in the State budget (around 50 000€/year with the possibility to apply for extra funding)	Harmful organisms listed in the Annexes to Council Directive 2000/29/EC (*Erwinia amylovora, PPV, ESFY, Flavescence dorée, Phytophthora ramorum, Verticillium alboatrum and Verticillium dahliae, Xanthomonas arboricola pv. pruni, Apple mosaic ilarvirus, Apple proliferation MLO, Pear decline phytoplasma, Xanthomonas campestris, PSTVd)* and some harmful organisms from marketing directives (*Phytophthora cactorum, Agrobacterium, PNRSV, PDV*)
UK	Possibility of compensation exists in Plant Health legislation but is not used. The whole area of cost and responsibility sharing between government and industry in relation to phytosanitary controls is under review.					

Sources: compiled by the FCEC on the basis of the information provided by the MS during the evaluation of the solidarity regime and the CPHR evaluation. Data on Italian, Austrian and Hungarian insurance schemes are from the 2008 JRC report on the agricultural insurance scheme (http://mars.jrc.it/Bulletins-Publications/Agricultural-Insurance-Schemes-I-JRC-Scientific-and-Technical-Report

ANNEX 9: Survey questionnaire used in the supplementary study

DG SANCO QUANTIFICATION OF COSTS AND BENEFITS OF AMENDMENTS TO THE EU PLANT HEALTH REGIME: SUPPLEMENTARY ECONOMIC STUDY (FCEC) Survey of Member State (MS) Competent Authorities (CAs)

Introduction

This survey takes place in the framework of the supplementary economic study commissioned by DG SANCO to the FCEC to quantify the impacts from the amendments to the Common Plant Health Regime (CPHR).

An evaluation of the Common Plant Health Regime (CPHR) was carried out in 2009 - 2010 by the Food Chain Evaluation Consortium (FCEC), led by Agra CEAS Consulting. The evaluation report contains a series of recommendations for the amendments of the regime. These recommendations are the starting point for the review of the regime, which by 2012 should lead to a legal proposal from the Commission to the Council and the European Parliament. The legal proposal will be accompanied by an impact assessment, to be prepared by the Commission Services.

Following a consultation with the stakeholders of the CPHR and the Member States, the European Commission selected the key areas of policy change that are likely to have significant economic, social or environmental impacts:

- Amendment of the scope of the CPHR (possible inclusion of invasive alien species and improving coherence with S&PM regime);
- Introduction of mandatory intra-EU surveillance obligations;
- Amendment of the import regime, such as introduction of post-entry quarantine;
- Improvements to the plant passport system (expansion of the scope and harmonisation of the plant passport document);
- Improvements to the Protected Zones system;
- Introduction of incentives for effective implementation of the provisions of the CPHR (e.g. co-financing of measures against natural spread; coverage of losses of growers).

The aim of this survey is to collect specific information and cost data on these issues, and namely on the introduction of mandatory surveillance (section 1), on the expansion of the EU Solidarity Regime to include natural spread (section 2), and on the amendment to the Plant Passport system (section 3). An introduction describing these issues is provided in the beginning of each section.

It is noted that the scenarios and assumptions presented in the questionnaire are working hypotheses developed by the FCEC for the purposes of calculating the impacts of the options under review and do not constitute in any way the outcome of the final proposals to be put forward by the Commission.

The information you provide will be treated on a strictly confidential basis. All data collected through the survey will be used by FCEC for statistical analysis of the costs related to the Community Plant Health Regime only. *The confidentiality of your responses and statements is guaranteed in the sense that only aggregated statistical data will be published and that you will not be identified as having responded to the survey. In case you consider that some data are too sensitive and should be kept confidential vis à vis the Commission, please mark these figures accordingly; otherwise, data collected through the survey will be transmitted to DG SANCO of the Commission (for their perusal on the same confidentiality terms).* Please note that in the use of the data collected, we conform to the best practices as described e.g. in the Chapter V on Statistical Confidentiality of Council Regulation (EC) No 322/97 on Community Statistics.

Please note the following **abbreviations** are used in this questionnaire:

- BZ: Buffer Zone
- CAs: Competent Authorities*
- CPHR: Common Plant Health Regime
- HO(s): Harmful Organism(s)
- IAS: invasive alien species
- MS: Member States
- PO: Private operator
- PP: Plant Passport
- PZ: Protected Zone

* The term 'Competent Authorities (CA)' refers to the Single Authority (usually the NPPO) and the Responsible Official bodies as defined in articles 1.4. and 2.1(g) of Directive 2000/29/EC.

THE FCEC THANKS YOU IN ADVANCE FOR YOUR COOPERATION

Please return this questionnaire by 18 March 2011, by e-mail to:

EUPH-impact-FCEC@ceasc.com

Section 1 Analysis of mandatory surveillance costs

Introduction

The objective of this task of the study is to estimate the costs of introduction of mandatory intra-EU surveillance for key priority HOs. For each HO, an appropriate level of surveillance needs to be defined, and the total annual costs (EU-MS, at 50:50) of introducing mandatory surveillance at these levels should be estimated.

The HOs which are considered for this exercise are the following:

- *Anoplophora chinensis*
- *Bursaphelenchus xylophylus*
- *Erwinia amylovora*
- *Guignardia citricarpa*
- *Phytophthora ramorum*
- Potato Spindle Tuber Viroid
- *Rhynchophorus ferrugineus*
- *Synchytrium endobioticum*
- *Thrips palmi*
- *Xanthomonas axonopodis*

In addition, in order to provide a comparator, the surveillance measures applied on a compulsory basis in the MS under control measures for potato diseases (potato-ring rot - *Clavibacter michiganensis ssp. Sepedonicus*, and potato brown rot - *Ralstonia solanacearum*) are also to be considered.

To this end, the present targeted survey aims at gathering data on:

1. Surveillance plans in place in the MS for the specified HOs (and/or information on the principles on which surveillance is based for those HOs for which emergency measures and surveillance for Buffer Zones (BZs) and Protected Zones (PZs) are not in place[328]);

2. Data on the unit costs of the various components of surveillance, and namely:

    - Inspections (differentiating between forestry/non forestry);
    - Diagnostics;
    - Traps;
    - Information campaigns.

Please note that data on inspections related to the issuing of Plant Passports should not be included here, as these are covered by separate questions under section 3 of this questionnaire.

[328] *Synchytrium endobioticum, Thrips palmi, Xanthomonas axonopodis.*

1. Surveillance plans

1.1 Taking into account the environmental and climatic conditions of your country, the distribution of host plants, and the results of surveys conducted in previous years (where applicable), how would you define the risk level for the following HOs in your country?

For each HO below, please indicate the level of risk the HO is considered to pose in your country (i.e. low / medium / high), and the reason why (please tick).

	Risk level:	**Reason why HO is considered a risk in your country:**			
	Low/ Medium/ High	***Past outbreaks***	***Environmental/ climatic conditions***	***Distribution of host plants***	***Economic importance***
HOs subject to mandatory surveillance under emergency measures and BZs/ PZS:					
Anoplophora chinensis					
Bursaphelenchus xylophylus					
Erwinia amylovora					
Guignardia citricarpa					
Phytophthora ramorum					
Potato Spindle Tuber Viroid					
Rhynchophorus ferrugineus					
Gibberella circinata					
Other HOs:					
Synchytrium endobioticum					
Thrips palmi					
Xanthomonas axonopodis					
Control measures for potato diseases:					
Clavibacter michiganensis ssp. sepedonicus					
Ralstonia solanacearum					

1.2 With regard to the following HOs subject to mandatory surveillance under emergency measures and BZs/ PZs, please indicate:

1.2.1 The susceptible area (in ha), per type of site;
1.2.2 The susceptible number of sites;
1.2.3 The area (in ha) currently subject to visual inspections, per type of inspected site;

1.2.4 The number of inspected sites, per type[329];
1.2.5 The number of samples for testing per site or ha;
1.2.6 Where applicable, the number of traps per ha.

<u>Note:</u> If data per type of site below are not available please provide total. Please provide number of sites and/or hectares (ha), as applicable per type of site and depending on data available (if data are not available on ha, please provide data on numbers of sites and vice versa).

	TOTAL	**Per site:**				
		Places of production (farms, nurseries)	**Production sites (orchards, fields)**	**Garden centres**	**Forestry**	**Public green**
	Surveyed/ susceptible	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**
	ha / sites	***ha***	***ha***	***sites***	***ha***	***sites***
example		*3000 ha / 15000 ha*		*200 sites / 500 sites*		
HOs subject to mandatory surveillance under emergency measures and BZs/ PZS:						
Anoplophora chinensis						
No of samples (per ha or site)						
Bursaphelenchus xylophylus						
No of samples (per ha or site)						
No of traps (for vector) per ha.						
Erwinia amylovora						
No of samples (per ha or site)						
Guignardia citricarpa						
No of samples (per ha or site)						
Phytophthora ramorum						
No of samples (per ha or site)						
Potato Spindle Tuber Viroid						
No of samples						

[329] Please note that data on <u>inspections related to the issuing of Plant Passports</u> should not be included here, as these are covered by separate questions under section 3 of this questionnaire.

	TOTAL	Per site:				
		Places of production (farms, nurseries)	**Production sites (orchards, fields)**	**Garden centres**	**Forestry**	**Public green**
	Surveyed/ susceptible	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**
(per ha or site)						
Rhynchophorus ferrugineus						
No of samples (per ha or site)						
No of traps per ha						
Gibberella circinata						
No of samples (per ha or site)						
Control measures for potato diseases:						
Clavibacter michiganensis ssp. sepedonicus						
Ralstonia solanacearum						

Please indicate whether any of the inspections above are combined for several HOs and which ones:

1.3 With regard to the following other HOs, to the extent these are relevant for your country and are currently subject or could be subject to surveillance, please indicate:

1.3.1 The susceptible area (in ha), per type of site;
1.3.2 The susceptible number of sites;
1.3.3 The area (in ha) subject to visual inspections[330];
1.3.4 The number of sites subject to visual inspections;
1.3.5 Where applicable, the number of samples for testing per site or ha.

<u>Note:</u> if data per type of site below are not available please provide total.

	TOTAL	Places of production (farms, nurseries)	Production sites (orchards, fields)	Garden centres

[330] Please note that data on <u>inspections related to the issuing of Plant Passports</u> should not be included here, as these are covered by separate questions under section 3 of this questionnaire.

	TOTAL	Places of production (farms, nurseries)	Production sites (orchards, fields)	Garden centres
	Surveyed/ susceptible	**Surveyed/ susceptible**	**Surveyed/ susceptible**	**Surveyed/ susceptible**
Example:		*200 sites / 500 sites* *3000 ha / 15000 ha*		
Synchytrium endobioticum				
No of samples (per ha or site)				
Thrips palmi				
No of samples (per ha or site)				
Xanthomonas axonopodis				
No of samples (per ha or site)				

Please indicate whether any of the inspections above are combined for several HOs and which ones:

1.4 Where available, could you please briefly describe the principles on which surveillance (of the specific HOs, or surveillance more generally) is based in your country?

This may refer to type of surveillance e.g. delimiting surveys or detection surveys, methodology for setting up inspection and testing targets, level of statistical confidence sought etc.
Please indicate for which HO the information is available and attach the surveillance plans, if available, in separate documents.

	Surveillance principles
HOs subject to mandatory surveillance under emergency measures and BZs/ PZS:	
Anoplophora chinensis	
Bursaphelenchus xylophylus	
Erwinia amylovora	
Guignardia citricarpa	
Phytophthora ramorum	
Potato Spindle Tuber Viroid	
Rhynchophorus ferrugineus	
Gibberella circinata	

	Surveillance principles
Other HOs:	
Synchytrium endobioticum	
Thrips palmi	
Xanthomonas axonopodis	
Control measures for potato diseases:	
Clavibacter michiganensis ssp. sepedonicus	
Ralstonia solanacearum	

1.5 Is the level of surveillance (i.e. inspection and sampling intensity) currently applied in your country, per HO, considered to be sufficient to address your needs? *Please indicate.*

If not, what level of surveillance would be considered necessary and reasonable (i.e. technically justified for the particular reasons for which you carry out surveillance in your country, as identified in Q 1.1)? *Please indicate the estimated need for increase in inspections and sampling (% increase on current levels).*

	Level of surveillance currently applied	**If current level not sufficient, level of surveillance considered necessary**	
	Sufficient/not sufficient	***% increase in inspections***	***% increase in sampling***
Anoplophora chinensis			
Bursaphelenchus xylophylus			
Erwinia amylovora			
Guignardia citricarpa			
Phytophthora ramorum			
Potato Spindle Tuber Viroid			
Rhynchophorus ferrugineus			
Gibberella circinata			
Synchytrium endobioticum			
Thrips palmi			
Xanthomonas axonopodis			

Comments:

2. Costs

2.1 Could you please indicate the average fee rates (€/hour) for the inspectors, and the number of hours required on average for an inspection (including the taking of samples)?

Place of inspection	**Average fee rates (€/hour)**	**Average time per inspection (number of hours)**
Places of production (farms, nurseries)		
Production sites (orchards, fields)		
Garden centres		
Forestry sites		
Public green		

2.2 Could you please indicate the general operational costs involved? Please include the cost of setting up the survey, preparing annual reports, annually reviewing survey targets etc. Where possible, please differentiate between one off costs (e.g. start up) and recurring costs (e.g. annual reviews and reporting). If necessary (e.g. because there are substantial differences in costs), please differentiate between HOs:

HO *(please indicate)*	**Total operational costs (€)**	**One off costs (€)**	**Recurring costs (€/year)**

2.3 Could you please indicate whether private operators contribute to any of the surveillance costs and to which extent (% cost sharing PO/CA)? For those HOs for which emergency legislation is not in place and for which surveillance is not currently carried out in BZs and PZs, please indicate whether mandatory surveillance would involve POs and to which extent.

	Place of production (farms, nurseries)	**Production sites (orchards, fields)**	**Garden centres**	**Forestry**	**Public green**
	PO/CA %	**PO/CA %**	**PO/CA %**	**PO/CA %**	**PO/CA %**
HOs subject to mandatory surveillance under emergency measures and BZs/ PZS:					
Anoplophora chinensis					
Bursaphelenchus xylophylus					
Erwinia amylovora					
Guignardia citricarpa					
Phytophthora ramorum					
Potato Spindle Tuber Viroid					
Rhynchophorus					

	Place of production (farms, nurseries)	Production sites (orchards, fields)	Garden centres	Forestry	Public green
	PO/CA %	**PO/CA %**	**PO/CA %**	**PO/CA %**	**PO/CA %**
ferrugineus					
Gibberella circinata					
Other HOs:					
Synchytrium endobioticum					
Thrips palmi					
Xanthomonas axonopodis					
Control measures for potato diseases:					
Clavibacter michiganensis ssp. sepedonicus					
Ralstonia solanacearum					

2.4 Testing:

2.4.1 Please indicate the costs of diagnostic tests in your country:
Please indicate the cost per test and the estimated cost of labour. Please differentiate between types of tests, only to the extent different tests with significantly different costs are used for the different HOs, and specify test.

Note: The cost of taking samples should be included in the inspection time under 2.1 above.

2.4.2 Please indicate whether sufficient diagnostic capacity is in place, and whether there would be a need to invest further in case surveillance activity is intensified:

	Fee (€/hour)	**Cost of test (€/per unit)**	**Diagnostic capacity**	
			Sufficient (Y/N)	**Need to invest (Y/N)**
Please complete with specific test used in your country (as applicable, per HO):				
e.g. Molecular tests (PCR/gene sequencing); specific test per HO etc.				

2.5 Traps:

2.5.1 Please indicate the costs of traps in your country for the following HOs:
2.5.2 Please indicate the costs of monitoring of traps for the specific HOs:

	Cost of setting trap (€/trap)*	**Cost of trap inspection (€/trap)**	**Number of traps**	**Frequency of trap inspection**
Anoplophora chinensis				
Bursaphelenchus xylophylus				
Phytophthora ramorum				
Rhynchophorus ferrugineus				
Thrips palmi				

**Note*: *to include both the cost of the trap as such and the cost of installing the trap.*

2.6 Could you please indicate the cost of information campaigns, if any, in your country, for the specific HOs?

	Information campaigns	
	Carried out? (Yes/No)	**Cost (total in €)**
HOs subject to mandatory surveillance under emergency measures and BZs/ PZS:		
Anoplophora chinensis		
Bursaphelenchus xylophylus		
Erwinia amylovora		
Guignardia citricarpa		
Phytophthora ramorum		
Potato Spindle Tuber Viroid		
Rhynchophorus ferrugineus		
Gibberella circinata		
Synchytrium endobioticum		
Thrips palmi		
Xanthomonas axonopodis		
Control measures for potato diseases:		
Clavibacter michiganensis ssp. sepedonicus		
Ralstonia solanacearum		

Section 2: Analysis of the financial impact of expanding the EU Solidarity Regime to include natural spread

Introduction

The objective of this task of the study is to estimate the costs of the expansion of the EU Solidarity regime so as to in future also cover prevention measures for natural spread.

If all kinds of outbreaks would become eligible (i.e. without distinguishing between natural and man-assisted spread), in your view, what would be the impact on the dossiers submitted by your country for solidarity funding (volume and value)?

	Solidarity dossiers submitted under current eligibility rules:			**Solidarity dossiers that would have been submitted if all kinds of outbreaks were eligible *:**		
	Number of dossiers	**Outbreaks (HOs) concerned**	**Estimated total value (in €)**	**Number of dossiers**	**Outbreaks (HOs) concerned**	**Estimated total value (in €)**
2010						
2009						
2008						

** Note: assuming no change to the other criteria of the solidarity regime in terms of types of costs covered*

Section 3: Analysis of impacts of amendments to the Plant Passport (PP) system

Introduction

The objective of this task of the study is to evaluate the potential impact of various possible amendments to the current plant passport (PP) system, in particular the following options:

- To ensure that plant passports (PPs) accompany even the smallest number of plants or plant material used in the Business-to-Business trade;
- Idem, but in the Business-to-Consumer trade (i.e. up to the final consumer);
- To extend the compulsory use of PPs to sales outside protected zones or demarcated areas (but limited to the plants/plant material subject to PPs under the present regulations for such protected zones and demarcated areas);
- To extend the compulsory use of PPs to **all** plants/plant material and to **all** geographical zones;
- In the aforementioned four cases, PPs can keep the existing formats; but the study should also investigate the feasibility and the impact of the compulsory use of a **fully harmonised** format (or a set of formats, depending on the conditioning and packaging of the plants/plant material), retaining all the actual data fields (in principle, 10 fields);
- As a variant of the last case, the study should also investigate the feasibility of introducing a **simplified but still fully harmonised format** (so-called: logo), containing only a subset of the actual 10 data fields, but still guaranteeing the possibility of traceability of the origin of the plants/plant material.

Assessing the impact of these possible amendments will need to be based on available qualitative and especially also quantitative data. In order to follow a methodology that can yield reliable information within the timeframe of the study, we need from the national Competent Authorities the following data. *Where the requested data are not available, it would be useful to indicate where such information might be available.*

1. How many operators are authorized to issue PPs in your country?

Number

Comments

2. Does this number include operators selling to the final customer (such as garden centres)?

yes	
no	
don't know	

If yes, how many are they? *In case you cannot provide a precise figure, please estimate as a percentage of the total number of operators authorized to issue PPs.*

Number or percentage

Comments

3. How many operators are involved in the trade of plants or plants products (both of passported and non passported plants)?

Number

Comments

4. Do you have information on the number of PPs, issued by operators, per type of passport? Please give the numbers per type on annual basis:

Numbers	**conventional PP**	**replacement PP**	**PP for trade in protected zone**
yes			
no			

If no, do you know where such information might be available (*please specify*)

Other comments

5. Do you have information on the volume of plants produced in your country (both passported and non-passported species) ? Please give the volume on annual basis, distinguishing, if possible, between passported and non passported plants. Please also indicate the unit in which this volume is expressed (number, lots, etc.):

	passported plants	non passported plants	total
yes			
unit in which this number is expressed			
no			
don't know			

If no, do you know where such information might be available (*please specify*)

Other comments

6. Do you have information on the percentage that passported plants represent in the total production volume, expressed in number of plants produced?

yes	
no	
don't know	

If no, do you know where such information might be available (*please specify*)

Other comments

7. Do operators in your country already use a standardised format or set of formats for PPs they are authorised to issue? Please distinguish between a standardised set elaborated by the Competent Authorities, and a standardised set elaborated by the plant industry itself:

yes, operators use a standardised format prescribed by the competent authorities	
yes, operators use a standardised format elaborated by the plant industry itself	

no, every operator uses his own format	
don't know	

Comments

8. In the case there exists in your country a standardised format elaborated by the competent authority, is its use by the operators optional or compulsory?

optional	
compulsory	
don't know	

Comments

9. In case the use of the format or set of formats elaborated by the competent authority is optional:

9a) Do you know how often this optional format is used?

always or nearly so	
most of the time	
it is hardly used	
it is not used	
don't know	

Comments

9b) Do you know why operators prefer to use their own format?

yes, for the following reason	
don't know	

Comments

10. In the case there is no compulsory format or set of formats, does the competent authority accept that the PP is composed of several parts, with some data on a commercial document used by the operator (e.g. invoice, shipping list, transportation document), and some other data on a complementary document ?

PP can consist of several parts	
PP has to be 1 single document	
don't know	

Comments

11. Do you have an idea on the number of cases in which PPs have actually been used to trace back the origin of a phytosanitary problem, e.g. since the year 2000?

yes	
no	

If possible, please provide details or other comments

12. In the case it would be considered to issue a PP for all plant material for planting (as defined in article 2 of Directive 2002/29/EC), are there species or categories of plants (e.g. plants for indoor use only) for which you consider that a PP would not be useful, because they play no role in the spread of harmful organisms, or for any other reason? If so, could you please specify the species or plant categories and the reason for which a passport would not be useful?

species or categories of plants	**reasons why a PP would not be useful**

Other comments

13. Can you provide the coordinates of operators or their representatives or other experts we could contact in order to have a good understanding of the computer systems operators actually use to manage their business (stock keeping, invoicing, transportation, issuing of PPs)? *Please note that expert(s) can be from the competent authorities, research centres or universities as well as from organisations representing the operators.*

name of operator	
if possible, telephone number or other contact data	

Comments

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DAISIE European Invasive Alien Species Gateway.

ANNEX 11: Terms of Reference