



Farmer's Toolbox for Integrated Pest Management

AGRI/2020/OP/0003

CONCLUSIONS

November 2022

Objectives of the Pilot Project

The objectives of the Pilot Project read into **four study themes** as follows:

- **Theme 1: Identification and assessment of effective practices and technologies** to reduce dependency on the use of pesticides in the EU.
- **Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers**
- **Theme 3: Assessment of how public bodies, private certification schemes, and other strategies** are contributing to the reduction of the dependency on pesticide use
- **Theme 4: Strategies on how to scale up good practices** throughout the EU

The **geographical scope** of the study is the 27 EU Member States, as well as **third countries including Switzerland and Canada**. As regards crops, the study has been focused on arable crops, viticulture and fruits and vegetables, however, without being exclusively limited to those.

Methodology

A **mix of data collection tools** have been used with priorities placed on direct interactions with targets:

- **Desk research and literature review**
- **An extensive interview programme** amounting to **a total of approx. 350 in depth-interviews** (+ other interviews to complete the inventory) and including
 - National level including NCAs, academic and technical experts, advisors, farmers' associations, NGOs;
 - EU level including associations and research projects.
- **12 case studies focusing on specific initiatives to reduce the dependency on pesticide use**, including 10 case studies within the EU, and two case studies in non-EU countries (Switzerland and Canada);
- **Workshop with a particular emphasis on Theme 4 and strategies on how to scale up good practices** throughout the EU.

A **team of country experts** has been involved to gather data at national level to ensure an understanding of the local context as well as to guarantee the possibility of participating in consultation in stakeholders' native languages.

Major outputs of the Pilot Project

- **In-depth analysis of the four study themes** as outlined above (no policy recommendations).
- An **EU-wide database including over 1 300 IPM examples of practices, techniques and technologies** gathered from across the EU Member States, covering all eight IPM principles as outlined in the SUD (Annex III, Directive 2009/128/EC), as well as the **official crop- or sector specific guidelines as referred to in the SUD** (Article 14(5)).
- A strategy to ensure a wide **dissemination of the database. What is next ?**
- **12 case study** reports illustrating **practices and collective approaches** to the reduction of pesticide use .
- **National fiches on IPM uptake**

Findings and conclusions

Theme 1: Identification and assessment of effective practices and technologies to reduce dependency on the use of pesticides in the EU

- **Main outputs** of the theme (descriptive part):
 - **Inventory of IPM practices, techniques and technologies;**
 - **Inventory of crop- or sector-specific guidelines;**
 - *Both being inserted in the Farmer's Toolbox.*
- **Analysis** (analytical part) related to:
 - How MS have used crop- and sector-specific guidelines to support the uptake (enforcement) of IPM by farmers;
 - Pesticide use and pesticide sales trends;
 - Assessment of IPM practices as regards their usefulness in reducing dependency on pesticide use;
 - Assessment of the SUD transposition;
 - Typology of Member States as regards IPM implementation.

Findings and conclusions

Theme 1: Identification and assessment of effective practices and technologies to reduce dependency on the use of pesticides in the EU

Inventory of IPM practices, techniques and technologies

- The eight IPM principles as set under Annex III of the SUD have been translated in 35 sub-principles.
- For each sub-principle, we have:
 - ✓ Identified **examples in national languages** (1 300 examples in total);
 - ✓ **Assessed the potential to reduce pesticide use** (each type/group of practices has been assessed as regards its potential to contribute to the reduction of dependency of pesticide use, its cost for implementation and its overall effectiveness);
- ⇒ Inventory/DB SHALL be considered as an **inspirational tool** and not, by far, an exhaustive tool on how to implement IPM at farm level;
- ⇒ The **main users of the DB should be the farm advisors** rather than the farmers themselves. Such users will find examples in the database that could be replicated after adapting the example to local/regional farm and agro-climatic conditions (**NOT "out of the shelves" solutions**) .

Findings and conclusions

Theme 1: Identification and assessment of effective practices and technologies to reduce dependency on the use of pesticides in the EU

Inventory of crop- and sector-specific guidelines

- A **mix of different approaches** on the drafting and development of such guidelines:
 - ✓ **Monitoring/controlling tool** at farm level (only 1 country followed that approach) ;
 - ✓ **Self-assessment tool** to help farmers to learn on IPM and to improve their cultivation technique (4-5 MS);
 - ✓ **Cropping guidelines:** documents describing how to apply crop protection on a given crop (the majority of MS) .

Findings and conclusions

Theme 1: Identification and assessment of effective practices and technologies to reduce dependency on the use of pesticides in the EU

How MS have used crop- and sector-specific guidelines to support the uptake (enforcement) of IPM by farmers ?

- Member States developed a wide range of activities to ensure uptake of IPM at farmer level, including the development of crop- and sector specific guidelines; training and information activities; providing warning systems, forecasting models.
- Cropping guidelines co-exist with those “officially recognised crop-specific guidelines” by public authorities in the context of Article 14(5) of the SUD (=> *confusion !*) .

Findings and conclusions

Theme 1: Identification and assessment of effective practices and technologies to reduce dependency on the use of pesticides in the EU

Pesticide use and pesticide sales trends

- Pesticide use data can be one source of information assessing the effects of IPM on the dependency on pesticide use. However, current data on **pesticide use as collected by EUROSTAT are fragmented**, which does not allow for an overall assessment of trends in their actual use. National data sets exist in a limited number of MS.
- **Pesticide sales (in tons) can be a correct proxy of pesticide use** when data series (3-5 years minimum) can be used.
- The **majority of Member States set out targets on pesticide risk reduction**, while only **one Member State defines a target on pesticide use (pesticide sales) reduction**.
- Country fiches on the implementation of IPM measures point at a **great variety of the uptake and implementation choices of IPM across EU Member States**.

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

- Analysis of:
 - The extent to which **alternative solutions** exist and are cost-effective;
 - The **cost of IPM implementation** at farm level as well as the **risk of yield reduction** linked to it;
 - The **link between the level of IPM measures uptake and farmers' characteristics**, including age, level of education and training ;
 - The **link between the level of IPM measures uptake and crop characteristics**;
 - **Cooperation and communication** between stakeholders, including the efficiency of collective actions and market initiatives;
 - **Knowledge transfer**;
 - **Other drivers and side effects** that can facilitate the reduction of dependency on pesticide use and side effects .

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

Availability of alternative solutions:

➤ Diverging views on the availability of alternative solutions:

- ✓ Producers (and economic actors at production level) consider that solutions shall be economically viable mid- and long term ;
- ✓ Other stakeholders have diverging positions considering that long-term environmental and social (health) issues are more important than the short-term economic viability.

⇒ *What does « economically viable » mean?*

⇒ *Are there tools to measure such economic viability?*

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

Availability of alternative solutions:

➤ Diverging views on what an alternative solution could be:

- ✓ Too often a solution is considered as a substitution 1:1 OR the use of a limited number of techniques related to a given pesticide, a given pest.
- ✓ (A certain) lack of consideration in the IPM concepts of the SUD that the solution can be global, not looking at a specific pest or specific pesticide but considering the overall cultural systems.
 - ⇒ *The DB includes examples aiming at promoting the change of cultural systems.*
- ✓ In most of cases, the **agronomic effectiveness of alternatives is lower** and, therefore, often, a mix of alternatives must be combined .
- ✓ The **costs of implementation of IPM at farm level vary considerably** from one cropping system to another and from one technology to the other and also regionally.

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

Link between the level of IPM measures uptake and farmers' characteristics

- While there are **links between the level of IPM measures uptake and farmers' characteristics**, a variety of factors act *together* in influencing agricultural practices used:
 - ✓ **Age, level of education and farmers typology (e.g., part-time vs full-time)** may affect the farmers' attitudes towards innovation and sustainability, which are both key for IPM adoption.
 - => *Looking at one factor in isolation, such as age or level of education of the farmers, is not sufficient!*

Link between the level of IPM measures uptake, crops & and yield level

- The level of **uptake and the potential of adopting IPM measures varies according to the characteristics of the crop**. The different applicability of IPM practices across crops translates into a different potential reduction of pesticides.
- The question related to **yield reduction linked to IPM uptake** is a subject to disagreement and no long-term assessment has been performed to date to answer such question.

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

Cooperation and communication between stakeholders

- **Collective approaches**, including those framed within operational programmes of producer organisations, promote farmers' learning about and uptake of better pest management practices (including IPM) by:
 - ✓ **Reducing costs and allows for extending the benefits** of reduced pesticide use at regional scale (*=> integrated pest management is more effective at cooperative level than at single-farm scale*).
 - ✓ By influencing **farmers' behaviour** (*=> increased learning processes and knowledge exchange*).
 - ✓ *Collective approaches also facilitate e.g., investment in costly equipment and pest monitoring at area of production level.*

- **Agricultural cooperatives and certification labels** constitute the most relevant marketing initiatives promoting reduced pesticides' use, although adoption of IPM practices, cooperation and exchange of information varies significantly among sectors.

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

Knowledge transfer

- The large majority of Member State authorities have reported the use of **pest monitoring systems and prognosis systems and models**, yet with a large variability in terms of actors and intensity of activities across Member States.
- Farmers are usually supported by **agricultural advisors and extension services** that provide advice on crop protection and other agronomic practices; several Member States have established rules or policy **measures aiming at separating advisory services from sales of pesticides**.
- The most promising approach to transfer knowledge at farm level and across farmers is certainly the **set-up of farm networks**, such as the DEPHY farm network in France, and the (first) Pan-European network set up within the H2020 project IPMWORKS.

Findings and conclusions

Theme 2: Estimation of the potential to reduce dependency on pesticide use and its key drivers and barriers

Other drivers and side effects that can facilitate the reduction of dependency on pesticide use and side effects

- Pressure from **civil society and policy developments** are a key potential driver of pesticide use reduction.
- **Digitalisation** might also be a driver of pesticides' reduction.
- **Taxation systems** and tools such as the polluter pays principle might help drive pesticides' use towards less-dependent patterns, however, their practical application results challenging.
- Leveraging on synergies between reducing pesticides use and pursuing other goals such as **nutrient management, soil conservation** etc. can support the design of policy that can achieve different goals simultaneously and with enhanced results.

Findings and conclusions

Theme 3: Assessment of how public policies, private certification schemes, and other strategies are contributing to the reduction of pesticide use

- Analysis of:
 - **Main factors affecting the difference in implementation** among MS, cropping system, region, etc?;
 - **Impact of market preferences or public preference on pesticide use (if any);**
 - **Impact of public policies, of which the CAP, contributing to the dependency on pesticide use;**
 - **Impact of other tools and schemes (certification, etc.).**

Findings and conclusions

Theme 3: Assessment of how public policies, private certification schemes, and other strategies are contributing to the reduction of pesticide use

Main factors affecting the difference in implementation

- The different levels of implementation of IPM practices across Member States depend on **several factors of legal, behavioural, environmental nature** as well as different degree of knowledge and resources.
- The **role of authorities as regards IPM implementation or awareness is crucial**, mainly taking the form of information and dissemination measures; financial support; and regulatory instrument and control of compliance.

Impact of market preferences or public preference, and private certification schemes on pesticide use (if any)

- Market preference and public preference have an impact on agricultural practices used, however, only to a limited extent.
- Schemes promoting reduction of pesticides do exist, however, it is difficult to market them due to low demand and awareness among consumers, except for F&V.

Findings and conclusions

Theme 3: Assessment of how public policies, private certification schemes, and other strategies are contributing to the reduction of pesticide use

Impact of public policies, of which the CAP, contributing to the dependency on pesticide use (only CAP analysed as other policies e.g., SUD have already been evaluated)

- CAP toolbox and instruments have been useful in promoting and supporting beyond the obligations, the uptake of IPM by farmers, however, only **to a limited extent**. More collective support would facilitate IPM uptake.
- While the new **CAP toolbox has been enriched by several tools** that could help Member States to fund IPM uptake, it remains the decision of the Member State authorities to activate the measures. At the time of drafting this report (January 2022), the Member States proposals were not yet publicly available.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

- Objectives:
 - How to encourage a **change in current agricultural practices** and promote lower dependency on pesticide use;
 - How to **foster cooperation between Member States**;
 - How to **implement CAP instruments effectively** to reduce dependency on pesticide use and how to **ensure coherence** with other incentives;
 - How to **improve knowledge and research** transfer among sectors and how to integrate it into conventional farming when it decreases the use of pesticides.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

Presence of advisory services at regional level and networking:

- Advisory services play a key role in the encouragement of change, and in favouring the use of new methods and technologies;
- A sufficiently developed advisory services network would allow for transfer of knowledge across MS;
- There is a large diversity of advisory services at regional/local level. But in many MS, there is a limited presence of advisory services;
- There are many types of advisors (public sector, research institutes, farmer-based organisations and private sector), with different roles and needs;
- These actors can be independent or not so independent, and both play an important role in IPM adoption. Most stakeholders say that advice must be impartial, trusted, simple and farm tailored;
- Main barriers identified: language, lack of connection of advisors between MS and the tools and resources applied by the advisors are not applicable to all regions.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

EU related projects and other initiatives aiming at knowledge transfer on IPM

- There is a vast amount of EU projects (past, ongoing and new) and initiatives looking into IPM and pesticide reduction topics, of which IPMWORKS, IPM Decisions, IWMPRAISE, SUPPORT, SmartProtect, ENDURE, OPTIMA, BTSF.
- Only a small number of stakeholders interviewed could identify relevant EU projects and initiatives.
- Strategies for dissemination and communication have been improved in recent years: social media, platforms, demonstration events, cross-visits,... Therefore, reaching more farmers and being more efficient in promoting IPM.
- These strategies are disseminating good practices across the EU to some extent, but they only reach a small percentage of farmers.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

Platforms and tools aiming at knowledge transfer on IPM

- A lot of platforms have been created to promote knowledge exchange on IPM.
- H2020 projects have been building tools and platforms for knowledge exchange on IPM (SmartProtect, IPM Decisions,...) but the adaptability to local conditions, user-friendliness and long-term sustainability is questioned.
- Platforms must be able to develop a better link between research and farmers/advisors, translating scientific knowledge into farm practices.
- There is a need for building synergies and integrating EU projects and regional/local resources, building a common platform to better reach farmers.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

Effective implementation of CAP instruments to reduce the dependency on pesticide use

- Information related to upcoming CAP instruments is limited, as National Strategic Plans for the new CAP 2023-27 were still under development during the analytical phase of the study.
- CAP instruments and measures contribute to the strengthening of Member State Agricultural Knowledge and Innovation Systems (AKIS).
- Eco-schemes (Pillar I) - possibility of enhancing practices that contribute to increased efficiency in the use of inputs and maximize ecosystem services provision.
- Rural Development (II Pillar) - possible support for holistic IPM, measures to support the training of advisors, the creation of Demo Farms, to ensure an effective demonstration of results and a real knowledge transfer to farmers.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

Transfer of knowledge across agricultural types (conventional vs organic)

- Knowledge has been transferred across agricultural types to some extent: mechanical weeding, use of beneficial organisms, reduced tillage practices.
- There is a need for learning on both sides and experience can be integrated through:
 - ✓ Practical advisory, and technical experts operating in the field;
 - ✓ Joint education and cooperation; finding common problems and complementary themes and approaching them on both ways;
 - ✓ An education system with emphasis on cooperation: trainings, round tables between the stakeholders, model farms and practical demonstrations with direct knowledge transfer from farmers with experience.
- Limitations: tensions between groups, risk aversion.

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

Strategies identified

| | Strategies identified |
|---------------------------------|---|
| Demonstration farms | Demonstration and model farms |
| | Extend the existing networks of demonstration farms |
| | Increased budget for demonstration farms |
| Trusted advisors support | Create a sense of community and transmit it to the farmer |
| | Close interaction with farmers and building trust |
| | Bottom-up approach |
| | Continuous training of advisors |
| Dissemination | Translated resources |
| | Discussion and study groups |
| | Improved use of social media |
| | Webinars |
| | Engagement of key stakeholders that can disseminate knowledge nationally |
| | IPM policy makers community |
| IPM Toolbox | Strategical DSSs based on benchmarking |
| | Coordinate the various initiatives on the topic |
| | EU wide data base of farm level IPM practices |
| Nudging strategies | Promote IPM not only with technical knowledge but also normative and social aspects |
| | System to reduce the impact of risk taking |
| | Reduce bureaucratic burden |

Findings and conclusions

Theme 4: Strategies on how to scale up good practices across the EU

Overview of impactful strategies identified

| Study questions | Impactful strategies |
|--|---|
| How to encourage a change in current agricultural practices and promote lower dependency on pesticide use | <ul style="list-style-type: none">• Demonstration and model farms• Continuous training of advisors• Discussion and study groups• Webinars |
| How to foster cooperation between Member States | <ul style="list-style-type: none">• Extend the existing networks of demonstration farms• Translated resources• Improved use of social media• Coordinate the various initiatives on the topic• EU wide data base of farm level IPM practices• IPM policymakers' community |
| How to implement CAP instruments effectively to reduce dependency on pesticide use and how to ensure coherence with other incentives | <ul style="list-style-type: none">• Increased budget for demonstration farms• Support continuous training of advisors in this topic• Reduce bureaucratic burden |
| How to improve knowledge and research transfer among sectors and how to integrate it into conventional farming when it decreases the use of pesticides | <ul style="list-style-type: none">• Demonstration and model farms• Discussion and study groups• Continuous training of advisors• Webinars |

Findings and conclusions

Drivers and barriers for IPM uptake

Drivers

- **Pressure from civil society** and **policy developments** promote and drive transitions to more sustainable agriculture.
- **Collective actions** increase the effectiveness of pesticides action plans, reducing costs and allowing for extending the benefits of reduced pesticide use at regional scale, whereas pest management is more effective at cooperative level than at single-farm scale. Also, collective actions appear to influence the farmers' behaviour, e.g., by incentivising farmers to adopt alternative practices by mirroring other virtuous farmers. Limitations: tensions between groups, risk aversion.
- **Further R&D efforts are needed** in many areas (knowledge on pest biology, improved methodologies on pest monitoring, prediction models, development of new farming models are needed). Industry must further invest in biopesticides, new farming equipment, robotisation, and digitalisation. Such innovations must cover many crops.

Findings and conclusions

Drivers and barriers for IPM uptake

Drivers

- **The presence of a dense network of independent advisory services** is a key driver and a pre-requisite in IPM uptake as knowledge needs to be communicated to producers.
- **The development of certification labels and private schemes** developed by agricultural economic organisations boosts the reduction of the dependency on pesticide use even if such developments are, for the time being, mainly limited to the F&V sector.
- **Policies need to play the role of “sticks and carrots”** to allow a smooth transition to IPM. Effective and efficient policies require a better understanding of farmer decision-making processes.
- **Promotion campaigns and training** are fundamental to fill this specific knowledge gap and boost the uptake of on-farm IPM practices.
- **Generational renewal** shall be used as a lever to change cropping practices towards a more sustainable agriculture in the EU.
- **Taxation systems** may be effective if they are precise and support a specific policy (e.g., risk reduction).

Findings and conclusions

Drivers and barriers for IPM uptake

Barriers

- **Lack of availability of economically viable alternatives** to conventional practices.
- The **regulatory framework (and its implementation)** for placing alternative products on the market remains perceived as **too cumbersome**.
- **Economic risks** of substitutes vs. chemical pesticides.
- **Potential lacking (market) compensation** for farmers to change practices.
- **Lack of knowledge** among farmers and uncertainty about agronomic effectiveness and efficiency of substitutes.
- The difficulties in estimating the **long-term societal and environmental costs (and benefits)** of pesticide use.