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Accompanying the

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

establishing a framework for Community action to achieve a sustainable use of pesticides

{COM(2006) 373 final}

THE IMPACT ASSESSMENT OF THE THEMATIC STRATEGY ON THE SUSTAINABLE USE OF PESTICIDES

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EXECUTIVE SUMMARY

This Impact Assessment (IA) has been prepared by the Commission services to support the Thematic Strategy on the Sustainable Use of Pesticides, which is presented in a separate Communication from the Commission[1]. Based on an in depth study carried out for the Commission by an outside contractant[2], it investigated in great detail the economic, social, health and environmental impacts of the measures proposed in the Thematic Strategy in order to achieve the overall objective of reducing the risks from pesticide use to human health and the environment.

1. Consultation of interested parties

The development of the Thematic Strategy on the Sustainable Use of Pesticides fully respected the minimum standards for consultation[3]: four rounds of consultations were organised by the Commission, so that all stakeholders concerned had the possibility to contribute to the development of the Thematic Strategy. First, a Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides'[4] was submitted to the European Parliament, the Council, and the Economic and Social Committee, and was published on the internet for consultation of the general public. Secondly, specific meetings and conferences on various specific issues raised were organised or attended to by the Commission. Then a study was elaborated in parallel by an external consultant (BiPRO) on the basis of surveys and interviews among the Member States and key stakeholders in order to assess economic impacts of the specific measures to be part of the Thematic Strategy. The final report of this study was published on the Commission's website to receive comments. And lastly a final consultation was launched on the Internet in 2005. It outlined the main actions that have been considered for inclusion in the proposal for a Thematic Strategy.

2. Problem definition

Pesticides are active substances and products designed to influence fundamental processes in living organisms and, therefore, may have the potential to kill or control harmful organisms such as pests, whether used in agriculture or to control the growth of plants on non-agricultural surfaces (*plant protection products*) or for other purposes (*biocidal products*). Given their much greater importance (both in terms of quantities used and related economic turnover) and although using the term "pesticides", the Thematic Strategy will deal for the time being with plant protection products (PPP) only. However, biocidal products may also be concerned at a later stage if estimated necessary.

There are significant economic and social benefits associated with the use of PPPs. They improve or safeguard yields by eliminating or reducing competition from weeds and attacks by pests; they protect and preserve plant products against harmful organisms; they improve or protect quality of the produce and they minimise labour input. PPPs also play an essential role in ensuring reliable supplies of agricultural products each year, by contributing to prevent

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1 COM(2006) 372.

2 The consultation was launched by the Commission following adoption of the Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides' - COM(2002) 349. All steps of the consultation and the relevant documents are available at: http://europa.eu.int/comm/environment/ppps/home.htm

3 COM(2002) 704.

4 COM(2002) 349, available at: http://europa.eu.int/comm/environment/ppps/1st_step_com.htm

fluctuations of annual yields. Moreover, the responsible use of PPPs contributes to ensuring the availability of low-priced fruits and vegetables of good quality, which makes them affordable for all consumers. The use of PPPs reduces demand for land for food production[5] and enables the regional production of a wider variety of food, which in turn can reduce transport costs and make more land available for other uses, e.g. amenity, natural parks and protection of biodiversity. Conservation tillage, which reduces erosion, and minimum tillage techniques, which reduce the demand for fossil energy in agriculture and decrease the leaching of nutrients, partly depend on the use of herbicides. Last but not least, the European plant protection industry is a significant economic player on the world market and an important employer in Europe with around 26.000 employees in the EU-25. Three of the five largest global companies are based in Europe. In addition, there are many other companies involved in the use of PPPs (e.g. manufacturers of spraying equipment, service companies for aerial spraying and others).

However, by nature pesticides are often deliberately released into the environment during use, which may lead to exposure of humans and the environment.

Risks to human health can occur through *direct exposure* (industrial workers producing pesticides and operators – in particular farmers - using them), and *indirect exposure* (consumers, residents and bystanders), in particular during or after use in agriculture, landscaping, on golf courses, schools and public building maintenance, road and highway weed control, lawn care and other activities.

A particular pesticide will have an adverse impact on human health when the level of exposure exceeds levels considered as safe. The risks related to each *individual* active substance contained in pesticides are evaluated during the relevant authorisation procedures, but there is no satisfactory assessment of the effects of exposure to *complicated mixtures* of chemicals (epidemiological studies are lacking and causal chains are too complex). Thus, it is impossible to evaluate the *overall effective impact on human health of <u>all</u> substances currently in use*.

According to a survey of the European Federation of Agricultural Workers' Unions (EAF), the most common observed adverse effects of pesticides on workers and operators are acute and include headaches, vomiting, stomach-aches, and diarrhoea, caused by exposure during application, preparation or mixing and handling of containers[6]. Chronic health impairment results from a low but constant exposure level and has a long-term character (e.g. cancer, birth defects reproductive problems, sensitisation). Major incidents, in particular clear correlations between exposure and chronic effects, are often not recognised immediately since no obvious symptoms of poisoning exist.

Indirect exposure of bystanders, residents (*via* spray drift) and consumers (*via* residual amounts in agricultural produce or water), can be amplified for especially vulnerable population groups, such as children (particularly sensitive to suspected 'cocktail effects'), the elderly, or other particular risk groups (immunologically compromised people, chronically sick, etc.), and workers (due to their possible intensive exposure). At present, the scientific

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5 Oppenheimer, Wolf and Donnelly, 1998. Possibilities for future EU environmental policy on plant protection products, Synthesis report of six sub-reports in PES-A/phase 2.

6 Summary of the EFA questionnaire on the health and safety linked to pesticides presented in the second EFA colloquium on pesticides, 6-8/3/1997: 2160 workers in all Member States responded, about 20% reported adverse incidents.

Community sees possible gaps in knowledge for children. Evidence is emerging to document combination effects, but adequate risk assessment methodology to predict their consequences is not available.

Risks to the environment from unintended and excessive flows of chemical substances to water, air and soil result in adverse effects on plants, wildlife, quality of the environmental compartments and biodiversity in general (although the latter is also influenced by a number of other factors). In particular, spray drift, leaching or run-off are diffuse sources of uncontrolled dissemination of plant protection products (PPPs) into the environment leading to pollution of soil and water compartments (surface water and ground water[7]). Environmental contamination can also occur during and after application, cleaning of equipment or uncontrolled, illegal disposal of PPPs or their containers (point sources). According to the European water suppliers organisation[8], pesticide contamination of raw water is very severe in lowland rivers, with a high proportion of contamination exceeding the 0,1 µg/L threshold value and, therefore, imposing pesticide removal treatment before the water can be distributed as drinking water. The potential contamination of surface and groundwater requires constant efforts to monitor and – taking into account the long time scale of contamination and remediation – high scrutiny in the regulatory process.

With regard to the potential for exposure of humans and direct emissions into the environment, ***the use and post-use stages are the riskiest steps*** in pesticide life-cycle. Emissions can occur in a diffuse way or at more concentrated points of incidental discharges. Producers and distributors are currently liable for the safe delivery and for the quality of the products sold to the final user, but their possibilities to influence activities regarding diffuse or point emissions are relatively limited. The user who is finally taking the decision on the 'why, 'what', 'when' and 'how' of any pesticide use – more or less influenced by the information received from the producers and distributors or other advisory bodies like extension services or food producers – is obviously the key actor for limiting unacceptable pesticide contamination of the environment at large.

The Legal Situation

The Community regulatory framework concerning plant protection products focuses primarily on the placing on the market and the end of the life cycle of such products. The most relevant pieces of legislation are:

Directive 91/414/EEC on the placing of plant protection products on the market, which intends to prevent risks at source through a very comprehensive risk assessment procedure for each active substance and the products containing the substance, before they can be authorised for marketing and use.

Regulation (EC) No 396/2005 on maximum residue levels in food and feed of plant and animal origin, which sets maximum residue limits (MRLs) of active substances in agricultural produce, thus intending to limit the risks to consumers when entering the food chain. Monitoring residues is decisive to know if recommendations and restrictions have been respected.

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[7] The most commonly found pesticides in groundwater are atrazine and simazine, broad spectrum herbicides used in the past in high quantities but now prohibited.

[8] EUREAU Position Paper 'Keeping Raw Drinking Water Resources Safe from Pesticides', 2001.

One of the shortcomings of the current legal framework concerning pesticides is that the actual use phase, which is a key element for the determination of the overall risks that they pose, is not sufficiently addressed. The very purpose of this Thematic Strategy is to address this deficiency (see Figure 1).

The international context

In view of the global and transboundary nature of the problems caused by pesticides, significant action has been taken at international level. The United Nations Food and Agriculture Organisation (***FAO***) adopted for the first time in 1985 the International Code of Conduct on the Distribution and Use of Pesticides, which contains guidance on pesticide management for all public and private entities engaged in or associated with these activities.

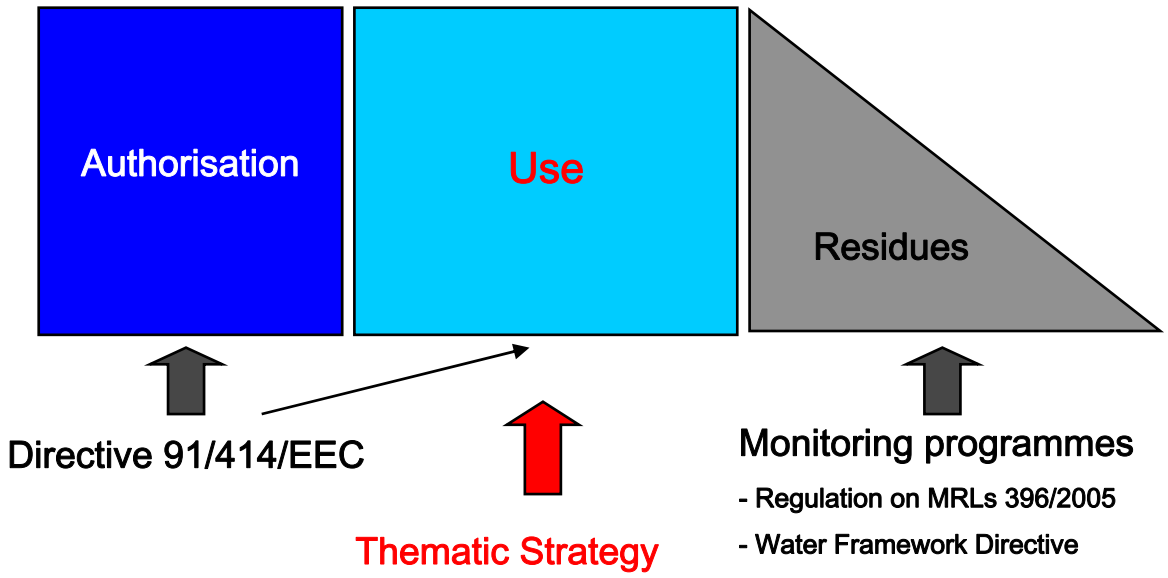

Figure 1: Deficiency in current legislation concerning pesticide use phase

The Environment Programme of the Organisation for Economic Co-operation and Development (***OECD***) has developed tools for chemical testing and assessment that promote international harmonisation, helps countries find ways to share the work of evaluating different types of chemicals, and, since 1992, provides a forum through which countries exchange information about regulatory approaches and decisions. A Pesticide Risk Reduction Steering Group was initiated in 1994.

A number of countries outside the EU have already put into place measures with regard to pesticides that are comparable to all or part of those now envisaged in the Thematic Strategy. Among these are the ***USA, Canada, Australia, Switzerland, Norway***, and also developing countries such as ***Brazil***.

Many particularly hazardous pesticides are also subject to international Conventions to protect human health and the environment such as the ***Rotterdam Convention on the Prior Informed Consent (PIC) procedure*** for certain hazardous industrial chemicals and pesticides in

international trade, implemented in the Community by Regulation (EC) No 304/2003[9] and the ***Stockholm Convention on Persistant Organic Pollutants*** (POPs), implemented through Regulation (EC) No 850/2004[10].

Need for EU action

Since no harmonised risk indicators are yet available at Community level in order to assess trends in the risks from pesticide use, the only proxy we currently have is trends in pesticide use. The current situation regarding pesticide use in the Member States is marked by large variations, not only in overall use, but also in the prevailing trends. These can be partly explained by the diverging structures of the agricultural sector and different climatic conditions (leading to different needs in terms of plant protection), but also by efforts undertaken in several Member States to reduce the need for pesticides and the correlated risks to human health and the environment through National Action Plans.

Currently, some Member States have already adopted measures to reduce the risks for health and the environment linked to pesticide use, while others have not yet taken such action. This creates a situation where there is no level playing field for pesticide users and pesticide industry, which can amount to unfair competition for economic actors in different Member States. Furthermore, there is no equal level of protection of human health or the environment throughout the Community and pesticide use shows diverging trends between Member States.

Without any Community intervention, this trend towards divergence in the Member States is very likely to continue, leading to totally different levels of protection of health and environment and diverging conditions for the main users of pesticides (i.e. farmers) in the Member States, which would be against one of the fundamental objectives of the Treaty. Setting equal standards and objectives to be achieved in all Member States can only be done by the Community. Otherwise the current situation with unequal obligations for economic operators will continue.

Besides, placing of pesticides on the market as well as monitoring of pesticide residues are already harmonised through Community legislation. The same should therefore apply to other aspects of pesticides policy.

3. Objectives

This Strategy positions itself within the Sixth Environment Action Programme (6th EAP), where its overall and specific objectives are underlined.

Pursuant to Article 7(1) of Directive 1600/2002/EC establishing the 6th EAP, the overall objective of the Thematic Strategy is to reduce the impact of pesticides on human health and the environment and more generally to achieve a more sustainable use of pesticides as well as a significant overall reduction in risks and of the use of pesticides consistent with the necessary crop protection.

[9] OJ L 63, 6.3.2003 p. 1-26.
[10] OJ L 158, 30.4.2004, p. 1.

The specific objectives of the Thematic Strategy on the Sustainable Use of Pesticides outlined in Article 7(2) (c) of the above-mentioned directive are:

(i) to minimise the hazards and risks to health and environment from the use of pesticides;

(ii) to improve controls on the use and distribution of pesticides;

(iii) to reduce the levels of harmful active substances including through substituting the most dangerous with safer (including non-chemical) alternatives;

(iv) to encourage the use of low-input or pesticide-free farming, in particular by raising users' awareness, by promoting codes of good practices and consideration of the possible application of financial instruments;

(v) to establish a transparent system for reporting and monitoring the progress made in the achievement of the objectives of the strategy including the development of suitable indicators.

By selecting measures optimising the economic, social, environmental and health impacts, the Strategy is fully coherent with the Lisbon objectives of growth and employment.

Besides, the goal to reduce significant threats from pesticide use is fully in line with the guiding precautionary principle for sustainable development.

4. Methodology used

Due to the holistic approach followed by Thematic Strategies in addressing a specific topic, a lot of emphasis has been put on integration of the measures of the Strategy in existing policies and legislation. The Thematic Strategy on the Sustainable Use of Pesticides is actually composed of a number of individual measures that, in accordance with this concept of integration, will either be implemented using existing instruments or, if not feasible, will be proposed as new legislation, which will be presented in parallel or partly subsequent to this Communication.

So the basic approach is threefold:

– incorporation of a number of measures into the existing legal framework, in particular Directive 91/414/EEC and its revision, and policy frameworks such as the CAP or Research and Development

– new legislative proposals: a Framework Directive on the sustainable use of pesticides that will incorporate all measures, where a legislative solution was found necessary but which cannot be integrated into existing legislation. The Directive will set out goals and objectives, leaving the necessary freedom to Member States to adapt the measures to their specific situations, and foresees a system of reporting with appropriate risk indicators and information exchange for reviewing the national measures in order to develop guidance and best practices. In addition, there will be a proposal for a Regulation addressing the collection of statistical information on the use of pesticides

– recommendation to Member States to take certain further measures as appropriate, for which Community intervention was not found adequate or practicable (in the spirit of the subsidiarity principle).

This impact assessment focuses on measures and related options that cannot be integrated in existing legislation / policies, that are expected to be of major relevance for achieving the objectives of the Thematic Strategy, or that were very controversial during the consultation process.

For each of the measures studied in detail in this IA, several options to put them into practice have been developed- ranging from 'no-action' to mandatory highly prescriptive legally binding options, *via* voluntary or partially binding options. It is to be stressed that the 'no-action' option has been systematically listed, and refers to a strict *status quo*: no improvement in the existing framework, but not alignment to the lower degree either ('no-action' is not 'no-acting'). As a consequence of this, by definition, the 'cost of no action' is equal in absolute terms but opposite in sign to the excepted benefit associated to the proposed strategy. All options have then been analysed in the following way:

– determination and documentation of the current situation (*status quo*) in EU Member States related to the key measures and options,

– identification of causalities and relations,

– assessment of the impacts of the various options,

– recommendation of most appropriate options.

Impacts were assessed with respect to:

– economic consequences (where possible measured in € additional costs or additional income compared to *status quo* for the actors concerned),

– social consequences (where possible measured in number and quality of jobs; based on average correlations income to jobs or costs to jobs),

– environmental consequences (mainly assessed on the basis of expected reduction in tons of PPP used, taking into consideration possible effects of PPP substitution and other consequences that are not correlated to use reduction but nevertheless constitute a risk reduction, e.g. buffer zones to protect water),

– health consequences (not quantified but qualitatively assessed taking into consideration avoided adverse health impacts on operators, consumers, bystanders as an effect of reduced exposure or reduced number of accidents).

The expected benefits are mainly improvements in the situation with regard to adverse impacts on the environment or health, or other societal benefits (i.e. reduced external costs due to PPP use) by a more sustainable use of pesticides. Conversion of such expected benefits to monetary terms is difficult as they are the outcome of a complex causal chain or it is impossible to estimate the value of the benefits for society, such as increased food quality due to lower contamination of feed and food products, enhanced biodiversity or higher quality of life due to decreased occurrence of diseases.

These positive societal effects are expected as a result from the implementation of the measures proposed under the Thematic Strategy. It has to be recalled that there is no simple correlation in the sense "use reduction of PPP = benefits for society". If not specifically targeted at risk reduction and this in a proportionate manner, a use reduction may cause unwanted effects such as yield losses, degradation of valuable man-made landscape, shift to use of highly active and riskier PPP or other unwanted impacts.

Figure 2 illustrates the correlation between benefits for the society and a targeted PPP use reduction in a schematic way.

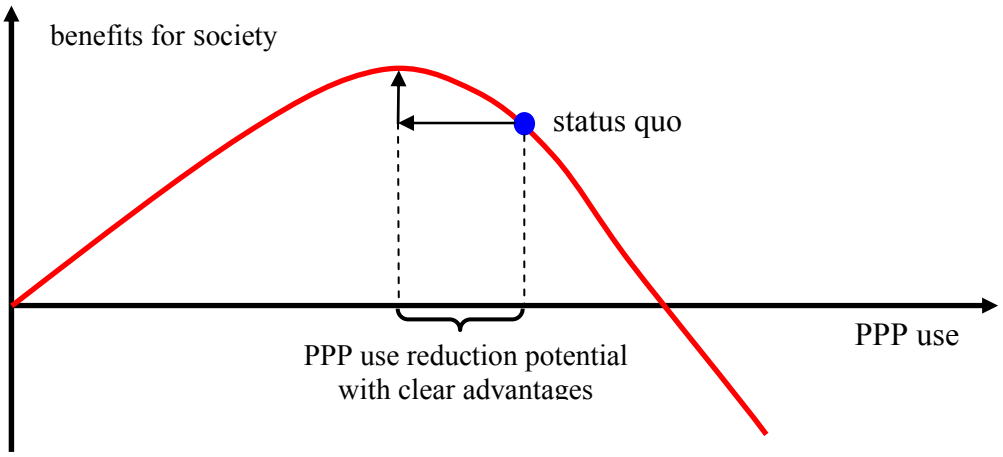

Figure 2: Schematic correlation between benefits for society and a targeted PPP use reduction

The curve represents marginal values and not total values. It intends to illustrate that probably the current situation regarding PPP use in the European Community is not at its optimum with respect to benefits for society, and that appropriate measures might allow to approach this optimum without adverse effects on output or explicit/implicit compensatory transfers among actors. For instance, it is quite clear that some farmers apply too high quantities of pesticides and they could achieve the same farm output with a lower consumption of PPP.

Making farmers have their equipment inspected and well maintained and reduce their PPP consumption is overall economically better for society. However, if arguments about competitiveness or other political considerations prevent authorities to oblige farmers to bear the full costs of their activities, the costs for having the equipment inspected and maintained for the individual farmer could be compensated by society, so that overall a better equilibrium is achieved without losses for a particular group. This could be achieved through various measures such as providing incentives, regulation, market based instruments, etc. It is precisely the purpose of the impact assessment to compare all possible options and identify the best one. By selecting measures optimising the economic, social, environmental and health impacts, the Strategy is fully coherent with the Lisbon objectives of growth and employment.

5. Measures proposed

In the light of the outcome of the impact assessment, it is recommended to propose as part of the Thematic Strategy:

– ***Training and certification of users***

It is recommended to establish mandatory training and qualification requirements for distributors and professional pesticide users in all Member States with minimum requirements agreed at Community level.

– ***Certification and technical check of spraying equipment***

It is recommended to establish certification systems for new application equipment mandatory to be placed on the market, as well as regular inspection of equipment in use in all Member States.

– ***General ban of aerial Spraying***

Following an intensive assessment and detailed studies, it has finally been decided to propose a general prohibition of aerial spraying, but Member States should allow for derogations in situations where it can be proved that aerial spraying offers clear advantages and also environmental benefits compared to other spraying methods, or where there are no viable alternatives.

– ***Enhanced Protection of Water***

The impact assessment shows clear socio-economic benefits for the measures 'installing buffer strips' and reducing spray drift through 'appropriate technical equipment'. These are even bigger, when considering that other non-quantifiable benefits such as positive impacts on biodiversity, landscaping, river bank management, and one of the main objectives of the Water Framework Directive (maintaining good chemical status of water) are taken into account.

– ***PPP free or reduced zones***

In the light of the outcome of the impact assessment it is recommended to put into practice a legally binding designation of zones of reduced or zero PPP use. Specific guidance and best practise for those areas have to be developed in cooperation between Member States and the Commission. Best practice and guidance should include elements of other discussed measures like Integrated Pest Management (IPM), inspection of equipment and training of users but also specific use reduction objectives.

– ***Collection of pesticide packaging and unused (obsolete) products***

In the light of the outcome of the impact assessment, it is recommended that all Member States should create, if not already done, collection schemes for empty pesticide packaging and unused (obsolete) pesticides. Organisational details should be left to the Member States.

– ***Systematic data collection on pesticides sales and use***

In the light of the outcome of the impact assessment for the four options examined, it is recommended that all Member States establish collection schemes for data on the placing on the market and use of PPP. Member States should remain free to decide on the optimum way on how to organise data collection, as this will depend strongly on the structure of the agricultural sector (number of farms, diversity in production etc.).

– ***Common framework for Integrated Pest Management (IPM)***

In the light of the outcome of the impact assessment it is recommended to put into practice the option "Harmonisation of the minimum general requirements through an amendment of the definition of integrated control in Directive 91/414/EEC" in combination with the option "Development of specific guidelines for IPM".

The impact assessment led to the rejection of both legally binding *quantitative use reduction targets* and *setting up of taxes / levies* at Community level.

6. Costs and benefits expected

The proposed measures target a reduction of the risks for the environment and human health linked to the use of plant protection products. Society at large, in particular operators, consumers and the environment will benefit from the various effects of reduced risks from PPP use. It is very difficult to monetise these benefits consistently at a general level. Extrapolation from a comprehensive (but very conservative) study in Germany leads to the conclusion that the optimised use in pesticides should create an overall benefit to the EU which would exceed € 200 million each year, through reduced externalities such as adverse effects on the environment and human health. Much more partial data from the UK and the Netherlands (see Chapter 5.1) give further evidence of the costs of the contamination of water supplies by pesticides.

By construction, losses (for the PPP industry, and for farmers paying for training and the certification and maintenance of application equipment) and benefits (for less consuming farmers, and training, maintenance or certificating firms) are equal. The net expected overall impact, which equals the above-mentioned reduced externalities (as it is the only benefit which is not compensated by any loss), is thus clearly positive.

Overall costs and benefits of the implementation of the measures proposed in the Thematic Strategy are summarised in Table 1. Benefits for humans and the environment are very difficult to quantify for different reasons: (i) because of a lack of pertinent available data, (ii) because some of them have only a qualitative and relative value, and (iii) because quantifying methodologies are not always available. For instance there is a scientifically proved link between PPP use and lower fertility. However, fertility decrease is not exclusively related to PPP use, data are lacking, causality chains are still largely unexplored and there is thus no available methodology to assess the share of fertility loss to be attributed to PPP use. Moreover, what is exactly the social cost of fertility decrease? The cost of infertility treatment? The cost of (lost) human lives? The value of the moral prejudice caused to infertile parents?

Although not an objective *per se*, the measures are expected to reduce overall quantities used by 11% to 16% (i.e. 31,000 to 44,000 tons of active substances) per year. Corresponding savings for farmers should be between € 770 million and 1100 million, which will also mean lower turnover for the plant protection product industry.

Even if the total cost of the measures (except the € 40 to 80 million necessary for setting up container management schemes, which should logically be supported by the pesticide industry) is left to farmers, net benefits for them would remain significant, of the order of € 380 million to 710 million (including support under rural development). The costs relate to around € 250 million for training, € 90 million for testing and control of sprayers, € 40 million for equipment maintenance, € 2-4.5 million extra costs for purchasing certified new equipment, € 2 million for detailed record-keeping and reporting on pesticide use. Further

costs in terms of extra working time (ca. € 210 million) and more intensive use of advisory services (around € 130 million) could be compensated under rural development measures of the CAP. The only case where a significant administrative burden for MS authorities was possible to assess and quantify is the collection of data on pesticide sales and use, which would cost about € 9 million / year.

In terms of jobs, the balance is expected to be highly positive, an overall net increase of ca. 3000. A loss of 1700 to 2000 (at worst) jobs in the manufacturing and distribution industries will be offset by the creation of new posts in other sectors: 200 related to the container management schemes, 2500 to training and certification, 1000 to testing and control of sprayers, 500 to equipment maintenance, and 900-1300 jobs in agricultural advisory services. Moreover, the Thematic Strategy will stimulate research and innovation for the development of more selective active substances. This would present a market opportunity for the most innovative companies, and would be fully compatible with the Lisbon strategy.

As the current situation in the Member States varies, it is expected that in nine Member States impacts will be minor to medium, in eight they will be medium, and in eight Member States they will be medium to strong.

Table 1: Overall costs and benefits of the Thematic Strategy

	Benefits	Costs	Balance
Farmers	M€ 1110 up to 1440 /yr Reduced health impacts	M€ 725 /yr	+ M€ 380 up to 710 /yr Reduced health impacts
Industries	+ 3000 jobs	M€ 300 up to 670 /yr (could be contained through more advisory services and development of more innovative products)	M€ - 670 up to - 300 /yr + 3000 jobs Higher competitivity
MS Authorities	M€ 200 /yr (savings for health and environment costs) + 180 jobs Positive impacts on humans and the environment	M€ 9 /yr	+ M€ 191 /yr + 180 jobs Positive impacts on humans and the environment

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

This Impact Assessment (IA) has been prepared by the Commission services to inform the development of the Community Thematic Strategy on the Sustainable Use of Pesticides, which is presented in a separate Communication from the Commission[11]. It is based on information that was made available during an extensive consultation process involving the European institutions, Member States and other stakeholders, and a specific study undertaken for the Commission by an outside contractant[12].

Any measure proposed in the Thematic Strategy may impact a variety of individuals and groups concerned with pesticides, and potentially affect them positively, negatively, or even sometimes both ways. In order to give all stakeholders concerned the possibility to contribute to the development of the Thematic Strategy, the Commission undertook four rounds of consultation, and the minimum standards for consultation were fully respected[13].

In July 2002, the Commission adopted the Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides'[14], which presented a list of possible measures to achieve the specific objectives of the Thematic Strategy as outlined in Article 7(2) (c) of Directive 1600/2002/EC defining the 6th EAP:

- Establishment of national action plans to reduce hazards, risks and dependance on chemical control
- Enhanced protection of the aquatic environment
- Defining areas of strongly reduced or zero pesticide use
- General ban of aerial spraying
- Epidemiological and residue monitoring studies
- Further research and develoment
- Quantitative use reduction targets
- Improved systems for the collection of information on production, import/export, distribution and use and enhanced monitoring measures on compliance including annual reporting
- Collection of PPP packaging and unused products and other measures connected to the handling of products
- Compulsory control of application equipment
- Creation of a system of mandatory education, awareness raising, training and certification of all PPP users (farmers, local authorities, workers, distributors, traders and extension services)

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11 COM(2006) 372.

12 The consultation was launched by the Commission following adoption of the Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides' - COM(2002) 349. All steps of the consultation and the relevant documents are available at: http://europa.eu.int/comm/environment/ppps/home.htm

13 COM(2002) 704.

14 COM(2002) 349, available at: http://europa.eu.int/comm/environment/ppps/1st_step_com.htm

– Comparative assessment and substitution principle

– Promotion of low-input farming and cross-compliance for CAP support measures

– Introduction of taxes/levies for pesticides

– Harmonisation of VAT

– Development and use of indicators

– Involvement of stakeholders

– Cooperation with candidate countries

– International aspects

– Format of the Thematic Strategy

The Communication was submitted to the European Parliament, the Council, and the Economic and Social Committee, and published on the internet for consultation of the general public. In November 2002, the Commission organised a Stakeholders Conference with more than 190 participants. More than 150 contributions were submitted during this consultation round. Overall, there was a lot of support from institutions and stakeholders for most of the measures proposed. However there were some controversies concerning certain measures (e.g. quantitative use reduction), and the way to implement the measures (at Community or Member State level; on a voluntary or a mandatory basis). The conclusions of the Council, the Resolution of the Parliament, the opinion of the Economic and Social Committee as well as these public contributions are summarised in Annex 1 to this report.

Thereafter, DG Environment organised *ad hoc* meetings on aerial spraying, on standards for spraying equipments and participated to numerous conferences on various specific issues to be part of the Thematic Strategy (e.g. comparative assessment, spraying equipment, IPM/ICM, etc.) and seminars organised by the OECD on compliance, container management ant others[15].

In parallel, the Commission contracted a study to a consultant (BiPRO) with the purpose of 'Assessing economic impacts of the specific measures to be part of the Thematic Strategy on the Sustainable Use of Pesticides'. This study was elaborated on the basis of surveys and interviews among the Member States (22 answered) and key stakeholders. It was accompanied from the inception to the final report by an interservices group involving all relevant Directorates-General and its final report was published on the Commission's website. 28 organisations submitted comments on the conclusions of the study[16].

A final Interactive Policy Making consultation was launched from March until 12 May 2005, which built on and focused on the results of the previous stakeholder consultations. It outlined the main actions that have been considered for inclusion in the proposal for a Thematic Strategy. 1767 answers were gathered from the public and stakeholders. The large majority of the measures proposed were regarded as of high or medium priority by all stakeholders. The answers received are summarised in Annex 2 to this report.

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15 Documents related to this are available at: http://www.europa.eu.int/comm/environment/ppps/2nd_step_tech.htm

16 These are available at: http://europa.eu.int/comm/environment/ppps/2nd_step_react.htm

2. PROBLEM DEFINITION

Pesticides are active substances and products designed to influence fundamental processes in living organisms and, therefore, may have the potential to kill or control harmful organisms such as pests. **Plant protection products** (PPP) are pesticides used to protect plants or plant products against harmful organisms (pests) or prevent the action of such organisms. They can function in many ways e.g. by killing pests, but also in other ways such as by creating a physical barrier, by repelling, by attracting pests away from plants, by regulating the growth of the plants etc. PPP are used in a wide spectrum of applications, such as agriculture, landscape gardening and along transport routes. PPP are also used to some extent in forestry and domestic gardening. **Biocidal products** are pesticides used in non-agricultural sectors, e.g. for purposes such as wood preservation or disinfection, household uses, etc.

2.1. Scope of the Thematic Strategy

The largest users of pesticides in the EU for plant protection purposes are farmers - agricultural uses represent 86 % of total uses[17]. The quantities of pesticides sold in the European Union (15 Member States) in 2001 was approximately 330,000[18] tonnes of active substances. This figure represents an increase of ca. 13% compared to the quantities sold in 1992 (and a decline of 8% compared to 1998/1999, where maximum quantities were sold). Figures of pesticide use in agriculture are notoriously difficult to obtain – only few Member States carry out regular surveys, whereas at Community level, available figures rely mostly on estimates from the most important industry association (European Crop Protection Association - ECPA). ECPA's estimates are based on sales and marketing information from its member companies that do, however, not control the complete pesticides markets in the Member States. In addition, the figures do not systematically include all types of products. A comparison of Member States' surveys and ECPA's figures showed that the industry figures were at a minimum around 20% lower than those from the authorities. ECPA's estimates for 1999 are at 232.000 tonnes, which suggests that real use in agriculture is probably more around 280.000 tonnes active substances. In 2002 ECPA companies sold 260,000 tonnes of active substances with a market value of € 5,908 million[19], which suggests that overall sales (including non-members of ECPA) were at 315.000 tonnes with a value of € 7 billion.

For biocidal products, the UK Pesticides industry association estimated recently that the existing market in the EU-15 represents about € 1,700 million, which is only about 25% of the value of plant protection products. In addition, as biocidal products achieve higher prices per volume, the tonnage of substances involved is comparatively even lower.

So, in comparison to PPP, biocides represent only a small share of the overall use in terms of tonnage. Many uses of biocides do not directly lead to intentional emissions into the environment. In addition, the reassessment of all biocides present on the market in accordance with Directive 98/8/EC has only started recently and the effects of this relatively new legislation will not become visible until well after 2006, when the first evaluations of active substances for use in biocidal products will be finalised. Therefore neither the Commission nor most Member States have currently sufficient knowledge or experience to propose further measures regarding biocides.

Consequently, the proposal for a Thematic Strategy on the Sustainable Use of Pesticides will first only address the use of Plant Protection Products – both in agriculture and for other purposes.

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17 West European Agrochemical Market 2002, Philip Mc Dougal.

18 'The use of Plant Protection Products in the European Union – Data 1992-1999' -Eurostat and European Crop Protection Association, 2002.

19 From European Crop Protection Association website : www.ecpa.be.

Should it be necessary at a later stage that similar measures are developed for biocides the scope of the Thematic Strategy will be widened accordingly.

2.2. The Pesticides Life-Cycle

The lifecycle of pesticides comprises the following major steps:

– **production**: main actors are manufacturers/producers of active substances and of the formulated preparations (PPP) which are actually placed on the market. The producers of an active substance and the PPP containing it can be the same company or can be different ones. Although overall, a number of companies are producing and selling PPP, the market is dominated by a nine globally operating companies. When a substance is not protected by a patent, it can also be produced by other companies. On the market, the research-based companies co-exist with these so-called 'generic producers'. Both are liable for the quality of their products, the recommendations for safe use and the general information and use instructions addressed to the user.

– **distribution:** includes transport, storage and sales operations carried out by specialised (in dangerous goods) transport companies, wholesalers, distributors/vendors. They are generally responsible for the pre-marketing operations (storage, transport) but rarely liable for the information provided to the user regarding the use phase. In some Member States, they are also taking care of the safe collection of empty PPP-packaging and obsolete products.

– the **placing on the market** of final products themselves occurs *via* distributors and vendors or *via* professional user organisations (cooperatives). Authorised products are normally sold in their original single-use packaging (in general no re-packaging is authorised) with an appropriate label and accompanying documents such as use instructions. The user acquires normally the appropriate quantities fitting with his yearly needs. Limited storage occurs at farm level except for products where the use is systematic from one to another year and which are sufficiently stable.

– the **use** step includes all the operations carried out by the actual users, like the temporary storage at farm level, the management/calibration of spraying equipment, protection of operators with appropriate personal protection equipment (gloves, glasses, clothes, mask,…), preparation of the spraying solution (handling of PPP, mixing, and filling the sprayer tank), and the application itself. Products can be applied from the ground with 'horizontal' or 'vertical' (air-assisted) sprayers or from airplanes or helicopters in certain cases. For plant protection products, the user is in general an independent farmer (self-employed) but small service enterprises are also active in the sector. The choice of the products applied, the time and conditions for application and therefore the compliance with conditions of the authorisation is therefore mostly the responsibility of individuals. Their behaviour will strongly influence the quality and the adequacy of the treatment as well as the safety or adverse impacts on human health and the environment. At this stage, the user himself, bystanders and the environment (soil, surface and groundwater, wildlife,…) can be exposed to PPP or to their degradation products (metabolites) *via* several mechanisms (drift, run-off, leaching).

– **post-use** operations include management of spraying residues, cleaning of contaminated protective equipment and application equipment, storage and disposal of empty packaging, and disposal of waste. These operations can lead to unintentional release into the environment of more or less concentrated pesticide residues ('point source' pollution). PPP producers and distributors can play an active role during this post-use

phase by organising collection and safe disposal of empty packaging and obsolete pesticides.

– the **harvest, transformation, and eventually consumption of agricultural produce** constitute the final goal of many farming activities but also the most important way of pesticides exposure for consumers *via* residues on produce. Feed and food retailers are buying the PPP-treated agricultural produces directly from the farmers or *via* cooperatives. With or without transformation, the food products potentially containing pesticides residues are then sold to the food retailer (distributor) and then to the final consumer. Food retailers do impose certain quality standards regarding the use of PPP, going frequently beyond the legal requirements regarding maximum residue levels, for instance, or refusing to buy produce having been treated with certain pesticides.

An analysis of the pesticides life cycle clearly shows that with regard to the potential for exposure of humans and direct emissions into the environment, ***the use and post-use stages are the riskiest steps***. Emissions can occur in a diffuse way or at more concentrated points of incidental discharges. Producers and distributors are currently liable for the safe delivery and for the quality of the sold products to the final user but their possibilities to influence activities regarding diffuse or point emissions are relatively limited. The user who is finally taking the decision on the 'why, 'what', 'when' and 'how' of any pesticide use – more or less influenced by the information received from the producers and distributors or other advisory bodies like extension services or food producers – is obviously the key actor for limiting unacceptable pesticide contamination of the environment at large.

2.3. Who is affected

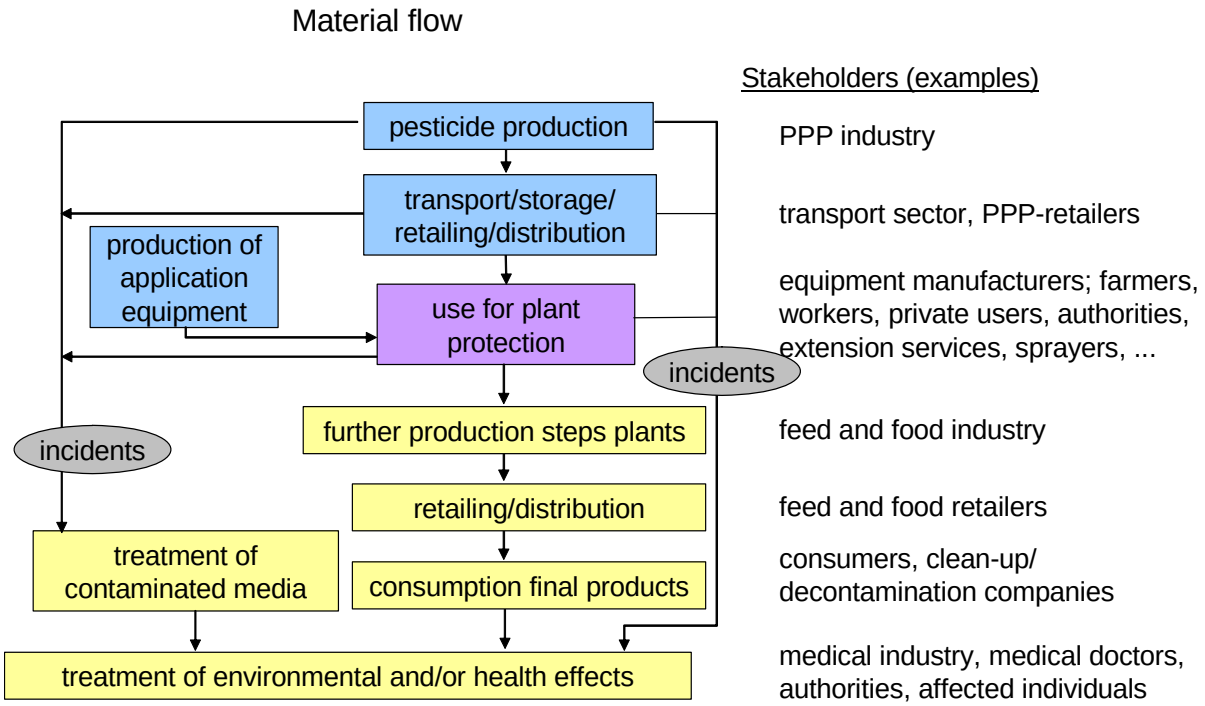

Figure 2-1: General material flow and concerned stakeholders

A variety of people, groups and individuals are concerned with pesticides, and therefore are potentially affected by the Thematic Strategy on their sustainable use. Some are affected positively, some negatively, and some both ways.

Figure 2-1 contains a scheme presenting the general material flow and the concerned stakeholders. It will be refined when detailing the envisaged measures of the Thematic Strategy.

Table 2-2: Numbers of stakeholders concerned by plant protection products in EU-25

Sector/activity	Number of people concerned
PPP Manufacturing	+/- 20,000
PPP Distribution	+/- 5,000
User: Agriculture	10,419,000
Non-Ag	Not available
Food Production	3,000,000
Food Consumption	470,000,000

Table 2-2 gives an overview of the numbers of actors/users/stakeholders involved or affected by plant protection products (the main group of pesticides) in EU-25. These have been estimated on the basis of information collected *via* pesticide industry federation, statistics on the farming sector and general Community statistics.

Any measure proposed in the Thematic Strategy will have impacts on these stakeholders. Obviously some are more directly affected than others due to their direct or indirect contact with pesticides.

2.4. Benefits associated with the use of PPP

There are significant economic and social benefits associated with the use of PPPs. They are used by farmers to improve or safeguard yields by eliminating or reducing competition from weeds and attacks by pests, to protect and preserve plant products against harmful organisms, to improve or protect quality of the produce, and to minimise labour input. PPPs also play an essential role in ensuring reliable supplies of agricultural products each year, by contributing to prevent fluctuations of annual yields. Moreover, the responsible use of PPPs contributes to ensuring the availability of low-priced fruits and vegetables of good quality, which makes them affordable for all consumers.

According to some sources, the use of fungicides also helps to reduce mycotoxins in food, such as aflatoxin or ergotamin. However, the Scientific Committee on Plants (SCP) examined the relationship between the use of PPPs on food plants and the occurrence of mycotoxins in foods. It concluded that there is not sufficient evidence that pesticides play a prominent and consistent role in preventing or inhibiting the production of mycotoxins by toxicogenic fungi. Data from field studies are equivocal and the SCP recommended further research on the issue.

The use of PPPs reduces demand for land for food production[20] and enables the production of a wider variety of foods regionally, which in turn can reduce transport costs and make more land available for other uses, e.g. amenity, natural parks, protection of biodiversity.

[20] Oppenheimer, Wolf and Donnelly, 1998. Possibilities for future EU environmental policy on plant protection products, Synthesis report of six sub-reports in PES-A/phase 2.

Conservation tillage, which reduces erosion, and minimum tillage techniques, which reduce the demand for fossil energy in agriculture and decrease the leaching of nutrients, also partly depend on the use of herbicides.

The European plant protection industry is a significant economic player on the world market and an important employer in Europe with around 26.000 employees in the EU-25. Three of the five largest global companies are based in Europe. In addition, there are a number of other companies involved with the use of PPP (e.g. manufacturers of spraying equipment, service companies for aerial spraying and others).

2.5. Risks from pesticide use

By definition, PPP are used in order to kill pests and modify crop growth conditions in a given environment. For this purpose, they are deliberately released into the environment during use, although most of them have inherent properties that make them hazardous to health and environment. For example, they can affect non-target organisms in the areas treated, and after treatment remain and move in environmental media such as soil and water.

2.5.1. Potential problems for human health

Risks to human health can occur through ***direct exposure*** (industrial workers producing pesticides and operators using them), and ***indirect exposure*** (consumers, residents and bystanders). Farmers and workers are exposed to pesticides in agriculture, landscaping, on golf courses, schools and public building maintenance, road and highway weed control, lawn care and other activities.

A particular pesticide will have an adverse impact on human health when the level of exposure exceeds levels considered as safe. Exceedance of this level will depend on:

– the content of active substances in a PPP and their inherent toxicity (No observed adverse effect levels – NOAELs),

– transport and fate and the concentration of the pesticide in water or environmental compartments contributing to human exposure

– the degree of uptake by organisms,

– the duration of exposure

– how quickly the PPP is metabolised and excreted.

The risks related to the individual active substance contained in PPPs are evaluated during the PPP authorisation procedures (Directive 91/414/EEC). It is however very difficult to evaluate the *overall effective impact on human health of all PPP substances currently in use* as the necessary methodology for assessing the effects of exposure to complicated mixtures of chemicals are not available yet. Epidemiological studies demonstrating clear links between cause and effect are lacking and the complexity of causal chains of observed effects impedes repartition of an observed impact to a particular chemical when exposure has been to a mixture of many chemicals.

According to a survey of the European Federation of Agricultural Workers' Unions (EAF), the most common observed adverse effects of pesticides on workers and operators are headaches,

vomiting, stomach-aches, and diarrhoea, caused by exposure during application, preparation or mixing and handling of containers[21].

In general, adverse health effects can be divided into acute or chronic effects.

- **Acute impairment of health**

Short-time exposure to pesticides can cause severe acute health effects, including diarrhoea, nausea, vomiting, abdominal pain, profuse sweating, salivation, blurred vision, irritation of skin and death are examples that have been reported in various publications.

- **Chronic impairment of health**

Chronic health impairment results from a low but constant exposure level and has a long-term character. Major incidents, in particular clear correlations between exposure and chronic effects, are not often recognised immediately since no obvious symptoms of poisoning exist.

There are various sources for continuous exposure, like the consumption of polluted water, pesticide residues in food, regular application of PPP over many years, or residential proximity to it and consequently direct exposure *via* air. People regularly or repeatedly exposed to or working with pesticides, may have a higher risk of incidence of:

– cancer or other chronic diseases,

– birth defects, cancer in offspring, stillbirths and reproductive problems,

– skin rashes and disorders, disturbed enzyme and nervous system.

Under real life conditions, acute and chronic adverse effects associated with exposure to the common classes of pesticides can vary a lot for a given substance or substance class. Conversely, different substances or substance classes can cause similar symptoms. For example, the following have been reported for certain classes of insecticides:

– ORGANOPHOSPHATES can cause headaches, pain, weakness, numbness in extremities, dizziness, damage to memory, mood control, chest tightness, loss of coordination, uncontrolled urination, seizures, death due to respiratory failure;

– CARBAMATES can cause headaches, genetic mutations, vomiting, birth defects, dizziness, reduced fertility, seizures, kidney damage, shortness of breath, nervous system damage;

– PYRETHRINS and PYRETHROIDS can cause lack of coordination, deep lung allergy, convulsions, pneumonia, muscle paralysis, vomiting, asthma and death due to respiratory failure.

Consumers and bystanders can also be subject to indirect exposure, due to the presence of PPP *via* residual amounts in agricultural produce. Effects could be amplified for especially sensitive population groups, such as children (due to specific physiological and developmental factors), the elderly (due to their possibly compromised metabolic capacity), or other particular risk groups

[21] Summary of the EFA questionnaire on the health and safety linked to pesticides presented in the second EFA colloquium on pesticides, 6-8/3/1997. 2160 workers in all Member States responded: about 20% reported adverse incidents.

(immunologically compromised people, chronically sick, etc.), and workers (due to their possible intensive exposure). At present, the scientific community sees possible gaps in knowledge for children, which are probably also the most sensitive group with regard to suspected 'cocktail effects' (i.e. mixtures of several substances)[22]. Evidence is emerging to document combination effects, such as additive or synergistic effects due to this multiple exposure to several pesticides while adequate risk assessment methodology to predict their consequences is not available.

2.5.2. Impacts on the environment

In addition to the intended use, pesticide application might lead to an unintended material flow of chemical substances into the environment. Due to the inherent properties of the active substances it is obvious that emissions to water, air and soil typically do not cause benefits but disadvantages and should be avoided. These disadvantages can be seen in the form of adverse effects on plants, wildlife, quality of the environmental compartments, and also biodiversity in general.

Risks to the environment consist of acute and/or chronic adverse effects on non-target species. Acute effects are mainly due to the high toxicity of certain PPPs. Chronic effects which might affect the fitness of exposed populations include those due to bioaccumulation and persistence of substances, irreversible effects such as adverse effects on the immune or endocrine systems of mammals, fish or birds.

In recent years, the emergence of a new type of hazard, endocrine disruption, has intensified the debate on health and environment protection. Endocrine disrupters are substances (including several pesticides), which are suspected of interfering with the endocrine systems of both humans and wildlife, and which may cause adverse health effects such as cancer, behavioural changes and reproductive abnormalities even through exposure to extremely low doses.

Spray drift, leaching or run-off are diffuse sources of uncontrolled dissemination of PPPs into the environment leading to pollution of soil and water compartments (surface water and ground water[23]). Environmental contamination can also occur during and after application, cleaning of equipment or uncontrolled, illegal disposal of PPPs or their containers (point sources). According to the European water suppliers organisation[24], pesticide contamination of raw water is very severe in lowland rivers, with a high proportion of contamination exceeding the 0,1 µg/L threshold value, where pesticide removal treatment is then usually necessary. Exposure *via* drinking water, although strictly limited by the EU Drinking Water Directive, requires constant efforts to monitor and – taking into account the long time scale of contamination and remediation – high scrutiny in the regulatory process.

PPP use may also lead to additional indirect effects on the ecosystem, e.g. loss of biodiversity. If weed control is less systematic, the resulting increase in insect populations is beneficial for the populations of insect-feeding birds[25]. Over-efficient weed control means that such birds may suffer from shortage of food. Biodiversity, however, is also influenced by a number of other factors, such as agricultural practices, plot sizes, type of crops, etc.

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22 Children's Health and Environment: a review of evidence. A joint report from the European Environment Agency and the WHO Regional Office for Europe, Tamburlini *et al* (2002) (http://org.eea.eu.int/documents/newsreleases/our_childrens_health-en)

23 The most commonly found pesticides in groundwater are atrazine and simazine, broad spectrum herbicides used in the past in high quantities (Source: Europe's environment: the Second Assessment (European Environment Agency, 1998) but now prohibited.

24 EUREAU Position Paper 'Keeping Raw Drinking Water Resources Safe from Pesticides', 2001.

25 Assessment of the Benefits of Plant Protection Products, Saub-Report, Eyre Associates, 1997.

2.6. The Legal Situation

2.6.1. The Community policy context

The Community regulatory framework concerning plant protection products focuses primarily on the placing on the market and the end of the life cycle of such products. The most relevant pieces of legislation are:

(1) Directive 91/414/EEC[26] concerning the placing on the market of plant protection products.

(2) Regulation (EC) No 396/2005[27] fixing maximum residue limits in several commodities as well as food and feedstuffs.

Directive 91/414/EEC intends to prevent risks at source through a very comprehensive risk assessment procedure for each active substance and the products containing the substance, before they can be authorised for marketing and use. The residues Regulation sets maximum residue limits (MRL) of active substance in agricultural produce, thus intending to limit the risks to consumers when entering the food chain. In addition, monitoring the respect of MRLs is an important tool to assess whether the users (i.e. the farmers) have correctly applied the recommendations and restrictions laid down in the authorisations of plant protection products delivered by the Member States.

Regarding the use of pesticides – and in particular the protection of the health of workers applying pesticides, the following Directives are also relevant:

– Directive 89/399/EEC[28] on the introduction of measures to encourage improvements in the safety and health of workers at work and Directive 98/24/EC[29] on the protection of the health and safety of workers from the risks related to chemical agents at work.

– Directive 89/655/EEC[30] regulating the minimum safety and health requirements for the use of work equipment by workers at work and creating obligation for employers to ensure that workers given the task of using work equipment receive adequate training, including training on any risk which such use may entail.

A number of other pieces of Community legislation and policies do also affect the use of pesticides. These are notably:

(a) The ***Water Framework Directive*** (WFD)[31], which changed the Community water policy towards a coherent and integrated framework for assessment, monitoring, and management of all surface water and groundwater based on their ecological and chemical status (among the list of 33 priority substances adopted in 2001[32], 13 are used as active substances in PPPs). The present limit value (0.1 µg/l) for active

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26 Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market (OJ L 230, 19.08.1991, p. 1).

27 OJ L 70, 16.3.2005, p. 1.

28 OJ L 183, 29.06.1989, p. 1.

29 OJ L 131, 05.05.1998, p. 11.

30 OJ L 393, 30.12.1989, p. 13.

31 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327 of 22. 12. 2000, p. 1).

32 Decision No 2455/2001/EC of the European Parliament and of the Council (OJ L 331, 15.12.2001, p. 1).

substances, which is an exclusion criterion for authorisation purposes, is considered as the maximum permissible concentration for defining good groundwater chemical status.

(b) Since the mid 80ies, and in particular with the 1992 reform, environmental concerns have been integrated into the various Regulations setting up the ***Common Agricultural Policy*** (CAP), with an enormous impact on agricultural production methods, their intensification and their impacts on the environment[33]. A study carried out in 1998 suggested that 20% of the variation of PPP use is attributable to the effects of the CAP. This percentage may be higher in sectors with heavy pesticides reliance and large CAP payments such as cotton or tobacco[34].

(c) Pesticides and, in particular, research activities aiming at the reduction and a more sustainable use of pesticides have been supported for many years in the ***Community Research and Development Framework Programmes***[35]. The Commission adopted in 2003 a ***European Environment and Health Strategy***[36] aiming at reducing diseases caused by environmental factors including exposure to chemicals and pesticides, with special emphasis on the most vulnerable groups in society (in particular children). The results of this research programme are also expected to contribute to a more sustainable use of pesticides[37].

(d) The use of pesticides is furthermore subject to a number of Directives aiming at the ***protection of health and the safety of workers***[38]. However, these are not applicable to the largest group of users, self-employed farmers.

One of the shortcomings of the current legal framework concerning pesticides is that the actual use phase, which is a key element for the determination of the overall risks that they pose, is not sufficiently addressed. The very purpose of this Thematic Strategy is to address this deficiency.

2.6.2. The international policy context

In view of the global and transboundary nature of the problems caused by pesticides, significant action has been taken at international level. Any Community action in relation to pesticides has to take into consideration this international work in the area. Conversely, the Community as a major player in international fora is in a position to influence international policies in accordance with its own objectives in particular in the relevant groups of OECD and FAO where similar topics are discussed.

The ***FAO*** adopted for the first time in 1985 the International Code of Conduct on the Distribution and Use of Pesticides**.** The Code contains guidance on pesticide management for all public and private entities engaged in, or associated with, the distribution and use of pesticides. The Code is designed to provide standards of conduct and to serve as a point of reference in relation to sound pesticide management practices, in particular for government authorities and the pesticide

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33 Further information on Agriculture and Environment can be found at: http://europa.eu.int/comm/agriculture/envir/index_en.htm

34 Oppenheimer, Wolf and Donnelly, 1998. Possibilities for future EU environmental policy on plant protection products, Synthesis report of six sub-reports in PES-A/phase 2.

35 Detailed information is available at: http://europa.eu.int/comm/research/index_en.cfm

36 COM(2003) 338, available at: http://europa.eu.int/eur-lex/en/com/cnc/2003/com2003_0338en01.pdf

37 COM(2003) 338, available at: http://europa.eu.int/eur-lex/en/com/cnc/2003/com2003_0338en01.pdf

38 Among others, the following Directives could be applicable: Directive 89/391/EEC, Directive 98/24/EC and Directive 89/656/EEC.

industry. This constitutes an approach, leading to sound management of pesticides which focuses on risk reduction, protection of human and environmental health, and support for sustainable agricultural development by using pesticides in an effective manner and applying IPM strategies. In addition, the revised Code includes the 'life-cycle concept' of pesticide management to address all major aspects related to the development, regulation, production, management, packaging, labelling, distribution, handling, application, use and control, including post registration activities and disposal of all types of pesticides, including used pesticide containers. The Code addresses the need for a cooperative effort between governments of pesticide exporting and importing countries to promote practices that minimize potential health and environmental risks associated with pesticides, while ensuring their effective use.

Parallel to the FAO activities, the ***OECD*** Environment Programme has developed tools for chemical testing and assessment that promote international harmonisation, helps countries find ways to share the work of evaluating different types of chemicals, and provides a forum through which countries exchange information about regulatory approaches and decisions. In 1992, the OECD established the first international forum for OECD regulatory authorities to discuss pesticide issues of common concern. The OECD Pesticide Forum[39] was formed to help countries work together to cope with the increasingly burdensome workload of pesticide reviews. Amongst the 6 topics addressed by the OECD, one aims at helping OECD countries to reduce the risks associated with pesticide use. The Pesticide Risk Reduction Steering Group was initiated in 1994. The objectives of the Groups activities are:

– creating strategic opportunities that facilitate risk reduction,

– giving international credibility to risk reduction tools and measures,

– reaching out to other groups, and

– promoting communication on risk reduction.

In 1995, the FAO and the Risk Reduction Steering Group co-organised a Workshop on Risk Reduction which made recommendations for (1) minimising risks associated with pesticide application and handling, and (2) reducing reliance on chemical pesticides by increasing the use of biologically based farming methods. The survey report "Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries (1996) Part 1"[40] gives an overview of the different approaches, ranging from mandatory reduction of pesticide use to targeted protection of vulnerable environments, priority registration of safer pesticides, participation in international treaties to reduce emissions to lakes and seas, and promotion of integrated pest management (IPM).

Many developing countries and Newly Independent States (NIS) do not have adequate legislation or infrastructure to ensure the safe use of chemicals. This problem is addressed by the ***Rotterdam Convention on the Prior Informed Consent Procedure (PIC)*** for certain hazardous industrial chemicals and pesticides in international trade, which was adopted in 1998, and is now implemented in the Community by Regulation (EC) No 304/2003[41] of the European Parliament and of the Council concerning the export and import of dangerous chemicals. Among other provisions, the Convention obliges exporters of chemicals on the PIC-list to obtain the consent of the receiving country before delivery and to guarantee appropriate labelling of exported

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39 The current name of the forum is 'OECD Working Group on Pesticides'.

40 Available at : http://www.olis.oecd.org/olis/1996doc.nsf/LinkTo/ocde-gd(96)121.

41 Regulation (EC) No 304/2003 of the European Parliament and of the Council of 28 January 2003 concerning the export and import of dangerous chemicals (OJ L 63 , 6.3.2003 p.1-26).

chemicals, and establishes a system of information exchange on chemical risks. The Convention also gives the opportunity to developing countries to propose the listing of severely hazardous pesticides formulations, which cause problems under the specific conditions of use in the developing country. Of the current 41 PIC substances 30 are pesticides.

Persistent organic pollutants (POPs) are chemical substances that persist in the environment, bioaccumulate through the food web, and pose a risk of causing adverse effects to human health and the environment. This group of priority pollutants consists of pesticides (such as DDT), industrial chemicals (such as polychlorinated biphenyls, PCBs) and unintentional by-products of industrial processes (such as dioxins and furans). Persistent Organic Pollutants are transported across international boundaries far from their sources, even to regions where they have never been used or produced. Consequently, persistent organic pollutants pose a threat to the environment and to human health all over the globe. The international community has called for actions to reduce and eliminate production, use and releases of these substances. To that end, two international legally binding instruments have been negotiated and concluded:

– ***The Protocol to the regional UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) on POPs*** (adopted in 1998)

– ***The global Stockholm Convention on POPs*** (adopted in 2001)

These instruments establish strict international regimes for initial lists of POPs (16 in the UNECE Protocol and 12 in the Stockholm Convention – in both cases 9 of the substances pesticides). Both aim at the prohibition or severe restriction of the production and use of intentionally produced POPs such as the pesticides concerned, and contain provisions on the safe handling and disposal of stockpiles and wastes. Both instruments are implemented in the Community through Regulation (EC) No 850/2004[42].

A key objective of several ***Conventions for the protection of the marine environment*** (OSPAR, Helsinki, and Barcelona Conventions[43]) is the cessation of discharges, emissions and losses of hazardous substances by 2020. Hazardous substances are defined through criteria on persistence, toxicity and potential to bio-accumulate *(PBT)*. The 'OSPAR Chemicals for Priority Action' and the 'OSPAR Substances of Possible Concern' include a considerable number of pesticides.

The ***Intergovernmental Forum on Chemical Safety (IFCS)***[44], which is responsible for the implementation of the "chemical chapter" of Agenda 21, has in its programme several activities and some key operational goals directly relevant for pesticides, in particular capacity building, information exchange, networking, risk reduction, illicit trafficking, and others.

Lastly, measures to increase the safe handling and use of pesticides are part of the ***Community's development and foreign relations policies***. Financial and technical assistance (capacity building) are provided in the framework of numerous bilateral and multilateral programmes such as the Cotonou Agreement with African, Caribbean and Pacific States[45]. Other examples are the initiative to enable developing countries to substitute pesticides no longer authorised in the EU and respect MRL on agricultural produce exported to the EU[46], support to the African Stockpile Programme, which has the objective to clean up and safely dispose of all obsolete pesticide stocks

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42 L 158, 30.4.2004, p. 1.

43 Oslo-Paris Convention for the North-East Atlantic, Helsinki Convention for the Baltic Sea, Barcelona Convention for the Mediterranean Sea.

44 http://www.who.int/ifcs/ , in particular the Bahia declaration adopted in IFCS III in October 2000.

45 http://europa.eu.int/comm/development/body/cotonou/index_en.htm

46 http://www.coleacp.org/FO_Internet/en/cadre/

from Africa and establish preventive measures to avoid future accumulation[47], support to NGO's (such as the Pesticides Action Network - PAN) working with farmers in Africa to support sustainable agriculture solutions[48], and in NIS for projects that could also address pesticides within the Environment Programme for Europe[49] and the European Neighbourhood Policy that the EU is developing with its neighbouring countries[50].

2.6.3. Activities in third countries

A number of countries outside the EU have already put into place measures with regard to pesticides that are comparable to those now envisaged in the Thematic Strategy.

United States of America[51]

In the USA, risk reduction measures are applied either on federal level or state level. On federal level the EPA's Pesticide Environmental Stewardship Program (PESP) has been designed as a voluntary programme that forms partnerships with pesticide users to reduce the health and environmental risks associated with pesticide use and implements pollution prevention strategies. *Integrated Pest Management (IPM) plays an important role*. Strategies to reduce pesticide risks by adoption of lower risk alternatives such as bio-pesticides, adoption of IPM practices, and implementation of training programs and demonstrations about ways to lower pesticide use and potential risks will be developed.

Two examples for activities to reduce risks on federal state level are given below, the Utah state certification plan of pesticide applicators and programs implemented in California.

Utah has set up a certification system for pesticide applicators. Depending on the field of application, pesticide applicators will be classified for certification and licensing as in three categories (commercial applicator, non-commercial applicator, and private applicator). All applicators are required to demonstrate or show by examination knowledge about general requirements and in the specific category(s) of application. These categories are *inter alia* agricultural pest control, forest pest control, and aerial application pest control.

Any person applying to become certified or recertified may be required to demonstrate the ability to: (a) read and understand three or more sets of pesticide label directions, copied or transcribed from pesticide containers randomly chosen by division personnel and (b) demonstrate the mixing and application of pesticides in a safe way. A score of less than 70% on the general test or category examinations shall result in the denial of certification of that test. The applicator is required to have their license in their immediate possession, at all times, when making a pesticide application.

In California, applicators, aircraft pilots, pest control dealers, designated agents, and agricultural pest control advisers are examined and licensed within the *Licensing and Certification Program*. Specific certification is required for pesticide applicators who use or supervise the use of restricted pesticides. It also licenses businesses that sell or apply pesticides or use pest control

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47 http://www.africastockpiles.org/

48 http://www.pan-uk.org/Internat/globinit/glindex.htm

49 http://www.unece.org/env/europe/welcome.html

50 http://europa.eu.int/comm/world/enp/policy_en.htm

51 Information from websites of the US EPA (http://www.epa.gov), California-Department of Pesticide Regulation: http://www.cdpr.ca.gov/index.htm, Utah Department of Agriculture and Food, Division of Plant Industry.

methods/devices for hire, i.e., pest control business, maintenance gardener pest control business and pesticide broker.

Current pesticide drift control regulations apply only to restricted materials. The Californian competent authority plans to change the regulations by applying *ground and aerial drift control restrictions* to both restricted and non-restricted pesticides. Spray drift control activities will be implemented to minimise or limit to the extent possible, non-target crop damage, human exposure, and environmental contamination caused by drift of restricted and non-restricted pesticides.

The California Pesticide Management Plan for Water Quality (Plan) has been set up to *protect water quality from the potential adverse effects of pesticides*. The Plan contains inter alia provisions for outreach programs, compliance with water quality standards, ground and surface water protection programs, self-regulatory and regulatory compliance. The Surface Water Protection Program addresses both agricultural and non-agricultural sources of pesticide residues in surface waters. It has preventive and response components that reduce the presence of pesticides in surface waters. The plan foresees development of management practices designed to reduce contamination of water bodies, which will usually be implemented initially through voluntary and cooperative efforts. If the revised use practices do not adequately mitigate the impacts, regulatory action could be taken by imposing use restrictions to prevent excessive amounts of residues from reaching surface water.

Australia

The Australian Pesticides and Veterinary Medicines Authority supports, where possible, support IPM in its regulatory approach. For example, initiatives have been developed with relevant government authorities to implement resistance management strategies that incorporate IPM, and to include reference to such strategies on relevant product labels.

Australian legislation requires that registered chemicals will not result in undue risk to the environment. To meet these legislative requirements, continued registration may require environmental monitoring for ground and surface water contamination by pesticides. This enables implementation of measures to reduce water contamination, for example tighter controls and restrictions on product use resulting in the adoption of improved agricultural practices and hence environmental protection.

Australia recently conducted a strategic review of agricultural chemicals management. The review, amongst other things, recommended that Australia develop a pesticide use reporting system by crop/species and region to provide a clear understanding of what and where chemicals are used, which would assist development of consistent monitoring priorities. Additionally, an adverse experience reporting program for agricultural chemicals will be implemented to collect information on suspected adverse reactions from the use of pesticides, which will significantly improve health monitoring.

Brazil

In Brazil, a law regulating the final destination of empty agrochemical containers entered into force in 2002. The law requires farmers to practice triple-rinsing, return empty containers to receiving stations, and keep the vouchers of package delivery and invoice of product purchase. Distributors are required to indicate on invoices where the growers are to return the used containers, construct and manage receiving stations, and implement educational programmes for end users. Pesticide manufacturers are required to provide transport, recycling or disposal services for empty packages collected at receiving stations; change labels to include information about

triple-rinsing and returning used containers and implement educational programmes for end users with distributors and government.

Canada[52]

Canada has or aims at implementing several risk reduction measures so as to reduce the negative impact of pesticides on human and animal health or the environment.

The Pesticide Risk Reduction Program highlights priorities for pest management, including biological controls, natural products, and low-risk minor use pesticides. This program aims at increasing the availability and adoption of reduced risk tools and practices to control pests in agriculture. The program will focus on:

– developing and implementing strategies to reduce pesticide risks;

– conducting research into improving methods for pest control;

– developing alternative approaches to pest management, such as integrated pest management, biological control methods, and bio-pesticides; and

– increasing the adoption of reduced-risk technologies by producers.

A comprehensive and refined modelling method for the prediction of pesticide concentration in drinking water sources (ground water and surface water) has been developed. A Federal / Provincial / Territorial drinking water monitoring working group for improved sharing of monitoring information has been established.

More accurate drift functions for predicting drift and deposit to wildlife habitats have been developed. Continued development of a policy allowing pesticide applicator to refine labelled buffer zones based on local application conditions and habitats.

A pesticide sales database framework has been developed, which will provide better estimates of pesticide exposure and risks to humans and the environment, assist in setting priorities for re-evaluation, and determine the extent of use of reduced risk products. A proposed regulation to require the mandatory reporting of annual sales data is under consultation. Increased funding was secured to expand research and monitoring activities, the results of which will better enable the identification of potential problems and allow for the refinement of risk characterization methods. Collaboration is ongoing with Federal departments and stakeholders to find ways to obtain commodity-based pesticide use data.

Pesticide risk indicator models from OECD work have been evaluated aiming at adapting an indicator for the Canadian context, which will provide risk trends by commodity at local, provincial or national levels and harmonize indicator characteristics with other OECD countries. A Federal/Provincial/Territorial Working Group on Pesticide Risk Indicators has been formed and a workshop on risk indicators has been held.

The objective of the National Agri-Environmental Health Analysis and Reporting Program (NAHARP) is to improve and develop a suite of agri-environmental indicators to assess and report on important environmental issues. These issues fall into five main themes: soil quality, water quality, agro-ecosystem atmospheric emissions, agricultural biodiversity, and eco-

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52 Information available from government websites at: http://www.agr.gc.ca/cb/apf/index_e.php, and http://www.pmra-arla.gc.ca/english/index-e.html

efficiency. The issues related to pesticides are: Water quality indicators – Pesticide contamination and Eco-efficiency indicators - Integrated pest management adoption.

Switzerland[53]

In recent years, the *Swiss Federal Council* has passed several measures as part of the legislation on agriculture, which are intended to reduce the use of pesticides. Since 1999, Integrated Production has been a prerequisite for direct payments. Integrated pest management, which is part of integrated production, is therefore de facto mandatory.

In order to be able to make a reliable assessment of the effect of environmental and agricultural policy measures, Switzerland initiated a program to collect data on the use of pesticides in a representative and transparent way. The risk associated with the pesticide applications will be determined using appropriate indicators, which are based on relevant regional or local monitoring. The results will also serve as a basis for targeted monitoring of environmental pollution from pesticides and for advice regarding targeted selection and application of pesticides.

2.7. Current pesticide use in the Member States

Since no harmonised risk indicators are yet available at Community level in order to assess trends in the risks from pesticide use, the only proxy we currently have is trends in pesticide use.

The current situation regarding pesticide use in the Member States is marked by large variations, not only in overall use, but also in the prevailing trends. These can be partly explained by the diverging structures of the agricultural sector and different climatic conditions (leading to different needs in terms of plant protection), but also by efforts undertaken in several Member States to reduce the need for pesticides and the correlated risks to human health and the environment through National Action Plans.

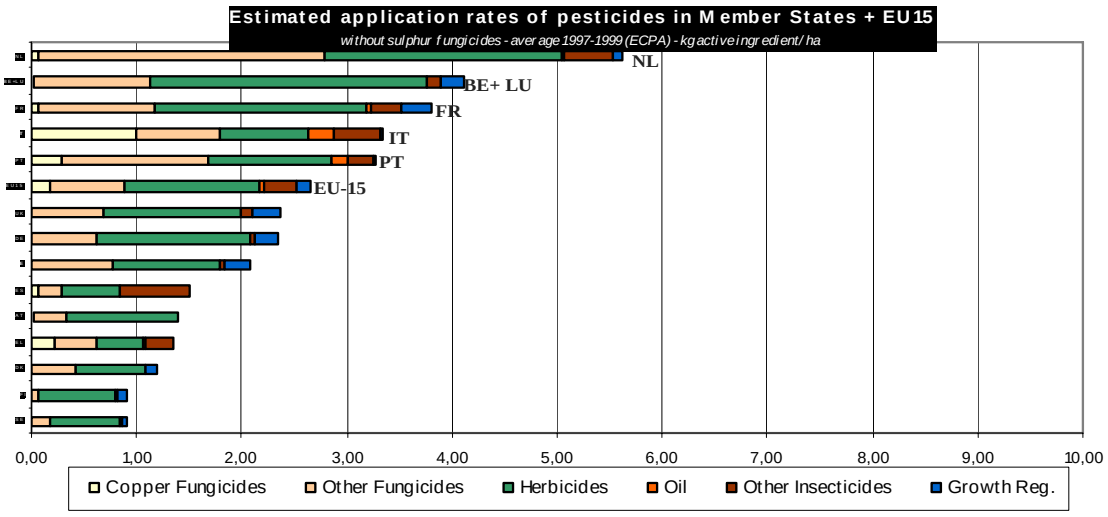

Figure 2-3: Estimated application rates of pesticides in the Member States (EU-15) in kg/ha

Figure 2-3 summarises the situation with regard to pesticide use in the period 1997-1999 in the Member States (expressed as kg active substance per hectare agricultural surface).

53 Swiss Agency for the Environment, Forests and Landscape (SAEFL), 2005 - http://www.umwelt-schweiz.ch/buwal/de/

In line with their agricultural surfaces, the main users in overall quantities are France, Italy, Spain, Germany, the UK, and Portugal. However, in terms of kg/ha, which is an indication of the intensity of use, the Member States with the highest consumption are: the Netherlands, Belgium, France, Italy and Portugal. This reflects the different needs for plant protection depending on climate, soil and the crops produced. In particular, production of vine, fruit, and vegetables are by far the most pesticide-intensive agricultural practices.

Developments in the individual Member States have shown significant differences as shown in Figure 2-4. Whereas some Member States have seen significant reductions from the period 1990-92 to 2000-2002 (HU, NL, DK), others (PT, PL, GR) have experienced massive growth in pesticide consumption.

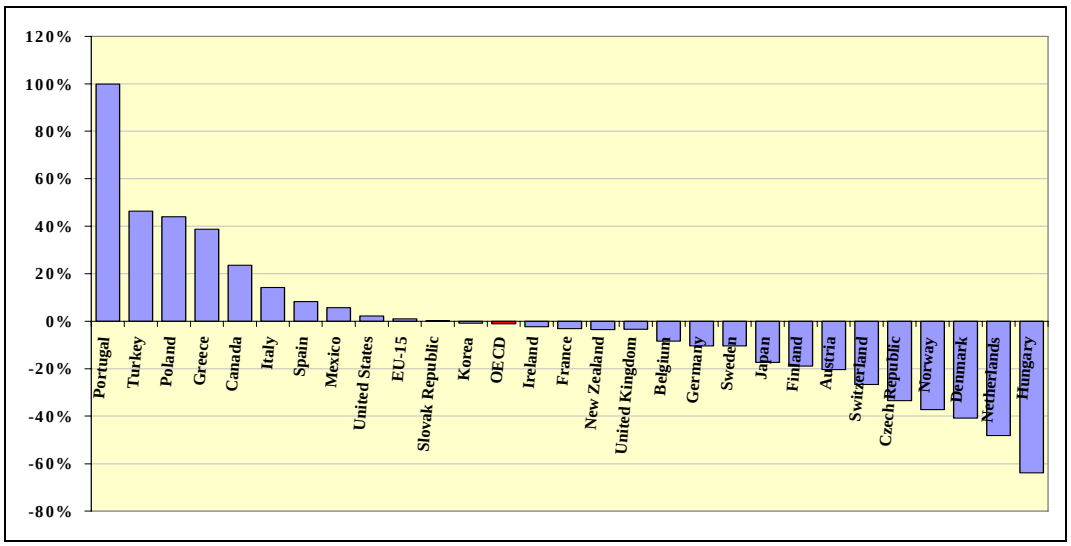

Figure 2-4: Percentage change in usage of pesticides in OECD member countries between 1990-92 and 2000-02 (Source: OECD Environmental Data Compendium, 2004)

2.8. Need for EU action

Without any Community intervention, this trend towards divergence in the Member States is very likely to continue, leading to totally different levels of protection of health and environment and diverging conditions for the main users of pesticides (i.e. farmers) in the Member States, which would be against one of the fundamental objectives of the Treaty.

Currently, some Member States have already adopted measures to reduce the risks for health and the environment linked to pesticide use, while others have not yet taken such action. This creates a situation where there is no level playing field for pesticide users and pesticide industry, which can amount to unfair competition for economic actors in different Member States. Furthermore, there is no equal level of protection of human health or the environment throughout the Community and pesticide use shows diverging trends between Member States.

Besides, placing of pesticides on the market as well as monitoring of pesticide residues are already harmonised through Community legislation. The same should therefore apply to other aspects of pesticides policy.

Setting equal standards and objectives to be achieved in all Member States can only be done by the Community. Otherwise the current situation with unequal obligations for economic operators will continue.

3. OBJECTIVES

3.1. Sixth Environment Action Programme (6th EAP)

This Strategy positions itself within the 6th EAP.

Overall objective of the Thematic Strategy:
The 6th EAP establishes in its Article 7(1) that the impact of pesticides on human health and the environment must be reduced and more generally that there is a need to achieve a more sustainable use of pesticides as well as a significant overall reduction in risks and of the use of pesticides consistent with the necessary crop protection.

The specific objectives of the Thematic Strategy on the Sustainable Use of Pesticides identified in the Article 7(2) (c) of Decision 1600/2002/EC establishing the 6th EAP are:

(i) to minimise the hazards and risks to health and environment from the use of pesticides;

(ii) to improve controls on the use and distribution of pesticides;

(iii) to reduce the levels of harmful active substances including through substituting the most dangerous with safer (including non-chemical) alternatives;

(iv) to encourage the use of low-input or pesticide-free farming, in particular by raising users' awareness, by promoting codes of good practices and consideration of the possible application of financial instruments;

(v) to establish a transparent system for reporting and monitoring the progress made in the achievement of the objectives of the strategy including the development of suitable indicators.

3.2. Other Community strategies

3.2.1. Lisbon Strategy

The proposed Thematic Strategy is fully coherent with the objectives of the Lisbon Strategy on growth and employment by selecting cost-effective measures optimising the economic, social, health and environmental impacts.

3.2.2. Sustainable Development Strategy

In 2001, the European Council in Gothenburg adopted the Sustainable Development Strategy. The guiding principles and objectives of sustainable development – economic prosperity, social equity, environment protection and international responsibilities – were reaffirmed by the European Council in June 2005 when they adopted guiding principles for sustainable development.

In the context of the Thematic Strategy on the sustainable use of pesticides, the goal to reduce significant threats from pesticide use contributes to the key objective of ensuring a high level of protection and improvement of the quality of the environment, and the objective of improving public health. It is based on the guiding precautionary principle.

4. POLICY OPTIONS

In the light of the preparatory work and the results of the various consultations and in the spirit of the holistic approach of Thematic Strategies, it became clear that the Strategy would have to be composed of a number of different measures. The detailed list of all the various options through which these measures could be put into practice, and which have been assessed as possible implementation, is provided below. As a general rule, for each measure, the full range of possibilities has been explored, from those of a rather prescriptive and binding character to those of a relatively voluntary quality, including those based on market based instruments. A no-action scenario was considered as a reference against which to appraise the costs anticipated from the measures proposed.

Thematic Strategies are new tools, which follow a holistic concept in addressing a specific topic. A lot of emphasis has therefore been put on integration of the measures of the Strategy in existing policies and legislation (such as the Common Agricultural Policy - CAP). Only when integration into other instruments or policies is not possible, new legislation – in particular a Framework Directive on the Sustainable Use of Pesticides - or other appropriate instruments are proposed.

This impact assessment therefore focuses on measures and related options that cannot be integrated in existing legislation / policies, that are expected to be of major relevance for achieving the objectives of the Thematic Strategy, or that are were very controversial during the consultation process.

Measures that are best integrated in other instruments / policies, or are of lower relevance are briefly described and assessed in 4.2.

4.1. Measures and options that have been assessed in detail

4.1.1. Creation of a system of mandatory education, awareness raising, training and certification for all PPP users (farmers, local authorities, workers, distributors, traders and extension services)

Awareness about the risks linked to the use of pesticides is considered as the most important factor to improve sustainability of use.

The intention of this measure is to give to all PPP users (farmers, local authorities, workers, distributors, traders and extension services) the necessary knowledge about safe use of pesticides (in addition to the provisions of the Directives 89/399/EEC and 98/24/EEC on the training and education of employees at work), covering both human health and environmental aspects, best plant protection practices, IPM, etc.

- *Option 1: Mandatory training and information schemes (not going into detail).*

The Strategy would require Member States to establish mandatory training and information schemes but the legislation would not go into any details. Member States would have full discretion to develop all necessary details as they see fit. Exchange of information between Member States on their national programmes, and on the progress observed would be ensured within an Expert Group.

This option is relatively flexible with regard to scope and content of training and information schemes.

- *Option 2: Mandatory education and training to PPP retailers, farmers and other professional users and extension services*

The Strategy would establish mandatory requirements regarding education and training. This would apply to PPP retailers, farmers and other professional users (if not already covered by Directive 89/391/EEC and 98/24/EC) and extension services. Specific guidance would be established by an Expert Group and should include the elements as outlined above.

The organisational aspects (like the training institutions/organisms involved, financing aspects, certification bodies, etc.) would remain the responsibility of the Member States.

This option is more prescriptive and leaves only little flexibility for Member States specific solutions.

- *Option 3: Recommendation to establish enhanced training and information*

The Strategy would recommend that Member States establish enhanced training and information schemes. Member States might choose to do this in a mandatory way or on a voluntary basis and with or without certification system. Exchange of information between Member States on their national programmes, and on the progress observed would be encouraged.

This option is mainly voluntary and leaves full flexibility for Member State specific solutions.

- *Option 4: Introduction of a general tax on pesticides*

The Community and/or the Member States would introduce a general tax on pesticides in order to increase costs for all users of pesticides significantly, which would give further incentives to minimise the use of pesticides including through improving application efficiency by training.

This option is a combination of a mandatory component (general tax) in an overall voluntary approach for training. Possibilities, details and other actions are left to Member States, but it is clear that concrete implementation, expected impacts on farmers' behaviour, and the related transaction costs are decisive for its practicability. The interest for farmers to participate voluntarily in training would be that they could optimise their pesticides use and thus recover the costs for training by spending less on pesticides, which would be more significant due to the increased prices.

- *Option 5: No action*

In this option, no particular action would be proposed in addition to already existing legislation.

- *Option 6 Combination of specific financial instruments with training and information schemes*

The Community and/or the Member States would introduce a system that would provide financial incentives to those users that are successfully attending training courses; or those users not attending training would be sanctioned.

This option remains flexible regarding the scope of the training and the implementation of the incentive/sanction system. A possible implementation could provide incentives to farmers by granting tax breaks for covering training costs, or providing support under rural development measures of the CAP. Alternatively, those users who are not participating in training could be sanctioned by having to pay an extra fee when purchasing pesticides. Again concrete

implementation, expected impacts on farmers' behaviour, and the related transaction costs are decisive for the practicability of such an option.

4.1.2. Standards for control and certification of application equipment

Optimising spraying equipment and guaranteeing its good functioning is an important element to achieve an application of pesticides with minimum adverse effects on the environment. The challenge is to apply the products at the right dosage and on the targets only. Generally, with appropriate training users can identify important shortcomings such as tank leakages or blocked nozzles. But other parameters need more complicated verifications. Pressure control, nozzles and spraying boom have to be well maintained in order to comply with optimal use standards and in order to reduce diffuse contamination.

The intention of this measure is to establish technical checks and certification programmes of spraying machines and equipment in all Member States.

For this purpose, it is necessary to distinguish two types of potential measures:

(a) Control: the control of spraying equipment refers to testing of sprayers, which are already in use.

(b) Certification: the certification of sprayers refers to testing of new spraying equipment that has to be successfully passed before a specific type of sprayer can be placed on the market.

- *Option 1: Mandatory certification systems for new application equipment (not going into detail).*

The Strategy would only require that Member States establish mandatory certification systems for new application equipment but would not go into any details. Member States would have full discretion to develop all necessary details as they see fit. Exchange of information between Member States on their national actions, and on the progress observed would be encouraged and organised through an Expert Group.

This option sets the objective of the measure in a binding way but leaves flexibility for Member States regarding practical implementation.

- *Option 2: Mandatory certification system for new application equipment and control of equipment in use.*

The Strategy would require Member States to establish certification systems for new sprayers and equipment like nozzles. Specific standards would be developed for certification to receive a 'CE-label' for fulfilment of specific safety requirements. Use of such material would be made compulsory as a risk management method in certain vulnerable situations or for the protection of watercourses (in particular for nozzles, which are decreasing spray-drift).

Member States would also be obliged to establish a system for the mandatory control of spraying equipment in use. This would include equipment already in use in those Member States where an equivalent measure was not implemented before. The legal instrument should establish:

– the objectives of the control (regular and reproducible spraying pattern, elimination of unsuitable apparatus, short training of users, etc.) and the conditions of validity of the certificate delivered by the control body;

– the link with existing CEN or ISO standards for the control methodologies.

This option is more prescriptive, as harmonised standards and control methodology would be binding but it leaves some flexibility for Member States regarding practical implementation.

- *Option 3: Voluntary control system*

The Strategy would recommend that Member States establish a voluntary control system for spraying equipment in use. Exchange of information between the Member States on the methodologies applied and results observed would be encouraged.

This option is mainly voluntary and leaves full flexibility for Member States to define the scope of action and methodology.

- *Option 4: Introduction of a general tax on pesticides*

The Community and/or the Member States would introduce a general tax on pesticides in order to increase costs for all users of pesticides significantly, which would give further incentives to minimise the use of pesticides including through optimally maintained application equipment.

This option is a combination of a mandatory component (general tax) in an overall voluntary approach for inspection of spraying equipment. Possibilities, details and other actions are left to Member States, but it is clear that concrete implementation, expected impacts on farmers' behaviour, and the related transaction costs are decisive for its practicability. The interest for farmers to have their application equipment inspected voluntarily would be that they could optimise their pesticides use and thus recover the costs for maintenance and inspections by spending less on pesticides, which would be more significant due to the increased prices.

- *Option 5: No action*

In this option, no particular action would be proposed in addition to already existing legislation.

- *Option 6: Introduction of a voluntary certification system*

The Strategy would recommend that Member States establish a voluntary certification system for new equipment.

This option is voluntary and the initiative would be left to manufacturer's self certification.

- *Option 7: Introduction of a voluntary certification and control system*

The Strategy would recommend that Member States establish a voluntary system for certification of new equipment and voluntary control system for spraying equipment in use. Exchange of information between Member States on the methodologies applied and results observed would be encouraged.

This voluntary option can be regarded as a combination of option 3 and option 6.

- *Option 8: Introduction of appropriate financial instruments*

The Community and/or the Member States would introduce a financial system that would provide financial incentives to those users who are complying with all technical requirements and/or to manufacturers who are placing on the market certified equipments complying with technical standards.

This option remains flexible regarding the scope of the inspections and the implementation of the incentive/sanction system. A possible implementation could provide incentives to farmers by granting tax breaks for covering inspection costs, or providing support under rural development measures of the CAP. Alternatively, those users who are not having their sprayers and/or other equipment inspected could be sanctioned by having to pay an extra fee when purchasing pesticides. Again concrete implementation, expected impacts on farmers' behaviour, and the related transaction costs are decisive for the practicability of such an option

4.1.3. General prohibition of aerial spraying

Certain crops or plants are sprayed by using special equipment mounted on airplanes or helicopters. These techniques were developed for practical reasons allowing economy of scale, speedier treatments and facilitating the work conditions for situations where the plants can only be reached by using knapsack sprayers handled by a single worker. In certain cases, this application technique has reduced the exposure of workers to pesticides. On the other hand aerial spraying is also suspected to have been at the origin of a majority of cases where dosages were exceeded and where the environment, in particular, watercourses, and residents and bystanders were endangered.

The intention is to limit the risks of significant adverse impacts on human health and the environment, in particular from spray drift.

- *Option 1: Legally binding ban of aerial spraying (exception possible)*

The Strategy would oblige Member States to generally ban the application of plant protection products *via* aerial spraying. By way of derogation, aerial spraying could be authorised by the Member States when there are no alternative ways of application. Such exception could be made only for zones where the risk for residents and bystanders, in particular for sensitive population groups like children, or the risk for the environment is acceptable. A clear definition of criteria for those zones where aerial spraying can be authorised and all other necessary criteria for possible derogation delivered on a case by case basis by the Member States would be further developed by an Expert Group.

This option is highly prescriptive and allows only flexibility for exceptions within the clear definition of criteria for possible derogations.

- *Option 2: Recommendation of severe restriction or ban of aerial spraying according to national rules*

The Strategy would recommend that Member States severely restrict or ban aerial spraying according to their own rules when the conditions for safeguarding (sensitive) bystanders or the environment can not be fulfilled. Those national rules could eventually be discussed in an Expert Group or in other forms of consultation with the objective of harmonisation.

This option is less prescriptive and contains a lot of flexibility for Member States to find specific rules for exceptions.

- *Option 3: Introduction of appropriate financial instruments*

The Community and/or the Member States would introduce appropriate financial instruments (taxes, levies, fees, etc) to increase costs of aerial spraying significantly in order to reduce aerial spraying without further restrictions or a ban.

This option has some mandatory elements (a financial instrument would be mandatory) and a voluntary approach (the user can make decisions what he prefers). Flexibility exists principally for the conception of a financial instrument. Based on the current status in certain Member States a pesticides tax could be a feasible approach. Another principle possibility, to have a tax on the use of helicopters, is not studied as no real concepts are available at the moment.

- *Option 4: No action*

The no action option would mean that there would be full flexibility for Member States to maintain the *status quo* or adopt new measures as they see fit.

- *Option 5: Legally binding minimum requirements*

The Strategy would define legally binding measure minimum requirements at Community level that have to be fulfilled for the application of PPPs by aerial spraying.

Such minimum requirements could comprise:

- announcement to authorities in advance, report after application,
- only pilots trained and licensed for aerial spraying are allowed to practice,
- checked and certified application equipment has to be used,
- guidelines with respect to exposure of bystanders and the environment have to be respected.

Further specification of the minimum requirements and a list of essential uses could be developed by an Expert Group.

This option is relatively prescriptive and only contains some flexibility with respect to the scope of minimum requirements.

4.1.4. Enhanced protection of the aquatic environment

The contamination of surface and groundwater with pesticides remains a preoccupying issue within the Community. Recognising that problem, the Community has developed different legal instruments and will continue to address the pollution of water by pesticides. Coherence between the Water Framework Directive (WFD) and 91/414/EEC Directive need to be strengthened in order to enforce mitigation measures decided in the PPP authorisation by the WFD. In addition, it will be necessary to apply further specific risk mitigation measures when the risk for pollution of the water compartment is high.

The intention of this measure is to limit the risks of contamination by PPP of the aquatic environment from point sources (packaging, obsolete pesticides or tank residues) or diffuse emissions (spray drift).

In order to prevent the discharge of pesticides to surface water, a number of measures can be taken, which can be divided as follows:

- Reduction of pesticide losses into surface waters by measures having an impact on land use or vegetation structure: pesticide-free buffer strips along banks of water bodies and creation of vegetation shields (hedges) to minimise spray drift of dispersed pesticides in particular from high growing plants such as orchards and vines;

– Reduction of pesticide losses into surface waters by technical measures on spraying equipment such as low-drift nozzles, 'tunnel sprayers', etc.

- *Option 1: Specific risk reduction measures will become mandatory parts of the river basin management plans.*

Specific measures to reduce the risks from pesticides to the aquatic environment would become mandatory parts of the river basin management plans under Directive 2000/60/EC. Such measures could include the definition of PPP-free areas or mandatory buffer strips or risk mitigation measures like hedges between water surfaces and orchards (to be implemented by the farmers), special equipment to reduce diffuse emissions (to be implemented by the producer/distributor of the pesticide, e.g. 'Twin-pack product/special nozzle'). Directive 2000/60/EC and its Article 16 (Priority substances) will set up environmental quality standards as reference values for surface water. For groundwater, the same threshold values as the ones established by the Drinking Water Directive, namely 0,1 µg/l for each active ingredient and 0,5 µg/l for the sum of all active ingredients present in groundwater, will apply according to the WFD Daughter Directive on groundwater protection[54]. Also, for each substance being evaluated under Directive 91/414/EEC, risk reduction measures relevant for the protection of the aquatic environment should be spelled out in detail in the individual Directive including the substance into Annex I of that Directive. Ban of specific active ingredients could be decided by river basin management units when the problem of water pollution persists.

This option corresponds to a mostly mandatory approach.

- *Option 2: Minimum criteria/standards/measures will become voluntary parts of the river basin management plans*

The river basin management plans will define minimum criteria or standards and measures that users/farmers can follow voluntarily after consultation with the river basin management organisations (according to the rules outlined in the surface water daughter directive when it will be adopted) for all fields and non agricultural areas where the use of PPP could compromise the quality standards or reverse quality trends of the water bodies concerned.

This option corresponds to a voluntary approach, and flexibility remains to develop guidance and best practices documents fitting the local needs.

- *Option 3: Introduction of appropriate financial instruments*

The Community and/or the Member States would introduce appropriate financial instruments (taxes, levies, fees, etc) in order to increase costs for users of pesticides significantly, if protection of the aquatic environment is not done properly.

This option leaves a wide range of flexibility to Member States regarding the type and strength of financial incentives.

- *Option 4: No action*

In this option, no particular action would be proposed in addition to already existing legislation.

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[54] Proposal for a Directive of the European Parliament and of the Council on the protection of groundwater against pollution, COM(2003) 550.

- *Option 5: Mandatory buffer strips along all surface waters*

In this option, farmers would be required to leave untreated buffer strips along all surface waters. To optimise their effect, these buffer strips are preferably 10 m wide. As 10 m wide strips may be costly and not applicable in all regions (depending on the size of the agricultural parcels), 5 m wide buffer strips can be seen as an alternative, albeit with reduced environmental effectiveness.

- *Option 6: Mandatory planting of hedges along all high growing crops*

In this option, farmers would be required to plant hedges alongside all high growing crop areas such as vineyards and orchards.

- *Option 7: Mandatory use of technical measures to reduce drift and losses to the aquatic environment*

In this option, farmers would be required to use specific low-drift equipment when spraying fields next to surface waters and to wash the equipment after use in specific cleaning stations where waste water would be treated (e.g. equipped with biobeds).

4.1.5. Defining areas of strongly reduced or zero pesticide use

In the European Community there are particularly vulnerable areas or zones where flora and fauna should be especially protected (e.g. those constituting the Natura 2000 network, drinking water abstraction zones, etc.). Furthermore, pesticides are still used in zones where bystanders cannot be protected sufficiently (public parks, schools, crop growing areas immediately adjacent to residential areas, etc.).

The intention of this measure is to limit the risks of adverse impacts on human health, the environment or biodiversity by promoting use reduction in these specific areas where the concerns are particularly important.

Because of the implied large uncertainty within this measure – there is no quantitative indication about the size of all possible zones – the quantitative analysis of the impacts of the proposed options concentrates on Natura 2000 areas. Additionally, public parks and comparable areas are taken into account. This measure would have clear consequences on the future possibility to use PPP in these areas. However, there could already be cases where existing regulations for these areas do already affect the use of pesticides.

- *Option 1: Legally binding designation and communication of zones of reduced or zero PPP use; development of guidance and best practices*

The Strategy would require Member States to designate zones of reduced or zero PPP use and communicate them to the Commission. The Member States should also communicate the reasons, in particular the relevance for other legislation such as the Water Framework Directive or Natura 2000. An Expert Group would discuss which zones have been designated by the Member States to develop guidance and best practices.

This option corresponds to a mostly mandatory approach, but some flexibility remains within the development of guidance and best practices.

- *Option 2: Recommendation to designate zones of reduced or zero PPP use and to develop guidance and best practice*

The Strategy would only recommend that Member States designate such zones. Those could eventually be discussed in an Expert Group or by other ways of information exchange with the objective of developing guidance and best practices.

This option follows a voluntary approach and leaves a wide range of possible flexibility to Member States.

- *Option 3: No action*

In this option, no particular action would be proposed in addition to already existing legislation.

4.1.6. Collection of PPP packaging and unused products and other measures connected to the handling of products

The current (bad) practice in most of the Member States regarding empty pesticides packaging and unused products is in favourable case to introduce them into the classical waste stream and in less favourable cases to abandon them on the field or to burn them. Such practices are causing point pollution of the environment by concentrated products. Different systems for collecting used packages and obsolete pesticides were introduced in some Member States and encouraged by different means (e.g. taxation on the packaging except if collection quotas are reached, pay-refund systems).

In addition, pilot projects for the cleaning of spraying equipment and disposal of unused tank mixtures are currently tested because these operations, which are part of good agricultural practice (in order to avoid cross-contamination between two treatments), are also potentially important emission sources of pesticides.

The intention of the measure is to ensure that used packaging and obsolete pesticides including those from amateur users are collected and safely disposed.

- *Option 1: Voluntary collection of empty packaging.*

The Strategy would require Member States to encourage industry, in line with the polluter-pays-principle to organise the collection of empty packaging at the farm level, with the voluntary support of distributors and vendors. No particular quantitative objective would have to be reached under this voluntary system, but Member States could establish a certain level of priority, e.g. based on the product toxicity or category of users (for example, excluding products used exclusively by amateurs). Member States will have to report how successful such a voluntary system would be. Exchange of information between Member States on their national actions, and on the progress observed would be organised through an Expert Group.

This option sets out a general obligation but leaves full flexibility for Member States to define the scope of actions, the possible quantitative objectives and the methodology to measure results.

- *Option 2: Mandatory collection of empty packaging.*

The Strategy would lay down in a legally binding measure that the collection of all empty packaging becomes compulsory. This would apply to every PPP (also to packaging of products used by the general public). Member States would have full discretion to develop all necessary details as they see fit. Exchange of information between Member States on their national actions,

and on the progress observed would be organised through an Expert Group. The legal instrument would establish:

– the objectives of the operation (decreasing point source emissions from packaging) and the implementation timetable (yearly objectives to be established by Member States);

– the priority categories of products concerned.

This option is more prescriptive but leaves flexibility for Member States regarding practical implementation.

- *Option 3: Introduction of appropriate financial instruments*

The Community and/or the Member States would introduce appropriate financial instruments (taxes) on pesticide packaging with a possibility of delaying their implementation if industry/distributors can demonstrate that the defined objective for the collection rate has been reached. Users could also be involved in the system with private "tax/refund" instruments to stimulate them to bring their empty packaging (correctly rinsed) to specialised centres or return them to points of sale.

- *Option 4: No action*

In this option, no particular action would be proposed in addition to already existing legislation or voluntary initiatives.

4.1.7. Improved systems for the collection of information on production, import/export, distribution and use

Lack of data on pesticide use is generally recognised as an important hurdle to define and monitor achievement of clear and realistic objectives in terms of risk reduction measured through appropriate indicators. In numerous studies conducted for the establishment of indicators, all experts expressed their concerns about accessibility, transparency, adequacy and reliability of data on pesticide use. Currently, most of the available data are from industry (through a voluntary commitment to provide data to the Commission's Statistical Office). Only few Member States do collect systematically use data and have made record keeping by users mandatory. The latter will change, though, through the implementation of Regulation 852/2004 on the hygiene of foodstuffs[55], which requires all users of pesticides to maintain detailed records of use.

The intention of this measure is to collect reliable data on sales and use to support the calculation of appropriate risk indicators and to inform many areas of research, legislation and agricultural practices, and should not be seen as a simple statistical exercise in its own right.

However, collection of more reliable and more detailed data on pesticide use will create burdens in particular for farmers (to register the use data) and for authorities to collect and report them. On the other hand it should be borne in mind that these data need to be collected only once and can then serve multiple purposes:

– to inform policy makers and citizens of the current status of pesticide use

– to provide data sets for the calculation of indicators of environmental impacts

[55] Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs (OJ L 139, 30.4.2004, p. 1).

– to monitor changes in the use of pesticides over time

– to provide information that could be useful in the review process of existing pesticides

– to provide information as part of the approval process of new pesticides

– to monitor the potential movement of pesticides into various environmental compartments

– to highlight areas where use may be optimised as a consequence of getting more information about farmers' practices

– to provide information for better organising and targeting residue monitoring programmes of fresh fruit, vegetables etc.

The following options have been examined:

- *Option 1: Collection of data mandatory for industry and distributors and voluntary for professional users.*

The Strategy would require Member States to collect data on sales and distribution *via* industry and distributors on a compulsory basis and on a voluntary basis from professional users.

Guidance would be developed in an Expert Group on how to organise this data gathering in a harmonised way, how to perform verification and monitoring of provided information. On the basis of the collected and transmitted data, indicators would be calculated (see Chapter 4.2.1) and, where feasible, the data could also serve to develop guidance on Best Agricultural Practices or IPM standards. Good co-operation by industry and retailers could be ensured by their certification through the national authorities or other appropriate certification schemes. Food retailers could contribute by setting up their own monitoring schemes, preferably in co-operation with the national authorities.

This option combines a mandatory with a voluntary approach with flexibility regarding the best implementation.

- *Option 2: Mandatory collection of data on sales, distribution and use (participation defined in detail)*

The Strategy would require Member States to collect data on sales, distribution and use on a mandatory basis. The participation/responsibility of PPP retailers, farmers, users and authorities would be defined in detail. Quality of data would be ascertained by a Member State quality check system. Details would be determined for Member States authorities, retailers and users.

This option defines a strict mandatory approach with little flexibility.

- *Option 3:Recommendation to collect data from distributors and users*

The Strategy would only recommend that Member States collect data on distribution and use from distributors and users on a voluntary basis. Guidance would be developed by an Expert Group (or other forms of co-operation between the Member States, referring in particular to private-public partnerships (co-operation with industry and retailers).

This option is mainly voluntary and leaves flexibility for further coordination among Member States.

- *Option 4: No action*

In this option, no particular action would be proposed in addition to already existing legislation or voluntary initiatives.

4.1.8. Promotion of low-input farming

One important tool to reduce input of plant protection products is increased application of Integrated Control methods such as Integrated Pest Management (IPM) or Integrated Crop Management (ICM), which aim at an optimised use of all available crop protection measures using wherever possible non-chemical alternatives first. However, IPM / ICM do also include chemical plant protection measures as ultimate resort. As a consequence it can be expected that the use of plant protection products in IPM / ICM is lower compared to conventional crop protection strategies. At present there is no common understanding of IPM and numerous different public and private IPM systems are co-existing within Europe and even within individual Member States. The existing systems are related to more or less specific and very differing requirements.

Conversion to these low pesticide input agricultural practices and respect of quality standards going beyond the usual good farming practice are financially supported by the CAP. Farmers can be compensated for the eventual additional costs or income losses through agri-environmental measures under Regulation (EC) 1257/1999. The level of support is correlated with the importance of the engagements. An analysis of measures taken by the Member States in application of Article 3 of Regulation 1257/1999 (including the possibility of applying penalties by cancelling or reducing benefits under direct support schemes if farmers do not comply with all legal requirements) has shown an uneven application by Member States. On this basis, the Commission has proposed and the Council include from 1 January 2006 national statutory requirements established in application of Directive 91/414/EEC (proper use of PPPs) into cross-compliance requirements. Farmers not respecting these requirements can see their direct support payments reduced.

The intention of this measure is to explore all the possibilities offered by the CAP instruments in view of supporting farmers in the implementation of several voluntary or compulsory measures to achieve a sustainable use of pesticides. In the revision of Directive 91/414/EEC application of the principles of Integrated Control could become part of the legal requirements and hence be subject to cross compliance. Non-respect of these obligations could lead to reduction of direct support payments. Alternatively, if Integrated Control would remain a voluntary standard, specific support could be envisaged under agri-environment schemes in the framework of Regulation 1257/1999 for IPM/ICM certified farmers.

The various options available to this effect have been developed and assessed against three main questions:

1. Should a common framework for IPM be developed?

2. Should IPM be imposed on all farmers at Community level or should the Member States be free to decide?

3. How can a shift towards IPM farming practices be induced?

- *Option 1: Establishment of new Regulations on IPM / ICM with clearly defined requirements.*

The Strategy would establish new Regulations on IPM with clearly defined requirements along the same line as Regulation (EEC) 2092/91 on organic farming, which would constitute a baseline for the determination of the eligibility of farmers for specific measures under rural development policy as it would also define specific requirements for which Members States can provide corresponding support.

This option corresponds to a mandatory approach with a low degree of flexibility that aims at a Community-wide harmonisation.

- *Option 2: Development of a new flexible Community framework on IPM/ICM with general definitions and criteria (Member State specific implementation)*

The Strategy would develop a new flexible Community framework on IPM / ICM with general definitions and criteria in a new Regulation. A modification of the definition of integrated control in Article 2(13) of Directive 91/414/EEC will have to accompany it. The implementation will be done by Member States according to their national/regional conditions.

The approach would also involve adoption of a new regulatory framework, but is less prescriptive and leaves more flexibility to Member States.

- *Option 3: Stronger cross-compliance mechanisms regarding pesticides by harmonisation of the minimum general requirements through an amendment of the definition of integrated control in Dir. 91/414/EEC*

The Strategy would harmonise the minimum general IPM-requirements by complementing the definition of integrated control in Directive 91/414/EEC, Article 2(13). Over time, more specific guidelines for various crops would be developed in the Expert Group.

In this option no new Regulation would be adopted to establish harmonised general minimum requirements but this will be part of Directive 91/414/EEC. This could be a somewhat more efficient way by using an already established Directive which is part of the statutory management requirements applicable within the framework of "cross-compliance".

- *Option 4: Clearer and more specific definition of IPM in the Thematic Strategy*

In addition to the minimum general requirements outlined in Option 3 (definition of integrated control in Directive 91/414/EEC, Article 2(13)), the Strategy would propose specific IPM requirements in the form of recommendations. Member States could decide to include the IPM-requirements in the national definition of proper use of pesticides.

This option would establish harmonised specific requirements for IPM / ICM as part of the Thematic Strategy that Member States could use voluntarily.

- *Option 5: Introduction of appropriate financial instruments*

The Community and/or the Member States would introduce appropriate financial instruments (taxes, levies, fees, etc) in order to increase costs for all users of pesticides significantly, which would give further incentives to minimise the use of pesticides through applying IPM concepts. Alternatively, payment of such taxes/levies could be limited to those users, who do not comply with all requirements of IPM / ICM and are not certified.

This option could, in fact be put into practice in two different ways:

– *option 5a*: introduction of a financial instrument that increases costs for all users with no distinction for users complying with IPM / ICM scheme: the expected financial advantage will come from savings on products which is amplified by the tax applied.

– *option 5b*: introduction of taxes / levies for all users that are not "IPM / ICM -certified" with an exemption from the tax for "IPM / ICM -certified farmers": those will then benefit directly from price differentiation .

As for the options employing financial instruments discussed for other measures previously, the key question, in all cases, is whether financial instruments do influence PPP use, and if they do, which one is best, how it should be used and under which conditions. Financial instruments have two effects: firstly creating transfers from those who have to pay to those who can use the revenues, and secondly modifying cost structures and thus possibly but not always and not necessarily in a 'good' way influencing behaviour and consumption patterns.

Flexibility within these options remains regarding the level of taxation necessary to influence sufficiently the price differentiation.

- *Option 6: No action*

In this option, no particular action would be proposed in addition to already existing legislation or voluntary initiatives.

4.1.9. Quantitative use reduction targets

The intention of such a measure would be to combat any unnecessary application of PPP and therefore reduce the hazards and risks by requiring a reduction of the overall quantities put into the environment.

In theory, by reducing the quantity of a pesticide used, the risk associated with its use should normally follow the same trend. This is certainly true, when looking at individual active substances. However a satisfactory crop protection is still required by the farmers. This means that if they are obliged to reduce quantities only without any further guidance or criteria, it is very likely that they will achieve this by resorting to substances that are more active and can be used at lower quantities in order to combine acceptable crop protection and PPP quantity reduction. However, substances with high activity can also cause higher risks at smaller quantities. Therefore, quantitative use reduction has to be assessed in the light of the practical impossibility to impose such reductions at constant use pattern (i.e. without granting farmers the possibility to modify the substance portfolio they are employing). The main reason for this is that the current use patterns at farm level are not known which would make enforcement impossible. Consequently, the measure has to be assessed under the condition that a shift in consumption patterns towards substances of higher activity and used at lower doses can occur.

The basis of the assessment of such a measure would be a hypothetical general quantitative use reduction target that establishes a relation between a reference year and a future date (e.g. 75% of the PPP amount used in 2000 would be allowed in 2010) or that gives a ceiling (e.g. max. 10,000 t/year active substance in 2010 for a defined region).

Such general quantitative use reduction targets have to be distinguished from more selective restricted use reduction targets. These could be expressed as:

– Frequency of use – restrict the numbers of possible PPP applications;

– Periods of the year when PPP can be used;

– Certain areas where PPPs cannot be used;

– Amount used for a given crop.

The following options have been developed and assessed:

- *Option 1: No action*

In this option, no particular action would be proposed in addition to already existing legislation or voluntary initiatives.

- *Option 2: Guidance on definition of use reduction targets and development of a specific instrument*

The Commission and the Member States could develop jointly guidance on how to estimate their margins of manoeuvre for setting quantitative use reduction targets. These would have to be established taking into consideration the national use patterns (substances and crops) and also the available results of pilot studies (established for instance by extension services) trying to optimise the dose rate applied in several crops and the efforts already carried out in the past.

Based on those pre-estimates, *via* a specific legal instrument or only as political objectives Member States could be forced (or invited) to achieve quantitative use reduction while surveying the evolution of the risk indicators in parallel to avoid any reversal of trends in the risk reduction objectives e.g. through shifts in the hazard profile of the substances actually used.

This option follows initially a voluntary approach regarding the objectives to be set up and leaves a wide range of possible flexibility to Member States depending on their local needs and opportunities. At a later stage, the option could become more mandatory, based on the results achieved during the voluntary phase.

- *Option 3: Introduction of appropriate financial instruments*

Assuming PPP demand is price elastic, demand reduction could be achieved through the Community and/or the Member States introducing appropriate financial instrument in order to increase costs for all users of pesticides significantly which would give further incentives to achieve general use reduction targets. The approach would be a general tax on pesticides Member States would be invited to develop concepts for the basis and rates of such a tax.

This option would leave maximum flexibility to the Member States to design such instruments and adapt them in the light of the reactions of the markets and farmer behaviour.

- *Option 4: Introduction of mandatory general use reduction targets*

A mandatory approach for Member States leaves only flexibility with respect to actual figure of the targets to be introduced and the scope of the foreseen reduction.

4.1.10. Taxes/levies

Many measures envisaged by this Thematic Strategy require resources and have to be financed. Taxation of pesticides is a potential resource for such revenues. Furthermore, it could provide incentives to farmers and users to implement better the other measures proposed in the Strategy.

In addition, taxes/levies on pesticides could, if properly designed, at least partly incorporate the externalities caused by pesticides and could be important tools to steer the behaviour of pesticide users in order to reduce the risks for human health and the environment from pesticide use. Specifically, this would be so if design of the tax / levy was such as to provide incentives to farmers to chose those pesticides – or other solutions to solve pest problems – that present the lowest risks to adverse effects on human health and the environment.

Taxation has been applied in certain Member States to several or to all pesticides in order to discourage users to buy certain substances or all pesticides in general.

- *Option 1: Flat rate tax on all pesticides based on volume*

The Community or the Member States would levy a fixed tax amount per kg/active substance sold. Perception of the tax would be at point of sale. The option is prescriptive and leaves little room for flexibility.

- *Option 2: Flat rate tax on sales price*

The Community or the Member States would levy a fixed tax as a percentage of the sales price. Perception of the tax would be at point of sale. The option is prescriptive and leaves little room for flexibility for the authorities. However, industry could influence the amount of applicable tax by setting sales prices differently.

- *Option 3: A banded tax system that defines different tax rates for different active substances.*

The Community or the Member States would set tax rates at different levels for various active substances in order to discriminate between less and more dangerous substances and thus induce qualitative improvements in consumption patterns. Perception of the tax would be at point of sale. The option offers a high amount of flexibility as there are many different ways in which the tax rates could be defined – e.g. depending on intrinsic properties (classification & labelling), type of PPP (insecticide, herbicide, fungicide, others), exempting specific groups of chemicals completely, etc.

- *Option 4: Recommendation to Member States to introduce a tax / levy.*

The Strategy would only invite Member States to introduce a system of taxes / levies that would provide incentives to users to select substances that poses lower risks to human health and the environment. In this option, introduction of such a system would be voluntary and Member States would retain further flexibility in designing their systems.

Each of these options can be further sub-divided into two sub-options:

– tax revenue is only used to finance measures under the Thematic Strategy (or is offset by other tax breaks, e.g. on farm property)

– tax revenue goes to general budget.

In addition, the impact assessment for each of the previously mentioned measures could be influenced by the introduction of a tax (either at Community or at Member State level). This will be examined as part of the impact assessment for these measures.

4.2. Measures that have been assessed in lesser detail in this impact assessment

4.2.1. Establishing a transparent system for reporting and monitoring the progress made in the achievement of the objectives of the strategy including the development of suitable indicators.

Legislation can only achieve the intended objectives, if it is well implemented and progress is monitored. In order to evaluate the progress realised, any policy, and especially those including voluntary aspects need to be evaluated by appropriate instruments. Various indicators are currently available in several Member States to measure the impacts of pesticides on the environment, though not harmonised. Several initiatives have been launched at international level to harmonise existing indicators and possibly define new ones.

Ideally, Member States will report on the progress made in the implementation of the Thematic Strategy on the Sustainable Use of Pesticides by using a common set of harmonised indicators, so that results achieved and trends can be compared. The Commission is currently financing a project in the 6th RTD Framework Programme that aims at the development of a set of indicators for this purpose: Harmonised Environmental Risk Indicators for Pesticide Risks (HAIR)[56]. This project is already well advanced and deliverables are expected in 2007.

The intention is to make these indicators, once they are finalised, binding for all Member States for the purpose of reporting progress with the implementation of the Thematic Strategy. Until that time, they may continue to use the indicators that they are applying now.

No specific option has been studied for this measure as the costs for the development of the indicators are already committed. The calculation of the risks indicators themselves will not require a lot of time and staff in the Member States, provided they have the necessary input data: various data banks on the intrinsic properties of the substances, geographic and climatic information, and data on use of pesticides.

In principle, the necessary databanks and calculation spreadsheets are among the deliverables of the HAIR project. The factors influencing mainly the efforts to be made by the Member States and other stakeholders are, therefore, linked to the collection of sales and use data. These will be examined in detail in the framework of the measure described in point 5.1.7.

4.2.2. Improved systems for monitoring compliance

Activities of the Member States to monitor compliance with pesticide authorisation conditions – including also particular restrictions and risk mitigation measures - are extremely weak, as can be seen in the various reports from the food and veterinary office[57]. The current provisions in Article 17 of Directive 91/414/EEC is clearly not sufficient, in particular when taking into account that as of 1 January 2006, the national provisions transposing Directive 91/414/EEC will fall under cross-compliance. Member States will have to establish that all requirements of Directive 91/414/EEC are fulfilled before paying direct support to farmers.

The intention of this measure is to strengthen in the Member States control of compliance with the provisions of Directive 91/414/EEC in order to verify at market and user level whether the marketing conditions and the use conditions are respected in practice. A Community monitoring programme could be organised as it is the case for maximum residue levels.

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[56] Harmonised Environmental Indicators for Pesticide Risks (HAIR): http://www.rivm.nl/stoffen-risico/NL/hair.htm

[57] http://europa.eu.int/comm/food/fs/inspections/fnaoi/reports/pesticides/index_en.html

The impact assessment for this measure will be carried out in the framework of the revision of Directive 91/414/EEC.

4.2.3. Reducing the levels of harmful active substances including through substituting the most dangerous with safer (including non-chemical) alternatives

Directive 91/414/EEC on the placing on the market of PPP is establishing the baseline for the acceptable risks before the placing on the market of pesticides. There are cases where different substances or products can be authorised and used for the same purpose as they are all complying with these minimal standards. However, some might have more favourable risk profiles than others. The concept of 'comparative assessment' consists of comparing the risks amongst this range of potential alternatives for a given phytosanitary problem and to not authorise or not use (i.e. substitute) a substance(s) or product(s) because of its less favourable risk profile.

The intention of this measure is to implement comparative assessment and the substitution principle in the same way as already done for biocides in Directive 98/8/EC. This can be done at different levels (Community-wide, Member States, Regions or users levels) which will influence the necessary instruments for the implementation.

During the consultation process for the revision of Directive 91/414/EEC, the vast majority of stakeholders supported the inclusion of comparative assessment into the Directive, albeit with different preferences with regard to the most appropriate level, where this should be applied.

Measures concerning comparative assessment for active substances at Community level and for plant protection products at Member State level will be included in the revised Directive 91/414/EEC. Details of the various options for including comparative assessment into the Directive and their assessment are presented in the Impact Assessment for the revision of the Directive. Comparative assessment can also be made at farm level – it will be necessary that farmers have the necessary knowledge, which can be acquired during the training referred to in Chapter 4.1.1, and is also part of the principles of Integrated Pest Management (IPM).

4.2.4. Reinforcement of annual monitoring programmes on residues of pesticides in food and feed, and epidemiological exposure studies

Annual monitoring programmes on residues of pesticides in food and feed are already in place and being carried out[58]. A reinforcement of these programmes would allow improving the knowledge about residues of plant protection products in food and feed in order to better assess the actual consumer exposure through his food basket.

This is already achieved through the recently adopted Regulation on Maximum Residue Levels[59] (MRLs) and therefore no further impact assessment is necessary.

Within the Strategy on Environment and Health (SCALE), the Commission and the Member States will, in the future, define the necessary monitoring and research activities for cases where there is an obvious need for more information, like exposure to multiple residues ('cocktail effect') and/or from multiple sources (combined exposure from dietary intake, water, and *via* environmental media), impacts on amateur users and particularly sensitive groups of the

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[58] Reports are available at: http://europa.eu.int/comm/food/fs/inspections/fnaoi/reports/annual_eu/index_en.html

[59] Regulation (EC) No 396/2005 of the European Parliament and the Council of 23 February 2005 on maximum residue level of pesticides in or on food and feed of plant and animal origin (OJ L 70, 16.3.2005, p. 1).

population (children and elderly). This could also include pesticides. The impacts of any such proposal will then be assessed within the framework of SCALE.

4.2.5. Environmental monitoring: pesticide concentrations in soil and water

Residues of pesticides and their metabolites cannot only remain in food and feedstuff, but can also occur in soil and water. Although fate and behaviour of active substances and other components of PPP are thoroughly investigated during the authorisation process and unacceptable results can lead to non-authorisation decisions or the definition of specific risk mitigation measures, the models and calculations used during the risk assessment might not always predict accurately the real behaviour of substances and their residues. Also, it is unclear whether all risk mitigation measures, such as buffer zones along surface waters, are fully respected. In addition, for certain substances, intrinsic properties such as persistence or potential for long-range transport cannot be fully clarified during the risk assessment process.

It would, therefore, be very interesting to measure concentrations of pesticides and their residues in soil and water (surface waters and groundwater) in order to verify whether the models and forecasting techniques are correct and whether all risk mitigation measures and use of pesticides according to Good Agricultural Practice do actually lead to acceptable concentrations in the environment.

However, such measurements are technically difficult and expensive and have to be concentrated on a limited number of substances. As the methodologies employed are the same that can also be used for other chemicals, environmental monitoring for pesticides should be integrated into the monitoring activities in the framework of the Water Framework Directive[60]. The forthcoming Thematic Strategy on Soil[61] might also offer possibilities in the future to monitor occurrence of pesticides in soil. Other environmental monitoring activities, e.g. from the European Environmental Agency, should also be examined for their suitability to include pesticides. The impacts of any planned particular action with regard to pesticides can then best be assessed within these existing frameworks.

4.2.6. Research programmes

The intention of increasing research activities on pesticides is twofold: to improve knowledge about effects – in particular also about the effects of exposure to mixtures of substances, new effects such as endocrine disruption, and specific needs of vulnerable groups such as children - and to find substitutes for more hazardous plant protection practices. An additional objective could also be to deliver risk management tools to authorities and users. Lastly, a better knowledge about the assessment of the externalities of pesticides, their quantification and monetisation would be necessary, in order to calculate the true costs to society of their use (see also Chapter 5).

Under the 6th Community Framework Programme for Research (FP6), several actions have already been suggested and supported under the heading 'Food Safety' and 'Scientific Support to Policies'. This should continue and be reinforced under the 7th Framework Programme.

In particular, under the heading 'Food Safety' of FP6, the Commission has launched several calls for proposals aimed "at promoting a durable restructuring of European research and development work on the use of chemicals (insecticides, nematicides, acaricides, herbicides and fungicides) in crop production. According to the call, it should include all fundamental and applied work which aims at reducing the use of pesticides by deepening our understanding of the biology, ecology,

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60 All relevant information available at: http://europa.eu.int/comm/environment/water/index.html

61 All relevant information available at: http://europa.eu.int/comm/environment/soil/index.htm

behaviour and underlying genetics of the crop-pest system. Network should include the expertise and knowledge available in the new Member States, and its restructuring should extend to projects already under way. It would be desirable to include in the networks those working in and for developing countries whose agricultural products are exported to Europe. Networks should establish themselves as world leaders for the development and implementation of durable pest control strategies, and should become recognised as the first point of reference in Europe not only for scientists but also for legislators and users. Industrial participation is recommended.

Under 'scientific support to policies' heading, a call for proposals has been launched for a research project on GIS-based system for risk classification of agricultural lands enabling the development of a sound scientific-based risk assessment methodology for the European Community, quantifying the influence of landscape and the role of bound residues. According to the call, it will allow the integration of risk assessment and risk management by e.g. allowing the incorporation of control measures envisaged under the Thematic Strategy, the Water Framework Directive and Directive 91/414/EEC in the calculation. Projects should also allow pesticides users to develop and maintain through a tailor-made information exchange platform, their ability of deciding if their actual use is guarantying a high level of water protection. Under this heading, the project FOOTPRINT (FuncTional tOOls for Pesticide Risk assessmeNt and managemenT) was selected and was launched in 2006.

There are several reasons why the funding of research actions should continue:

– the total amount the actual financial support is relatively modest (for example for HAIR, € 2.7 million over 39 months – RTD contribution is € 1.7 million) but may vary depending on several factors (reactivity of tenderers, scope and structure of the projects,…).

– such projects do have a very positive effect in clustering and focusing efforts and knowledge development – for example 18 institutes from 9 countries are participating in the HAIR project with a total of 315 person/months involved. A committed network has been created, which induces synergies, a better circulation of information and enhanced understanding of issues at stake.

– the overall impacts of any research projects are difficult to be assessed, but it can be assumed that the outcome of the projects will lead to important benefits in changing the behaviour of farmers to reduce input of pesticides and even more so reduce the risks to human health (in particular operators) and the environment linked to this use, due to increased knowledge about non-chemical alternatives, a better way to calculate the risks coming from one substance compared to another, better application of Integrated Control principles etc. In addition, the results of this Research might also be of relevance for other policy areas, such as water protection (calculation of risk indicators for the aquatic environment that can also be used for substances other than pesticides) and for environment & health.

4.2.7. Harmonisation of VAT

Differences in VAT-rates (from 3 to 25 %) can create price differences in the Member States for the same PPP, and could hence lead to illegal transboundary movements of products from one Member State to another. The user (in addition to having acted illegally as all products applied have to be authorised in the Member State concerned) will be faced with the problem that the label is not written in his own language: therefore misuse can easily occur and the user's health and the environment can be endangered as the safety profile or use recommendations can easily differ from one product to another. Subjecting all PPP to the normal rate of VAT in all Member

States could reduce such price differences and consequently reduce the attractiveness of transboundary movements.

On the other hand, it has to be noted that price differences can also result from agrochemical companies applying different prices in the Member States, triggered for example by their marketing strategies, the age of the product on a given market, competition from other companies, etc. These differences might, in fact, be larger than those resulting from different levels of VAT.

Member States have the possibility to apply reduced VAT to pesticides sales in accordance with Directive 77/388/EEC, Annex H, point 11. That same Annex also contains a number of other goods and services. Any amendment would have to be agreed by unanimity in the Council. It would be highly unlikely that a proposal to modify Annex H only with regard to pesticides would find the necessary support in the Council for adoption. In 2006, thirteen Member States apply reduced VAT rates to pesticides sales.

Given that it cannot be conclusively proven that difference in VAT are the main reason for price differences of a given PPP in different Member States and that it is highly unlikely that a legislative proposal to oblige Member States to apply the normal rate would be successful, it cannot be recommended to propose an amendment to Annex H of Directive 77/388/EC for pesticides.

Instead, the Commission will invite the Member States which still apply reduced VAT rates to examine their position in order to contribute better to the achievement of the objectives of the Thematic Strategy. They should instead apply the standard Community VAT-rate of minimum 15% set in Article 12(3) (a) of the Sixth VAT Directive, in order to reduce price differentials. Obviously such a change regarding pesticides does not need to affect any other goods or serviced covered by point 11 in Annex H to Directive 77/388/EEC.

It should however be mentioned that the Commission has to periodically revise the scope of reduced rates (Article 12(4) of the 6th VAT Directive[62]) and issue a report. On the basis of this report, "the Council shall, starting in 1994, review the scope of the reduced rates every two years. The Council, acting unanimously on a proposal from the Commission, may decide to alter the list of goods and services in Annex H."

In this context, if important distortions of competition should be reported to the Commission, then the application of reduced rates on pesticides might have to be revised. The last modification of the Sixth VAT Directive concerning reduced VAT rates took place on 14 February 2006, and the Council did not modify any of the categories in Annex H[63].

4.2.8. Setting up national action plans (NAPs) and involvement of stakeholders

Several Member States have established National Action Plans (NAPs) to manage hazards and risks associated with the use of pesticides for many years and some others, on the basis of the Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides'[64] have in the meantime developed or launched the development of National Action Plans.

Denmark was the first Member State in the Community to have used such an Action Plan. Their latest 'Pesticide plan 2004-2009' aims at reducing further pesticide consumption and their impacts

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62 Sixth Council Directive 77/388/EEC of 17 May 1977 on the harmonization of the laws of the Member States relating to turnover taxes - Common system of value added tax: uniform basis of assessment

63 Council Directive 2006/18/EC of 14 February 2006 (OJ L 51, 22.02.2006, p. 12).

64 COM(2002) 349.

on the environment. Efforts have been made to achieve minimisation of the use of pesticides to a level still allowing for profitable crop production. All actions within the plan have been proposed on a voluntary basis. Support to organic farming was one of the main features. To measure achievement of the objectives, the Danish authorities opted for using the 'treatment frequency index' and have defined the objective to reduce this index as much as possible. In parallel, spray-free buffer zones have been established along targeted watercourses, warning system to identify problematic substances or particularly sensitive areas regarding groundwater pollution, as well as an increased focus on point sources have been envisaged too. A steering committee (Bichel Committee) grouping all stakeholders has over the years been involved in the development and evaluation of the successive plans and for making proposals for amending them.

Sweden was also a pioneer country where reduction of pesticide risks and adoption of less hazardous pest management strategies started very early. With large support among the Swedish farmers' union, the voluntary actions plans aimed at reducing chemical pesticide use, at choosing with precaution which pesticides to be applied and at minimising pesticides residues in food and in water. Involvement of stakeholders is also very important in Sweden, as all competent authorities, farmer's representatives and food suppliers are participating in the elaboration and implementation of the plan.

In the Netherlands, multi-annual plans for pesticides management have been established the latest one from 2004 with the aim of reducing the negative impacts on the environment by 95% compared to 1998 levels.

Belgium and Germany have both adopted very recently action plans which were largely inspired by the ideas presented in the Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides'. Belgium has also included some initial actions for biocides.

The UK presented a proposal for a National Pesticides Strategy in February 2005 with five strategy action plans addressing: "Water", "Biodiversity", "PPP availability", "Amenity sector and amateur", and "Targeted Use Reduction" action plans.

France is currently discussing a national risk reduction plans within an inter-ministerial group with the aim of adopting this action plan as soon as possible.

In the light of the successes achieved with the National Action Plans in a number of Member States, the Commission considers that these are indeed an important tool to achieve the objectives of the Thematic Strategy and should be set up in all Member States. The Member States should give the public early and effective opportunities to participate in the process of elaboration of the NAPs to increase acceptance and ownership.

The NAPs will be composed of the individual measures that are described in the preceding chapters in addition to national objectives and timetables. The overall impacts are those resulting from the individual measures, as will be described in Chapter 7. Involvement of all relevant stakeholders in the drawing up or revision of NAPs will increase some initial burden, but such consultations are today generally accepted elements of good governance.

5. ANALYSIS OF IMPACTS AND METHODOLOGY USED

5.1. Analysis of impacts

It is generally recognised to be extremely difficult to quantify many of the actual adverse effects resulting from the use of pesticides and even more difficult to attribute monetary values to them.

Even in extreme cases, when human health or life is at stake, although standards exist in order to value them, they are by definition conventions and very badly reflect the utilities for individuals at stake.

Quantification or monetisation of impacts are further complicated by very complex cause-effect relationships. For example, as the intrinsic properties of pesticides vary considerably between the different substances, certain observed effects (e.g. high bee mortality) might well be avoided by banning one (or few) particular substances without necessarily reducing the use of a great number of other substances. There is, therefore, no direct relationship between the overall use of pesticides (expressed in applied volume) and the potential threat that this use poses to human health or the environment.

The assessment of the actual environmental impacts of the use of pesticides in agriculture is furthermore difficult to determine because of several other factors:

– Agriculture is diverse amongst the Member States of the Community, size of holdings and farms is very variable depending on the environmental and economic conditions from one region to another;

– Farming is a part of an ecosystem rather than being external to it, unlike most other economic activities;

– Spatial distribution of agriculture is varying so that similar farming practices could have very different impacts locally on the environment;

– Environmental impacts could become apparent after varying timescales depending on agricultural practices, climatic conditions, etc.;

– Lack of information regarding the current actual contamination.

For example, information on the number of proven cases where pesticide use has let to incidents in the environment is scarce. Only very few Member States do collect such information systematically or carry out studies on the impacts of pesticides on biodiversity. Figures from the UK show a declining trend in the numbers of incidents in which wildlife (including beneficial insects and domestic animals) have been put at risk or harmed by pesticides. In 2003, a total of 126 incidents were found to be caused by pesticides, 85 were identified as resulting from deliberate abuse, 17 involving misuse and for 19 cases no clear cause could be reliably assigned[65].

On the other hand, on farmland with lower input of PPPs specific animal species (e.g. arthropods, earthworms, birds, etc) showed significantly higher diversity or population density. In addition, measures such as buffer strips and hedges – which may be established as risk mitigation measures linked to pesticide use, but could also have other reasons, contribute to increased biodiversity and cross-linking of biotopes and thus to the survival and spreading of animal and plant species. It is, however, impossible to monetise this benefit for enhanced biodiversity and conservation of species. Nor is their installation motivated exclusively by concerns about pesticides.

Nevertheless, it is justified to assume that reduced input of pesticides – and in particular excessive use – will in general lead to a reduction of adverse effects in the environment, which can be described at least qualitatively in the following way.

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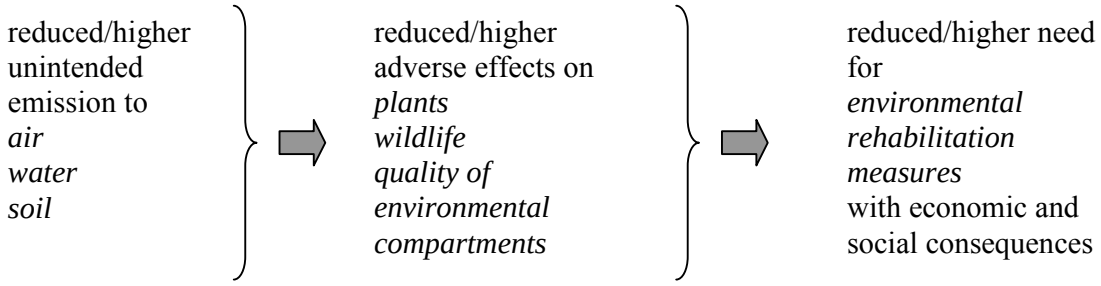
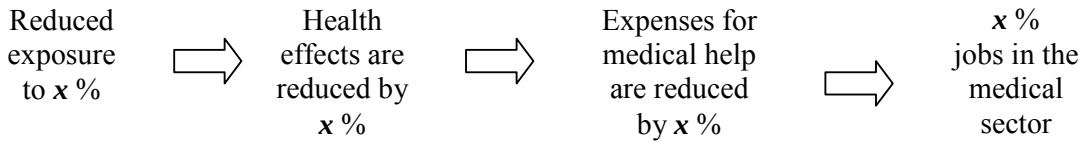
[65] For further details, please refer to: http://www.defra.gov.uk/news/2004/041209c.htm



The same goes for the effects and costs associated with adverse health effects such as direct negative health impacts (or even death) but also broader induced acute and chronic health problems. Although related costs are certain, it is impossible to establish a detailed quantitative causal chain establishing a quantitative relationship of the following type:



The overall quantity of all pesticides is not correlated directly with overall health effects, and causal chains as well as monetisation of related costs are particularly complicated to specify.

Indeed, the same effects can be caused by several substances and one substance can cause several effects. Whilst it is in general possible to establish direct links between substances used and acute health effects, such as organophosphate poisoning, it is extremely difficult, if not impossible, to prove that a particular chemical caused particular chronic effects in a given person – to become chemically-sensitized, a tumour to form, a miscarriage to occur, or brain damage to happen.

Furthermore, even for incidents involving acute effects, available figures are incomplete and not necessarily comparable among the Member States. A survey of the Health and Safety Executive in the UK for the year 2000/2001 reports 170 pesticide incidents, 71 of which involved allegations of ill health[66]. In 2002, the figure had declined to around 140 incidents involving pesticides - 55 concerned misuse, 12 were enquiries about the possible health effects of pesticides, and in 62 cases no causal link between pesticide use and the symptoms described was established[67]. From a more recent survey organised on behalf of the Commission[68], just for Greece, in 2002, a total of 1400 incidents were reported (5 people died and the rest were injured), while Germany and Lithuania reported for 2003, respectively 163 and 94 incidents involving workers during transport, storage and use of plant protection products.

In many other Member States, information on poisoning is also available, but figures often reflect both actual incidents and enquiries to poison centres on possible consequence of pesticide use. In most cases it is also not possible to distinguish between PPP or biocides. Reported figures range from nil or very few cases (0 in Denmark, 8 per year in Austria) to several hundred to 1000 cases (Germany, Finland, Belgium, Portugal, Spain, Sweden. No information is available for many

66 Health and Safety Executive; Agriculture and Wood Sector. Pesticide Incidents Report 2000/01. Available on the Internet: http://www.hse.gov.uk

67 See: http://www.defra.gov.uk/news/2004/041216d.htm

68 BiPRO survey, September 2004.

others such as France, Greece, Ireland, or Italy)[69]. It is, therefore, not possible to establish with confidence overall figures of acute incidents on human health caused by pesticides throughout the EC, and even less so for chronic effects. Due to the intrinsic problems of placing values on health effects or death – as explained above – no reliable overall figure to monetise such effects can be established either. Any figures proposed in studies can easily be contested. However, it is clear that there is evidence in a number of Member States that there are significant numbers of health incidents involving pesticides.

Obviously acute and chronic health problems have also consequences on costs and jobs in the farming sector, but again, no overall figures are available.

But even if it is not possible to specify the effects and quantify them, the causal chain exists and it is reasonable to assume that measures that reduce exposure of humans to pesticides have qualitatively the beneficial effect of reducing the cases of acute or chronic health effects and related costs. Such beneficial effects will be higher if in particular substances with more severe intrinsic properties are targeted.

Despite the quoted difficulties, several studies have been undertaken to quantify and monetise the effects of pesticides on human health and the environment. In 2004, a report[70] has tried to provide monetary estimates of the environmental impacts of agriculture for the UK: both negative (water, air, soil) and positive (landscape, habitats and species) impacts. Although the report did not focus specifically on pesticides, it provides the following figures as estimates to monetise impacts of pesticides for the UK: £ 246 million to prevent the decline of nine bird species and ca. £ 150 million for the removal of pesticides from drinking water. The latter figure was drawn from another report estimating that in the UK, the use of PPP in agriculture contributes to 43% to the contamination of water[71]. These figures can not simply be extrapolated to the European situation, as the situation might be very different in other MS. However it is sure that substantial costs are incurred by the removal of PPPs from drinking water resources.

Another study[72] carried out in Germany estimated the following repartition of the costs of pesticide use. In this study, additional effects were identified but not yet assessed in monetary terms: losses through pesticide exposure in other productive areas such as fish farming; costs of withdrawing contaminated goods from the market; cost of monitoring imported food for pesticide residues; and the effects on non-target animals and plants. Other negative aspects of pesticide use include chronic human health problems, long-term loss of sustainability in agricultural production and soil fertility and changes in consumer preferences, for example, replacement of tap drinking water by mineral water. The real long-term costs for society in Germany are, therefore, estimated to be considerably higher than the € 128 million indicated in Table 5-1. Extrapolation from these figures to EU-25 (taking into account the differences between the Member States) would lead to minimum total externalities of € 900 million. This of course relates to the total externalities linked to the use of pesticides. The part of this related to the use addressed within the Strategy is estimated to € 200 million.

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69 For further information, see the 1st Composite Report on the Implementation of the Biocides Directive, available at: http://europa.eu.int/comm/environment/biocides/pdf/composite_report.pdf

70 Framework for Environmental Accounts for Agriculture, Economics for the Environment Consultancy EFTE, July 2004.

71 Pretty, J.N., Brett, C. Gee, D., Hine, R.E., Mason, C.F., Morison, J.I.L., Raven, H., Rayment, M.D., and van der Bijl, G., (2000) An assessment of the Total External Costs of UK Agriculture.

72 Hermann Waibel and Gerd Fleischer, Pesticides Policy Project, University of Hannover,*2001*.

Table 5-1: Externalities linked to pesticide use in Germany

Approximate costs of pesticide use (in million € per year) ***to society in Germany***	
Contamination of drinking water resources	64
Damage to honey bees	1
Loss of biodiversity caused by herbicide use	5
Monitoring of food residues	12
Damage to human health	12
Cost of government control	34
Total	**128**

A recent report[73] established in the Netherlands indicated that the cost of treatment of raw water to remove pesticides and the cost of monitoring the water quality is increasing and amounts to about € 30 million per year for a production of 1,200 million m³, corresponding to € 0.025 /m³. The direct consequences are higher costs for advanced drinking water-treatment and increased monitoring efforts but also decrease of consumer confidence in the quality of tap water.

The figures contained in the preceding paragraphs show a very large variation. It therefore is extremely difficult to fix a particular price tag for the externalities associated with the use of pesticides in general. However, it is clear that all measures leading to reduced exposure of humans or the environment in general will reduce the externalities and hence costs to society at large.

Obviously, the analysis can not stop at this point as the reduced costs for society would be partly offset through reduced benefits that farmers generate from pesticides use today. In fact, a total ban of the use of pesticides, which could maximise the benefits to society from avoided externalities, would have major impacts on the quantities and reliability of agricultural production. Some kinds of crops, which require absolute absence of pests and diseases, would have to be abandoned. This would, in particular, have devastating effects on specialized crop producers who can not limit crop losses by changing crop rotation.

Furthermore, the competitive situation of European agriculture has to be taken into account. If European farmers were unduly disadvantaged by too severe restrictions on the use of pesticides, their competitors in 3rd countries could benefit if other countries did not implement comparable measures themselves. In fact, increased production in 3rd countries using more pesticides could also offset on a global scale the environmental benefits generated in Europe by the Strategy.

Again, it is very difficult to estimate the losses to farmers resulting from reduced pesticide use and estimates a widely diverging. Hence a comparison with the social 'utility gains' to society is complicated, if at all accepted[74]. A study in Germany concluded that in a "0 pesticide scenario"

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73 "Door drinkwaterbedrijven gemaakte kosten als gevolg van bestrijdingsmiddelengebruik – Inventarisatie over de periode 2001-2003" – VEWIN (ref.2004/46/4218) – December 2004.

74 Economists such as Walras or Pareto are opposed to any such comparison.

the total average yields in crop production would decline in a dimension of 50% to 80%[75]. Accordingly, although negative externalities would be eliminated, the study concludes that a pesticide ban cannot be considered as socially acceptable. In contrast, extensive economic analysis in Denmark concluded that a 30% reduction of pesticide use (expressed in terms of treatment frequency) would lead to no significant operating and socioeconomic losses in agriculture[76].

Overall it therefore seems that whilst the current use of pesticides maximises some private benefits at the expense of significant costs to society and the environment, it is not easy to find a better equilibrium. It is quite certain that the current level of pesticide use exceeds the optimal level of use, but there are no reliable figures that would show by how much. Furthermore, qualitative factors (such as the intrinsic hazard profile of individual pesticides used) have a significant impact over and above any quantitative relations.

5.1.1. What kind of benefits can be expected from the Thematic Strategy?

The Thematic Strategy positions itself in the perspective described above and its general objective is to achieve environment and health improvements or other societal benefits (e.g. reduced external costs due to PPP use) by a more sustainable use of pesticides.

As described in the preceding chapter, expression of such benefits in monetary terms is difficult as they are related to a complex causal chain and information to quantify or monetise them in a reliable way is not available. Still, it is reasonable to assume that a better and reduced use of pesticides would result in a variety of benefits for society such as:

- increased food quality due to lower contamination of feed and food products,
- higher quality of life due to decreased occurrence of diseases among the users, bystanders, and to a lesser extent (as correlation between pesticides exposure of the consumer *via* residues in the food basket and emergence of disease is currently difficult to establish) among the consumers,
- decreased costs for curing professional diseases,
- lower losses of working power due to decreased inactive periods of sick leave,
- lower redemption costs for contaminated sites due to less accidents and lower general contamination levels,
- cleaner environment and thus contribution to the sustainable conservation of natural resources,
- decreased costs for decontamination of drinking water,
- enhanced biodiversity,
- enhanced recreational effects due to impacts on landscape (e.g. hedges, buffer stripes).

However, it has to be recalled that ***reduction is not an objective per se, because, in some cases, it would be detrimental to aggregate welfare***. Besides, there is no simple correlation in the sense

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[75] Nutzen-Kosten-Analyse Pflanzenschutz, P. Schmitz, Wissenschaftsverlag Vauk Kiel KG, 2002.

[76] Report from the Bichel Committee, available at: http://www.mst.dk/udgiv/Publications/1998/87-7909-445-7/html/helepubl_eng.htm

"use reduction of PPP by x% = benefits for society of y%". If not specifically targeted at risk reduction and implemented in a proportionate manner, a use reduction may cause adverse effects such as an adverse shift in qualitative pesticide demand (towards more dangerous substances that can be used in lower quantities while posing higher risks), disproportionate yield or quality losses, degradation of valuable man-made landscape or other unwanted impacts.

It is expected that implementation of the measures that will be recommended as an outcome of this impact assessment will lead to a significant reduction of risks to health and the environment and a better protection of human health. This risk reduction will also induce an annual PPP use reduction, mainly due to a reduction of unintended losses, overuses and a more efficient application of PPPs.

5.1.2. Possible impacts on growth, competitiveness and jobs

In accordance with the latest IA guidelines, this issue has been studied with particular care, and is the main reason not to consider measures which would threaten too much the regularity and average yield of crops (such as extensive PPP bans), and to investigate cases where benefits for society *and* farmers would exist (in which case measures can be easily financed by farmers' own savings, e.g. on PPP inputs, possibly complemented by transfers from society).

Of course, as soon as measures imply a decrease of or shifts in PPP sales, *ceteris paribus*, PPP producers and distributors are affected (their potential loss is exactly equal to the farmers gains through lower spending). But they can also profit from the farmers' lower revenue constraints (lower quantity to buy) to upgrade their offer, and better answer the farmers' assumable better sensitivity to more innovative (and expensive) products, characterised by a more environment-friendly content. Considering that the present PPP market is characterised by an important share of generic products, this should be considered a serious opportunity for the leading PPP developers. As a consequence, if properly designed, and as long as measures do not significantly impact aggregate output, ***it is perfectly possible to achieve a situation where everybody gains***: the public through lower negative PPP-related externalities, the farmers though lower PPP quantities to buy, and the European industry with a greater share of sales made with more sophisticated and profitable products.

In fact, the key question here is how the measures are financed. On the one hand, the polluter pays principle (and the need for internalisation of externalities) should make farmers pay. On the other hand, if the global benefits for society are unbalanced by transfers, the reduced budget constraints for farmers will not translate into increased demand for new innovative products from industry. On the contrary, the less the measures are financed by farmers themselves, the more their demand will shift qualitatively towards more environmental friendly products, for the greater profit of everybody (as upgrading average product characteristics would help reducing externalities further). This complicated trade-off should be taken on board by Member States when they have to implement the strategy.

An important dimension for competitiveness is the comparison of the (present and proposed new) regulatory framework with that of the main foreign competitors. In this perspective, the important element to stress is that, at least in many Member States, requirements are presently quite low compared to some US, Australian or Canadian standards. Basically, most proposed measures infra are already somehow implemented in one or more of our main competitors (see Chapter 2.6.3).

Even if strategy-related costs were fully supported by farmers, and in fact even if the whole impact assessments below were over-optimistic, it is to be recalled that PPP-related costs are only a tiny proportion of their inputs. Namely, ***overall expenditure on pesticides by the agricultural sector corresponds to only around 4.2% of total expenditure on inputs*** (ranging from 0.2% in Austria over 5.6% in France to 6.2% in the Czech Republic). Thus, at least as long as output is not

in danger (and this was one of the main reason to focus only on a certain kind of possible measures), it is obvious that their competitiveness with respect to the rest of the world would not primarily depend on that factor. In the same vein, it is to be recalled that the EU PPP-related industry is a first-class world actor. Thus, its turnover does not solely depend on EU sales, and the marginal possible quantitative decrease in EU sales (if not compensated by a qualitative shift) is only a fraction of it.

A last way to pay due regard to competitiveness issues was an *a priori* in favour of market based instruments, and, specifically, the systematic assessment of the use of taxation as a possible solution for each of sub-options considered (having in mind that taxation can be both a financing and a correcting instrument). This has been extensively examined in the impact assessment.

5.1.3. The baseline

The overall quantity of pesticides sold in the European Union (15 Member States) in 2003 was approximately 290,000[77] tonnes of active substances. This number represents an increase of ca. 7% compared to the quantities sold in 1992 (and a decline of 17% compared to 1998, where maximum quantities were sold – see Figure 5-2).

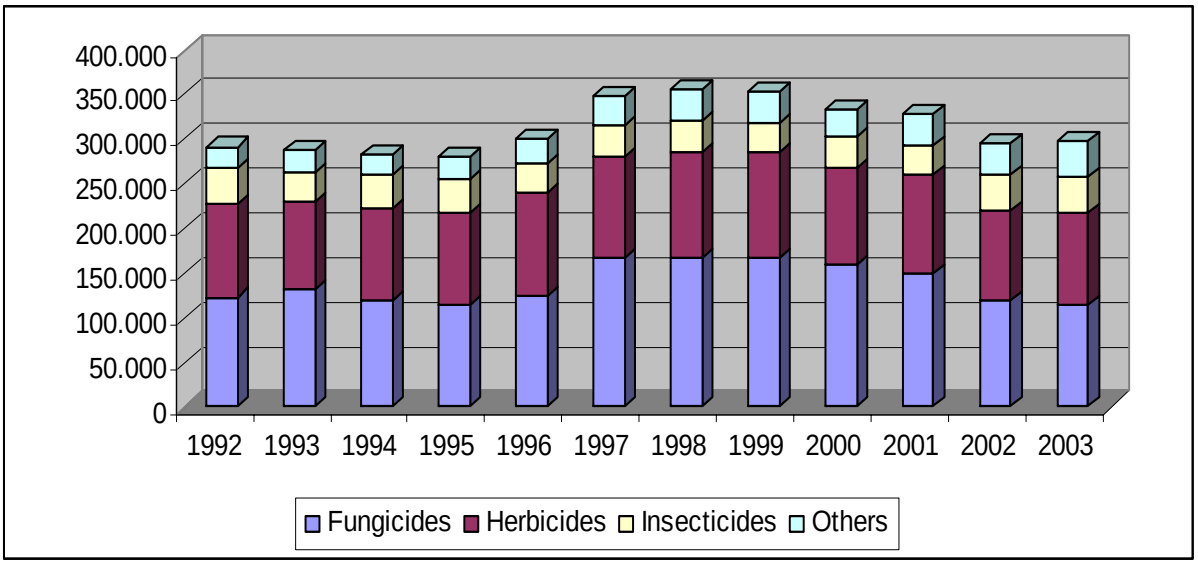

Figure 5-2: Trends in total sales of pesticides in EU-15 (in tonnes of active ingredients)

Quantities of pesticide use in agriculture are notoriously difficult to obtain – only few Member States carry out regular surveys, whereas at Community level, available figures rely mostly on estimates from the most important industry association (European Crop Protection Association - ECPA). ECPA's estimates are based on sales and marketing information from its member companies that do, however, not control the complete pesticides markets in the Member States. In addition, the figures do not systematically include all types of products. A comparison of Member States' surveys and ECPA's figures showed that the industry figures were at a minimum around 20% lower than those from the authorities. ECPA's estimates for 1999 are at 232.000 tonnes, which suggests that real use in agriculture is probably more around 280.000 tonnes active substances. In 2002 ECPA companies sold 260,000 tonnes of active substances with a market value of € 5,908 million[78], which suggests that overall sales (including non-members of ECPA)

[77] 'The use of Plant Protection Products in the European Union – Data 1992-1999' -Eurostat and European Crop Protection Association, 2002.

[78] From European Crop Protection Association website : http://www.ecpa.be.

were at 315.000 tonnes with a value of € 7 billion. Table 5-3 gives some key figures concerning pesticides that will be particularly relevant in the evaluation of the economic impacts of the measures of the Thematic Strategy.

As already described and summarised in Figures 2-3 and 2-4 above, the current situation differs quite a lot from one Member State to another with respect to quantities used, structure and importance of the agricultural sector, impacts from pesticides and trends in pesticide use.

The good point in this is that already existing implementation in one or several Member States of most of the measures proposed in the strategy can serve as baseline for the assessment of their implementation in the others. Similarly, the absence of spontaneous convergence and clear aggregated trend among EU Member States leads to the conclusion that, under the "no action" option, overall quantity of pesticides used will not go down significantly – neither will the negative externalities.

Table 5-3: Economic key data concerning pesticides (EU-25)

Facts	Figure	Unit	Source
Total value of crop production (2002)	166,697	M€	European Commission (COM), Eurostat
Total utilised agricultural area (UAA)(2001))	167,000,000	ha	COM, Agriculture
Area used for crop production (1999)	74,118,000	ha	COM, Eurostat
Volume of active substances for agricultural use per year (estimation 1999)	280,000	t	COM, Eurostat
Volume of non-agricultural use (estimation 1999)	~36,000	t	COM, Eurostat
Average use per ha UAA(calculation 1992-1999)	1.7	kg	COM, Eurostat
Average PPP use for main consuming crops per ha (calculation 1992-1999)	4.2	kg	COM, Eurostat
Value of agricultural PPP market (estimation EU-15 data 2002)	5,908	M€	ECPA
Average price per kg a.i. (calculation 2002)	~25	€/kg	ECPA
Number of employees in PPP industry (estimation EU-15 data for 2002)	26.300	persons	ECPA
thereof in agricultural business	23.000	persons	
thereof in non-agricultural business	3.300	persons	
Average turnover per employee chem. Industry	313.000	€	BiPRO
Number of agricultural holdings	7.900.000	holdings	COM, Agriculture
Average agricultural area per holding (estimation EU-15 data)	20	ha	COM, Agriculture
Average PPP use per holding	35.5	kg	BiPRO
Average cost per employee at authorities (estimation)	50.000	€	BiPRO

5.2. General methodology

The basis for this assessment are the Guidelines of the European Commission on Impact Assessments (ExIA). These guidelines set up 7 steps:

1. Description of procedural issues and consultation of interested parties
2. Definition of the problem to be tackled
3. Definition of the objectives to be reached
4. Description of the policy options available to reach the objective
5. Analysis of the impacts – positive and negative – expected from the different options identified
6. Comparison of the impacts of the various options
7. Monitoring and evaluation of the proposed options

In order to apply this methodology for the Thematic Strategy, for each of the measures studied in detail in this IA, different options on how they can be put into practice - ranging from 'no-action', *via* partially binding to highly prescriptive legally binding options - have been developed. It is to be stressed that the 'no-action' option has been systematically listed, and refers to a strict *status quo*: no improvement in the existing framework, but not alignment to the lower degree either ('no-action' is not 'no-acting'). When we dealt with training, for example, 'no-action' means training in countries which already imposed it (and of the same kind), and no training in the other ones. In fact, we never considered the option of suppressing all existing measures ('no-acting') because it never made sense, whereas we indeed considered partial steps back. For instance, when we studied the generalisation in Europe of authorisation of aerial spraying under strict restrictions, this options meant authorising aerial spraying in countries where it is presently totally banned, and restricting its use in other countries where is more freely allowed. As a consequence of this, by definition, the 'cost of no action' is equal in absolute terms but opposite in sign to the excepted benefit associated to the proposed strategy. All options have then been analysed with regard to their economic, social, and environmental impacts in the next chapters in the following way.

– determination and documentation of the current situation (*status quo*) in EU Member States related to the key measures and options,

– identification of causalities and relations,

– assessment of the impacts of the various options,

– recommendation of most appropriate options.

Impacts are assessed with respect to:

– economic consequences (where possible measured in € additional costs or additional income compared to *status quo* for the actors concerned),

– social consequences (where possible measured in number and quality of jobs; based on average correlations income to jobs or costs to jobs),

– environmental consequences (mainly assessed on the basis of expected reduction in tons of PPP used, taking into consideration possible effects of PPP substitution and other consequences that are not correlated to use reduction but nevertheless constitute a risk reduction, e.g. buffer zones to protect water),

– health consequences (not quantified but qualitatively assessed taking into consideration avoided adverse health impacts on operators, consumers, bystanders as an effect of reduced exposure or reduced number of accidents).

The expected benefits are mainly improvements in the situation with regard to adverse impacts on the environment or health, or other societal benefits (i.e. reduced external costs due to PPP use) by a more sustainable use of pesticides.

As already explained in Chapter 5.1, conversion of such expected benefits to monetary terms is difficult as they are the outcome of a complex causal chain or it is impossible to estimate the value of the benefits for society, such as:

– increased food quality due to lower contamination of feed and food products,

– higher quality of life due to decreased occurrence of diseases among the users and – probably to a lesser extent - the consumers as correlation between pesticides exposure and emergence of adverse impacts is difficult to establish, in particular for consumers,

– decreased costs for curing professional diseases,

– reduced losses of working power due to decreased inactive periods of sick leave,

– lower redemption costs for contaminated sites due to less accidents and lower general contamination levels,

– cleaner environment and thus contribution to the sustainable conservation of natural resources,

– decreased costs for decontamination of drinking water,

– enhanced biodiversity,

– enhanced recreational effects due to positive impacts on landscape (e.g. hedges, buffer stripes).

These positive societal effects are expected as a result from the implementation of the measures proposed under the Thematic Strategy. It has to be recalled that there is no simple correlation in the sense "use reduction of PPP = benefits for society". If not specifically targeted at risk reduction and this in a proportionate manner, a use reduction may cause unwanted effects such as yield losses, degradation of valuable man-made landscape, shift to use of highly active and riskier PPP or other unwanted impacts.

Figure 5-4 illustrates the correlation between benefits for the society and a targeted PPP use reduction in a schematic way.

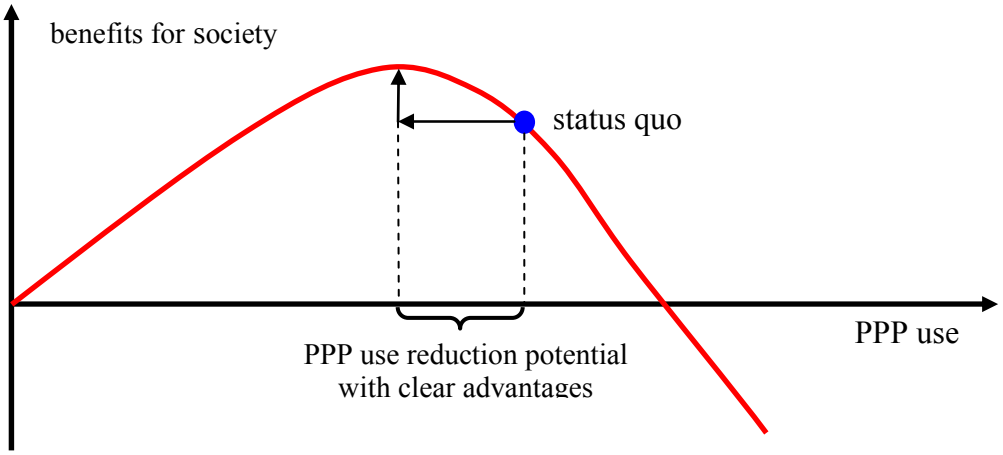

Figure 5-4: Schematic correlation between benefits for society and a targeted PPP use reduction

The curve represents marginal values and not total values. It intends to illustrate that probably the current situation regarding PPP use in the European Community is not at its optimum with respect to benefits for society and that appropriate measures might allow to approach this optimum without adverse effects on output or explicit/implicit compensatory transfers among actors. For instances, it is quite clear that some farmers apply too high quantities of pesticides and they could achieve the same farm output with a lower consumption of PPP. This situation can be due to the fact that the prices of PPP are too low, because externalities (adverse effects on health and environment) are presently not correctly integrated and because better farm practices would imply certain additional costs. For example, sprayer maintenance and inspections require time and costs – hence if PPP prices are comparatively low, some over-consumption through the use of bad equipment is not an economic disadvantage. From a purely economic perspective, such behaviour is likely to happen, if for farmers the utility of time / action needed to reduce PPP consumption (at constant output) is higher than the monetary value of PPP used in excess. Therefore, the 'natural' market equilibrium may be individually rational and optimal, but not so collectively. Still, it is unlikely that farmers by themselves would change this situation.

Making farmers have their equipment inspected and well maintained and reduce their PPP consumption is overall economically better for society. However, if arguments about competitiveness or other political considerations prevent authorities to oblige farmers to bear the full costs of their activities, the costs for having the equipment inspected and maintained for the individual farmer could be compensated by society, so that overall a better equilibrium is achieved without losses for a particular group. This could be achieved through various measures such as providing incentives, regulation, market based instruments, etc. It is precisely the purpose of the impact assessment to compare all possible options and identify the best one.

Society at large, in particular operators, consumers and the environment will benefit from the various effects of reduced risks from PPP use. As illustrated in Chapter 5.1, it is very difficult to monetise these benefits consistently at a general level. The most comprehensive attempt to quantify the externalities of PPP use in a Member State has been performed in Germany. Externalities have been estimated to amount as a minimum to approximately € 130 million. These costs are still an underestimation as several relevant costs cannot be quantified.

Many of the costs contained in the overall sum will actually not be reduced, if the use of PPP is partially reduced, as these costs are not all proportional to actual quantities applied. For example the costs linked to monitoring water quality will remain the same, but the costs for actually

treating contaminated water will decrease, as the need for treatment will go down. The same will apply to costs linked to effects on biodiversity and health costs, which should go down in a certain relation to reduced use of pesticides, whereas the authority costs linked to authorisation procedures and monitoring stay the same. Costs linked to the externalities that could actually be affected by a reduction in use of pesticides amount to approximately € 27 million. Having in mind the limitations of an extrapolation from this individual Member State to the European level this would correspond to externalities of about € 200 million for EU 25[79] that could be eliminated through a optimised use in pesticides (which means a reduction of current use without significant negative impact on the users of pesticides).

It has to be pointed out that calculations of external costs of pesticide use tend to result in an underestimation as several relevant costs cannot be quantified. The above figure of € 200 million for EU-25 is therefore a first conservative proxy of benefits that can result from a reduction in the use of pesticides and if the costs associated with the efforts to reduce PPP use stay below or only slightly above this figure, it is reasonable to assume that in reality they would be well below the external costs triggered by the current pesticide use.

5.3. Specific challenges to apply the general methodology to the measures constituting the Thematic Strategy

5.3.1. Particular Problems

The Impact Assessment for the Thematic Strategy on the Sustainable Use of Pesticides is complicated by some specific problems that made it necessary to develop additional methodological elements. The main issues can be summarised as follows:

a) The flexibility of measures and options.

The Thematic Strategy is not only concerned with one specific proposal but comprises a whole set of measures, for each of which there are different options. All of these have a significant degree of flexibility. For example

– an option could have several sub options

– important decisions within an option are still open and need to be made in the future where Member States would have to decide on detailed implementation within a given framework.

– the option leaves various alternatives to Member State decisions

It is obvious that in order to assess impacts of the various options a proper methodology is necessary to deal with this problem of flexibility.

b) Different status quo in Member States

There are significant differences with respect to the existing situation in Member States. This means that a certain option might have important impacts in one MS and no impacts in another one. For that reason it is necessary to have a methodological element to take different *status quo* into consideration.

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[79] Extrapolation from the Report 'Assessing economic impacts of the specific measures to be part of the Thematic Strategy on the Sustainable Use of Pesticides', available at: http://europa.eu.int/comm/environment/ppps/2nd_step_study.htm

c) Completeness and plausibility of impacts

Different types of impacts have to be assessed i.e. environmental impacts, health impacts, economic impacts have to be covered. It is obvious that not all impacts can be fully analysed and that focussing on the more important ones is necessary. Against this background it is crucial to have a methodological element that enables to

– analyse completeness of impacts

– evaluate importance of impacts

– check plausibility of impacts

d) Data availability and data gaps

Assessment of the impacts of the use of pesticides is a widespread and complex field which leads to a huge demand for data to assess impacts of the Thematic Strategy. However a lot of necessary data are not available or it would have taken too long to collect them. The lack of coordination between authorities concerned in Member States is frequently cited to explain the data gaps: this indication is also important for the implementation phase of the Thematic Strategy. In the meantime, a methodology had therefore to be developed to collect as many as possible reliable data in a short period of time and to cover data gaps in an appropriate way.

e) Overlapping impacts and communication requirements for the results

There are various impacts that are caused in similar ways by different measures, options and case studies. For example: the complex causal chain: reduced use of a given pesticide[80] → reduced exposure of humans → reduced health problems → reduced costs for health treatments, is relevant for many options and measures.

A methodology is necessary to cover these overlapping impacts and avoid double counting.

5.3.2. Overview: the complete methodological concept

The overall methodology applied for this impact assessment has been developed in order to enable the fulfilment of the following tasks:

– development of possible options for the implementation of specific measures for the achievement of the objectives of the Thematic Strategy

– determination and documentation of the *status quo* in EU Member States related to the measures and options

– impact identification of the developed options relative to the *status quo*

– consideration of flexibilities within the options

– identification of causalities

– assessment of qualitative/quantitative impact

– recommendation of most appropriate options

[80] Caused for example by improved training, technical check, enhanced protection of water or quantitative use reduction.

Figure 5-5 shows the complete concept of the applied methodological elements that has been used in the main source of information for the quantification of impacts in this assessment[81].

Starting points are the options that have been developed for every possible measure that aims to contribute to the achievement of the objectives of the TS.

Steps 2, 3, and 4 of the Guidelines on Extended Impact Assessment are covered by the first matrix ("options-objectives-matrix" (a)). The matrix makes clear which of the objectives of the TS are aimed at and which are the measures and options that could contribute to achieve the objectives. The impacts of these options have then been assessed in the following steps ((b) to (h)). Where necessary, new options have been included in the options-objectives-matrix in an iterative process based on the initial results of the impact assessment and more policy-making discussions.

The structure of the options-objectives-matrix is identical to the matrix that summarises the final results containing the recommendations about the suitability and ranking of the options (recommendation-matrix (h)).

Key points of the current legal situation have been determined and evaluated and compared for all Member States (b) (legal-*status quo*-matrix). For this purpose appropriate data had to be collected.

[81] For further details, please see: *Assessing economic impacts of the specific measures to be part of the Thematic Strategy on the Sustainable Use of Pesticides,* BiPRO 2004, available at: http://europa.eu.int/comm/environment/ppps/pdf/bipro_ppp_final_report.pdf

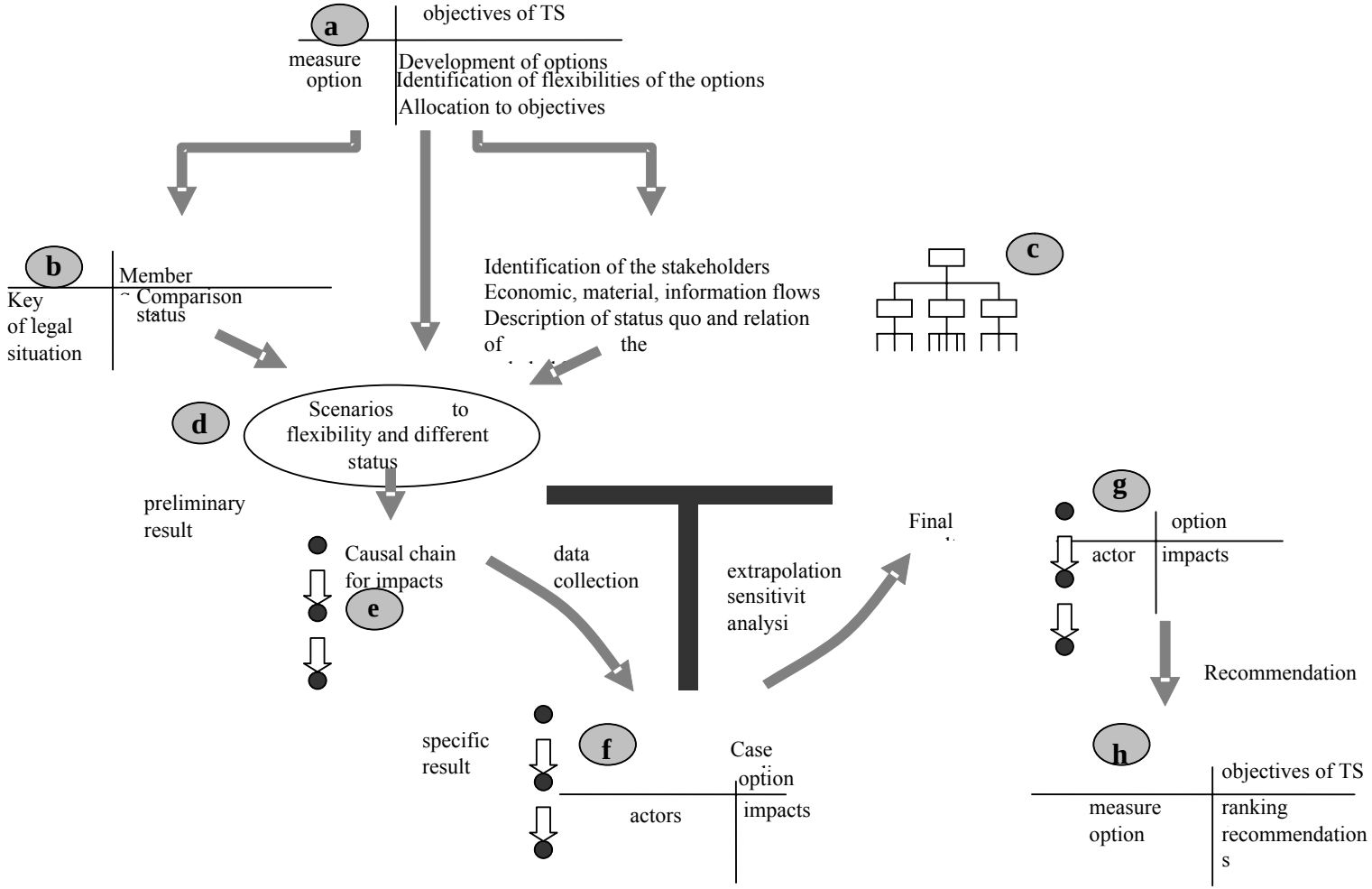


Figure 5-5: Overview of the complete methodological concept

In addition to the legal situation, the *status quo* is also characterised by relevant actors and their relations, material flows (e.g. amounts of pesticides used), economic flows and information flows (c). Also for the investigation and documentation of the *status quo* with regard to the flows, vast amounts of data had to be collected.

The results of steps (b) and (c) and their documentation as the present *status quo* is an important outcome because it defines the starting point for the evaluation of the various options against the current situation or in other words it represents the "no-action option". The *status quo* is documented at EU level and for the individual Member States. All impacts are evaluated relative to the *status quo*.

Options that are flexible constitute a particular problem. For their evaluation their internal flexibility had to be taken into consideration. To this end different scenarios had to be set up that cover the existing flexibilities (d) and these could lead to different impacts.

The scenarios are closely correlated with the causal chains that are established in order to describe systematically all relevant impacts (e). Following the causal chains first impact results became available. If the impacts were important, they were checked by a detailed analysis. Where reliable data for a detailed analysis were not available at European scale typical case studies in individual Member States were carried out (f) which were then extrapolated in order to conclude on the general situation at European level. For this purpose again data collection was necessary.

The case studies themselves were used to extrapolate to general results covering relevant actors and relevant impacts (environmental, economic, social, health impacts) (g). The procedure follows a so-called "T-principle" and finally enables to answer the question 4 of the Guidelines on Extended Impact Assessment: "What are the impacts – positive and negative – expected from the different options identified?"

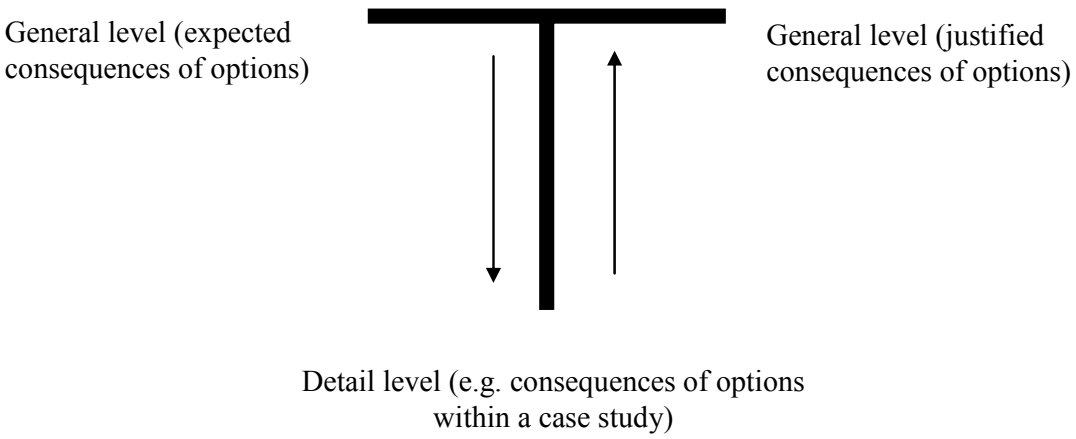


Figure 5-6: The "T"-principle

The "T" principle means a methodology that starts with preliminary general results at European level, goes into details at a certain point for checking and improving the general results and finalises the exercise by extrapolating to reliable results on the general level. It is a tool that helps to create a reliable information basis if appropriate data are not available on a European scale.

During the multiple phases of data collection and using the methodological element of the T-principle, steps 5 and 6 of the Guidelines on the Extended Impact Assessment could be put into practice.

The overall results for the various impacts have then been extrapolated for the options and the objectives of the TS. A final matrix presents the evaluation of the options regarding their suitability to achieve the objectives of the Thematic Strategy taking into consideration the positive and negative impacts of each option (h). The final matrix is designed as an easily understandable policy making tool and a basis for the Commission's proposal and its justification (seventh step of the guidelines on Extended Impact Assessment). The evaluation of the options illustrated in the matrix is justified in a transparent and detailed way by the impact assessments carried out in the corresponding chapters.

5.3.3. Assessment of measures and options

The objectives of the Thematic Strategy and the envisaged measures and their options are best presented in a 'options-objectives-matrix', as illustrated in Table 5-7.

Table 5-7: Options-objectives-matrix

Objectives Measure/ Options	A	B	C	D	E
Measure I	✳				
Option I-1					
Option I-2					
Option I-3					
Option I-4					
Option I-5					
Measure II		✳		✳	
Option II-1					

✳ indicates that this measure is expected to contribute significantly to achieving the indicated objective

The various options were developed in a specifically created Interservices Group comprising a number of Directorates-General from the Commission in addition to DG Environment. Options initially containing too much flexibility were split in the course of the process. For example, within the measure "Technical check for spraying equipment" one of the proposed option deals with the recommendation to "establish a voluntary control system with or without certification". As the flexibility within this option might lead to a recommendation of either

– a voluntary control system without certification, or

– a voluntary control system with certification

the original option was split into two in order to make the evaluation easier. If additional aspects came up during the examination of impacts new options have been developed in an iterative way.

For some measures added values can be expected if options are combined (example: voluntary approach combined with financial instruments).

Despite these efforts a lot of flexibility remained in some options that resulted in a wide range of possible impacts. This flexibility is addressed in a scenario approach and a sensitivity analysis.

The structure of the options-objectives-matrix is also maintained for the documentation of the final result. Based on the impact analysis and the results thereof the final recommendations-matrix has the following structure as shown in Table 5-8.

Table 5-8: Recommendation-Matrix

Objectives Measure/ Options	A	B	C	D	E
Measure I	✳				
Option I-1	**1**				
Option I-2	**2**				
Option I-3	**3**				
Option I-4	**3**				
Option I-5	**1**				
Measure II					
Option II-1					

✳ indicates that this measure is expected to contribute significantly to achieving the indicated objective: the figures indicate the appropriateness of an option relative to the *status quo* (no-action): **1 recommended, 2 neutral, 3 not recommended**

As mentioned above, this matrix is designed as an easily understandable policy making tool and a basis for the Commission proposal and its justification. The evaluation of the options as ranked in the matrix is justified in a detailed way by the impact assessments carried out in the corresponding chapters of this report.

5.3.4. Consideration of status quo

The existing *status quo* is the essential basis for assessing impacts of potential measures and their various options. Other future developments independent of the Thematic Strategy such as price changes, newly developed PPPs, economic growth, etc. have not been taken into consideration as they would occur also in the baseline situation. The whole analyses of options and measures is therefore based on "ceteris paribus" (all else being equal) assumptions.

With respect to the legal *status quo* key points for differences between the existing situation and the options have to be identified. Table 5-9 shows the matrix that is used to compare the situation in the different Member States.

Table 5-9: Matrix to present current legal situation in MS (example aerial spraying)

	EE	ES	FI	....
Total ban	X			….
Ban with exception				
Severe restrictions Authorisation in advance Advanced warning with possibilities for authorities to restrict		X ● ●	X ● ●	
Non severe restrictions Trained and certified pilots Restricted to crop type Guidelines for best practice		X ●	X ● ●	
financial instruments				
no restrictions				

In addition to the description of the legal situation, knowledge about the *status quo* with respect to

– material flows

– economic flows

– information flows

is essential. Between the various actors involved in the use of pesticides these flows are the basis to describe all relevant relations between the actors.

Further to the description of the *status quo* these flows are methodological tools for

– the identification of cause-effect relations

– estimations with respect to data gaps

– plausibility checks.

Figure 5-10 shows the general ***material flow*** related to PPP between the main stakeholders concerned.

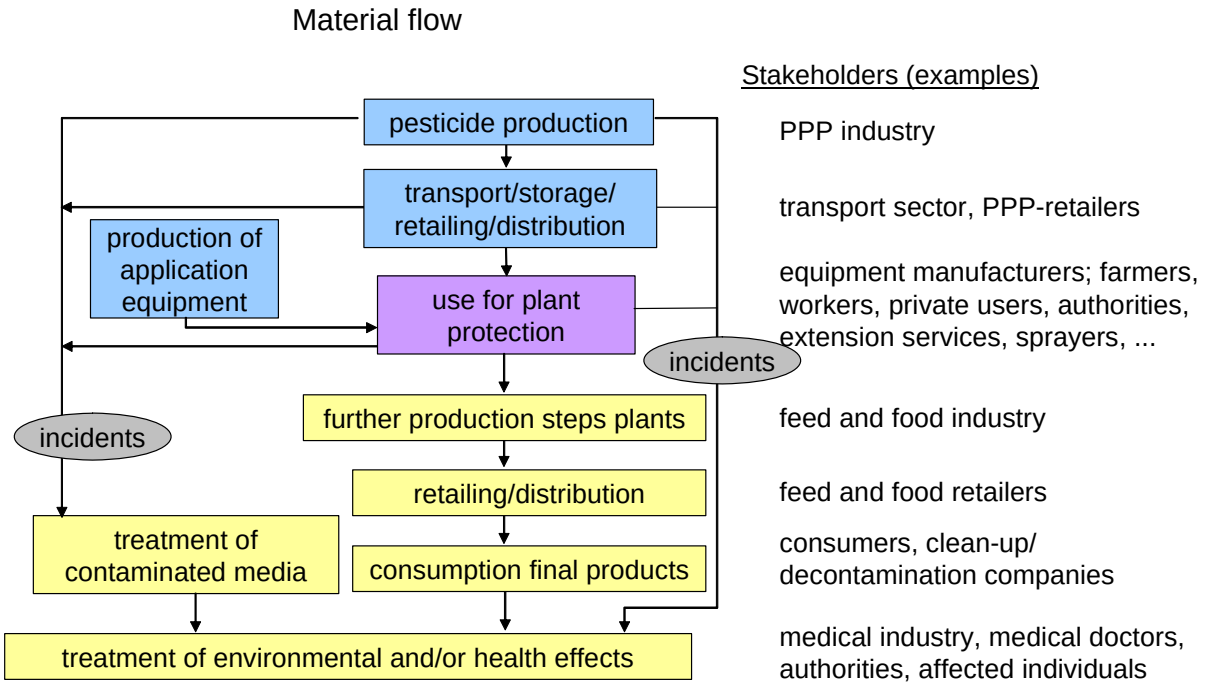


Figure 5-10: General material flow and concerned stakeholders

The main actors (and hence most concerned stakeholders) are:

– producers of PPP

– companies responsible for transport, storage, retailing, distribution of PPP

– users of PPP

– producers of application equipment

– actors dealing with the treatment of contaminated media (in particular water treatment companies)

– actors involved in further production steps, retailing and distribution of agricultural products

– consumers

There are three major types of material flows

– flow of PPP

– flow of agricultural products

– flow of equipment

Figure 5-11 shows the principle ***information flows*** by means of the example of aerial spraying.

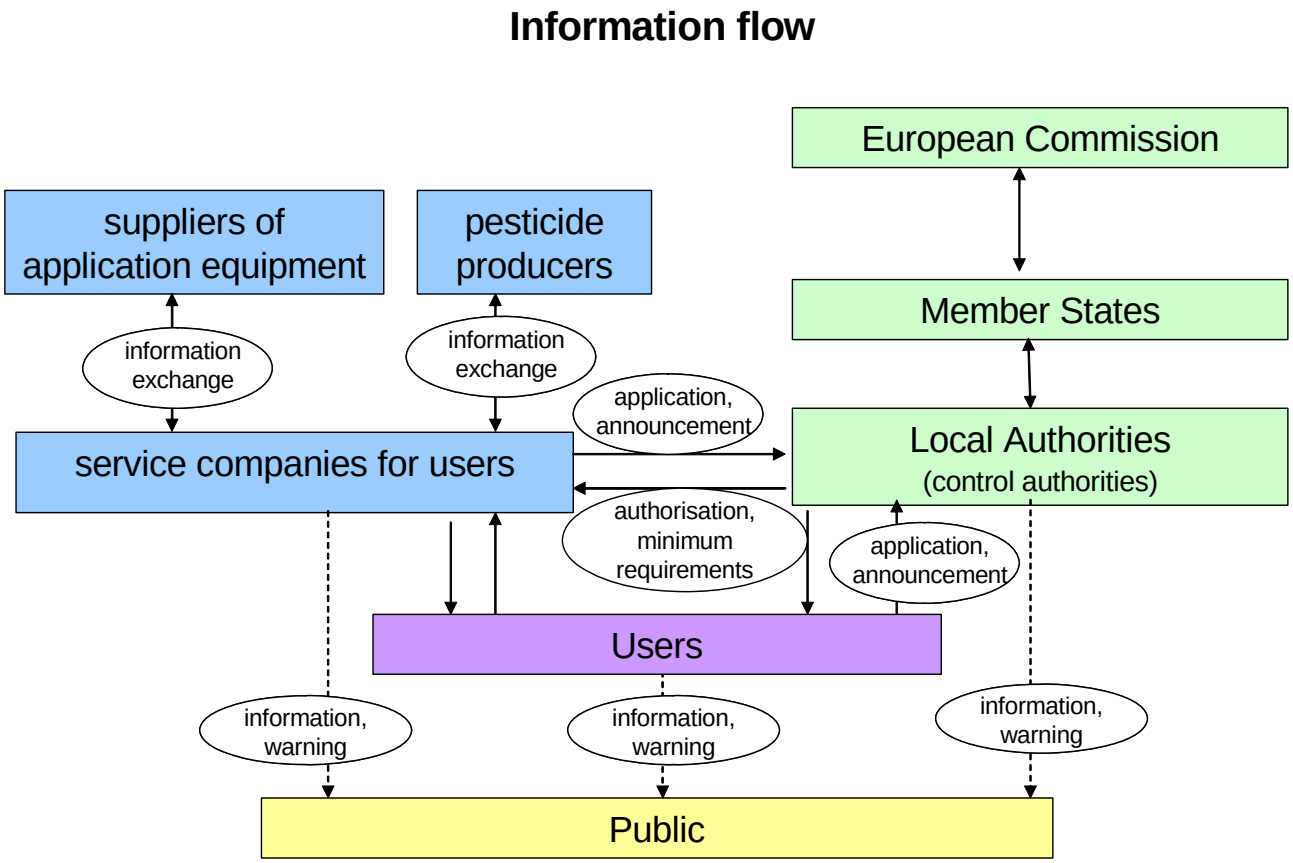


Figure 5-11: Information flow scheme as illustrated with the example aerial spraying

In addition to the already mentioned actors and stakeholders, the following are relevant:

– authorities

– training and service (e.g. consulting) institutions

– certification institutions

– controlling institutions

As material and information flows are typically combined with ***economic flows*** the same actors appear in the economic flow chart. Additional actors are relevant that are dealing with the treatment of environmental and/or health effects and actors that are providing services (like aerial spraying companies). Figure 5-12 shows the major monetary flows for the example of training of users.

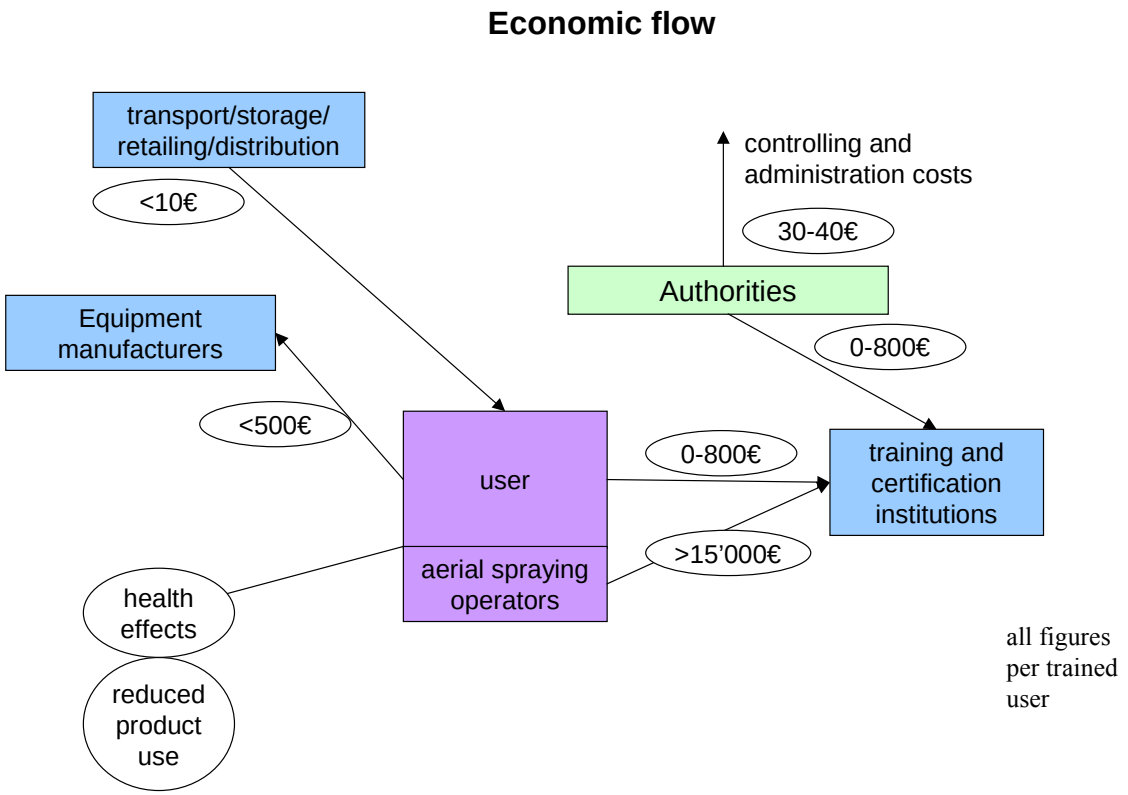


Figure 5-12: Economic flow – example training and certification of users

Impact analysis studies often mention impacts only in one direction. For example, if there is a need to install new equipment to respect new limit values, the additional costs are highlighted. But following the economic flow principle these additional costs on the one hand mean additional earning for the producers of equipment on the other hand. In other words, in many cases costs for one actor mean benefits for another. If results are based on flows these relations become more obvious.

5.3.5. Completeness and plausibility

Based on the scope of the analysis and the flexibility of the options for the various measures not all data that were relevant for impacts could be collected. As a consequence there was a need to focus on the most important impacts and to work with the help of case studies. These could be checked on their plausibility taking into consideration the overall relations of the general flows and the flows of the case studies. Also, in cases where quantification of impacts was not possible (due to absence of relevant data) a qualitative analyse had to suffice.

5.3.6. Identifications of impacts and causal chains

For the identification of impacts of measures and their options it has to be borne in mind that an assessment of impacts is depending on a number of uncertainties such as:

– In many cases there are various alternatives for the actors to react to changes of the *status quo*.

– In many cases there is still some flexibility within the options analysed and also a 100% implementation might not be achievable for all measures.

Against this background it seemed essential to follow causal chains for the assessment of impacts. The developed methodology foresees that in a first step the direct impacts were identified, which were the starting points of the causal chain. For direct impacts the actors are typically addressed immediately in the option analysed.

Example: If there is an option to ban aerial spraying the direct impact is that aerial spraying companies have to stop operations related to pesticide application, independent of whether they did it properly or not. The impact that aerial spraying companies give up and jobs are lost in these companies is not a direct impact but a consequence thereof, i.e. indirect impact in the causal chain. Furthermore, it is also not sure that this indirect impact happens as aerial spraying companies might find other business.

Thus, after the direct impacts also indirect impacts are examined. They are divided into level 1 impacts (following the direct impacts) and level 2, 3, etc. impacts (following the level 1, 2, etc. impacts). This is illustrated in Table 5-13 for the example of aerial spraying.

Table 5-13: Example aerial spraying: indirect impacts

Direct impact: no proper and improper aerial spraying	
Starting actor: aerial spraying companies	
Impact level 1	Specialised aerial spraying companies have no possibility to survive with other business
	loss of jobs
	loss of earning
Impact level 2	Manufacturer of helicopters and aerial spraying equipment
	loss of earnings and jobs

One direct impact in case of a total ban of aerial spraying is that aerial spraying companies are not allowed to spray anymore. As a consequence specialised aerial spraying companies have no possibility to survive with other business (worst case) and therefore give up and the employees will lose their jobs (impact level 1). The closing of aerial spraying companies induces a loss of earning for manufacturers of helicopters and other aerial spraying equipment (impact level 2). Another impact (level 1) of a total ban of aerial spraying would be that – where economically feasible – PPP-application will in many cases be done in another way and new jobs may be created due to this. This in turn may have positive effects on equipment manufacturers of ground spraying equipment (impact level 2).

5.3.7. Collection and checking of data

Data collection was a major task of the impact assessment in particular in order to determine the *status quo* with respect to the envisaged measures within the Member States. For the collection of data different approaches have been followed.

A questionnaire was developed for authorities and other stakeholders. Based on the feedback of the authorities, official data are available for most of the Member States. The questionnaire[82] had the main function to provide a first basis which was followed up by personal discussions, telephone interviews, participation in conferences and meetings. Additionally, relevant literature and studies have been checked for data and results pertinent for the impact assessment.

As far as possible, the received information has been integrated into the schemes of material and economic flows and has been checked by this means for their plausibility.

In some cases, key factors (e.g. use of kg active substance per hectare; average cost PPP/ha) for cross checking of important data have been collected and have been compared for different Member States. If these key factors showed important divergences, they were cross-checked with the authorities.

5.3.8. Addressing data gaps

Despite all efforts to collect all relevant data, it was not always possible to close all data gaps. These are documented and, where feasible, quantitative estimations based on the flows or on key figures are made. If quantified estimations are not possible either, qualitative results instead of quantitative impacts are given.

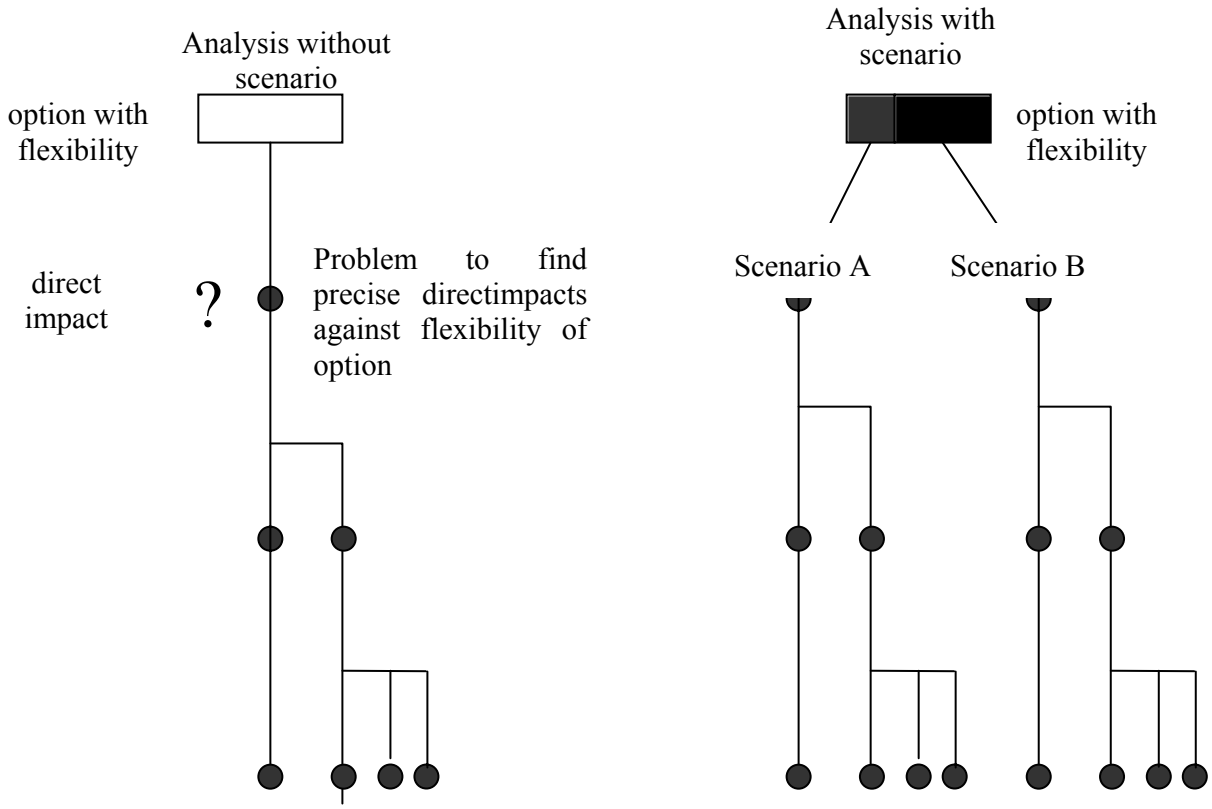
Some of the figures occurring in certain tables (e.g. in tables related to sensitivity analyses) are calculated and therefore seem to have a level of accuracy that is implausible on the basis of the underlying data: e.g. expected job losses of 362 jobs means that job losses in the dimension around 350 jobs are expected. Still, the indication of calculated figures increases the transparency of the results. In general statements and recommendations rounded figures are given.

5.3.9. Analysing scenarios

Analysing different scenarios is a tool to examine different possible future developments that can appear due to the flexibility of options, different *status quo* in Member States and non-rational behaviour of actors.

It is possible to use scenarios for different levels of the causal chain, which however, can make the results for impacts very complex.

[82] Available at : http://europa.eu.int/comm/environment/ppps/pdf/bipro_ppp_final_report.pdf, p. 387 ff.



Working with scenarios leads to ranges of results for the expected impacts. The scenario results after the impact analysis are best presented in an overview as shown in Table 5-14.

Table 5-14: Summary table for impacts of various scenarios within one option

	Measure X, option/scenario				
Stakeholder	option X-1 scenario A	option X-1 scenario B	option X-1 scenario C	option X-2 scenario A	…
economic impacts					
environmental impacts					
health impacts					
social impacts					

The ranges for the results of the scenario analyses have to be condensed to a final result as different scenarios might have different probabilities to occur and consequently there is a certain

probability within the ranges of results. However it is only a theoretical approach to calculate the probability within the range of results. Due to missing data this is feasible only for a few examples. But even if a quantitative statement is not possible, a qualitative assessment on the probability has been done within the sensitivity analysis.

5.3.10. Case studies

Case studies are a tool to

- examine impacts more in detail and with a deeper involvement of stakeholders
- deliver arguments and examples for the Commission's deliberations
- enable extrapolations to a broader scope if reliable data are not available at European scale (as it was observed frequently during the survey).

Case studies are used in the project in accordance with the "T" principle (see Figure 5-6) which starts with preliminary general results, goes into details for checking and improving the general results and finalises the exercise by extrapolating to reliable results at the general level.

Case studies have been selected according to the following requirements:

- results of case study are important
- results can be extrapolated
- data are available

Case studies, their impact assessment and scenarios are designed in a way similar to the general approach.

5.3.11. Overlapping correlations of impacts

Certain impacts further down in the causal chain are based on general trends and are more or less independent from an individual measure or its options at the starting point of the causal chain. It is also important to note that certain effects of the various measures are either overlapping or cumulative.

Example: Better maintained spraying equipment reduces the unwanted loss of pesticides. Reduced losses of pesticides mean less volume sold by the producers of pesticides and less earnings. Also better training for users reduces the loss/overuse of pesticides and the same impacts for the producers occur as described above. Ideally, the impact analysis of single measures and options would provide the information to which extend the two measures contribute to the reduction of the losses of PPP. Then the general overlapping correlation "reduced losses of PPP → reduced earnings of PPP producers" can be applied. However, in the course of the assessment, it was not always possible to clearly differentiate how much each of the analysed measures and options would contribute to an overall expected result.

A further difficult area is the analysis of health effects. Ideally, it would be desirable to differentiate between acute and chronic effects. It is also necessary to distinguish between occupational exposure, e.g. of operators, and consumer exposure (see Figure 5-15). Within the feasible depth of analysis of the assessment, however, it is assumed that health impacts follow the same rules, i.e. the impact analysis will provide information how the exposure is reduced and then the correlation "reduced exposure → reduced health effects" can be applied.

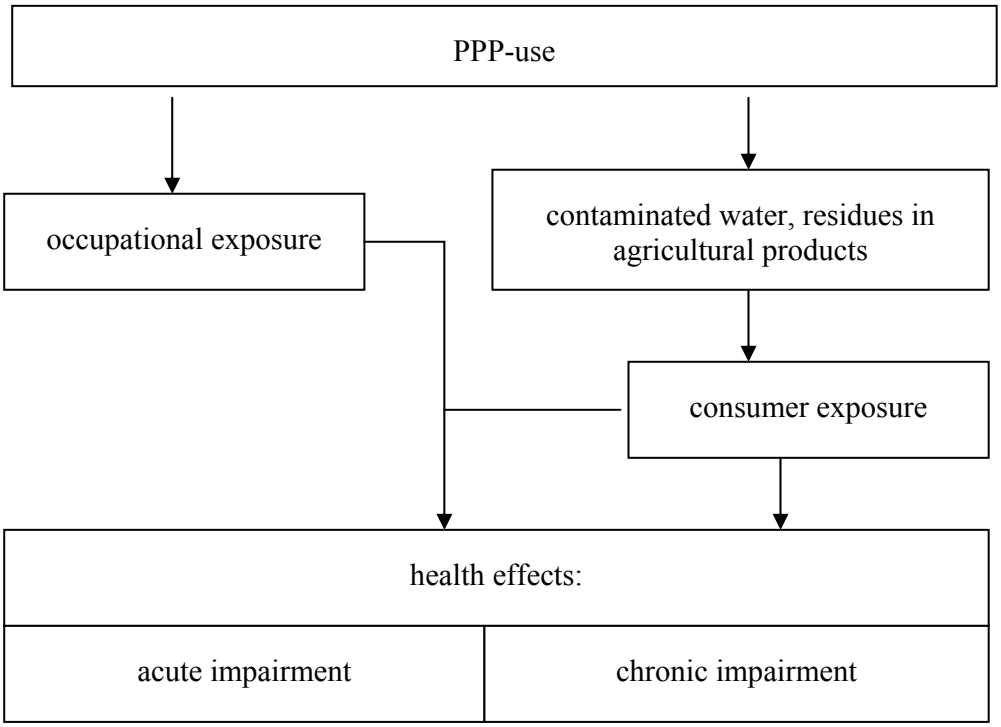


Figure 5-15: Causal chain for health impacts

Example: Assuming that based on national statistical data there would be about 150 acute accidents related to the use of pesticides annually in a Member State due to occupational exposure. Implementation of measures like the establishment of mandatory training schemes for operators might decrease this figure, as users are more aware of the risks of PPP and possible safeguards. If the exposure will thus be reduced by 50% it is possible to assume that that, as a result, also the number of acute health impairments will be reduced by a comparable figure.

For consumer exposure the cause-effect relation is less clear because e.g. reduced overuse may, but does not necessarily mean reduced contamination of the final agricultural product. However there are clear cause-effect relations if one considers e.g. the consumption of drinking water or the application of alternative, non-chemical plant protection as contained in the options of measure related to IPM.

5.3.12. Methodology to derive recommendations

Deriving recommendations against the background of the assessed impacts is a difficult task when a broad range of possible impacts, criteria and solutions exist.

It is, on the one hand, obvious that an option for an envisaged measure contributing better to a particular objective than the others is a candidate for recommendation. However, it might be that exactly this option has impacts that are not intended and therefore the recommendation does not remain clear. To make it more complicated the various impacts themselves might lead to a very inhomogeneous picture as there are in most cases winners and losers, which are not necessarily the same in the different options. Quantification of results is often not possible at all or only partially possible.

The methodology applied in this impact assessment therefore relies on the following principles:

– the relative comparison between options against the *status quo*,

– the relative importance of impacts,

– the existing flexibility within the options and the potential for an optimised implementation.

In the relative comparison between options the "no action – no impacts" situation defines the baseline. Advantages and disadvantages of each option are compared to this standard. Disadvantages (= negative impacts) are checked for whether they will lead to unacceptable consequences that would cause severe problems for implementation and acceptance of the whole Thematic Strategy. If “yes” then the option is characterised as "not recommended". If "no" then the advantages (positive impacts) compared to the no action standard are evaluated. If there are significant advantages then the option is characterised as "recommended", if not, it is characterised as "neutral".

For the two types of decision, whether a negative impact was unacceptable or whether positive impacts were significant, the relative importance of the impacts for the various options is taken into consideration.

If there are several options that can be recommended, additional information is given on the existing flexibility and the potential for an optimised implementation.

6. COMPARING THE OPTIONS

6.1. *Status quo* situation in Member States

As already stated, the impact assessments for the individual measures will be performed against the existing *status quo* in each Member State or for each stakeholder group. It is therefore crucial to analyse the existing specific (legal) situation in Member States first. Therefore each Member States has been surveyed with regard to the existing legislation for the measures that are examined in this impact assessment. It is also important to identify the main actors concerned by the possible measures in the given sector and to present the existing economic or information flows.

6.1.1. Creation of a system of mandatory education, awareness raising, training and licensing for all PPP users (farmers, local authorities, workers, distributors, traders and extension services)

Current legal situation

Existing Community legislation requires already training of workers to avoid risks to safety and health when using pesticides. Directive 89/391/EEC[83] contains a general obligation in Article 1 to introduce measures to encourage improvements in the safety and health of workers at work. Furthermore, Article 12 states that "the employer shall ensure that each worker receives adequate safety and health training".

In Directive 98/24/EC[84] training is regulated in Article 8 regarding information and training of workers when it comes to chemical agents. A specific guideline on Directive 98/24/EC will be published before the end of 2005.

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[83] Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OJ L 183, 29.6.1989 p. 1-8).

[84] Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (OJ L 131 , 5.5.1998 p. 11-23).

Directive 89/655/EEC[85] is regulating the minimum safety and health requirements for the use of work equipment by workers at work. In Article 7, the Directive contains an obligation for employers to ensure that workers given the task of using work equipment receive adequate training, including training on any risk which such use may entail.

In case pesticides are regarded as carcinogenic, Directive 90/304/EEC as amended, will also apply with its stricter requirements than the chemical agents Directive. This Directive also contains an obligation on training in Article 11.

It is important to note that none of the Community Directives on training are applicable to self-employed farmers.

A Handbook produced by a Workers' Unions[86] contains the main guidelines which operators should be familiar with before spraying pesticides. This includes information about legislation - approval of pesticides -, pesticide handling (disposal of residues and containers, transport), potential health hazards, poisoning routes, protective equipment, use of supplier's instructions, workplace instructions, spraying operation (preparation of spraying solution, check of sprayers), suitable use conditions, mixing, potential environmental impacts, etc.

In order to be able to further evaluate possible impacts of the different options of the measure regarding training and awareness raising it is necessary to get an overview on the *status quo* for existing legislation regarding qualification and certification of users.

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85 Council Directive 89/655/EEC of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work (OJ L 393 , 30.12.1989 p. 13-17).

86 Instructions for Spray Operators – Spraying methods, the environment and safety – GEOPA and EFFAT (EMPL/1422/01/00-EN).

Table 6-1: Training and certification of users – current legal situation in Member States [Source: questionnaires, SPISE-Workshop on Standardized Procedure for the Inspection of Sprayers in Europe; personal interviews]

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Is a mandatory qualification/certi-fication already required for people involved in PPP use?	yes	yes	yes		yes	yes	yes	yes		yes	yes		no	yes	yes		yes	no	yes	yes	no	yes	yes		yes
Wholesalers/Retailers	yes	yes	yes		yes	no	yes	yes		yes	yes			yes	yes		yes		yes				yes		yes
Industrial Users	yes	yes	yes		yes	no		yes		yes	yes			yes	yes		no		yes			yes	yes		yes
Farmers	yes	yes	yes		yes	yes	yes	yes		no	no			yes	yes		yes		yes	yes		yes	yes		yes
Other Users	yes	yes	yes		yes	yes		no		no				yes	yes		no						yes		yes
Voluntary schemes existing?	no	no	no		no	no	yes		yes	yes	no		yes		no		no	no	no		yes	no	no		yes
Wholesalers/Retailers										yes			yes								yes				
Industrial Users							yes			yes											yes				
Farmers									yes	yes			yes								yes				yes
Other Users							yes														yes				
Repeating Frequency (years)	5	no	2		no	no		?	10		no				5		5	3	5			6	3		no

The current situation with respect to the legal framework is summarised in Table 6-1:

– 17 Member States have made the qualification for persons involved in the use and/or handling of PPP compulsory. In many Member States the obligation of training or certification is correlated to qualitative (e.g. toxicity of products) or quantitative (e.g. more than 200 l / 200 kg) criteria.

– 6 Member States have existing voluntary schemes

– In those Member States where qualification is required, usually all stakeholders such as retailers, distributors, farmers and other professional users are concerned

– In those countries where the qualification is voluntary, the farmers are mainly concerned.

– The frequency for repeating training/certification varies between 10 years (FI) and 2 years (CY). In some Member States only a one-time training/certification is foreseen without regular repeating.

Involved stakeholders

A change of the EU-policy related to training and certification of users will cause effects in various fields and affect several groups either directly or indirectly. The following actors might be concerned:

- Users

In case of mandatory training systems, all professional pesticide users (farmer and or industrial/municipal user) have to take part in regular training activities and/or to hold a certification document. In case of voluntary systems the user decides for himself whether to participate in relevant certification or training programmes. Normally, the user has to bear the costs for training or certification.

- Training institutions

Training institutions are responsible for providing training to users and possibly also for their certification. They can be either public or private with a special permit for carrying out the training/certification activities.

- Authorities

In case of mandatory systems the authorities have to monitor that only wholesalers/retailers/distributors and users that comply with the training/certification requirements handle and use pesticides. They are also involved in the design of compulsory training schemes or in the approval of the voluntary schemes.

- PPP producing industry

PPP producers are an important information source for users and training institutions for specific product information. Furthermore, PPP producers also organise information events to inform users about latest developments or specific advantages and use conditions for their products. The information provided may, however, not always be totally objective, due to the commercial interest of a given producter in underlining the advantages of his own product(s).

- Wholesalers/Retailers/Distributors

In many Member States, wholesalers, retailers or distributors of pesticides have to take part in regular training activities and/or be certified to deal with pesticides. These actors often play an important role as they serve as "consultants" to users with respect to the choice of the products. Again, the information provided may not always be totally objective, due to particular close relations with one or several specific producers.

- Spraying equipment producers

Equipment producers offer training or information courses for their equipments.

Economic flows and key figures

The economic flows are illustrated in Figure 6-2. Costs for attending courses at training institutions range from € 20 (“soft” trainings) to up to around € 900 (UK, comparatively intensive training) with an estimated European average of around € 400 (costs in France approximately € 350), which have either to be borne by the users themselves or which are paid for at least partly by authorities.

Costs for initial courses are typically higher than for refreshing courses and costs in new Member States are significantly lower than in old Member States. Usually the courses offered by the equipment manufacturers or by PPP producers cost less, but have a more distinct marketing character. Controlling and administrative costs are reported to be in the order of € 30-40 per trained user in mandatory systems.

The training of aerial spraying operators has to be regarded separately as it costs up to € 15,000 (high standard example based on the German requirements for aerial spraying operators). It has to be mentioned that the economic figures are one-off costs. The annual costs depend on the chosen interval for repeating training.

Gains or losses of about € 100,000 of annual turnover in training and certification institutions can be related to the creation or abolishment of one job. This figure includes all costs that are required for the provision of the working place (infrastructure, equipment, salary, etc.). It corresponds to costs per hour of around € 55 which is comparatively low for several Member States where real costs are higher. However it is comparatively high in some of the new Member States where real costs are lower. An average of € 100,000 per year has been taken as a basis for the impact assessment related to job gains or losses in the sector of training and certification.

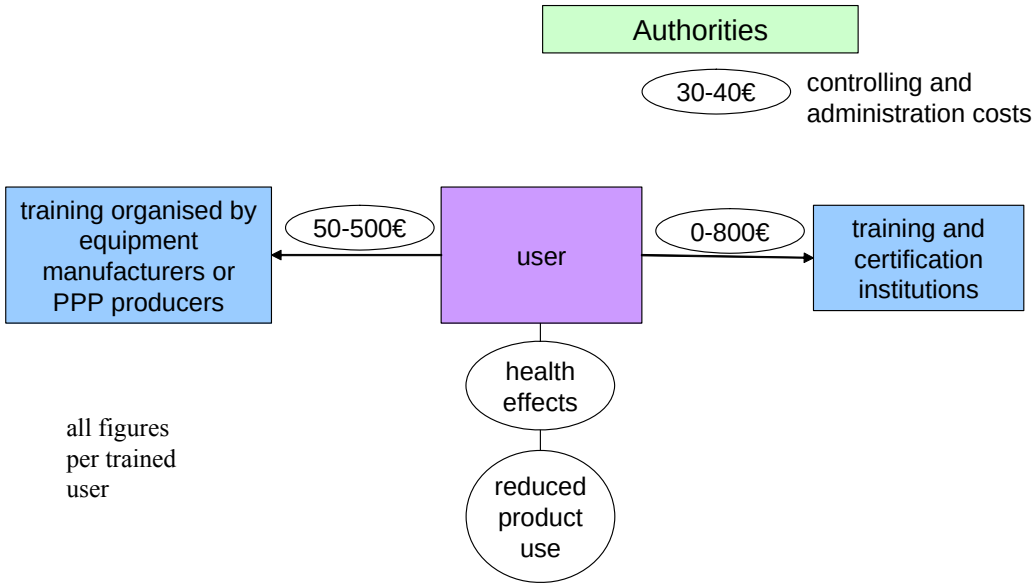

Figure 6-2: Economic flows – training and certification of users (source: questionnaires, expert interviews)

Information flows and key figures

The information flow in Figure 6-3 shows that training and certification of users is partly covered by an existing EU-framework, e.g. like Directive 89/391/EEC on the "introduction of measures to encourage improvements in the safety and health of workers at work". However, this Directive is not applicable to self-employed farmers.

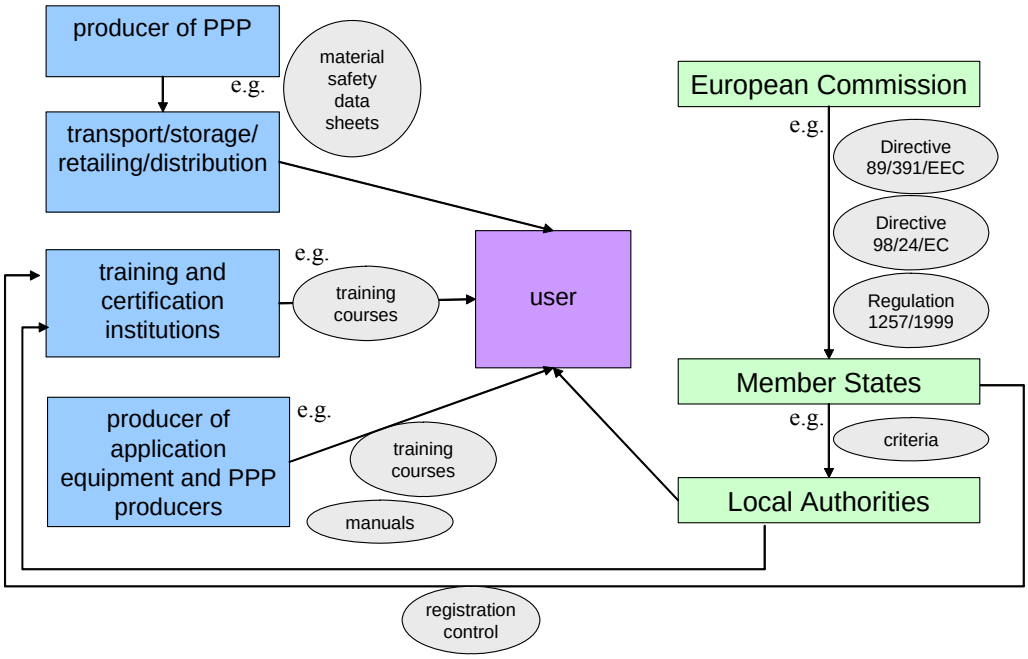

Figure 6-3: Information flow – training and certification of users

On Member State level, in most cases national legislation regulates the training and certification system e.g. by defining the concerned stakeholders or by determining specific criteria. Training courses are offered to the users by special training institutions (public or private). In case of mandatory certification and training the (local) authorities are responsible to control compliance with the regulations. Additionally, many national authorities offer information e.g. *via* internet or special agencies (extension services) on pesticides, for example which pesticide should be used for certain pests, the right dosage of pesticides or the environmental requirements that have to be taken into consideration.

Producers of PPP provide pesticides specific information e.g. by means of safety data sheets or information events. Producers of application equipment also contribute to the information flow by offering special training courses for the correct equipment use as well as by means of manuals.

6.1.2. Standards for certification and control of application equipment

European standards related to the certification of new sprayers ([EN 13790]) and related to the inspection of sprayers in use ([EN 12761]) differentiate between field-crop sprayers[87] and vertical-crop or air-assisted sprayers[88].

The situation with respect to specific legal frameworks in the Member States concerning the control of spraying equipment is very inhomogeneous. Table 6-4 shows that compulsory schemes, as implemented in Germany, Belgium or the Netherlands are coexisting with voluntary systems e.g. in France or Slovakia. All together ten Member States have established compulsory control systems and seven have introduced inspection schemes on a voluntary basis. This means that adequate maintenance of spraying equipment is covered by national legislation in about 60% of the Member States.

Involved stakeholders

A new EU-policy on sprayer testing would cause impacts in various fields and affect several groups, either directly or indirectly. The following list gives a short overview on the relevant actors and indicates how they might be concerned.

- Spraying equipment producers

Will be affected strongly if a new Regulation establishes mandatory specific requirements for new sprayers.

- Control institutions

Control institutions are in charge of testing the spraying equipment in use and assigning a proof if a sprayer has passed the inspection successfully. Such institutions are either public institutions or private companies recognised by authorities. Control institutions may be affected if new prescriptions will lead to an extension/reduction of testing activities.

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87 "Implement which distributes liquid by means of a horizontally positioned boom, located above the crop; it includes equipment for distributing liquid with air assistance, pneumatic boom, etc." [EN 12761-1:2001].

88 "Implement, without a horizontal boom, which distributes liquid by air assistance and which is primarily used for perennial crops such as orchards, vineyards and hops" [EN 12761-1:2001].

Table 6-4: Existing legal situation – technical check of sprayers [Source: Questionnaires, SPISE, interviews]

Member State	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK	Total "yes"
Inspection of sprayers mandatory?	yes	yes	no	yes	yes	yes	no	no	no	no	no	no	no	yes	yes	n.a.	no	no	yes	yes	no	no	yes	no	no	10
If yes, for vertical-crop sprayers?	yes	yes		yes	yes	no								yes	yes				yes	yes			yes			9
If yes, for field-crop sprayers?	yes	yes		yes	yes	yes								yes	yes				yes	yes			no			9
Inspection of sprayers voluntary?			n.a.				yes	yes	yes	yes	no	no	no			n.a.	no	no			n.a.	yes		yes	yes	7

- Certification institutions

Certification institutions are in charge of development and carrying out tests of new sprayers. They may be affected if new prescriptions will lead to an extension/reduction of certification activities.

- Users (farmers)

Farmers are required to have their equipment tested in some Member States. Usually they have to take the sprayers to inspection facilities and bear the costs for the test. However, users generally intend to keep their equipment well maintained also by themselves in order to optimise the application of PPP. Mandatory inspections will lead to higher costs for the majority of users. Farmers would also be affected by stricter requirements concerning certification of new equipment as prices might increase. On the other hand, if sprayers are better maintained and inspected and PPP consumption should be reduced and farmers would save part of the purchase costs for PPP. Users are also affected as operators (see further down).

- Authorities

Authorities are responsible for the control of sprayers and are in charge of the administration of a control and certification system (if applicable). New minimum requirements may lead to increased administrational efforts for the implementation, organisation and management of certification and control.

- Operators, bystanders, environment

Direct exposure of operators can occur before, during, or after the application process and the health of bystanders can be affected e.g. due to spray drift of badly maintained nozzles. Adverse environmental effects on the ecosystem may occur due to unintended contamination of non-target plants, wild life and environmental compartments, which could increase through badly maintained application equipment. The handling of pesticides is of special interest and technical checks of spraying equipment may improve the situation.

- Producers of PPP

As well maintained sprayers may lead to a PPP use reduction, also the producers of PPP could be affected (adversely), if a new regulation will be set up, as their turnover and net result might decrease – however, any such reduction would only concern excessive consumption due to bad sprayer conditions.

- Maintenance companies

To fulfil the requirements of the control procedures for sprayers, additional repair work may have to be done at maintenance companies, and turnover should increase.

Economic flow and key figures

Figure 6-5 gives an overview on economic flows in the existing control systems of spraying equipment within the EU. The involved stakeholders and the associated costs / efforts are shown in boxes and ellipses to indicate the costs which the actors have to bear.

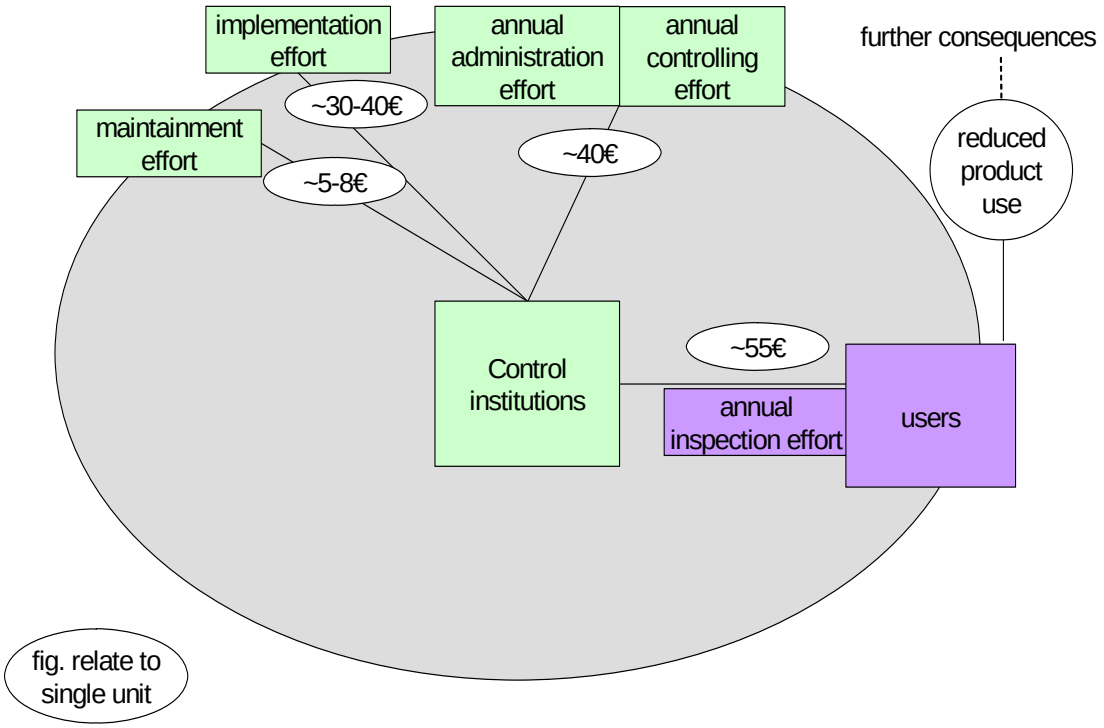

Figure 6-5: Economic flow – testing of spraying equipment[89]

Users, who are obliged to have their equipment tested can be regarded as the most relevant actors in the control process. Where mandatory schemes are already established, sprayers usually have to be inspected every 2-3 years. Only few Member States require other periods (e.g. Italy, where sprayers have to be tested only every 5 years). The average inspection frequency is 3 years.

The average costs for inspection vary considerably in the different Member States in a range of € 10-340 per inspection period, depending on the type of sprayer, testing period, testing method and the scope of the inspection activities. The users have to pay for the inspection about € 55 average annual costs per sprayer.

In addition another € 50 is required for average annual repair costs that are necessary before or after control. Some of these repair costs occur anyway, some are necessary to fulfil specific control requirements and are only carried out due to regular inspections (estimation for average annual repair costs as a direct consequence of control: ~ € 25).

On balance users typically benefit of inspection and correlated repair/optimisation of their sprayers since a PPP use reduction is resulting that provides savings with respect to PPP costs. As a result of discussions with experts during and in the follow up of the SPISE workshop[90], the average PPP use reduction potential resulting from regular control is estimated to range from 5 to 10% of overall quantity used, without any loss in crop production. Usually the savings of such amounts exceed the inspection and repair costs.

This result is not intuitive. If PPP saving exceeds costs of inspection and repair, why do farmers keep one not inspecting and maintaining their machines? First, some do, even when they are not obliged to. Second, on average, it seems that farmers tend to under-estimate the bad-maintenance-related PPP over-consumption and related proper-maintenance gain (according to the

89 Sources: questionnaires, interviews, SPISE workshop.

90 Standardized Procedure for the Inspection of Sprayers in Europe – First European Workshop organised in Braunschweig (DE) 27-29 April 2004.

abovementioned experts). Third, inspection & maintenance costs are well-known and certain ex ante whereas gains related to proper maintenance follow a statistical distribution. Indeed, before the inspection, nobody knows whether actual maintenance will be necessary or not, and whether the inspection costs themselves will prove to be a saving (if derived maintenance allows to save an excessive over-consumption of PPPs) or a pure cost (if the machine is fine, the inspection was, ex post, but not ex ante, non-necessary). This seems to play a deterring role, even if, statistically speaking (under zero risk-aversion assumption) inspections and maintenance are financially profitable. Training may improve the information gap related to overall underestimation of average savings. But compulsory inspections are certainly needed to address last issue.

The inspection costs are paid to a control institution, which can either be privately organized or run by authorities. This institution can be seen as a central actor in the control process and is usually responsible for the implementation of the control system. In general, authorities are in charge of the sprayer testing. Only some MS have arranged the inspection on the basis of private companies, which however have to be recognised by the authorities.

The average annual costs are about € 45-48 per year and sprayer. These can be divided into annual administration and controlling costs of about € 40 and costs of € 5-8 to maintain the control equipment (including depreciation) and costs to keep the technical equipment up to date. In addition, investment costs, which have to be paid once for the implementation of the control system, amount to about € 30-40.

With respect to the number of existing and inspected sprayers very detailed data have been established during and after the SPISE workshop. Table 6-6 gives an overview on the relevant figures. Precise figures on sprayers in use are available for 10 Member States (BE, DE, UK, IT, ES, SE, NL, LT, PL, SL) and relevant additional information for most of the EU Member States. The information allows an estimation of the amount of sprayers (in use and inspected or not inspected respectively) and an extrapolation to EU level.

Extrapolation to the total number of sprayers in use is based on the amount of active substance typically consumed per sprayer in the ten SPISE countries (~ 127 kg a.s./sprayer and year) and the area typically treated per sprayer (~ 68 ha/sprayer and year). The extrapolation from the 10 "SPISE Member States" leads to a number of about 352,000 inspected sprayers in these countries. The extrapolation is based on realised inspections in the SPISE countries in 2003 taking into account the corresponding inspection frequencies.

Table 6-6: Relevant figures on inspection of sprayers; extrapolation from ten countries ("SPISE" countries; in bold) to EU level[91]

MS	control system	number of sprayers in use	UAA [*1000ha]	Inspections in 2003	Inspection frequency in years	Inspection rate	Inspections in full cycle (extrapol. based on inspections in 2003)	Inspections in full cycle assuming compliance rates as in footnote[92]
AT	mandatory	43,000	3,375					43,000
BE	**mandatory**	**24,500**	**1,518**	**8,150**	**3**	**1.00**	**24,450**	**24,500**
CY	?	2,106	143					?
CZ	mandatory	63,029	4,280					63,029
DE	**mandatory**	**190,000**	**17,038**	**55,982**	**2**	**0.59**	**111,964**	**142,500**
DK	mandatory	39,673	2,694					39,673
EE	Voluntary	13,121	891					656
ES	**Voluntary**	**300,000**	**25,596**	**600**	**3**	**0.01**	**1,800**	**15,000**
FI	Voluntary	32,634	2,216					1,632
FR	Voluntary	410,219	27,856					20,511
GR	no inspection	52,647	3,575					0
HU	no inspection	86,194	5,853					0
IE	no inspection	65,650	4,458					0
IT	**mandatory**	**550,000**	**15,355**	**12,500**	**5**	**0.11**	**62,500**	**275,000**
LT	**mandatory**	**8,200**	**3,478**	**109**	**3**	**0.04**	**327**	**4,100**
LU	?	1,870	127					?
LV	no inspection	36,521	2,480					0
MT	no inspection	147	10					0
NL	**mandatory**	**14,500**	**1,933**	**8,590**	**2**	**1.18**	**17,180**	**14,500**
PL	**mandatory**	**330,000**	**18,246**	**38,000**	**3**	**0.35**	**114,000**	**165,000**
PT	?	56,520	3,838					?
SE	**Voluntary**	**19,300**	**3,054**	**3,005**	**2**	**0.31**	**6,010**	**6,010**
SI	**mandatory**	**35,000**	**486**	**4,714**	**2**	**0.27**	**9,428**	**26,250**
SK	Voluntary	32,987	2,240					1,649
UK	**Voluntary**	**38,000**	**15,799**	**5,000**	**1**	**0.13**	**5,000**	**5,000**
SPISE		**1509500**	**102503**	**136650**			**352659**	**677860**
EU		**2445818**						**848010**

As the number of inspections is varying considerably from year to year (depending on the implementation rate in Member States), the extrapolation to EU level has been adjusted on the assumption that under voluntary systems 5% of sprayers in use are inspected and under existing mandatory systems a range of 50 to 100 % of all sprayers in use are inspected within the full inspection cycle. The range has been assessed on the basis of inspections carried out in 2003.

Table 6-7 summarises the figures that will be used for the impact assessment.

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91 Source: SPISE workshop, questionnaires, interviews, statistics DG AGRI.

92 Extrapolation based on estimated implementation rate (rate of sprayers inspected) depending on inspection rate (percentage of sprayers controlled officially in 2003):
implementation rate = 100% if inspection rate in 2003 was higher than 0.75
implementation rate = 75% if inspection rate in 2003 was higher than 0.5
implementation rate = 50% if inspection rate in 2003 was below 0.5.

Table 6-7: Number of sprayers in EU 25 (based on: SPISE workshop, interviews, questionnaires)

	10 Member States[93] source: SPISE workshop; inspections in 2003	Adjusted[94] estimation for these 10 Member States over full cycle	Estimation EU-25
Number of sprayers in use	1,509,500	1,509,500	~ 2,500,000
Number of inspected sprayers in use	352,659	677,860	~ 900,000
Number of sprayers in use, not inspected	1,156,841	831640	~ 1,600,000

With regard to the certification of new sprayers, equipment manufacturers have a leading role, taking into account the defined minimum requirements, e.g. European Standards like EN 12761 on 'Agricultural Machinery – Sprayers – Environmental Protection'. It is estimated that an owner will on average replace his machinery every 12 to 15 years. This means that about 5-10 % of the estimated total of 2,500,000 sprayers in the EU are replace every year, amounting to about 125,000 to 250,000 new sprayers being placed on the market every year.

Germany and Poland are the only Member States, where the certification of new sprayers has been made mandatory. In Italy certification is voluntary. To comply with the legal requirements, equipment manufacturers have integrated all specific minimum requirements into their production. It is expected that a future EU wide harmonisation of minimum requirements will generally raise standards for new equipment with respect to health and environmental requirements. As a consequence, average production costs for spraying equipment manufacturers could rise.

The expected cost increase is difficult to quantify as several equipment manufacturers already provide sprayers that are satisfactory for certification of new sprayers at a high level and it is difficult to discriminate between these, who would have no or insignificant cost increases, and others who would have to raise the production standards significantly with correlated costs. Additional increased costs at equipment manufacturers for a certification procedure of new sprayers are possible but not quantifiable with certainty.

Information flow and key figures

Starting point of the information flow, shown in Figure 6-8, are the authorities that are involved in the definition of minimum requirements for the certification of new sprayers as well as for the control of spraying equipment in use.

The users have to comply with the established requirements. Control institutions carry out a test protocol and provide a sticker if the test has been passed successfully. Producers of application equipment provide manuals and certificates.

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93 Based on precise figures from the following 10 Member States: BE, DK, ES, IT, LT, NL, PL, SE, SL, UK.

94 Based on actual frequency of inspections and assumed compliance rates as in footnote 79.

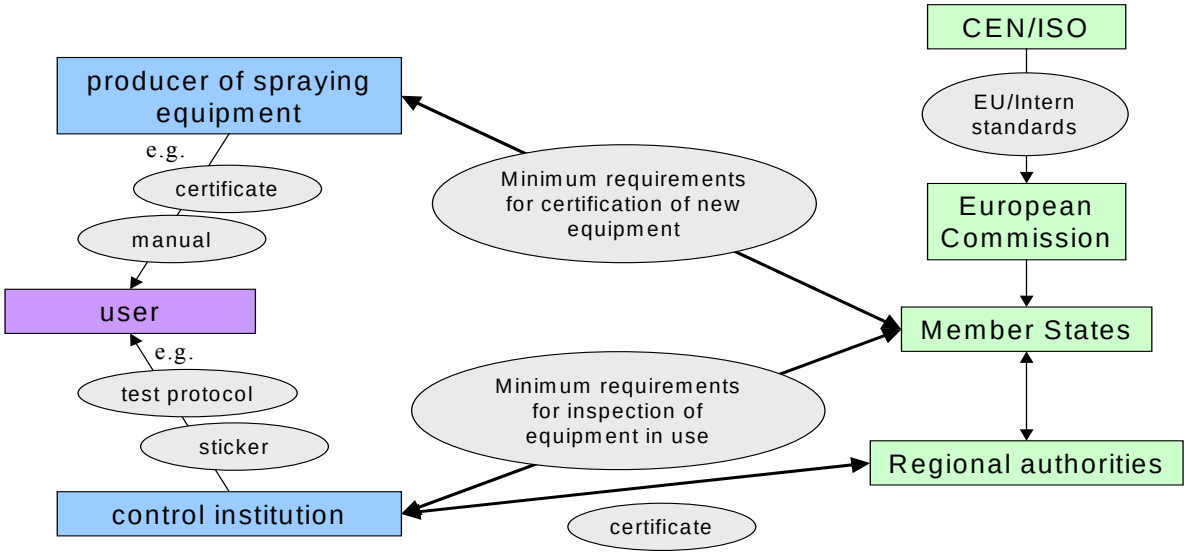


Figure 6-8: Information flow – testing of spraying equipment

6.1.3. General prohibition of aerial spraying

Legal situation

There is no harmonised European wide regulation with respect to aerial spraying and the present situation in the Member States varies between a total ban (e.g. in Estonia) and no restriction at all in Malta. In most Member States aerial spraying of pesticides is allowed but different restrictions are in place. Aerial spraying can be performed with airplanes or with helicopters.

Table 6-9 gives an overview of the current situation in Member States based on the evaluation of the answers received to the questionnaires and personal interviews with national experts.

Involved stakeholders

A change of the EU-policy related to the application of pesticides by aerial spraying will cause effects in various fields and affect several groups either directly or indirectly. The most important actors concerned are:

– *Aerial spraying service companies*
In most countries specialised service companies carry out aerial spraying of pesticides. The companies provide for the relevant equipment (planes, helicopters), in most cases trained and certificated pilots, as well as the specific know how.

– *Users (farmers*)
The user decides for his plants whether aerial spraying or ground spraying is the most effective way to apply pesticides.

– *Aerial spraying equipment producers*
Producers of the necessary special equipment for the aerial spraying of pesticides (helicopters, special sprayers) will also be concerned by any new measures.

– *Ground spraying service companies*
In most cases ground spraying is done by the farmer or his employees. But sometimes external service companies are involved.

– *Ground sprayer producers*
Ground sprayer producers are also involved as a ban or severe reduction of aerial spraying results in an increased need for ground sprayers.

– *Authorities*
Mainly local authorities are concerned.

– *Bystanders, operators (health effects), environment*

With respect to health effects, the direct exposure of the operators during the application process and the handling of pesticides are of special interest. The health of bystanders can be affected by spray drift or direct contact with the pesticides (e.g. if a person stays in an area which is treated with pesticides by plane or helicopter).

With regard to the environment, the effects on plants, soil and water as well as the unintended treatment of non-target plants and wild life have to be taken into consideration.

Table 6-9: Aerial spraying – current legal situation in MS[95]

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Total ban							X																X		
Ban with exception	X		X								X			X	X							X			
Severe restrictions		X	X	X	X	X		X	X	X	X	X	X	X	X		X		X	X	X				X
• Authorisation in advance		●	●	●	●	●		●	●	●		●	●	●	●		●								
• Advance warning with possibilities for authorities to restrict		●	●	●	●	●		●	●	●		●	●	●	●		●		●		●				●
Non severe restrictions		X	X	X	X	X		X	X	X	X	X			X				X		X				X
• Trained and certified pilots		●	●	●	●	●		●	●	●	●	●			●				●		●				●
• Restricted to certain crop type											●														
• Guidelines for best practice		●	●		●				●	●		●							●		●				●
financial instruments																									
no restrictions																		X							

NB: A country can provide both 'severe' and 'non severe restrictions'. For each kind, the most used ones (e.g. authorisation in advance / guidelines) are detailed.

95 Source: questionnaires and interviews.

Material flows and key figures

The following figures give an overview on the use of pesticides applied by aerial spraying in the different Member States.

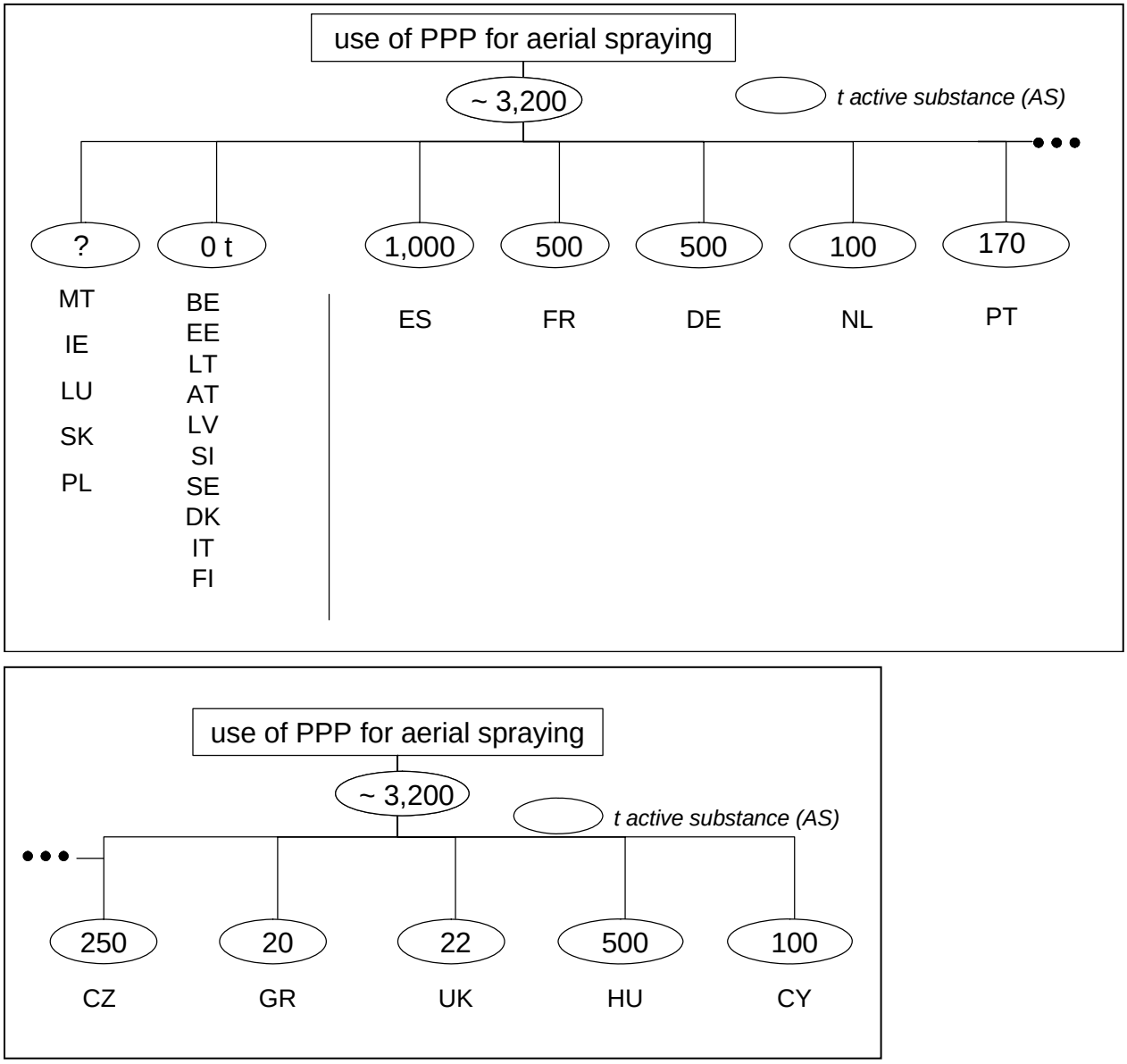


Figure 6-10: Amount of PPP used for aerial spraying in the European Community[96]

Taking into consideration – as far as available – the reported data from authorities / stakeholders and additional data from Eurostat, a total amount of about 3,200 t (AS) is applied by aerial spraying per year. The most important countries with respect to aerial application are Spain, France, Germany and Hungary. Ten Member States reported that no aerial spraying takes place either because it is banned or because there was no need for it. Regarding the plant-specific use, arable crops are by far the most important application field with more than 62% (see Figure 6-11). Application is relatively stable from year to year.

[96] Source: Eurostat, ECPA, questionnaires, interviews.

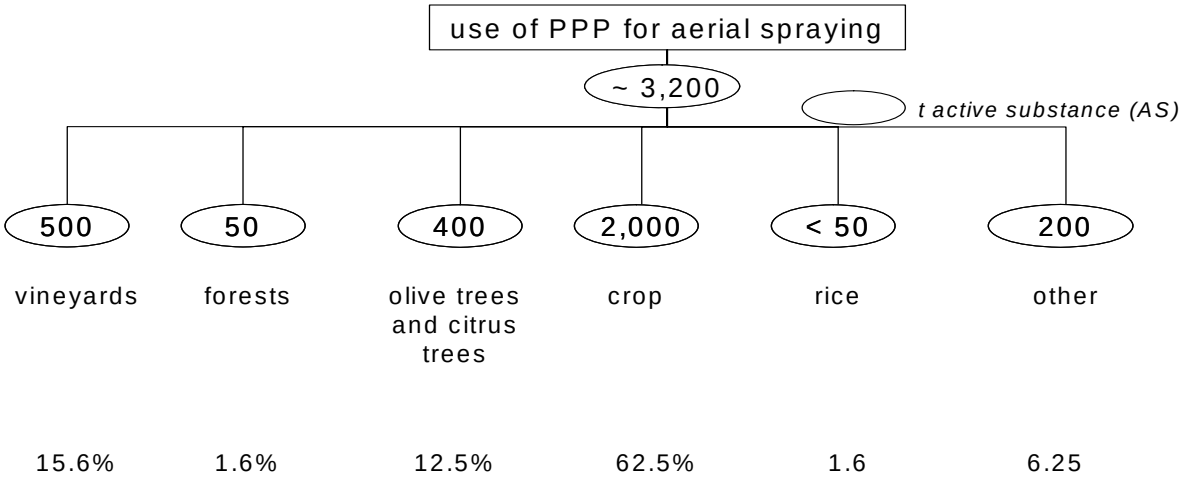


Figure 6-11: Fields of application for aerial spraying

Contrary to the treatment of arable crops or vineyards, the aerial application of pesticides for forests is subject to considerable annual fluctuations as the treatment normally only takes place in case of acute pest affection.

Economic flows and key figures

The economic situation of aerial spraying of pesticides is illustrated in the following table.

Table 6-12: Economic data aerial spraying – total figures

Total expenses for aerial spraying	~ € 60 million
Total number of companies involved	~ 120
Total number of aircrafts	> 300
Total number of jobs directly correlated with aerial spraying	~ 800

About 120 companies, more than 300 aircrafts and around 800 jobs are directly correlated with the application of PPPs by the means of aircrafts. The total expenses for aerial spraying in the European Community can be estimated to € 60 million per year (without the costs of pesticides). The importance of aerial spraying with respect to various crops is shown in the following table.

Table 6-13: Economic data aerial spraying – crop specific estimation

	vineyards	olive, citrus	Rice	Other crops
Total expenses for aerial spraying (M€)	10	7	1	38
Monetary value of the crop in EU (M€)	20,000	11,000	800	136,000
% aerial / monetary value	0.05	0.06	0.1	0.03

Information flows and key figures

Figure 6-14 illustrates the potential relations with respect to the information flow between the involved stakeholders.

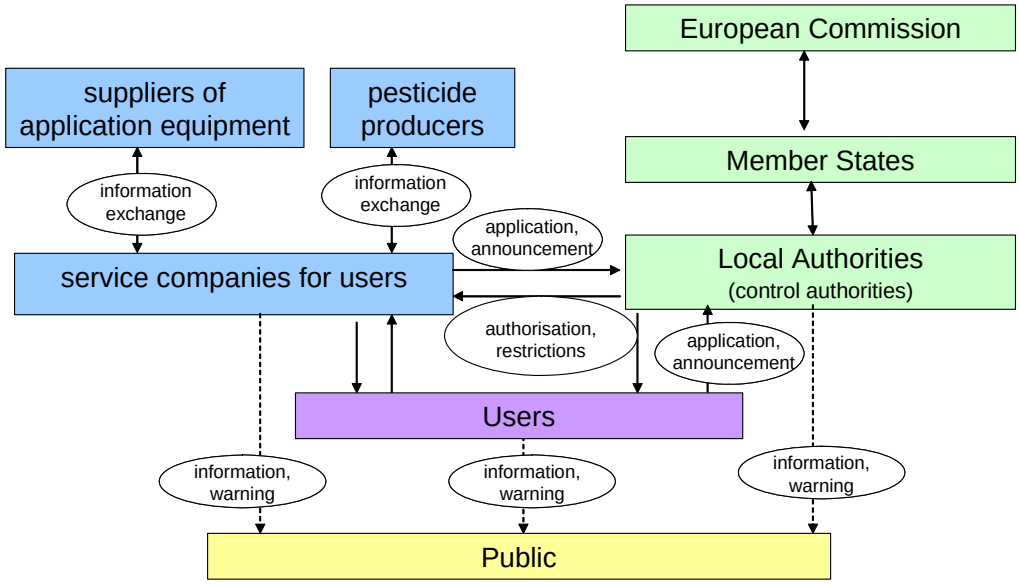


Figure 6-14: Information flow – aerial spraying (source: questionnaires, interviews)

To what extent the above shown relations are put into practice depends on the legal requirements in the countries. In some countries the user/service company has to apply for an authorisation in advance which normally defines a higher administrative effort than only an announcement in advance (application announcement). Also the post-application communication between service companies and relevant authorities is regulated differently. For example in France the service company has to report to the authorities within 5 days after aerial treatment.

There are also differences between the Member States as far as the information or warning of the public is concerned. In some countries the local authorities are responsible for warning of the public, in other countries the user/service company has the obligation to warn the public in advance with adequate means e.g. with posted signs.

The information flow between equipment suppliers and pesticides producers is of informal character and serves mainly as an information exchange to improve the effectiveness of pesticides and equipment.

6.1.4. Enhanced protection of the aquatic environment

Legal situation

The feedback from the different countries on the *status quo* concerning the size of the area which is relevant for surface water and ground water protection within the individual Member States was relatively inhomogeneous and shows different situations:

– In Cyprus special areas for the protection of surface water are established around existing dams for the collection of water and cover approximately 3000 ha;

– In the Netherlands the banks of the rivers Rhine and Meuse underlie particular provisions for surface water protection. Up to approximately 100.000 ha are relevant for ground water protection but only about 16.000 ha currently underlie restrictions for pesticide use directly around water abstraction points;

– The total area relevant for surface water protection in Latvia is not calculated, but in the Daugava River Basin protection belts cover 210.000 ha or 8,9 % of total area of the River Basin (the length of the bank of river or lake multiplied with the width of protection zone required by the "Law on Protected Belts", which depends on the length of the River or the area of the Lake);

– Denmark has implemented buffer zones along targeted watercourses (approximately 50.000 ha) and around lakes with a surface area above 100 m^2 (approximately 20.000 ha);

– In the Czech Republic around 750.000 ha are relevant for ground water protection e.g. in drinking water abstraction zones or sensitive environmental areas.

The majority of countries have established legislative measures for specific risk reduction in order to protect water bodies from impacts of plant protection products. Most common are measures such as buffer strips or hedges, less common are technical measures and those that are generally based on river basin management. Based on the feedback received, the *status quo* is the following:

– 14 Member States have established specific risk reduction measures

– 3 Member States have reported no such measures

– 10 Member States have established buffer strips next to surface waters

– 7 Member States have established other risk mitigation measures with regard to surface water (e.g. hedges)

– 6 Member States refer to the use of special equipment with reduced diffuse emissions (low-drift nozzles)

– 3 Member States have risk reduction measures generally based on River Basin Management Plans

– 2 Member States have other additional risk reduction measures for the protection of waters

As documented in Table 6-16, financial support programmes for farmers who implement measures for water protection are established in about half of the 11 Member States that provided information with respect to this question. For several Member States no information was provided.

Table 6-15: Enhanced protection of water – *status quo* with regard to specific risk reduction measures for water protection

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
existing legislation for protection of waters from impacts of PPPs	yes	yes	no	yes	yes	yes		yes	yes		no		no	yes	yes		yes		yes		yes	yes			yes
buffer strips next to surface water	yes	yes			yes			yes	no						yes		yes		yes		yes	yes			yes
other risk mitigation measures (e.g. hedges)	yes	yes[1]			yes				no						yes		yes		yes		no	no			yes
use of special equipment with reduced diffuse emissions	yes	yes[1]			yes				no						no		no		yes		yes[4]	no			yes
generally based on River Basin Management Plans	no	no		yes	no				no					yes	no		no				yes	no			no
other (additionally)		yes[2]		yes[3]																	no				

'1: implantation ongoing; 2: Agri-environmental schemes; 3: safeguard zones of drinking water sources ; 4: recommendations

Table 6-16: Enhanced protection of water – *status quo* for support to specific risk reduction measures for water protection

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Financial support programmes for farmers who implement measures to protect water	no	yes	no		yes	yes			yes		no		no				yes[3]		no		yes	yes			no
Buffer strips besides surface water		yes			yes				yes								yes				yes	yes			
other risk mitigation measures (e.g. hedges)		no			yes				no								yes				no				
use of special equipment with reduced diffuse emissions required		yes			yes				no								yes				yes				
Other (additionally		yes[1]				yes[2]			yes																
if yes: annual budget of this program (M€)		15.4			n.d.	n.d.			n.d.												n.d.	1.9			

1 Agri-environmental schemes; 2 According to Water supply Act water wokrs may compensate farmers who do not use pesticides in specific areas. Buffer stripes beside surface is covered by set aside compensation.; 3 Tax allowances for farmers implementing SAPARD programme

Involved stakeholders

A change of EU-policy related to enhanced protection of water would affect the following stakeholders:

– Users of PPP,

– Local authorities,

– Water treatment companies,

– Monitoring institutions.

Material flows and key figures

Approximately 10% of the total European freshwater resources are annually abstracted (i.e. approximately 35 billions m^3).

A study performed by the European Union of National Associations of Water Suppliers and Waste Water Services[97] concludes that considerable shares of ground water resources and raw surface water resources are regularly contaminated with pesticides above 0.1 µg/l[98]. The problem is most severe in raw surface water resources but is also significant for groundwater resources. There are important differences between the Member States. Pesticide contamination of raw water is most acute in lowland countries/regions, particularly in Belgium, France, Netherlands, and the UK. According to the study it can be estimated that 5 to 10% of extracted raw water resources are contaminated in excess to 0.1 µg/l of individual pesticides. The study only covers the "old" Member States but the situation may be similar in "new" lowland Member States. There are some doubts about some figures regarding the contamination of water compartments in several Member States (e.g. surface water contamination in Belgium 100% vs 0% in Germany).

Based on the assumption that 5 to 10% of abstracted water do not comply with the required quality standards regarding pesticides, 2.8 to 5.6 km^3 of abstracted water need to be decontaminated before use as drinking water. The total amount of approximately 270.000 t of plant protection products used in the EU Member States originates from agricultural and non agricultural use. The most important part of this amount has no impact on the water resources but a certain share leads to the contamination of raw water resources. A rough estimation of the presence of active substance in minimum 5% of the total raw water resources leads to the conclusion that at least 20 tonnes of active substance are currently contained in the total amount of raw water resources. Figure 6-17 summarises these material flows.

97 Keeping raw drinking water resources safe from pesticides, EUREAU, 2001.

98 The EU quality standard for pesticides in drinking water is 0.1 µg/l for any individual pesticide and 0.5 µg/l in total.

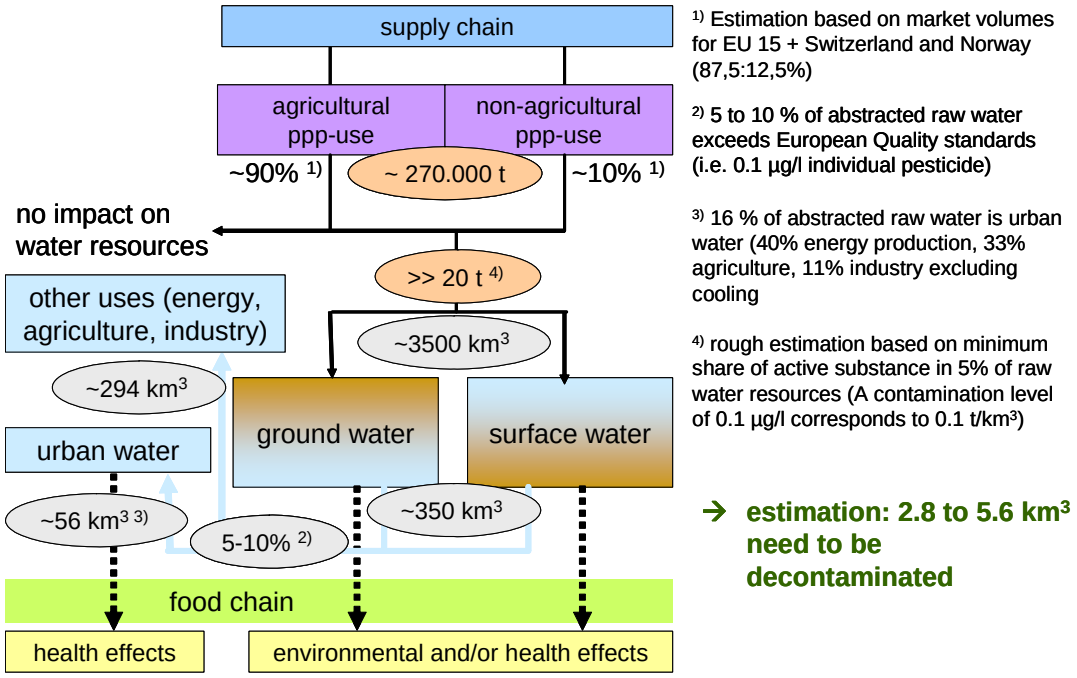


Figure 6-17: Enhanced protection of water - Material flow

The mentioned study also shows that certain specific plant protection products are the most common cause for the excess of the 0.1 µg/l quality standard. In the following the most common problem pesticides are listed (ranked according to frequency of problems caused):

Raw ground water resources:

Atrazine and related compounds[99]

Simazine

Mecoprop

Bentazone[100]

Raw surface water resources:

Diuron

Isoproturon [100]

Atrazine and related compounds

Simazine

Mecoprop

MCPA

Choroluon

Raw upland water resources:

No common pollution pattern

Economic flows and key figures

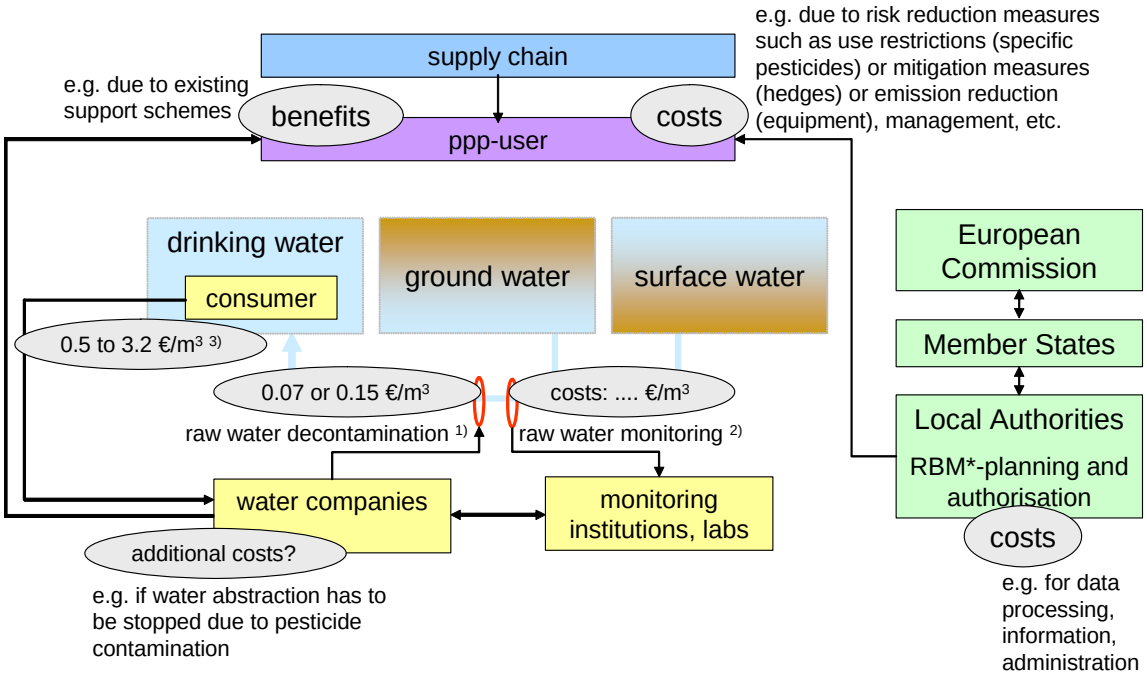
Figure 6-18 shows, that throughout the Member States the price for drinking water varies from € 0.5 to 3.2 /m^3.

[99] Priority substances under WFD.

[100] Included in Annex I of CD 91/414; note for particular attention to the aquatic environment.

For the U.K. and the Netherlands data are available that allow an estimation of the average costs for the extra treatment of drinking water polluted by PPP leading to € 0.07 and 0.15 per m^3 drinking water respectively. The costs for water companies to remove specifically pesticides from drinking water in the UK are estimated at around 147.4 Mio. £ annually (ca. € 217 million)[101].

Monitoring costs in the water compartment (including analytical costs) should be considered as marginal as monitoring is in any case an obligation under the Water Framework Directive.



1) usually granular activated carbon filters and or oxidation by ozone

2) information about use patterns may increase cost effectiveness 3) source: OECD 1999 to 2001

Figure 6-18: Enhanced Protection of Water – Economic Flow

Information flows and key figures

The information flow gives an overview on the communication between the different stakeholders and shows in particular the information exchange between public institutions, suppliers of pesticides and PPP-users and finally water suppliers and monitoring institutions (Figure 6-19). A good information flow between the stakeholders can increase the efficiency of water monitoring (e.g. specific measurements are not necessary during standard monitoring if certain active substances are not used).

101 [Pretty et. al. 2000].

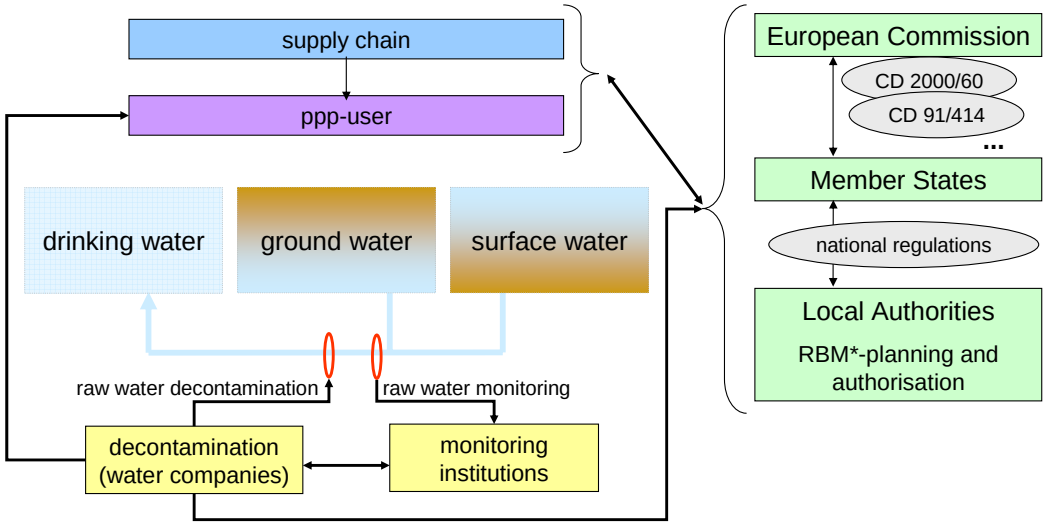


Figure 6-19: Enhanced protection of water: Information flow

6.1.5. Defining areas of strongly reduced or zero pesticide use

Legal situation

The *status quo* (see Table 6-20) in the Member States shows that most countries have defined zones with restrictions or a ban on the use of PPP. Exceptions are Malta, Cyprus and Ireland.

The situation is very inhomogeneous when looking at the legal basis of restrictions which sometimes is national law and sometimes Community law. Only Finland and Portugal have stated a clear correlation to Directives 92/43/EEC (Habitats) and 79/409/EEC (Birds). Some countries have mentioned water protection issues as the reason for adopting restrictions or bans.

Involved stakeholders

– Farmers

– Public authorities (at different levels: national, regional, local)

– PPP-producers/supply chain

– Bystanders and consumers: Exposure of bystanders (e.g. in public parks) is a particularly relevant

– Institutions for remedying environmental contamination.

Table 6-20: Reduced or PPP-free zones – current legal situation in MS

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Areas with restrictions or ban for the use of PPP	X	X		X	X	X		X	X	X	X	X		X	X			-	X	X	X	X	X		
Based on national law	-	-		●	●	●			●		●			●	●				●		●	●	●		
Based on regional law	●	●		-	-	-			-		-			●	-				●		-	-	-		
Based on 92/43 or 79/409	-	-		-	-	-			●					-							●	-			
Related to water protection issues	●	-		●	●	-		-	●					-					●		-	●			
Knowledge on area size available at MS level					X						X														
No restriction			X										X					X							

Material flow and key figures for Natura 2000 sites and public parks

For a possible European approach, Natura 2000 areas and other sensitive areas like those for drinking water abstraction, school grounds, playgrounds, public parks and water protection areas are expected to be the most relevant target areas.

Areas for which water protection issues are relevant, are addressed in more detail in the context of the measure "Enhanced water protection". The focus of the assessment for this measure are Natura 2000 areas and public parks.

Many different sites are classified as Natura 2000 areas (in EU 15 more than 3,000 sites for Directive 79/409/EEC with a size of 27.4 Mio. ha and more than 15,000 sites for Directive 92/43/EEC with a size of 45,4 Mio. ha, for details see Table 6-21 below).

Table 6-21: Numbers and size of Natura 2000 sites

	Directive 79/409/EEC (bird protection)		Directive 92/43/EEC (habitat protection)	
Member State -	Number	Ha	Number	Ha
AT	95	1,235,300	160	889,600
BE	36	431,300	271	318,400
DE	466	2,897,700	3,536	3,215,100
DK	111	960,100	194	1,025,900
ES	416	7,825,200	1,276	11,849,600
FI	452	2,837,300	1,665	4,793,200
FR	155	1,174,900	1,202	4,130,000
GR	151	1,370,300	239	2,764,100
IE	109	223,600	381	1,000,000
IT	392	2,340,300	2,330	4,423,700
LU	13	16,000	47	38,300
NL	79	1,000,000	141	750,500
PT	47	867,100	94	1,650,000
SE	436	2,723,600	3,420	6,037,200
UK	242	1,470,400	601	2,472,100
EUR15	3,200	27,373,100	15,557	45,357,700
Total NATURA 2000	72,730,800 ha in 18,757 sites			

It has to be mentioned that there are sites which are included in both groups, the birds Directive and the habitats Directive, therefore the simple addition like in the table above does not reflect the real total size of the sites.

Within the Natura 2000 areas, the following categories of land are mainly relevant for the use of PPP:

– Extensive cereal cultures (including Rotation cultures)

– Rice fields

– Improved grassland

– Other arable land

– Broad-leaved deciduous woodland

– Artificial forest monoculture (e.g. Plantations of poplar or Exotic trees)

– Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)

The area of public parks within cities is difficult to estimate. Based on several case studies, it is assumed that this area is smaller than 400,000 ha in the EU-15[102]. In a statistical extrapolation from the case studies it is assumed that about 37,000 t (± 6,000 t) of PPP are used within Natura 2000 areas, while public parks are treated with less than 100 t per year.

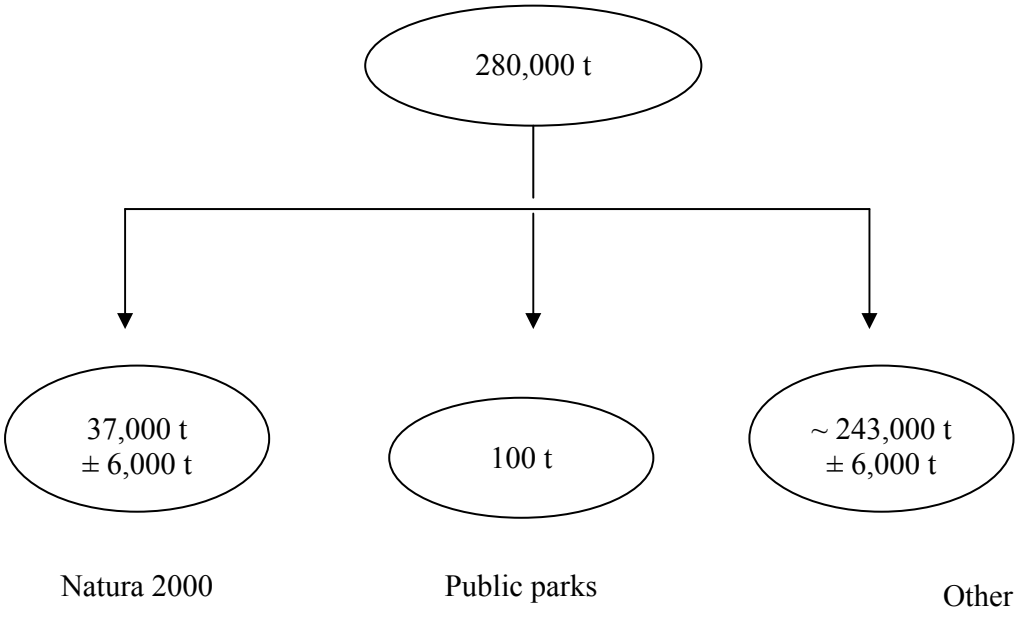


Figure 6-22: Material flow – reduced or PPP-free zones: total amount of PPP used in different areas

[102] See report *Assessing economic impacts of the specific measures to be part of the Thematic Strategy on the Sustainable Use of Pesticides*, available at: http://europa.eu.int/comm/environment/ppps/pdf/bipro_ppp_final_report.pdf (page 156 ff).

Economic flow and key figures

The economic flow shows the amount of money that is spent for PPP in the different areas. The figure assumes average prices and intends mainly to show the orders of magnitude.

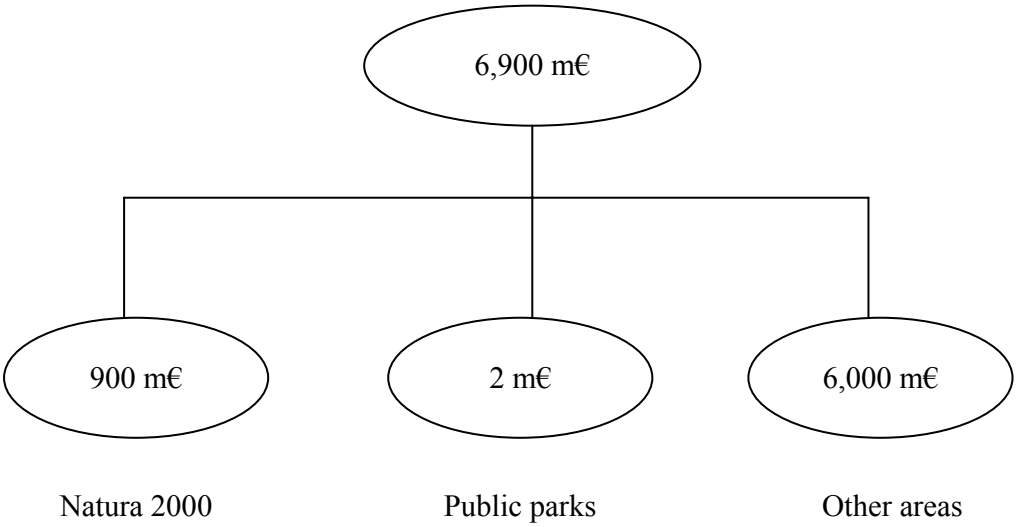


Figure 6-23: Economic flow – PPP use in reduced or PPP-free zones

Information flows and key figures

In the light of the interviews with authorities, the current information flow with respect to PPP in restricted or PPP-free areas between users and national or EU institutions is poor. Information is mainly exchanged with local authorities.

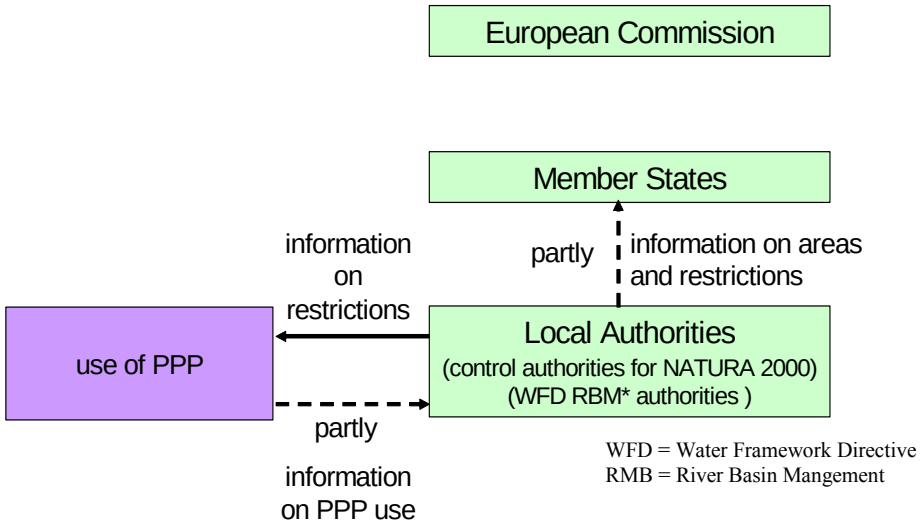


Figure 6-24: Information flow – reduced or PPP-free zones

6.1.6. Collection of PPP packaging and unused products and other measures connected to the handling of products

The current (bad) practice in most Member States regarding empty pesticides packaging and unused products, is in favourable cases to introduce them into the classical waste stream and in less favourable cases to abandon them in the field or to burn them. Different systems for collecting used packages and obsolete pesticides have been introduced in some Member States and encouraged by different means (taxation on the packaging except if collection quotas are reached, pay-refund systems, etc.).

A recent OECD seminar provided some information on ways to achieve pesticide risk reduction through good management of used containers of chemical pesticides.

The seminar addressed all stages of container management: collection, recycling, disposal, and handling of small quantities of left-over pesticides. It also addressed aspects of safe handling of pesticides that are closely related to container management such as filling, mixing and rinsing, as well as container design helpful for safe handling. Both agricultural and home & garden uses were considered, while taking note of the fact that different mechanisms of container management are required by different uses and users. Brief summaries (organisation, logistics, types of containers collected, recycling/disposal options, financing, and policy context) of the reviewed container management schemes are presented in Table 6-25, supplemented by a summary of collection rates, charges/fees and costs[103].

Involved stakeholders

A change of the EU-policy related to the collection of pesticides packaging will cause effects in various fields and affect several groups either directly or indirectly. The most important actors concerned are:

– Manufacturers and distributors
  In most countries where such initiatives have already been taken, manufacturers and distributors were always involved.

– Users
  The farmers, the professional non-agricultural users (municipalities services,..) and the private users are all disposing packaging or storing products.

– Authorities
  Mainly inspection authorities are concerned.

– Bystanders, operators (health effects), environment

[103] A full report of the Seminar is available at: http://www.europa.eu.int/comm/environment/ppps/pdf/container_management.pdf

Table 6-25: Collected amounts of pesticides containers, fees/levies and overall costs for some OECD Countries

Country (scheme/ operator name)	**Collection** (weight, 2003)	**Collection rate** (2003)	**Charge/levy/fee**	**Reported cost** *conversion into EUR or USD/ton**
Australia (DrumMuster)	?	35%	AUD 0.04 (€ 0.024) per litre or per kg	Cost of processors (for compacting or plastic recycling), AUD 250-400/ton (€ 205-328/ton)
Belgium (Phytofar-Recover)	483 tons	92%	Stimulated by tax of € 0.124 / liter packaging	Total cost € 704 229 (2003) € 1463/ton
Brazil (inpEV)	7 800 tons	?		
Canada (CropLife Canada)	5 million containers	70%	CAD 0.54 / cont. (about € 0.36/cont.)	Total annual cost = CAD 4 million (€ 2.6 million) **€ 520/ton** (assuming 1 container = 1 kg)
France (Adivalor)	1 840 tons	25%		€ 2/kg packaging material (2003) € 2000/ton
Germany (PAMIRA)	1 545 tons	52%		€ 1075/ton (2003)
Hungary (CSEBER)	?	?	€ 0.04 / cont. (2-25 litre containers) € 1.00 / cont. (26-60 litre containers) € 2.00 / cont. (61-250 litre container) € 3.50 / cont. (>250 litre container)	Total cost € 720 000 (2003) € ?? / ton
USA (ACRC)	3 175 tons	28%		Total annual cost $ 3.9 million (€ 3.12 million**)** € 1000/ton

Material flow

From the sales figures available in France and Belgium for active ingredients (ESTAT) and commercial products (sources UIPP and Belgian action plan), it can be deducted that the converting factors between tonnage of active ingredients and tonnage of commercial products amounts at average to about a factor 8. Packaging volumes amount then to around 2 % of the total quantities of formulated products put on the market, which equal 16 % of the weight of active ingredients.

For a total amount of 280.000 tonnes of active ingredient, this would mean 44.800 tonnes of packaging material.

The average costs of collection of packaging is varying between € 1 and 2 /kg packaging material, which in total for EU-15 would amount to between M€ 44,8 and 89,6 of total costs.

6.1.7. Improved systems for the collection of information on production, import/export, distribution and use and enhanced monitoring measures on compliance including annual reporting

Currently, most of the available data concerning marketing and use of PPP are from industry (through a contractual arrangement to provide data to EUROSTAT). The Commission supports this financially by providing a grant in the order of € 130.000 per 3 years. Only few Member States do collect systematically use data and have made record keeping by users mandatory.

Legal situation

Data collection is already covered by existing legislation to a limited extent (e.g. for production, import/export and residues). For the assessment of the sustainability of PPP use and the effects of the Thematic Strategy, the "real use" data at farm level are of crucial importance. As a consequence there is a real need for the systematic collection of use data and this will be the main focus of the assessment.

In order to be able to describe the current situation several questions have been addressed to authorities and stakeholders by means of questionnaires and personal interviews. The questions were in particular related to the following points:

– What kind of data is already available and what is the corresponding level of detail?

– Who collects/reports the data?

– Is data collection based on mandatory or voluntary approaches?

– What are the related costs for the involved stakeholders?

The evaluation of the questionnaires, additional interviews, literature and statistics demonstrate the following *status quo* with respect to the present situation, which is also summarised in Tables 6-26 and 6-27.

Table 6-26: Data availability concerning pesticides

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Data available	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes		yes	yes	yes	yes	yes	yes	yes		yes
Production	yes	yes	yes	no	yes			yes	no						no		no	no	no	yes	no		yes		
Import/Export	yes	yes	yes	no	yes		yes	yes	no				yes		yes		yes	yes	no	yes	no	yes	yes		yes
Sales	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	no	no	yes	no	yes	yes	yes	yes	yes	no	yes
Use (general)	yes	no	yes	yes	no	yes		yes	no						no		yes		yes	no	yes	yes	yes		yes
Use (specific for user groups)	no	no	yes	yes	no	no		yes	no						yes		no	yes	yes	no	yes	yes	no		yes
Use (specific for areas)	no	no	yes	yes	no	no		yes	no						no		yes	no	yes	no	no	yes	no		yes
Use (specific for crops)	no	yes	yes	yes	no	no		no	no						yes		no	no	yes	yes	no	yes	no		yes
Residues	yes	no	yes	no	no	yes	yes	yes	yes				yes	yes	no		no	yes	yes	yes	yes	yes	yes		yes

Table 6-27: Systematic data collection on use – data basis

Basis for collected data	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Mandatory collection (mostly from manufacturer)	yes	no	yes	no	yes	yes		yes	yes						yes		yes	yes	yes	yes	yes	yes	yes		yes
Mandatory reporting to authorities	yes	yes	yes	yes	yes	no	yes	yes	no				yes	yes	yes		yes	no	yes		yes	yes	yes		no
Voluntary reporting to authorities	no	yes	no	no	yes				yes	yes					no		no	no	yes		yes	yes	yes		yes

Data availability

– 21 Member States have access to data on at least one of the areas production, import/export, sales, use (general or specific) or residues. From the Member States responding to the questionnaire up to now, only Greece states to have no data collection/reporting at all.

– 14 countries have information on import/export and 20 countries on sales figures

– 11 countries are able to provide data on use to different levels of detail and up to 9 countries are able to provide data specified with respect to user groups, areas or crops.

It is obvious that numerous activities related to data collection on production, import/export, sales and use are currently already ongoing in the Member States. Consequently a considerable effort is already spend on data collection.

However, during expert interviews and during the attempt to find reliable and comparable data, it turned out that data are only available in very limited cases in a satisfying degree of detail and in a comprehensive way. If data are available it is often difficult to trace how the information was aggregated. Furthermore, data are frequently not comparable as the information collected is not the same (e.g. sales data intended for agricultural use in one case versus total sales data in others). Finally, data that have been collected for specific purposes (e.g. for marketing decisions by industry) are not available due to reasons of confidentiality.

In most of the Member States data collection/reporting is covered by a legal framework and the data is made available on the basis of different, coexisting mandatory and voluntary systems. As Table 6-27 indicates:

– 20 Member States have established mandatory collection and/or reporting systems that are sometimes supplemented by additional voluntary systems

– 9 Member States rely exclusively on voluntary reporting systems

The legal situation with respect to data collection mirrors the existing framework in the MS with respect to reporting of data. Except for France, all Member States, for which information was available, confirm the existence of legislation on reporting. In addition it is planned in five Member States to establish further legislation within the near future (BE, FI, IE, IT, PT).

Involved stakeholders

The information flow (see Figure 6-29) gives an overview on the communication between the different stakeholders and shows in particular the information exchange between relevant actors. The most relevant actors to be considered in the impact assessment are authorities, users, those in the supply chain and eventually research or Statistical institutions.

– Authorities:
  Collection and aggregation of information from several stakeholders. Evaluation of data for policy decisions. This can take place at different aggregation levels (local, national and international level). For the purpose of statistical data management, institutions like EUROSTAT, or national statistical offices are involved.

– PPP-Users:
  Usually users do not provide data on pesticide use. In selected cases specific information, e.g. related to amounts and types of PPP use in specific areas or specific crop types is reported.

Information provided by PPP users would provide the highest spatial and thematic resolution possible.

– PPP-Producers:
Producers are important information holders within the supply chain, due to own data collection or contracting such work to research institutions in order to dispose of decision basis for marketing policy. Producers are obliged to provide data on production and import/export in the context of the legal framework related to economic statistics.

– Distributors/Retailers:
Also information holders about the supply chain and in some MS already obliged to provide data on distributed or sold quantities. Appropriate starting point for comparatively high spatial and thematic resolution of information. *Via* distribution it can be concluded on use at regional level (spatial resolution) and on use types (e.g. agricultural use or non-agricultural use)

– Research or Statistical institutions:
Collection and aggregation of data in a professional way e.g. by doing surveys mandatory by industry or authorities. The tasks depend on the contracting parties. Either collection or aggregation of data only performed by research institutions or evaluation of the information to form a decision basis e.g. for marketing or policy measures. Provision of the raw, aggregated or evaluated data to the supply chain institutions or authorities

– NGOs
The work and the contributions of NGOs depend to a large extent on specific interest they have for the survey and on the reliability of their database.

Economic flows and key figures

The costs currently incurred by authorities related to the collection, evaluation and other processing of PPP related data are summarised in the Table 6-28.

The evaluation of the questionnaires with respect to costs for data collection and evaluation shows a quite inhomogeneous picture. The costs per country vary from several thousand € (authority costs) up to M€ 2 (industry costs). It can be concluded that authority costs for data collection usually amount up to several € 10.000 (the amount certainly depends on the degree of detail and the volume of PPPs used in a certain country). However, it seems that the "true" costs behind the authority costs for the real collection and compilation of data which is now often carried out by industry may be significantly higher. This conclusion is justified on the one hand by the high estimates for industry costs (see e.g. Belgium and France) and on the other hand by costs related to specific voluntary approaches where the whole range of costs from data collection at users level to the final aggregation and evaluation is covered and taken into consideration (see e.g. voluntary data collection in Germany or the United Kingdom).

Table 6-28: *Status quo* on costs related to the collection, evaluation and use of PPP related data

Data	Note	costs [€/year]
UK	England and Wales only	400.000
AT		3.000
BE	The budget for the TAPAS action in Belgium in 2002 was € 58.300 Industry estimates costs significantly higher: "In Belgium, industry pays an independent market research company for data collection on the use of PPP's. They do provide use data, but surely serious costs and a lot of time are involved. However, one should really explore the added value of further data collection / reporting systems first - and its value / contribution towards achieving sustainable use and further risk reduction"	€ 58.000
CY		20.000
CZ	Details available	216.000
DE	The personnel costs for the existing monitoring and reporting system for PPP sales is € 30,000 (0.6 man years in Federal Office of Consumer Protection and Food Safety). The voluntary NEPTUN survey (from 2000 to 2003) of PPP use costs EUR 364,000 per year (see case study)	30.000 364.000
DK	4 to 6 man weeks authority work + € 10.000 consulting; costs for extension services and industry not included	16.000
ES		30.000
FR		M€ 1 to 2
SI	~ 700 working hours	21.000
SE	details on collection system available	25.000

Information flows and key figures

The information flow shown in Figure 6-29 gives an overview on the institutions involved in the communication chain and further shows the direction of possible information flows.

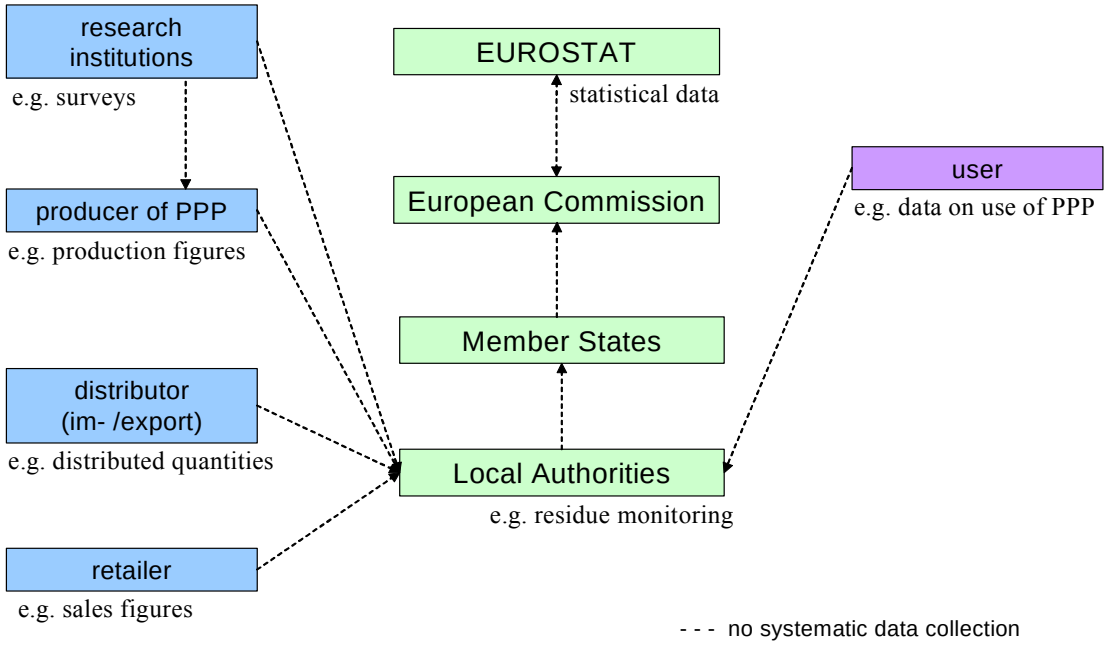


Figure 6-29: Information flow – systematic data collection on use

The central actors in the data collection process are the authorities, as on their level the collected information is aggregated. Aggregation and evaluation is possible at several levels (e.g. at regional, national and Community level). Users provide either general data on use (overall quantities) or specific data e.g. for certain areas or crops. In addition research institutions perform surveys and producers as well as distributors collect information on capacities or quantities and may provide specific data. In any case they are already obliged to provide data on production and import/export.

The information is communicated to the Member States and afterwards provided to the European institutions as a basis for data at EU level e.g. within the corresponding EUROSTAT database.

Generally the information is related to the PPPs themselves and in particular to the following details:

– the amount of PPPs in terms of kg active substance;

– the amount of PPP types differentiated according to their function such as e.g. fungicides, herbicides, insecticides or plant growth regulators in terms of kg active substance; the differentiation may go in more detail on the basis of the chemical properties of PPPs;

– the amount of each specific active substance in kg.

The latter point constitutes the crucial link between use and related risks because each active substance has specific physico-chemical, toxicological, and ecotoxicological properties which decide its transport, fate and impacts. As a consequence, this information is indispensable for the assessment of risks related to the use of PPPs and should therefore be targeted in a data collection system.

The PPP related details can be collected and reported according to the following structure:

– Production,

– Import/Export,

– Intended use,

– Real use:

  – Application type (e.g. use for agriculture, forestry, public gardens and parks, railroads and streets, etc),

  – Crop type (e.g. use for specific crops).

Real use data including information on active substances are a prerequisite for appropriate risk calculations. Under aspects of risk assessment the real use with all details on application type and crop type contains the optimum information for a risk assessment. However all information on production, import/export and intended use is needed to complement a PPP-use risk assessment. At present the status of information flows based on collection and reporting of such data and details is extremely inhomogeneous throughout MS.

6.1.8. Encouraging the use of low pesticide input farming

Low pesticide-input farming systems refer to organic farming and integrated pest management or integrated crop management (IPM/ICM). Currently, farmers are often compensated for the possible additional costs or income losses through agri-environmental measures of Regulation (EC) 1257/1999. Such support is possible, if farmers undertake specific efforts that go beyond those legally required. This might change in the future, as with the adoption of Regulation (EC) 1782/2003, all provisions related to the use of pesticides under Directive 91/414/EEC will become subject to the cross-compliance requirements of the Common Agricultural Policy (CAP) as of 1 January 2006. Those not respecting these requirements will see their direct support payments reduced. So depending on whether application of IPM becomes mandatory or not, different ways of providing support or sanctioning non-respect of obligations are available to the authorities. Organic Farming is regulated at Community level through Regulation (EEC) 2092/91.

In order to be able to assess the current situation with regard to IPM in the Member States several questions have been addressed to authorities and stakeholders by means of questionnaires and personal interviews. The questions were in particular:

– Are there IPM systems existing and what kind of definitions and criteria are included in the IPM systems, schemes and protocols?

– What is the share of IPM in relation to the total utilised agricultural area in your Member State?

– Can you quantify changes in product yields, jobs and use of PPPs comparing IPM to conventional farming?

– Is there a shift to more toxic products due to IPM related quantitative use reductions?

– Which financial incentives are available in your Member State to support IPM?

The evaluation of the questionnaires, additional interviews, literature and statistics demonstrate the following *status quo* (see Table 6-30).

Legal situation

At present there is no common understanding of IPM and no legally binding definition at Community level. Numerous different public and private IPM systems are co-existing within Europe and even within individual Member States.

In at least 17 Member States definitions of IPM schemes, systems or protocols already exist. The existing systems are related to more or less specific and very differing requirements and they are based either on official (i.e. legal) definitions or private initiatives (e.g. private certification system). For example in Denmark there is no legal definition for IPM, however the share of IPM according to private systems is quite high (~ 23%).

The European Initiative for Sustainable Agriculture (EISA) has made an attempt for a non-official harmonised definition for integrated farming that includes IPM-definitions[104]. A conceptual framework for integrated production has also been established by the International Organisation for Biological and Integrated Control of Noxious Animals and Plants (IOBC) which also includes IPM definitions[105]. In several countries IPM definitions are based on those of EISA or IOBC. It has to be acknowledged that for many respects, definitions are frequently not very clear and the requirements are in fact often close to the less demanding concept of good farming practice (GFP).

Involved stakeholders

The information flow and ongoing communication between the different stakeholders involve public institutions and extension services, the PPP supply chain, equipment manufacturers, suppliers of seeds and plant varieties, and public or private advisory institutions providing services such as training and other issues for IPM (e.g. pest forecasting, tools for IPM management, etc.). The most relevant actors to be considered in the impact assessment are the farmers, the supply chain, authorities and advisory institutions (public and private):

– Farmers:
  On the basis of the actual legal, social and economic environment the farmer decides what kind of farming system is put into plan on his farm: organic farming, integrated production (including IPM) or conventional farming (usually according to good farming practices (GFP)) with all implications on the other involved stakeholders such as the PPP supply chain, equipment manufacturers, suppliers of seeds and training and advisory institutions.

– Advisory institutions (public or private):
  In most Member States there is currently a shift from public services towards private companies providing agricultural advisory services. Advisory activities concern training and in particular on the one hand support related to economic questions and on the other hand to agricultural production. Advisory services for production are usually based on current GFP and rely in many Member States at present not only on chemical plant protection measures but include already several aspects of IPM. An increased share of IPM farming opens economic chances to advisory institutions. Their services are paid by the farmers.

– Supply chain:
  The supply chain is concerned as increased IPM requirements may lead to significant reductions of PPP volumes used and corresponding economic and job losses in all sectors of the PPP industry

104 [EISA 2004].
105 [IOBC 1999].

– Authorities:
Authorities are concerned at several levels (EU, national and local) as they are required to develop, implement, manage and control provisions related to direct support schemes as well as those related to rural development measures including the implementation, management and control of certified IPM systems.

Other stakeholders - suppliers of machinery and seeds - are regarded to be of minor importance as conversion to IPM would not result in significant impacts for them.

Material flows and key figures

The average share of IPM in agriculture in the Member States today is around 3% (2.7% in 2002) of the utilisable agricultural area (UAA). The share of IPM and organic farming within the individual Member States is shown in Table 6-31. Where available, crop specific figures on the basis of the evaluation of the questionnaires and related interviews are shown in the table.

These figures have to be seen against the background that there is currently no harmonised definition for IPM. Consequently the shares of IPM are given according to the many coexisting and different systems in the individual Member States. In some of them very specific definitions exist for specific crops (e.g. Austria) whereas in other Member States no official definition for IPM is available at all.

The total share of IPM farming amounts up to approximately 23% for individual countries (in Denmark according to private IPM initiatives) and up to 100% for specific crops in specific countries (e.g. tomatoes in Belgium). In some cases, the figures are changing rapidly: e.g. in France the current share of IPM is very low (<1%) but recently an official definition has been established in the framework of the French system for integrated production ("Agriculture Raisonnée"). The objective is to increase the share of integrated production in French agriculture to 30% in 2008.

According to a study on "Integrated Crop Management Systems in the EU"[106] a reduction of PPP amounts up to 50% is theoretically possible due to the optimisation of PPP-use in IPM systems in several Member States (figure derived from various projects with conditions that do, however, not necessarily correspond to real-life conditions).

The use reduction potential has to be seen against the background that also Good Farming Practice (and hence Good Plant Protection Practice) encompasses already more than chemical plant protection measures. Also, other plant protection measures such as optimised crop rotation, technical spray drift minimisation, alternative pest management strategies (e.g. biological measures) and other measures are already part of the public and private advisory services provided to farmers and are part of common Good Farming Practise. German extension services estimate that at least 50% of farmers are already practising measures which are in fact corresponding to a "kind of integrated pest management". A high use reduction potential is consequently only possible for farms where such integrated measures are not yet put into practice at all, which is not the case in current Good Farming Practise.

106 *Integrated Crop Management Systems in the EU*, Agra CEAS Consulting, May 2002.

Table 6-30: *Status quo* - specific definitions included in existing IPM schemes/systems/protocols; source: questionnaires and interviews

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
specific IPM definitions	yes[2)]	yes [2)]	yes	yes	yes[1)]	yes[3)]		yes[2)]		yes[1)]				yes	yes	yes[1)]			yes	yes[5)]	yes	yes	yes		yes[1)]
pesticide minimisation strategies (e.g. lowest effective rate; partial or band application)	no	yes	yes	yes	no			no[4)]		yes				no	yes	yes			yes	no	yes	yes	yes		yes
selection of pesticides with minimal non-target impacts	yes	yes	yes	yes	no			yes[4)]		yes				yes	yes	yes			yes[3)]	no	yes	yes	yes		yes
selection of crop varieties with high pest resistance	yes	yes	yes	yes	yes			yes[4)]		yes				no	yes	yes			yes	yes	yes	yes	no		yes
optimised crop rotation	yes	yes	yes	yes	yes			yes[4)]		yes				no	yes	yes			yes	no	yes	no	yes		yes
fertilisation strategies in order to reduce competition from non-crop plants	no	yes	yes	yes	no			yes[4)]		yes				no	yes	yes			no	no	yes	no	yes		yes
irrigation strategies in order to ensure optimum PPP efficiency	no	yes	yes	yes	yes			no[4)]		yes				no	no	yes			no	no	yes	no	yes		yes
technical spray drift minimisation (e.g. by machinery, maintenance)	yes	yes	yes	yes	yes			yes[4)]		yes				yes	yes	yes			yes[3)]	yes	yes	yes	yes		yes
organisational spray drift minimisation	yes	yes	yes	yes	yes			no[4)]		yes				no	yes	yes			yes[3)]	no	yes	yes	no		yes
monitoring and record keeping of pest populations	yes	yes	yes	yes	yes			yes[4)]		yes				yes	yes	yes			yes	no	yes	yes	yes		yes
forecasting of pest populations	yes	yes	yes	yes	yes			yes[4)]		yes				yes	yes	yes			yes	no	yes	yes	yes		yes
alternative pest management strategies (e.g. biological)	yes	yes	yes	yes	yes			yes[4)]		yes				yes	yes	yes			yes	yes	yes	yes	yes		yes
other specific definitions	no	yes	no	no	no			no[4)]		no				no	yes	no			yes	no	yes	no	no		no

1) based on EISA obligations [EISA 2004]
2) based on IOBC definition [IOBC 1999]
3) specific definitions only in private initiatives
4) inhomogeneous situation within the Comunidades Autónomas; the presented *status quo* reflects the situation in the Comunidád Autónoma de Catalunya
5) Integrated production has been introduced with the Polish law on plant protection; the fulfilment of two out of the three definitions determines the understanding of "integrated plant protection".

Table 6-31: Share of IPM and organic farming in EU Member States; Sources: Questionnaires, [Agra CEAS 2002] [EAPOFF 2004] [1] not necessarily representative for Spain; the presented *status quo* reflects the situation in the Comunidád Autónoma de Catalunya

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
IPM share	up to 80	up to 100	5 to 95	0 to 0,2	up to 80						0,01 to 0,19		0,5 to 1,0						9,75		0 to 0,3	up to 92	up to 85		n.a
Total share	n.a.	2,24			20			~40[1]					0.5-1.0						9,75			n.a.			
Wheat	n.a.	0	95,0	0,2	20			0,5[1]														32			
Potatoes	n.a.	0	20,0	1	30			1[1]			0.02											30			
Citrus fruits	n.a.	0	40,0	0	0			11[1]			0.01										0,19				
Apples	70	85	10,0	0,1	80			44[1]			0.16								6		0,27	65	85		
Tomatoes	n.a.	100	5,0	0	80			2,3[1]			0.02								40		0,028	92			
Vineyards (grapes)	80	0	10,0	0,1	80			1,9[1]			0.19										0,2		45		
high share (>10%)	x		x		x	x																x			x
medium share (2 - 10%)		x																	x				x		
low share (<2%)				x				x	x	x	x		x	x							x				
ICM according to [Agra CEAS 2002]	17,8	0,5	n.a.	n.a.	1,3	23	n.a.	0,1	0,7	0,4	0	n.a.	0,4	1	n.a.	n.a.	n.a.	n.a.	1	n.a.	1,5	5,1	n.a.	n.a.	9,8
Organic according to [EAPOFF 2004]	8,5	1,5	0,1	5	3,7	6,5	2	1,7	6,6	1,4	0,6	1,8	0,7	8	0,2	1,7	0,8	0	1,5	0,3	1,8	6,3	0,8	2,5	4
SUM ICM + organic	26,3	2	n.a.	n.a.	5	29,5	n.a.	1,8	7,3	1,8	0,6	n.a.	1,1	9	n.a.	n.a.	n.a.	n.a.	2,5	n.a.	3,3	11,4	n.a.	n.a.	13,8

IPM/ICM system	Designation		share	note
research	Boigneville	FR	0,55	
	Lautenbach	DE		n.a.
	Camar	IT	0,53	
	FOFP	UK	0,50	
	LIFE	UK	0,50	
commercial	Champagne	FR		< 1
	Akil	DE	0,50	< 1
	Chianti	IT		< 1
	Citrus	ES		< 1
	Pome	ES		< 1
non-case-study	Lanxade	FR		< 1
	Intex	NL	0,37	
	Nagel	NL	0,35	
	Nagele II	NL	0,43	
	Logarden	SE	0,40	
	Boxworth	UK		< 1
	SCARAB	UK	0,52	
	LINK-IFS	UK	0,82	
mean			**0,495**	

Source: Integrated Crop Management Systems in the EU, DG Env, Agra CEAS, 2002

share:

share of PPPs used in IPM/ICM system compared to use of PPPs in conventional farming

conclusion:

50% use reduction theoretically possible due to optimisation of ppp-use (derived from single projects with conditions that do not necessarily correspond to praxis conditions);

improvements of good acricultural praxis lead to improvements in conventional farming

→ reduction potential up to 50%

Figure 6-32: Possible PPP-use reduction in integrated farming systems compared to conventional farming

As a consequence a PPP use reduction up to 20% is taken as estimation for the further impact assessment when considering conversion from current farming practise to IPM with specific requirements. This assumption is in line with the estimation of German authorities guessing that a 20% use reduction of PPPs can be achieved in IPM farming compared to Good Farming Practises and estimations from Spanish authorities estimating a possible use reduction of 20 to 30%.

If only general IPM requirements are taken into account the resulting farming practise will be closer to conventional farming and, depending on the "specificity" of the general requirements, somewhere in between conventional farming and IPM farming with detailed specific requirements. Consequently, the use reduction potential decreases in parallel with decreasing content of specific requirements of such schemes. For the further assessments a use reduction up to 10% is assumed for systems based on 'general' IPM requirements.

In order to differentiate between the specificity of IPM systems in this sense the term "general IPM" and "specific IPM" are used for IPM systems related to specific requirements and a use reduction potential up to 20% and to general requirements and a use reduction potential up to 10%:

specific IPM	specific requirements per crop	use reduction potential up to 20%
general IPM	only general requirements and principles	use reduction potential up to 10%

Taking into account a use reduction potential of 20% in specific IPM compared to conventional farming, it can be estimated from the existing material flows (see Figure 6-33) that currently more than 96% of the total amount of plant protection products used is applied in conventional farming, a slightly higher proportion than its share of agricultural land (94% of the crop area). Approximately 2.5% of the total amount of plant protection products is used in integrated farming, which covers approximately 3% (~ 2.220.000 ha) of the crop area.

It is sometimes argued that the effectiveness of pesticides as toxins has been rising while the volume of active substances used has declined[107]. As a consequence compounds would be applied in smaller quantities than previously but would show higher activity (both wanted and unwanted). Consequently, the environmental burden will not have fallen in parallel with the reduction in terms of tons of active substances. Theoretically it would not be impossible that a reduction of a given quantity of PPP use caused by IPM could be accompanied by a shift towards substances with higher activities at lower doses. As a consequence the amount of PPPs would have been reduced, whereas the related risks might even have increased.

However, none of the information collected indicates that such a shift to more dangerous active substances in IPM or other integrated farming systems has occurred. In contrast, some of the existing IPM or IFS schemes contain requirements that should normally lead to a shift to the use of less dangerous substances.

Corresponding requirements are contained in individual definitions and criteria of IPM or IFS systems e.g. in the form of specific prescriptions such as:

– use restricted to compounds that do not leach into the water compartment

– selection of plant protection products with lowest side effects

– restricted list of allowed and pre-selected plant protection products

In particular the latter bullet point – closed lists of allowed PPPs - could create a certain problem. In view to the high diversity of pests and the potential to create pest resistances if the same or similar PPPs are used repeatedly to fight against the same pest type, a too severe restriction of choice could cause problems to treat occurring pests appropriately in the mid to long term and possibly the need to apply higher dosages, to use more toxic products or product with higher side effects. As a consequence it is often argued that an appropriate offer and the possibility to select between sufficient numbers of different PPPs are necessary for a long term sustainable pest control.

[107] EFTEC, Economics For The Environment Consultancy Ltd : Framework for environmental accounts for agriculture, EFTEC on behalf of DEFRA, UK, final report, July 2004.

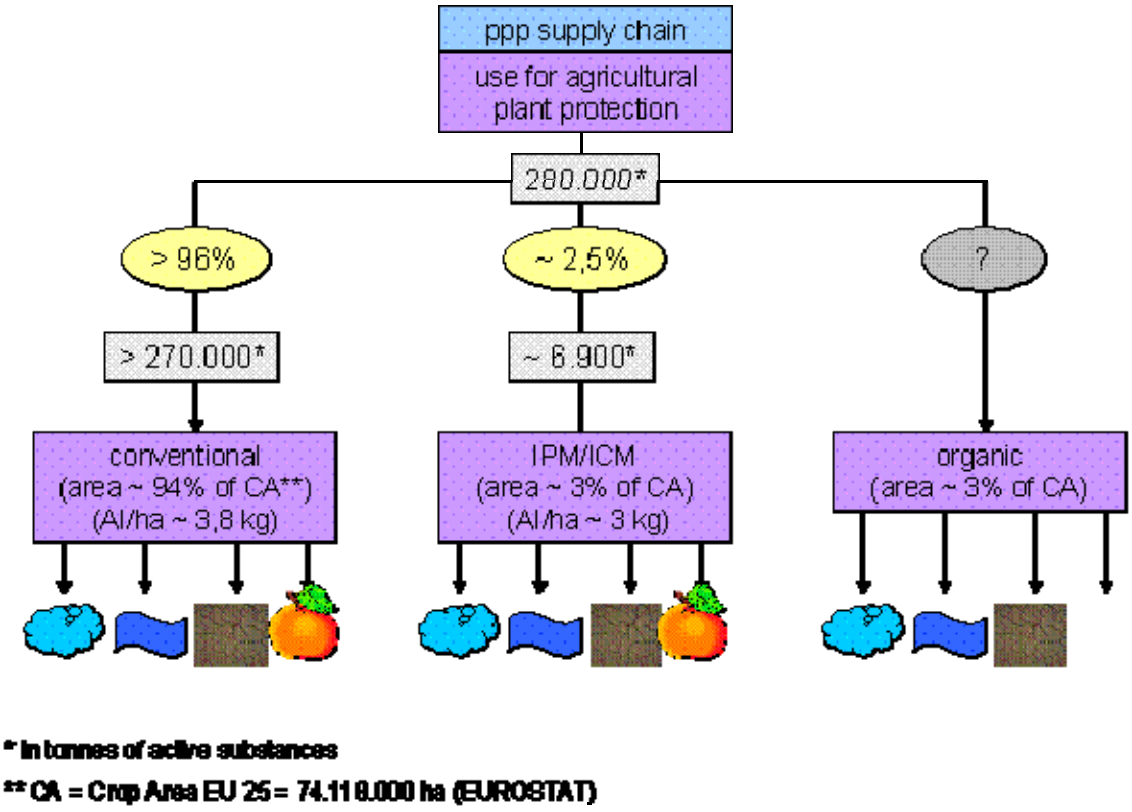


Figure 6-33: Material flow: use of PPPs for agricultural plant protection

Other criteria for the optimised use of PPP triggered by IPM systems are e.g.

– priority for consideration of non-chemical plant protection strategies

– strategies to determinate the right product and the appropriate dosage

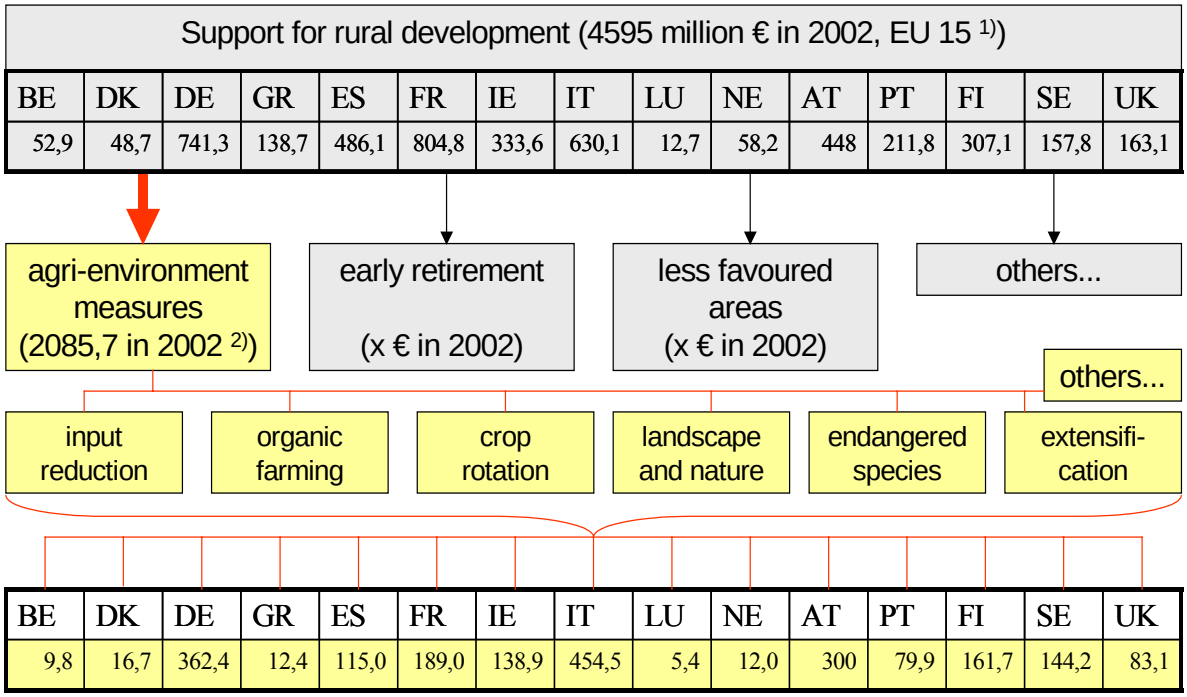
– technical and organisational drift minimisation strategies

– training of users and certification of sprayers

Accordingly, as IPM aims at taking first non-chemical measures into account, the general assumption is that IPM may lead to a risk reduction with positive impacts on environment and health and is usually not accompanied by a shift to more dangerous substances (even if this cannot be ruled out completely).

Economic flows and key figures

Financial support is being granted within Rural Development Plans in several Member States to farmers who voluntarily convert to IPM in the framework of agri-environmental commitments. The support is co-financed by the European Community and the individual Member States. A recent Commission report on the budget allocated to agri-environmental measures illustrates the actual current support to rural development under the CAP (see Figure 6-34). These measures encompass in several Member States also support for IPM systems.



1) source: Commission Decision 1999/659/EC fixing an indicative allocation by MS under the EAGGF Guarantee Section for rural development measures

Figure 6-34: Financial support for rural development (for 2002) and thereof for agri-environment measures (annual average from 2000 to 2002)

How much support is precisely allocated for IPM is only known in individual cases. Overall, the feedback related to the question on financial support for IPM was not quite satisfactory and there remain information gaps. The information received from some Member States in this respect is shown in Table 6-35.

Table 6-35: Financial incentives to support IPM

	AT	BE	CY	FR	NL	PL	SE	UK
financial incentives to support IPM (million EUR)	>25	~2	~1,5	none	none	none	0,04	none

In Austria a well developed system with specific criteria is established with a related budget of approximately € 25 million, which is annually allocated to support specific IPM measures (with a focus on pesticides and fertilisers). This amount corresponds to about 8% of the total support for agri-environmental measures in Austria. In Belgium the analogous figures are approximately € 2 million for IPM measures which corresponds to approximately 20% of the total support for agri-environmental measures in Belgium. France, the Netherlands, Poland and the United Kingdom do not provide financial support for implementing IPM systems. In Poland there are plans to support IPM in the near future.

It can therefore be assumed that in the majority of the Member States there is no specific support for IPM under agri-environmental measures or it is usually not higher than in Austria. In other words the European average is estimated to be below 8% of the total support for agri-environmental measures (i.e. below € 167 million in EU-15).

In 1998 approximately 27 million ha have been under contract of agri-environmental measures and approximately € 1.300 million have been expended from the EAGGF for this purpose[108]. Taking into account co-financing from Member States and the Community, an average support for agri-environmental measures of approximately € 100 per hectare results. This figure serves as a basis for the assessment of economic impacts of agri-environmental measures.

The average direct support for plant products from the EAGGF Guarantee budget is about € 344 per hectare[109]. This figure serves as a basis for the assessment of economic impacts related to direct support schemes. Such impacts have in particular to be considered in the framework of cross-compliance and related reductions and exclusions from direct payments as laid down in Regulation (EC) 1782/2003. As explained earlier, pesticide use legislation will be included in cross-compliance requirements as of 1 January 2006. Reductions are possible in the range from 5 to 100%. Account shall be taken of the severity, extent, permanence and repetition of non-compliance. In case of negligence, the percentage of reduction shall not exceed 5% and, in case of repeated non-compliance, 15%. For the non compliance with IPM requirements a reduction of direct support of 5% is taken as a figure for the assessment of the economic consequences. As only 1% of farmers are annually controlled with respect to cross-compliance, the economic consequences (5% reduction of direct support) due to non compliance is only taken into account for 1% of the non complying farmers.

The socio-economic situation at farm level depends on several variables:

– Implementation costs and eventually costs for certification

– Yields and product prices

– Production costs (including among others costs for pesticides, seeds and plants, machinery, working hours, external advisory services, training)

– Financial support (in particular direct payments and payments for rural development measures)

Comparing IPM with conventional farming, the socio-economic situation at farm level according to feedback from the questionnaires and interviews can be summarised as follows (without taking into account financial support):

– the implementation of IPM entails negligible investment costs as IPM relies on a methodological approach, good knowledge (education, training) and appropriate advice; the financial effort is restricted to some extremely low cost technical means such as a magnifying glass, counting frame for plant pests, "yellow dishes"[110], eventually specific systems for the diagnosis of pests, etc.;

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108 EEA indicator fact sheet signals 2001 - chapter agriculture, area under AE management contracts: http://themes.eea.eu.int/Sectors_and_activities/agriculture/indicators/contract/ag11_17.5.01.pdf

109 Calculation based on the EAGGF Guarantee budget for plant products for 2004 expenditure from 16.10.2003 to 31.07.2004 was 25,530.2 m€) and the EU-25 crop area.

110 Translation from the German term "Gelbschale" which is a small basin used as a trap for pest insects for the determination of the presence and frequency of the corresponding organisms.

– certification costs are only required for systems where a demonstration or proof of IPM conformity is necessary. The costs for the certification of an integrated farming system in France (Agriculture Raisonnée) is € 800 per farm and is valid for 5 years;

– comparable or slightly lower yield in IPM farming; in selected case studies the yields for different crops ranged from –28 to + 9%, when compared to conventional farming[111];

– comparable or slightly higher product prices in IPM farming; for example, producer prices for German ICM labelled products increase by 5 to 10%[112];

– reduced financial effort for buying pesticides[113] (up to 20% cost reduction);

– comparable or slightly higher costs for buying crop varieties;

– comparable costs for application equipment and other machinery;

– higher efforts for IPM management, education and external services. Costs are about € 4.2 per ha and year[114]. The share for advisory services which is related to integrated pest management is estimated to be approximately 40% thereof (€ 1.7). According to the present status of advisory services used at farm level, the costs for IPM related will increase up to € 1.7 /ha, per year;

– comparable job situation.

Overall it can be concluded that higher efforts and costs are outweighed by savings but that there may remain a certain higher risk for possible harvest losses in IPM systems. The job situation at farm level remains the same even if increased efforts will be required for additional IPM management. Table 6-36 summarises selected key figures for the impact assessment of the options of the IPM related measure.

111 Agra Ceas Study (Akil and Boigneville).

112 Producer price increase for HQZ labelled cereals ranged from ~ 0.5 to 1.0 €/100 kg product (ICM label in Baden Württemberg, Germany) which corresponds to a producer price increase of approximately 5 to 10%.

113 Significant crop specific differences have to be taken into consideration: average costs range from ~ 45 €/ha (cereals) up to ~ 920 €/ha (vineyards) (calculated on the basis of EUROSTAT and ECPA data).

114 Advisory costs per 1000 ha crop area for integrated production advisory 3600 €/1000 ha (usual costs e.g. Poland and Hungary) to 4720€/1000 ha (usual costs e.g. for Germany and the Netherlands); thereof share of pest related advisory 1444 to 1888 €/1000 ha (source: international agricultural advisory institution).

Table 6-36: Selected key figures for the impact assessment of the measure on IPM[115]

Parameter	Costs
average profitability of IPM farming systems compared to conventional farming	comparable
average reduction of PPP use due to specific IPM requirements compared to conventional farming	up to 20%
average reduction of PPP use due to general IPM requirements compared to conventional farming	up to 10%
costs for certification of audited IPM systems[116] (certification frequency 5 years)	~ € 160 /farm/year
average costs for integrated production advice	~ € 4,2 /ha
thereof average share of pest related advice leading to 20% use reduction (estimation)	~ € 1.7 /ha
theoretical average share of pest related advisory leading to 10% use reduction	~ € 0.83 /ha
area currently cultivated under IPM farming systems (~ 3% of crop area)	~ 2.2 million ha
area currently cultivated under conventional farming systems (~ 94% of crop area)	~ 70 million ha
annual costs per job in agricultural advisory institutions	~ € 50,000 /year
annual payments for IPM farming systems under agri-environmental measures (estimation)	below € 167 million
average support for agri-environmental measures	~ € 100 /ha
average direct support from EAGGF Guarantee section (based on expenditure)	~ € 344 /ha

Information flow and key figures

Figure 6-37 illustrates the information flow between the involved stakeholders. The information flow helps in particular to identify the relevant stakeholders.

115 Algorithms were used for calculated figures in 5-13.

116 Information from France; valid for a farm area about 42 ha.

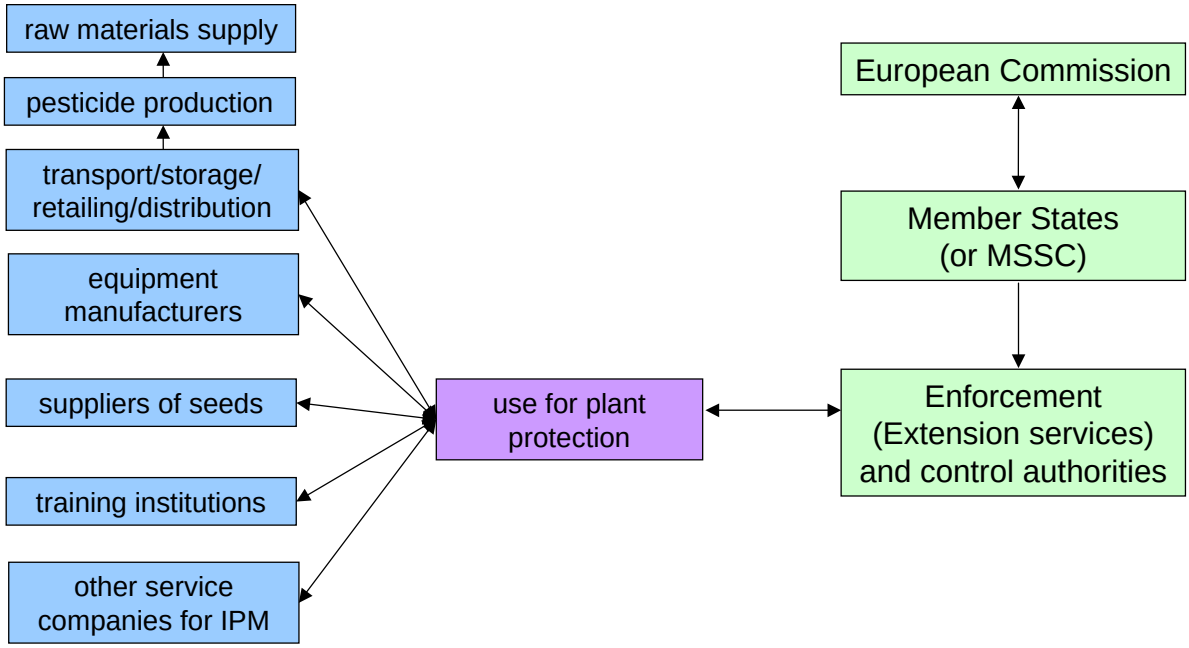

Figure 6-37: Information flow IPM

6.1.9. Quantitative use reduction

Legal situation

Such a measure, if adopted, would establish general quantitative use reduction targets in relation to a reference year and by a future date (e.g. 75% of the PPP amount used in 2000 is allowed in 2010) or give a ceiling (e.g. max. 10,000 t/year active substance in 2010 for a defined region). Alternatively, there could be other approaches that would define restrictions for certain applications with respect to

– Frequency of use,

– Periods of the year,

– Certain areas,

– Amount used for a given crop.

At present, no Member State has mandatory use reduction targets. Denmark and Sweden have elaborated voluntary use reduction targets. The effect of the reduction program is measured using a specific indicator (Treatment Frequency Index – see below for details).

Some Member States like Belgium, Denmark, the Netherlands, Portugal, Sweden, Lithuania and Slovenia have established specific use reduction targets.

Table 6-38: General use reduction – current legal situation in Member States

	AT	BE	DE	DK	NL	SE	UK	FI	PT	CY	IE	IT	GR	LT	CZ	SI
Quantitative use reduction targets* • General mandatory • General voluntary • Specific mandatory • Specific, voluntary		X ● ●		X ● ●	X ● ●	X ●			X					X ●		X ●
No quantitative use reduction targets	X		X				X	X		X	X	X	X		X	

* Not covering issues under measure: "Reduced or PPP-free zones", measure "IPM/ICM" or other measures

As mandatory general use reduction targets do not exist in Member States, potential impacts of introducing them might vary in a broad way depending on a lot of parameters with respect to the *status quo* (e.g. type of crops, types and amount of PPP currently used, existing PPP alternatives).

Involved stakeholders

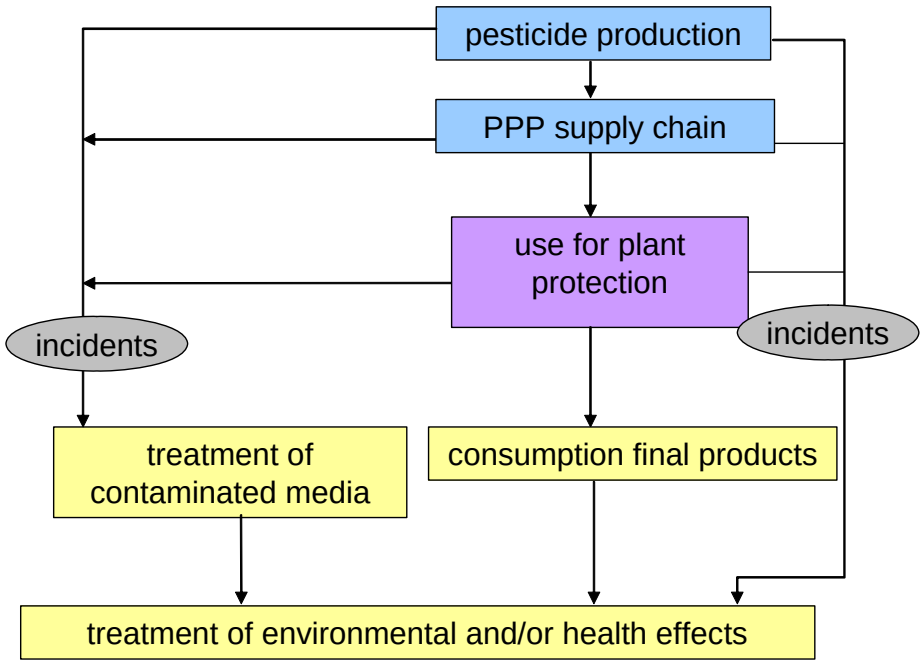

Figure 6-39: involved stakeholders - all participants of the material flow

If such targets were to be established and implemented, the following stakeholders would be involded:

– users (farmers)

– PPP-producers

– PPP wholesalers and -retailers

– authorities

– treatment companies

– NGO campaigning on environmental aspects

– consumers

Key figures within material flows

The following tables give an overview on basic data regarding the use and sales of pesticides in the different Member States.

Table 6-40: Statistical data of pesticide use in EU-15[117]

	UAA* 1.000 ha (2001)	crop area 1.000 ha (1999)	t act. subst used (1999)	t act. subst sold (2002)
AT	3.375	962	2.028	2.694
BE (inkl. LUX)	1.518	729	3.008	5.017
DE	17.038	8.658	21.953	26.635
DK	2.694	1.678	1.936	2.719
ES	25.596	9.306	31.609	40.727
FI	2.216	777	633	1.633
FR	27.856	13.812	82.811	82.456
GR	3.575	1.724	12.696	11.852
IR	4.458	326	556	1.551
IT	15.355	6.600	50.910	42.112
NL	1.933	808	4.075	8.073
PT	3.838	976	7.885	25.754
SE	3.054	909	934	1.836
UK	15.799	4.228	11.344	21.114
EU-15	128.305	51.493	232.378**	274.173**

* UAA= Utilised Agricultural Area
** the significant differences between use and sales data are a result of the lack of reliable use data for most Member States. The indicated figures are industry estimates provided to EUROSTAT

[117] Source: The Use of Plant Protection Products in the European Union 1992 – 1999; ECPA Statistical Revue 2002; Statistical Data of DG Agriculture.

The significant differences between the sales and use data show the absence of reliable statistical information with regard to real pesticides use in the EU-15. The situation with regard to data availability is worse for the new Member States, as shown in Table 6-41.

Table 6-41: Statistical data of pesticide use in new Member States

	UAA 1.000 ha (2001)	crop area 1.000 ha (1999)	t act. subst total use (diff. yrs)	t act. subst sold (2002)
CY	143	60	?	975
CZ	4.280	3.100	?	4.670
EE	891	420	208	
HU	5.853	3.900	8.500	9.009
LT	3.478	1.270	847	
LV	2.485	1.010	41	
MT	12	5	?	
PL	18.246	11.500	8.534	9.681
SI	486	160	1.406	815
SK	2.444	1.200	?	
EU-10	38.318	22.625		

Sales of pesticides in the EU-15 since 1992 have seen a slight decline in 1994-1995 and then started to grow strongly with a peak in 1998-1999. Since then, there seems to be a slight decline to about 290.000 tonnes per year in 2002-2003 (see Figure 5-2).

However, the developments in the individual Member States have been quite different, as already seen in Figure 2-4: whereas some Member States have seen significant reductions from the period 1990-92 to 2000-2002, others have experienced massive growth in pesticide consumption.

Some further economic key figures with regard to agriculture and pesticides are contained in Table 6-42.

From this information, it is obvious that use of pesticides is very different in the Member States. In line with their agricultural surfaces, the main users in overall quantities are France, Italy, Spain, Germany, the UK, and Portugal. However in terms of kg/ha, which is an indication of the intensity of use, the Member States with the highest consumption are: the Netherlands, Belgium, France, Italy and Portugal. This reflects the different needs for plant protection depending on the crops produced. Production of vine, fruit, and vegetables are by far the most pesticide intensive agricultural practices.

As shown in the table, the overall expenditure on pesticides by the agricultural sector corresponds to only around 4.2% of total expenditure on inputs (ranging from 0.2% in Austria over 5.6% in France to 6.2% in the Czech Republic). In other words, costs for pesticides in agricultural production are only a small part of the costs for all inputs.

Table 6-42: Economic statistical data in Member States (2002)

Country	Output in agricultural activities sector (Mio. EUR)	Consumption of inputs (Mio. EUR)	Gross value-added at basic prices (Mio. EUR)	PPP total sales 2002 (Mio. EUR) [ECPA 2003a]
AT	5.704	3.086	2618	7,68
BE.	7.056	4.385	2672	147,29
DE	41.454	24.943	16511	1.133,00
DK	8.348	5.051	3297	80,96
ES	37.335	13.619	23716	636,11
FI	4.288	2.658	1630	58,00
FR	64.813	33.207	31606	1.869,00
GR	12.189	2.938	9251	168,90
IE	5.746	3.114	2631	59,83
IT	43.639	14.511	29128	674,91
LU	256	129	127	n.d.
NL	20.114	11.034	9080	263,48
PT	6.258	2.993	3264	113,88
SE	4.710	3.235	1475	50,76
UK	24.465	13.344	11121	575,32
CY	n.d.	n.d.	n.d.	8,77
CZ	3.283	2.354	929	146,18
EE	475	277	198	n.d.
HU	6.077	3.975	2102	212,10
LT	1.067	757	311	n.d.
LV	587	332	255	n.d.
MT	146	68	78	n.d.
PL	13.241	8.324	4917	309,25
SI	1.062	568	494	22,30
SK	1.677	1.151	527	60,76
EU 15	286.375	138.247	148127	5.839,11
EU 10	27.615	17.806	9811	750,59
EU 25	**313.990**	**156.053**	**157938**	**6.589,7**

6.1.10. Taxes/levies

Four Member States have already introduced taxes on pesticides[118] with the objective of reducing the use of pesticides in general or particular substances: Sweden, Denmark, Belgium and France. Taxes are collected from manufacturers/importers or at points of sale.

[118] *Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the European Union and its Member States*. ECOTEC Research&Consulting,

Sweden and Belgium apply flat rate taxes per kg of active substance: € 2.2 / kg and € 2.5 / kg respectively. There is no differentiation between the active substances. However, it has to be noted that in Sweden the tax applies to all active substances, whereas in Belgium it is applicable only to 4 active substances with a high risk of water pollution (two of them have been banned completely by now as they were not included into Annex I of Directive 91/414/EEC).

Denmark applies *ad valorem* taxes and differentiates between insecticides (35%) other chemical pesticides (i.e. herbicides, fungicides, growth regulators, 25%), and microbiological agents: 3%. In order to offset income losses due to modified pricing policies by companies, the tax is calculated based on a fixed price label system.

France has classified all active substances in 7 categories depending on their toxicity / ecotoxicity. Taxes vary from 0 to € 1.67 / kg and are part of a larger system of 'General taxes on polluting activities', which covers also areas such as waste, atmospheric emissions, detergents, noise from airplanes and lubricants. (Precise classification criteria and numbers of substances in the various categories are not known).

All Member States have established systems of fees and charges to be paid for product authorisation in the framework of Directive 91/414/EEC, which can be substantial (up to € 350.000 for an inclusion into Annex I of the Directive and up to € 35.000 for product authorisation). In addition, some Member States, such as UK and Belgium require annual fixed fees for each existing authorisation that are independent of quantities sold, but in the case of Belgium, somewhat higher for authorisation of products considered more dangerous. The UK has also carried out a prospective study on the design of a general tax scheme[119], but as farmers and industry agreed to implement a voluntary initiative to reduce the negative impacts of pesticides on health and the environment, introduction of the tax is pending the outcome of the evaluation of the success of the voluntary initiative.

6.2. Assessment of the impacts of the various measures and their options

In the following, the impacts of the various options for the measures examined in this assessment will be presented. Much of the information is based on the outcome of a study that the Commission mandated to a consultant in 2004, and which can be consulted for further background information on the Commission's website[120]. In addition, other information received during the extensive consultation process – including also the final Internet Consultation has also been taken into account.

6.2.1. Creation of a system of mandatory education, awareness raising, training and certification for all PPP users (farmers, local authorities, workers, distributors, traders and extension services)

It is reasonable to assume that untrained users are sub-optimal in the application of PPP and as a consequence have economic disadvantages (due to overuses and losses), have to bear unnecessary health risks as they do not pay enough attention in handling PPP in a safe way. The corresponding losses and improper handling also cause negative environmental impacts.

Brussels, April 2001.
(see:http://europa.eu.int/comm/environment/enveco/taxation/environmental_taxes.htm)

[119] *Design of a Tax or Charge Scheme for Pesticides*, Department for Environment, Food & Rural Affairs, UK, April 2000 (see: http://www.defra.gov.uk/environment/pesticidestax/01.htm).

[120] http://europa.eu.int/comm/environment/ppps/2nd_step_study.htm

Table 6-43: Measure 'training' - General impacts

Options Actors	Option 1: Mandatory training and information schemes (not going into detail)	Option 2: Mandatory education and training with minimum standards to PPP retailers, farmers and other professional users and extension services	Option 3: Recommen-dation to establish enhanced training and information	Option 4: Introduction of a general tax	Option 5: No action	Option 6: Combination of specific financial instruments with training and information schemes
Farmer (incl. wholesalers, advisors) Economic	~	~	~	-	~	+ / -
Authorities Economic	-	-	~	+	~	+ / -
Training institutions Economic Social	~ ~	+ + + +	~ ~	~ ~	~ ~	+ +
Producers Economic Social	- -	- - - -	~ ~	~ ~	~ ~	- - - -
Environmental issues	+	+ +	~	~	~	+ +
Health issues	+	+ +	~	~	~	+ +
Plant protection issues	~	~	~	~	~	~

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

To realise the potential for improvement, 17 Member States have at least to some extent established compulsory training schemes by law.

To demonstrate the impacts of the different options for this measure, the mandatory training and certification system in Denmark was chosen as a case study. In Denmark all farmers and professional users have to be trained and certified for applying pesticides. Wholesalers and industrial users are not obliged to be certified. As second case study the training system of

the UK, which is voluntary, has been analysed. The system includes wholesalers/retailers, industrial users and farmers.

Conclusions

Table 6-43 shows the impacts of the 6 options examined in particular for these 2 case studies and then extrapolated. Option 2 "mandatory training and information schemes with minimum harmonised requirements" is the recommended outcome. With these minimum requirements a substantial training can be implemented throughout the European Union leaving organisational aspects to individual Member States.

In addition to the qualitative overview in Table 6-43, Table 6-44 contains information on the quantification of some impacts (averages and ranges).

It is expected that through mandatory training and education requirements with minimum requirements throughout the EU, farmers will on average use ~ 1.2 kg less in active substances per farm, which means ~ € 30 annual savings per farm in Europe. Overall this will lead to a reduction in use of ~9.000 tonnes throughout the EU, which – based on the average price mentioned in Table 5-3 (€ 25 / kg) – means around € 225 million less to spend on pesticides. The costs to all farmers, retailers and other trainees throughout the EU will be in the dimension of € 250 million. So on balance there is no significant direct economic disadvantage expected for farmers. In addition, there are benefits for the farmer's health, and also those of bystanders, which cannot be quantified.

In the case where authorities are managing the training schemes by themselves or perform quality control mechanisms for training measures, they in total will have additional expenses, some Member States being significantly more concerned than others as they do not have any existing training schemes. Training and certification institutions will have additional incomes of about € 250 million, resulting in 2,500 additional jobs. For the environment and for health effects a reduction of up to 9000 t/year can be expected on a European scale with a corresponding general environment and health risk reduction, which again cannot be quantified.

For some countries (e.g. Denmark) the option would mean very low impacts, for other countries (e.g. Portugal) much bigger impacts are expected. The overall use reduction is expected to be in the range of 3% of the total used PPP, a dimension of 9,000 t/year. For a single farm this would mean an average of 1.2 kg/year and corresponding average savings of € 30 /year and farm.

Compared to option 2, option 1 will have lower overall impacts, as it will mainly concern Member States that do not have any mandatory training requirements in place yet. Also, as there will be no minimum standards, it is not expected that Member States that have either mandatory or voluntary systems in place will change these significantly. Therefore it is expected that there would be increased costs in a dimension of M€ 50 /year with a range of M€ 36 to 83 /year. This will enable a PPP use reduction in the dimension of 2,000 t/year (range 1,600 to 2,400 t/year) with savings of about M€ 50 /year (range M€ 40 to 60 /year).

Table 6-44: Sensitivity analysis measure 'training'

Options Actors	Option 1: Mandatory training and information schemes (not going into detail)	Option 2: Mandatory education and training with minimum standards to PPP retailers, farmers and other professional users and extension services	Option 3: Recommen-dation to establish enhanced training and information	Option 4: Introductio n of general tax	Option 5: No action	Option 6: Combination of specific financial instruments with training and information schemes
Farmer (incl. wholesalers, advisors) Economic	~	~	~	~	~	~
Authorities Economic	not quantified	not quantified	~	not quantified	~	not quantified
Training institutions Economic Social	+ M€ 50 (36-83) +50	+ M€ 250 (60-680) +2,500	~ ~	~ ~	~ ~	+ M€ 250 (60-680) +2,500
Producers Economic Social	- M€ 50 (36-83) -167	- M€ 225 (60-680) -833	~ ~	~ ~	~ ~	- M€ 225 (60-680) -833
Environment[121]	2,000 t/a (1,600 – 2,400)	9,000 t/a (7,200 to 10,800)	~	~	~	9,000 t/a (7,200 to 10,800)

Consequently the option will be on average more or less cost neutral, but overall there will be less beneficial impacts than in option 2.

The option combining financial instruments (taxes/levies) with training and information schemes, although presenting similar expected impacts is eventually not recommended at Community level for reasons explained under Chapter 6.2.10. All other options show none or less favourable impacts.

[121] Expressed as a tonnage of reduced use.

6.2.2. Standards for the certification of new spraying equipment and technical check of equipment in use

Badly maintained spraying equipment is a major reason for unintended PPP-losses or overuse. Reducing these losses results both in economic and ecological/health advantages.

As documented in Chapter 6.1.2, 10 Member States (MS) have established mandatory inspection systems for spraying equipment, in 7 further MS voluntary systems exist. The eight options for this measure have been assessed by studying two case studies (Belgium and Germany).

Conclusions

Table 6-45 contains a qualitative summary of the impacts for the different options and Table 6-46 a quantitative assessment (where feasible).

Option 2, creation of mandatory inspection and certification requirements throughout the EU, is the most favourable one. It will cause on the one hand additional costs for farmers of about M€ 130 per year, on the other hand farmers will realise savings of about 9,000 to 18,000 t active substance which corresponds to an amount of € 230 to 460 million. In the long-term savings will dominate significantly for farmers.

About 1000 new jobs will be created at national control institutions, covered by earnings of about € 90 million per year. New jobs (in a dimension of 500) will also be created within maintenance companies. The PPP producing industry may loose turn over in a dimension of € 230 to 460 million in the long term resulting in a possible loss of jobs between 750 and 1500.

With respect to environment and health impacts only advantages are resulting, the expected quantification shows a range between 9,000 and 18,000 t per year reduced active substance of PPP input.

On the basis of interviews with experts, additional costs for certification are estimated to amount to € 2 to 4,5 million. These are the costs that initially will occur at equipment manufacturers for certification (costs that would eventually occur for improvements in the production processes at equipment manufacturers are not considered). As far as the market conditions allow, the costs for certification will be transferred to users *via* increased prices for spraying equipment.

Assuming an average lifetime of 12-15 years per sprayer each year approximately 125,000-250,000 new sprayers are purchased for the whole Community. It is assumed that new certified sprayers will reduce overuse and losses to the environment due to a higher efficiency compared to new but not certified sprayers and will consume approximately 5% less PPP or reduce by an equivalent the losses caused by the handling of products during mixing, loading, spraying and cleaning operations.

Table 6-45: Measure Certification and technical check of spraying equipments: General impacts

Options / Actors	Option 1: Introduction of a mandatory certification scheme	Option 2: Introduction of mandatory certification and control schemes	Option 3: Introduction of a voluntary control scheme	Option 4: Introduction of financial instrument general approach	Option V-5: No action	Option V-6: Introduction of a voluntary certification scheme	Option V7: Introduction of a voluntary control and certification scheme	Option V-8: Introduction of financial instrument distinct approach
User of PPP								
Economic	~	- / +	- / +	-	~	~	- / +	- / +
Social	~	~	~	~	~	~	~	~
Health	+	+	-	~	~	~	-	+
Controlling institutions								
Economic	~	+	-	- / +	~	~	-	+
Social	~	+	-	- / +	~	~	-	+
Certification institutions								
Economic	+	~	~	~	~	+ / -	+ / -	~
Social	+	~	~	~	~	~	~	~
Equipment manufacturer								
Economic	-	~	~	~	~	~	~	~
Social	~	~	~	~	~	~	~	~
PPP Industry								
Economic	~	-	+	- / +	~	~	+	-
Social	~	-	+	- / +	~	~	+	-
Authorities								
Economic	-	-	+	+	~	-	+ / -	- / +
Production issues	-	-	+	~	~	~	+	-
Environmental issues	+	++	-	~	~	~ / -	-	+
Health issues	+	++	-	~	~	~ / -	-	+
Plant protection issues	~	~	-	~	~	~	~	+

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

Table 6-46: Sensitivity analyses Measure 'Certification and Technical check of spraying equipment'

Options **Actors**	**Option 1:** Introduction of a mandatory certification scheme	**Option 2:** Introduction of mandatory certification and control schemes	**Option 3:** Introduction of a voluntary control scheme	**Option 4:** Introduction of financial instrument general approach	**Option 5:** No action	**Option 6:** Introduction of a voluntary certification scheme	**Option 7:** Introduction of a voluntary control and certification scheme	**Option 8:** Introduction of financial instrument distinct approach
User of PPP								
annual control, repair and certification costs	M€ 2.5 to 4	M€ 128	M€ 12 to 73				- M€ 12 to -73	M€ 48 to 128
savings due to changed PPP use	~ M€ 12 to 24	M€ 225 to 450	- M€ 25 to 280				- M€ 25 to 280	M€ 82 to 450
additional costs for tax				depending on tax				up to M€ 55
Controlling institutions/Authorities								
additional income control		M€ 88	M€ -8 to -50	M€ -50 to + 30 depending on tax			M€ -8 to -50	M€ 33 to 88
additional income tax				-600 to + 400				up to M€ 55
jobs		1000	- 100 to - 600				- 100 to - 600	375 to 1000
Certification institutions								
additional income	M€ 2.5 to 4	M€ 2.5 to 4				M€ 1.5 to 3.6	M€ 1.5 to 3.6	
jobs	50 to 80	50 to 80				30 to 70	30 to 70	
Maintenance companies								
income from repair costs		M€ 40	M€ -4 to -23				M€ -4 to -23	M€ 15 to 40
jobs		800						
PPP Industry								
turnover		M€ -225 to -450	M€ +25 to 280	M€ -160 to +280			M€ +25 to 280	M€ -82 to 450
job		-750 to -1,500	+80 to +930	-530 to +930			+80 to +930	-530 to +930
Environmental issues								
Use reduction	~ 500 to 1000 t	9,000 to 18,000 t	-980 to -11,110			+ (not quantified)	-980 to -11,110	3,300 to 18.000

This assumption is at the lower edge of the range of controlled versus non-controlled sprayers (which ranges between 5 and 10%) because in this case the comparison is made regarding the efficiency of new sprayers (certified and not certified). Also not certified sprayers have already to comply with certain quality standards applied in sprayer manufacturing. The certification of new sprayers would assure that new purchased sprayers are in a good condition after their sale and before the first time that they have to undergo an inspection (e.g. after 3 years). The resulting average annual use reduction amounts up to about 500-1000 tons. This would be related to annual savings up to around € 12-24 million which exceeds the increased costs for certification, in particular if it is organised by type of sprayers (with a certificate of conformity to the certified type for every new sprayer put on the market).

All other examined options taking into consideration voluntary systems, financial instruments and "no action" show less advantageous impact relations against the background of the objectives of the Thematic Strategy.

6.2.3. General prohibition of aerial spraying

Application of PPP by aerial spraying can pose considerable risks to human health and the environment when carried out improperly. If aerial spraying is not correctly operated, the environment (in particular the water compartment) and the residents and bystanders could be put at risk because of drift or spray on inhabited zones. On the other hand, aerial spraying can reduce operators' exposure applying pesticides from the ground, which would replace aerial spraying if it was banned completely. For certain applications, aerial spraying constitutes the only economically viable or practically feasible techniques (forestry, point applications in large areas, etc.).

As documented in Chapter 6.1.3, the current legal situation in Europe is very heterogeneous, it ranges from a total ban (e.g. Slovenia, Estonia) *via* a ban with few exceptions (e.g. Italy) to comparatively weak restrictions (e.g. Spain) or no regulation (e.g. Malta). The volume of PPP applied by aerial spraying is less than 5,000 t active substances per year. Most important users are Spain, France, Germany and Hungary.

The five options for this measure were assessed in three case studies (vineyards in France, olive trees in Spain, forests in Germany).

Conclusions

Option 1:

A strict ban of aerial spraying (even if few exceptions are possible) will lead to significant negative economic impacts due to yield losses or higher costs for alternative treatments by ground spraying. Cost will increase in the order of € 20 million. For aerial spraying companies (and special equipment manufacturers) the consequences would be dramatic with a loss of turnover of € 50-60 million and 600-800 jobs – only few companies might survive. On the other hand, ground spraying companies (and equipment producers) might gain business up to € 80 million and create up to 1000 jobs. However, overall this will have negative health impacts due to increased operator exposure (more persons needed - around 200 -, and longer exposure times). The environment might benefit as certain bad practices occurring today will no longer be possible. Authorities might save some costs flowing from reduced monitoring and implementation efforts. For PPP companies the effects will be neutral as the overall quantity of pesticides used will not change significantly.

Option 2:

The impacts will depend significantly on the degree to which a recommendation from the Community would change current practices in the Member States. They could range from no impacts at all to the same as those described for option 1. However, as the implementation of a recommendation will most likely be less significant than a legally binding measure, the overall impacts are lower.

Option 3:

The introduction of a general financial instrument is not recommended for reasons set out in Chapter 6.2.10.

Option 4:

No impacts as *status quo* will remain.

Option 5:

This option – restriction of aerial spraying with mandatory strict minimum requirements for the application of plant protection products by proper aerial spraying – has clear advantages with regard to the environmental and health impacts as proper aerial spraying can lead to reduced drift problems, reduced water contamination, and to reduced overall exposure of operators and bystanders. Depending on the existing legal situation in individual Member States there are no major socio economic consequences expected (in some Member States proper aerial spraying can start, in some Member States improper aerial spraying has to change to proper application). In some Member States the administrative efforts might rise compared to the *status quo*. On the other hand, advantages of proper aerial spraying might increase the competitiveness of farmers in certain Member States where aerial spraying is not possible at the moment. Overall impacts are difficult to quantify as the share of improper aerial spraying currently ongoing is unknown.

Table 6-47 summarises qualitatively the impact assessment of the various options. Table 6-48 contains information on the quantification of some impacts (averages and ranges).

Table 6-47: Measure 'Aerial spraying' - General impacts

Options Actors	**Option 1:** Legally binding ban of aerial spraying (few exception possible)	**Option 2:** Recommendation of severe restrictions or ban of spraying according to national rules	**Option 3:** Introduction of appropriate financial instruments	**Option 4:** No action	**Option 5:** Legally binding minimum requirements
User (farmer)					
Economic	–	–	–	~	+ / –
Social	+	+	~	~	–
Health (occ. Exposure)	–	–	~	~	+
Aerial spraying companies					
Economic	– –	–	~	~	+ / –
Social	– –	–	~	~	+
Ground spraying companies	+ +	+	~	~	–
Economic	+ +	+	~	~	–
Social	+	–	~	~	+
Authorities					
Economic	–	~	+	~	– / ~
Producer of ground spraying equipment					
Economic	+	+	~	~	~
Social	+	+	~	~	~
Producer of aerial spraying equipment					
Economic	–	–	~	~	~
Social	–	–	~	~	~
Production issues	~	~	~	~	~
Environmental issues	+	~ / +	~	~	+
Health issues	~ / +	~	~	~	+
Plant protection issues	–	~	~	~	~

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

Table 6-48: Sensitivity matrix – Measure 'Aerial spraying'

Options Actors	**Option 1:** Legally binding ban of aerial spraying (few exception possible)	**Option 2:** Recommendation of severe restrictions or ban of aerial spraying according to national rules	**Option 3:** Introduction of appropriate financial instruments	**Option 4:** No action	**Option 5:** Legally binding minimum requirements
User (farmer) Economic Social	Ad. costs up to M€ 20 Ad. jobs up to 200	Ad. costs up to M€ 14 Ad. jobs up to 160	ad. costs for pesticides depending on tax	/	± M€ 6 not quantified
Aerial spraying companies Economic Social	Loss M€ 50-60 Loss 600 – 800	Loss up to M€ 50 Loss up to 640	/	/	± M€ 6 not quantified
Ground spraying companies Economic Social	Plus up to M€ 80 Plus up to 1,000	Plus up to M€ 64 Plus up to 800	/	/	± M€ 6 not quantified
Authorities Economic	Savings up to M€ 2		Ad. tax income	/	not quantified

Overall option 5 is recommended as it will bring benefits to the environment and human health without negative economic or social disadvantages. The environmental and health benefits could - to some extent - also be realised by a legally binding ban of aerial spraying with few exceptions (option 1), but this alternative would mean up to M€ 20 /year additional costs for users and a loss of 600 – 800 jobs at aerial spraying companies. Although some corresponding benefits for ground spraying companies are expected, overall the number of operators exposed to pesticides will increase and their behaviour might be more difficult to influence and monitor than those of aerial spraying companies. This option is rather similar to a general ban with derogation granted for situations where aerial spraying offers clear advantages and also environmental benefits compared to other spraying methods, or where there are no viable alternatives. None of the other options is expected to lead to any significant changes to the current situation, which means that although they would not create any additional economic or social costs, the benefits of option five in terms of reduced impacts on health and environment would not materialise.

6.2.4. Enhanced protection of the aquatic environment

Specific measures to protect surface and groundwater are required to reduce the risks from pesticides to the aquatic environment. With respect to the existence of specific risk reduction measures in the form of existing legislation for the protection of water the majority of Member

States has established such measures. Most common are buffer strips or hedges, less common are technical measures and those that are generally based on river basin management plans.

The impacts of the seven options developed in Chapter 4.1.4 were assessed, starting from the options 'mandatory installation of buffer strips along all surface waters', 'mandatory planting of hedges along all fields with high growing crops' and 'mandatory use of technical measures on spraying equipment leading to reduced losses', as these are in fact the truly operational possibilities[122]. The other 4 options are more of organisational nature in order to govern the application of the three operational options.

The option 'Mandatory installation of buffer strips' would entail the set-aside of agricultural land along river banks through conversion into extensive grassland or natural vegetation. To optimise their effects, buffer strips would preferably be 10 m wide. As this size might not be realistic in all regions (depending on the size of the agricultural plots), 5 m wide buffer strips can be seen as an alternative, albeit with reduced environmental effectiveness.

The measure would lead to improved surface water quality by minimising the losses of pesticides from run off and spray drift from agricultural land. Positive secondary effects on biodiversity as new habitats for a variety of species are created, improved bank structures and a positive effect' on the landscape. Negative effects are reduced yields for agriculture due to the loss of usable agricultural land and possibly also due to shading.

It is important to note that buffer strips are put in place also for various other reasons, such as soil erosion, nature development, maintenance of the river banks, and within the framework of the Nitrates Directive. For example, using buffer strips as a measure against soil erosion is common practice in hilly and mountainous areas.

According to the second report on implementation of the Nitrates Directive, 43% of the territory is considered sensitive from the perspective of nitrates pollution and require measures to protect water courses by preventing losses from fields. Within the framework of the Nitrates Directive, buffer strips are one of the possibilities to meet the requirements.

Also to note, along many larger rivers, there are no agricultural fields as they are often boarded by roads or railways. In addition, as documented in Table 6-15, about 10 Member States require already the respect of buffer strips along surface waters.

It is, therefore extremely difficult to quantify the amount of new buffer strips that would have to be installed as a consequence of this measure in the Thematic Strategy. This means that any cost estimate will require a (very uncertain) assumption about much land would be concerned. It may be sensible to assume that not more than 10 % of the agricultural areas along rivers would be transformed into new buffer strips as a consequence of solely the Thematic Strategy.

According to information provided by the European Environment Agency (EEA), the total river length in the EU-15 (except Greece) is 2,191,730 km. In this estimation, all rivers significant enough to be mapped at a 1:50,000 scale are included and artificial drainage ditches are excluded. Extrapolation of this figure, based on the corresponding surface area, results in a total river length in the EU-25 of 2,586,425 km. As not all land along the banks of the river is agricultural land, the share of river length with agricultural land is calculated using the ratio of the total agricultural area to the total surface area for each Member State. In that way, the total river length considered to be

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[122] These options were also positively assessed in a study carried out by Ecolas in July 2005: "Assessing economic impacts of the specific control measures for priority substances and priority hazardous substances regulated under Article 16 of the Water Framework Directive" (Réf 03/07767/DL).

exposed to pollution by pesticides from adjacent agricultural land is estimated to amount to 1,172,731 km. With the above mentioned assumption, 10% thereof, i.e. 117,273 km would require buffer strips along both banks. The total land surface to be set aside (buffer strips on both sides of the river, with a width of 10 m) thus amounts to 117,273,000 m * 10 m * 2 = 2,345,402,000 m^2 (or 234,546 ha).

The purchasing cost can be seen as an approximation of the net present value of the agricultural yield that could be achieved on that respective land in the future if it was still used for that purpose. In general, the cost depends very much on the price of the land to be purchased, on the size of the watercourses to be included (especially in the baseline assumptions) and on the desired width of the buffer strips.

Assuming a purchasing cost for agricultural land of € 1.30 /m^2 [123], the value of this land surface corresponds to € 3,049,100 million (or roughly € 3.05 billion). Assuming a 5m width of the buffer strips instead of 10, this would be reduced to € 1.53 billion.

For some agricultural activities, notably for orchards and vines, pesticides have to be applied by air-assisted sprayers, leading to increased spray-drift at higher altitudes. To prevent pollution of adjacent surface waters, it is more effective to plant shrub vegetation, which will create a shield against the drift. Orchards (fruit trees) and vines together represent about 3% of agricultural land. They are, however, very unevenly distributed among the Member States – for example most of the vineyards are concentrated in 6 southern and western Member States. Taking the same ratio of the surface concerned to the total river length as before, this would mean that 1,172,731,000 m * 0.03 = 35,181,930 m would be exposed to spray drift from orchards or vineyards.

Negative effects of this measure could be reduced yields for agriculture due to shading. This can be (partly) compensated by the positive effect of the hedges on climatic factors (improvement of microclimate due to wind braking, extending far into the field).

The costs for planting hedges are € 10 per piece, 5 pieces per linear meter, resulting in € 50 /m. For the total length exposed (and planting on both sides), this would lead to 35,181,930 m *2 * 50 €/m = € 3.52 billion. In addition, assuming that ultimately the hedges would be 5m wide (and with the same purchasing price as above) the net present value of the land concerned would be 35,181,930m * 2 *5m *1.30€/m^2 = € 0.46 billion. Furthermore, hedges need to be maintained annually, at a cost of ca. € 1.60 /m, leading to annual maintenance costs € 112 million.

For the third measure – technical solutions – costs can be estimated as follows. an injector nozzle designed for 90 % drift reduction costs approximately € 3.60 /nozzle. For one piece of spraying equipment (working width of 21 m, one nozzle every 0.5 m, 42 nozzles in total), this results in a total cost of approximately € 180. The number of spraying machinery in the EU-25 is estimated to be 2,500,000. However, not all of them are used on surfaces adjacent to water. Using the same ration of agricultural land to total surface of the Member States, this would mean that around 1,133,500 sprayers would have to equipped in this way representing total costs of ca. € 200 million. Obviously this sum would be for the benefit of equipment manufacturers leading to the creation of a number of jobs.

The installation of special washing stations with collection of contaminated rinsing water (biobeds) is estimated to amount to € 25,000 per station. Assuming a total number of 20,000 stations to be installed, this would lead to costs of around € 500 million.

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[123] Purchase price of agricultural land: z 1.30 €/m2 (range up to 4.00 €/m2) (Interwies et al., 2004).

For all three measures, the total costs do not have to be paid each year. Table 6-49 shows the annual costs assuming an annuity of 25 years and various discount rates. With a discount rate of 4 %, annual costs are thus ranging from € 41 million for technical measures, over € 178 million for buffer strips to € 344 million for hedges, which would essentially have to be born by farmers.

Table 6-49: Annual costs of measures to reduce discharges of pesticides into surface waters

Discount rate	***Measure***	***Negative net present value (million Euros) (total discounted cost)***	***Annuity over 25 years (million Euros) (annualised cost)***
0%	Buffer Strips	3050	122
	Hedges	3980	159.2 +112 (maintenance)
	Technical equipment	700	28
4%	Buffer Strips	2784	178
	Hedges	3633	232.3 +112 (maintenance)
	Technical equipment	639	41
8%	Buffer Strips	2641	247
	Hedges	3446	323 +112 (maintenance)
	Technical equipment	606	56.8

How are these costs offset through possible benefits?

Considerable amounts of surface water resources (and groundwater) used for the abstraction of drinking water are contaminated with pesticides in concentrations > 0.1 µg/I, purification treatment is required for the production of drinking water (see Chapter 6.1.4).

The cost of pesticide removal for the production of drinking water has been discussed in Chapter 5.1. Although widely diverging the average figure is around € 0.03 per m^3 water delivered. Figures from Eurostat for 2002 give the total amount of surface water abstracted for drinking water in EU-25 as 17,290.3 million m^3 (and 17,909.6 million m^3 from groundwater). Total treatment costs for purification of polluted surface water are therefore around € 484.5 millon per year.

Assuming that 50% of pollution could be avoided through the measures ‘buffer strips’ and ‘technical equipment (and around 20% through the measure hedges (as the length of rivers shielded would be much lower) discussed, this would reduce the costs to water companies by around € 242 million per year (€ 96.8 million).

Farmers can be compensated for their efforts through the CAP, either through direct payments under the 1st pillar for set-aside of the surfaces of the buffer strips, or under rural development (agri-environment or 'meeting standards' – the latter for a limited time only). Direct support payments are in the order of € 344 / ha, agri-environment around € 100 / ha. This would mean for the surfaces concerned for buffer strips (234,546 ha) and hedges (35,181) respectively: € 27 – 79.7 million and € 4 – 12 million.

In addition, farmers would save pesticides in a quantity that would normally be applied on the now untreated surfaces for buffer strips, hedges or the 90% not lost due to drift. With the relationship of the surfaces concerned to the total agricultural surface, 280,000 tonnes of pesticides consumed in total and a price of € 25 / kg pesticide, this would amount to savings of € 22.2 million per year (for buffer strips and technical equipment) and € 3.3 million for hedges. The overall costs and benefits are summarised in the following Table 6-50.

Table 6-50: Overall costs for the three measures to reduce pollution of surface waters

Measure	Costs to farmers at 4% discount	Compen-sation CAP	Saved Pesticides	Avoided Drinking Water Cleaning	Equipment Manufactu-rers	Overall farmers	Overall society
Buffer strips	- 178	+ 27 to + 79.9	+ 22.2	+ 242	-	- 129 to - 76.1	+ 113 to + 166
Hedges	- 344	+ 4 to + 12	+ 3.3	+ 96.8	-	- 336.7 to - 328.7	-239.9 to - 231.9
Technical Equipment	- 41	- *	+ 22.2	+ 242	+ 12.8	-18.8	+236

* possible support under 'meeting standards neglected

Conclusions

Overall, there are clear benefits of the measures 'buffer strips' and 'technical equipment'. These benefits are even bigger, when considering that other non-quantifiable benefits such as positive impacts on biodiversity, landscaping, river bank management, and one of the main objectives of the Water Framework Directive (maintaining good chemical status of waters) are taken into account. For the measure 'planting hedges', however, the overall costs seem to be too big to be possibly offset by these non-quantifiable benefits.

Still, costs and benefits for these measures would have to be born by different parts of society. Farmers (and to a lesser extend the PPP industry due to reduced PPP use) would incur all costs, whereas water companies (and ultimately consumers) would reap the benefits. Whilst this would be fully in line with the 'polluter pays principle', it seems difficult to recommend that indeed buffer strips and the technical equipment have to be installed everywhere.

Instead, using the two clearly beneficial tools of 'buffer strips' and 'technical equipment' should be targeted on those areas, where there is a real need (*nota bene*: not all waters are polluted by pesticides). The need for them can best be identified in the framework of the river basin management plans that have to be set up under the Water Framework Directive. Where the need

has been identified, the measures should then become mandatory (option 1 from the organisational options) and farmers concerned could be compensated for their overall remaining costs (i.e. after deduction of CAP support) by additional payments from the water companies (option 3 – appropriate financial instruments) that could be financed from the savings in water treatment costs. A general tax / levy would not change the behaviour of farmers and is not recommended (see also Chapter 6.2.10). Table 6-51 summarises qualitatively the impacts of the 4 organisational measures.

Table 6-51: Measure 'Enhanced protection of the aquatic environment' - General impacts of the organisational measures

Options Actors	**Option 1:** Specific risk reduction measure will become mandatory parts of the river basin management	**Option 2:** Minimum criteria/standards/measures will become voluntary parts of the river basin management plans	**Option 3** Production of appropriate financial instruments	**Option 4:** No action
User Economic Social	 - ~	 ~ / + ~	 / + ~	 ~ ~
Authorities Economic Social	 - +	 ~ / + ~	 + +	 ~ ~
Water treatment companies Economic Social	 + ~	 ~ / - ~	 + ~	 ~ ~
Environmental issues	+	~ / -	+	~
Health issues	+	~	+	~
Plant protection issues	~	~	~	~

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

In conclusion, it is recommended that measures such as mandatory buffer strips and use of appropriate drift reducing technical equipment become part of the river basin management plans, where appropriate. Farmers concerned can be compensated through payments under the CAP and from water companies. Planting hedges cannot be recommended as a general measure[124].

[124] In fact, shielding of drift from air supported sprayers on high growing plants can also be reduced through technical measures such as 'tunnel sprayers' – this relatively new technique has not been assessed here, but the potential savings in pesticide losses are high (also in other areas of a plot not adjacent to water. River basin management plans could contain this as voluntary measure, support to the necessary investments could be provided by water companies.

As mentioned earlier on, rivers and bigger waterways are often lined by transport routes such as railways that have to be kept vegetation free for security reasons. As it is often not possible to install buffer zones between the railways and the water surface, but on the other hand the potential for run off from these highly permeable surfaces is high, those responsible for treating this infrastructure should be obliged to look for alternative ways of eliminating plants (e.g. heat treatment), use all technical possibilities to reduce pesticide use (such as precision spraying) and select only active ingredients that degrade rapidly and/or are not toxic to the aquatic environment.

The same high potential for run off exists for herbicides used by amateur users on sealed surfaces around houses, garages, etc. Even though not necessarily close to water surfaces, runoff from sealed surfaces and sewage systems can lead to significant concentrations of pesticides in sewage treatment stations or pollution of groundwater. The only way to control this is by specific authorisation of pesticides for amateur use, where substances which are problematic for the aqueous environment are not authorised for non-professional use, and awareness raising campaigns for the general public.

6.2.5. Defining areas of strongly reduced or zero pesticide use

As described in section 6.1.5, plant protection products are used in *Natura 2000* zones and public parks, playgrounds etc. In most Member States restrictions for use of PPP in these areas exist, mostly based on national, sometimes based on regional regulations. In expert interviews deficits with respect to knowledge and implementation of existing regulations for PPP use in the mentioned areas have been identified.

A sample of 310 *Natura 2000* sites (out of a total of 18757 sites) has been examined in detail. Based on this sample it can be extrapolated that an amount of 37,000 t (±6,000 t) active substances of PPP are used in *Natura 2000* zones in Europe. This has been reported as a normal need for an active management aimed at maintaining or achieving favourable conservation status. Herbicide use is sometimes essential for the management of vegetation in *Natura 2000* sites[125]. Such use would always have to take into account environmental risks and the conservation gain would have to outweigh any risks to conservation features.

On the other hand, the amounts of Plant Protection Products used in public parks, playgrounds and other public green areas in cities are much smaller. In Vienna for an area of 1.900 ha only about 30 kg active substance are used per year. In Barcelona an amount of about 55 kg per year is reported for public parks and street trees. A very rough estimation leads to an amount used in European public parks and similar areas of less than 100 t active substances of PPP/year.

Conclusions

Evaluation of the three options as described in Chapter 4.1.5 leads to the recommendation to implement the 1st option: a legally binding designation of zones of reduced or zero PPP use. Where relevant, clear links with applicable Community legislation are to be indicated. Specific guidance and best practise for those areas has to be developed in cooperation between Member States and the Commission. Best practice and specific guidance should include elements of other discussed measures like Integrated Pest Management (IPM), check of equipment and training of users but also specific use reduction objectives.

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125 Response to the 'Towards a Thematic Strategy on the Sustainable Use of Pesticides' by English Nature on behalf of the Joint Nature Conservation Committee.

This option could contribute eventually to a PPP-use reduction up to 8,000 t/year or about 20% of the PPP used in *Natura 2000* areas. The reduction can be expected mainly as a result of a combination of the other measures discussed like training of operators, integrated pest management, or check of application equipment. The use reduction in the field of *Natura 2000* areas is expected to provide significant environmental benefits as the effects are more important than in less sensitive areas. It has to be emphasised that the mentioned guidance should not only focus on a reduced amount of PPP but should take appropriate risk indicators as well as intrinsic properties of the substances used into account. The following Table 6-52 gives an overview on the qualitative assessment of impacts.

Table 6-52: Measure 'Defining areas of strongly reduced or zero pesticide use' - General impacts

Options / Actors	**Option 1:** Legally binding designation and communication of zones of reduced or zero PPP use; development of guidance and best practise	**Option 2:** Recommendation to designate zones of reduces or zero PPP use and to develop guidance and best practise	**Option 3:** No action
User of PPP			
Economical	+ / -	+ / -	~
Social	~	~	~
Producer of PPP			
Economical	-	-	~
Social	-	-	~
Authorities			
Economical	-	-	~
Social	+	+	~
Consultants			
Economical	+	~	~
Social	+	~	~
Health issues (in particular vulnerable population)	+	+/~	~
Plant protection issues	~ / -	~ / -	~
Environmental issues	++	+	~

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

The option would result in expected savings for farmers in *Natura 2000* areas due to a reduced or more efficient use of PPP (possible dimension € 200 million/year in the long run). These saving will – at least partly – be offset by increased management costs, training, and maintenance of equipment (however, these additional costs to farmers would be minor, as most of the measures that they would apply would have to be implemented anyway under the Thematic Strategy). Further losses to farmers could result from reduced yields in the zones where quantitative use reduction targets were introduced – however, in the absence of specific knowledge on what crops would be concerned and how severe the reduction targets were, it is not possible to quantify these losses. The option will mean higher costs for authorities with respect to implementation of measures and regulations. It is also expected that this option will bring losses to the PPP producing industry and the PPP supply chain.

Similar but less important effects could also be achieved by a less compulsory approach which leaves more flexibility to Member States as foreseen in option 2 by a recommendation to MS to designate zones of reduced or zero PPP use. This option is regarded as less favourable as the

impacts will be less significant due to the less compulsory approach and thus lack of harmonisation in the implementation throughout the Community.

In addition to the qualitative overview above, Table 6-53 contains information on the quantification of some impacts (averages and ranges).

Table 6-53: Sensitivity Analysis – Measure 'Defining areas of strongly reduced or zero pesticide use'

Options / Actors	**Option 1:** Legally binding designation and communication of zones of reduced or zero PPP-use; development of guidance and best practice (estimated max. effect: like change from intensive to extensive agric.)	**Option 2:** Recommendation to designate zones of reduces or zero PPP-use and to develop guidance and best practice (estimated max. effect: like implementation of IPM in Natura 2000 area)	**Option-3:** No action
PPP-use reduction	up to 20% (~8,000 t)	0 to 1% (400 t)	0
User of PPP			/
Economical	up to + M€ 200[126]	M€ 0 to + 10[126]	
Social	~	~	
Producer of PPP			/
Economical	up to - M€ 200	M€ 0 to -10	
Social	up to ~ -700 jobs	0 to ~ -30 jobs	
Authorities	costs for implementation/control	costs for implementation/control	/

The use of PPP in public parks and playgrounds seems to be very specific regarding particular pests and very small in overall volume. Further reduction would have no measurable economical or social effects to involved people and companies. However reduced use in such areas will significantly decrease the exposure levels of the general public and particularly sensitive population (e.g. children). However, in the absence of any reliable data on actual exposure, it is impossible to quantify or monetise these benefits.

Long-term side effects like reduced lifetime of trees, the inconvenience for inhabitants of cities or tourists facing 'November-look' trees or other pest effects already during the time of August – October cannot be assessed either.

6.2.6. Collection of PPP packaging and unused (obsolete) products

Bad management of empty packaging can lead to direct spillages of pesticides into the environment. The safe collection of empty packaging (starting in field), storage at the farm and thereafter transport to collection centres could avoid these unforeseen releases of pesticides residues into the environment. Based on the assumption that without rinsing the container a residue of 1 % of the total quantities remain and can contaminate the environment, it can be estimated that a collection of all containers would reduce unwanted pollution 2800 tons of active ingredients not

[126] Yield losses not taken into account.

released into the environment. The normal procedure recommended by distributors requires triple-rinsing of the empty packaging which reduces the residual to 0.01%, which means that, if this procedure is applied correctly by every users, the potential savings would be reduced to 28 tons only.

One can assume that the 'triple rinsing rule' is not always respected by the user. In addition, certain quantities of pesticides stocked at farm level might become obsolete – either because their use-date has expired, or the active substance contained in the product is banned before all stocks are used. The minimum quantities of avoided pollution through collection of empty packaging and obsolete pesticides are therefore certainly higher. For the purpose of the present impact assessment it is assumed that 1000 tons of losses are avoided *via* a comprehensive collection scheme with good participation of farmers.

From the various cases examined in the OECD context, it seems that voluntary collection schemes organised by distributors are working rather well – in particular if authorities have fixed quantitative objectives for the collection rate and are stimulating the process by the perspective of introducing a tax on packaging, applied in the case when the quantitative objective could not be reached. Other successful incentives to farmers are deposits which are refunded upon return of the empty packaging.

This situation (e.g. optimal results in Belgium with 93 % of the packages collected) corresponds to a combination of options 1 and option 3. The costs for the users is considered to be very small (transport to the collection centre, plastic bags for storage, etc.), as far as the taxation on tonnage of packaging placed on the market remains is not levied (i.e. when the objective fixed by the authorities) can be respected by the distribution chain.

Based on the figures presented in Chapter 6.1.6 (cost of collection varying between € 1 and 2 / kg packaging material, 44,800 tonnes of packaging overall and a 90% collection rate), total costs of this combination of options 1 and 3 are in the order of will generate costs for distributor/industry comparable to the ones namely between € 40 to 80 million and would create around 200 jobs. Industry can recover at least part of this cost by selling the recycled plastics (either for mechanical recycling or energy recovery). Assuming a sales price of € 0.5 / kg, this would allow to generate revenues of around € 20 million reducing the overall costs to € 20 – 60 million, which compared to the overall turnover of 6 billion € is very small.

Option 2 would lead to similar costs, but in addition the authorities would have costs to bear to introduce and monitor the necessary legislation. They might also have to create different collection and recycling structures, if those from industry cannot be used. So, overall costs of such a mandatory solution might be higher. On the other hand, a mandatory solution would prevent certain companies to take advantage of voluntary systems by not contributing to their financing (the co-called free riders).

Table 6-54 summarises the qualitative assessment of the various options.

Table 6-54: Measure 'Collection of PPP packaging' - General impacts

Options Actors	**Option 1:** Voluntary collection	**Option 2:** Mandatory collection	**Option 3** Introduction of appropriate financial instruments	**Option 4:** No action
User Economic Social	~ ~	-/~ ~	- ~	~ ~
Authorities Economic Social	~ ~	-/~ ~/+	+ +	~ ~
Distributors/industry Economic Social	- +	-/~ ~/+	- ~	+ +
Environmental issues	+	+	+	-
Health issues	+	+	+	
Plant protection issues	~	~	~	~

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

6.2.7. Improved systems for the collection of information on production, import/export, distribution and use and enhanced monitoring measures on compliance including annual reporting

Accurate and up-to-date information on PPP use is an important element for measuring the success of the Thematic Strategy and for monitoring that the use of PPP does not lead to unacceptable risks for human health and the environment. It will thus be essential to dispose about reliable statistical information on pesticide use in order to evaluate the effects of the TS and to decide on the possible need for further or adjusted measures.

Obviously, data collection as such does not directly cause health and environmental benefits, but enables

– to inform policy makers and citizens of the current status of pesticide use

– to provide data sets for the development of indicators of environmental impact

– to monitor changes in the use of pesticides over time

– to provide information as part of the review process of existing pesticides

– to provide information as part of the approval process of new pesticides

– to monitor the potential movement of pesticides into water

– to highlight areas where use may be optimised as a consequence of a monitoring of farmers practices

– to provide information for residue monitoring programmes of fresh fruit, vegetables etc.

As described in Chapter 6.1.7, important efforts have already been undertaken in many Member States to collect information on PPP use by many stakeholders but the obtained information is often only limited in the details or is difficult to compare. According to information received from the Member States, only nine of them are in a position to provide data specified with respect to user groups, areas or crops, even though 20 Member States already have a mandatory data collection system and significant amounts of budget are already allocated to the collection of data on the use of PPPs (estimation ~ € 3 million within EU-25 authorities). So far the Commission services rely mostly on use estimates provided by industry (with a support of € 130,000 per grant agreement), which are delivered every 3 years. However, comparison of this data from industry with surveys made by Member States' authorities have shown significant divergences – industry figures are normally considerably lower, which is due to the fact that not all uses are covered and that the industry association does not necessarily cover the quantities of substances placed on the market by companies that are not members of the relevant industry association.

More precise and in particular harmonised information collection will allow to better assess the impacts on environment, users and consumers and to adjust assessments that are currently rather relying often on worst case assumptions.

The economic impacts of any data collection proposal depend to a large degree on

– the approach to collect data

– the detail of information to be collected

– the coverage of the collected data concerning PPP use

– the frequency of data collection

These flexibilities have been examined in the form of three scenarios (see Table 6-55 below: high, medium and low extent of data collection) on the basis of the information from two case studies in Germany and the UK.

Furthermore, it has to be born in mind that the main purpose of collecting the data on sales and use of pesticides would be to calculate appropriate risk indicators. Extensive work in the framework of the OECD and within Member States has shown that a high level of detail (active ingredients used, high special resolution, climatic conditions) are required to calculate meaningful risk indicators.

It can be expected that the main burden caused by any data collection scheme will be on the authorities charged with the collection, transformation and reporting of the data. Pesticides users (in particular farmers) and distributors will also experience negative impacts, but these will not all necessarily be a consequence of the Thematic Strategy: producers and distributors do already have to maintain sales records and report data on production, export, import and sales for other statistical

purposes; farmers are obliged to maintain records of pesticide use by Regulation 852/2004 on food hygiene.

Table 6-55: Scenarios for the impact assessment of options related to measure III: systematic data collection

	EU authorities			MS authorities			Producer			Distributor, Retailer			User		
Level of detail of data	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
Intended use															
PPP amount [kg AS]		x	x		x	x			x		x	x			
Amount of PPP types [kg AS]		x	x		x	x			x		x	x			
Amount of each AS [kg]			x			x			x			x			
Real use															
PPP amount [kg AS]	x	x	x	x	x	x							x	x	x
Amount of PPP types [kg AS]		x	x		x	x								x	x
Amount of each AS [kg]			x			x									p
Application type															
PPP amount [kg AS]		x	x		x	x			x			x		x	x
Amount of PPP types [kg AS]		x	x		x	x			x			x		x	x
Amount of each AS [kg]			x			x			x			x			p
Crop type															
PPP amount [kg AS]			x			x			x			x			x
Amount of PPP types [kg AS]			x			x			x			x			x
Amount of each AS [kg]			x			x			x			x			p

L = low, M = medium, H = high level scenario, p = PPP-product

Conclusion

Against this background option 2 "Mandatory collection of data on sales, distribution and use (participation to be defined) and the establishment of a Member State quality check procedure is recommended because its realisation would enable the development of accurate and reliable data on the production, distribution and use of PPP in a way that is faster and more cost efficient compared to the current situation and the other evaluated options.

Estimations based on the case studies in the U.K. and Germany (and taking into account information from other Member States as documented in Chapter 6.1.7), a mandatory collection of all relevant data from distributors and users could entail costs of up to € 9 million /year additional costs due to increased efforts for the establishment and organisation of data collection systems. Data on production and import/export are already required from industry in other legal context for the establishment of economic statistics and should not be collected as a burden under the Thematic Strategy. However, if a high level of detail of collected information will be required some additional efforts at industry level will be necessary (estimation: up to € 2 million /year additional costs).

A mandatory collection on use would also require a contribution from users beyond what is already required by Regulation 854/2004 which is related to a possible economic impact of around € 3 million /year.

So overall, the economic impacts are relatively moderate - the high level scenario results in costs of about € 14 million /year.

A mandatory collection enables optimum outcomes with regard to comparability of data and synergy effects because methods for data collection and quality assurance can be established in a co-ordinated between Member States and the Commission and the same details can be applied in all Member States at the different levels of information collection. This might reduce the burden on Member State authorities for developing and implementing their own individual systems. On the other hand, Member States should remain free to decide on the optimum way on how to organise data collection, as this will depend strongly on the structure of the agricultural sector (number of farms, diversity in production etc.).

The other options evaluated under measure are less advantageous – although the costs would be lower (in particular for authorities), the information would either not be sufficient to calculate risk indicators (option 1 – no information on real use, which would again have to be estimated on the basis of sales figures) or there are insufficient incentives or obligations to expect any real change in comparison to the *status quo* (options 3 and 4), which was found to be unsatisfactory. The following Table 6-56 gives an overview on the qualitative assessment of impacts for the various options.

Table 6-56: Measure 'Data collection on distribution and use' - General impacts

Options **Actors**	**Option 1:** Collection of data mandatory for industry and distributors and voluntary for professional users	**Option 2:** Mandatory collection of data on sales, distribution and use (participation to be defined)	**Option 3:** Recommendation to collect data from distributors and users	**Option 4:** No action
User of PPP				
Economic	~	-	~	~
Social	~	~	~	~
Authorities				
Economic	-	-	- / ~	~
Social	+	+	~	~
PPP Industry				
Economic	~ / -	~ / -	~	~
Social	~ / +	~ / +	~	~
Quality of data	+	+ +	~ / +	~

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

The following Table 6-57 contains information on the quantification of some impacts (averages and ranges). Where calculations were not possible the same symbols as in the table above have been used ("+", "~" and "–").

Table 6-57: Results from sensitivity analyses measure: systematic data collection

Option Actor	**1** Collection of data mandatory for industry and distributors and voluntary for professional users	**2** Mandatory collection of data on sales, distribution and use (participation to be defined)	**3** Recommendation to collect data from distributors and users	**4** No action
Authorities				
economic effort	M€ 1 to 9	M€ 1 to 9	M€ 0 to 6	~
new jobs	20 to 180	20 to 180	0 to 120	~
PPP-Users				
economic effort	M€ 0 to 1	M€ 2 to 4	M€ 0 to 1	~
social	~	~	~	~
PPP-industry				
economic effort	M€ 0 to 2	M€ 0 to 2	~	~
new jobs	0 to 20	0 to 20	~	~
Data quality	+	++	+/~	~

Overall costs have to be put into perspective by the fact that the measure would create a number of jobs (up to 200 in authorities and industry) and that the data collected can be used multiple times – in fact, Member States do report today on pesticides sales and use in addition to Eurostat to the OECD and the FAO. The same data can be used and the other international organisations would also benefit from greater reliability of the data reported.

Although collection of data does not create environmental or health benefits per se, the data can be used to validate many of the model and assumptions applied during the risk assessment process in the framework of the authorisation process under Directive 91/414/EEC. This would allow refining the models and adapting them more to reality.

Also, comparison of the use data from farms in similar conditions would allow defining with more confidence good plant protection practices and optimal use of pesticides – including in particular IPM schemes (see also next chapter). Such use data will have to be generated anyway if guidance and best practices are seriously to be developed.

The costs for Member States and farmers can also be reduced if collection of data is not carried out annually but only in regular intervals (e.g. varying between 1 and 3 years. In the internet consultations there was almost equal support for reporting every year and reporting every 5 years).

Lastly, when establishing a PPP related data collection system, the usefulness of making data collection on PPPs compatible with the existing FADN (Farm Accountancy Data Network) system and eventually the FSS (Farm Statistical System) should be examined. This would have to be done when establishing a system for data collection in detail and in close cooperation within the Commission services and the Member States.

6.2.8. Encouraging the use of low pesticide input farming – Integrated Pest Management (IPM)

As described in Chapter 6.1.8, there is at present no common understanding of Integrated Pest Management (IPM). Numerous different public and private systems co-exist within Europe and even within individual Member States. In at least 17 Member States some definitions for IPM are in use, the average share of IPM is around 3% of the utilisable agricultural area with shares up to 23% in individual Member States (e.g. Denmark). In some countries the IPM shares are changing rapidly (e.g. France has currently < 1%, objective is 30% in 2008). It is estimated that about 6,900 t active substance PPP/year is used in IPP areas against a total use of PPP in Europe of about 280,000 t/year. Other key figures, including also regarding the pesticide reduction potential in comparison to current (good) agricultural practices, costs for advisory services and possible financial support to farmers are presented in Chapter 6.1.8.

Conclusions

Based on these figures and the analysis of a number of case studies, the following impacts are expected for the various options described in Chapter 4.1.8.

Option 1:

A new Regulation with specific requirements would result in an expected pesticide use reduction of 0.2 to 1.5% and corresponding positive environment and health benefits. Farmers who decide to convert to specific IPM can continue farming under comparable social and economic conditions in a more sustainable way. They can be compensated for any possible crop loss and increased work requirements by financial support under the CAP (rural development - RD) in the order of € 73 to 518 million. Overall, this would probably be financed from a shift within the RD budget and other agri-environment measures might be supported less as a consequence. This might lead to negative consequences elsewhere. Advisory institutions will profit from the need of farmers for increased demand for IPM related services with expected socio-economic gains ranging between M€ 1.2 and 8.6, or 25 to about 170 jobs. These impacts have to be seen against negative effects, which are in particular high implementation effort of a new regulation at all levels (difficult to quantify in economic figures) and socio economic losses in the supply chain (reduced turnover and loss of 50 to 360 jobs).

Overall there are therefore moderate positive environment and health effects but high implementation efforts. Furthermore moderate positive socio-economic advantages for advisory institutions have to be seen against corresponding but slightly higher negative socio-economic effects in the supply chain. Increased sustainability due to IPM may be at the expense of decreased sustainability in other agricultural activities.

Option 2:

A new flexible Community framework on IPM with general definitions and criteria would generally have similar effects as option 1. However, the expected smaller use reduction of PPP (below 1%) would also mean only very moderate expected environment and health effects. Farmers

converting to specific IPM will profit from the possibility to receive financial support under RD measures amounting up to € 390 million, but as in option 1, this might lead to a re-allocation of budget within the overall RD envelope. Advisory institutions will profit from the need of farmers for increased demand for IPM related services with expected socio-economic gains up to € 4 million or about 80 jobs. These impacts have to be seen against negative effects which are in particular implementation efforts (although these are comparatively low depending to a high degree on the initiatives taken within the individual countries) and moderate socio economic losses in the supply chain (reduced turnover and loss of up to about 180 jobs).

Overall, a Community framework on IPM as outlined in option 2 may provide guidance to Members States for the promotion of more harmonised IPM throughout Europe with comparatively low implementation efforts. The expected impacts on environment and health and sustainability of PPP use are very moderate. Some positive socio-economic advantages for advisory institutions are possible and slight negative socio-economic effects are expected in the supply chain. Due to a possible budget shift within RD, increased sustainability due to IPM may be achieved at the expense of decreased sustainability elsewhere.

Option 3:

A harmonisation of the minimum general requirements by introducing a clear definition of IPM in Directive 91/414/EEC would result in an expected use reduction of pesticides of 8 to 11% (this estimate includes reduction of 0.2 to 1.5% due to farmers going beyond the general requirements for IPM and applying crop specific IPM with even higher use reduction potential). Due to the high use reduction important overall positive environment and health effects are expected as a consequence of the high IPM caused use reduction. Farmers complying with general IPM requirements will have neither negative nor positive impacts. They will receive direct support as before. Farmers not complying with general IPM requirements will experience economic losses due to reduced direct support if they are controlled and identified as "non-IPM-conform" (up to € 84 million). Member States could decide to support application of the more demanding specific IPM through further support under RD. The share of farmers going beyond the general IPM requirements is probably in the same order of magnitude as for option 1 and RD payments in the order of € 73 to 518 million could result, associated with the same shift in the RD budget envelope as described before.

Authorities will have additional efforts for the implementation of the adjusted Directive, however, the extra effort to monitor compliance with IPM will be moderate as in any case they have to monitor 'proper use' of pesticides as this is a requirement flowing from the fact that the Directive will be subject to cross compliance as of 1 January 2006. Advisory institutions will draw important socio-economic advantages from the option (€ 48 to 67 million or up to 1330 jobs) whereas the supply chain will have very important drawbacks (€ 575 million up to € 700 million or up to 2300 jobs).

Overall, the option has the potential to lead to significant use reduction, with associated benefits for health and environment. Impacts on farmers will be relatively low, for advisory institutions they will be positive, whereas negative for authorities (moderately) and the PPP industry.

Option 4:

Option 4 aims at complementing option 3 and has therefore been assessed in combination with it. Advantages of a combination of options 3 and 4 can in particular be expected in a higher share of farmers performing specific IPM and thus a slightly higher use reduction and in decreased implementation efforts at MS level due to the provided guidance for harmonised specific IPM at

EU level. Corresponding to option 3 the option will lead to a very significant (and even slightly higher) use reduction and the expected effect on sustainability in the use of PPPs is quite high. Effects on farmers are slightly more positive (due to slightly higher support under RD), those on advisory services and the PPP industry are not significantly different from those of option 3 alone.

Option 5a:

This option is inappropriate for reasons that will be set out in Chapter 6.2.10.

Option 5b:

Even a tax of 20% on sales price of pesticides for non IPM certified farmers would mean that costs of certification could be recovered only over a long period of time. Therefore the share of farmers converting to IPM to avoid the tax would be relatively small and the expected benefits in terms of PPP use reduction (and reduced impacts on health and environment as well). The larger part of the farming Community would have to pay the taxes, leading to increases costs and no (or only marginal) benefits in pesticide use (see also Chapter 6.2.10) for further details.

As a consequence of the impact assessment it is recommended to follow option 3 "Harmonisation of the minimum general requirements through an amendment of the definition of integrated control in Dir. 91/414/EEC" in combination with Option 4 "Clearer and more specific definition of IPM in the Thematic Strategy".

This combination could lead to a pesticide use reduction of 22,000 t to 31,000 t active substance/year. There will be no significant impact on farmers complying with the better defined requirements of Directive 91/414/EEC. Those going beyond and applying more specific IPM guidelines, could receive support under rural development measures in a dimension of € 70 million to € 520 million. Non complying farmers could see their direct payments reduced by up to - M€ 84. Jobs will be generated in the agricultural advisory area (900 to 1,300). Losses might occur in the supply chain for PPP producing industry in a dimension of up to - M€ 700 corresponding to 1,900 to 2,300 jobs as a result of the mentioned estimated use reductions with corresponding positive environmental and health effects.

The following Table 6-58 gives an overview on the qualitative assessment of impacts.

Table 6-58: General expected impacts of the individual options of measure VI - General framework for IPM

Option Actor	1 Specific IPM Regulation	2 Flexible Community IPM	3 Cross-compliance for general IPM	4 Community Guidance specific IPM	5a General tax	5b Tax for non IPM certified farmers	6 No action
Authorities economic	––	–	–	–	+	+	~
Farmers economic social	~ ~	~ ~	–/~ –/~	–/~ –/~	– –	– –	~ ~
Consultants economic social	+ +	+ +	+ +	+ +	~/+ ~/+	+ +	~ ~
Producers economic social	– –	– –	–– ––	–– ––	~/– ~/–	– –	~ ~
Environment issues	+	+	++	++	~/+	+	~
Health issues	+	+	++	++	~/+	+	~
Plant protection issues	~	~	~	~	~	~	~

"++" = very positive impact; "+" = positive impact; "~" = neutral impact;
"–" = negative impact; "––" = very negative impact

In addition to the general expected impacts, the sensitivity analyses display the budget shift for rural development measures (RD budget shift) and the changes of direct support. The budget shift does not change the economic situation of the authorities or farmers as a whole. Therefore it cannot be evaluated as positive or negative economic impact. However it can be expected that an increased budget attributed to support IPM will lead to an increased sustainability of the use of PPPs. On the other hand, as the shift will lead to reduced support for other agri-environmental measures it may lead to a decreased sustainability of agriculture due to reduced support for other activities. The sensitivity analysis is based on the evaluation of scenarios. The following Table 6-59 gives an overview on the scenarios that have been used. The selection of relevant criteria, i.e. the expected:

– use reduction of PPPs in specific or general IPP compared to conventional farming systems

– share of specific or general IPP when a specific option will be realised

– height of a tax for the tax based options

have been explained in the sections on the impact assessment of the corresponding options. The following table gives an overview on the scenarios which are also the basis for the sensitivity analyses.

Table 6-59: Scenarios for sensitivity analysis

Option	**1**			**2**			**3**			**4**			**5a**		**5b**	
Scenario	A	B	C	A	B	C	A	B	C	A	B	C	A	B	A	B
average use reduction specific IPP	20%	20%	20%	10%	10%	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
average use reduction general IPP							10%	10%	10%	10%	10%	10%				
increased share specific IPP	33%	100%	233%	33%	100%	233%	33%	100%	233%	33%	100%	233%	0%	1%	1%	3%
Increased share general IPP							80%	90%	100%	80%	90%	100%				
tax height													20%	20%	20%	20%

Table 6-60 below shows the results from the sensitivity analyses. Where calculations were not possible, the same symbols as in the qualitative assessment have been used (“+”, “~” and “–”).

Table 6-60: Results from sensitivity analyses

Option Actor	1 Specific IPM Regulation	2 Flexible Community IPM	3 Cross-compliance for general IPM	4 Community Guidance specific IPM	5a General tax	5b Tax for non IPM certified farmers	**6** No action
Authorities							
Economic gains	––[127]	–	–	–[128]	M€ 1,242 to 1,239[129]	M€ 1,176 to 1,043	~
RD budget shift[130]	M€ 73 to 518	M€ 55 to 388	M€ 73 to 518	M€ 73 to 518			
Farmers					M€ -1,380 to -1,373	M€ -1,376 to -1,379	~
Economic	~	~	–/~	–/~	–	–	~
Social	~	~	–/~	–/~			
RD budget for IPP support	M€ 73 to 518	M€ 55 to 388	M€ 73 to 518	M€ 73 to 518	M€ 0 to1.2	M€ 1.2 to 3.7	~
Direct support			M€ -84 to 0	M€ -84 to 0	0 to 24 jobs	24 to 74 jobs	~
Advisory bodies							
Economic	M€ 1.2 to 8.6	M€ 0.6 to 4.3	M€ 48 to 67	M€ 48 to 67	M€ 0 to 15	M€ 15 to 47	~
Social	24 to 172 jobs	12 to 86 jobs	952 to 1,332 jobs	952 to 1,332 jobs	0 to 51 jobs	51 to 156 jobs	~
Producers					0 to 0.22	0.22 to 0.67	~
Economic	M€ -15 to -108	M€ -8 to -54	M€ -575 to -700	M€ -575 to -700	+	+	~
Social	-51 to -363 jobs	-26 to -181 jobs	-1,918 to -2,333 jobs	-1,918 to -2,333 jobs	~	~	~
Environment[131]	0.22 to 1.55	0.11 to 0.78	8 to 11	8 to 11			
Health	+	+	++	++			
Plant protection	~	~	~	~			

127 High effort for new regulation.
128 Higher compared to VI-3 due to additional efforts for the Thematic Strategy.
129 Balance based on income from the tax and implementation effort.
130 Support of IPM would lead to a budget shift within RD measures for AEM.
131 Use reduction as share of total use in %.

6.2.9. Quantitative use reduction

The main objective of the Thematic Strategy is to minimize hazards and risks for human health and the environment related to the use of pesticides and more generally to achieve a more sustainable use pf pesticides as well as a significant overall reduction in risks and of the use of pesticides consistent with the necessary crop protection.

Many of the measures and options discussed in the previous chapters will, although not specifically targeted at it, contribute to the goal "quantitative use reduction" because they aim at an optimised use of PPP, lead consequently to reduced use – and more significantly choice of substance and their application that present lower risks so that the expected risk reduction is even more significant than the reduction in volume. For example the measures on "technical check for sprayers", "training for users" or "general framework for IPM" will definitely have this effect.

Still, theoretically the Thematic Strategy could contain a measure aiming particularly at reducing the quantities of pesticides used as a target in itself. The various options how this could be put into practice are described in Chapter 4.1.9.

Any quantitative use reduction objective would have to be implemented with care as it could lead to shift in sales from compounds consumed in high quantities to lower-volume compounds which are more biologically active but having less favourable environmental profiles. For example the replacement of inorganic sulphur, which is used in high quantities and doses (several kg/ha) in vineyards but is environmentally relatively benign, by more specific fungicides that are used in much lower doses (< 1 kg/ha), but can have a more unfavourable environmental profile) would clearly lead to a reduced figure for the tons of active substances used, but the resulting risks to the environment might be higher.

Possible measures in the Strategy aiming specifically at use reduction have been discussed in a very controversial manner all through the consultation process. The current situation in Europe shows that there is no Member State with *mandatory* general use reduction targets, Denmark is the only country that has voluntary general use reduction targets. Some Member States like Belgium, the Netherlands, Portugal, Sweden, Lithuania and Slovenia have reported specific use reduction targets (i.e. use reduction targets for certain user groups like public institutions).

Denmark has also decided to measure the use reduction in the form of the 'Treatment Frequency Indicator', which expresses the average number of times per year agricultural land can be treated with the quantity of pesticides sold, assuming that they are used in the prescribed normal dosages. The situation in Denmark was also chosen as the case study for analysing the effects of the options discussed for this measure.

Conclusions

As a consequence of the impact assessment it is recommended to follow for the moment the "no action option" at Community level and evaluate the effects of the other measures of the Thematic Strategy with respect to risk reduction and use reduction. At national level Member States may study the possibilities for use reduction targets for certain crops (particularly high consuming crops) and exchange information between Member States and the Commission. Depending on these evaluation results it is recommended for mid term actions to either develop specific instruments for appropriate general use reduction or to still follow the "no action" line (option 2).

The following Table 6-61 gives an overview on the qualitative assessment of impacts.

Table 6-61: Measure 'Quantitative use reduction' - General impacts

Options **Actors**	**Option 1:** No action	**Option 2:** Guidance on definition of use reduction targets and development of a specific instrument	**Option 3:** Introduction of appropriate financial instruments	**Option 4:** Introduction of mandatory general use reduction targets
User (farmer)				
Economic	~	~	- -	~ / - -
Social	~	~	~	-
Authorities				
Economical	~	-	+ +	-
Production issues	~	~	- -	~ / - -
Environmental issues	~	~	+ / ~	- / ~ / +
Health issues	~	~	+ / ~	~ / +
Plant protection issues	~	~	~	~ / - -

+ + strong positive impacts + positive impacts ~ neutral
– – strong negative impacts – negative impacts +/– pos. or neg. impacts depending on details of options and *status quo*

For option 1 (no action) there are no direct impacts. However, it is expected that with the measures discussed in the previous chapters a general use reduction in the range of 11% to 16% of the current PPP consumption can be achieved. In addition, it can be expected that risk reduction is even bigger as the previous measures will have produced effects on riskier substances and practices.

Option 2 (guidance on specific reduction targets and possibly measures later) has no immediate impacts on pesticide use but will increase the administrative efforts for authorities and users. However, in the long run, and based on better knowledge about pesticides use it might be possible to implement this option.

Option 3 is not recommended for reasons that will be discussed further in Chapter 6.2.10.

Option 4 is not recommended because quantitative mandatory general use reduction objectives are not specifically targeted or motivated by risks to human health or the environment. A purely mass oriented approach may stimulate a substitution of less efficient but likely also less harmful PPP with a higher dosing rate by those with lower dosing rates but higher problematic properties. Such a substitution is not necessarily correlated with lower risks if it is not accompanied by other measures (such as described in the previous chapters). On the other hand, it is possible that a reduced number of applications reduces the risks to operators and the environment, as the occasions where exposure occurs would be less frequent.

Impacts of mandatory general use reduction are hard to calculate as the dimension and direction of substitution effects is not predictable and ways of implementation remain unclear. On a qualitative basis, if the political objective of quantitative use reduction is applied to all crops, higher costs for the users are possible if PPP will be substituted with new, more efficient and thus likely more expensive products. This may eventually be

correlated with crop losses if plant protection cannot any more be carried out because the amount allowed for use is not sufficient for appropriate plant protection.

In addition there are a number of practical problems that would lead to significantly higher efforts for authorities. For example, in many Member States there is no good information available regarding current pesticide use. This would mean that it would be very difficult to define a baseline and quantitative reduction targets. Then there would be important questions of liability and redress depending on how the targets were to be implemented – at farm level (placing obligations on each farmer) or at regional/national level (this would make it unclear who would be responsible if targets are missed). Lastly, annual fluctuations in pest pressure and climate might lead to significant changes in the need for pesticides, which would obviously have an impact on quantities used and in a 'bad' year the targets could be easily missed.

6.2.10. System of taxes/levies to provide incentives for risk-based choices

The possible use and role of Market Based Instruments (MBI), and specifically taxation, has been a very important component of discussions about the Pesticides Thematic Strategy, and, of course, of the present impact assessment (IA). This issue is indeed decisive both in the perspective of the overall effectiveness of the strategy, and in the light of the increased competitiveness focus of Commission's IA.

In most environmental policies, MBI deserve a clear preferred attention, due to their better transparency, neutrality and compatibility with competition and market imperatives. Moreover, in the perspective of economic theory, the introduction of environmental taxes / levies is, in most cases, THE adequate tool to internalise externalities (which are obvious in the case of pesticides). They would *a priori* also be particularly welcomed to finance (at least partly) the various other measures foreseen under the Thematic Strategy.

Following detailed research and taking due account to the specificities of both pesticides' supply and demand, the Commission finally considered that, at least at this stage, taxation should not be introduced at Community level as part of this Thematic Strategy. This conclusion is based on at least three types of considerations.

First, and contradictory to the general rule, the Commission came to the conclusion that adequate 'internalisation of externalities' through taxation is at least at this stage not possible for PPPs.

Theory says that taxation can internalise externalities through increasing costs of practices creating the said externalities so that they are limited to cases where their marginal utility effectively exceeds the negative externalities they induce. Typically, as long as pollution is not taxed, producers will not integrate cleaning costs in their production function, and tend to produce too much. Taxing pollution helps reaching more optimal equilibria.

The implicit assumption is that taxation can be proportionate to (or at least a function of) actual or potential risks attached to the products (the said externalities). However, if this is the case for 'standard' pollution, it is not yet the case for PPPs. Indeed, there are only 3 possible tax bases: weight, price or intrinsic characteristics.

There is no clear function between the two first ones and actual and potential damages. With respect to weight-related taxation, evidence is that some of the products that are perceived as more environmentally-friendly (such as inorganic sulphur, which is allowed in organic

agriculture) have to be used at relatively high doses per hectare (although there is no general rule). Thus, weight-based taxation would simply induce farmers either to stop buying those traditional (good) products or to buy others that work at lower doses but can have more detrimental effects on the environment and the risks might even increase.

Similarly, price-related taxation would be detrimental to more expensive products although these are normally the new and innovative ones, to the benefit of older and cheaper products (unless the new substances are necessary to combat pests' resistance to traditional products). As a general statement, a fixed percentage on sales price would impediment research and marketing of new innovative products.

It is obvious that such tax bases cannot suitably be related to internalisation of externalities, as they primarily induce (at best) a shift in demand towards products being efficacious at lower doses or being cheaper, but not necessarily induce choices for less dangerous substances. In fact, in order to internalise externalities, the establishment of the tax needs to be risks – related (i.e. based on the toxicological and ecotoxicological properties of a given substance).

This objective is however complicated by the fact that PPP are not equally dangerous in all applications. Indeed, the same substance can be relatively risk-free when used on crops at large distance from surface waters, but can pose high risks when used in the vicinity of water. The externalities in the first case would be much higher than in the second. Thus, in theory, in order to truly internalise externalities, the rate of taxation should reflect not the potential risk associated to the product, but the actual one, i.e. both the intrinsic and internal properties of the substances and the actual modalities of their use. This is of course impossible as product taxation is applied when the product is placed on the market, and cannot, as such, be differentiated with respect to actual (later) use.

As a proxy, however, one could imagine to define rules to incite choices of products leading to reduced risks by classifying PPP in categories. Each category of risk would be associated with a given taxation rate (which would be a positive function of 'risks', as defined by the rule), and the rates would reflect better the expected externalities associated with products (which is not the case with flat rate systems). In such a case, taxation would definitely allow prices to better embody consequences of consumption and, also, induce a shift in the demand function toward less dangerous products, without adverse effects on production, competitiveness and market equilibriums. At the same time, high taxation is a good alternative to simple ban in the case of potentially very toxic and dangerous products, which however can remain useful in some very specific cases (e.g. to combat resistance to other products): prices far above actual ones would ensure that their actual use is limited to the very cases where no other substitutes can be found.

The problem is that in the light of current knowledge about existing active substances, it is very difficult to find a basis for such categories. The Thematic Strategy explicitly addresses the issue, and tries to improve it. During the evaluation of active substances in the framework of Directive 91/414/EEC, all substances that pass the evaluation are put in one Annex, without further distinction. In addition, only around 25% of all existing substances have been reviewed. This will change in the future: the revised Directive will create three distinct annexes: 'normal risk substances', 'low risk substances', 'substances with concern and subject to comparative assessment'. This classification will remove the most important obstacle to a possible banded Community system. In addition, it has to be noted that the tax basis is only one problem, among many other potential ones to be cleared before any actual proposal for introducing a tax can be made (optimal taxation rate, moment to which the tax becomes due /

is to be paid, control modalities, etc.). Anyway, as long as such information is not available (and thus as long as such classification is not robust), internalisation of externalities through taxation will be unrelated to effective externalities, and it will therefore be useless to internalise them.

The Commission is dedicated to investigate taxation further. First, the Commission will definitely follow with particular attention the promising recent introduction of a "banded" PPPs taxation system in France (with 7 different classes based on a combination of inherent risks to human health and the environment), as well as the reasons for the envisaged abandonment of the system (only two rates will applied in the future).Second, as already said, it will pave the way to a possible robust classification of products through the revision of Directive 91/414/EEC. Taxation is an interesting approach and could be further examined at Community level in the future, once the review of all active substances is completed. In the meantime, Member States are of course invited to explore whether they want to introduce national systems and in so doing, they may benefit from the French experience.

On top of internalisation of externalities (i.e. reallocation of PPP demand toward less dangerous products), some also see taxation as a means to reduce overall quantitative consumption (i.e. inducing farmers to use less PPPs irrespective of their nature). But, in addition to the fact that there is no direct link between tons of PPP consumptions and actual risk (volume reduction should not be an objective *per se*), the Commission came to the second major conclusion that, in the very specific context of PPPs, taxation (applied at the level of rates usually under discussion) will not have a significant effect on volumes.

This reflects the very specific and quite counter-intuitive shape of both supply and demand functions. With respect to supply, as already said, it happens to be that ‘good’ basic and generic PPPs are available at relatively low cost, because they employ a very well known and quite simple technology, using quite cheap and generic inputs. Since those products are quite effective in most cases, the bulk of the market is thus supplied by products the prices of which are determined by those of generic inputs (which aggregate demand and supply does only partially depend on PPPs dynamics, so that their prices can be assumed to be exogenous, and thus given). Economically speaking, elasticity of supply to prices is infinite around the equilibrium for such generic PPPs (supply curve is vertical). *De facto*, the industry is only able to reward higher technology by higher prices in cases, where competition remains based on intrinsic technology, such as emerging resistance to generic products or GMO-related technologies. This implies that the market, up to a certain point, is segmented. The bulk of it is very competitive, but there is also a real (although quantitatively more marginal) need for some expensive products addressing specific cases (including preventing resistance by using, from time to time, innovative and non-usual PPPs).

With respect to the second ones, non-linearity prevails indeed, and leads to ‘abnormal’ situation. Basically, it is to be recalled that PPP are not final but intermediate goods: they have no utility per se, but only in a production process in which they are absolutely necessary. Moreover, there is a quite fixed relationship between quantities of PPPs, the nature of crops to be treated, the prevailing pest pressure, and size of land / total output. Even if prices are very low, it is nonsense to use more quantities than needed, and if they are too high, it is also a non-sense to use them at significantly lower levels. In fact, if treatment is insufficient, the probability to lose the crop is significant, and the potential loss exceeds by far the possible cost of the treatment (especially if available generic products are cheap). As demonstrated in Chapter 6.1.9, costs for PPP are on average only corresponding to 4.2% of overall input costs. This is why a PPP total ban has not even been considered in the Thematic

Strategy: it would have financial consequences without any relation to the share of PPP in the production function.

In economic terms, the double fact that quantities are defined by the above-mentioned mechanical relation and that elasticity of supply to prices is infinite around the equilibrium for the bulk of the market induces that the marginal utility of PPP by far exceeds the marginal average cost of production, but that there is no likely additional demand to make prices adapt and equalise them… In other words, farmers would be ready to pay much more, but competition among producers and objective cost of production for PPPs are such that prices do not go up (or do not do so sufficiently to catch up marginal utility).

In this sense, economists needs to verify the preliminary observations: we are facing a very 'strange' market where the total amount of consumption is not primarily determined by the price of the product, but by an implicit ratio with total output, and this has decisive consequences on possible effectiveness of taxation (as a tool to modify demand and supply by price changes).

Demand and supply functions as specified above are synthesised in Figure 6-62.

As already said, the prices P0 of generic PPPs are determined by those of their input, which are almost fixed. Farmers are willing to pay up to PMax for PPPs which is the marginal utility of PPPs, but do not need to, thanks to competition among producers and the generic and 'simple' nature of most needed products. There is QSubj quantity of PPPs, which is fixed by what traditional use considers being necessary quantities related to the nature of crops and quantity of land to be treated. As long as prices are below the marginal utility of PPPs, farmers will accept to pay any market prices, but they will not change their demand, which will remain fixed at QSubj. In other terms, demand (Q) is step-shaped with respect to prices: almost flat (and equal to QSubj) up to the point (QSubj, PMax), and zero when prices exceed PMax.

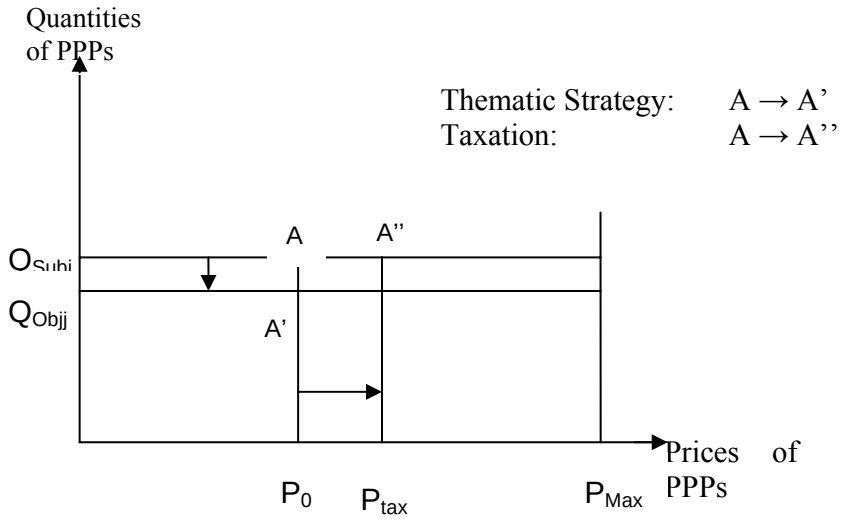

Figure 6-62: Demand and Supply Function for Pesticides

Taxation means increasing prices from P0 to Ptax. As already said, due to the generic nature of most PPPs, P0 is far below PMax, which means that Ptax will also remain below PMax unless the taxation rate is very high. Thus, taxation means shifting from A to A", which, as obviously shown on the diagram, has no effect on PPP demand (which remains at QSubj for those keeping on producing), and only reduces farmers competitiveness and benefits (or turn them into losses).

Ex ante, equilibrium is at A (characterised by prices P0 and quantities QSubj).

Of course, if taxation is such that, at least for some farmers, prices reach the PMax threshold, which means they will not use PPPs anymore in the same quantity, overall demand will decrease (it is the reason why, when reasoning at the aggregate level, demand is in fact not totally flat but very lightly decreasing until aggregate QSubj: there are a few crops for which PPPs are less necessary, and for which taxation may induce taking the risk stopping using them).

But any quantitative effect of taxation will be at the expense of aggregate production, since un-treated crops will have much lower and uncertain yields (remaining output being more dependent on pest occurrence and other unpredictable events). For example, if prices of PPP are such that vineyards cannot not be treated anymore, most wine growers will not accept taking risks and will rather stop production, and, for those accepting them, wine output is going to depend much more highly on annual variations in pest pressure: the effect will not only be on average output, but also on its variability. Moreover, it is impossible to anticipate ex ante how consumption would react to huge price increases, since any projection is based on past evolutions (which have so far only been marginal) and on the assumption that the underlying economic model remains valid (which is not likely in this case).

In other words, only huge price increases are in this case likely to have an quantitative impact on overall PPP demand, but it is unlikely that governments would propose them, because of both possibly huge effects and inability to anticipate them.

Of course, if 'normal' taxation rates are unlikely to induce quantitative effects, they will definitely induce qualitative ones. Although undifferentiated taxation doesn't change relative prices, it induces a revenue effect on top of the price effect, which affects the portfolio composition of demand. Because the price of some already expensive products will reach the revenue constraint, there will be, inevitably, an overall shift toward less costly products. As already said, this may favour products that work at lower doses but can have more detrimental effects on the environment and exclude more expensive but new and innovative ones. Some environmentally-friendly products are less costly too, which means that, in some specific cases, this shift toward cheaper products might be positive, but the overall effect is uncertain (in fact we don't have sufficient information about the demand function to detail it), and possibly negative. As a consequence, taxation (as long as it is not risk-based) having no or little effect on quantities, and possibly having counterproductive ones on qualities, precaution principle impose abstaining.

This of course perfectly holds when one considers harmonisation of taxation rates in Europe. During the consultation process, this proposal obtained such a universal support from all stakeholders (cf. Annex 1, Chapter 1.15) that it was not detailed in the Impact Assessment. If MS follow on the EP call to eliminate provisions allowing Member States to apply reduced VAT rates for pesticides, the abovementioned phenomenon may happen. But it will so at a low degree, since taxation increase will be moderate and induced revenue effects too. Moreover, there is a political dimension in this issue and applying 'reduced' rates to PPPs is

obviously an indistinct support to PPP consumption, which is inconsistent with this thematic strategy. Politically, it is important not to convey a more 'correct' message and apply at least 'normal' rates to a product that conveys obvious negative externalities. Last but not least, expected benefits (e.g. obvious internal markets and fair competition arguments, as well as health and safety ones, since harmonisation will limit the existing 'traffics' which induce farmers to buy 'foreign' PPPs, which notices are in a language they don't understand) are expected to exceed by large the said phenomenon, with a clear net positive gain for society.

Finally, it has to be recalled that the relative inelasticity of PPP demand to price increases is actually confirmed by experience in the Member States that introduced taxes (Sweden: flat rate on kg; Denmark: different flat rates on sales price for insecticides, herbicides, fungicides, growth regulators). In both cases, the effect of the tax was lower than expected and, to have a real effect, the tax/levy would have to be set very high, which would make it highly unacceptable to farmers and industry.

The philosophy of the Thematic Strategy tries to reflect this very specific and quite exceptional context. Instead of shifting the supply curve to right, it namely tries to shift the demand curve down. In particular, instead to move from A to A'', to move from A to A'. Indeed, as already said, there is a fixed relation between what farmers consider to be the need for PPP, type of crop and size of land. But this relationship is not that objective, and evidence shows that farmers tend to overestimate quantities needed. This trend is of course reinforced by the discrepancy between the cost of PPPs and their marginal utility.

Moreover, as PPPs are cheap, farmers do not always bother to go into detailed calculations, provide for a margin of error, and over-consume. Only massive price increases would change this behaviour, which may be in some cases rational. To give a simple example: if PPPs are cheap (and, as already said, internalisation of externalities not possible), it may well be cost effective not to regularly check the functioning of sprayers. Spraying will then of course be more irregular, but, for the farmer, it may be less expensive to simply ensure that minimum quantities are applied through spraying more on average than to pay for regular checks, and update more frequently the machines themselves.

In such cases, the only way to change the situation is to persuade farmers that they can obtain the same output with less (but better used) PPPs' input (e.g. through training), and to prevent/modify, by regulation and control, activities and behaviours which 'rationally' produce negative externalities. This is the purpose of the Thematic Strategy.

Some see taxation as an adequate way to simply finance the various measures of the Thematic Strategy. There are indeed 'fixed' external costs of pesticide use which are independent of the type of pesticide used and their likely toxicity. Namely, the very demand for data collection and the costs associated with it arise from all pesticides.

On the other hand, a tax also implies collection costs, and it is questionable whether introducing a new tax at Community level could be justified only for the sake of ensuring that users pay for the collection of data linked to these specific activities. First, in some Member States, such financing schemes already exist and the added value of EU-wide harmonisation is not obvious. Second, statistical institutions are usually financed globally, as data collection is seen as a public good, irrespective to the nature of data collected. Creating a new tax in order to earmark and specifically address PPP data collection needs goes against obvious economies of scale considerations. Last but not least, once a tax is introduced, it is sometimes difficult to ensure that its revenues really go into related measures and are not just

absorbed somewhere else in the general budget. For instance, in the above mentioned 'banded' French tax, the money actually goes into social security.

More fundamentally, considering the present situation described above, taxation could only be based, if introduced now, either on weight or prices (the French scheme is not transposable at such at the EU level until Directive 91/414/EEC is revised and active substances are classified in different categories). As already shown, this would induce adverse effects which would certainly overcome the possible benefits of financing data collection through a dedicated, activity-related scheme.

With respect to taxation, the impact assessment thus led to the conclusion that for the case of pesticides taxation is not an adequate instrument to tackle aggregate quantitative level reduction, due to quite specific characteristics for both demand and supply. At the present stage, and due to the impossibility to generate robust classifications, it is also not a good instrument to generate qualitative shifts in the demand portfolio towards more environmentally or health friendly products. If otherwise justified, taxation could indeed help financing the Strategy, but cannot be introduced on this sole purpose. However, the revision of Directive 91/414/EEC, and the future induced better knowledge of PPPs characteristics, could pave the way toward a differentiated, Community-wide, toxicity- or risk-related taxation scheme.

It should also be recalled that adoption of a tax on pesticides at the Community level would require unanimity in the Council. Even "IF" a future robust classification allows for taxation to be considered, in theory, as a good instrument to internalise actual externalities (which cannot be the case in present circumstances), the political context is not the most favourable one.

It has finally to be noted that the stakeholder consultation process reinforced the Commission cautious position with respect to taxation, some contributors developing argumentations very similar to its own one. Just to give one example, Water UK wrote that, 'if taxation were introduced, "many pesticide users, in both agricultural and non-agricultural sectors, would abandon their current voluntary actions to protect the environment on the grounds that they would not want to "pay" twice. Those that are participating in voluntary initiatives to reduce the impact of pesticides on water may already be incurring extra expenditure e.g. using a more expensive but less persistent herbicide. The additional cost of a tax could result in them deciding to abandon the cost and effort involved in the voluntary actions. Similarly, taxation may result in financial burdens on water companies, which would result in an increase in fly-tipping and illegal avoidance of disposal charges, thereby leading to adverse environmental impacts. The risks posed by pesticides are multi-dimensional and therefore using taxation of PPP to influence behaviour of users can be counter-productive'.

7. MEASURES PROPOSED IN THE THEMATIC STRATEGY AND OVERALL IMPACT

The Thematic Strategy on the Sustainable Use of Pesticides is actually composed of a number of individual measures that, in accordance with this concept of integration, will either be implemented using existing instruments or, if that is not feasible, will be proposed as new legislation, which will be presented partly in parallel and partly subsequent to this Communication. Certain measures that have been examined have been discarded eventually.

So the basic approach is threefold:

– incorporation of a number of measures into the existing legal framework, in particular Directive 91/414/EEC and its revision, and policy frameworks such as the CAP or Research and Development;

– new legislative proposals: a Framework Directive on the sustainable use of pesticides that will incorporate all measures, where a legislative solution was found necessary but which cannot be integrated into existing legislation. The Directive will set out goals and objectives, leaving the necessary freedom to Member States to adapt the measures to their specific situations, and foresees a system of reporting with appropriate risk indicators and information exchange for reviewing the national measures in order to develop guidance and best practices. In addition, there will be a proposal for a Regulation addressing the collection of statistical information on the use of pesticides;

– recommendation to Member States to take certain further measures as appropriate, for which Community intervention was not found adequate or practicable (in the spirit of the subsidiarity principle).

7.1. Summary of the evaluations and recommendations

7.1.1. Training and certification of users

It the light of the outcome of the impact assessment for the 6 options examined, it is recommended to establish mandatory training and education requirements for pesticide retailers, farmers, and other professional users and extension services in all Member States with minimum requirements agreed at Community level.

It is expected that through this measure, farmers will on average use ~ 1.2 kg less in active substances per farm, which means ~ € 30 annual savings per farm in Europe. Overall this will lead to a reduction in use of ~9.000 tonnes throughout the EU, which – based on the average price mentioned in Table 5-3 (€ 25 / kg) – means around € 225 million less spent on pesticides. The costs to all farmers, retailers and other trainees throughout the EU will be in the dimension of € 250 million. So on balance there is no significant direct economic disadvantage expected for farmers. In addition, there are benefits for the farmers' health, and also those of bystanders, which cannot be quantified.

The reduced use of pesticides would lead to losses in turnover for the PPP industry (around € 225 million) which could lead to job losses in the dimension of 830 jobs. On the other hand, training and certification institutions will have additional income of about € 250 million, resulting in 2,500 additional jobs. In the case where authorities are managing the training schemes by themselves or perform quality control mechanisms for training measures, they in total will have additional expenses, some Member States being significantly more concerned than others as they do not have any existing training schemes.

A reduction of up to 9000 t/year of pesticides use is expected to lead to corresponding general environment and health risk reduction, which however cannot be quantified. Still, as these externalities are existing and are certainly not negligible, a reduction - could it be quantified would – add to the overall positive balance of the measure proposed.

7.1.2. Certification and Technical check of spraying equipment

In the light of the outcome of the impact assessment of the eight options examined it is recommended to establish mandatory control systems for all sprayers in use and certification systems for new spraying equipment in all Member States.

Regular inspection of spraying equipment will cause on the one hand additional costs for farmers of about € 130 million per year, on the other hand farmers will realise savings of about 9,000 to 18,000 t active substance which corresponds to an amount of € 230 to 460 million. In the long-term savings will dominate significantly for farmers.

About 1000 new jobs will be created at national control institutions, covered by earnings of about € 90 million per year. New jobs (in a dimension of 500) will also be created within maintenance companies. The PPP producing industry may loose turn over in a dimension of € 230 to 460 million in the long term resulting in a possible loss of 750 to 1500 jobs.

With respect to environment and health impacts only advantages are resulting, the expected quantification shows a range between 9,000 and 18,000 t per year reduced active substance of PPP input.

Additional costs for certification are estimated to amount to € 2 to 4.5 million. These are the costs that initially will occur at equipment manufacturers for certification (costs that would eventually occur for improvements in the production processes at equipment manufacturers are not considered. Assuming an average lifetime of 12-15 years per sprayer each year approximately 125,000-250,000 new sprayers are purchased for the whole Community. It is assumed that new certified sprayers will reduce overuse and losses to the environment due to a higher efficiency compared to new but not certified sprayers and will consume approximately 5% less PPP or reduce by an equivalent the losses caused by the handling of products during mixing, loading, spraying and cleaning operations. The resulting average annual use reduction amounts up to about 500-1000 tons. This would be related to annual savings up to around € 12-24 million which exceeds the increased costs for certification.

7.1.3. General ban of aerial spraying with derogation

In the light of the outcome of the impact assessment of the five options examined it has finally been decided to propose a prohibition, but to allow derogations in situations where it can be proved that aerial spraying offers clear advantages and also environmental benefits compared to other spraying methods, or where there are no viable alternatives. This option corresponds to option 5, since as a consequence aerial spraying will be restricted to situations where it can be proved that it offers clear advantages and also environmental benefits compared to other spraying methods, or where there are no viable alternatives. However the political message of a general ban is stronger than that carried by sole restrictions.

Where derogations are allowed for by Member States, strict minimum requirements will have to be implemented, in order to ensure protection of the environment (e.g. reduced drift problems, reduced water contamination) and of the health of residents and bystanders. The socio-economic consequences expected in individual Member States will depend on the existing legal situation, but the administrative burden should increase, due to the management of derogations.

As aerial spraying should be allowed by way of derogation for crops and areas where it offers advantages compared to other application techniques or where there are no viable

alternatives, yield losses or higher costs for ground spraying for farmers should be avoided. Besides, the use of derogations should avoid dramatic loss of turnover for aerial spraying companies.

7.1.4. Enhanced Protection of Water

In the light of the outcome of the impact assessment of the seven options examined it is recommended to realise the option "Specific risk reduction measures will become mandatory parts of the river basin management in combination with specific financial instruments".

From the possible measures examined there are clear benefits of the measures 'buffer strips' and 'technical equipment'. These are even bigger, when considering that other non-quantifiable benefits such as positive impacts on biodiversity, landscaping, river bank management, and one of the main objectives of the Water Framework Directive (maintaining good chemical status of waters) are taken into account. For the measure 'planting hedges', however, the overall costs seem to be too big to be possibly offset by these non-quantifiable benefits.

Still, costs and benefits for these measures would have to be born by different parts of society. Farmers (and to a lesser extend the PPP industry due to reduced PPP use) would incur all costs, whereas water companies (and ultimately consumers) would reap the benefits. Whilst this would be fully in line with the 'polluter pays principle', it seems difficult to recommend that indeed buffer strips and the technical equipment have to be installed everywhere.

Instead, using the two clearly beneficial tools of 'buffer strips' and 'technical equipment' should be targeted on those areas, where there is a real need (*nota bene*: not all waters are polluted by pesticides). The need for them can best be identified in the framework of the river basin management plans that have to be set up under the Water Framework Directive. Where the need has been identified, the measures should then become mandatory and farmers concerned could be compensated for their overall remaining costs (i.e. after deduction of CAP support) by additional payments from the water companies that could be financed from the savings in water treatment costs.

7.1.5. PPP free or reduced zones

In the light of the outcome of the impact assessment for three options it is recommended to put into practice a legally binding designation of zones of reduced or zero PPP use. Where relevant, clear links with applicable Community legislation are to be indicated. Specific guidance and best practise for those areas has to be developed in cooperation between Member States and the Commission. Best practice and specific guidance should include elements of other discussed measures like Integrated Pest Management (IPM), check of equipment and training of users but also specific use reduction objectives.

This option could contribute eventually to a PPP-use reduction up to 8,000 t/year or about 20% of the PPP used in *Natura 2000* areas. The reduction can be expected mainly as a result of a combination of the other measures discussed like training of operators, integrated pest management, or check of application equipment. The use reduction in the field of *Natura 2000* areas is expected to provide significant environmental benefits as the effects are more important than in less sensitive areas. It has to be emphasised that the mentioned guidance should not only focus on a reduced amount of PPP but should take appropriate risk indicators as well as intrinsic properties of the substances used into account.

The option would result in expected savings for farmers in *Natura 2000* areas due to a reduced or more efficient use of PPP (possible dimension € 200 million /year in the long run). These saving will – at least partly – be offset by increased management costs, training, and maintenance of equipment (however, these additional costs to farmers would be minor, as most of the measures that they would apply would have to be implemented anyway under the Thematic Strategy). Further losses to farmers could result from reduced yields in the zones where quantitative use reduction targets were introduced – however, in the absence of specific knowledge on what crops would be concerned and how severe the reduction targets were, it is not possible to quantify these losses. There might be higher costs for authorities with respect to implementation of measures and regulations. It is also expected that this option will bring losses to the PPP producing industry and the PPP supply chain due to reduced sales and related job losses (up to € 200 million and 700 jobs).

The use of PPP in public parks and playgrounds seems to be very specific regarding particular pests and very small in overall volume. Further reduction would have no measurable economical or social effects to involved people and companies. However reduced use in such areas will significantly decrease the exposure levels of the general public and particularly sensitive population (e.g. children). However, in the absence of any reliable data on actual exposure, it is impossible to quantify or monetise these benefits.

7.1.6. Collection of PPP Packaging and unused (obsolete) products

In the light of the outcome of the impact assessment for the four options examined, it is recommended that all Member States should create collection schemes for empty PPP packaging and unused (obsolete) pesticides.

The reduction of direct emissions into the environment from discarded or carelessly stored empty containers is estimated to be in the order of 1000 tons, as probably not all farmers are applying correctly the triple rinsing instructions. From the case studies examined, it seems that voluntary collection schemes organised by the PPP industry and distributors is working rather in particular when authorities have fixed quantitative objectives for the collection rate and have announced taxation in case the objectives are not met. Alternatively, deposit schemes can be put into place as incentive. The costs for the farmers are negligible (transport to the collection centre, plastic bags for storage, etc.). Overall costs for distributor/industry are between € 40 and 80 million (which can be reduced if a market for the collected plastic can be found), but will also create 200 jobs.

7.1.7. Systematic data collection on pesticides sales and use

In the light of the outcome of the impact assessment for the four options examined it is recommended that all Member States establish collection schemes for data on pesticides sales and use involving industry, distributors and users. The details on how the collection schemes are to be organised in an optimal way can be worked out by the Member States.

Important efforts are already undertaken in many Member States to collect information on PPP use by many stakeholders (at annual costs of around € 3 million) but the data are incomplete and difficult to compare, which makes it extremely difficult to determine the risks and externalities linked to pesticides. Without any change, it will not be possible to improve this situation and in particular also to monitor the success of the implementation of the Thematic Strategy through the calculation of appropriate risk indicators and to decide on possible further or adjusted measures.

The economic impacts – mainly on authorities – to set up improved collection schemes in all Member States depend to a large degree on the chosen approach to collect data, the detail of information to be collected, the coverage of the collected data concerning PPP use and the frequency of data collection. Data collection with a high level of detail results in costs of about € 9 million /year in addition to what is spent today. Data on production and import/export are already required from industry in other legal context for the establishment of economic statistics and should not be collected as a double burden under the Thematic Strategy. However, if a high level of detail of collected information will be required some additional efforts at industry level will be necessary (estimation: up to M€ 2 /year additional costs).

A mandatory collection on use would also require a contribution from users beyond what is already required by Regulation 854/2004, which is related to a possible economic impact of around € 3 million /year. So overall, the economic impacts are relatively moderate - the high level scenario results in costs of about € 14 million /year. The costs for Member States and farmers can also be reduced if collection of data is not carried out annually but only in regular intervals (e.g. varying between 1 and 3 years. In the internet consultations there was almost equal support for reporting every year and reporting every 5 years).

On the positive side, mandatory collection enables optimum outcomes with regard to comparability of data and synergy effects because methods for data collection and quality assurance can be established in a co-ordinated manner between Member States and the Commission and the same details can be applied in all Member States at the different levels of information collection. This might reduce the burden on Member State authorities for developing and implementing their own individual systems. On the other hand, Member States should remain free to decide on the optimum way on how to organise data collection, as this will depend strongly on the structure of the agricultural sector (number of farms, diversity in production etc.).

The measure would create a number of jobs (up to 200 in authorities and industry) and the data collected can be used multiple times – in fact, Member States do report today on pesticides sales and use in addition to Eurostat to the OECD and the FAO. The same data can be used and the other international organisations would also benefit from greater reliability of the data reported.

Although collection of data does not create environmental or health benefits per se, the data can be used to validate many of the model and assumptions applied during the risk assessment process in the framework of the authorisation process under Directive 91/414/EEC. This would allow refining the models and adapting them more to reality.

Also, comparison of the use data from farms in similar conditions would allow defining with more confidence good plant protection practices and optimal use of pesticides – including in IPM schemes. Such use data will have to be generated anyway if guidance and best practices are seriously to be developed.

7.1.8. Common framework for Integrated Plant Protection (IPP)

In the light of the outcome of the impact assessment for the six options examined it is recommended to put into practice the option "Harmonisation of the minimum general requirements through an amendment of the definition of integrated control in Directive 91/414/EEC" in combination with the option "Clearer and more specific definition of IPM".

This combination could lead to a pesticide use reduction of 22,000 t to 31,000 t active substance/year with corresponding positive environmental and health effects, which can, however, not be quantified. There will be no significant economic impacts on farmers complying with the better defined requirements of Directive 91/414/EEC. Those going beyond and applying more specific IPM guidelines, could receive support under rural development measures in a dimension of € 70 million to 520 million. Non complying farmers could see their direct payments reduced by up to - € 84 million. Jobs will be generated in the agricultural advisory area (900 to 1,300).

Losses will occur in the supply chain for the PPP producing industry in a dimension of up to - M€ 700 corresponding to 1,900 to 2,300 jobs as a result of the mentioned estimated use reductions.

7.1.9. Quantitative Use Reduction

In the light of the outcome of the impact assessment for the four options examined it is recommended not to propose quantitative use reduction targets for the time being at Community level and evaluate first the effects of the other measures of the Thematic Strategy with respect to risk reduction and use reduction. At national level Member States may study the possibilities for use reduction targets for certain crops (particularly high consuming crops) and exchange information between Member States and the Commission. Depending on these evaluation results it might be possible in the future to either develop specific instruments for appropriate general use reduction.

Quantitative mandatory general use reduction objectives are not specifically targeted or motivated by risks to human health or the environment. A purely mass oriented approach may stimulate a substitution of less efficient but possibly also less harmful PPP with a higher dosing rate by those with lower dosing rates but higher problematic properties. Impacts thereof are hard to calculate as the dimension and direction of substitution effects is not predictable and ways of implementation remain unclear.

In addition there are a number of practical problems that would lead to significantly higher efforts for authorities. For example, in many Member States there is no sufficient information available regarding current pesticide use. This would mean that it would be very difficult to define a baseline and quantitative reduction targets. Furthermore, there would be important questions of liability and redress depending on how the targets were to be implemented – at farm level (placing obligations on each farmer) or at regional/national level (this would make it unclear who would be responsible if targets are missed). Lastly, annual fluctuations in pest pressure and climate might lead to significant changes in the need for pesticides, which would obviously have an impact on quantities used and in a ‘bad’ year the targets could be easily missed.

Still, it is expected that with the other measures envisaged as part of the Thematic Strategy which target risk reduction, there will also be a use reduction in the range of 11% to 16% of the current PPP consumption can be achieved. Therefore the "no action" option does not mean that there is no progress towards a minimisation as well.

7.1.10. Taxation

In the light of the outcome of the impact assessment for the four options examined it is recommended not to use for the time being market based instruments (MBI) and more

specifically taxation at Community level for the purposes of the Thematic Strategy for the following reasons.

Taxation is not an adequate instrument to reduce overall quantitative consumption (i.e. to induce farmers to use less PPPs irrespective of their nature), due to both demand step-shaped nature and supply almost infinite elasticity around equilibrium. Moreover, volume reduction is not an objective per se (as there is no direct correlation between tons of PPP consumed and actual risk), and any quantitative effect of taxation would be at the expense of aggregate production (lower and more variable output).

In theory, taxation could help generating qualitative shifts in demand portfolio towards more environmentally-friendly products, and thus help better internalising externalities. But this cannot be achieved through traditional and easy tax bases such as prices or weight (which are not correlated with neither toxicity nor risks, and may even induce damaging shifts in consumption), and no alternative tax base is yet available. Internalisation of externalities is moreover complicated by the fact that taxation cannot be differentiated with respect to actual -later- use (the externalities of PPPs depend on the actual situation in which they are used). Basing tax rates on an average expected use does not reflect potential real damages, and basing them on potential maximum damages unduly penalises actors using them properly. Although other potential problems exist (optimal taxation rate, moment to which the tax becomes due / is to be paid, control modalities…), the most important obstacle to internalisation of externalities through taxation may however be cleared in a few years, when Directive 91/414/EEC will allow for an available risk- and toxicity-related classification on which differentiated taxation could be based. The Commission is thus dedicated to investigate taxation further in order to establish a 'banded' taxation system as a proxy for true externalities in the future. It invites Member States to do so too.

If otherwise justified, taxation could help financing the strategy, but cannot be introduced on this sole purpose.

It is also to be recalled that taxation requires unanimity. Even when a future robust classification will be available, the political context will remain difficult. This cautious assessment with respect to taxation was backed by the stakeholder consultation process, in which some contributors developed argumentations very similar to the Commission's one.

7.2. Combination of recommended measures

With the proposed measures and options for the Thematic Strategy for a Sustainable Use of Pesticides a reduction of 11% to 16% (meaning 31,000 t to 44,000 tons of active substances per year) of the currently used plant protection products can be reached in the mid to long term. It is important to note that as a consequence of the measures (in particular training of farmers and IPM), this reduction is correlated with a more pronounced risk reduction for environmental and health issues.

It is extremely difficult to differentiate the contributions from the individual measures to the overall use reduction of 11 to 16%. This is due to the fact that the single measures sometimes aim at the same or similar effects. As a consequence in the combination of measures double counting has to be avoided. An example can illustrate this: the measure on training and certification of users could lead to a use reduction of around 9,000 tons of active substance as an effect of better trained operators. The measure concerning IPM will lead to a use reduction ranging from 22,000 to 31,000 tons of active substances. As IPM contains important requirements related to training and certification of users, this measure incorporates an important share of use reduction which is due to better trained operators.

Table 7-1: Expected annual use reduction of the recommended options by themselves and in combination

Recommended options	Expected annual use reduction of the individual options [tons]		Expected annual use reduction of the recommended options in combination with others [tons]	
	lower range	upper range	lower range	upper range
Training	9000	9000	9000	9000
Sprayers	9000	18000	9000	18000
Aerial spraying	risk reduction without expected use reduction			
Reduced PPP-use zones	6900	9500	1700	2400
Enhanced protection of water	not quantifiable as depending on decisions within River Basin Management Plans			
Collection of packaging	risk reduction with reduction of losses estimated at 1000 t/y			
Data collection	better data quality but no direct use reduction			
IPM	22000	31000	11000	15000
Quantitative use reduction	no use reduction as no action is recommended			
Total expected PPP use reduction			30700	44400

Obviously one can not simply cumulate the effects and consequently it is difficult to allocate the expected use reduction to a single measure. It becomes more complicated when considering the combination of all measures that are related to use reduction (e.g. also sprayer certification and inspection). Table 7-1 contains a rough estimate for allocating shares of the individual measures to the overall use reduction.

In this context it is important to emphasise that the use reduction is not per se the objective of the Thematic Strategy. The recommended measures aim in particular at reducing risks and impacts related to health and environment for a more sustainable use of PPPs. This is associated to a certain PPP use reduction as a consequence of some of the recommended options but it is not the aim of the proposed options. In the absence of any better indicators to express the expected risk reductions, use reduction is used as a proxy only – in the future, when appropriate risk indicators are available, it will be possible to measure and express the consequences in terms of risk.

The economic and social consequences for the agricultural sectors are overall positive. Farmers will be able to save between € 770 million and 1100 million in reduced need for pesticides (at € 25 /kg active substance) with no expected crop losses. When implementing correctly general IPM requirements to be introduced in Directive 91/414/EEC there direct support payments will not change. Accepting additional specific IMP requirements could lead to support under rural development in the order of € 70 to 520 million. Specific further requirements in the framework of river basin management plans could be compensated through CAP payments (set-aside) or payments from drinking water companies. In terms of costs, farmers will face around € 250 million in expenses for training, € 130 million for maintenance and inspection of sprayers, € 2 - 4.5 million extra costs for purchasing certified new equipment (instead of non certified equipment), € 2 million for detailed record keeping and reporting. Overall, farmers can therefore expect benefits in the order of € 460 million to 1230 million (even without any additional support under rural development for specific IPM, benefits will still be in the order of € 380 million to 710 million). Additional costs in terms of extra work to apply IPM and use advisory services are estimated at € 4.5 /ha (€ 1.7 /ha for advisory services), which at a total crop surface of 75.1 million ha would lead to costs of € 340 million. Further to these economic benefits, farmers will have significant (albeit non-quantifiable) social benefits in terms of reduced health impacts (from reduced exposure) and higher levels of training and education.

Member States authorities will see relatively small impacts – however, these will depend strongly on the current situation, depending on whether they have already put into place some or all of the envisaged measures or not. Also, the costs, revenues and jobs affected will depend on whether Member States implement some of the activities within authorities (e.g. training, control) or delegate this task to designated authorities. Any overall figures are therefore not particularly meaningful and these need to be assessed by the individual Member States, when they implement the Thematic Strategy and devise their National Action Plans (NAPs). The only measure that will have a clear impact is the collection of data on pesticides sales and use. Additional costs (in comparison to the situation today) are in the order of € 9 million / year. This would translate into the creation of up to 180 jobs in the authorities. Furthermore, the collected data can be used for multiple purposes and costs can be reduced if collection is carried out in combination with other activities of the authorities (e.g. monitoring and control for purposes of cross compliance or other support payments).

The PPP industry and supply chain will have to bear the brunt of the economic effects. In fact, the expected use reduction of 37000 to 44000 tons active substances per year would correspond to a loss in turnover of between € 770 million and 1100 million. In addition there might be additional costs of € 40 to 80 million for setting up container management schemes. This might lead to a loss of jobs in the production and distribution chain of 1700 to 2000 jobs, whilst 200 might be created

for the container management schemes. The PPP industry might be able to contain these losses by offering more advisory services to farmers (in particular for implementing IPM) and through the development of new, more selective active substances, which present lower risks and sell at higher prices. In this way, the larger part of the use reduction would affect older (and cheaper) active substances for which Research and Development oriented companies are competing with generic manufacturers.

Other sectors of the manufacturing and service industries are set to benefit from the measures of the Thematic Strategy. There will be estimated revenues of € 250 million for training and certification institutions translating into 2500 additional jobs, revenues of € 90 million and around 1000 jobs in testing and control institutions for sprayers, € 40 million revenue and 500 jobs in equipment maintenance companies, and revenues of around € 130 million corresponding to around 900-1300 jobs in agricultural advisory services (in particular to advise farmers on IPM). Consequently, the job losses in the PPP producing and distribution chain would be more than compensated by new jobs in other industry and service sectors (overall balance: ca. + 3000).

In summary, the expected overall socio-economic impacts on the agricultural, industry and service sectors are positive. However, as the current situation in the Member States with regard to the various measures is very diverse: some have already all measures in place, whereas others have done so only partly or not at all. It is not possible to quantify the impacts of the Strategy for each Member States individually as this would require massive further investigations. Nevertheless, a qualitative assessment is possible, and this is contained in Table 7-2.

Table 7-2: Qualitative assessment of impacts in the Member States

Measure	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	SE	SI	SK	UK
Training	1-2	1-2	1-2	?	1-2	1	1-2	1-2	1-2	1-2	1-2	?	3	1-2	1-2	?	1-2	3	1-2	1-2	3	1-2	1-2	?	1-2
Sprayers	1	1	3	1	1	1	3	3	3	3	3	3	3	1	1	?	3	3	1	1	3	3	1	3	3
Aerial spraying	2	2	2	2	1	2	3	2	2	1	2	1	2	2	2	?	2	3	1	2	2	2	3	?	1
Water protection*	1	1	3	1	1	1	?	1	1	?	3	?	3	1	1	?	1	?	1	?	1	1	?	?	1
Reduced PPP-use	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Packaging	3	1	3	3	1	2	3	3	2	2	3	1	3	3	3	1	3	3	2	3	3	2	3	3	3
Data collection	1	1	1	1	1	1	1	1	1	2	?	?	1	1	1	1	1	1	1	1	1	1	1	1	1
IPM	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Use reduction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1-2	1-2	2-3	1-2	1-2	1-2	2-3	2	2	2	2-3	2-3	2-3	1-2	1-2	1-2	2	2-3	1-2	2	2-3	2	2	2-3	2

1 = no or minor change/impact; 2 = medium change/impact; 3 = strong change/impact

* will depend strongly on decisions in river basin management plans

It is expected that in nine Member States, impacts will only be minor to medium, in eight Member States they will be medium and in eight Member States they will be medium to strong.

More important, all recommended options are correlated with a more pronounced risk reduction for environment and health (in addition to the farmers also for bystanders and consumers). Agricultural produce will contain lower levels of residues leading to reduced dietary exposure of consumers.

Water will be less polluted, leading to reduced treatment costs for water companies and possibly lower costs for consumers. Bystanders (including residents in the neighbourhood of crop growing areas, visitors of parks, children in playgrounds) will be less exposed. Last but not least, reduced losses of pesticides into the environment (in particular in the sensitive Natura 2000 sites) will be beneficial for flora and fauna as non-target organisms will be less exposed. This will have significant benefits for biodiversity.

As explained in Chapter 5.1, none of these effects can be quantified with confidence and then monetised. However, if the figures resulting from the study in Germany that is mentioned there were used and assuming that the Thematic Strategy would reduce these externalities by two thirds, the resulting benefits would be in the order of € 600 million.

Despite the remaining flexibility in some of the proposed measures, they will – if implemented - improve the situation with respect to harmonisation throughout the Community. They will therefore contribute to a more equal level of protection of health and the environment and improved living conditions, which are among the fundamental objectives of the Treaty.

8. MONITORING AND EVALUATION

8.1. How will the strategy be implemented?

The Thematic Strategy on the Sustainable Use of Pesticides is presented in the form of a Communication outlining the overall approach and the purposes and extent of the different actions envisaged as well as the non envisaged actions.

Wherever possible, measures will be implemented through integration into existing Community legislation and policies, such as Directive 91/414/EEC (and its upcoming revision), the Common Agricultural Policy (CAP), the Water Framework Directive and the Research Framework Programme.

To implement the measures that cannot be integrated into existing instruments, the Communication will be accompanied by a Directive establishing a framework for Community actions to achieve a sustainable use of pesticides. Therefore implementing the strategy is a matter of realising the various different types of actions envisaged in the strategy, rather than simply pursuing a single measure. Elements of the implementation will include:

– Development or revision of Community legislation, subsequently to be transposed and implemented by the Member States.

– Actions at the level of the Member States or below, where Community action is not considered appropriate.

– Undertaking further studies, assessments and research to fill gaps in knowledge about the pesticides use problem and its possible solutions.

In the light of the outcome of this impact assessment, it is appropriate to require that Member States implement a set of mandatory measures, but to leave a certain level of flexibility in order to adapt the mandatory measures to the local needs and circumstances.

In order to maintain overall coherence, Member States will be required to set up national action plans involving all aspects of the Thematic Strategy on the sustainable use of pesticides. These National Action Plans should be developed, implemented and revised in collaboration with all concerned stakeholders.

The need for a holistic approach will also be ensured at Community level with a Thematic Strategy Expert Group involving the Commission, the Member States and all other relevant stakeholders for continuous improvements and developments of appropriate guidance, best practices and recommendations.

Although the need for and feasibility of improved data schemes for collecting data on pesticides sales and use are demonstrated in this impact assessment, a concrete proposal for legislation will be presented only at a later stage as the necessary details still have to be worked by experts from the statistical offices of the Commission and the Member States.

8.2. How will the strategy be monitored and reviewed?

Further to the revision process foreseen in their national action plans as described above, Member States will be required to report to the Commission about the concrete details of the measures and actions put in place.

In the future, Member States will also have to report data on pesticides sales and use and – once they are available - the calculated indicators expressing risks for human health and the environment. Common and harmonised indicators are important in order to measure trends in risk reduction within and among the Member States. At the moment there are no harmonised risk indicators available and agreed yet. This work is currently carried further in a project financed under the 6th Framework Programme on Research and Development: HAIR (HArmonised environmental Indicators for pesticide Risk)[132]. It will be finalised in spring 2007.

Once this work is finalised, a common set of risk indicators should be agreed by the Commission and the Member States and be made binding for all Member States for regular reporting. Until that time, Member States can continue to use their current indicators (even if only volume based).

Further information on the occurrence of pesticides and their residues in environmental media would be of interest in order to monitor whether the real application of pesticides does not lead to unacceptable values in the environment as calculated in the risk assessments under Directive 91/414/EEC. This goes in particular for concentrations in water (both surface and groundwater) and soil. Monitoring of pesticides in these media can best be achieved by integrating the necessary activities in those ongoing under the Water Framework Directive and the future Thematic Strategy on Soil, if such activities are carried out in the framework of these instruments.

As many of the measures constituting the Thematic Strategy necessitate a sufficient degree of subsidiarity, it will be necessary to exchange information among the Member States about their national action plans and precise solutions that they have found and to develop all necessary guidance and best practices. The draft Framework Directive, will therefore establish a consultative forum the *Thematic Strategy Expert Group* to develop guidance on best practices and monitor the implementation of the Thematic Strategy, among others through:

- exchange of information and experience as reported by the Member States when implementing the Thematic Strategy (lessons learned in the past in some Member States will also be fully taken into account);

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132 All information available at : http://www.rivm.nl/stoffen-risico/NL/hair.htm

- harmonisation of necessary technical guidelines and best practices, where relevant, for all measures mentioned above;

- establishment of a set of indicators, based on which quantitative objectives of risk reduction can be established and progress measured;

- mutual information on ongoing developments and progress achieved – including the setting of targets, where appropriate.

In the light of the outcome of this information exchange and the deliberations of the Thematic Strategy Expert Group, the proposed measures will be regularly reviewed and amended as appropriate.

Annexes to the Impact Assessment
for the
Thematic Strategy on the Sustainable Use of Pesticides

9. ANNEX 1: RESULTS OF THE STAKEHOLDERS CONSULTATION ON THE COMMUNICATION 'TOWARDS A THEMATIC STRATEGY ON THE SUSTAINABLE USE OF PESTICIDES'

In its Communication 'Towards a Thematic Strategy on the Sustainable Use of Pesticides' of July 2002, the Commission launched a broad consultation of all stakeholders and institutions.

The Communication recollected on the basis of preliminary studies the shortcomings of the current situation with regard to the use stage in the life cycle of plant protection products. The Communication included background elements and presented a list of essential points to be addressed. It discussed possible measures to inverse negative trends and address the use stage more specifically. No priority was defined in the presentation of these measures: they were all considered as contributing to the general goal of reducing the risks associated with the use of pesticides, based on the preliminary studies conducted during the preparatory phase.

In the following, the proposals presented in the Communication and the reactions from the major stakeholders are summarised. Consultation encompassed the Council, the European Economic and Social Committee, the European Parliament and more than 150 contributions from diverse stakeholders (via the Internet and via a Stakeholders Conference in November 2002[133]).

Overall, there was a lot of support from all stakeholders for most of the measures discussed. Institutions and other stakeholders did differ, though, on the details – for example, whether a measure should be implemented at Community level or Member State level, or whether it should be legally binding or voluntary. The most controversial debate has been about aerial spraying, quantitative use reduction targets, and taxation, where the opinions from the various stakeholders have been totally opposed. For example Environmental NGO's argued for a total ban of aerial spraying, introduction of mandatory use reduction targets, and taxes/levies on pesticides sales. Farmers and industry opposed all of these. Several Member States also opposed the setting of taxes at Community level.

9.1. National Plans to reduce hazards, risks and dependence on chemical control (National Action Plans)

(a) Communication: *The Commission proposed that all Member States establish national action plans within two years and report regularly, with the aim of reducing hazards, risks and dependence on chemical control. Reduction measures for all areas under the control of public authorities should be exemplary parts of these plans. The plans should be closely co-ordinated or integrated with similar actions under other Community legislation such as the river basin management plans under the Water Framework Directive and the rural development plans under the CAP.*

(b) Opinions from the consultation: The **Council** agrees that national plans should be established in all Member States and cover a large number of national measures, which might be used. The Council asks for a maximum degree of subsidiarity for Member States when developing those national plans. It requests the Commission to provide only guidance on key measures for these

[133] All opinions submitted are available at: http://www.europa.eu.int/comm/environment/ppps/home.htm

national plans. Measures contained in different national plans should take into account already existing reduction programmes as well as the prevailing conditions for agricultural production and the state of the environment in regions and Member States.

The **EP** asks for binding and effective goals and timetables to be established for each Member State via national reduction plans. It wants the plans to comprise mandatory and voluntary measures and to cover, among others, the following aspects:

- assessment of existing situation at Member State level
- awareness raising campaigns
- designation of vulnerable zones
- monitoring in environmental media
- regular progress reports by Member States on the implementation of reduction programmes
- crop protection licenses, drift reduction measures, disease prevention measures, approval of spraying equipment

The **EESC** supports the establishment of national action plans and common EU criteria, guidelines and other parameters for the measures to be taken to avoid distorting competition in the internal market. Many of the remaining measures in the proposed strategy ought to be incorporated into these national plans, which should be assessed at regular intervals.

Whilst all **other stakeholders** support the idea of setting up national action plans, opinions are divided on how this should be done. Industry and farmers favour maximum flexibility for the Member States and full subsidiarity. Environmental NGOs, on the other hand, support a rather prescriptive approach with mandatory requirements regarding the content, targets, and timetables of such national action plans.

9.2. Enhanced protection of the aquatic environment

(a) Communication: The Commission underlined that it is fully committed to the successful implementation of the Water Framework Directive (WFD). The Commission proposed *to introduce, within the context of the Common Implementation Strategy for the Water Framework Directive, best practices in river basin management such as mandatory field margins or specific agreements between water companies and farmers*.

(b) Opinions from the consultation: The **Council** has not addressed this issue.

The **EP** recommends the designation of pesticide vulnerable zones where use is banned or severely restricted such as drinking water collection or abstraction zones. It also asks the Commission to establish a system of compulsory protection zones for all surface water at European level, whereas the protection zones should be adjusted at regional level in order to take into account the specific characteristics of the region and the potential risks.

The **EESC** considers it important to take into account local conditions when details of how to achieve the necessary protection will be established regarding the protection of the aquatic environment. To the extent that these areas need extra protection, this ought to be made clear in the Water Framework Directive that deals with the whole range of threats.

Opinions from **other stakeholders** are divergent. Industry considers that full implementation of the Water Framework Directive, and in particular the river basin management plans that are being set up, is sufficient and no other measures are necessary. Environmental NGOs do not agree, in

particular due to the fact, that the Common Implementation Strategy is not efficient, as it will not foresee binding measures (only non-binding recommendations).

9.3. Defining areas of strongly reduced or zero pesticide use

(a) Communication: The Commission proposed that *Member States introduce measures to increase the protection of environmentally sensitive areas by reducing the overall use of PPP and defining areas of zero PPP use*.

(b) Opinions from the consultation: The **Council** has not addressed this issue.

The **EP** supports the designation of 'pesticide-free' zones, such as areas for drinking water abstraction, school grounds, playgrounds and parks in order to protect children, and in areas close to inhabited zones.

The **EESC** underlines the importance of special precautionary measures in particularly sensitive areas, e.g. water protection areas and areas defined according to Natura 2000, but local conditions have to be taken into account.

Other stakeholders (in particular industry) underline that it might not be possible to define zero-pesticide use areas in specifically protected zones such as under Natura 2000.

9.4. Ban of aerial spraying

(a) Communication: The Commission proposed a general ban of aerial spraying. Specific derogation may be given by the national authorities of the Member States if aerial spraying represents clear advantages and also environmental benefits compared to other spraying methods.

(b) Opinions from the consultation: The **Council** has not addressed this issue.

The **EP** fully supports the recommendation for a ban of aerial spraying.

The **EESC** has not addressed this issue.

Opinions of **other stakeholders** were strongly divided. Whilst environmental NGOs and individuals supported the Commission's view (even insisting on not foreseeing any possibility for derogation), professionals directly concerned by such a ban, e.g. rice and wine growers, helicopter organisations, strongly opposed such a ban. They considered a general ban unfeasible, as there are many situations, where there is no practical alternative.

9.5. Epidemiological and residue monitoring studies

(a) Communication: The Commission proposed that the Member States, including through possible Community funded research programmes, initiate mid to long-term epidemiological research on PPP users at risk and launch broad investigation and monitoring programmes on pesticide residue levels for consumers, with particular emphasis on groups of the population at particular risk. National monitoring efforts should be co-ordinated for better efficiency with enhanced support by the FVO.

(b) Opinions from the consultation: The **Council** has not addressed this issue.

The **EP** calls on Member States to carry out mandatory and frequent monitoring of pesticide concentrations in environmental media, as well as of residues in food in a harmonised way.

The EP urges the Commission to set up EU-wide databases containing all national monitoring data, which should be made accessible to the public and the information should be actively disseminated.

The EP also calls on the Commission to propose a legally binding EU-wide pesticide pass in which the producer indicates the use of all pesticides on each product in order to facilitate controls. The EP asks for an approximation of information systems relating to contamination caused by pesticides and stresses the necessity to conduct further research on the environmental impacts on the effects which pesticides have on health.

The **EESC** asks for not allowing a higher level of residues in imported products than in goods produced within the Community.

9.6. Research programmes

(a) Communication: The Commission proposed to support or create together with the Member States research and development efforts and calls on industry to contribute to the activities. Such research and development should concern: economic data on pesticides use, less hazardous methods of application and handling of pesticides, IPM techniques as part of ICM, improved insurance schemes against potential crop losses, potential synergistic and antagonistic effects of PPPs, quantification of point source pollution and practical solutions to address related hazards, improved methods to assess the chronic and acute risks from residues to infants and children when establishing MRLs to safeguard their health.

(b) Opinions from the consultation: The **Council** has not addressed this issue.

The **EP** urges the Commission to expand financial support of research and promotion activities specifically intended to develop alternative pest control methods and systems.

The **EESC** has not addressed this issue.

From the **other stakeholders**, NGOs supported the establishment of mandatory requirements on research in all these areas.

9.7. Quantitative use reduction targets

(a) Communication: The Commission affirmed that an increase (or a reduction) in the total volumes of pesticides sold/used is not necessarily equivalent to an increase (or a reduction) in the risks associated with their use. In practice, different PPP pose different types and levels of risk depending on a whole set of factors that are the basis of the risks. In this context, it clearly appears that the volume applied is only one of the factors that are at the basis of risks associated with the use of pesticides. Therefore, the Commission did not propose to establish quantitative reduction targets.

(b) Opinions from the consultation: The **Council** has not addressed this issue directly but recalls that Decision No 1600/2002/EC laying down the Sixth Community Environment Action Programme determines that reducing the impacts of pesticides on human health and the environment and more generally to achieve a more sustainable use of pesticides as well as significant overall reduction in risks and of the use of pesticides consistent with the necessary

crop protection should be one of the objectives and priority areas for action on the environment and health and quality of life.

The **EP** stresses the need for urgent and mandatory complementary action on pesticide use reduction and therefore calls on the Commission to speed up the process of developing binding and effective measures and to define clear goals and timetables for each Member State, taking into account reductions already achieved in some Member States since the implementation of their national reduction plans.

Quantitative reduction targets are to be achieved by adopting a mix of mandatory and voluntary measures. The EP recommends an assessment of the existing situation regarding pesticide use and impacts and the consequences of the implementation of various reduction scenarios, including cost-benefit analysis for scenarios which include evaluation of the external costs on a scientific basis.

The **EESC** considers that reducing risks associated with the use of pesticides is the focus of the strategy, but that it is also important to seek to reduce the scale of use. This can be achieved through more effective utilisation, adapting use to requirements, improved methods and other measures relating to use. Reduced use can lead to reduced risk. The EESC invites the Commission not to forget use-reducing strategies for non-agricultural areas.

Opinions among **other stakeholders** are strongly diverging. Industry and farmers are strictly opposing any form of mandatory use reduction, which is considered arbitrary and not at all linked to risk reduction. Environmental NGOs introduced legally binding targets and timetables for the Member States in their proposal for a Directive on a European Pesticides Use Reduction Strategy.

9.8. Improved systems for the collection of information on production, import/export, distribution and use and enhanced monitoring measures on compliance including annual reporting

(a) Communication: The Commission proposed relevant mandatory requirements within two years of the adoption of the thematic strategy for ; a) the reporting of production and import/export quantities of PPPs by producers and distributors to national authorities ; b) the reinforcement of ongoing work on the collection of data concerning use (quantities of PPPs applied per crop, product, area, time of application…); c) the reinforcement of the system of inspections / monitoring of uses and distribution of PPP by wholesalers, retailers and farmers in a co-ordinated way. The Commission has also indicated that compliance needs to be assured through adequate monitoring measures.

(b) Opinions from the consultation: The **Council** has not addressed this issue.

The **EP** stresses the need to collect, in a harmonised way, sales and use data for all user categories as well as import and export data**,** and to make publicly available all information per active ingredient. The EP also calls for regular reports to be submitted by the Member States on the implementation of national action plans. The EP urges the Commission to set up EU-wide databases containing all national monitoring data.

The **EESC** considers that it is important not to build up reporting systems and administration ('red tape') with the associated costs unless there is a clear benefit to be gained from them. The information to be provided by users should be of such a kind that they feel it is worthwhile in production terms to collect the information. The EESC does not yet take a view on reinforced 'cross-compliance' as it is necessary to get a clearer idea of how such rules would be framed.

From the **other stakeholders**, industry and farmers voiced concern that the burden and administrative effort for a very extended mandatory data collection system might not be justified by the benefits that could be gained from obtaining the data.

Environmental NGOs requested the introduction of obligations for mandatory record keeping by pesticide distributors and users, which should be regularly inspected and collected.

9.9. Collection of PPP packaging and unused products and other measures connected to the handling of products

(a) Communication: The Commission suggested the *introduction of a system of regular and safe collection, possible re-use and finally controlled destruction of PPP packaging and unused products.*

(b) Opinions from the consultation: The **Council** has not addressed the issue.

The **EP** stresses the need to introduce the concept of producer or importer responsibility for the recovery and safe disposal of all pesticide packaging, pesticides past their expiry date and revoked pesticide products by way of a mandatory deposit-refund system. Moreover, the EP asks the Commission to address the specific problems arising from filling and cleaning as important point sources of emissions and to propose measures to collect and treat remaining pesticides. The EP also calls for particular attention to be paid to the use of pesticides in containers for the shipment of goods and the health and safety risk for those who treat, or are in the vicinity of, those containers.

The **EESC** considers it important that in drawing up the rules for the collection of packaging containing pesticide residues it is made possible to co-operate in the collection of other dangerous waste, e.g. batteries, waste oil and fluorescent lamp tubes. There are many good examples of campaigns organised in various Member States (e.g. Germany and Belgium) to collect used pesticides and packaging. It is important to raise awareness of contamination connected with the filling and cleaning of equipment and with the handling of packaging.

Other stakeholders agree to the necessity of having collection and recycling systems in place. However, industry pointed out that in many Member States such systems are already working well and that the current situation should be analysed before new requirements are set up. Environmental NGOs call for the establishment of mandatory systems, to be set-up by industry and specifically authorised by the Member States.

9.10. Compulsory control of application equipment

(a) Communication: The Commission announced its intention *to propose the introduction of a compulsory system of regular technical inspection of application equipment.*

(b) Opinions from the consultation: The **Council** calls on the Commission to consider the usefulness of establishing requirements for plant protection equipment and maintenance of the equipment.

The **EP** calls for mandatory requirements relating to technical equipment, preparation, storage and application, as well as measures to control and monitor compliance with these requirements.

The **EESC** supports the proposed measures to introduce technical inspection of spraying equipment that should be made compulsory.

All **other stakeholders** are also in favour of setting standards for application equipment and requiring regular inspection and certification.

Members of various working groups in CEN and ISO pointed out that these two organisations have already developed relevant standards and continue to do so.

9.11. Creation of a system of mandatory education, awareness raising, training and certification for all PPP users (farmers, local authorities, workers, distributors, traders and extension services)

(a) Communication: The Commission announced its intention to propose requirements to *create a system of mandatory education, awareness raising, training and certification for all PPP users (farmers, local authorities, workers, distributors, traders and extension services). The training should put emphasis on safe use, covering both human health and environmental aspects. It would further contribute to the free movement of workers through common and recognised training requirements. Best practice guidelines for the most essential parts of the training should be developed. This could be done against the background of the education programmes provided for in article 9 of Chapter III of Council Regulation (EC) 1257/99.*

(b) Opinions from the consultation: The **Council** recommends that national plans should cover a large number of national measures to achieve the objectives outlined by the Commission, as for instance information, advice, and training. The Commission is asked to take into account differences between Member States, when proposing guidelines for training, education and advice of the users of pesticides to be included in national plans.

The **EP** recognises that improved knowledge of the individual pesticide user is a prerequisite for changing behaviour and hence training, education and the dissemination of information should be a crucial element of the thematic strategy. For the training of farmers and operators, the EP would like to see a comprehensive framework or guidelines being developed and measures to raise awareness being adopted. This will include information campaigns, advisory services development, mandatory basic training and continued training and certification of all professional users, advisory officers and dealers with particular emphasis on low-pesticide pest-control systems and non-chemical alternatives, and special information for private purchasers. The EP sees those measures as part of the national action plans.

The **EESC** supports the proposed measures to require training and qualification for all pesticide users (farmers, farm workers, seasonal workers, etc.). Several surveys in different Member States indicate that training of and providing advice to users can significantly curb risks. Training should also be given to increase knowledge and understanding of existing legislation. Training and qualification should be made compulsory. The EESC also takes the view that it is important to keep the public constantly updated on pesticide-related risks and what can be done to reduce the risks.

Other stakeholders (consumers, retailers, farmers) also recall that knowledge about the risks and hazards of pesticides and educational measures to increase this knowledge are of major importance. Access to information should be facilitated.

9.12. Comparative assessment and Substitution principle

(a) Communication: The Commission proposed to amend Directive 91/414/EEC in order to include among other modifications the substitution principle. The Commission announced that it will study feasibility and possible methodologies for its application in practice. Member State

Rapporteurs should then carry out comparative assessments under appropriate conditions (which need to be defined) when evaluating active substances, taking due account of possible resistance problems.

(b) Opinions from the consultation: The **Council** has not addressed this issue directly but recalls its earlier conclusions on the Commission's 10-year report on the functioning of Directive 91/414/EEC, where the Commission is asked to study the feasibility of introducing the concept of comparative assessment into the Directive.

The **EP** emphasises the need to include, in the revision of Directive 91/414/EEC, the substitution principle, the precautionary principle and comparative assessment (including non-chemical alternatives), but notes that this principle should also be the basis for action at national level.

The **EESC** welcomes the revision of Directive 91/414/EEC and aspects such as the substitution principle and regional tests are regarded as positive. The EESC is assuming that the Commission proposal will allow reasonable periods of time for the phasing out of substances under the substitution principle, in order to reassure the manufacturers and give them an incentive to develop new, less harmful substances.

Opinions among **other stakeholders** are strongly divided. Environmental NGOs and consumer organisations are strongly supporting the inclusion of the principle in Directive 91/414/EEC and are even contributing to the preparatory work by organising workshops and seminars to work out the details. Farmers and industry are strongly opposed, arguing that the Directive should only evaluate substances against the established safety criteria. When found acceptable, substances should be included Annex I without comparing their properties against others. Choice of the most appropriate and least risky substance should be left to the individual farmer, and as a maximum be taken during national authorisation. This would be the only way to ensure effective resistance management.

More recently, in the discussions about impending bans of individual substances under review, many Member States have advocated the use of comparative assessment before bans are adopted.

9.13. Promotion of low-input farming and cross-compliance for CAP support measures

(a) Communication: The Commission e*ncourages the use of low-input or pesticide-free crop farming particularly by raising user's awareness, promoting the use of codes of good practices and consideration of the possible application of financial instruments. The Commission proposes to implement the current provisions more rigorously and exploit them fully. The Commission will include pesticides issues in the discussion on the future evolution of Good Farming Practices as a policy tool.*

(b) Opinions from the consultation: The **Council** calls on the Commission to include in the thematic strategy a proposal for an EU framework for the development of Integrated Pest Management (IPM) and Integrated Crop Management (ICM) as one of the tools that could be used in national plans to achieve the sustainable use of pesticides. The framework should provide the possibility to develop EU guidelines, including a definition and essential requirements of IPM/ICM, while taking into account regional/local conditions and international agreements. Moreover, the Commission is invited to promote further the use of low-input or pesticide-free crop farming, especially the appropriate use of organic farming.

The **EP** stresses that national action plans should contain definitions of ICM for each major crop to be established by independent experts and calls for expanded financial support for the development of various biological alternatives, the crops' own resistance and farming methods capable of minimising the use of pesticides. The EP also stresses the need for preference to be given, whenever possible, to organic methods of pest control and to the use of sound farming practices, rather than the use of pesticides.

The EP considers an integrated crop protection policy to be an absolute necessity. IPM should be made mandatory for public authorities and the Commission should lay down clear definitions and minimum criteria in this respect and set deadlines for the mandatory application of ICM on all cultivated land not yet in organic farming. ICM/IPM should be proposed as a common basic requirement for the authorisation of any pesticide. The EP urges Member States to exploit fully the provisions laid down in Regulation 1257/1999 and insists that financial incentives for conversion to low-input and organic agriculture should be strengthened.

The **EESC** underlines that the overriding long-term objective should be to make farming less dependent on chemical pesticides. Efforts should concentrate on developing various biological alternatives, the plants' inherent resistance and farming methods which could minimise pesticide use. The EESC is open to the idea of supporting a whole range of practices that in different ways reduce both utilisation and risks through a number of possible ways of taking better account of environmental aspects in agricultural policy. The 'second pillar' of the CAP will give Member States the opportunity to compensate farmers who succeed in reducing the risks involved in their use of chemical plant protection products.

Other stakeholders are also in favour of promoting low input farming. Industry considers this a cornerstone for a successful implementation of the strategy. Many concepts of IPM/ICM exist already (also specifically defined by large food retailers). The Commission will have an important role in providing for the necessary information exchange and some form of standardisation, however, leaving the necessary flexibility for meeting local needs. Environmental NGOs and one farmer organisation call for setting targets and timetables and establishing the right incentives to shift into less intensive pesticide use practices and pesticide-free alternatives. They ask for a clear definition of ICM and a general obligation to use ICM as the minimum standard for CAP payments.

9.14. Taxes/levies

(a) Communication: The Commission proposed *not to develop a fully-fledged EU-wide scheme of levies on PPPs that would reflect real marginal externalities. Further research into the full costs and benefits (including externalities) of using PPPs or alternative methods will be necessary first. The Commission considers that, if such a levy was to be introduced, Member State should be encouraged to apply tax differentiation, taking into account the general principles of the EC Treaty and their specific environmental concerns. Taxation should provide sufficient incentive to pesticide users to opt for pesticides less harmful for the environment in the particular context of the Member State concerned and contribute to internalise at least partly the external effects of the use of PPPs. It could further contribute to the financing of a number of measures under the national risk reduction plans and research and development as proposed in various earlier points.*

(b) Opinions from the consultation: The **Council** calls on the Commission to consider the potential for economic instruments at all appropriate levels as one of the means to achieve sustainable use of pesticides.

The **EP** has not addressed the issue. Initial proposals to introduce such a levy were defeated in plenary.

The **EESC** thinks that an environmental charge levied on pesticides can be justified, partly to reduce their use and partly for collective funding of certain activities. Since many of the measures of the thematic strategy envisaged by the Commission require funding, it is reasonable for the users of pesticides to meet part of the costs.

It would therefore be conceivable to levy a very limited charge for every kilo of active substance used, with a view to financing some of the proposed measures, such as information and training and the national risk-reduction plans.

However, a limited charge would also further push up the cost of production in the EU. To avoid a distortion of competition, the EESC is inviting the Commission to seek to ensure that corresponding charges are also introduced in other countries.

Opinions of **other stakeholders** are divided. Industry and farmers are opposing strongly any move to introduce an environmental levy or pesticide tax. Environmental NGOs are in favour of such a measure.

9.15. Harmonisation of VAT

(a) Communication: The Commission *proposed that the harmonisation of VAT at the normal Community rate should be considered as the necessary first step to respect the requirements of a single market and to reduce risks of illegal imports.*

(b) Opinions from the consultation: The **Council** calls on the Commission to consider the potential for economic instruments at all appropriate levels as one of the means to achieve sustainable use of pesticides.

The **EP** welcomes the proposed elimination of provisions allowing Member States to apply reduced VAT rates for pesticides.

The **EESC** considers that one prerequisite for an effective internal market with a level playing field is the harmonisation of VAT rates on pesticides.

Other stakeholders also expressed support for such a harmonisation of VAT.

9.16. Development and use of indicators

(a) Communication: The Commission *proposed that Member States report regularly on progress with national risk reduction programmes. Pending the development of harmonised indicators, they should report on progress by using the most suitable indicators currently available to them.* The Commission announced that it *and the Member States should actively contribute to the international development of indicators (in particular within the OECD) and their subsequent use*.

(b) Opinions from the consultation: The **Council** is supportive of developing suitable indicators to measure the progress on national risk reduction plans. Such indicators shall take into account the work done by Member States and the OECD. Indicators may also take into account the specific risks of plant protection products and national risk mitigation measures and the Commission should therefore develop a system leading to comparable statistics on pesticides.

The **EP** notes that a variety of indicators exist - including sales volumes, use volumes, use patterns, treatment frequency, residues in food and environmental media, the percentage of land in organic farming and the percentage of farmers adopting Integrated Crop Management (ICM). If used in combination they are suitable for measuring progress. The EP, therefore, calls on the Commission to use those indicators while continuing to work on the development of agreed environmental load indicators.

The EP considers that Member States should carry out mandatory and frequent monitoring of pesticide concentrations in environmental media as well as residues in food in a harmonised way.

The **EESC** finds it necessary to have a suitable system, like indicators, for showing the results of measures taken, in order to be able to assess them and make improvements.

To measure the change in residues in foodstuffs or in the blood of users, it is technically possible to carry out chemical analyses. As regards the monitoring of reduction of risks to the ecosystem and to water, the EESC supports the Commission's proposal to find indicators which do not focus on quantity used, but focus on the properties of the preparations concerned and of how they are handled in use.

All **other stakeholders** support the development of indicators as a necessary tool to measure progress. In particular environmental NGO's, recommend that in a first instance the frequency of use indicator (as developed by Denmark) should be used to establish and assess the implementation of use reduction objectives.

9.17. Involvement of stakeholders

(a) Communication: The Commission suggested that broad participation by all parts of society, particularly farmers, their unions, extension services and the public authorities should be encouraged when designing the specific programmes, targets and timetables.

(b) Opinions from the consultation: The **Council** calls on the Commission to explore how different stakeholders, inter alia producers, distributors, users and consumers, may contribute to achieving sustainable use of pesticides.

The **EP** has not addressed this issue in its Resolution.

The **EESC** insists on the involvement of all stakeholders in the process of developing national plans while establishing criteria, guidelines and parameters for the measures to be taken at EU level.

All **other stakeholders** who contributed during the consultation process appreciated to be closely involved in the forthcoming process of developing the thematic strategy itself.

9.18. Candidate countries

(a) Communication: The Commission proposed that in close co-operation with candidate countries, specific support programmes be developed, which target the handling of stocks of obsolete PPP and their safe destruction. Such programmes should start with the identification and quantification of the existing and expected stockpiles (How big is the problem?) and then propose appropriate disposal measures (preferably within the national hazardous waste management plans). Member States should provide technical (and if necessary financial) support to build the necessary administrative capacity to develop and manage such disposal programmes.

The Commission also proposed continued support of candidate countries for the pilot agri-environmental schemes, as established under the SAPARD Regulation, to develop them further, in particular in view to reducing risks associated with the use of pesticides, so that these schemes will be correctly established as a part of rural development schemes once accession takes place.

(b) Opinions from the consultation: **The Council** calls on the Commission to keep in mind the situation in third countries concerning the use of pesticides and to ensure consistency between the EU's internal and external policies and relevant international agreements.

The **EP** calls on the Commission to develop an EU-wide fund financed by both Member States and industry in order to ensure a safe disposal of stocks of obsolete pesticides in candidate countries and requests the Commission to lead global action and enforce producer responsibility to prevent future stocks.

9.19. International aspects

(a) Communication*:* The Commission has already proposed *to the Council the necessary legislation to ratify and implement the Rotterdam Convention on Prior Informed Consent including an amendment of Regulation 2455/92*(adopted in the meantime). The Commission has also *presented the necessary proposals for ratification and implementation of the Stockholm Convention on Persistent Organic Pollutants (also done in the meantime).*

It was also underlined that t*he Commission and the Member States will have to contribute to the technical and financial assistance provided for in the Conventions, as well as in specific bilateral agreements (such as with the ACP countries). In addition, they should increase their commitments under particular programmes, such as research on DDT alternatives to combat malaria (in the framework of the Community initiative on communicable diseases), capacity building for the management of chemicals, and support to enable developing countries to substitute pesticides no longer authorised in the EU and to prove compliance with Community MRLs on agricultural produce. The Commission will also seek to collaborate with the NIS on the management of chemicals.*

The Commission and the Member States will continue to take part in work under the Codex Alimentarius to ensure that Codex MRLs provide for adequate protection of human health and to minimise the risks of challenges of Community measures under the WTO.

(b) Opinions from the consultation: The **Council** calls on the Commission to keep in mind the situation in third countries concerning the use of pesticides and to ensure consistency between the EU's internal and external policies and relevant international agreements.

The **EP** stresses that development aid should focus on capacity building within third countries and on minimisation of pesticide use, organic agriculture, ICM and IPM.

9.20. Format of the Thematic Strategy

(a) Communication: The 6th Environment Action Programme does not define the legal form of the thematic strategies. The Commission therefore has full flexibility to choose the most appropriate form. In the Communication, the Commission considers that *in implementing the strategy, the Community and the Member States could use many different instruments: legally binding measures, (economic) incentives, research or voluntary measures. Combination of all types of instruments is also possible. Many measures could most effectively be integrated in already existing or currently developing related policy areas*.

(b) Opinions from the consultation: The **Council** notes that the thematic strategy should complement the existing legal framework by targeting the use-phase of plant protection products.

It calls for coherence in the development of the strategy and the revision of Directive 91/414/EEC in order to contribute to sustainable use of pesticides while taking the principle of subsidiarity fully into account.

The **EP** stresses the need for urgent and mandatory complementary action in addition to Directive 91/414/EEC and calls on the Commission to develop binding and effective measures.

The EP urges the Commission to co-ordinate the internal work on drawing up the proposals for a thematic strategy and an amended Directive 91/414/EEC. The thematic strategy should be designed as an umbrella for existing and future legislation and the Commission should propose an effective and enforceable mix of instruments. Any new requirement should not weaken existing environmental protection and should take the form of minimum standards.

The **EESC** considers that this strategy should operate as an umbrella framework and include existing legislation, probably also proposing new legislation. It notes the importance of clarifying the role of the future strategy, taking care to avoid overlaps between legislation at different levels, both European and local, at the risk of causing confusion and increasing costs.

Opinions of **other stakeholders** are widely diverging. Whilst many (in particular farmers) do not consider additional measures necessary, environmental NGO's request the Commission to present ambitious legislative proposals. Several NGO even submitted jointly the text of a draft 'Directive on pesticide use reduction in Europe (PURE)'.

10. ANNEX 2: RESULTS OF THE FINAL STAKEHOLDERS CONSULTATION (INTERACTIVE POLICY MAKING)

The final public consultation received 1770 responses. The vast majority of the measures proposed were regarded as of high or medium priority by all stakeholders. So were the details proposed for the content of training measures, requirements for aerial spraying (several NGO's sent additional letters expressing their continued support for a ban on aerial spraying), and the content of national action plans (NAPs). For training, the majority supported a repetition frequency of one every three years and for the inspection of sprayers opinions were divided between frequencies of every year and once every two years.

Opinions were clearly split (with equal support for yes or no) on taxation, designation of areas of reduced pesticide use, and the application of comparative assessment, where equal fractions advocated application at Community level (when deciding on including an active substance into Annex I) or at farm level (by the user).

Numerical Results

Distribution of Member States where organisations were established or where individuals had their residence was as follows:

FR	France	514	(29.1%)
DE	Germany	373	(21.1%)
UK	United Kingdom	161	(9.1%)
IT	Italy	145	(8.2%)
BE	Belgium	75	(4.2%)
NL	The Netherlands	48	(2.7%)
ES	Spain	37	(2.1%)
LT	Lithuania	26	(1.5%)
AT	Austria	21	(1.2%)
HU	Hungary	17	(1%)
EL	Greece	15	(0.8%)
PT	Portugal	15	(0.8%)
IE	Ireland	14	(0.8%)
SE	Sweden	14	(0.8%)
PL	Poland	11	(0.6%)
SI	Slovenia	9	(0.5%)

DK	Denmark	8	(0.5%)
CS	Czech Republic	7	(0.4%)
FI	Finland	5	(0.3%)
LU	Luxembourg	5	(0.3%)
RO	Romania	3	(0.2%)
SK	Slovak Republic	3	(0.2%)
BU	Bulgaria	2	(0.1%)
ET	Estonia	2	(0.1%)
CY	Cyprus	1	(0.1%)
LV	Latvia	1	(0.1%)
MT	Malta	0	(0%)
Other		15	(0.8%)

Reply:

As a private or professional individual	1125	(63.7%)
on behalf of an organisation	422	(23.9%)

Category

USER	Private or professional individual using pesticides	97	(5.5%)
NGO	Non governmental organisation	88	(5%)
IND	Manufacturing industry	52	(2.9%)
FARM	Farmer organisation	25	(1.4%)
CA	Competent Authority	9	(0.5%)
CONSUM	Consumer Organisation	7	(0.4%)
FOOD	Food manufacturer or retailer	3	(0.2%)
OTHER	Other category than specified one	132	(7.5%)

Size of organisation

1 - 9	199	(11.3%)
10 - 49	48	(2.7%)
50 - 249	49	(2.8%)
250 - 499	18	(1%)
500 - 999	17	(1%)
1000+	82	(4.6%)

10.1. National Action Plans

National Action Plans would be the framework for co-ordinating all measures and their implementation in the Member States that will be part of the Thematic Strategy. They would ensure overall coherence of the measures while allowing for the necessary flexibility to adapt the measures to particular circumstances (subsidiarity). National co-ordination bodies involving all stakeholders could be set-up for the development and implementation of the NAPs.

Question 2: How would you rate the importance of the following elements in the National Action Plans?

Setting up national coordination bodies involving all stakeholders

High	767	(43.4%)
Medium	733	(41.5%)
Low	47	(2.7%)

Training schemes

High	1396	(79%)
Medium	118	(6.7%)
Low	33	(1.9%)

Technical check of sprayers

High	1358	(76.9%)
Medium	143	(8.1%)
Low	46	(2.6%)

Requirements for aerial spraying scheme:

High	877	(49.6%)

Medium	620	(35.1%)
Low	50	(2.8%)

Restrictions on use in public areas

High	789	(44.7%)
Medium	144	(8.1%)
Low	614	(34.7%)

Risk indicators: establishment of baseline values and quantitative objectives for risk reduction at national level

High	769	(43.5%)
Medium	195	(11%)
Low	583	(33%)

EU guidance regarding the content of NAPs and the measures to be included

High	689	(39%)
Medium	711	(40.2%)
Low	147	(8.3%)

Financial instruments (taxation)

High	693	(39.4%)
Medium	135	(7.6%)
Low	716	(40.5%)

Economic instruments (incentives)

High	744	(42.1%)
Medium	700	(39.6%)
Low	103	(5.8%)

Other elements needed

Yes (please specify):	610	(34.5%)

No	874	(49.5%

10.2. Training and awareness raising

The new Directive could require Member States to set up a system of ***mandatory education, awareness raising, training and licensing*** for all pesticide users in order to ensure that those who use pesticides (in particular professional users) are fully aware of the risks linked to their use and take appropriate measures to find the least harmful means of combating plant protection problems. This will include guidance on choosing between the different products available for the same application (substitution at farm level). A minimum list of points to be addressed by the training courses could be annexed to the Directive. Details, such as frequency of training and the categories of users concerned, as well as certification systems, would remain the competence of the Member States.

Question to stakeholders and authorities

1. In your opinion, what minimum requirements should be covered by training for professional users? Indicate their level of importance.

Integrated plant and crop protection (IPM, ICM)		
High	853	(48.3%)
Medium	674	(38.1%)
Low	20	(1.1%)

Toxicology, operator safety		
High	1452	(82.2%)
Medium	85	(4.8%)
Low	10	(0.6%)

Storage, handling, cleaning procedures		
High	1419	(80.3%)
Medium	113	(6.4%)
Low	15	(0.8%)

Environmental protection		
High	1476	(83.5%)
Medium	57	(3.2%)
Low	14	(0.8%)

Plant protection (phytopharmacy, pest resistance,…)		
High	1303	(73.7%)
Medium	219	(12.4%)
Low	25	(1.4%)

Alternatives to chemical plant protection		
High	819	(46.3%)
Medium	626	(35.4%)
Low	102	(5.8%)

Plant protection equipment (material, calibration,…)		
High	1313	(74.3%)
Medium	203	(11.5%)
Low	31	(1.8%)

2. How can better training be guaranteed (indicate frequencies where appropriate)?

o *Compulsory participation with certification of participants*	1260	(71.3%)
o *Compulsory participation*	105	(5.9%)
o *Voluntary participation with certification of participants*	109	(6.2%)
o *Voluntary participation*	14	(0.8%)
o *Participation required if farmer participates in agri-environmental schemes*	59	(3.3%)

3. What could be the optimal frequency of training of the professional users?

o *Once every year*	274	(15.5%)
o *Once every two years*	218	(12.3%)
o *Once every three years*	909	(51.4%)
o *Once every five years*	96	(5.4%)
o *Once every ten years*	34	(1.9%)
o *More*	16	(0.9%)

4. In your opinion, which actions should be covered by an awareness raising programme addressed to non professional users?

o *Labelling and packaging: clearer information for users*	1409	(79.7%)
o *Special requirements for distribution of plant protection products via certified vendors that would have an obligation to advise buyers*	803	(45.4%)
o *Information campaigns on general risks*	693	(39.2%)
o *More specific product oriented stewardship programmes*	223	(12.6%)

10.3. Compulsory control and standardisation of application equipment (sprayers)

The new Directive could contain an obligation for Member States to set up a system of regular compulsory technical inspections of sprayers in use. This could be organised in accordance with European standards (e.g. CEN 13790) but Member States would define the frequency (maximum interval of x years) and the practical details. All machines for which a CEN standard has been agreed would be inspected.

1. Question to stakeholders and authorities: Do you consider that technical control of sprayers in use should:

o *be implemented as proposed above.*	1461	(82.7%)
– *once every year*	676	(38.3%)
– *once every two years*	629	(35.6%)
– *once every three years*	98	(5.5%)
– *once every five years*	31	(1.8%)
– *once every ten years*	03	(0.2%)
– *more*	15	(0.8%)
o *not be implemented as proposed above*	86	(4.9%)
– *all categories of sprayers (also those without standard) should be inspected*		
Yes	30	(1.7%)
No	42	(2.4%)
Don't know	13	(0.7%)

– *inspections should depend on intensity of use*

Yes	43	(2.4%)
No	34	(1.9%)
Don't know	08	(0.5%)

- *possible criteria to trigger the moment when technical check has to be done are*

- quantities of product applied	45	(2.5%)
- surface of farm where sprayer is used	27	(1.5%)
- other criteria (please specify)	30	(1.7%)

In parallel, Member States could be obliged to ensure that application equipment is certified before it is placed on the market in order to ensure that they respect the necessary criteria for safety of human health and the environment. One or more European standards (e.g. CEN 12761) could be developed as references for certification.

2. Question to stakeholders and authorities: Do you agree that new sprayers should be certified before they are placed on the market as proposed above:

Yes	1450	(82.1%)
No	44	(2.5%)
Don't know	53	(3%)

10.4. Specific measures on aerial spraying

Currently application of pesticides by aerial spraying is banned in some Member States, and in others requirements differ widely. The new Directive could oblige Member States to allow aerial spraying of pesticides only under strict legal requirements and only in situations where it represents advantages and also environmental benefits compared to other spraying methods or where there are no viable alternatives. Minimal requirements (training/certification of pilots, inspections of spraying equipment, prior-informed consent on a case-by-case principle, etc) could be laid down in an annex to the Directive. Community guidance on these could be established through information exchange and co-operation between the authorities.

Question to stakeholders and authorities: In your opinion what minimum requirements should be covered by national regulations to ensure that aerial spraying is done carefully?

o	*Specific training and certification of pilots*	1404	(79.5%)
o	*Restrictive list of "priority crops" for which aerial spraying will be maintained*	339	(19.2%)
o	*Specific authorisation procedure for plant protection products applicable by aerial spraying*	808	(45.7%)
o	*Prior informed consent procedure managed by local authorities with systematic assessment of the risks associated with the aerial spraying of specific plots of land*	785	(44.4%)

10.5. Areas of strongly reduced or zero PPP use

The new Directive could oblige Member States to restrict the use of Plant Protection Products in certain areas where protection of consumers, bystanders or bodies of water is at particular risk. Their use could be prohibited in schools, in public parks, and in particularly vulnerable areas such as Natura 2000 sites, areas covered by the Habitats Directive, etc.

Question to stakeholders and authorities

1. In your opinion do you consider that such restrictions would be enough to ensure a higher level of protection for such vulnerable sections of the population or the environment?

Yes	833	(47.1%)
No	685	(38.8%)
Don't know	29	(1.6%)

2. In your opinion should such restrictions be lifted in emergency situations (to be determined):

Yes	796	(45%)
No	662	(37.5%)
Don't know	89	(5%)

10.6. Collection of PPP packaging and unused (obsolete) products

The new Directive could oblige Member States to establish a system for the safe collection of empty pesticides packaging and obsolete products. There are different ways of setting up such a system (including the financial aspects).

Questions to stakeholders and authorities

1. Who should collect packaging and obsolete products?

o *The industry, in particular the holders of product authorisations, (in association with distributors)*	869	(49.2%)
o *Farmers*	170	(9.6%)
o *All other users*	74	(4.2%)
o *A specific body (please specify):*	943	(53.4%)

2. Any such scheme would have to be financed through contributions from producers and users. What incentives could be proposed to avoid free-riders (i.e. producers or users not contributing)?

o *Deposit scheme*	194	(11%)
o *Specific tax on pesticide packaging*	163	(9.2%)
o *Leave financing to industry and introduce a tax on packaging only when fixed quantitative objectives are not reached*	578	(32.7%)
o *Other incentives (please specify):*	612	(34.6%)

o

10.7. Monitoring and reporting

Current knowledge about pesticide use is patchy at best, whereas sales data are available, albeit with varying degrees of detail. The new Directive could require the Commission to measure progress in risk reduction by calculating ***appropriate harmonised risk indicators.*** At the moment, there are no agreed indicators available, but the development of a set of indicators is the subject of a Research project called 'HAIR' funded under the 6th Research and Technological Development Framework Programme. It is expected to be completed by spring 2007 and the indicators could then be made binding for all Member States for regular reporting.

A major input for calculating indicators is good statistical information on sales and actual use of pesticides. Regulation 852/2004/EC on food hygiene already provides that as of 2006 any use of pesticides should be recorded in special registers at farm level. This could be a source of information for calculating the indicators to monitor the success of the Thematic Strategy. In addition, the data collected could also be used to define best practices in plant protection and to develop standards of Integrated Pest Management (IPM). Member States could be obliged to regularly collect sales and use information and report it to the Commission.

Question to stakeholders and authorities

1. In your opinion what is the most appropriate level to monitor and report about progress made in terms of risk reduction:

o	*Member State level*	1173	(66.4%)
o	*Regional level*	504	(28.5%)
o	*Community level*	515	(29.1%)

2. What could be the optimal frequency of reporting in order to ensure proper surveillance but limit the administrative burden?

o	*Once every year*	649	(36.7%)
o	*Once every two years*	174	(9.8%)
o	*Once every three years*	126	(7.1%)
o	*Once every five years*	546	(30.9%)
o	*Once every ten years*	17	(1%)
o	*More*	35	(2%)

o

10.8. Compliance controls

The current provisions in Directive 91/414/EEC regarding monitoring of compliance of pesticide users with the legal requirements are relatively weak and inspections by the Food & Veterinary office have shown Member States' activities in this regard are insufficient[134]. The revision of the Directive could be used to reinforce these provisions by defining in more detail the obligations of the Member States with regard to control activities (multi-annual control plans, audit by FVO, etc.).

Question to stakeholders and authorities: In your opinion do you consider that control of the compliance with the legal requirements for use of pesticides:

o *is beneficial regarding the protection of the environment and human health and should be reinforced*	576	(32.6%)
o *is beneficial regarding the protection of the environment and human health, but current provisions are sufficient. Additional requirements would be too cumbersome and costly.*	639	(36.2%)
o *is not very useful regarding the protection of the environment and human health. No further measures are necessary*	27	(1.5%)
o *is important to establish that farmers are eligible for direct support under the Common Agricultural Policy*	305	(17.3%)

10.9. Comparative assessment and substitution principle

The proposal for a revised Directive 91/414/EEC could integrate the principle of comparative assessment in the process of evaluation of active substances and authorisation of products at Member State level**.** This could be put into practice by comparing the risk levels of different active substances used for the same purpose at several levels:

- at inclusion into annex 1 of the Directive of active ingredients at Community level
- at the stage of authorising preparations containing these active ingredients at national/zonal level
- in view of choosing the actual 'best chemical solution' to protect plant at user level.

134 http://europa.eu.int/comm/food/fvo/specialreports/index_en.htm

Question to stakeholders and authorities: In your opinion do you consider that the comparative assessment could:

o *never be applied at Community level to decide on the inclusion of an active substance into annex 1 of Directive 91/414/EEC and only be applied at Member State and user level*	86	(4.9%)
o *not be applied at Community level to decide on the inclusion of an active substance into annex 1 of Directive 91/414/EEC, as long as the review programme of all active substances is not completed*	73	(4.1%))
o *be applied at Community level in view of the inclusion of the active substance in a specific annex 1 called 'active ingredient candidates for substitution'*	597	(33.8%)
o *be applied at user level as far as this issue is clearly part of the training schemes*	687	(38.9%)
o *be facilitated with a differentiated taxation system of plant protection products*	104	(5.9%)

10.10. Integrated Pest Management (IPM)

The proposal for a revised Directive 91/414/EEC could integrate a clearer definition of the IPM in view of reinforcing the harmonisation of a European IPM standard through enhanced cross-compliance mechanisms foreseen under the Common Agricultural Policy.

More specific guidance documents could be developed for the main crops where IPM schemes have been developed in the context of the Thematic Strategy via a system of information exchange to be set up between Member States.

Question to stakeholders and authorities: In your opinion do you consider that the IPM should:

o *only be further defined and specified through the mechanisms as described above*	725	(41%)
o *only subject to general definition and that crop specific definition as proposed in the context of Thematic Strategy will be difficult if not impossible to be realised*	542	(30.7%)
o *be further integrated in separate Regulation defining the requirements similar to what the Community has already developed for the organic farming schemes with Regulation 2092/91*	280	(15.8%)

10.11. Taxation

Several of the measures envisaged by the Thematic Strategy and to be implemented by national action plans will need to be financed publicly funded. One way of limiting public expenditure is

to tax plant protection products. Taxation is also in theory a possible market-based instrument to discourage the use of particularly harmful or dangerous Plant Protection Products by increasing their relative prices.

The Commission is not envisaging any Community action for pesticide taxation in the Thematic Strategy, as the issue is particularly complex and the review of all existing active substances has not yet been completed. This option could be looked at in the future.

Question to stakeholders and authorities

1. Do you consider that taxation of plant protection products could be used to influence the behaviour of the users and encourage them to choose the least harmful products?

No	877	(49.6%)
Yes	640	(36.2%)
Don't know	30	(1.7%)

2. If possible in the future, should taxation of plant protection products be used solely to finance the measures to be implemented?

No	933	(52.8%)
Yes	533	(30.2%)
Don't know	81	(4.6%)