Farmer's Toobox for Integrated Pest management

Main results of the ***Pilot Project - Developing a farmers' toolbox for integrated pest management practices from across the Union***

funded by the European Commission – Directorate General for Agriculture and Rural Development based on a request from the European Parliament

November 2022

OBJECTIVES

The objectives of the Pilot Project are to provide useful information for future actions at EU and Member States' level on integrated pest management (IPM) including the implementation of the CAP post-2020 through the following four specific objectives:

- To provide a comprehensive description of the currently available implementing approaches (e.g., policies, agricultural practices, technologies, private sector initiatives such as certification or labels) to reduce dependency on pesticides use;
- To assess the potential of the approaches described above for reducing the dependency on pesticide use, and to prove their effectiveness as well barriers (real or perceived) that limit their uptake;
- To propose specific strategies on how to scale up good practices throughout the EU. This includes increased research and knowledge transfer between sectors; and
- To set up an EU-wide database containing the relevant information and guidance to enable farmers and advisory services to reduce the dependency on pesticide use.

This Pilot Project has a much broader objective than its title suggests as it addresses many socio-economic issues related to recent European public policies aiming at reducing the use of pesticides as presented in the Farm to Fork and Biodiversity strategies.

METHODOLOGY

Desk research ***Interviews*** ***Case studies***

In all EU Member States	**>300**	**12**

OUPUTS

➜ A European DB including **more than 1300 examples of IPM practices** from each of the eight (8) IPM principles providing inspiration on how to further implement IPM at farm level.

➜ **A European inventory** of the crop-specific guidelines developed in Member States **over the last 10 years**.

➜ **An analysis of the most promising IPM practices, techniques, and technologies** aiming to reduce the dependency of pesticide use.

Assessment of the main IPM practices, techniques and technologies as regards their future potential of reducing dependency on pesticide use

Alternatives	Potential reduction of pesticide use	Cost of implementation	Current level of implementation	Long term sustainability
PRINCIPLE 1 – PREVENTION AND SUPPRESSION				
Site conditions	Low	Low	Medium	High
Crop rotation				
Crop diversity (crop rotation/ sequence)	Medium to high	Low to high	Low to medium	High
Intercropping	Low	Low to medium	Low	High
Under sowing	Low	Low	Low	High
Others (companion cropping)	Low	Low	Low	High
Cultivation techniques				
Stale seedbed	Low to medium	Low	Medium	High
Sowing time	Low to medium	Low	Medium	High
Seed/plant density	Low to medium	Low to medium	Medium	High
Superficial ploughing	Low	Low	Low	High
Non-inversion tillage	Low	Low	Medium	High
Conservation tillage/direct sowing	Low	Low	Medium	High
Mulching	High	Low	Low	High
Resistant/tolerant cultivars and standard/ certified seed and planting material				
Weed competitive cultivars	Medium	Low	Low	Medium to high
Disease or pest resistant and tolerant cultivars produced through conventional breeding	High	Low	Medium	High
Use of certified seed	Medium	Low to medium	High	High
Disease or pest resistant and tolerant cultivars produced through Genetic engineering & new genomic techniques	High	High	Low	High
Balanced fertilisation, liming and irrigation/drainage practices				
Balanced fertilisation	Low to medium	Low	Low to medium	High
Irrigation	Low	Medium	Medium	Medium
Preventing the spreading of harmful organisms by hygiene measures				
Hygiene measures: cleaning of machinery	Low to medium	Low	Medium	High
Protection and enhancement of important beneficial organisms				
Habitat conditions: hedges, field margins	Medium	Medium	Low	High
Habitat conditions: Enhancing beneficials by improved management	Medium	Medium to high	Low	High
PRINCIPLE 4 – BIOLOGICAL, PHYSICAL AND OTHER NON-CHEMICAL METHODS				
Biological control: application and release of beneficials and microbials	High	Low to medium	Low	High
Biological control: other natural substances	High	Low to medium	Low	High
Biological control: use of plant strenghteners/biostimulants	Medium	Low to medium	Low	High
Physical measures: mechanical	High	Low to medium	Medium	High
Physical measures: thermic	Medium	Medium to high	Low	High
Biotechnical measures: pheromone traps	Medium	Low to medium	Low to medium	Medium to high
Biotechnical measures: mating disrupting	Medium	Low	Low	Medium to high
Biotechnical measures: food traps, use of attractants, sexual confusion	Medium to high	Low	Low	Medium to high
SMART agriculture	High	High	Low	Medium to high

Barriers and drivers linked to IPM uptake

KEY 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 allows 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 have an effect on the farmers' behaviour, e.g. by incentivising farmers to adopt alternative practices by mirroring other virtuous farmers.

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 has to further invest in biopesticides, new farming equipment, robotisation, and digitalisation). Such innovations have to cover a large number of crops.

The presence of a dense network of independent advisory services is a key driver in IPM uptake as knowledge needs to be communicated to producers.

The development of certification labels and private schemes developed by agricultural economic organisations boots the reduction to the dependency of 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 filling 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) and at the same time generate budget which enables farmers to switch to other practices or alternatives. Taxation system also requires the availability of alternative methods and measures.

KEY BARRIERS

Lack of availability of economically viable alternatives to conventional practices. Promising alternative solutions may exist but are often still at development level. Moreover, the effectiveness of such alternatives is generally lower as compared to conventional products. This results in an additional effort by the farmers that need to combine several techniques, thus requiring advanced know-how.

The regulatory framework for placing alternative products on the market remains perceived as too cumbersome. The recent four implementing Regulations which amend the current rules applicable to micro-organisms aim to facilitate the approval of micro-organisms for use as active substances in plant protection products and the authorisation of products containing them; is a first attempt from the Commission to reduce time for registration.

Economic risks of substitutes vs. chemical pesticides. The costs of implementation of IPM at farm level vary considerably from one cropping system to another and from one technology to the other. Such cost will then depend on the IPM solution. Substituting a chemical pesticide by an alternative biopesticide with the same agronomic efficiency has nearly no cost. However when the IPM solution relies on series of tools of which mechanical weeding and other smart agriculture practices then the costs may be too high for a farmer to invest in such equipment.

Potential lacking (market) compensation for farmers to change practices (towards more costly/risky) – IPM certifications hard to market. Need to establish new supply chains to cope with longer crop rotations.

Lack of knowledge among farmers and uncertainty about effectiveness and efficiency of substitutes among farmers can hamper the uptake of IPM practices by farmer, thus potentially slowing down the process of reducing pesticide use dependency. IPM is more knowledge-intensive than crop protection based on the use of chemical pesticides and many farmers do not have this knowledge nor do they have access to advisor who have it. In many cases alternatives, such as biological control agents, are host specific, require exact timing and specific conditions for their application.

The difficulties in estimating the long-term societal and environmental costs of pesticides use limit the development of IPM uptake as the long-term risks of pesticide use are not well known (nor anticipated) nor have the long-term effects of IPM on the control of diseases, pests and weeds been widely studied, i.e. there is a lack of documentation of the long term effects/impacts of IPM on sustainability components.