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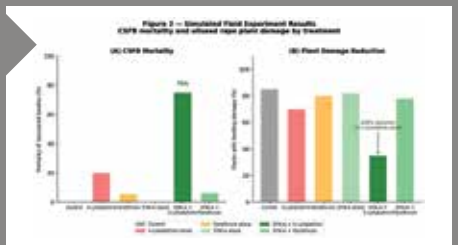
TECH FARMER

TECHNOLOGY FOR FARMING

TECH MAGAZINE

Smart Disease Control



WHERE IS **AGTECH** REALLY HEADED?

WRITTEN BY CHRIS FELLOWS

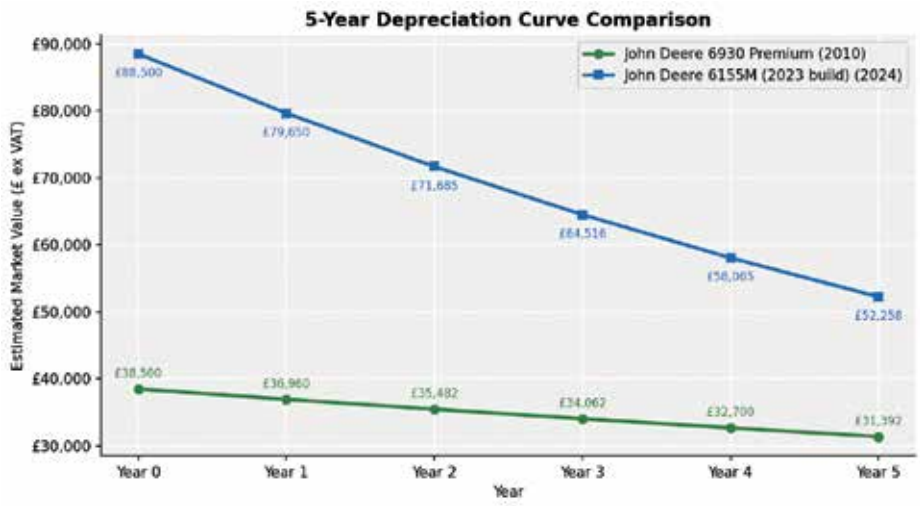
For the past decade, the agricultural industry has been sold a vision of the future farm that looks more like a science fiction film than a muddy Tuesday in Lincolnshire. Fully autonomous tractors, robot swarms, and artificial intelligence running everything while the farmer watches from a dashboard were promised as the inevitable next steps. Step onto most UK farms in 2026, however, and the reality is markedly different. Technology is advancing quickly, and AI is now part of everyday conversations, but the direction of travel for agtech is not heading towards fully automated farms just yet. It is heading somewhere far more practical and arguably far more interesting.

It has been a pleasure to meet so many farmers while delivering our AI workshops at Harper Adams and up in Edinburgh. But I do feel guilty that I learn more by listening to farmers and trying to understand what they need, as opposed to sharing the knowledge we have built up. Writing this article, though, made me realise that not enough companies spend enough time listening to farmers on the ground; they just develop solutions they are "sure" farmers need. Following this feedback, we have applied for two ADOPT grants with Innovation UK to test some of our ideas on-farm to see if they can deliver any value. By the next issue, I should be able to update you on whether we have been successful in applying for this competition. There are so many good ideas out there that would benefit from trials and testing – so look out for ADOPT Round 7 if you have something you would like to test. (I'd be happy to offer any advice if you need it.)

The hype is fading. ROI is taking over.

The biggest shift happening right now is straightforward: if a piece of technology does not deliver a clear return this season, it does not get used. That might sound obvious, but it marks a real change from even five years ago, when plenty of tools were adopted because they were new, impressive, or came bundled with funding. Today, farmers are asking harder questions. Does this save me time? Does it reduce inputs? Does it make decision-making easier? Will it pay for itself quickly? If the answer is not clear, adoption stalls. Too many times, tech is priced at what they think the farmer can "save", and thus, when adopting the tech, the farmer doesn't save much at all; they just have another supplier to pay out of the increased profits.

This pragmatic approach is quietly reshaping the entire agtech sector. The winners are not necessarily the most advanced tools; they are the ones that fit seamlessly into existing systems and deliver immediate value. This shift is occurring against a backdrop of significant venture capital losses in the sector. An analysis published in March 2026 by Sarah Nolet of Tenacious Ventures examined $18.5 billion in agrifood-climate tech failures across 113 companies, concluding that unit economics matter, that competing on a green premium alone does not work, and that capital intensity without a clear path to profitability is fatal. The lesson is stark: the sector has paid a very high price for prioritising ambition over practicality.



AI as a co-pilot, not a replacement

There has been considerable noise around AI replacing farmers. In reality, what is emerging is something very different. AI is becoming the interface

of the farm. Instead of digging through dashboards, spreadsheets and disconnected platforms, farmers are starting to interact with systems in a more natural way: asking questions, generating plans, and receiving recommendations in real time. It is less about automation and more about decision support at speed.

The shift is from "Here is your data" to "Here is what to do next and why." That distinction is significant. It reduces mental load, saves time, and makes complex systems genuinely usable in the real world. The farmer remains firmly in control; the technology is simply making that control more informed and more efficient.

We have added a new conversation on TFF where farmers can download pre-built AI "skills" and run them against their data. The first one looks at the economics of trading in one tractor against a new one at a dealer. It considers running costs, depreciation, interest rates, insurance and more in its analysis. All the farmer has to do is input the details of both tractors. It even tells you if it thinks you are getting a good deal! You can try it by scanning the QR code:

The changing role of the farmer

If anything, the role of the farmer is becoming more important, not less. What is changing is the nature of the job. Instead of being purely operational, farmers are increasingly acting as system managers, decision-makers and risk assessors. Managing a network of tools, data streams and interacting decisions requires a different skillset: interpreting recommendations, understanding trade-offs, and knowing when to trust or ignore the technology. And more tools are being launched all the time.

In short, the farmer is moving up the stack. The best operators will be those who can combine deep practical experience with digital confidence. That combination, rather than any single technology, is likely to define the most successful farms of the next decade.

Autonomy's gradual arrival

Autonomous machinery is real, it works, and in controlled environments it is already delivering results. But farming is not a factory. Fields are messy, conditions change daily, weather disrupts everything, boundaries are not always clearly defined, and livestock do not follow rules. All of this makes full autonomy far harder to achieve at scale than many predicted.

So instead of a sudden leap to driverless farms, what we are seeing is a more gradual shift: guidance systems becoming more advanced, specific tasks being automated and machines designed to assist rather than replace operators. It is co-pilot farming, not autopilot. That is likely to remain the case for longer than many technology companies anticipated when they were raising capital on promises of full field autonomy.

The quiet revolution: integration

One of the least talked about, but most important, trends in agtech is integration. For years, farms have been collecting data from multiple sources: machinery, soil tests, satellite imagery, weather stations and livestock systems. The problem is that most of it sits in silos. The next phase of agtech is not about creating more tools; it is about connecting the ones that already exist. I really do think that AI can have a massive part to play here, but the considerations of who you are sharing your information with are a persistent concern with many systems.

When systems start communicating with each other properly, that is when real value appears: better decision-making, less duplication, fewer manual inputs and clearer insights. The future is not a single all-in-one platform; it is an ecosystem where tools work together seamlessly. The companies that enable that connectivity may ultimately prove more important than those building new standalone features.

New income streams and a consolidating sector

Another significant shift is the emergence of non-traditional farm income streams, particularly around carbon and sustainability. What was once theoretical is now becoming tangible through carbon payments, biodiversity schemes and environmental incentives. These are not yet replacing core farm income, but they are becoming a meaningful part of the mix. For UK farmers navigating schemes such as the Sustainable Farming Incentive (SFI) and evolving environmental policy, this could be one of the most significant developments of the next decade.

Behind the scenes, the agtech sector is also going through a period of consolidation. The early wave of startups produced a large number of tools and platforms, but not all of them were built to last. Fewer new entrants, more partnerships, acquisitions by larger players, and a focus on scalable solutions are now the defining features of the landscape. Fewer, stronger, more integrated tools could ultimately deliver far more value than a fragmented landscape of competing platforms, and the sector may be better for it.

Biology meets technology

One of the more interesting directions emerging is the merging of digital and biological approaches. Agtech is no longer just about software and machinery; it is increasingly tied to soil health, biological inputs and regenerative practices. Technology is being used to monitor biological systems, optimise natural processes and measure outcomes more accurately. This creates a powerful combination: data-driven decisions applied to biological systems. For UK agriculture, where regenerative approaches are gaining traction, this convergence could prove to be a defining trend.

So, where is agtech really headed?

Not towards fully autonomous farms, at least not yet. Not towards replacing farmers. And not towards ever more complex systems. Instead, the direction of travel points towards simpler, more useful tools; better decisions made faster; systems that work together; farmers supported rather than replaced; and new income streams alongside core production.

In other words, agtech is becoming less about technology and more about practicality. The future of the sector is grounded in something very simple: if it saves time, reduces cost or improves decisions, it stays. If it does not, it disappears. And perhaps that is no bad thing. Because while the idea of fully autonomous farms grabs headlines, the real progress is happening in quieter ways, on real farms, solving real problems, one decision at a time.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PROVING AGRI-TECH

By CEO, Steve McLean, UK Agri-Tech Centre

Our ambition is to make the UK the best place to start, grow and scale agri-tech businesses. But that only matters if technologies are proven in real-world, commercial environments – and adopted at scale.

Our strategy is built around helping agri-tech businesses move from innovation to commercial reality – to prove what works, build viable agri-tech businesses and scale impact at pace. That means tackling common barriers: fragmented support, long development timelines, and the realities of designing for complex, working farm environments.

We start with commercial viability – because if it doesn't stack up, it won't be adopted. A big part of that is giving companies access to real farming environments across the UK, where their technology can be properly tested and challenged, accelerating the path to commercial adoption.

We work with businesses across robotics, AI, sensors, engineering biology and controlled environment agriculture, but the focus is always the same: can it deliver reliably and commercially in a working farming system?

That's why our commercial farm network is so important. It is where innovation is proven in real conditions – across different soil types, weather patterns and operational constraints.

There's also a growing push from policy, supply chains and markets for better data. The Government's Land Use Framework reflects this shift, with a clear emphasis on productive and sustainable land and the need to evidence outcomes. That's where agri-tech is becoming critical to delivering meaningful outcomes – particularly in measurement, monitoring and reporting.

In partnership with The Carbon Trust, we are running an accelerator programme

Steve McLean, CEO, UK Agri-Tech Centre

Credit Earth Rover

that helps businesses develop MRV technologies and move closer to market readiness with tailored support. One of the cohort, Paul-Tech, develops soil stations that provide near real-time insight into soil conditions, combining in-field sensing with weather and satellite data. For farmers, that translates into clearer decisions around inputs – improving productivity whilst reducing cost and environmental impact.

Elsewhere, real-time monitoring technologies, combined with predictive modelling, are enabling earlier detection of nutrient loss and diffuse pollution events – supporting faster intervention and better environmental outcomes.

One example is our work with Lacuna Space and Aberystwyth University, funded by Innovate UK, where satellite-enabled IoT technology is making water-quality monitoring more affordable, reliable and continuous, even in remote areas. By integrating low-cost sensors, satellite communications and user-focused data platforms, this approach enables real-time monitoring of indicators such as nitrates and phosphates – significantly improving on traditional manual sampling.

The result is more frequent, more reliable data, enabling earlier intervention, lower monitoring costs and more effective catchment management.

Connectivity is a key enabler. By allowing sensors to transmit data in areas where traditional networks are unavailable, it unlocks continuous monitoring in locations that have historically been difficult to reach – enabling solutions to scale across more geographies.

Robotics is also playing an increasingly important role in improving productivity, reducing cost and increasing precision in both linear and broadacre crop systems. Our focus is on helping businesses move from prototype to commercial reality, overcoming the practical and operational challenges that can slow adoption.

At our Midlands Agri-Tech Innovation Hub, Earth Rover has successfully commercialised a robotic system, CLAWS™ (Concentrated Light Autonomous Weeding & Scouting), which is capable of tasks such as weeding and crop scouting. Using AI and precision imaging, these machines help address labour shortages while enabling more targeted, efficient and environmentally responsible interventions.

These shifts – from periodic assessment to continuous insight, and from broad application to precise decision-making – are a key part of how agri-tech can deliver real value on farm and scale across different production systems.

Ultimately, once technologies are proven, our focus is on helping businesses grow – supporting adoption across the UK and into global markets to deliver impact at scale.

That is how agri-tech moves from innovation to impact.

A PROMISING START FOR **FARMER-LED RESEARCH**

One year ago, Direct Driller covered the launch of the ADOPT funding scheme from Defra's Farming Innovation Programme with Innovate UK. ADOPT supports farmers in testing new ideas, products or practices on farm, providing project grants of £50-£100k over 1–2 years. 70 farmer-led projects have now started. With a total initial funding commitment of £20 million, there is still scope for more farmers to start projects to test their ideas.

Direct Driller readers have been responding to the opportunity. After the first article, several farmers reached out and were put in touch with Dr Daniel Kindred at the newly formed **Agronomy Research Circle** (ARC).

"ADOPT has already been transformative," says Daniel. "Farmers are experimenters by nature, but they often lack the time, support or networks to formalise trials, analyse results or share insights. ADOPT offers the funding and framework to enable that."

Farmers can apply for a Facilitator Support Grant that enables a Project Facilitator like Daniel to help turn an idea into a fully formed project proposal.

In the first year, Daniel has worked on 18 successful Support Grants and has helped get 12 Full ADOPT projects funded. He's now started ARC Innovators as a place for farmers, agronomists, researchers and agtech providers to collaborate. They can work on farm innovation projects from the earliest stages and be the first to get results as they emerge. It already has over 150 members.

"The last year has shown there is a real demand for supported on-farm trials across a wide range of topics. We've got ADOPT projects on crop nutrition, no-till systems, on-farm composting, smart irrigation, benchmarking, disease detection and more.

Projects underway

Will Grant from Lincolnshire was one of the first farmers to get in touch with ideas for an ADOPT project, wanting to evaluate a high-capacity compost turner.

"We wanted to prove the benefit of processing manures and applying compost, with a newly designed compost turner that could make composting on-farm feasible for us. This project gives a really good opportunity to thoroughly investigate this and hopefully demonstrate to others that it's possible to see improvements in soil health, fertility and yields," says Will.

Farmyard manure is rich in nutrients, but management can be a challenge, not least because of the sheer volume of material. Raw manure applications are tightly regulated by NVZ and Farming Rules for Water, and also result in significant nutrient loss through run off and volatilisation. Will is keen to move away from applying raw manure due to the emissions and the difficulties of storing and handling.

The project allows Will to work with Essex arable farmer Simon Cowell, who has over two decades' experience of producing and using compost on farm. A "regenerative farmer" many years before the term was even coined, he is contributing to the design of the new composter that the project is testing.

As Simon explains, "When you spread manure on a field, most of the carbon disappears up into the atmosphere. But by composting, you are stabilising it. So, when you put it on the soil, you are literally raising the organic matter levels in the soil. But the other more interesting part is the biological inoculation you get with compost."

In Simon's experience of having visitors on farm, the cost of the composting machine is a major barrier to wider uptake. "For a long while, I've wanted to redesign the machine and make it more affordable. There's lots of things about it that could be made simpler and cheaper."

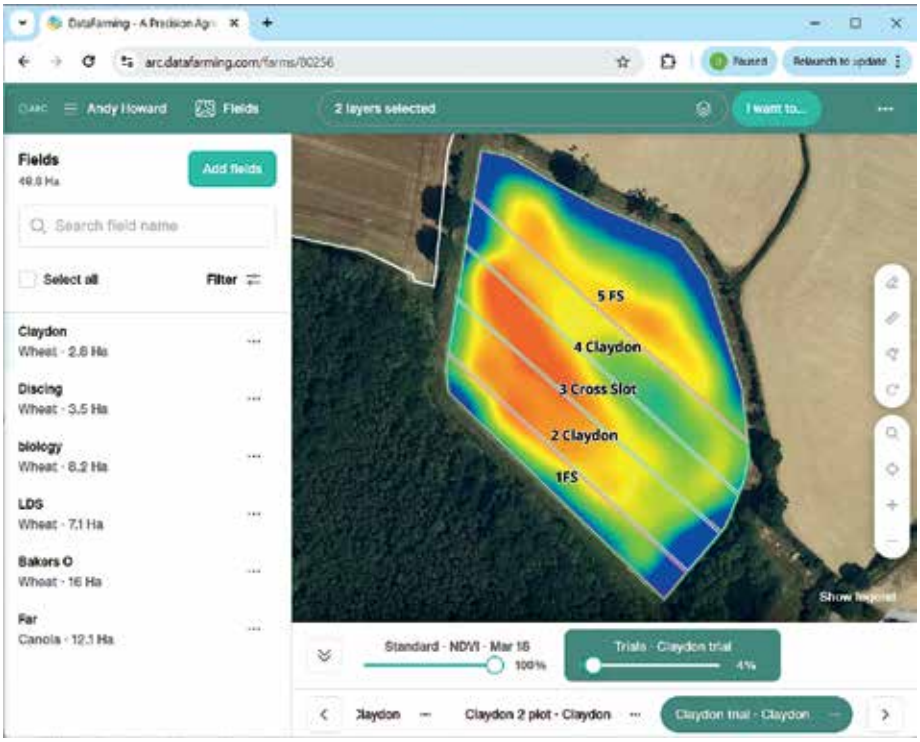
Following conversations with Daniel on the yield limitation that Simon sees in his long-term no-till situation, and his strangely higher yielding headlands, Simon and Daniel developed another ADOPT proposal to investigate with a range of soil and crop measures and simple trials. That project brings in other no-till farmers, John Cherry and Andy Howard, with expertise from David Purdy and Rothamsted Research.

Another ADOPT project is looking at a technology from the US, **Green Lightning**, that electrifies water and air to create a cold plasma, fixing nitrate in **plasma activated water**. Simon Craven has the first machine in the UK running on his farm in Yorkshire, and with Staffordshire farmer Tim Ellis, they will be testing its value in simple field trials to reduce nitrogen applications. They are excited by its potential to transform the model of fertiliser production and distribution.

The Agronomy Research Circle is based on the idea of supporting and connecting groups of farmers in a given region or with an interest in a particular topic. Daniel explains, "I'm hopeful with ADOPT that we can form grower groups that persist beyond a project's end, providing an enduring bottom-up approach to generating and sharing knowledge that's useful to farmers."

With that in mind, ARC's first ADOPT project brought together four farms in Yorkshire with ADAS' local farming association to create the **Yorkshire Crop Nutrition Club**. The initial focus is on testing approaches and technologies to make better

nutrient decisions. Partner Adam Hayward says, "The project being open is a big draw for me, being able to discuss things openly within a network. Previously, projects have often been a bit more closed off, with sensitivities around a company's intellectual property. This feels more properly farmer-led, where we're going to be able to benefit more people than just the small group we are currently in."



Proving "what works" on farm

The Agronomy Research Circle takes a broad view of the approach to help farmers evaluate whether a practice, product or technology is worthy of adoption. Daniel suggests there are four "Es" or elements that can sway a farmer's decision.

"First, there needs to be a good **Explanation** for why something works. Next, there can be **Evidence** of positive associations with crop performance. We are just starting an ADOPT project on data sharing and benchmarking, adopting the approach from the Yield Enhancement Network (YEN).

"**Experiments** are invaluable in proving a difference between one decision and another, but it can be easy to jump to false conclusions, so care is needed. Finally, we shouldn't underestimate the importance of **Exchange** – sharing experiences is often the most powerful route to adoption – farmers learn most from other farmers."

"We try to embed these 4Es in each of the projects we run," Daniel continues. "Ideally with a work package corresponding to each."

With Australian company Data Farming, Daniel has developed the ARC Farm Trials Tool to make it easy to place treatment areas using satellite imagery to see historic spatial variation. "Farmers know better than anyone how soil conditions can vary in just a few metres. Good trial design is vital to avoid misleading results. With satellite imagery through the season, seeing a difference "to a line" where you've imposed a treatment can give enormous confidence." The tool is freely available to ARC members.

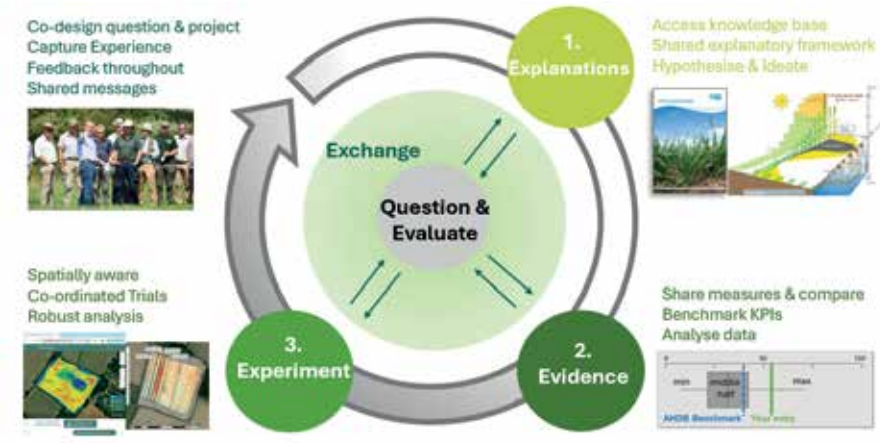
"Knowledge exchange is an essential part of ARC and ADOPT. We want good ideas to get taken up elsewhere. And if something hasn't worked, we need to share that too, so others don't try the same thing again, but use what we learnt to come up with a better approach."

Daniel has been really encouraged by the enthusiasm of farmers and quality of ideas he's engaged with over the past year. "It's still early days both for ARC and for ADOPT, but there is no shortage of good ideas to test or engage farmers to work with. ADOPT gives us the first opportunity to unleash that potential," he says.

Defra has recently committed a further £30 million to ADOPT, and there are rolling rounds of funding, so applications can be made at any time if there is something you'd like to investigate. Funding rules mean that the lead farmer for any project must be based in England, but farmers from anywhere in the UK can join as collaborators.

The ARC is connected with a wide network of individuals and organisations who can help develop proposals, find collaborators and manage projects.

Visit www.thearc.farm to find out more. Farmer readers of Direct Driller can join ARC Innovators with three months free using the QR code in the advert.



BREAKING THE RESISTANCE

HOW AN OLIVE-DERIVED COMPOUND COULD SAVE UK OILSEED RAPE FROM THE CABBAGE STEM FLEA BEETLE

By Chris Fellows

For nearly a decade, arable farmers across the United Kingdom and Northern Europe have been fighting a losing battle against a formidable, albeit tiny, adversary: the cabbage stem flea beetle (Psylliodes chrysocephala, or CSFB). Following the European Union's 2013 ban on neonicotinoid insecticidal seed treatments – a regulatory decision driven by concerns over environmental and pollinator health – the agricultural sector was left with a gaping hole in its pest management arsenal [1]. Without neonicotinoids, CSFB populations surged dramatically, with larval numbers in the UK increasing tenfold shortly after the ban [1].

Growers were forced to rely almost exclusively on pyrethroid insecticide sprays. However, this over-reliance created immense selection pressure, rapidly accelerating the development of pyrethroid resistance across Europe. Today, there are virtually no fully susceptible CSFB populations left in the UK [1]. The consequences have been devastating. In regions like the south-east of England, entire crops have been decimated, forcing farmers to abandon winter oilseed rape (OSR) in favour of alternative, often less profitable, crops[1]. The UK, once the fifth-largest exporter of OSR globally, has transitioned into a net importer, costing the economy an estimated £1 billion annually [1].

The industry desperately needs a breakthrough. Now, a collaborative research effort between Rothamsted Research and ApresLabs Ltd has unveiled a highly promising, naturally derived solution that could turn the tide: SYN-A.

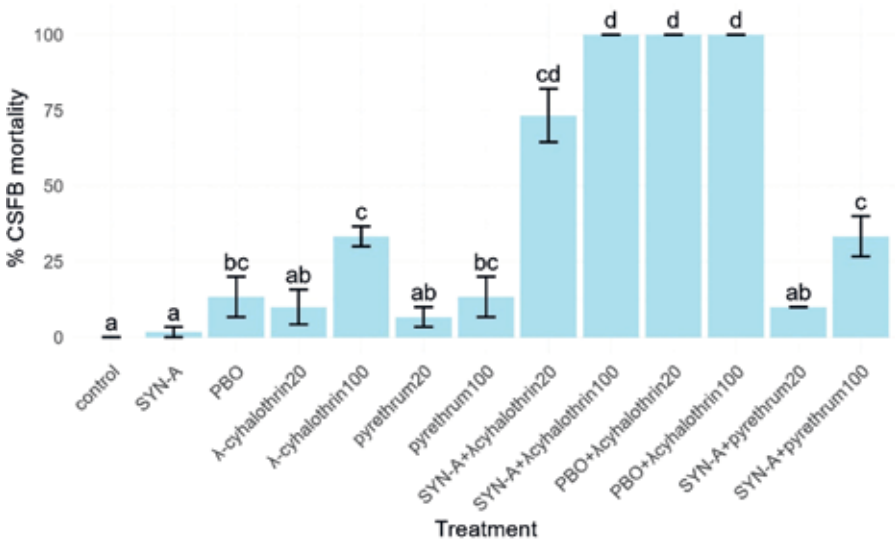


Figure 1 – CSFB mortality in glass vial bioassays
Effect of SYN-A and PBO synergists combined with insecticides

The science of synergy: What is SYN-A?

When insects develop metabolic resistance to insecticides, their bodies overproduce specific detoxification enzymes that break down the chemical before it can reach its target site and kill the pest. In the case of the cabbage stem flea beetle, resistance to pyrethroids is largely driven by the heightened activity of cytochrome P450 monooxygenases and esterase enzymes [1].

To combat this, scientists look to "synergists" – compounds that are not inherently toxic on their own but enhance the lethality of an insecticide by inhibiting the pest's detoxification pathways. While synthetic synergists like piperonyl butoxide (PBO) have been used in agriculture and public health for decades, there is a growing demand for more sustainable, naturally derived alternatives.

Enter SYN-A. Discovered, developed and patented by Dr Graham Moores, founder of ApresLabs Ltd, SYN-A is a novel, natural synergist extracted from the unsaturated fatty acids found in olive oil [2].

"I have long felt that synergists should be utilised to a greater extent in agriculture," Dr Moores commented. "SYN-A is a natural extract that allows a reduction in insecticidal rates whilst still overcoming resistance problems, with the concomitant environmental benefits this brings" [2].

In a recent peer-reviewed study published in Pest Management Science, researchers demonstrated that SYN-A effectively inhibits both cytochrome P450 and esterase activity in CSFB in a dose-dependent manner [1]. By blocking these crucial metabolic

pathways, SYN-A strips the beetle of its chemical defences, leaving it highly vulnerable to pyrethroid insecticides once again.

Laboratory breakthroughs: Restoring pyrethroid efficacy

To quantify the impact of SYN-A, the research team, led by Dr Samantha Cook and Dr Patricia Ortega-Ramos, conducted rigorous glass vial bioassays. They exposed adult cabbage stem flea beetles to the synthetic pyrethroid lambda-cyhalothrin, both alone and in combination with SYN-A.

The results were striking. When applied alone at the full recommended field rate, lambda-cyhalothrin achieved a dismal mortality rate of just 22%, underscoring the severe level of resistance present in the tested beetle populations [1]. However, when the insecticide was combined with SYN-A, mortality skyrocketed.

As illustrated in Figure 1, the addition of SYN-A to lambda-cyhalothrin at the full field rate resulted in 93% mortality – more than a threefold increase compared to the insecticide alone [1]. Even more remarkably, the synergistic effect was so potent that applying just 20% of the standard lambda-cyhalothrin field rate alongside SYN-A achieved 68% mortality. This means that a drastically reduced dose of insecticide, when paired with the olive-derived synergist, provided 2.2 times greater control than the full-rate insecticide applied on its own [1].

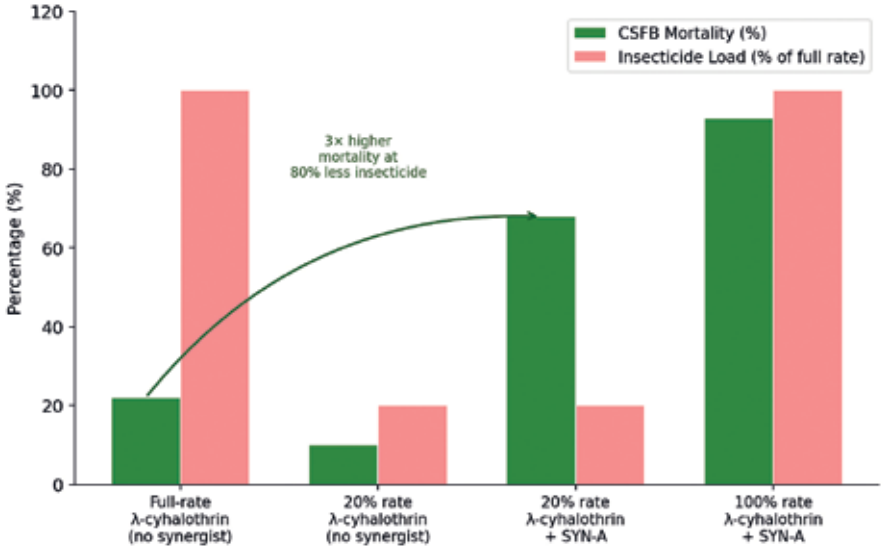


Figure 2 – Insecticide dose reduction potential with SYN-A
Efficacy vs insecticide load across treatment scenarios

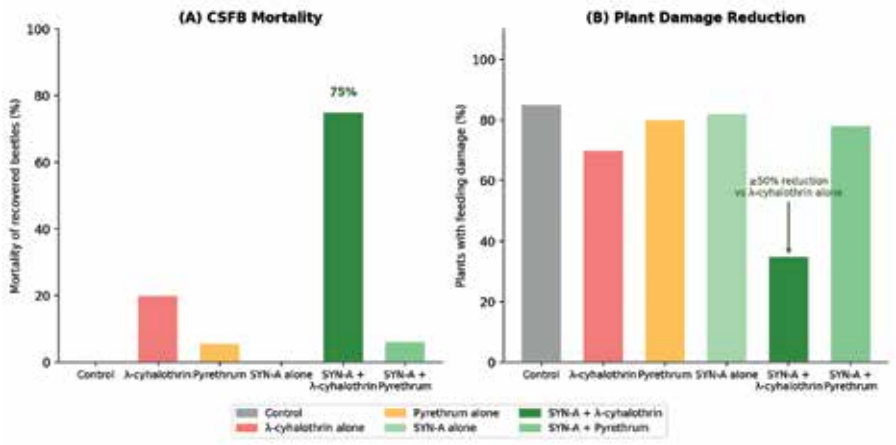


Figure 3 – Simulated field experiment results
CSFB mortality and oilseed rape plant damage by treatment

Dr Samantha Cook highlighted the urgency of these findings: "CSFB is the No. 1 insect pest of farmers right now due to their inability to control it using traditional insecticides... This tiny beetle is threatening oilseed rape production throughout the UK and much of Europe. The industry badly needs alternatives, but these are some way off in the development pipeline" [2].

The ability to achieve superior pest control while slashing the volume of active synthetic chemicals applied to the field represents a massive leap forward for integrated pest management (IPM).

Figure 2 visualises this dose reduction potential. By utilising SYN-A, farmers could theoretically reduce their pyrethroid inputs by 80% while simultaneously tripling the mortality rate of resistant beetles compared to current standard practices [1].

From lab to leaf: Simulated field trials

While glass vial bioassays provide excellent baseline data, agricultural environments are infinitely more complex. To validate their findings, the researchers progressed to simulated field experiments. Oilseed rape plants were treated with various combinations of insecticides and synergists, and adult beetles were introduced to assess both mortality and feeding damage.

The simulated field trials mirrored the laboratory successes. Lambda-cyhalothrin alone yielded a mere 20% mortality rate among recovered beetles. In stark contrast, the combination of SYN-A and lambda-cyhalothrin boosted mortality to 75% [1].

Beyond simply killing the pests, the treatment significantly protected the crop. As shown in Figure 3, plants treated with the SYN-A and lambda-cyhalothrin mixture exhibited at least a 50% reduction in feeding damage (measured by the proportion of damaged plants and the number of feeding holes per leaf) compared to those treated with the insecticide alone [1].

The researchers also tested an organic pyrethrum extract in hopes of finding a fully natural control method. Unfortunately, pyrethrum – which degrades rapidly under ultraviolet light – failed to provide adequate control in the simulated field environment, even when combined with SYN-A, yielding only about 6% mortality [1]. For now, the most viable path forward relies on pairing SYN-A with existing synthetic

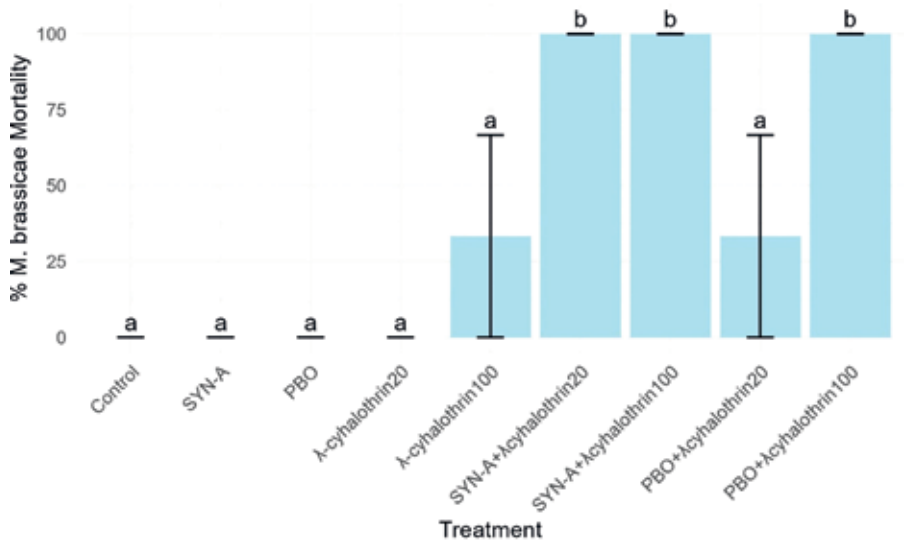


Figure 4 – Non-target impact on parasitoid wasp (Microctonus brassicae) Mortality following exposure to synergists and insecticides

pyrethroids.

The environmental catch: Protecting beneficial parasitoids

While SYN-A offers a powerful mechanism to break CSFB resistance, the study also uncovered a critical environmental caveat that farmers and agronomists must carefully navigate.

In agriculture, natural enemies play a vital role in keeping pest populations in check. For the cabbage stem flea beetle, one of the most important natural predators is Microctonus brassicae, a beneficial parasitoid wasp. Female wasps use their ovipositor to inject an egg directly into the adult flea beetle. The wasp larva then develops inside the living host, eventually killing the beetle when it emerges to pupate [1].

"It provides important natural control of CSFB and needs to be protected and encouraged in the farmed environment," noted Dr Patricia Ortega-Ramos [2].

Because SYN-A works by inhibiting fundamental metabolic enzymes, it does not discriminate between pest and beneficial insect. The researchers found that SYN-A inhibited cytochrome P450 and esterase activity in M. brassicae just as effectively as it did in the flea beetle [1].

When the parasitoid wasps were exposed to lambda-cyhalothrin alone, they exhibited a surprising degree of natural tolerance, with 100% survival at the 20% field rate and roughly 67% survival at the full field rate [1]. However, when SYN-A was introduced into the mix, this natural tolerance was completely erased.

As depicted in Figure 4, the combination of SYN-A and lambda-cyhalothrin – at both the 20% and 100% field rates – resulted in 100% mortality for the beneficial parasitoid wasps [1].

This stark finding underscores a fundamental principle of synergist use: while they allow for a reduction in the total volume of insecticide applied, they fundamentally increase the toxicity and potency of the chemical mixture to both target and non-target organisms.

The path forward: Precision and Integrated Pest Management

The discovery of SYN-A presents a double-edged sword, but one that can be wielded effectively with careful management. The ability to restore pyrethroid efficacy and potentially reduce insecticide application rates by 80% aligns perfectly with ambitious European Union targets to minimise pesticide use and environmental impact [1] [2].

However, the severe impact on M. brassicae dictates that SYN-A cannot be used indiscriminately as a blanket spray. Instead, it must be integrated into a highly precise Integrated Pest Management (IPM) framework.

The authors of the study emphasise that successful implementation will require strategic temporal targeting. By closely monitoring the phenology (life cycle timing) of both the cabbage stem flea beetle and its parasitoid wasp, agronomists could time the application of SYN-A and pyrethroids to coincide with peak pest vulnerability while avoiding the windows of maximum parasitoid activity [1]. Furthermore, advances in formulation technology, such as microencapsulation, could help localise the delivery of the synergist directly to the pest's feeding sites, thereby reducing environmental drift and non-target exposure [1].

With few new active insecticidal ingredients coming to market and existing chemicals failing due to resistance, the agricultural industry is in a precarious position. Compounds like the olive-derived SYN-A offer a vital lifeline, extending the useful life of current chemistries and buying researchers time to develop long-term, sustainable alternatives.

The next step for SYN-A involves larger-scale field trials under realistic farming conditions to validate these promising laboratory and semi-field results [2]. If successful, and if managed with a deep respect for the broader agricultural ecosystem, this natural olive extract could soon become a cornerstone in the fight to save UK oilseed rape.

References

[1] Ortega-Ramos, P. A., Moores, G. D., & Cook, S. M. (2026). SYN-A, a naturally derived synergist, restores pyrethroid efficacy against cabbage stem flea beetle but negatively impacts its parasitoid Microctonus brassicae. Pest Management Science.

[2] Rothamsted Research. (n.d.).SYN-A, a natural olive-derived compound, controls insecticide-resistant cabbage stem flea beetle. Retrieved from https://www.rothamsted.ac.uk/news/syn-natural-olive-derived-compound-controls-insecticide-resistant-cabbage-stem-flea-beetle-2

LANDMARK PROJECT DEVELOPS NEXT-GENERATION OILSEED RAPE AND SMART DISEASE CONTROL

Precision-bred oilseed rape will be put to the test in trials on commercial farms for the first time in Europe, offering fresh hope for a crop under pressure.

A new £2.5m, three-year project marks a major step towards rebuilding the UK's most important break crop.

The project, Light Leaf Spot Enhancing Resistance And reducing Susceptibility with EDiting (LLS-ERASED), is led by the British On-Farm Innovation Network (BOFIN) and funded through Defra's Farming Innovation Programme, delivered in partnership with Innovate UK. It brings together farmers, plant breeders, crop scientists and agronomists to tackle light leaf spot, oilseed rape's most damaging disease, using precision breeding alongside new disease-management tools.

Light leaf spot has become the number one disease threat to UK oilseed rape, with yield losses estimated to have risen from £94m in 2017 to more than £300m in 2022. Despite widespread fungicide use, control has become increasingly unreliable as pathogen populations evolve and resistance to azole fungicides spreads. At the same time, currently available varieties struggle to offer strong, durable resistance.

LLS-ERASED aims to change that by delivering oilseed rape varieties with significantly reduced susceptibility to light leaf spot, developed using precision-breeding techniques that accelerate the introduction of beneficial traits without introducing foreign DNA. Crucially, the project will move these traits beyond the laboratory and into farmer-led field trials on commercial farms, supported by real-time disease forecasting and decision-support tools.

"This project is game-changing for farmers," says LLS-ERASED project lead Tom Allen-Stevens, founder and managing director of BOFIN.

Tom Allen-Stevens, founder and managing director of BOFIN

"It will put precision-bred oilseed rape technology into trials on their farms for the first time across Europe. This is combined with risk forecasting and a new decision support tool that will bring growers effective disease control that is truly risk-based and data-driven. That is the reboot the industry needs and is what will help reverse the decline in the crop's planted area."

At the heart of the project is a newly identified plant susceptibility gene. By switching off this gene using precision breeding, researchers have shown it is possible to reduce the ability of the light leaf spot pathogen to infect the crop, offering a more durable form of protection than traditional resistance genes that pathogens can quickly overcome.

The science is being led by the John Innes Centre and the University of Hertfordshire, working alongside ADAS and Scottish Agronomy to integrate the new trait into practical, farm-ready disease-management strategies. A consortium of leading UK and European oilseed rape breeders is involved in developing the disease-forecasting and testing material in elite commercial backgrounds. UK Agri-Tech Centre is overseeing project delivery and integration, supporting effective collaboration across partners and ensuring outputs remain focused on adoption, scalability and real-world impact.

A key element of the project is collaboration with US-based Cibus (NASDAQ: CBUS), whose Rapid Trait Development System™ (RTDS®), a suite of technologies including non-transgenic processes, enables precise genetic edits to be introduced directly into elite breeding lines with scale and speed, dramatically shortening the time needed to bring new traits to market.

Dr Rachel Wells of the John Innes Centre

"I am really excited to move our resistant material from the laboratory to field scale trials to see how it performs in a real-world setting," says LLS-ERASED technical lead Dr Rachel Wells of the John Innes Centre.

"Precision Breeding offers us an excellent opportunity to develop material to combat our pests and pathogens while supporting sustainable farming.

Developing a trusted pipeline to streamline the process from research to variety release will be invaluable for crop improvement.

"Bringing this work together in an integrated pest management package looking at multiple, combined solutions, is the future of crop protection."

Yongju Huang, Professor of Plant Pathology

For airborne diseases like light leaf spot, information on timing of pathogen spore release and virulence in pathogen populations is essential for effective disease control, adds Yongju Huang, Professor of Plant Pathology at the University of Hertfordshire. "Combined with host resistance information about the pathogen, this project will develop an evidence-based real-time decision support system for farmers to achieve effective disease control and reduce the reliance on chemicals."

Alongside new varieties, LLS-ERASED will deliver a farmer-led delivery platform designed to support the adoption of precision-bred crops. This includes a new disease-management tool combining weather data, pathogen monitoring and on-farm trial results to guide fungicide use more accurately, reducing unnecessary applications while protecting yield.

Faye Ritchie, technical director at ADAS

"The project offers a well-timed opportunity to focus on improving the control of light leaf spot, and the field-based guidance available," comments Dr Faye Ritchie, technical director at ADAS. "Farmer collaboration and knowledge is essential to build effective disease management tools and IPM testing protocols that are practical and cost-effective."

Farmers will play a central role in LLS-ERASED through on-farm trials across England, feeding results directly into a grower-led knowledge-exchange network. The approach is designed not only to bring the first precision-bred oilseed rape varieties to commercial farms, but also to establish a pipeline for future traits. This will include resistance to other diseases and pests, such as cabbage stem flea beetle, which is widely reported as a major limiting factor for UK oilseed rape growers.

"By combining precision breeding with integrated disease management and farmer-led testing, the project positions the UK at the forefront of efforts to rebuild oilseed rape production in a more resilient, sustainable way," says BOFIN's Tom Allen-Stevens.

"What's more, building on similar precision-breeding grower-led platforms, it establishes the UK as a world leader in the technology and an on-farm testbed for future traits. This has potential benefits for farm profitability, pesticide reduction and food security, not just for the UK, but across Europe, as the EU moves towards greater acceptance of new genomic techniques."

YOU'RE COLLECTING MORE **SOIL DATA** THAN EVER. CAN YOU ACTUALLY USE IT?

How UK farmers are drowning in test results from different tools and labs, and what happens when you finally bring it all together.

There's a quiet irony at the heart of modern soil management. Farmers have never had access to more data about their land. Soil chemistry tests, leaf tissue analysis, plant sap readings, nitrate sensors, satellite imagery: the menu of diagnostic technologies keeps growing. And yet, when it comes to making a fertilisation decision in March, most farmers are still relying on a phone call with their agronomist and a gut feeling about what worked last year.

The problem isn't a lack of data. It's that none of it is connected. Lab results don't talk to each other across labs. But they also don't talk to your field observations, your fertiliser applications, your management practices or your weather data. If you want to understand whether something worked, whether that cover crop improved biology, whether the gypsum moved your calcium, whether the dry spring explains the potassium drop, you need all those dots connected. And right now, they live in completely separate systems.

The filing cabinet problem

Consider a typical progressive arable farmer in the UK. Over the past three seasons, they might have standard soil tests from one lab, Albrecht-method analyses from another, plant sap results from a third, plus whatever sensor data they've been trialling on top. Just the lab-based data alone is a nightmare: each report uses different units, different reference ranges, different ways of expressing the same nutrients. One lab reports phosphorus as P_2O_5 in mg/l. Another reports Olsen P in ppm. A third gives Mehlich-3 P in a completely different range.

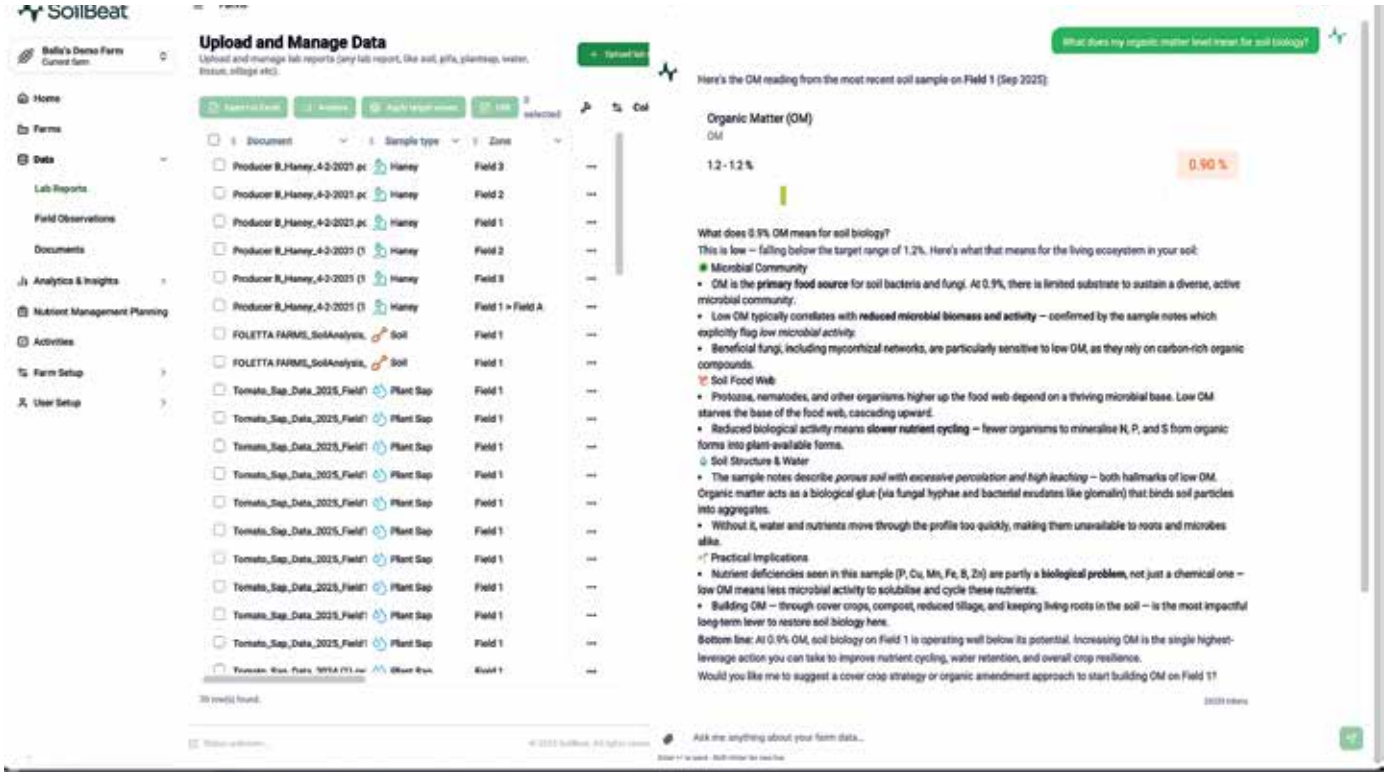
Are you deficient or adequate? Impossible to say without manually cross-referencing every result.

Now multiply that across 15 fields, 4 test types and 5 years of history. Add the fertiliser applications you logged somewhere, the field observations your agronomist noted on a visit, the weather that might explain why nitrogen crashed in June; it's all sitting in separate systems, email attachments, lab portals, spray records, desk drawers. Nobody has time to stitch it together into a picture where you can see the test result next to the application next to the weather event next to the outcome.

This is the gap that SoilBeat was built to close.

From scattered PDFs to one comparable dataset

SoilBeat is a farm data platform, not a lab, not a sensor, and not a replacement for your agronomist. It brings together the data streams that currently live in separate silos: lab results, field observations, fertiliser applications, crop management practices and weather, and



connects them per field and per season.

The platform's AI parser handles reports from over 100 lab formats. Upload a PDF from any lab – Lancrop, NRM, Eurofins, a US lab, a Dutch lab – and SoilBeat structures the data into standardised nutrient readings, linked to specific fields and seasons. The system maintains 597 nutrient mappings across soil, plant sap, tissue, biology and water tests. It handles the unit conversions, the reference range differences and the formatting inconsistencies that make manual comparison so painful.

But the lab data is only part of the picture. SoilBeat also tracks fertiliser applications with products and rates, logs field observations with photos and GPS, and overlays weather data on your nutrient timelines. On a single chart, you can see that potassium dropped in July, that you applied muriate of potash in August, that heavy rain followed, and that the September test showed no recovery. No individual lab report gives you that kind of cause-and-effect visibility.

The question every farmer asks (but can't answer)

"I applied compost last autumn. Did it actually help?"

It's a simple question. Answering it properly means more than comparing two soil tests. You need to know what was applied, when, at what rate, and then compare the soil biology and organic matter readings before and after, factoring in what the weather did in between. Without a connected data record, that's an afternoon's work at a desk.

SoilBeat answers this in seconds. With Pulse, an AI chat built into the platform, you can type that question and get the before-and-after comparison from your own data, with specific values, dates and the application record that sits between them. Not generic advice from the internet. Your fields, your tests, your applications, your results.

This matters for farms running nutrition trials or experimenting with different approaches across strips. When you're comparing a "modest" input programme against a "complete" nutrition strategy, the value isn't in the harvest alone, it's in understanding what happened in the soil and plant along the way. That requires longitudinal data that's structured enough to query.

Benchmarking: learning from each other

One of the most promising ideas in UK farming right now is collaborative benchmarking, farmers working together on similar challenges, learning by seeing their results in context. Groups like ARC Innovators are already exploring this.

But benchmarking only works if the data is comparable. If one farm's soil test uses one method and another's uses a different one, the comparison is meaningless. SoilBeat's standardisation layer means that two farms using different labs and test types can still compare their phosphorus levels, organic matter trends or nitrogen efficiency on the same scale. When a group is running nutrition trials side by side, comparing modest input programmes against complete nutrition strategies, the only way to compare outcomes fairly is if the baseline data is structured identically.

The platform supports advisor-farmer collaboration too. An agronomist working with multiple farms in a group can see patterns across the entire cohort that would be invisible farm by farm. "All six farms on sandy loam showed phosphorus dropping after the same calcium amendment": that's the kind of finding that emerges when the data is unified.

Regulation is coming, documentation is not optional

UK agriculture policy is shifting. The Sustainable Farming Incentive, Environmental Land Management schemes, and Nitrate Vulnerable Zone rules all point the same way: farmers will need to demonstrate what they're doing with their nutrients, not just assert it.

That doesn't mean more paperwork for the sake of it. It means having a system where every test, every application, and every field observation is already recorded, organised and exportable. SoilBeat builds that record as you use it. When someone asks how you manage your nutrients, you have an answer backed by data, not just experience.

What this isn't

SoilBeat doesn't replace your agronomist. It doesn't tell you what to apply without understanding your context. And it doesn't compete with the labs and technologies you're already using, whether that's sap analysis, biology testing or tools like Paul-Tech or YaraPlus.

What it does is connect the dots between your lab results, your applications, your field observations and your outcomes. Your soil test from Lancrop, your sap analysis from NovaCrop Control, your fertiliser records, your field photos; they all feed into one structured record per field. Your advisor can see what you see. You can see what they recommended, what you applied and whether it made a difference.

As the platform grows, integrations with sensor and satellite technologies are on the roadmap, bringing even more data streams into the same picture.

The data you're already paying for starts working harder. And for the first time, your farm's history becomes something you can query, compare and learn from, not just file away.

SoilBeat is free to try. Upload a lab report and ask Pulse a question at soilbeat.com. For UK farmers exploring collaborative soil management, the platform supports multi-farm.

THE PRECISION REVOLUTION:

HOW NEW SPRAYING TECH IS REWRITING THE CROP PROTECTION RULEBOOK

Written by Chris Fellows

The agricultural sector stands on the precipice of a fundamental shift in how crop protection products are applied, formulated and regulated. Driven by rapid advancements in precision application technology, from AI-guided optical spot sprayers to autonomous drones, the traditional model of broad-acre, high-volume spraying is being systematically dismantled. This technological evolution is not merely changing the machinery in the field; it is forcing a complete rethink of agrochemical formulation, accelerating the development of novel active ingredients, and colliding head-on with the shifting regulatory landscape of the UK-EU Sanitary and Phytosanitary (SPS) agreement.

For UK arable farmers, the convergence of these forces presents both unprecedented opportunities for efficiency and significant risks to the established crop protection toolbox.

The rise of precision and drone application

The global agricultural drone market is experiencing explosive growth, projected to surge from $2.63 billion in 2025 to nearly $10.8 billion by 2030. While China currently leads in manufacturing and adoption, the technology is rapidly gaining traction across the US and Europe. Drones offer distinct advantages: they can access difficult terrain, eliminate

soil compaction, and operate within tight weather windows when ground conditions might otherwise prevent application.

Simultaneously, ground-based precision spraying is moving from a premium add-on to a standard requirement. Technologies such as Pulse Width Modulation (PWM) enable variable-rate application while maintaining a consistent droplet spectrum, allowing sprayers to adjust output dynamically across a field. More advanced systems, like John Deere's See & Spray and Bosch's Smart Spraying technology, utilise artificial intelligence and machine vision to detect individual weeds and apply herbicides only where necessary. In 2024, See & Spray customers in the US reported average herbicide savings of 59% across corn, soybean and cotton fields.

However, this shift toward ultra-low volume (ULV) and highly targeted application creates a significant challenge for agrochemical manufacturers: the products themselves must change.

The reformulation imperative

Historically, crop protection products have been formulated for high-volume, broad-acre application using traditional hydraulic nozzles. Drone spraying and precision spot application operate under entirely different constraints, requiring much lower spray volumes and higher concentrations of active ingredients.

This transition is fundamentally a reformulation challenge. When active ingredients are applied at higher concentrations in lower water volumes, the physical properties of the spray mixture change dramatically. Viscosity becomes a critical factor; if a formulation is too viscous, it can lead to poor atomisation, increased pump wear and inconsistent dosing. Conversely, if viscosity is too low, the risk of drift increases significantly.

Manufacturers are now racing to develop shear-thinning formulations: liquids that remain stable and viscous in the tank but become fluid under the shear stress of pumping and atomisation. Furthermore, the regulatory labels on many existing products mandate minimum water volumes that are incompatible with drone payloads, creating a regulatory bottleneck that must be addressed before these technologies can be fully utilised.

A shrinking toolbox and the SPS threat

As the industry grapples with the technical challenges of precision application, UK farmers are facing a more immediate threat to their crop protection arsenal. The proposed UK-EU SPS agreement, expected to take effect in mid-2027, includes a commitment to “dynamic alignment” with EU rules on pesticide regulation.

While alignment could theoretically provide access to new biopesticides approved in the EU, a "cliff-edge" implementation could be devastating. An analysis by The Andersons Centre, commissioned by CropLife UK, warns that immediate alignment could cost the UK arable, horticulture, and sugar sectors between £500 million and £810 million in the first year alone. (Seems a lot given the price of wheat right now; maybe they know something we don’t.)

Farmers on TFF have highlighted that a sudden alignment would result in the loss of four new active ingredients recently approved in Great Britain but not yet available in the EU, including the cereal fungicides isoflucypram and pydiflumetofen, and the herbicides cinmethylin and bixlozone. Furthermore, 15 actives currently used in over 100 UK products, such as flufenacet, prochloraz and metribuzin, are no longer permitted in the EU and would likely be withdrawn.

"The prospect of losing access to such key crop protection tools, and hundreds of millions of pounds with them through loss of yield, would be catastrophic," warned NFU Crops Board chair Jamie Burrows, emphasising the need for a phased transitional approach.

Innovation in active ingredients

The dual pressures of regulatory restriction and the demand for precision application are driving a new wave of innovation in active ingredients. With herbicide resistance reported in 75 countries and affecting over 100 crops, the need for novel modes of action has never been more urgent.

One of the most promising developments is emerging from Cambridge-based startup Bindbridge, which recently secured $3.8 million to develop a new class of herbicides using targeted protein degradation. Inspired by advancements in cancer therapeutics, this approach uses "molecular glues" to tag specific proteins within a weed for destruction by the plant's own cellular machinery. Because this method degrades rather than merely inhibits the target protein, it has the potential to overcome existing resistance mechanisms and could operate at application rates up to 100 times lower than traditional chemistries. Bindbridge's initial focus is on developing a broad-spectrum replacement for glyphosate.

Meanwhile, established players are also bringing new tools to market. Syngenta recently announced its VIRESTINA™ technology, a fourth-generation ACCase-inhibitor designed to control grass weeds that have developed resistance to glyphosate and clethodim.

The biostimulant and biopesticide sectors are also experiencing rapid growth, with the European biostimulants market projected to reach $3.08 billion by 2030. Precision application technologies are critical enablers for these biological products, which often require highly accurate and timely placement to be effective.

Conclusion

The future of crop protection is undoubtedly precision-driven. As drones and AI-guided sprayers become commonplace, the agrochemical industry must adapt, delivering highly concentrated, stable formulations designed for ultra-low volume application. While the looming UK-EU SPS agreement threatens to restrict access to vital existing chemistries, it also underscores the urgent need for the next generation of active ingredients.

For the UK arable sector, navigating this transition will require careful management of the regulatory landscape, investment in new application technologies, and a willingness to adopt novel chemistries. The era of "spray and pray" is ending; the era of precision chemistry has arrived.

SPRAY PRECISION UNDERPINS EFFICIENT DIRECT DRILLING SYSTEMS

In direct drilling systems, every pass carries weight. With fewer opportunities to intervene through cultivation, crop protection strategies need to be both precise and adaptable. As a result, spray application is under increasing scrutiny – not just in terms of efficacy but also cost control and environmental responsibility.

Maximising the performance of each litre applied has become central to success. This means not only selecting the right chemistry, but ensuring it is delivered accurately, consistently and only where required.

A number of key principles now underpin modern application techniques:

- Accurate targeting of inputs across variable field conditions
- Minimising overlaps and misses, particularly on irregular field shapes
- Adjusting tank mixes to suit specific areas or restrictions
- Opportunities for band spraying within row-based systems
- Maintaining optimal droplet size across changing forward speeds
- Keeping boom height stable to reduce drift and improve coverage

These factors are particularly relevant in low-disturbance systems, where residue levels, soil structure and crop establishment methods can all influence spray performance.

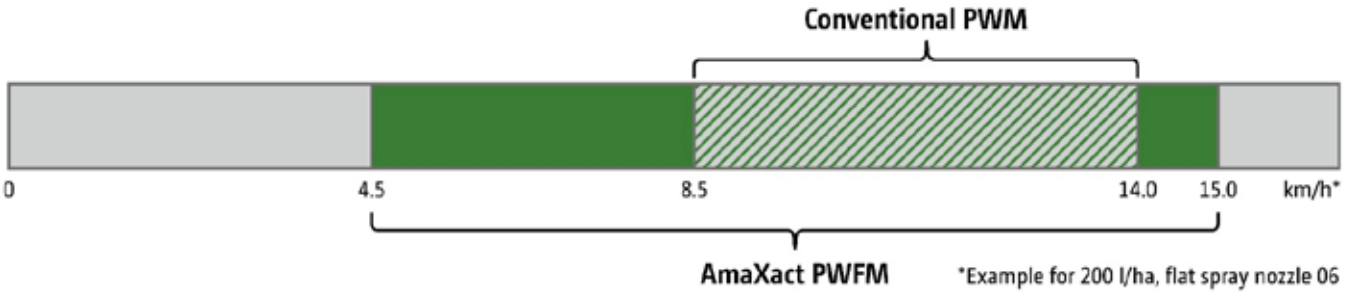
With over 50 years' experience in application technology, AMAZONE continues to refine how these challenges are addressed. However, in a direct drilling context, accuracy alone isn't enough — work rates, simplicity and reliability are equally critical. Spray windows can be tight, and technology must support decision-making rather than slow it down.

Ease of operation is therefore a key focus. Integrated software and hardware systems are designed to be intuitive, reducing set-up time and simplifying operation in the cab. Automation plays a major role here. For example, Comfort-Pack Plus manages the filling process by calculating exactly how much liquid is required for the task, even when working from application maps. This helps to avoid unnecessary leftovers while keeping turnaround times to a minimum. Fast induction rates and automatic cleaning functions further streamline the process.

Maintaining the correct boom position is another crucial element, particularly over uneven ground. ContourControl uses a combination of sensors to continuously monitor and adjust boom height, ensuring it remains consistent relative to the target. This not only improves application accuracy but also reduces the risk of drift. Integrated systems such as SwingStop help to stabilise boom movement, maintaining even coverage across the full working width.

Flexibility in application is increasingly important, especially where field variability is high. DirectInject allows operators to introduce products to the spray mix on the move. This could be used to manage buffer zones without additional passes, or to vary application

The AmaXact system gives improved longitudinal application quality due to its ability to change both the nozzle opening times and the frequency.



The AmaXact PWFM system offers an 87% larger working range in terms of speed and rate

rates across different areas of the field, whether based on crop potential or weed pressure. In systems where mapping and data are already widely used, this level of control fits naturally.

Nozzle management is another area where automation supports consistency. AmaSelect enables automatic nozzle selection based on forward speed and application rate, helping to maintain the correct droplet size at all times. CurveControl further refines this by adjusting output across the boom when turning, reducing the risk of over- or under-application.

For growers incorporating row crops into their rotation, band spraying offers significant potential savings. Systems such as AmaSelect Twin allow precise application over the crop row, reducing chemical use while maintaining effectiveness. Increasing the resolution of spot spraying, down to 25 cm zones, also improves targeting accuracy and reduces unnecessary application.

More recently, pulse width frequency modulation (PWFM) technology has been introduced with the AmaXact system on UX 01 trailed sprayers. This represents a step forward in maintaining consistent application across a wide range of speeds and conditions. By controlling not just the timing but also the frequency of nozzle operation, the system improves longitudinal distribution and maintains droplet quality more effectively than conventional approaches. Combined with DynamicFlow pressure regulation, this ensures accurate delivery even under changing field conditions.

For direct drilling systems, where attention to detail often defines success, these developments in spraying technology provide the tools to match inputs more closely to need. The result is a more efficient use of chemistry, improved crop outcomes and a system that supports both economic and environmental objectives.

AMAZONE's sprayer range spans tank capacities from 900 to 12,000 litres, with boom widths from 12 to 48 metres.

REDUCING **NITROGEN FERTILISER** USE

By Rosalind Platt, managing director of BFS Fertiliser Services, UK leaders in crop nutrition since 1948.

Late-season foliar nitrogen applications can significantly lower the total nitrogen required in crop production while maintaining – or even increasing – yields. Recent research has shown particularly strong results in oats.

Ongoing volatility in the fertiliser market continues to place pressure on farmers. At the same time, the industry's shift toward Net Zero has encouraged the development of more efficient nutrient strategies. In response, BFS developed a foliar nitrogen product, PolyNPlus.

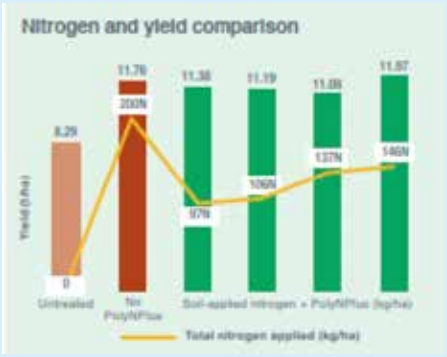
Following five years of independent trials carried out by organisations such as Niab and Velcourt, along with tramline trials conducted by a number of growers and agronomists, PolyNPlus has consistently delivered positive results. More recent studies on spring oats – now increasingly used as a break crop ahead of winter wheat – have also shown encouraging outcomes.

Traditionally, farmers apply soil-based nitrogen fertilisers two or three times during spring. However, nitrogen use efficiency (NUE) from soil applications can fall to around 25% later in the season, particularly in dry conditions.

Long-term research shows that PolyNPlus foliar nitrogen can reduce overall nitrogen requirements without compromising yields. Once sufficient leaf canopy has developed, it can partially replace soil-applied nitrogen. For example, applying 25 litres of PolyNPlus (equivalent to just 8kg of nitrogen) between growth stages 32 and 39 can replace 40–50kg of conventional soil-applied nitrogen. Alternatively, some growers apply two treatments of 15 litres per hectare at growth stages 32 and 37.

PolyNPlus is safe for application to growing crops and can be tank-mixed with fungicides, reducing the need for additional field passes. This improves efficiency while lowering input use.

Trial results support these benefits. A Velcourt study on Crusoe winter wheat in Lincolnshire found that lower nitrogen inputs combined with PolyNPlus produced comparable or improved yields – see chart. Additionally, replacing 40kg of soil-applied nitrogen with 25 litres of PolyNPlus reduced the carbon footprint



of the third application by 77%.

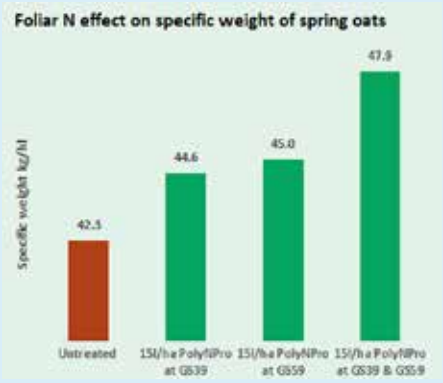
As well as wheat and oilseed rape, PolyNPlus can also be used in oats, applied just before panicle emergence. While oats require adequate nitrogen for optimal yields, excessive nitrogen can increase the risk of lodging. Although plant growth regulators can reduce this risk, they may also negatively affect grain quality.

A recent trial in Wiltshire investigated whether foliar nitrogen could improve efficiency. The crop received a standard 90kg/ha of soil-applied nitrogen alongside fungicide, without a growth regulator. A PolyNPlus product, PolyNPro, was applied at different stages: flag leaf (GS39), heading (GS59), both stages combined, and compared with an untreated control. The findings were promising. Dual applications at GS39 and GS59 resulted in a significantly higher specific weight – see chart.

Further data from ongoing oat trials will be available after this season's harvest.

How PolyNPlus works

Soil-applied urea undergoes multiple biological transformations before becoming available to the plant. These



processes consume energy and reduce the amount of nitrogen ultimately absorbed by the plant.

In contrast, PolyNPlus is absorbed directly through the leaf, leading to much higher NUE. Its formulation includes molecules of varying chain lengths: shorter chains are absorbed rapidly, while longer chains release nitrogen gradually over time. This sustained delivery allows the plant to utilise nitrogen more effectively.

Six different formulations

The PolyNPlus product range is formulated with ureic polymers, sulphur, magnesium, manganese, micro-nutrients and organic uptake enhancers. Uniquely, there are six formulations to meet different crop needs: PolyNPlus Cereals, PolyNPlus ManMag, PolyNPlus High Sulphur, Straight PolyN. Also available with required trace elements for oilseed rape and maize are: PolyNPlus Oilseed and PolyNPlus Maize.

A more efficient future

Foliar nitrogen is expected to play a key role in the future of sustainable farming. It offers a practical and cost-effective approach to improving nitrogen efficiency, maintaining or boosting yields, reducing environmental impact and lowering farm carbon emissions.

Leeb VT

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TOGETHER FOR A HEALTHY AGRICULTURE

WHERE INNOVATION GETS REAL: THE EVOLUTION OF CEREALS 2026

Written by Chris Fellows

When you walk into Cereals in 2026 (if you can get in past all the influencers who are going to descend on Diddly Squat), it will be immediately clear this is no longer just a machinery show. Gone is the really big kit, with combines and tractors lined up in neat rows. But look closer and something fundamental has shifted. This is now an event about systems, precision and decisions. The conversations are less about horsepower and more about inputs per hectare, labour per acre and resilience per season. Technology is not being showcased for the sake of it; it is being pushed through a much harsher filter: does it actually make farming more efficient, more profitable or more resilient? From AI-led spot spraying to autonomous field platforms, Cereals 2026 will offer one of the clearest snapshots yet of where UK arable farming is really heading.

The shift is significant because it reflects the reality of modern farming under pressure. With volatile weather, tightening margins and a shrinking labour pool, the industry can no longer rely on simply scaling up traditional methods. The focus has moved from blanket applications to targeted interventions, from operator-led performance to system-led autonomy, and from heavy iron to biological understanding. This transition is not just theoretical; it is visible in every corner of the event, demonstrating that the future of farming lies in the intelligent integration of technology and agronomy.

Precision is no longer optional

The Sprays & Sprayers Arena remains one of the headline attractions, but its focus has evolved. This is no longer just about bigger booms or higher output; the emphasis is firmly on accuracy, waste reduction and operator simplicity. Closed transfer systems like easyconnect are gaining traction, not because they are flashy, but because they solve a real-world problem: safer handling, less waste and better compliance. Alongside this, nozzle technology, drift reduction systems and integrated software platforms are all converging towards one goal: put the right product in the right place, at the right time, in the right dose. And we are all still asking, "Could drones be the answer?"

But the real shift is what happens when you move from precision application to precision decision-making. The integration of data into these systems means that operators are no longer just driving tractors; they are managing complex, data-driven operations that require a different level of understanding and control.

The rise of "See and Spray"

Camera-led spot spraying is one of the most talked-about technologies at the event, and for good reason. Systems like Techneat's Weed Wizard represent a step change in how farmers think about crop protection. Instead of blanket applications, these machines scan, identify and treat weeds individually. In practice, that means reduced chemical use, lower costs, less resistance pressure and more sustainable systems.

This is not theoretical anymore; it is working kit, in UK conditions, on UK farms. And it signals a broader direction of travel: inputs are becoming increasingly targeted, intelligent and conditional. The ability to apply herbicides only where they are needed is a game-changer for both the environment and the bottom line, and it is clear this technology is moving rapidly from the fringe to the mainstream.

Autonomy moves into the mainstream

Autonomous machinery has been talked about for years, but Cereals 2026 feels like a turning point. Platforms like AgXeed are demonstrating that autonomy is no longer experimental, it is operational. These machines are not about replacing tractors overnight. Instead, they are being positioned as labour-saving tools, consistency engines and enablers of controlled traffic systems.

For many businesses, the appeal is simple: reliable output without the constraints of labour availability. In a sector where skilled operators are increasingly hard to find, that is a powerful proposition. The bigger shift, however, is philosophical. Farming is starting to move from operator-led performance to system-led performance, where the machine is just one part of a larger, integrated operation.

Establishment tech reflects a changing mindset

Drilling technology on display tells its own story. Across the board, there is a clear move towards low disturbance establishment, multi-crop flexibility, higher work rates, and compatibility with regenerative systems. Direct drills, angled tine systems and high-speed planters are all competing for attention, but the underlying theme is consistent: do more with less soil movement.

This aligns with wider changes in thinking around soil health, moisture retention and input efficiency. Farmers are no longer just choosing drills based on output, they are choosing them based on how they fit into a broader system. The ability to establish crops reliably while minimising soil disturbance is becoming a baseline requirement rather than a niche preference.

Genetics: The quiet revolution

While the machinery grabs the headlines, some of the most important innovation at Cereals is happening in the crop plots. With hundreds of varieties on display, breeders are tackling some of the biggest challenges facing UK agriculture: drought resilience, disease resistance, input efficiency and market diversification.

New protein crops and alternative break options are also beginning to gain attention, particularly as rotations come under pressure. This is innovation that does not arrive in a single purchase decision, but its long-term impact on farm performance can be far greater than any machine. The focus on genetics highlights the understanding that technology alone cannot solve every problem; it must be paired with resilient, high-performing crops.

BOFIN will be speaking on the Mainstage at 10:30 on day 2 with a session outlining the science behind three precision-bred cereal varieties and an oilseed rape line that will come into farmer-led field trials during 2026 and 2027. It will explore how the new traits push the boundaries on plant agronomy going forward.

Soil is back at the centre

The popularity of soil-focused features,

including live soil pits and regenerative agriculture zones, reflects a wider shift in priorities. Farmers are increasingly focused on soil structure, biological activity, organic matter and long-term resilience. These are not new concepts, but they are being re-evaluated through a more practical lens. The question is no longer "should we focus on soil health?" but "how do we make it work commercially?"

Technology is playing a role here too, from better establishment systems to improved soil management tools. The integration of these tools into a cohesive soil management strategy is becoming a key differentiator for successful farming businesses.

Water and weather drive new priorities

Drainage and water management have become critical topics, particularly after a run of challenging seasons. Modern drainage systems, mapping tools and installation techniques are being showcased as essential infrastructure rather than optional extras. At the same time, traction solutions such as track systems are gaining interest as farms look to maintain work rates in increasingly unpredictable conditions.

In simple terms, the weather is forcing innovation and the industry is responding. The ability to manage water effectively, both in terms of drainage and retention, is becoming a critical component of farm resilience.

Livestock tech reconnects systems

One of the more interesting developments at Cereals is the growing presence of livestock-focused technology within an arable event. Virtual fencing systems, such as GPS-controlled collars, are enabling more flexible grazing strategies. This opens the door to integrating livestock back into arable rotations without the traditional infrastructure challenges.

For regenerative systems in particular, this could be a key enabler, allowing farmers to capture the benefits of livestock without the complexity that often comes with it. The ability to manage grazing dynamically and precisely is a significant step forward for mixed farming systems.

Efficiency is the common thread

Across all these innovations, one theme stands out: efficiency. Not just in terms of fuel or labour, but across the entire system. Inputs are used more precisely, labour is deployed more effectively, soil is managed more sustainably, and crops are selected more strategically. The technology at Cereals 2026 reflects a sector that is under pressure, but also one that is adapting rapidly and intelligently.

Top 10 innovations to see at Cereals 2026

1 AI spot spraying systems: Camera-led weed detection and targeted application; a major leap towards reducing chemical use with both drones and boom sprayers.

2 Autonomous field platforms: Robotic machines capable of consistent, labour-free field operations.

3 Easyconnect closed transfer systems: Safer, cleaner and more efficient chemical handling.

4 Next-gen precision sprayers: Advanced nozzle tech, drift reduction and integrated control systems.

5 High-speed direct drills: Low-disturbance establishment combined with high output.

6 Multi-crop, multi-system drilling tech: Flexible machines capable of handling diverse rotations and cover crops.

7 New crop genetics: Varieties built for resilience, lower inputs and changing climate conditions.

8 Soil health demonstrations: Practical insights into structure, biology and system performance.

9 Virtual fencing technology: GPS-controlled livestock systems enabling flexible grazing in arable setups.

10 Track systems for reduced compaction: Improved traction and soil protection in challenging conditions.

The bigger picture

Cereals 2026 is not about a single breakthrough technology. It is about a convergence of changes. Precision, automation, biology and system thinking are all coming together to reshape how farms operate. The most successful businesses will not necessarily be the ones that adopt the most technology, but the ones that adopt the right combination of technologies and integrate them effectively. The real takeaway from this year's event will be that innovation is no longer a bolt-on. It is the backbone of the farm.

However, if none of that appeals, you are sure to find me in the afternoon sun in the Hawkstone bar enjoying the social side of Cereals. As always, say hello and join us for a drink if you see any of our team there.

✔ Broad spectrum[1]
✔ Excellent value
✔ +0.26t/ha vs. Ascra® Xpro[2]
✔ Powered by Revysol®

BASF
We create chemistry

[1]Based on BASF and external field trial results, alongside interpretation of AHDB fungicide performance curves on key T1 target diseases. [2]Based on 16 independent trial comparisons at typically applied field rates as indicated by manufacturer recommendations and Kynetec field data (Revystar® XE 0.75l/ha, Ascra® Xpro 1l/ha). Use plant protection products safely. Always read the label and product information before use. For further product information including warning phrases and symbols refer to www.agricentre.basf.co.uk. Revystar® XE contains mefentrifluconazole (Revysol®) and fluxapyroxad (Xemium®). Ascra® Xpro contains bixafen and Fluopyram and prothioconazole. Revystar® XE, Revysol® and Xemium® are registered Trademarks of BASF. All other brand names used on this advertisement are Trademarks of other manufacturers in which proprietary rights may exist.

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