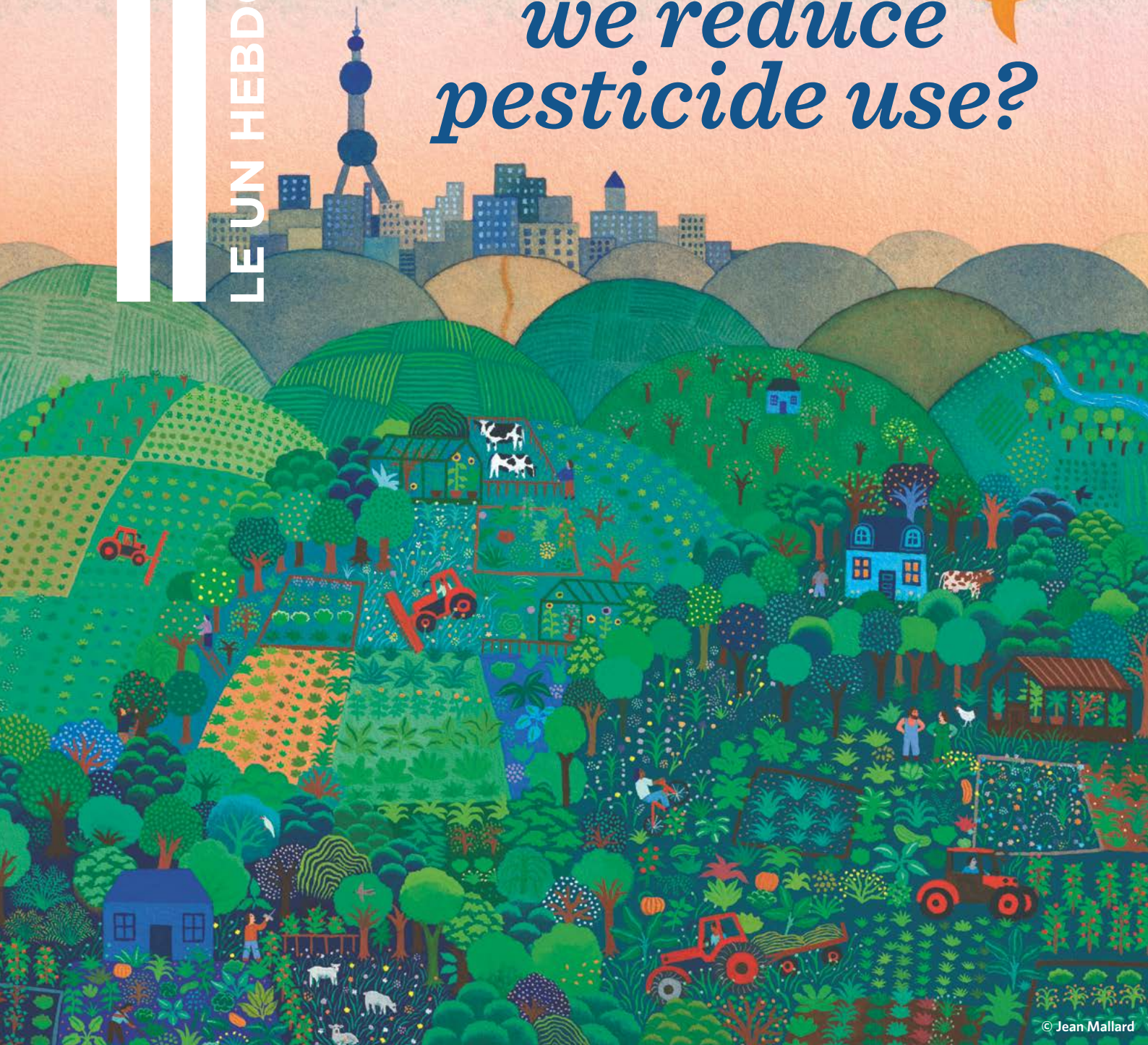


1
LE UN HEBDO

How can we reduce pesticide use?



© Jean Mallard

Despite their well-known impact on human health and ecosystems, synthetic pesticides are still often the default choice for farmers keen to protect their crops. In partnership with the European project Agrowise, Le 1 explores the thousand and one ways to reduce their usage – and rethink our relationship with farming.

“PLANT HEALTH IS A COLLECTIVE QUESTION, NOT AN INDIVIDUAL ONE”

A conversation with agronomist **CHRISTIAN HUYGHE**

OTHER WAYS TO PROTECT YOUR PLANTS
OUR ILLUSTRATED GUIDE



1 EDITORIAL

Another
(agri)culture

by Lou Héliot

THE BANE OF GARDENERS, “weeds” (les adventices in French, literally “outsiders”) are any plants that have not been deliberately sown. Pretty intruders such as thistles, datura and poppies take root in fields and disrupt the growth of crops such as maize (corn) and wheat. Then there are pests: insects and animals that feast on roots, bulbs, and young shoots. Not content with feeding on crops, pests transmit all kinds of diseases. Last but not least in this infernal triad are fungi and bacteria. These are sometimes beneficial to plants, but they can also destroy crops in a matter of days. Their appearance is generally viewed with concern.

In the battle to protect crops, chemical solutions have been the mainstay since the post-war period. Synthetic pesticides – fungicides, insecticides and herbicides – are formulated in laboratories to rid farmers of anything that might threaten their harvests. Today, nearly 500 active substances are authorized in Europe for use in pesticides.

But is the era of “all-out pesticide use” coming to an end, as agronomist Christian Huyghe suggests in an enlightening interview? Given the now well-documented harm to farmers’ and consumers’ health, the soil and water pollution, the collapse of biodiversity and the increased resistance

of pests to chemicals, it has become crucial to adopt other methods of protecting crops. Many alternatives already exist, and more are constantly being invented.

To explore this non-chemical arsenal, *Le 1* has joined forces with the European Agrowise project, which brings together research organisations from across Europe to provide recommendations to all agricultural stakeholders on how to reduce pesticide use and impact. In this special issue – created in collaboration with INRAE and Agrowise teams coordinated by Maud Blanck, and translated into six European languages – we hear from people who work the land. They share their experiences, challenges and successes in reducing pesticide use. In a large poster designed by illustrator Claire Martha, we explore the many alternatives to chemicals. As well as physical tools, these include collaborating with other organisms (for example, ladybugs, fungi or even “good” weeds), drone-based monitoring, pheromones, and even scents that disorient insects without killing them. We also consider the crucial role played by the agricultural sector as a whole, as well as that of banks, insurance companies, and consumers, in making this transition possible. As philosopher and farmer Léo Coutellec puts it in these pages, these are all inspiring avenues for imagining “another culture of agriculture”. 1



1 LE UN HEBDO

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« WHEN I SAW
MY SOIL CHANGE,
I MADE CHANGES TOO »

Tom Tierney is an Irish conservation-agriculture farmer and brand ambassador of Duncan no-till drills in Ireland and the UK

I CULTIVATE 170 HECTARS in the Kildare County, growing mostly wheat, barley, oats, beans and oilseed rape. When I started, I was full synthetic: synthetic pesticides and synthetic fertilisers. The change came with an accidental opportunity. In 2015, while I was on a once-in-a-lifetime trip in New Zealand, my rented car broke down. While I was waiting for it to be fixed, I came across a factory that makes no-till drills. These machines can drill into grass, into residues, without the need to plough the field. The point is to preserve soil, reduce labour and reduce fuel. Upon hearing that I was an Irish farmer, the director of the factory offered me a coffee and made me an offer that would change my vision of agriculture. He said: “I want to sell my drills in the Northern hemisphere. If you are interested, I will ship one for you to try on your farm.” I thought about it, I said okay, he sent the drill... and I ended up buying it a year later. I switched from plough= based to no-till in 2016 and it changed everything, including my use of synthetic pesticides.

First, I needed to improve the soil structure to make direct drilling work better, so I started cover-cropping and applying organic manures. That made the soil much healthier. When I saw my soil change, I made changes too. The first thing to go was insecticides, because I believed I needed the beneficial predators like spiders, ladybugs, beetles, etc. In the plough system, you just bury them down. But when you’re no-till, you suddenly see all these living creatures and you wonder: why am I putting an insecticide on this ground?

An example would be aphid, a green fly that is a pest for cereals. If I had used insecticides, aphid would go but so would its predators, and you could get another flight of aphid the week after. It didn’t make sense. This is how I went from one or two sprayings per year to zero.

I also started using organic fertiliser like mushroom compost, chicken litter and wood chip-based horse litter, to improve soil biology. After these initial changes, I observed that the yields stayed stable, so I knew I was doing something right.

Then, around 2020, I started looking at synthetic fungicides, thinking I could use less if I kept the plants healthy. I embarked on a trial test, together with an Irish agronomist. We would provide the plants with silica as well as calcium, magnesium, zinc, copper, etc. These elements would reinforce the plants and make them more resistant to diseases, thus requiring less fungicides. After trying it on spring wheat for two years, we observed that there was some disease on the lower leaves, but nothing too dangerous. So for the last five years, the whole farm has been on reduced fungicides. I use them only as a last resort, if I see that a disease is getting out of control, like septoria in wheat. Last year I sprayed once, whereas in typical Irish conditions we would have a four-spray programme.

Regarding herbicides, I didn’t reduce that, I possibly even use slightly more. Basically, my process is as follows: I grow cover crop, I drill into this cover crop and then I use Roundup to destroy it and let the crop grow without

competition. I’ve tried to crimp the cover crop and let it die off in the sun but with our Irish conditions it gets enough energy and moisture to regrow and stand back up.

Overall, according to Teagasc, I’ve reduced my pesticide usage by one third. They also calculated that my profit margin is higher than conventional growers because my costs are lower. I save on insecticides, on fungicides, on synthetic fertilisers, but also on labour and diesel because I don’t plough.

Since 2018, I have been an ambassador of this New Zealand no-till drill in Ireland and in the UK. I’ve sold 35 to 40 machines and set up a WhatsApp group where we can exchange ideas not just about the drill, but also about reduced fungicides, reduced insecticides... It does help when guys can have that confidence. What is holding farmers back is that, once they have a system that works, they’re reluctant to change: if ploughing works, why would I stop? And I suppose the other thing is that when you change your system you do have to re-learn and re-skill, and you do have to make good decisions too, so there’s a risk to that. It isn’t an easy transition to start with. If it wasn’t for my trip to New Zealand, I suppose I would still be in a ploughing and full-synthetic system. 1

In conversation with HÉLÈNE SEINGIER
Illustration Stéphane Trapier

3./

The Georgics

VIRGIL
(70-19 AV. J.-C.)

I cou'd be long in Precepts, but I fear
So mean a Subject might offend your Ear.
Delve of convenient Depth your thrashing Floor;
With temper'd Clay, then fill and face it o'er:
And let the weighty Rowler run the round,
To smooth the Surface of th' unequal Ground;
Lest crack'd with Summer Heats the flooring flies,
Or sinks, and thro' the Crannies Weeds arise.
For sundry Foes the Rural Realm surround:
The Field Mouse builds her Garner under ground,
For gather'd Grain the blind laborious Mole,
In winding Mazes works her hidden Hole.
In hollow Caverns Vermine make abode,
The hissing Serpent, and the swelling Toad:
The Corn devouring Weezel here abides,
And the wise Ant her wintry Store provides. (...)
Some steep their Seed, and some in Cauldrons boil
With vigorous Nitre, and with Lees of Oyl,
O'er gentle Fires; th' exuberant Juice to drain,
And swell the flatt'ring Husks with fruitful Grain.
Yet is not the Success for Years assur'd,
Tho' chosen is the Seed, and fully cur'd;
Unless the Peasant, with his Annual Pain,
Renews his Choice, and culls the largest Grain.
Thus all below, whether by Nature's Curse,
Or Fates Decree, degen'rate still to worse.
So the Boats brawny Crew the Current stem,
And, slow advancing, struggle with the Stream:
But if they slack their hands, or cease to strive,
Then down the Flood with headlong haste they drive.

Translated by John Dryden



CELINE DEVAUX

LOUIS CHEVAILLIER

selects and presents a poem.

Can a return to ancient wisdom teach us how to better respect the planet? In 29 BC, the Roman poet Virgil recited the *Georgics* for the future emperor Augustus. Poetry became an instrument of knowledge while losing none of its hymnal quality. «Happy is he who knows the rural gods.» 1

 A WORD
FROM ROBERT
SOLÉ

[Confusion]

WEEDS, pests, fungi, bacteria, viruses... My garden is under attack on all fronts! I tried beer for the slugs, nettle manure for the aphids, a garlic decoction for the caterpillars, black soap, white vinegar...I'm sick of solutions from old wives' tales! Which herbicides, which insecticides, which fungicides and which brands do you recommend? – None! They're poisons that pollute the air, the soil

and the water table, not to mention their devastating impact on health and biodiversity. Use a good natural method.
– Oh please! Not the rhythm method!
– You should try sexual confusion.
– I'm not joking. I need to protect my plants, my kitchen garden, my orchard.
– Sexual confusion is a clean, fast and powerful biocontrol technique that disrupts communication between pest insects.
– I'm not sure I follow.

– It's simple. You spray a perfume similar to that used by the females to attract males. The latter become disoriented and fail to locate the object of their desire.
– And then?
– This reduces mating, and therefore the number of eggs and the multiplication of the species. Sexual confusion has proven successful in viticulture, arboriculture, and in greenhouse gardening, to protect tomatoes for example. In short, no need to turn to those disastrous pesticides: you just need to know how

to disrupt the reproductive GPS of the pests in question.
– So if I've got this right, this natural method of yours disrupts nature. This raises a philosophical problem: can one fight a just war by such nefarious means? It boggles the mind. 1

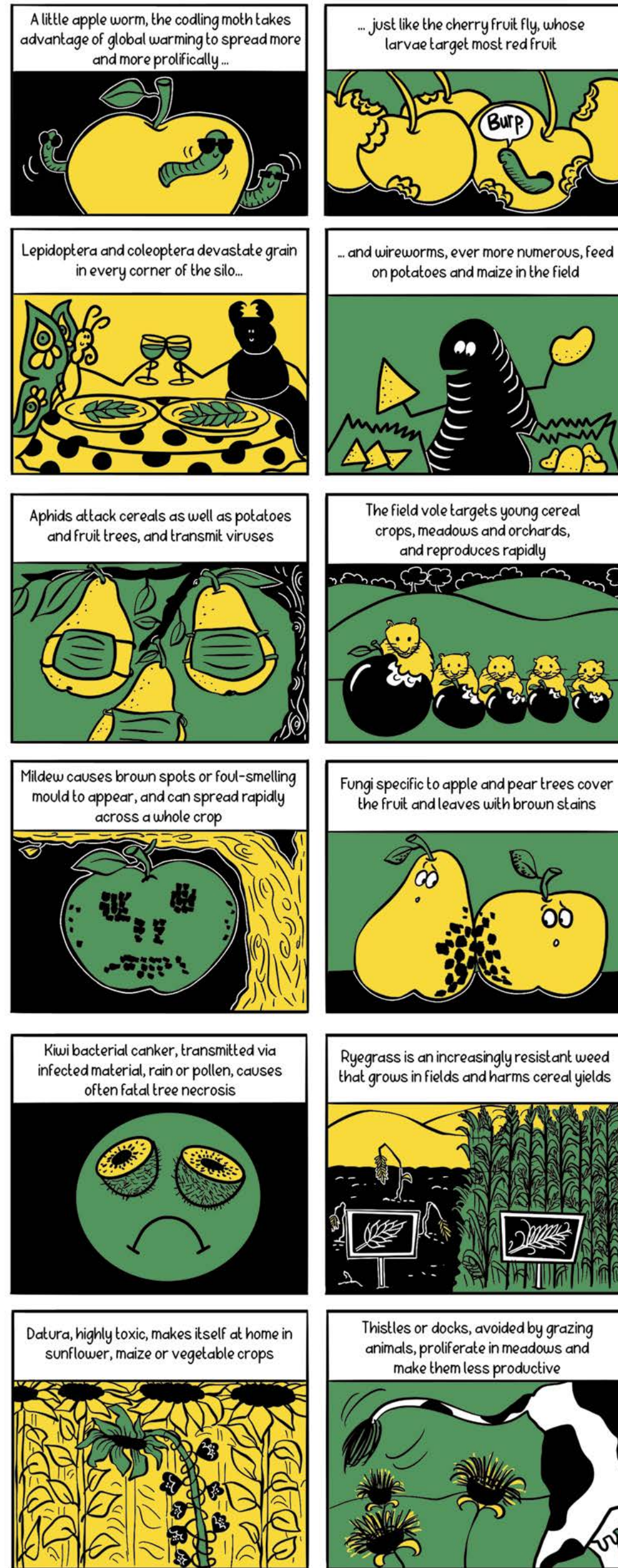
«The field is the master, man is its guest.»

Chinese proverb



REFERENCE POINTS

WANTED : THE ENEMIES OF EUROPEAN CROPS



Louison

Concept and documentation LOU HÉLIOT

«THE CHAPTER OF ALL-OUT PESTICIDE USE IS DRAWING TO A CLOSE»

A CONVERSATION WITH CHRISTIAN HUYGHE

AGRONOMIST
INRAE's Scientific Director of Agriculture, and author, along with Philippe Mauguin and Thierry Caquet, of «Que sais-je ?» L'Agroécologie (PUF, 2024).

For how long have Europeans relied on pesticides for crop protection?

Since the beginning of agriculture, in the neolithic era, farmers around the world have mobilised every possible instrument to protect crops against weeds, insects and fungi. The latter in particular was responsible for tragedies such as the great epidemics of the fifteenth and sixteenth centuries involving ergot, a fungus found in rye, and the great famine in nineteenth-century Ireland, caused by potato blight.

As for pesticides, they first appeared in the nineteenth century. The trigger was phylloxera, which was decimating French vineyards. There were attempts to remedy the problem by introducing American vine varieties resistant to phylloxera. But, in doing so, a disease that was just as devastating was introduced: downy mildew. Against this backdrop, two researchers from the Montpellier Institute of Agronomy discovered that Bordeaux mixture, a product made by mixing lime and copper sulphate, can limit the development of this mildew. It was also observed that a large quantity of copper sulphate kills certain weeds. This was the beginning of selective herbicides, and opened up a whole field of chemical research for plant protection.

Then came the world wars and the accompanying advances in chemistry, particularly for warfare applications. Throughout the twentieth century, multi-purpose pesticides were developed that were capable of combating virtually all pests and diseases in all crops. In France, a total of 291 active substances are authorised; across Europe, there are 464. Although this may seem like a large number, their modes of action – i.e. the way in which they kill an insect, weed or fungus – widely vary.

Why are there now efforts to reduce our reliance on pesticides?

First of all, because of their impact on biodiversity, specifically the collapse of insect populations. This disruption has deprived agriculture of certain ecosystem «services» such as pollination. Another justification, that often takes centre stage, is the risk for human health in pesticides – through water or air pollution, as well as direct exposure to the products in question. Very specific diseases, such as Non-Hodgkin Lymphoma or Parkinson's, have been recognised as occupational diseases for farmers. It's a failure of public policy that there has been no strong push

to change this situation. A third reason is their gradual loss of effectiveness.

What does that mean?

Just as certain bacteria develop resistance to antibiotics, the widespread and regular use of the same molecule or mode of action causes resistance in the living organisms that are targeted. Once this resistance is acquired, there's no going back! Thus, many herbicides no longer have any effect on grasses, which are the main problem for cereal crops. In France, under the strategic plan for the withdrawal of active substances, 75 out of 291 authorised active substances are likely to be withdrawn within the next five years, due to their toxicity or loss of effectiveness. These represent 79 percent of volumes currently used! And it's unlikely that new pesticides can be rapidly produced, since their modes of action are limited. The era of all-out pesticide use is a chapter that is about to close. This is forcing us to think differently about how to protect crops.

What are the potential alternatives?

When you are faced with a pest in your crop, either you kill it – hence the word «pesticide» – or you manage its population to keep it under the harm threshold. To achieve this, the first step is to prevent the appearance of the problem: this is prophylaxis. If you increase the diversity of crops, choose varieties that are more tolerant, reduce the plot size and use cover crops, you continually disrupt the environment and limit the potential spread of diseases, insects and weeds. You can also take action against the «reservoirs», the places where these pests tend to be «stored». To combat beet yellows virus, for example, you need to remove any regrowth. You can also clean the grain silos to limit the presence of insects that target the stored crop.

“When you are faced with a pest in your crop, either you kill it or you manage its population to keep it under the harm threshold”

These preventive measures are highly effective, but not one hundred percent reliable. They also have one particular drawback: unlike with pesticides, you have to anticipate the future. You have to move from the logic of «killing» to «anticipation», or even «collective anticipation». But farmers know how to anticipate. Besides, by maximising the prophylaxis stage, you limit the resistance to pesticides, which therefore remain effective as a last resort. Like antibiotics in the context of human health.

What if prevention is not enough?

We clearly have to retain curative methods, which are more effective when used sparingly. As a replacement or comple-

ment to pesticides, a wide array of biocontrol products are being developed to limit the spread of pests. These include natural substances such as sulphur and macro-organisms such as lacewing – a predatory insect that can be deposited into fields using drones. We can also use micro-organisms (fungi, bacteria, viruses...) to limit the spread of diseases. The latest scientific advances have led to major breakthroughs in this area. For example, it has been discovered that plants have a micro-biome that can influence their health. Then there's the discovery that insects respond to odours in order to reproduce (sexual pheromones) or feed. So now we can recreate these odorous molecules and powder a field with them. This disorients the insects and prevents them from proliferating. These «chemical mediators» form a part of biocontrol. As for innovations in machinery, these have vastly improved our capacity to measure and predict the behaviours of pests, allowing us to remove weeds effectively, and the development of AI will take us even further.

So, are we reducing our use of pesticides?

Between 2009 and 2023 in France the volume of synthetic pesticides used shrank by 40 percent. And this drop was most significant for the most dangerous substances, those that are carcinogenic, mutagenic or reprotoxic. At the same time, sales of biocontrol products have increased by 200 percent. So the system is moving. And these changes in practice have not impacted the productivity of French agriculture.

But if we reduce our use of pesticides even further, isn't there a risk of a collapse in production?

I'm convinced that this is not the case. Reducing pesticide use does not mean reducing the level of crop protection. Moreover, reducing the use of these products should be accompanied by a change in practice on a larger scale: maximising prophylactic measures, increasing crop diversity, and mobilising all available control methods. This means you don't keep producing exactly the same thing, and that we'll have to develop new sectors and mobilise the downstream segments of the production chain.

So farming with reduced pesticide use means a genuine change in mentality...

Yes, we have to learn to mobilise all the biological controls possible so that we only use pesticides as a last resort. We also need a powerful message that crop health is a collective issue, rather than an individual one. Pesticides allowed us to limit our focus to our own plots, whereas using pheromones or deploying prophylactic measures require working with neighbouring farmers. Moreover, with the agroecological approach, instead of focusing on the effects of substances one by one, we work with consortia of fungi and bacteria, which have combined effects, and we treat crops as ecosystems. We use the «community» effect. Besides all this, we also have to work on the collective image we have of agriculture, which is handed down from generation to generation. In the collective

imagination, a good plot of wheat is large, uniform, without any diversity. In other words, it's a biological desert. How do we change this?

What is holding back the widespread adoption of these approaches?

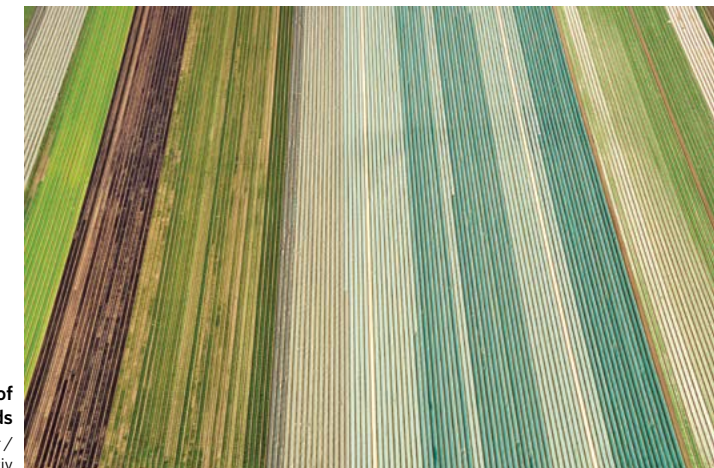
Today, farmers still bear the full cost and risk of reducing pesticide use. Until recently, for example, downstream supply-chain actors – such as agri-food industries or supermarkets – gave paradoxical instructions to farmers, asking them to produce exactly the same thing as before, but with fewer pesticides and at the lowest possible cost. For the system to change – and it is changing – these actors must take responsibility, for example by slightly reducing their margins on goods produced with fewer pesticides. The consumer also has to agree to pay slightly more for such products: around two cents more for a baguette, for example, so that the farmer receives 50 euro more per tonne of wheat.

“We also have to work on the collective image we have of agriculture, which is handed down from generation to generation”

There's a widespread sense that the transition to reduced pesticide use is costly. This is not entirely true. What changes, above all, is the mental load, because the farmer has to anticipate more, observe more and plan more – all without the guarantee of 100-percent effectiveness. To lighten this load, two major levers have to be put in place: firstly, training and collective frameworks to share the risk among the various actors; and secondly, financial incentives or insurance to compensate any farmer who suffers a setback while playing by the rules. Finally, the Common Agricultural Policy has to be aligned with the move towards reduced pesticide use. Public policy plays a crucial role: by making clear the responsibility of each actor by putting forward an ambitious vision of farming; and by ensuring that agricultural policies are consistent with those concerning water, biodiversity and health. ¶

Interview conducted by HÉLÈNE SEINGIER & LOU HÉLIOT

TALKING PHILOSOPHY



ANOTHER CULTURE OF AGRICULTURE

IS AGRICULTURE ABLE to walk without the technological crutch of pesticides? Considering the numerous and inventive alternatives that have been tested on thousands of farms around the world over the last few decades, the answer appears to be yes. And yet we continue to hear that the alternatives are ineffective, and there's a clear sense of inertia when it comes to changing practices. How should we interpret this paradox? Perhaps the question has just been poorly formulated: the alternative to pesticides is less a question of efficacy than efficiency, according to the philosopher François

Jullien, who writes that «true strength is not power that is displayed, but potential power».

Efficacy consists in following a plan and its necessary steps, and the suppression of all obstacles that might harm the final performance objective. To accomplish this, all methods are good, including those that are destructive. Efficiency, on the other hand, aims to promote, upstream, the conditions that make agriculture without pesticides possible. For example, in the fight against a crop-destroying «pest», efficacy demands a frontal assault: destruction, elimination of the threat, in a techno-solutionist approach. Efficiency, on the other hand, takes the agro-ecological approach: action is taken on the local environment, on the agro-ecosystem, to prevent the appearance of the «pest». The techniques are countless: planting hedges to promote biodiversity capable of regulating the «pest» populations; paying attention to the soil; diversifying crop rotations; promoting complementarity between livestock and crops... Of course, this raises the question of temporality. Where pesticide use tends to take place during the growing season alone and the expected effect is a very short-term consideration, the agro-ecological approach is a long-

term affair. Diversified crop rotations are a matter of five, even eight years, and the effect of planting a hedge is measured in decades. So this involves getting away from the short-term mindset by placing the emphasis on care for the agroecosystem as a whole and in the long term.

Thinking about the alternatives to pesticides in terms of efficiency rather than efficacy also allows us to expand our focus beyond merely technical or agronomic approaches. To ensure that such changes in practice don't put farms out of business, it's important to foster diversity and col-

lectivity. Farms with diversified production are more resilient to the vicissitudes of production: if it's a bad year for fruit crops, these farms can compensate with dairy sheep or flour. But the responsibility for this change should not be on the shoulders of farmers alone.

The potential power of change also requires the involvement of citizens, the «eaters».

This occurs through very concrete steps: the establishment of solidarity-based food distribution networks, the purchase of shared farmland, the creation of third-party food centres where farmers and residents mix... But this also requires an education in «self-limitation», to borrow a concept from the philosopher Cornelius Castoriadis. What do we need? What is possible and where are our red lines? It's important to rediscover a certain «sense of limits» so that we can decide, collectively, on what we want to eat and the conditions of production. This is precisely why the question of food democracy – and the accompanying project of food social security – is at the heart of farmer agroecology, that *other culture of agriculture*. ¶

In conversation with HÉLÈNE SEINGIER & LOU HÉLIOT

LEARN MORE

The Agrowise project is part of the European LIFE programme and aims to provide member states with a list of recommendations to reduce the use and impact of pesticides in agriculture. Spanning eighteen months and eight European countries, the project brings together ten research organisations working on integrated crop protection. For more information visit eng-agrowise.hub.inrae.fr.

SEEDS OF CHANGE

How can we protect crops effectively while using fewer pesticides?
The keywords are: anticipation, collaboration... and modification of farming practices. With this in mind, the European project Agrowise relies on the eight principles of integrated protection. Firstly, the prevention of diseases or pests, especially via crop diversity or with the help of «auxiliaries» ❶. Next is monitoring the fields, so that intervention can occur at the right moment ❷, along with training and advice so that the right decision can be taken ❸. If intervention is necessary, non-chemical methods are favoured ❹. Synthetic pesticides only enter the picture as a last resort, and with due caution: choosing the most suitable substance ❺, optimising the dosage ❻, limiting the risks of resistance ❼ and evaluating the effect of the intervention ❽. Cooperatives, supermarkets and food industries also have a role to play by promoting the products made using these innovative protection methods. As for political decision-makers, it is up to them to create the conditions that encourage farmers to take the plunge.

Concept
Hélène Seingier
Illustration
Claire Martha
Sources
INRAE
© Le 1

From cooperatives to agribusiness: THE ROLE OF BUYERS

«Against the backdrop of climate change, as well as the reduction in the available chemicals, we need farmers to keep producing in the long term.» Like many buyers of agricultural goods, Pierre Toussaint of Axereal has growing concerns about securing supplies. Axereal is a cooperative that receives crops like wheat, sunflower seeds or lentils from 11,000 farmers in central France, and supplies them to brands like Bannette, Panzani, Lesieur or supermarket chains. Since 2017, Axereal has encouraged members to apply a sustainable-farming framework. The goal: limit the use of pesticides, fertilisers and tillage to protect biodiversity, the climate, human health and water resources in one go. Thousands of farmers have adopted this approach – and agree to the necessary inspections. «We don't push farmers into failure. For example, there's no demand that they don't treat crops when there is no alternative to maintain productivity», explains Toussaint. «But the market demands goods with less environmental impact.» In exchange for these efforts, the cooperative guarantees markets for diversified crops – such as buckwheat, lentils or sorghum – and offers premiums: up to 3,700 euro per year for the most committed members.

Processors, the next link in the agro-industrial chain, are also joining the effort. «By the end of the 2025 harvest, 100 percent of our "1664" brand beer will be produced with sustainably produced barley malt, thanks to a partnership with the Soufflet cooperative», says Franck Charnay, sustainability manager for Kronenbourg breweries. The company and its supplier have established their own set of specifications, while an independent firm audits the farmers.

From Pasquier to Danone or Heineken, every brand is pursuing its own approach to sustainable sourcing. «There is a lack of homogeneity in the way we all envisage this transition», Charnay admits. Then there's the other big question: if these less chemically-intensive products end up supplying the entire market, who will finance the premiums for the farmers? «It's not the consumer who will pay the highest price», says Agnès d'Anthony, who also works with Kronenbourg. When it comes to beer, milk or yoghurt, there is a price above which these products become difficult to sell.» Consumer awareness campaigns? Subsidies? Lower margins for intermediaries? The debate is wide open.

The biocontrol alternative

JENNIFER LEWIS
EXECUTIVE DIRECTOR OF IEMA
(International Biocontrol Manufacturers Association)

«Biocontrol products are naturally occurring technologies that aim to regulate diseases or pest populations. These technologies include 'beneficial' insects such as larvae that parasitise on pest insects. They can also be micro-organisms, such as bacteria that kill caterpillars or a fungus that controls fusarium, a disease that affects wheat crops. There are chemical intermediaries, such as sexual pheromones that prevent target insects from reproducing. Finally, there are natural substances: plant extracts such as geranium oil to control certain insects, or minerals such as sulphur to control certain fungi.

These products can act as substitutes for synthetic fungicides and insecticides; others, fewer in number, can replace herbicides. In general, biocontrol products are less harmful to our environment and health. Most are also more precise, targeting only one or two species of pest or types of disease. This limited scope reduces their impact on biodiversity and soil health, but it also restricts their potential market.

Currently, most chemical manufacturers are developing biocontrol technology, in part due to some of the substances they previously produced being withdrawn from the market. In the late 2010s, for example, there was a ban on certain anti-slug molecules. Instead, farmers began using ferric phosphate, a naturally occurring substance, and were surprised to see good results. In a system that includes rich biodiversity, healthy soil and the right agricultural equipment, biocontrol can work just as well as pesticides, with comparable yields and generally lower chemical costs, which can improve profitability for farmers. A study of 3,000 French farms in the Dephy network, all of which use alternative techniques to protect their fields, showed identical revenues for all crops except beetroot and potato.

In 2022, biocontrol in Europe accounted for ten percent of the crop protection market, with an annual increase of ten percent. Biocontrol is used for almost all greenhouse crops, as well as in many vineyards and orchards. On the other hand, fewer products exist for field crops. For progress to be made, it is essential, among other things, to pursue innovation, accelerate product authorisation procedures and find ways to reward farmers who use biocontrol.»

“Imagine pesticides on prescription”

INÈS BOUCHEMA
LEGAL EXPERT
doctor of rural and environment law,
lecturer and researcher at AgroParisTech.

«The law already regulates the use of pesticides in Europe, and more strictly than anywhere else: it requires prior authorisation, bans certain molecules that are too dangerous, regulates how they can be used, etc. But, as with voluntary incentives such as labels or subsidies, these legal instruments are still not enough to limit the risks.

To reduce pesticide use in the long term, we can imagine dangerous products being issued 'on prescription': before using them, farmers would have to prove that they are the only solution to save their crops – this is already the case with veterinary antibiotics in livestock farming. Ultimately, access to dangerous pesticides could even be made conditional on having taken all possible measures beforehand to avoid having to resort to them: hedges to provide shelter for the predators of pests, smaller plots, etc.

The law can also further reward and protect farmers who make the effort to commit to this transition, since the move to reduced pesticide use is costly and very risky. A system of compensation in the event of crop losses would be welcome. But these changes cannot happen without the cooperation of the entire agri-food chain. For example, one of the tools for reducing

pesticides is crop diversification. But if a farmer produces lentils, someone has to buy them, which means that people have to eat them. Moreover, if we are going to restore diversity in and around plots of land and make crop rotations more complex again, then the question of farm size arises – and this means that the entire CAP subsidy system, as well as land ownership and transfer policy, needs to be reviewed. The same goes for employment policies, given that reduced pesticide use requires more labour in the fields. Agri-food standards also have to be changed: in today's market, an apple must be smooth, round and spotless... To meet these requirements, the use of insecticides is virtually indispensable.

Finally, the use of pesticides ensures high productivity and relatively low prices for consumers. Who is going to pay for the increase in production costs and food prices that results from reducing pesticide use? And how can we ensure that high-quality food is available to everyone? Imports from third countries, which don't have the same production standards and can offer very low prices, are also a difficult issue that needs to be resolved.

Faced with this set of challenges, there is still reason for optimism: the legal instruments to initiate the transition to a manageable implementation is mainly hampered by a lack of political will and the complexity of the actions that need to be taken.»

NEW FARMING HABITS

Change on all fronts. Farmers who decide to use fewer pesticides have to adopt new habits while maintaining their productivity and income. Before even sowing seeds, planting 'cover' crops allows farmers to occupy the space and thus limit the need for herbicide applications. During this time, at the edges of the field or in the orchards, there is often a big winter clean-up. Tuber and fruit waste has to be eliminated, before they become «reservoirs» of viruses and diseases from one year to the next. The one way to fight the beet yellows virus, which would otherwise be fought with neonicotinoids – pesticides that harm the nervous systems of insects, including bees.

Using agronomy rather than chemical treatments to actively prevent pests, farmers can plant hedges or grassy strips, which serve as hotels for «crop auxiliaries»: caterpillars-eating birds, aphid-eating ladybird larvae, slug-eating hedgehogs and ground beetles... Choosing varieties that are disease-resistant – for example, a potato crop that is very rarely susceptible to mildew – is part of the same preventive approach.

With the logic of protection with fewer chemicals, monocultures no longer exist: to slow the spread of pests, the crops that are grown in each plot are changed from year to year. It's just a matter of being able to sell the diversified crops, be they hemp or lentils. Finally, crop-growing tricks such as false seedlings or intercropping also help to attenuate attacks. By growing broad beans amid rapeseed, for example, the odour of the latter is camouflaged and the insects that typically devour it have more difficulty «detecting» the plot.

However, protecting fields with fewer chemicals also means monitoring them more closely, so that intervention occurs at the first sign of trouble. Technology provides a helping hand: drones capable of spotting the appearance of a weed in the field; artificial intelligence that detects the airborne spores of a fungus before it can damage orchards or vegetable crops. New machinery is also appearing, such as a machine that can top weeds and eliminate their seeds mechanically rather than chemically.

In cases where prevention hasn't been enough, the focus is on natural as well as collective methods. The use of sexual pheromones does indeed prevent pest insects from reproducing, but it requires coordination with neighbours, given that it only works with a large surface area – eight to ten hectares to combat a vine pest, for example. As for synthetic pesticides, the principle is to use them only with extreme caution and as a last resort... or even not at all, if a farmer has decided to go organic (or more than organic).

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