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Smarter agriculture: farmers work with nature to cut pesticides

With support from EU-funded researchers, farmers across Europe are adopting smarter and better integrated pest management that protects crops and cuts chemicals - without cutting profits.

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In sunny Tourinha, a small town north of Lisbon, farmer Bruno Neves proudly walks through his fields and greenhouses full of lettuce and cucumbers. Come Christmastime, there will also be the traditional Portuguese Christmas cabbage. Ladybirds, hoverflies and other insects buzz through the air, tiny allies in his mission to grow healthy crops.

“I create good conditions for insects to live on my farm,” said Neves, who works hard to limit the use of chemical pesticides. “We cannot fight nature, we should see nature as our friend.”

Nature first

His approach reflects the essence of a method of farming known as integrated pest management (IPM). It offers a smart, eco-friendly way to protect crops by working with natural processes instead of relying primarily on chemicals.

IPM combines techniques like crop rotation and pest-resistant varieties. It also applies biological controls such as ladybirds, parasitic wasps and beneficial fungi to keep pests in check.

Importantly, pesticides are not banned altogether, but are used as sparingly as possible and in ways that minimise risks to human health, beneficial organisms such as bees, ladybirds or fungi that protect plants from pathogens, and the environment.

Neves is one of many farmers in Europe who have been experimenting with IPM as part of an EU-funded initiative called IPMWORKS that ran from 2020 to April 2025.

“The objective of IPMWORKS is to grow healthy crops and manage crop diseases, weeds and pests while reducing the use of pesticides,” said Nicolas Munier-Jolain from France’s National Research Institute for Agriculture, Food and Environment, who coordinates the IPMWORKS research team.

Pesticide risks

Chemical pesticides are still a major source of pollution, contaminating soil, water and air, harming biodiversity, and even creating resistant pests. They also pose risks to human health, with exposure linked to chronic illnesses such as cancer, heart, respiratory and neurological diseases.

Although IPM became mandatory in the EU in 2014, adoption has been slow. Most farmers still rely heavily on pesticides. IPMWORKS set out to change that by building a network of pioneering farmers like Neves.

“I’ve never liked pesticides,” said Neves, who has been applying IPM since taking over the family farm in 2011. “I didn’t want to use them because of health concerns, but also because I believe that if we can do better, we should.”

His persistence is paying off. “A lot of farmers don’t believe me, but last year I only sprayed three or four times,” he said. “Some farms spray as often as twice a week.”

Learning from each other

The IPMWORKS network provided invaluable support in finding effective alternatives to pesticides, said Neves.

“It was great to connect with like-minded farmers who had the same goals and challenges. Having the opportunity to share my experiences and to learn from others gave me the strength to continue even when it was not easy.”

One of the big successes of the initiative was the creation of farmer hubs. They are peer-to-peer networks led by specialised coaches like Jolien Claerbout, a Belgian agricultural researcher from Inagro, an agriculture consultancy, who worked with farmers in Flanders.

“The role of hub coaches was crucial,” said Claerbout. “First, we needed farmers to trust us and each other. Then we could share ideas and practical solutions.”

These hubs became spaces for farmers to exchange experiences and find alternatives together. “Otherwise, with so much work on their farms, they might never take the time,” she said.

Just as profitable

Did it work? Yes – and not just for the environment. Farmers also stand to benefit.

“We have shown that holistic IPM is cost-effective and offers better pest control,” said Munier-Jolain. “It reduces reliance on costly pesticides, often without any loss of profits.”

The research team also produced training modules and an online IPM Resource Toolbox to help farmers adopt sustainable methods.

Munier-Jolain noted, however, that many farmers still hesitate. More financial incentives could help, as well as shifting perceptions, he said.

“We should try to present IPM as an economic opportunity, not as a constraint on farmers.”

According to Neves, fear also plays a role. “The biggest challenge is mindset,” he said. “Many farmers fear their crops will lose value. They need to believe it’s possible.”

Wider impact

While exact numbers are not available, EU data suggests that there is huge potential in expanding IPM. According to Munier-Jolain, scaling it up could bring major benefits for both society and the environment.

“If all European farmers adopted holistic IPM, we could realistically aim for a 50% reduction of pesticides – without any real decrease in food security,” said Munier-Jolain. That would mean cleaner water, healthier soils, and a big boost for biodiversity.

For Neves, it is a vision that motivates him. “As a farmer, I don’t just produce food, I also protect the environment. I want my children to look at this land in 40 years and see that their father helped to protect it, not destroy it.”

This is not just about fewer pesticides. It is about rethinking farming so that people, profits and the planet all win. The challenge now is scaling up these successes, because a greener future for farming depends on it.

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More info

- IPMWORKS (CORDIS)
- IPMWORKS project website
- Integrated pest management