Brussels; 16/01/2018 EXPERT GROUP ON PLANT HEALTH LEGISLATION

Methodology for the identification of the Union quarantine pests qualifying as *priority pest*

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The European Commission's science and knowledge service

Joint Research Centre

Outline

- Legal framework
- Approach to selection of pests to be analysed
- Other initiatives of priority pests approaches in EU
- Methodology applied by JRC
- Conclusions and open issues for discussion

Legal framework

The new plant health regulation
Regulation (EU) 2016/2031

Article 6 (1) defines priority pests

Pests whose **potential economic, environmental or social impact** is the most severe

Article 6(2) empowers the EC to adopt a delegated act establishing a list of priority pests based on specific criteria (Annex I)

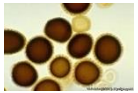
Technical assistance based on

JRC scientific expertise

EFSA extrapolation of technical and scientific data related to those pests

Approach to selection of pests to be analysed

- **Preliminary list** submitted by MS of potential candidates to qualify as priority pests
- The list includes a total of **33 pests** with crop, forest or both as hosts
- Identification of three pilot pests: one per type of host
  - **Crops:** *Tilletia indica (Karnal bunt of wheat) – Wheat*
  - ***Permanent crops:*** *Xanthomonas citri (Citrus canker)– Citrus plants*
  - ***Forestry:*** *Agrilus anxius (Bronze birch borer) – Birch*



- **Extension to all other pests** put forward by MS and draft priority list by 05/2019
- Adoption of list by the Commission by **second half 2019**

Other EU initiatives for identification of priority pests

Pest risk ranking in the Netherlands

Netherlands Food and Consumer Product Safety Authority
Ministry of Economic Affairs

The **UK Plant Health Risk Register**

Department for Environment Food & Rural Affairs

Bior²: a database/software process dedicated to plant pest ranking in France

anses
Investigate, evaluate, protect

FinnPRIO: A Model for Ranking Invasive Plant Pests Based on Risk

Evira

The **ERIN system** to identify, describe and rank new plant health threats in Norway

VKM
Vitenskapskomiteen for mattrygghet
Norwegian Scientific Committee for Food Safety

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Main characteristics

Combining risk of establishment and impact

Indicators measured mainly with semi-quantitative expert assessment

More quantitative input for risk of establishment

Limited set of indicators for impact (NL: 7; UK: 3; FR: 9; FI: 5; NO: 5)

Aggregation into single indicator based on de-facto multi-criteria analysis

Methodology applied by JRC

Composite indicators including multiple criteria

Indicators selection	Quantitative or qualitative measures
Data selection	Measuring indicators based on available statistics and experts
Normalization	Allows comparing indicators with different scales; dimensions or units
Weighting	To aggregate indicators based on weights set by the Legislator(s)
Uncertainty of data	Probabilities and sensitivity analysis

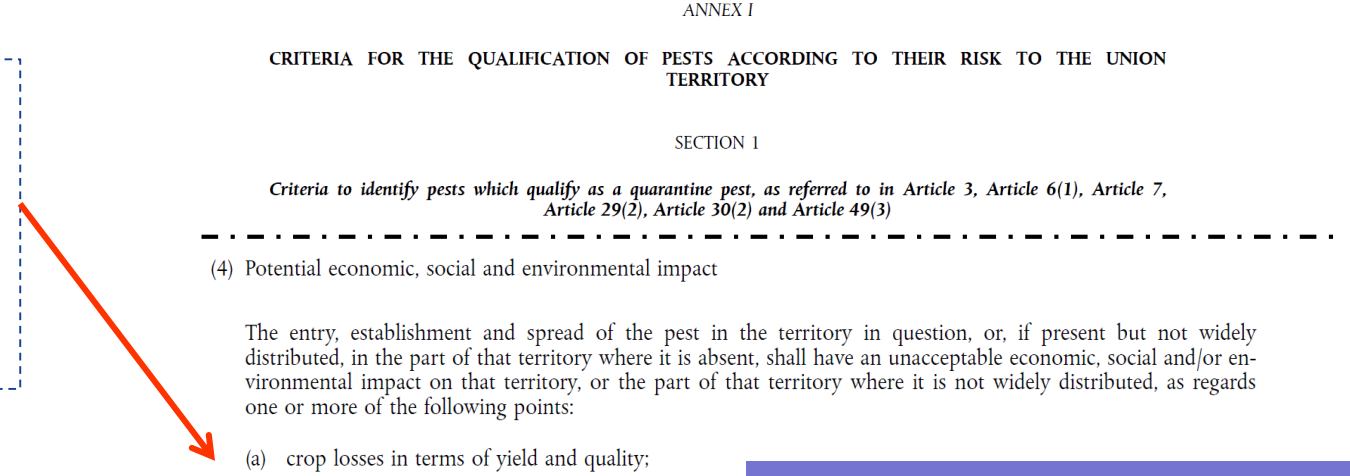
Overarching principles of JRC approach

- Evaluation of impact at **maximum spread scenario** for all pests – worst case scenario
- **Common data availability** – Homogeneous analysis and equal attention for all pests
- **Uncertainty** incorporated via sensitivity analysis – Impact on pest selection of weights and data quality

Step 1 - From regulation to indicators

Systematic review of Regulation to identify all criteria mentioned

Example code:
Crop losses in terms of yield and quality is criteria 4(a) of Section 1 of Annex I
[AI S14a]



ANNEX I

CRITERIA FOR THE QUALIFICATION OF PESTS ACCORDING TO THEIR RISK TO THE UNION TERRITORY

SECTION 1

Criteria to identify pests which qualify as a quarantine pest, as referred to in Article 3, Article 6(1), Article 7, Article 29(2), Article 30(2) and Article 49(3)

(4) Potential economic, social and environmental impact

The entry, establishment and spread of the pest in the territory in question, or, if present but not widely distributed, in the part of that territory where it is absent, shall have an unacceptable economic, social and/or environmental impact on that territory, or the part of that territory where it is not widely distributed, as regards one or more of the following points:

(a) crop losses in terms of yield and quality;

Each indicator covers one of more criteria

All criteria addressed by one or more indicators

Economic: 12 indicators
Social: 6 indicators
Environmental: 8 indicators

I.e. Maximum production loss indicator fulfils regulation criteria: AI S1 4ª [crop losses] & AI S1 4i [effect on profits]

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Structure of Impact Indicator of Quarantine Pests (IIQP)

$$IIQP = W_1(\Sigma\, w_{1j} \times X_{1j})_{j=1,4} + W_2(\Sigma\, w_{2j} \times X_{2j})_{j=1,3} + W_3(\Sigma w_{3j} \times X_{3j})_{j=1,4}$$

W_1 1. Economic impact

w_{1j}	X_{1j}
$w_{1.1}$	1.1 Production impacts
$w_{1.2}$	1.2 Price and market Impacts
$w_{1.3}$	1.3 Trade impacts
$w_{1.4}$	1.4 Impacts in other agents

W_2 2. Social impact

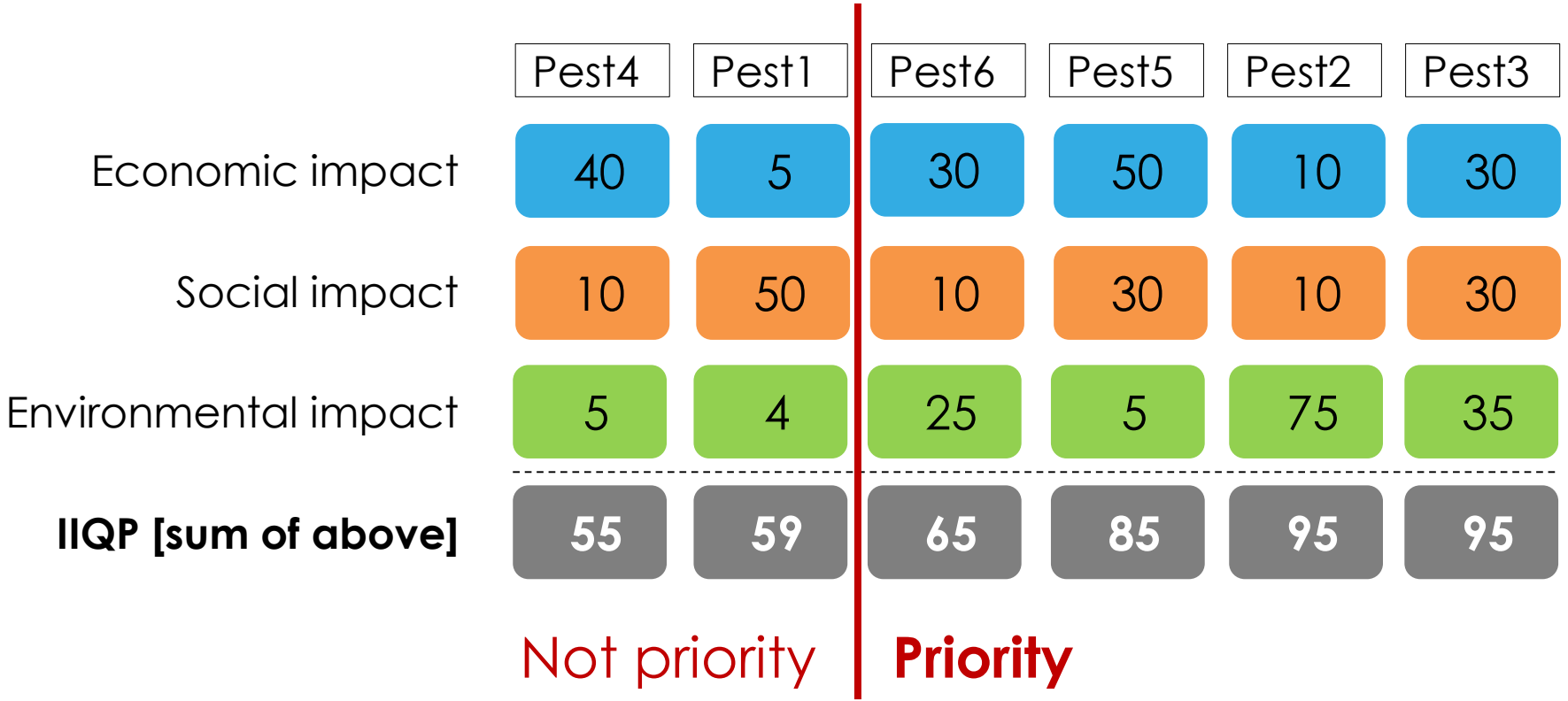
w_{2j}	X_{2j}
$w_{2.1}$	2.1 Employment impact
$w_{2.2}$	2.2 Food security / food safety impacts
$w_{2.3}$	2.3 Recreation, landscape cultural heritage impacts

$$\sum_{i=1}^{i=3} W_i = 100 \qquad \sum_{j=1}^{j=n} W_{ij} = 100 \;\forall\; i[1,3]$$

W_3 3. Environmental impact

w_{3j}	X_{3j}
$w_{3.1}$	3.1 Impact on street trees
$w_{3.2}$	3.2 Impact on spread pests
$w_{3.3}$	3.3 Impacts control measures
$w_{3.4}$	3.4 Impacts biodiversity or ecosystem services

Example of Impact Indicator of Quarantine Pests (IIQP)



Notes: (1) Simplified example only for presentation purposes; (2) Priority if IIQP ≥60; (3) Equal weights for all impacts ($W_1 = W_2 = W_3 = ⅓$)

The indicators in details: Economic Impact

1. Economic impact

W_1	1. Economic impact
$W_{1.1}$	1.1 Production impacts
$W_{1.2}$	1.2 Price and market Impacts
$W_{1.3}$	1.3 Trade impacts
$W_{1.4}$	1.4 Impacts in other agents

Direct economic impacts – 1.1 Production impacts

W_1	1. Economic impact
$W_{1.1}$	1.1 Production impacts
$W_{1.2}$	1.2 Price and market Impacts
$W_{1.3}$	1.3 Trade impacts
$W_{1.4}$	1.4 Impacts in other agents

I.1 Maximum production loss

Data from EUROSTAT (latest 3 years)		
Host(s) planted area (ha)	Yield (kg/ha)	Producer Price (Euro/t)

Data from EFSA		
Yield loss (%)	Quality loss (%)	NUTS2 regions climatically suitable for the pest

Direct economic impacts – 1.1 Production impacts

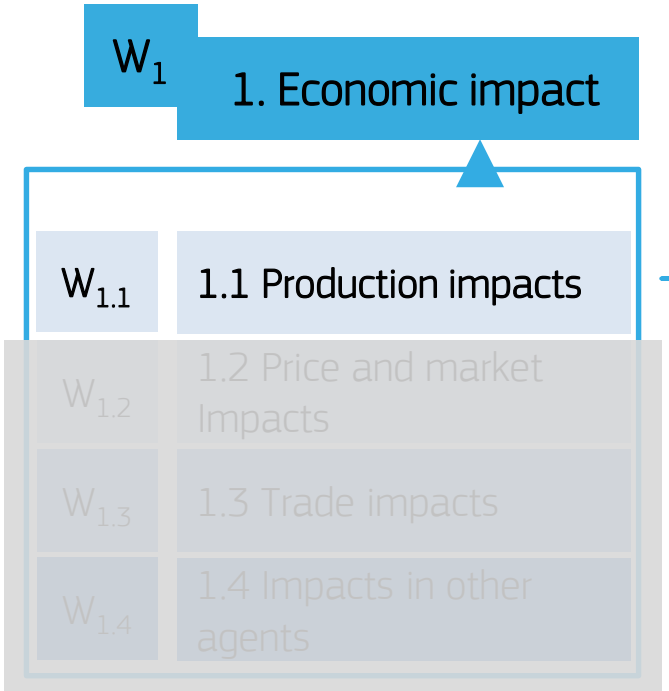
W_1	1. Economic impact
$W_{1.1}$	1.1 Production impacts
$W_{1.2}$	1.2 Price and market Impacts
$W_{1.3}$	1.3 Trade impacts
$W_{1.4}$	1.4 Impacts in other agents

I.1 Maximum production loss

I.2 Share of MS affected 

Data from EFSA
NUTS2 regions climatically suitable for the pest

Direct economic impacts – 1.1 Production impacts



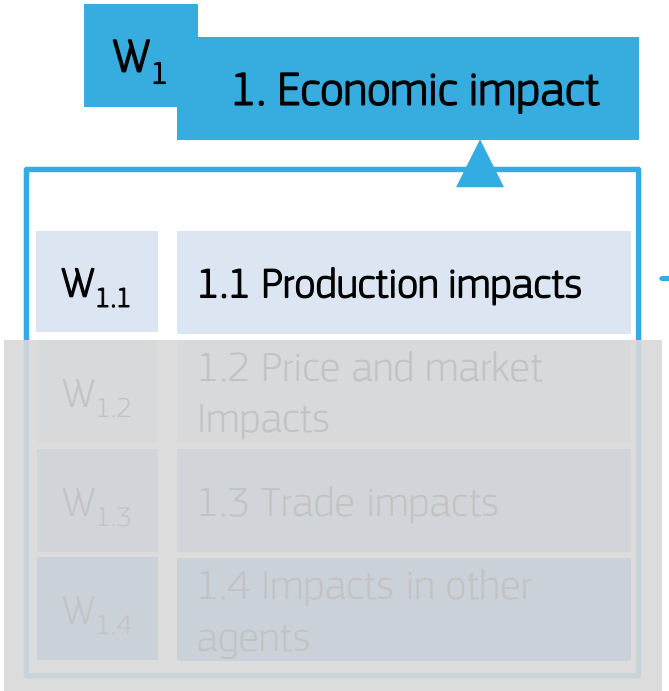
I.1 Maximum production loss

I.2 Share of MS affected

I.3 Additional producer cost

Data from EFSA
Number of additional treatments
Number of additional practices

Direct economic impacts – 1.1 Production impacts



I.1 Maximum production loss

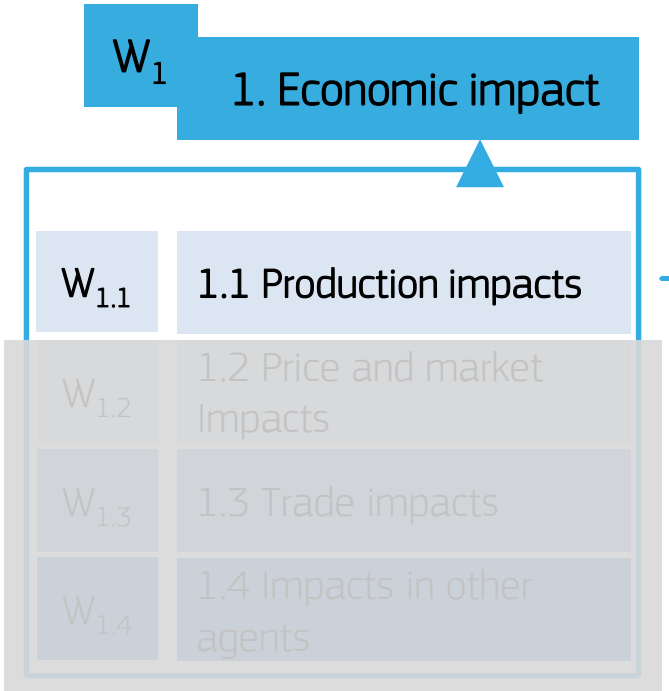
I.2 Share of MS affected

I.3 Additional producer cost

I.4 Difficulty of eradication

Data from EFSA
Classification based on: polyphagous pest vs monophagous; perennial vs annual hosts; presence of asymptomatic infections vs not presence; natural spread rate It is still under development – option to add more parameters

Direct economic impacts – 1.1 Production impacts



I.1 Maximum production loss ↑

I.2 Share of MS affected ↑

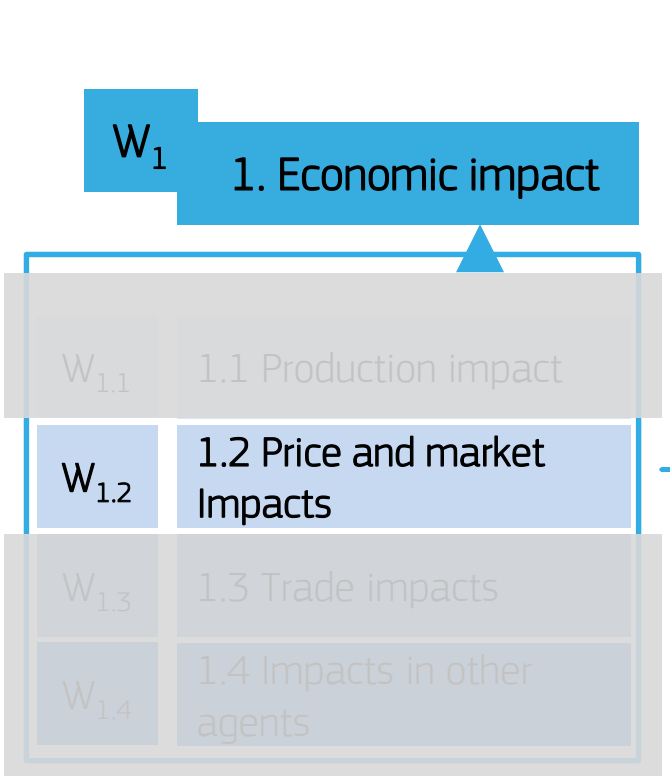
I.3 Additional producer cost ↑

I.4 Difficulty of eradication ↑

Aggregation to single indicator after normalization and using weights set by Legislator(s)

↑ Higher production impacts, higher the economic impact and higher the priority

Indirect economic impacts – 1.2 Price and market impacts



I.5 Percentage change in prices

Data from EUROSTAT; COMEXT & Literature
Change in total domestic supply availability (Y+M-X-Losses)
Price elasticities

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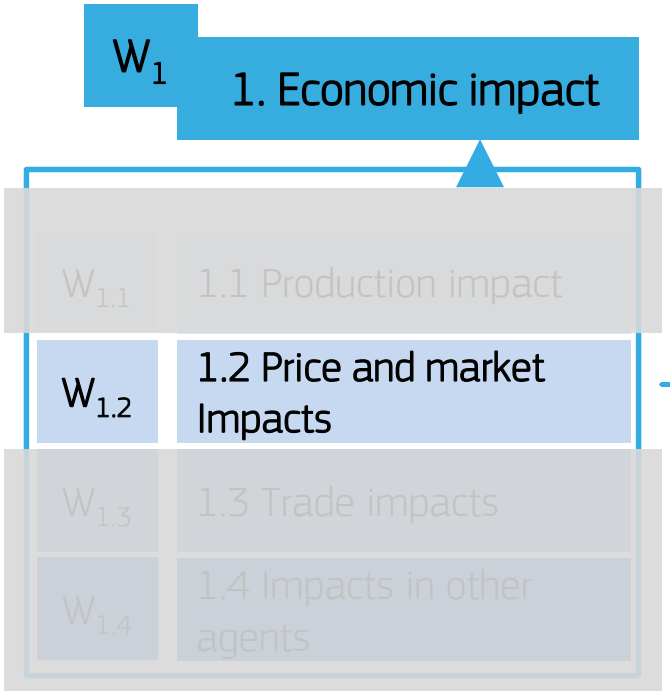
Indirect economic impacts – 1.2 Price and market impacts

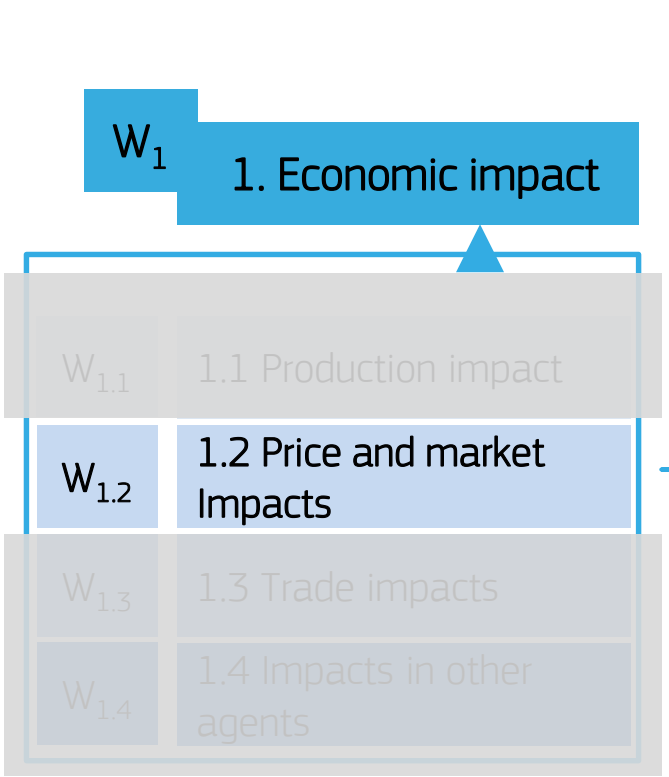


I.5 Percentage of change in prices

I.6 Trade intensity

Data from EUROSTAT and COMEXT
Total production (t)
Quantity of imports (t)

Indirect economic impacts – 1.2 Price and market impacts



I.5 Percentage of change in prices

I.6 Trade intensity

Higher the price and market impacts, higher the economic impact and higher the priority

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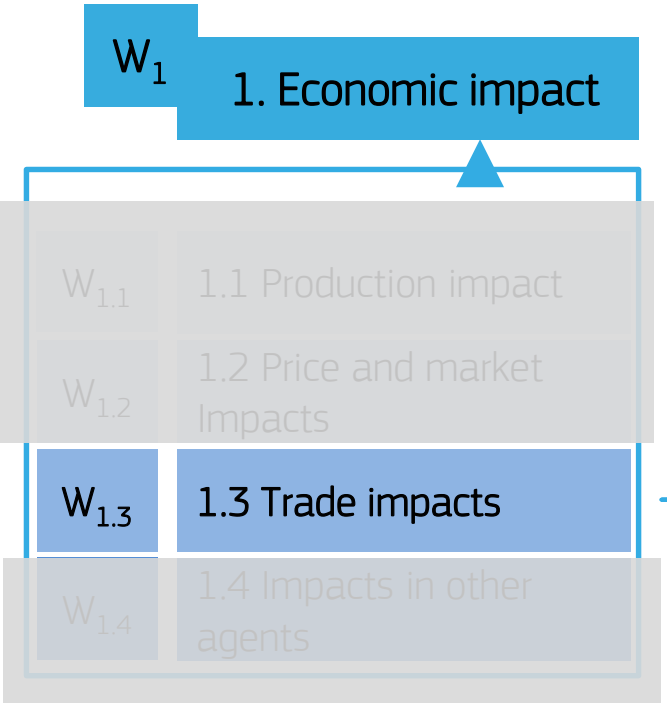
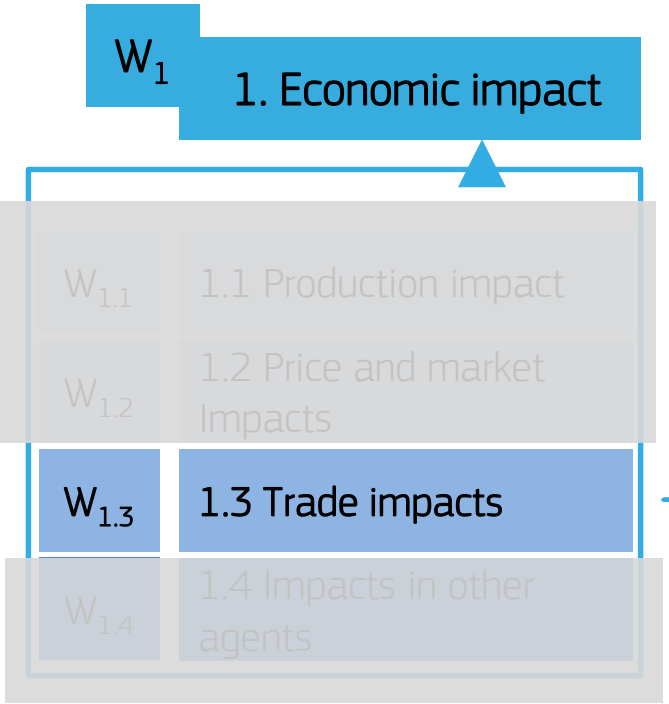
Indirect economic impacts – 1.3 Trade impacts



I.7 Export losses

Data from EUROSTAT and COMEXT
Total production (t)
Quantity of exports (t)
Price of exports (€/t)
Maximum production loss (t)

Indirect economic impacts – 1.3 Trade impacts



I.7 Export losses

I.8 Share of production traded

Data from EUROSTAT and COMEXT
Total production (t)
Quantity of exports (t)

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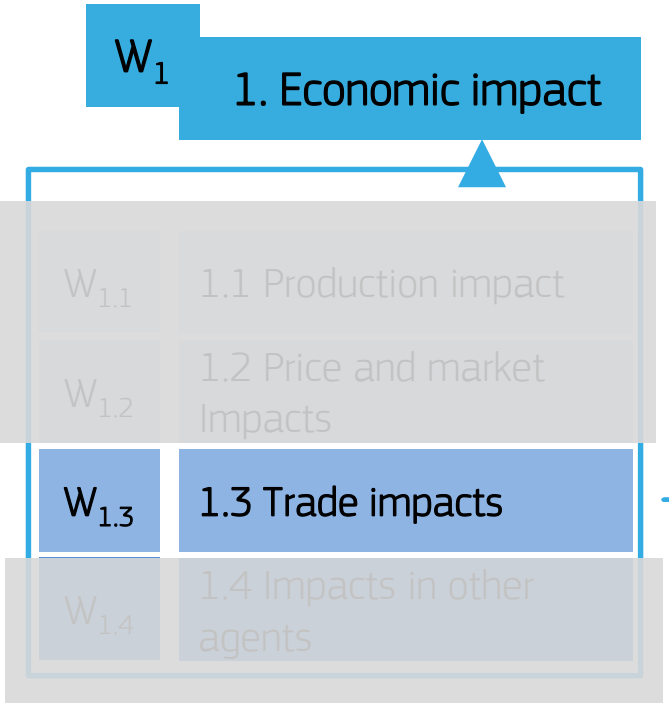
Indirect economic impacts – 1.3 Trade impacts



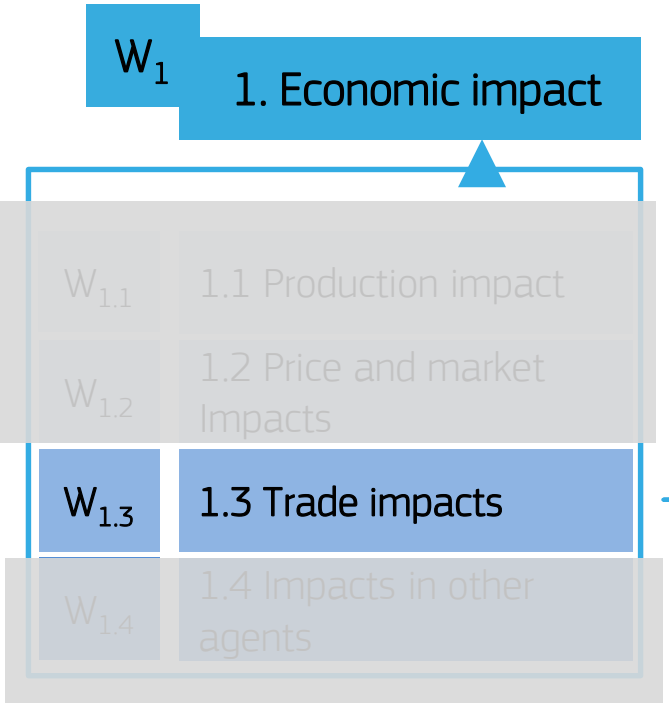
I.7 Export losses

I.8 Share of production traded

I.9 Export network

Data from COMEXT and EFSA
Number of trading countries importing from EU a specific commodity affected by the pest (based on pest presence and quarantine status -EFSA)

Indirect economic impacts – 1.3 Trade impacts



I.7 Export losses

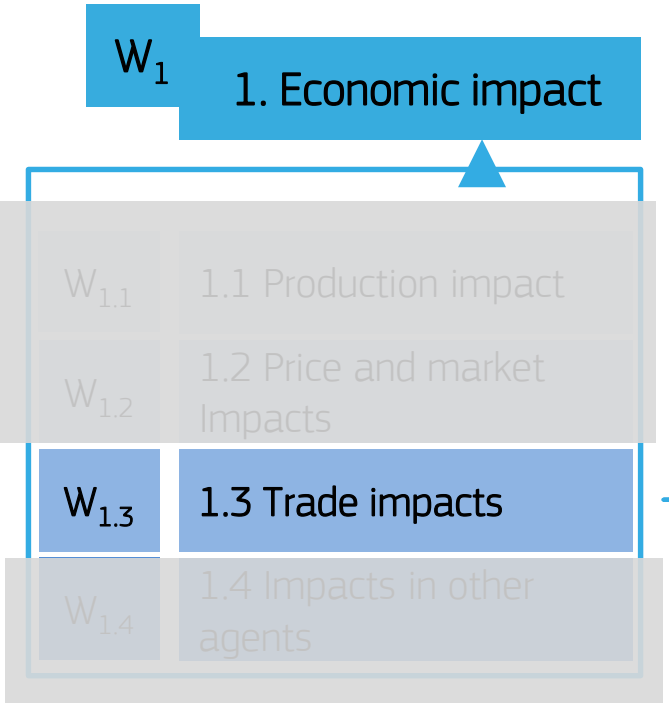
I.8 Share of production traded

I.9 Export network

I.10 Trade concentration (HHI index)

Data from COMEXT and EFSA
Number of trading countries
Quantity of exports by country

Indirect economic impacts – 1.3 Trade impacts



- I.7 Export losses ↑
- I.8 Share of production traded ↑
- I.9 Export network ↑
- I.10 Trade concentration ↑

↑ Higher the trade impacts, higher the economic impact and higher the priority

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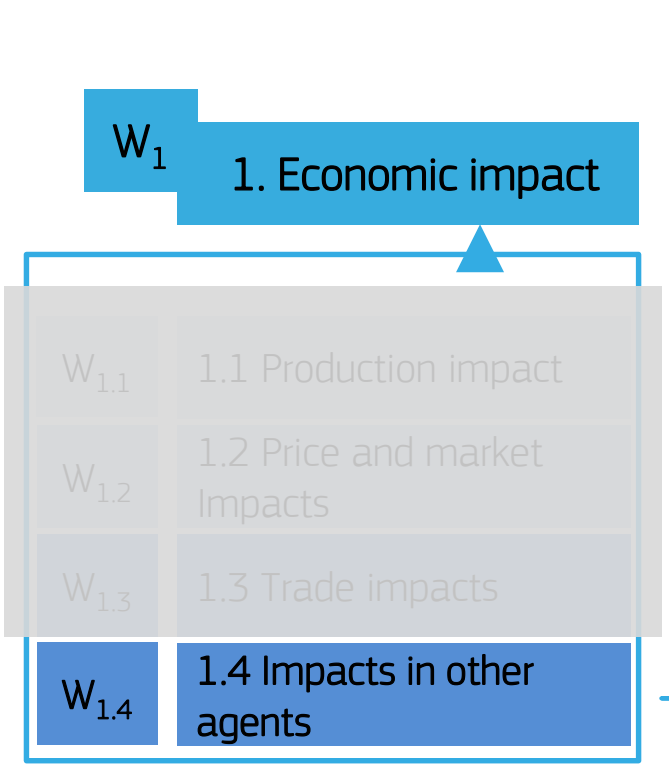
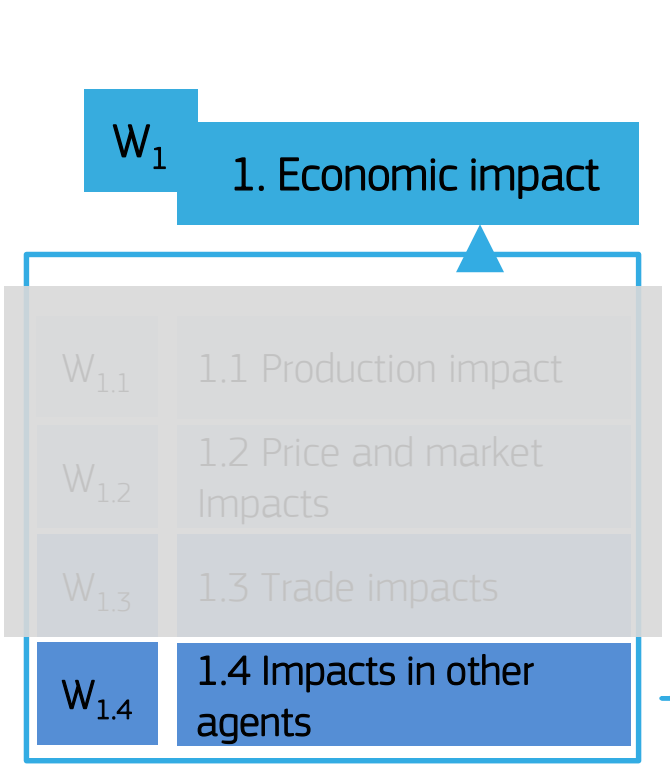
Indirect economic impacts – 1.4 Impacts in other agents



I.11 Public expenditure

Data from Experts / Literature
Research and control programmes expenditure

Indirect economic impacts – 1.4 Impacts in other agents

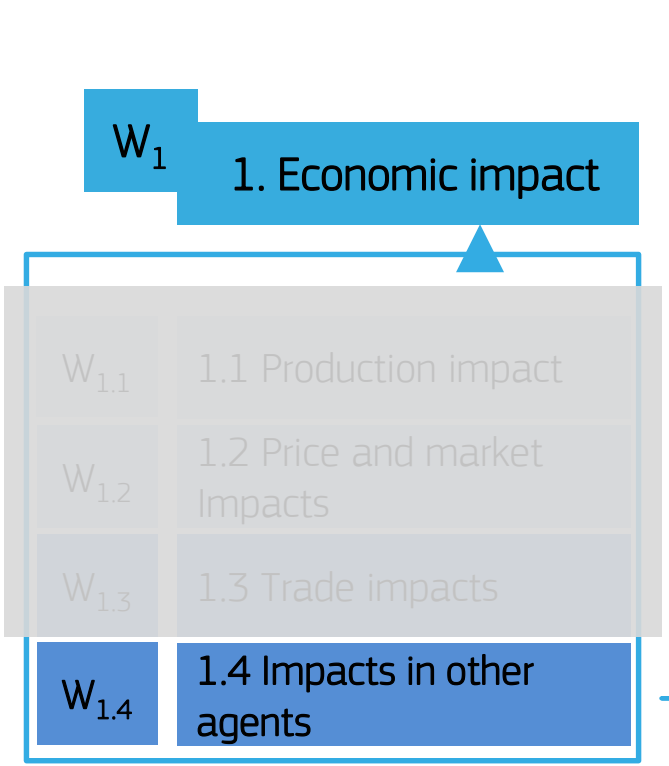


I.11 Public expenditure

I.12 Upstream and downstream effect

Data from JRC Research
Number of sector downstream and upstream affected

Indirect economic impacts – 1.4 Impacts in other agents



I.11 Public expenditure ↑

I.12 Upstream and downstream effect ↑

↑ Higher impacts in other agents, higher the economic impact and higher the priority

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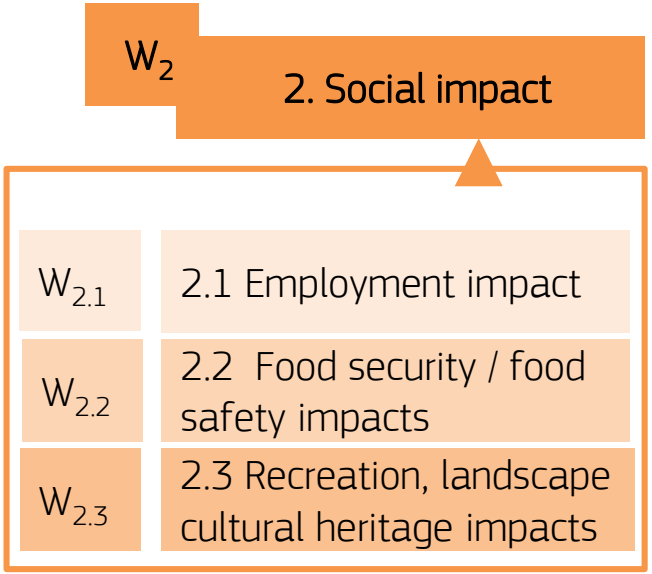
The indicators in details: Social Impact

2. Social impact



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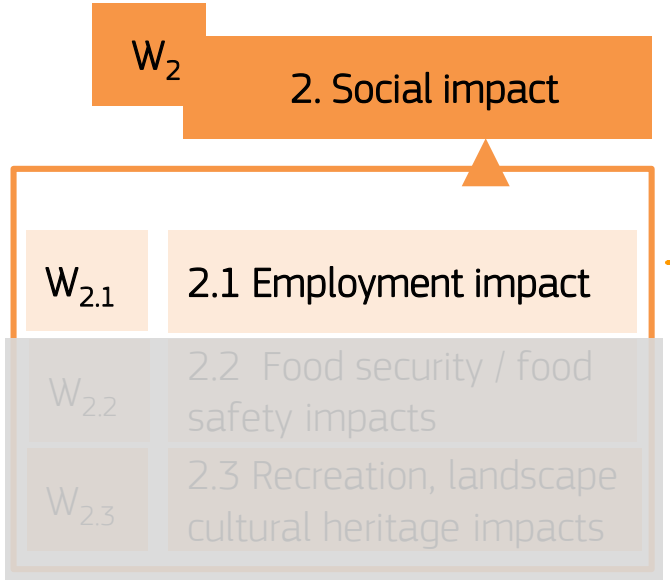
Social impacts – 2.1 Employment impact



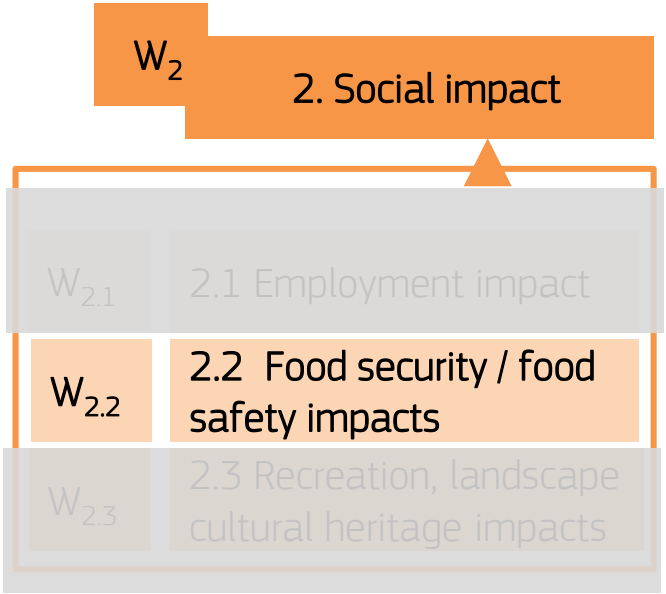
I.13 Employment loss

Data from EUROSTAT and COMEXT
Host planted area (ha)
Maximum production loss (t)
Total production (t)
Labour needs for production (AWU/ha)

Higher employment impact, higher the social impact and higher the priority

European Commission

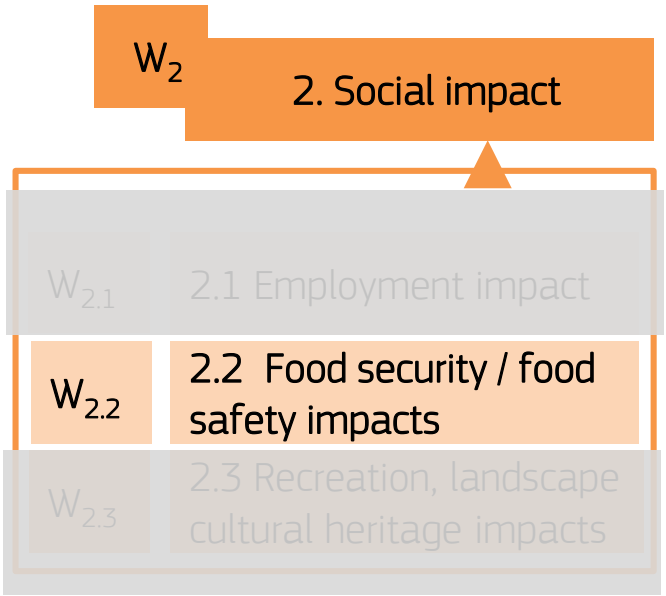
Social impacts – 2.2 Food security / food safety impacts



I.14 Caloric supply

Data from FAO
Food supply quantity of affected commodities (kcal/capita/day)
Total food supply quantity (kcal/capita/day)

Social impacts – 2.2 Food security / food safety impacts



I.14 Caloric supply

I.15 Protein supply

Data from FAO
Protein supply quantity from affected commodities (g/capita/day)
Total protein supply quantity (g/capita/day)

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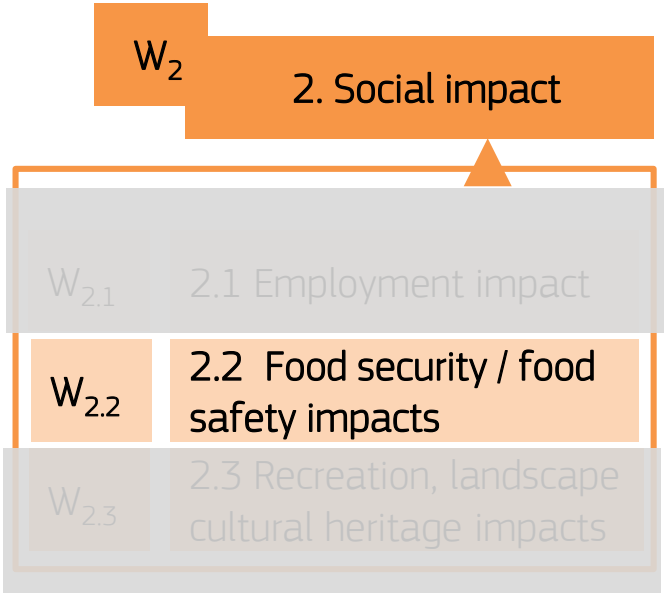
Social impacts – 2.2 Food security / food safety impacts



I.14 Caloric supply

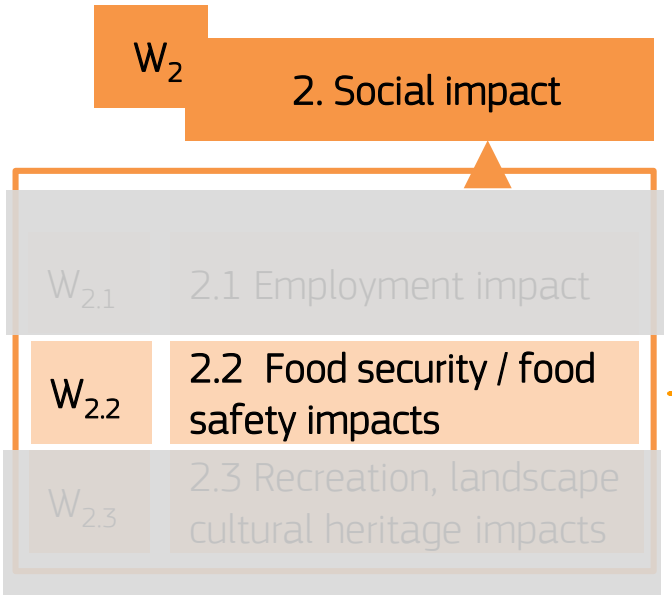
I.15 Protein supply

I.16 Fat supply

Data from FAO
Fat supply quantity from affected commodities (g/capita/day)
Total fat supply quantity (g/capita/day)

European Commission

Social impacts – 2.2 Food security / food safety impacts



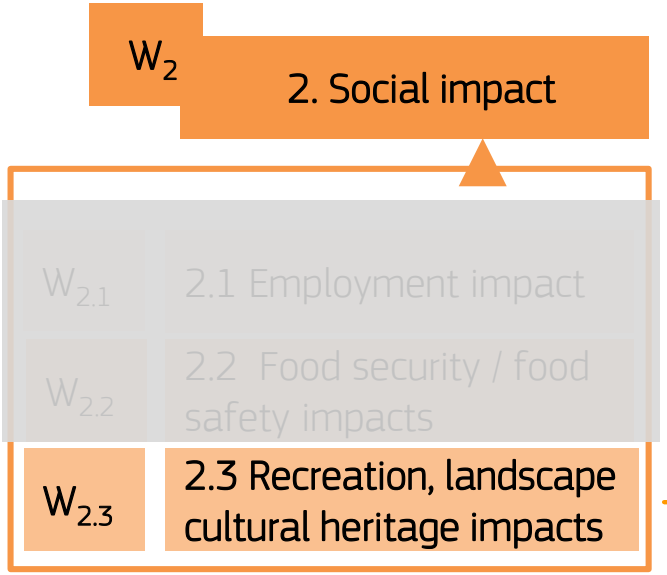
I.14 Caloric supply ↑

I.15 Protein supply ↑

I.16 Fat supply ↑

↑ Higher food security / food safety impacts, higher the social impact and higher the priority

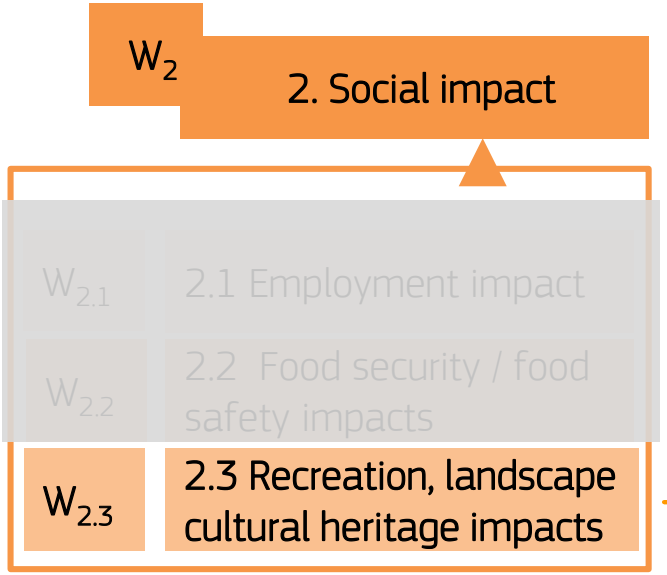
Social impacts – 2.3 Recreation, landscape cultural heritage impacts



I.17 Degree of diversification

Data from EUROSTAT
Share of diversification of production by means of other gainful activities (recreation, tourism, landscape, fishing and hunting) by region – common to all crops

Social impacts – 2.3 Recreation, landscape cultural heritage impacts

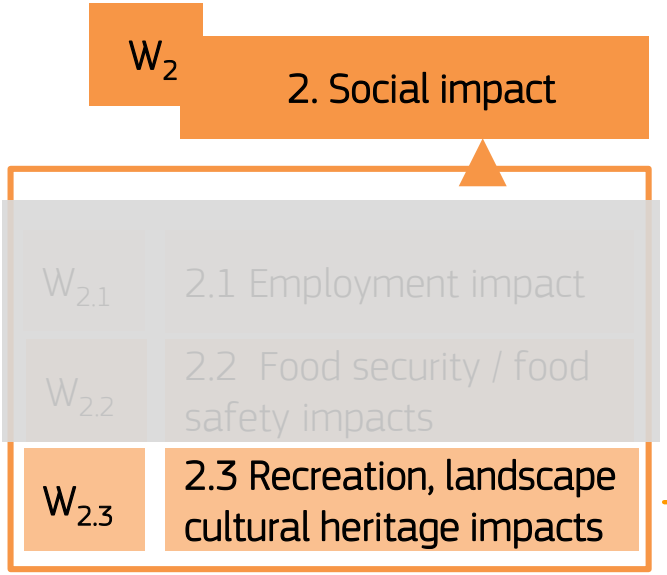


I.17 Degree of diversification

I.18 Cultural heritage importance

Data from UNESCO and DG AGRI
Number of UNESCO World Heritage agricultural or natural landscapes with host presence
Number of commodities related to crop affected that are labelled with Protected Designation of Origin

Social impacts – 2.3 Recreation, landscape cultural heritage impacts



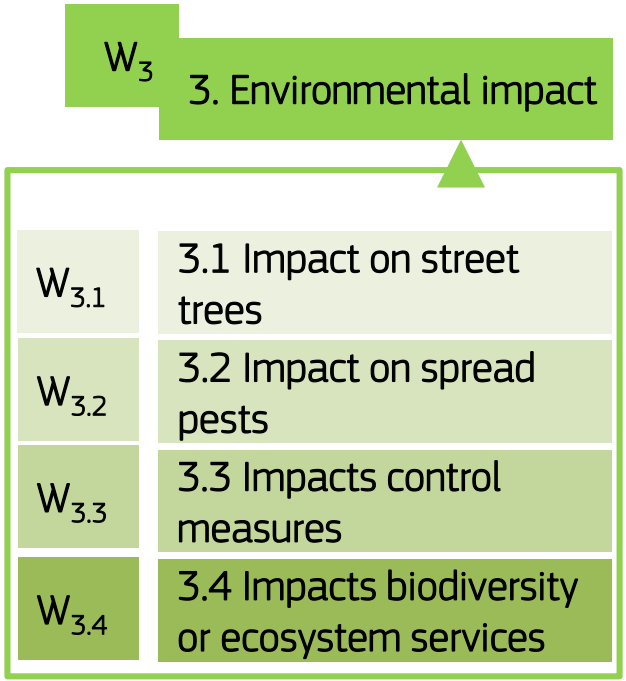
I.17 Degree of diversification ↑

I.18 Cultural heritage importance ↑

↑ Higher recreation, landscape cultural heritage impacts, higher the social impact and higher the priority

The indicators in details: Environmental Impact

3. Environmental impact



Environmental impacts – 3.1 Impact on street trees

W_3 3. Environmental impact

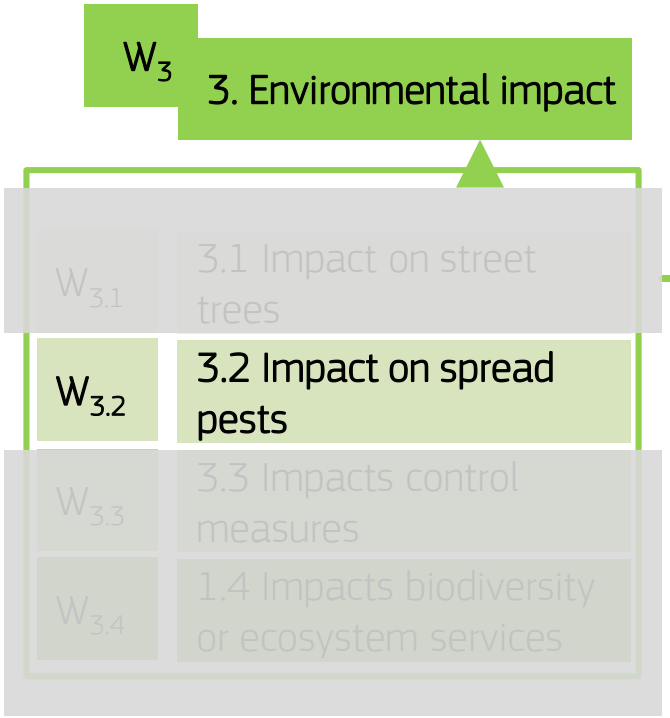
- $W_{3.1}$ 3.1 Impact on street trees
- $W_{3.2}$ 3.2 Impact on spread pests
- $W_{3.3}$ 3.3 Impacts control measures
- $W_{3.4}$ 1.4 Impacts biodiversity or ecosystem services

I.19 Damage / mortality of street plants

Data from EFSA / Experts
Dichotomous variable - Yes/not the pest can negatively affect species of ornamental and street plants and trees (EFSA list of host plants)

Higher the impact on street trees, higher the environmental impact and higher the priority

Environmental impacts – 3.2 Impact on spread pests



I.20 Capacity to boost other pests

Data from EFSA / Experts
Dichotomous variable - Yes/not the pest can boost other pests or diseases

Higher the capacity to boost other pests, higher the social impact and higher the priority

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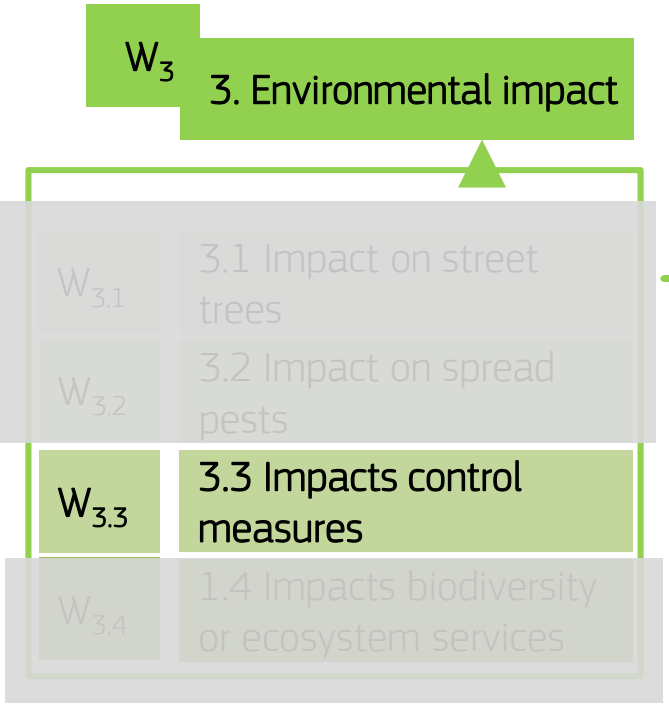
Environmental impacts – 3.3 Impacts control measures



I.21 Undesired effects ↑

Data from EFSA / Experts
Dichotomous variable - Yes/not the pest can trigger significant increases of the use of plant protection products

↑ Higher the impacts of control measures, higher the environmental impact and higher the priority

Environmental impacts – 3.4 Impacts biodiversity or ecosystem services

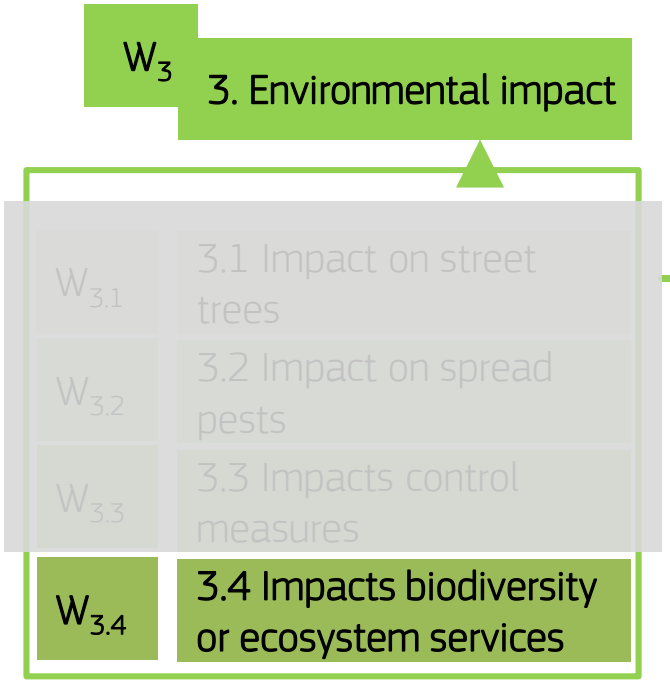
W_3 3. Environmental impact

- $W_{3.1}$ 3.1 Impact on street trees
- $W_{3.2}$ 3.2 Impact on spread pests
- $W_{3.3}$ 3.3 Impacts control measures
- $W_{3.4}$ 3.4 Impacts biodiversity or ecosystem services

I.22 Soil erosion

Data from EUROSTAT
Soil water erosion rates per land cover group

Environmental impacts – 3.4 Impacts biodiversity or ecosystem services

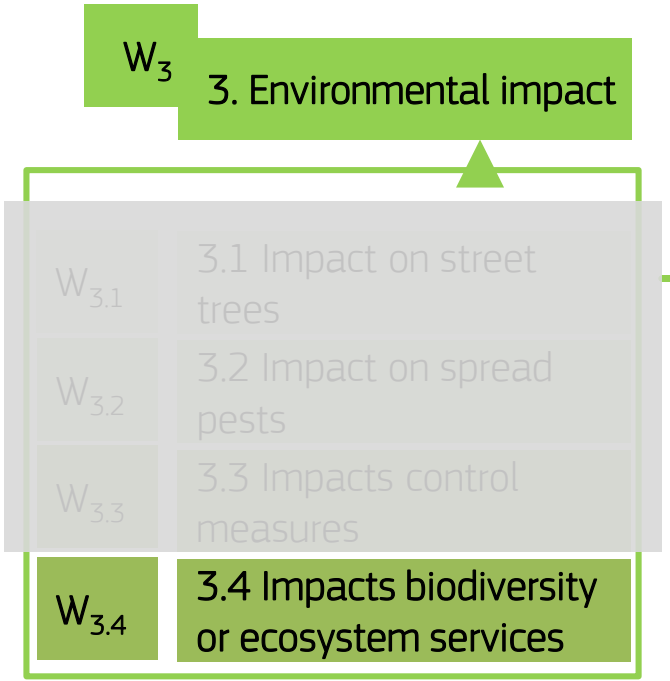


I.22 Soil erosion

I.23 Damage/mortality of native plants

Data from EFSA / Experts
Dichotomous variable - Yes/not the pest can negatively affect species of native plants

Environmental impacts – 3.4 Impacts biodiversity or ecosystem services



I.22 Soil erosion

I.23 Damage/mortality of native plants

I.24 Losses of biodiversity & wildlife

Data from EFSA / Experts
Number of protected animal and plant species associated with the habitat that can be affected

Environmental impacts – 3.4 Impacts biodiversity or ecosystem services

W_3 3. Environmental impact

- $W_{3.1}$ 3.1 Impact on street trees
- $W_{3.2}$ 3.2 Impact on spread pests
- $W_{3.3}$ 3.3 Impacts control measures
- $W_{3.4}$ 3.4 Impacts biodiversity or ecosystem services

I.22 Soil erosion

I.23 Damage/mortality of native plants

I.24 Losses of biodiversity & wildlife

I.25 Soil carbon stocks (tbc)

Data from IPCC reports
Soil carbon stocks rates per land cover group

Environmental impacts – 3.4 Impacts biodiversity or ecosystem services

W_3 3. Environmental impact

- $W_{3.1}$ 3.1 Impact on street trees
- $W_{3.2}$ 3.2 Impact on spread pests
- $W_{3.3}$ 3.3 Impacts control measures
- $W_{3.4}$ 3.4 Impacts biodiversity or ecosystem services

I.22 Soil erosion

I.23 Damage/mortality of native plants

I.24 Losses of biodiversity & wildlife

I.25 Soil carbon stocks

I.26 Protected areas

Data from Natura 2000 / Experts
Number of habitats in Natura 2000 associated to the host

Environmental impacts – 3.4 Impacts biodiversity or ecosystem services

W_3 3. Environmental impact

- $W_{3.1}$ 3.1 Impact on street trees
- $W_{3.2}$ 3.2 Impact on spread pests
- $W_{3.3}$ 3.3 Impacts control measures
- $W_{3.4}$ 3.4 Impacts biodiversity or ecosystem services

- I.22 Soil erosion ↑
- I.23 Damage/mortality of native plants ↑
- I.24 Losses of biodiversity & wildlife ↑
- I.25 Soil carbon stocks ↑
- I.26 Protected areas ↑

↑ Higher the impacts on biodiversity or ecosystem services, higher the social impact and higher the priority

Conclusions

1. Approach similar to other initiatives: more focus on quantitative measurement of impact
2. More and better data on direct economic effects of pests affecting crops
3. Indicators for environmental (and to a lesser extent) social impacts still to be tested with available data
4. A combination of qualitative and quantitative assessment is likely the best approach
5. Data availability and nature of impact probably different between crops and forestry host → differentiated approach and 2 sectoral lists

Open issues for discussion

1. Data availability at MS level: so far mostly based on EU wide available data bases:
    - Any suggestions hints for sources
2. Covering data gaps with ad-hoc consultation to MS?
    - How to articulate the process
3. Differentiated approach to pests related to crops versus forestry host?
    - Any feedback / reactions

Thanks for your attention

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