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CROP PRODUCTION MAGAZINE

October 2025

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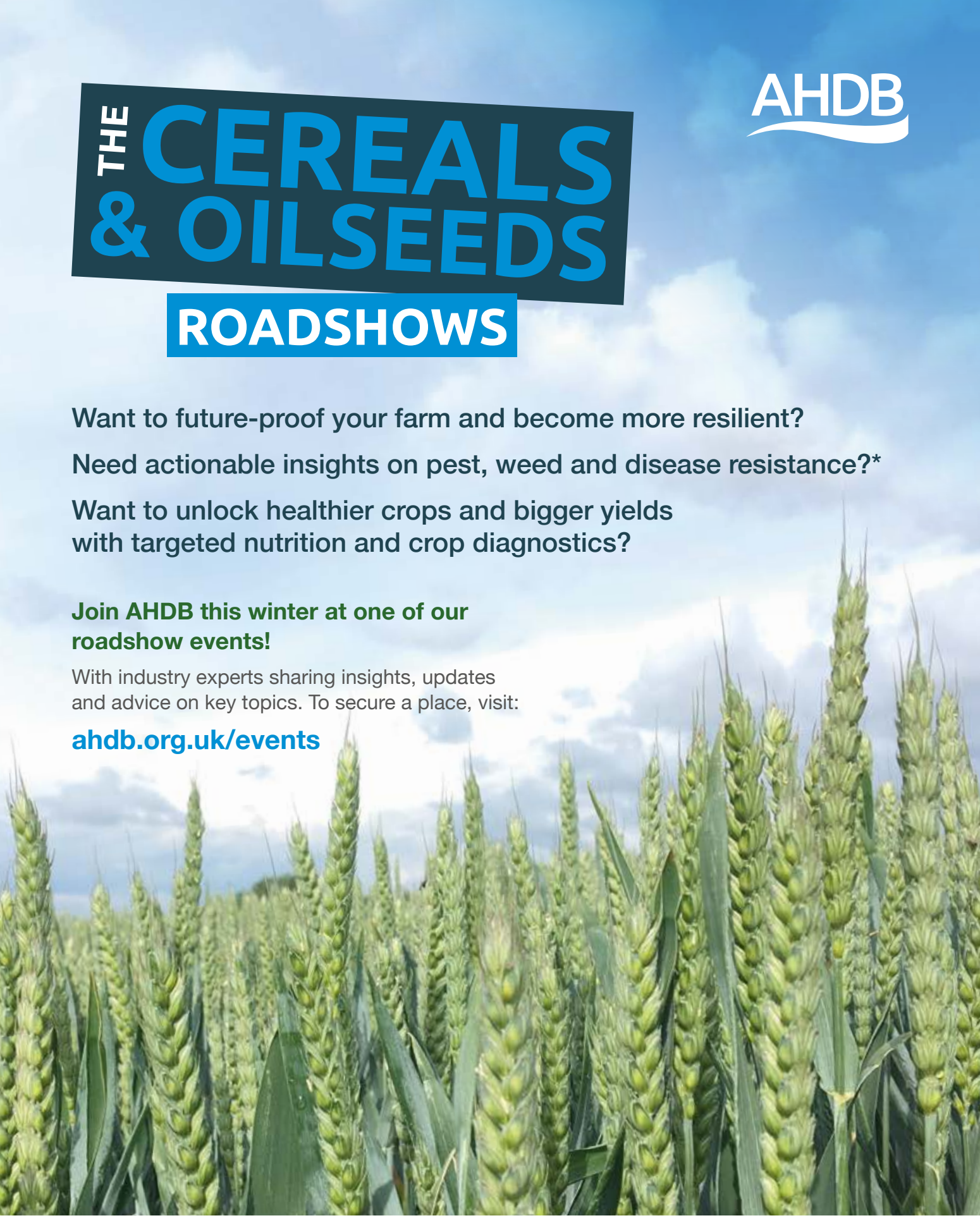

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There are implications for everyone

POINT OF VIEW

After the season just gone, we have to talk about yellow rust – it's clear a collaborative approach is required to avoid a repeat of 2025. Being on the back foot is never good when a new, highly virulent race is spreading rapidly across the country.

Initially suspected and subsequently confirmed, a major gene that once provided robust and durable resistance, and present in many UK wheat breeding programmes, had been overcome. From the beginning, I felt strongly the message to growers was to keep calm and carry on. After all, the on-farm scenario was different to the levels of infection seen in trials, plus growers had access to products that remain effective. The priority was understanding what was happening.

Yellow rust is a dynamic and highly adaptable pathogen that's capable of evolving new races and can cause severe yield loss. However, cultural controls and a well implemented fungicide programme usually keep it in check. Variety choice is one of the strongest tools growers have.

Resistance ratings, however, aren't set in stone and crops should be monitored as part of well-placed agronomy.

The yellow rust population is progressively diverse across the UK with some varieties performing well in one region but worse in another. Monitoring variety performance and how this relates with ratings falls to the AHDB in the form of its Watch Lists.

The question is, could the Watch List have predicted what we saw this year and if so, would it have made a difference? The simple answer is, no. It's unlikely the breakdown of a single major gene can be predicted, and it's why breeding is so important.

And while there are a number of genes involved in yellow rust resistance, there are some we know about, and others we don't. Thus, the continuing evaluation of material by breeders to deliver new genetics from novel sources should be recognised and celebrated – it's how farmers stay ahead and meet the rising demand for food.

So what about the future? We saw strange behaviours in some varieties last year, widespread infection this year, and my prediction is, it'll only be worse next year. Although dry, last spring's warm days and cool nights presented good conditions for yellow rust to develop at the young plant stage. With the right temperature and humidity, the pathogen can cycle quickly.

The AHDB has a difficult job ahead. Farmers will want to know whether to stick with a variety that's performed well, even if its yellow rust rating has plummeted.

My advice is to look carefully at ratings and how the variety has performed in untreated trials. Choose options with durable resistance, it also makes sense to grow more than one variety for a diverse mix of resistance genes.

It doesn't matter whether you're a farmer, plant breeder, seed merchant or end user; there are implications for everyone. A joined-up, multifaceted approach is required so the industry can be proactive rather than reactive.

It might be an old phrase, but it's always best to sing off the same hymn sheet!

By George Goodwin, managing director of Senova.

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We speak to a Staffordshire mixed farmer P.28

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COVER STORY

Paul Pickford stresses the importance of calculating gross margins P.22

Kate Woolley explains why personal data laws apply to you P.35

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As one season closes and another begins, CPM supports growers with topical insight.

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About Crop Production Magazine

Crop Production Magazine is the leading specialist journal for UK arable farmers and agronomists.

The magazine operates within a controlled circulation with a readership including farm managers, agronomists, machinery dealers and other arable supply industry professionals.

CPM is also distributed to agricultural universities, colleges and research institutes, examined by some of the leading researchers in their field as well as the next generation of crop specialists.

Above all, the magazine is read by UK farm business owners – decision makers. Articles are mostly in-depth and analytical, exploring the issues behind a current problem while aiming to present new ways of thinking.

The magazine doesn't seek to prescribe solutions, rather inspire, stimulate and inform.

CPM is proud to represent some of the most experienced agronomic, technical and machinery journalists, many of whom have received British Guild of Agricultural Journalist awards for their contributions.

The team works closely with companies that support *CPM* to gather inside knowledge on the technical issues that affect farmers and the wider food chain. Although small, *CPM* is managed by a driven team, responsible for delivering the sharpest insight and most relevant information across both print and digital formats.

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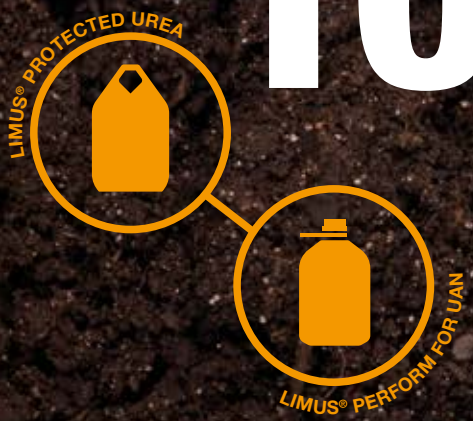

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Start as you mean to go on

With good seedbed conditions and fairer weather suggesting a positive drilling period, are there any watch-outs looming for this autumn's weed control? *CPM* finds out.

By Janine Adamson

With drills on the move across the country there'll undoubtedly be a lot of wood being touched, ladders avoided and four-leaf clovers being sought, in the coming weeks.

At the time of writing (end of September), conditions have permitted wheels to roll, with just enough moisture to penetrate to drilling depth, says Niab agronomist for the eastern region, Gary Rackham. "Growers are motoring on and drilling cereals; crops seem to be going into good conditions.

"I certainly don't want to jinx it, but in the East on lighter soils we have the capacity to take more rain and still be out drilling a few days later. Hopefully it'll remain a positive picture," he comments.

HOLDING FIRM

With the impetus to get going, Frontier's Paul Fogg counters that until now, he's been encouraging growers to wait, mainly due to a lack of weed flush. "With the exceptionally early harvest, it's admittedly hard to sit on your hands.

"But in the North, for those who didn't wait, we're seeing grassweeds coming through now in-crop, which of course are much more challenging to control."

Otherwise, for those more patient, he says they're entering a decent wheat drilling period. "Where soils have been worked post-harvest they've taken any rain well; most places have then seen a flush and applied glyphosate accordingly.

"In terms of herbicides, it's now building the best chemistry into a programme balanced against the most cost-effective approach. If wheat has been drilled early, growers may want to consider a top-up early post-emergence, paying particular attention to the qualities of the different actives, such as persistency."

Weed expert, Dr Will Smith, believes growers should be in a 'genuinely good place' compared with previous seasons. "Following a solid control year, in most cases, the seed return will be low. However, due to the nature of the weed seed-bank, you can't afford to be complacent.

Encouraging beginnings
For those who've held off drilling, Frontier's Paul Fogg says they're entering a decent wheat drilling period.

Protracted germination
With a potentially open autumn, growers may see an elongation of the germination period and weeds could keep coming, comments Gowan's Dr Will Smith.

"Many will have seen a significant flush already following a couple of decent rainfall events – moisture has soaked in, opened up soils and consequently, weeds have germinated.

"But we're in this for the season – with a potentially open autumn we may see an elongation of the germination period; the weeds will keep coming," he cautions. "Of course for high pressure grassweed areas, the hope would be that drilling is delayed."

According to Will, if the weather continues to permit, paying attention to the finer details can reap rewards. "Really make the most of improved conditions – check nozzles and application techniques – be detailed. Then, evaluate how successful pre-ems have been and whether you might have to go back in with a top-up," he adds.

As technical lead for Gowan, he also highlights the potential use of Avadex Factor (tri-allate). "For those drilling later in the season, this remains a good pre-em option, and is a robust addition to herbicide programmes, offering diversity."

PRODUCT SUPPLY

Gary warns of a watch-out looming on the horizon: "While most cereal crops will have a pre-em, there appears to be a supply problem with some chemistry which may complicate programmes. This is especially the case if growers are working hand-to-mouth due to cash flow or time management issues, it means they could miss out on their preferred herbicide options," he says.

Paul agrees that flufenacet appears limited. "This means having FMC's Fundatis (bixlozone+ beflubutamid), which was recently launched in

Mitigating risk with a two-spray programme

Don't ignore what could be around the corner, particularly when it comes to weeds

Despite a good control year and decent conditions at drilling, weeds still require careful management, stresses Bayer's Matt Siggs. "Obviously it varies by region, but on the whole, farmers took advantage of good drilling conditions in late September into early October, rather than delay for better weed control.

"On the plus side, September rain and low blackgrass dormancy meant we saw some reasonable flushes even before September-drilled wheat. Conditions were also favourable for crop establishment and pre-emergence performance."

He reminds that the downside is, of course, greater potential weed pressure in the crop and on some farms, higher BYDV risk too.

"Now is the time to think about a follow-up herbicide application. After 2–3 weeks, any residual with a shorter half-life will have degraded rapidly following the relatively warm air and soil temperatures. As a result, there's less protection against freshly emerging weeds.

"In our trial work, the best grassweed results always come from a two-spray programme in wheat, especially in earlier drilled crops. Laying down a consistent residual layer through the autumn will provide protection well into November, helping to control a wide range of potential weed threats.

"Only in the lowest pressure situations would I recommend using only a pre-em in September-drilled wheat."

As ever, the first thing to do is check the field, he adds. "Look for discolouring of weeds which show the pre-em is working, but also keep an eye out for germinating weeds that appear unaffected. As the soil weathers and clods break open, more weeds will inevitably appear.

"Residuals work best if they're applied before weeds germinate, so it's important to apply the follow-up within a couple of weeks of the pre-em so it's still offering some protection," explains Matt.

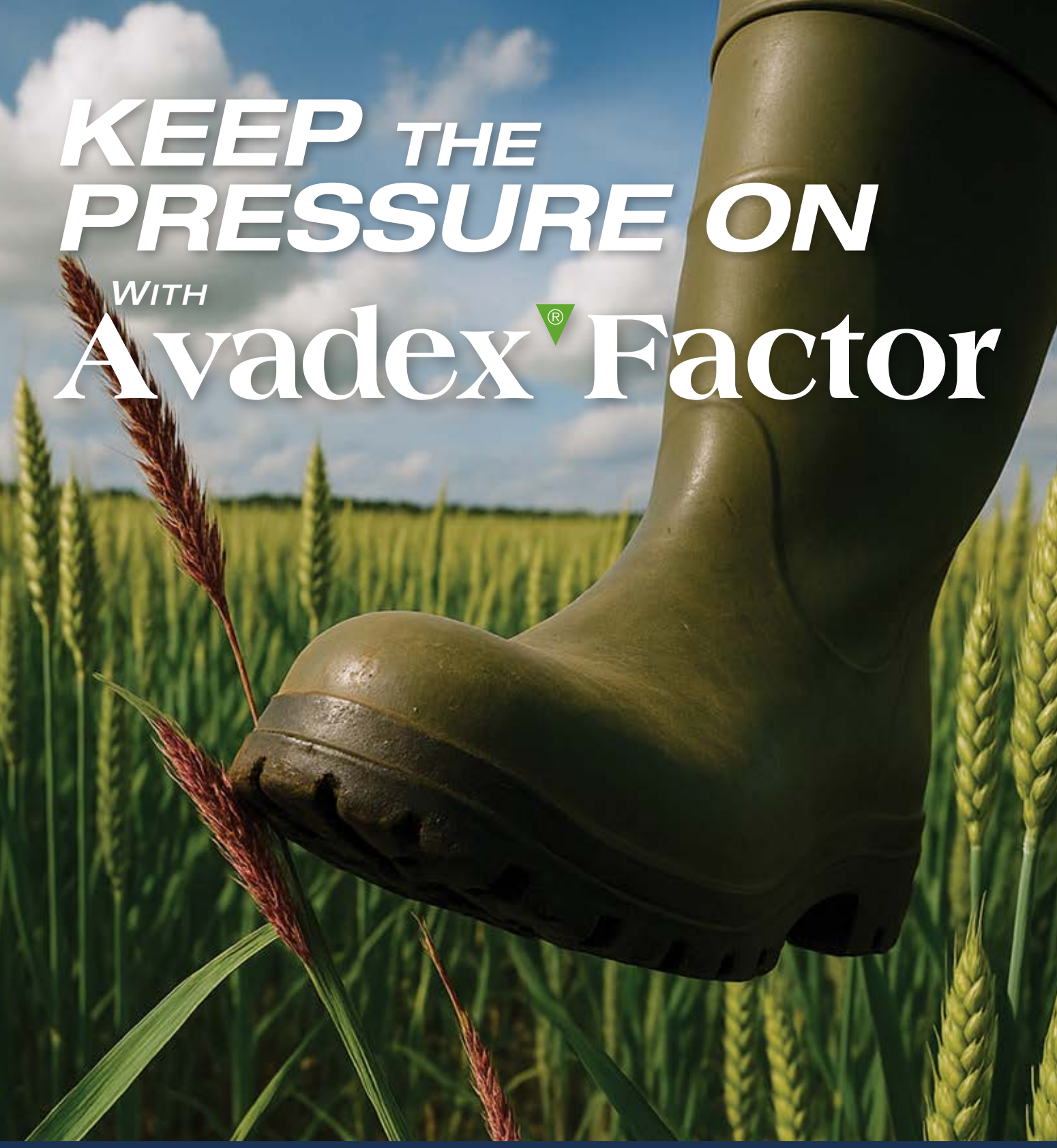
He suggests a metribuzin product such as Alternator Met, Cadou Met or Octavian Met (all metribuzin+ flufenacet+ diflufenican) applied at 0.5-1.0 l/ha can help if germination has already started. This is because metribuzin has contact activity against already emerged weeds.

"It also controls groundsel, burr chervil and several other broadleaf weed species which can simplify spring fieldwork."

Two-spray approach
In Bayer's trial work, the best grassweed results always come from a two-spray programme in wheat, especially in earlier drilled crops, points out Matt Siggs.

If there's a risk of BYDV, an aphicide spray may coincide with the top-up herbicide application. "But don't force the issue, make each application at the correct timing.

"For BYDV, use the T-Sum calculation to work out the correct time to spray. The post-em herbicide application is a judgement call about when you assess the pre-em will start losing efficacy, and when you expect further weed germination to get through the initial barrier," he concludes.



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Glass half full for OSR

Despite falling into two camps, it's proven a mostly positive start

With a level of cautious optimism among growers following a successful Harvest 2025, it appears oilseed rape could be in for another positive year.

While reports from the field suggest there are 'two crops' – those drilled early and those planted later – estimates suggest the cropping area has indeed increased year-on-year.

Frontier's Paul Fogg believes particularly for those in the south, there's been a return to OSR. "Following the recent harvest with yields of 5t/ha+ in some cases, growers can see it has the potential to deliver more. Consequently, there's renewed interest in pushing OSR's performance and building more resilience into the crop," he says.

"We've certainly seen a surge in uptake of Frontier's risk scheme lately, where growers only pay for the established area of OSR, rather than an upfront seed cost."

Overall, Paul suggests crop establishment seems good, even when drilled later into drier seedbeds. "But for those early planted crops, they've almost done too well and are forward with potentially large weed burdens which will prove difficult to hit with chemistry.

"However, the recent launch of LaDiva (halauxifen-methyl+ aminopyralid+ picloram) from Corteva adds flexibility in terms of early weed control, offering efficacy against broadleaf weeds such as chickweed and mayweed. You can then return with propyzamide (as in Kerb) at a later timing," he explains.

Niab agronomist, Gary Rackham, provides independent advice to growers across the eastern region. He agrees that OSR is in two camps and highlights that GB, is useful, particularly in winter barley where cinmethylin can't be used," he raises. "With no post-em options in winter barley, a robust pre-em strategy is essential."

Another concern for Gary are areas which are coming out of SFI agreements and going back into cereal crop production. "These could be hard to manage this season due to the weed burden which will have been allowed to build. Robust herbicide stacks and careful management will be required in these situations."

While for Paul, it's yellow rust that's high up his agenda. "Let's not sleepwalk into a yellow rust disaster in spring – we should have it in the back of our minds from the get-go." ●

High risk areas

Niab's Gary Rackham is concerned regarding weed control in areas which are coming out of SFI agreements and going back into cereal crop production.

later drilled crops in his area have seen some cabbage stem flea beetle damage.

"The pest is about this year but new growth appears clean so plants should successfully grow away from the grazing damage. Because these crops are somewhat patchy, blackgrass is starting to appear," he highlights. "With this variability it'll also prove a challenge to find a suitable window for an application of graminicide Centurion Max (clethodim), while respecting the important stewardship guidelines."

Paul adds that he's heard reports of CSFB in the North. "Could there be a geographical spread emerging? Either way, contrary to previous years, I'm not sure it's doing significant damage this season," he says.

As for disease, AHDB's online phoma leaf spot forecast suggests many OSR crops may reach the spray threshold during 12-25 October. The forecast uses rainfall and temperature data to estimate when 10% of OSR plants may develop phoma symptoms at hundreds of sites across Great Britain.

It says the guidance is to treat varieties with relatively low Recommended List stem canker disease resistance ratings (7 and below) and small crops promptly when 10-20% of plants develop phoma leaf spots.

Some sites, mainly in the south west, have already passed the earliest threshold dates, while others are expected to not reach the threshold until November (mainly in the North East).

AHDB's Sacha White says although summer was dry, it was the warmest on record. "The more recent showers will have encouraged disease progression. As a rule of thumb, symptoms show on infected leaves after at least 20 rainfall days in August and early September."

A change in fortune

Reports from the field suggest renewed optimism following another year of good establishment.

Covering all bases

The past three seasons alone have demonstrated that when it comes to disease, it's impossible to predict what may strike the hardest. For this month's Common Ground, *CPM* explores the importance of keeping an open mind when planning profitable winter wheat fungicide programmes.

By Janine Adamson

While the disease of the past season has undoubtedly been yellow rust, with associated concerns regarding the *Yr15* gene, experts remain confident in the performance of current fungicides.

However, with no two seasons ever the same, growers are being urged to take a fresh perspective on the upcoming winter wheat crop, concentrating on what can be done, rather than what can't, when planning crop protection programmes.

To discuss this further, *CPM* hosts senior scientist from Niab, Dr Aoife O'Driscoll; BASF's agronomy manager, Andrew Smooker; and cereal fungicide business development manager for BASF UK, Jared Bonner.

THE 2025 SEASON

To open up the discussion, Aoife explained that the past season offered extremes. "We had an

Managing *Yr15*

Niab's Dr Aoife O'Driscoll said although the shift in yellow rust is very interesting biologically, agronomically, it's yet to make such an impact.

Control tools

BASF's Jared Bonner commented that despite the new strain of yellow rust, it remains a fairly easy disease to control with the tools available.

exceptionally warm and dry spring with stress in the crop that capped yield potential early on.

"In terms of disease expression, this was uneven across not only the country, but across farms and within crops. Septoria, which is usually dominant, was held back by the lack of leaf wetness in April and May, but then we had the issue with yellow rust which made the headlines. Individuals had to adapt quickly if they were affected."

Andrew agreed, adding that it was another rollercoaster season. "Ultimately, it's been a year of relentless challenges on farm right through to harvest, although there were pockets that fared a little better where rainfall and soil type allowed.

"It may also be viewed as a lower disease pressure season overall, but actually, the rust we saw in our trial sites was very high by the time it came to review the trials, with some untreated plots completely succumbing. As ever, lots of twists and turns."

YELLOW RUST

While the *Yr15* gene being overcome by yellow rust has made farming headlines, Aoife pointed out that although it's very interesting biologically, agronomically, it's yet to make such an impact.

"I don't think it affected many situations this past year because if you're used to dealing with yellow rust, you're accustomed to it. It was the minority who aren't used to dealing with it who were caught out.

"It's likely this is because it was a new issue to them and they were following advice to apply a T0 of 0.5 l/ha of tebuconazole, which only provides a week of protection. The preferred approach would have been to go for a tebuconazole and strobilurin mix, adding perhaps £10/ha to the spray programme, but doubling the protection in terms of curative activity and persistence."

She added that with the recently adjusted yellow rust ratings on the Recommended List, variety choice will require further consideration, although understanding how to manage the disease effectively should be the primary factor. "I don't think people will make the same mistake twice if they've had an issue this year."

Reflecting further on varieties, Jared pointed out that 15 varieties make up around 98% of the total UK winter wheat area, and at the beginning of last season, only three of those had a yellow rust rating of 6 or less.

"But by the end of the season, that increased to 11 out of the 15, which is about 70% of the area. Of course, seed crops were planted last year so there can't be a dramatic change in availability. Instead, it's understanding which varieties are now susceptible to yellow rust and how to manage them in the correct way.

"Think ahead – don't necessarily shy away from varieties which are proven to be good on farm – and plan fungicide programmes accordingly," he advised.

Andrew reminded of the interaction between varieties and chemistry: "It's important they work together and support each other.

"This is a season where there's been a significant change on the varietal front with yellow rust, but if you can get the programme right, you can still have a good outcome.

"There are also varieties with different genetic backgrounds on yellow rust as well, plus many other diseases and traits to think about and weigh up as ever."

ACHIEVING CONTROL

Discussing current fungicide options, Jared said despite the new strain of yellow rust, it remains a fairly easy disease to control with the tools available. "It does, however, require a different mindset because it cycles a lot quicker. If you take septoria,

Cycling fast

In the right temperatures, yellow rust can cycle in 10 days or less meaning the disease requires monitoring between classic spray timings.

most of the fungicide programme is built around that disease with four weeks between sprays, because it's cycling every 21-28 days.

"But yellow rust, in the right temperatures, can cycle in 10 days or less. So if you've planted a yellow rust susceptible variety you can't rely on a classic T0 and returning again at T1, it requires monitoring in between.

"This is where you tend to see a T0.5 or T1.5 timing for example, where people are potentially coming back in as a top-up for yellow rust control."

He stressed nothing has fundamentally changed with the chemistry itself. "It's more about active management – if you're looking at a T1 and see you have active yellow rust, ask whether an eradicant is required as well as the protectant in the tank."

In response, Andrew pointed out that while there have been no changes in the chemistry intrinsically, during the past three years with high septoria, brown rust and yellow rust, there's more to contend with.

"There's an increasing demand for versatility and all-round strength; chemistry has been really tested in recent years, both in terms of disease control and value for money.

"Although there's a general focus on every timing, T2 can take the

Fungicide ROI

Linked to value are the added benefits which can be achieved from using fungicides such as better water use efficiency, increases in nitrogen use efficiency (NUE), or maintaining green leaf area, explained BASF's Andrew Smooker.

limelight. But with the unpredictability of the past few seasons and risk management, more emphasis has to shift towards T0 and T1."

THE ROLE OF AZOLES

According to Aoife, Revysol (mefentrifluconazole) remains the top azole in the market for septoria control. "We have to consider what we have available to us in terms of SDHIs, strobilurins and QiLs in fenpicoxamid, but as an azole for septoria control, Revysol is definitely the best that we have.

"We require azoles as the backbone of all fungicide programmes at T1 and T2, and because tebuconazole and prothioconazole have only modest activity, Revysol has to be in there in some form. Both biologically and agronomically, it's very important to have Revysol in the programme."

Jared added that Revystar XE (mefentrifluconazole+ fluxapyroxad) proved good value last year and remains a strong offer when it comes to septoria control, while offering other robust activity on yellow and brown rust.

"Often the Xemium (fluxapyroxad) component of Revystar XE is forgotten, but this brings additional rust, eyespot and mildew activity. This means Xemium is a good partner for Revysol; in increasingly unsettled years, we have to be ticking more boxes than just septoria, we want that all-rounder.

"Equally, when it comes to resistance management, we have to bring other actives into play. With perhaps an over-reliance on prothioconazole as a partner, using Revysol as a different azole in a fungicide programme is an important factor."

Andrew raised the heritage associated with the azole family. "They've stood the test of time and on-farm, I believe there's an affection towards some of the actives that have come and gone like epoxiconazole, and obviously prothioconazole that we still have."

> ***"Both biologically and agronomically, it's very important to have Revysol in the programme."***

In reply, Aoife said it's well understood that SDHIs are more susceptible to faster shifts in resistance, but azoles are more balanced in terms of how mutations develop. "Some mutations leave, some come back in again, so even though there's been a shift, overall, azoles have been very stable.

"SDHIs tend to be a little unpredictable; so how do you manage that instability? You add something in there that's stable, therefore Revysol is offering quite a lot to the other molecules."

CHOOSING FLEXIBILITY

With growers facing increasingly difficult decisions regarding the bottom line, while still managing a multitude of risk factors beyond their control, Jared proposed the value of flexibility.

"If you can use products where there's some flexibility in application rate, you have the potential to tailor their use to the situation that's in front of you.

"This means not being tied to a set rate that could potentially be too high for a specific situation. Equally, simple considerations such as can it be used at different timings or in a different crop? It's avoiding having products sat in the shed that have to wait for the next season."

Andrew pointed out that also linked to value are the added benefits which can be achieved from using fungicides. "That could mean better water use efficiency, increases in nitrogen use efficiency (NUE) or maintaining green leaf area – there's robust data to back these claims up for Revystar XE.

"These are aspects which when margins are tight and yield is challenging, can help to push a crop on. If something is paying for itself beyond chemistry terms, then that's a positive well beyond just disease control."

ANY OTHER BUSINESS

Aoife suggested that for now, the best approach is to focus on drilling a crop into good conditions. "Psychologically, it's not wise to get drawn into worrying about things beyond your control."

Jared agreed: "For now, concentrate on getting good, healthy crops established and tackling any grassweed problems. The only caveat being, you may want to be more vigilant on certain varieties which have had their RL yellow rust scores adjusted.

"Let's hopefully get crops off to a good start and see what next year has in store," he concluded. ●

The rapid response technology

> *"The premise is that we can silence certain genes in the plant or in the pest, to offer protection or resistance."*
>
> DR ADRIANA BOTES

A problem vexing the brightest minds in crop production – as new chemistry becomes more difficult to discover and commercialise, can pests and diseases be tackled by other means? *CPM* investigates the emerging science striving to achieve just that.

By Rob Jones

In a hi-tech laboratory near York, something innovative is brewing – a project that could change how growers manage their approach to crop protection.

Star of the show is *Gluconacetobacter diazotrophicus* (Gd) – if this sounds familiar, that's because it's already attracted attention for its ability to convert atmospheric nitrogen into plant-accessible ammonia.

It achieves this feat from within the plant's cells – in leaves, stems and roots – providing a steady stream of nitrogen throughout the growing season.

Having isolated and patented a particularly efficacious strain of Gd, *Az19*, available to UK growers as Encera, it's these same plant-colonising characteristics that firm Azotic Technologies seeks to utilise in a new project.

Dr Adriana Botes, research and development director, says this is because Gd has a second string to its bow beyond nitrogen fixation. "We're exploring the 'programmable plant' concept.

"The premise – already proven – is that we can silence certain genes in the plant or in the pest, to offer protection or resistance."

This so-called 'gene silencing' is already being used in human health, where it's deployed to alleviate disorders such as cystic fibrosis, and is also under investigation as a potential cancer treatment. In crops, researchers originally focused on the transgenic route – around the turn of the century, US growers could purchase genetically-modified potato varieties resistant to the potato leafroll virus.

INFLUENCING GENES

Then around 20 years ago, the naturally occurring biological process of RNA interference (RNAi) was discovered. RNA is chemically similar to DNA, the nucleic acid molecule that carries the genetic instructions for all living organisms. Its molecules influence which genes are suppressed or expressed.

"In turn, another molecule is associated with this gene expression process, and that's double-stranded RNA," explains Adriana. "Plant scientists realised they could tailor a specific dsRNA molecule that when applied to plants, could silence an essential gene within a target pest.

"There it would inhibit a critical biological process, resulting in death, thus reducing the pest population as would a traditional insecticide."

The first foliar-applied, dsRNA-based bioinsecticide was approved by the United States Environmental Protection Agency in 2023. The active ingredient, ledprona, targets the Colorado potato beetle, silencing a gene that produces a vital protein.

Without this protein, the beetle stops eating and dies. Recognised as a new ▶

Inconspicuous yet efficacious
Gd is like a Trojan Horse, delivering dsRNA right into the plant cell, says Azotic's Dr Adriana Botes.

mode of action by the Insecticide Resistance Action Committee, ledprona offers farmers control of a pest that accounts for global crop losses of more than $500M.

"It's called spray-induced gene silencing (SIGS)," says Adriana. "Without doubt it's a more sustainable approach to crop protection and pathogen control.

"With tailored dsRNA – which can be produced by large-scale fermentation – growers could have new options for insect control, fungal pathogens and plant viruses, with minimal off-target effects.

"Such a new mode of action could replace many chemical-based pesticides and avoid the cycle of resistance against new actives. It also provides an alternative to creating and using transgenic plants, GMOs, which are restricted in many parts of the world."

Despite its benefits, Adriana says SIGS faces a major obstacle: its delivery method. "As a foliar spray, its effectiveness depends on uptake of sufficient dsRNA. It has to penetrate the waxy cuticle, the cell wall and the membrane before it accesses the plant cell's own RNAi machinery.

"Even then, it won't move through the plant systemically, so while it's good for insect pests feeding above ground, it's of limited use for pests that target roots."

But, here enters Gd. Could its innate ability to colonise a wide variety of crops be used to produce and deliver dsRNA, so that it's delivered within the plant itself?

Adriana believes so. In fact, it's why Azotic's new project is supported with a £500,000 grant from the UK's Advanced Research + Invention Agency (ARIA) as part of its 'Programmable Plants' opportunity space.

"Gd is like a Trojan Horse, delivering dsRNA right into the plant cell. Then we use the plant as the fermentation vessel to produce more Gd and dsRNA. That's more effective, more efficient and less expensive.

"What's more, dsRNA isn't the only molecule that modified Gd can produce," she points out. "Enzymes and peptides, for example, are powerful biostimulants and many exhibit antimicrobial properties too.

"But they're both very difficult to apply foliarly. Around 99% of a peptide application is degraded before it gets inside the plant."

Adriana points out that the attraction with Gd, besides its ability to colonise the plant, is its versatility. As well as targeting plant pests and diseases, dsRNA can also alter plant traits without permanent genetic modification.

"We're talking the ability to simultaneously transform all cultivars of a crop using a single strain of Gd engineered to express one or more genes. We could improve crop quality, productivity, or resilience against abiotic stresses such as drought, salinity or even heavy metals."

Ahead of the ARIA project is a smaller, Innovate UK-funded study with partner FERA. It's testing efficacy of modified Gd strains on the root-knot nematode *Meloidogyne incognita*.

"It's a devastating pest – it attacks more than 3000 plant species and causes losses of up to $70Bn each year. It's a great example of a pest that can't be tackled by SIGS, nor the other variations of gene-silencing currently available such as transgenic plants or virus vectors.

"How would you ever re-engineer all the crops it affects to create dsRNA-producing versions? You can't, but, you can do it simultaneously with Gd."

PROOF OF CONCEPT

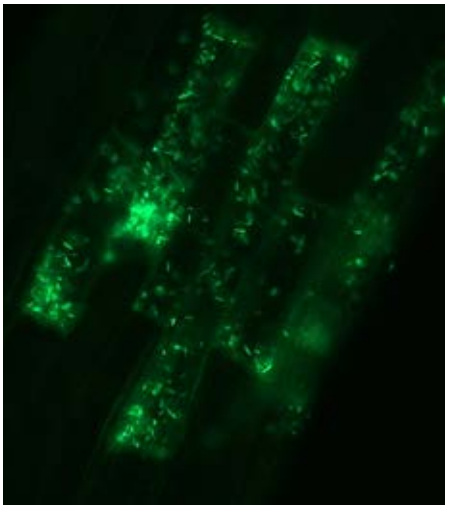
The project with FERA finishes in January and should confirm how a foliar application of Gd colonises the plant's roots to produce dsRNA that silences a specific gene in *M. incognita*. But the bigger prize is the proof of concept that will come from the three-year ARIA study.

In partnership with the University of Durham, the team is using *Arabidopsis kaleidocell*, a laboratory plant modified to fluoresce. By measuring the intensity of this fluorescence after the plant's been treated with dsRNA modified to silence the fluorescent gene, Ariana can compare a SIGS treatment against Gd.

She expects first-stage results (due in spring 2026) to confirm that not only does Gd work to suppress the fluorescence, but that it does so for far longer than SIGS (more than six weeks, compared with seven days). Further project stages will confirm Gd's ability to produce and secrete peptides within the plant cell of rice, corn, wheat, potato and tomato, followed by work to demonstrate that Gd is as effective as CRISPR techniques in altering plant phenotypes.

This last point is highly topical in view of this year's observed breakdown in the *YR15* yellow rust resistance gene, notes Adriana. "The gene features in several important varieties and had been seen as an important line of defence since its discovery in the 1980s."

However, Gd could potentially create a 'repair patch', she says. "This could increase a variety's resistance again by targeting a specific gene. The same goes for a disease like potato blight; once you know which genes in which varieties are responsible for conferring resistance, you can put those into Gd and bring resistance to other cultivars."



Florescent marker

Seen here under a microscope, Gd has colonised the root cells of tomato, seven days after inoculation, producing green fluorescent protein (GFP) as a marker. *Photo: Azotic*

Adriana believes even emerging pests and diseases could be tackled relatively quickly. "It's a rapid response technology – you'd be able to create an effective control if not within the same season, then certainly by the following one.

"And for existing pests and diseases, we can develop protection where no effective solutions currently exist."

The intention is to build a portfolio of modified Gd strains, each offering a different property: nematode control, an anti-fungal, insect control, activity against phytophthora, and so on. "You could apply these as required through the season, perhaps starting with a seed treatment followed by later foliar applications.

"But each one of these strains would still provide Gd's characteristic N-fixation; growers will be getting a dual-action product."

However, Adriana says the main stumbling block is how regulators will perceive the modified Gd strains. "These gene expressions happen only when Gd colonises and proliferates within living plants, but there's no survival outside the host plant or in progeny – the microbe isn't present in harvested seeds.

"Nevertheless, the bacteria will be engineered, and so we must engage with regulators to encourage the regulatory landscape to 'keep up' with new biotechnologies and their potential; it's untapped potential." ●

Smith's SOAPBOX

WITH GUY SMITH

Blue or red?

"There was an old adage that did the rounds, that UK agriculture was better off under a Labour government than a Tory one. Like many pearls of wisdom, it didn't stand up to much analysis, but it wasn't glaringly wrong either.

It likely stemmed from the post-war socialist Atlee government which sought to support agriculture, contrasting with the 'laissez-faire' neglect of pre-war governments dominated by the Conservatives. The fact is, since the 1940s, there hasn't been a pattern to suggest which party farmers do best under. Furthermore, it's primarily markets that dictate our fortunes, not politics.

This is demonstrated by the present, where we have strong prices in the buoyant dairy and beef sectors contrasting with poor prices for depressed arable crops. The point is, it's all happening under the same Labour administration; it's a coincidence.

This leads to another adage – 'up horn, down corn', or vice-versa. This is well reflected in the latest Total Income from Farming Figures, which show a 5% increase in the livestock sector during the past 2-3 years, mirrored by a 5% decline in arable.

What isn't clear is whether you always get a see-saw effect of one up, one down; there have been several periods post-war where farm gate price for most commodities were either collectively depressed or buoyant.

What the TIFF figures chart as a trend, is a decline in income from government support – 11% in 2020 to 8% in 2024. Furthermore, this 3% drop masks that you now have to spend money to access this support, whereas under the hectare-based schemes of the CAP, you didn't.

It's in relation to support that the importance of government policy comes to the fore, but again, history shows little difference between right or left wing governments. Before we joined the EU, the price support scheme was similarly funded by Atlee and Wilson in the red corner, and Churchill, MacMillan and Heath in the blue.

Once we were under the auspices of the CAP, the complexion of the House of Commons had limited effect on the politics of Brussels. But now, post-Brexit, the ball is back in the Westminster court.

Since 2016 there hasn't been much difference between the two main parties when it comes to agricultural policy. The Tories put down the bare bones 6-7 years ago, and the Starmer regime has largely stayed on-script. The question is, will we see divergence between the agricultural policies of the main parties? Equally, if the likes of Reform or the Lib-dems hold some sort of coalition sway, then should farmers be examining their ag-manifestos too?

Ag-policy is essentially a three-legged stool which dictates support, trade protection and regulation. If just one of these doesn't sit comfortably then things get wobbly. If the cost of the regulatory burden on agriculture is out of kilter with trade protection or the level of support, then UK agriculture will be uncompetitive on the world stage. So the question for the main parties is, how to approach these three areas?

This takes us back to the 1930s where government policy did influence the fortunes of farming and led to imports of cheap foreign produce. So I'll leave you with this cartoon from 1933 where the Minister of Agriculture enrages his farmer constituent by saying rather than protecting farmers from cheap imports, he's going to protect them from themselves. 100 years later, will history repeat itself?

YOUR CORRESPONDENT

Guy Smith grows 500ha of combinable crops on the north east Essex coast, namely St. Osyth Marsh – officially the driest spot in the British Isles. Despite spurious claims from others that their farms are actually drier, he points out that his farm is in the Guinness Book of Records, whereas others aren't. End of. @essexpeasant

Tried, tested and still performing

As the latest Recommended List prepares to launch and excitement builds about the latest newcomers, breeders say there's still merit in some of the older, 'tried and tested' varieties. *CPM* finds out more.

By Charlotte Cunningham

Each year the launch of the latest Recommended List brings a flurry of excitement – new names dominate the headlines promising higher yields, stronger disease packages and improved agronomics. And while there's no denying the innovation pipeline is impressive, it's easy to overlook the quiet resilience of those slightly older, tried and tested varieties still doing a solid job on farm.

The appeal of new varieties is obvious. Breeders invest heavily in genetics that push the boundaries of what's possible, whether that's squeezing out another percent of yield or delivering more robust resistance to septoria. But, a shiny new tool isn't necessarily the best – nor the only – tool for the job.

Established varieties, by contrast, have weathered multiple seasons in the field; their strengths and weaknesses are well understood by both growers and agronomists. This real-world data is invaluable and a variety's performance under commercial conditions, across variable soils and in unpredictable weather, can often only be properly judged after several years.

It's this reliability that explains why many farmers keep stalwarts in their rotations, says KWS' Olivia Bacon. "Take, for example, Group 4 wheats that continue to underpin feed markets, or malting barleys with proven acceptance from end users. For those marketing into contracts, continuity of supply and known quality parameters often outweigh the allure of a marginally higher yield from a newcomer."

Equally, in a season where input costs are high and risk appetite is low, a variety with a track record of resilience can feel like the safer bet. "Tried and tested disease scores, known standing power, and consistent harvest quality bring peace of mind," she adds.

BALANCED DECISIONS

None of this diminishes the importance of new varieties, of course. Progress depends on adoption and many of the genetics now moving through the system are a step-change in their ability to withstand climatic and market pressures. The trick is not to view variety choice as a binary old versus new decision, but rather as a balanced portfolio, believes Olivia. "Promising newcomers can sit alongside established performers, giving growers the best of both worlds."

For KWS, KWS Extase and KWS Dawsum continue to demonstrate their relevance, even as newer genetics – including from their own stable – arrive.

When Extase joined the Group 2 sector six years ago, it set a new benchmark for what growers could expect from a milling wheat, highlights Olivia.

"It offered something very different

Tried and tested
The proven reliability of tried and tested varieties is why many farmers keep stalwarts in their rotations, says KWS' Olivia Bacon.

Still awesome Dawsum?
Despite being a slightly older variety, KWS Dawsum is still proving to be a grower favourite.

when it was first introduced – a high-yielding, quality wheat with outstanding septoria resistance and the strongest untreated performance on the RL at that time," she explains.

"Since then, it's proven itself across a wide range of conditions. It's come through wet springs, dry summers and harsh winters without losing its consistency, which is why it still holds its place on farm today despite strong competition from newer Group 2s."

That dependability has made Extase a safe option for many businesses, particularly where spray timings or rotations are under pressure, she believes. "Its combination of robust agronomics and marketable quality ensures it remains a versatile choice, even as other varieties edge forward on yield or protein."

In the Group 4 hard sector, KWS Dawsum has carved out a similar role. Bred to perform across a range of drilling dates, soils and regions, it's quickly established itself as one of the most widely grown feed wheats.

"Dawsum is very much the classic barn-filler," says Olivia. "It combines high yields with strong disease resistance and a grain package that makes it suitable across the feed market.

"Agronomically, it's straightforward to manage, thanks to its shorter straw, good tillering and excellent standing power, and with a specific weight close to 80kg/hl, it gives growers a level of harvest security that's invaluable in challenging seasons."

Olivia is quick to point out that while Extase and Dawsum continue to prove their worth, they aren't in competition with the next generation of wheats, but instead, provide balance.

"With margins under pressure, growers want genetics they can trust season after season," she says. "That's what makes varieties like Extase and Dawsum so important. At the same time, new introductions such as KWS Scope bring fresh opportunities – Scope delivers exceptional yield while Dawsum gives reassurance and resilience. Together, they allow growers to spread risk without compromising on performance."

While they both still boast many benefits, the recent breakdown in yellow rust resistance must be noted. Like many other varieties on the current RL, Dawsum's yellow rust resistance score has been reduced for 2026/27 following the emergence of a new strain of the disease earlier this year. But Olivia says this doesn't appear to have harmed growers' interest in the variety.

"Extase remains at 7 for yellow rust but Dawsum has had its score reduced. It now has a 5, but this is pretty much the average yellow rust score for a Group 4 variety.

"Yellow rust is still a relatively easy disease to control cost-effectively at T0 and growers are factoring this into their agronomy programmes for 2026. If you want a reliable, high yielding barn-filler, we still believe Dawsum is the variety to beat and I think growers feel the same way."

CONSISTENCY WITH SKYFALL

Another variety continuing to command hectarage is Skyfall from RAGT. Although Skyfall first appeared almost a decade ago, it continues to carve out a strong position in Group 1, says RAGT's Andrew Creasy.

"Group 1 tends to move slower than other categories, and Skyfall really hit the ground running. It combined yield with solid standing ability and, crucially, end users liked it from the start. That consistency is what's cemented its place – you plant it and you know what you're going to get."

Perhaps one of Skyfall's continually strongest assets is its sowing flexibility. "It has a massive drilling window," explains Andrew. "There's nothing wrong with putting it in during September, but equally you can take it right through the season – officially up to the end of February, but some growers have successfully pushed beyond that.

"Its low vernalisation requirement means it will still produce an ear. That makes it an insurance policy – the variety you know will get you out of a muddle if things don't go quite to plan."

Skyfall stays strong
Although Skyfall first appeared almost a decade ago, it continues to carve out a strong position in Group 1.

The variety's robust agronomics underpin this flexibility, with septoria resistance remaining relatively solid, while mildew resistance is also strong. Yellow rust ratings have slipped back, but Andrew stresses this is manageable.

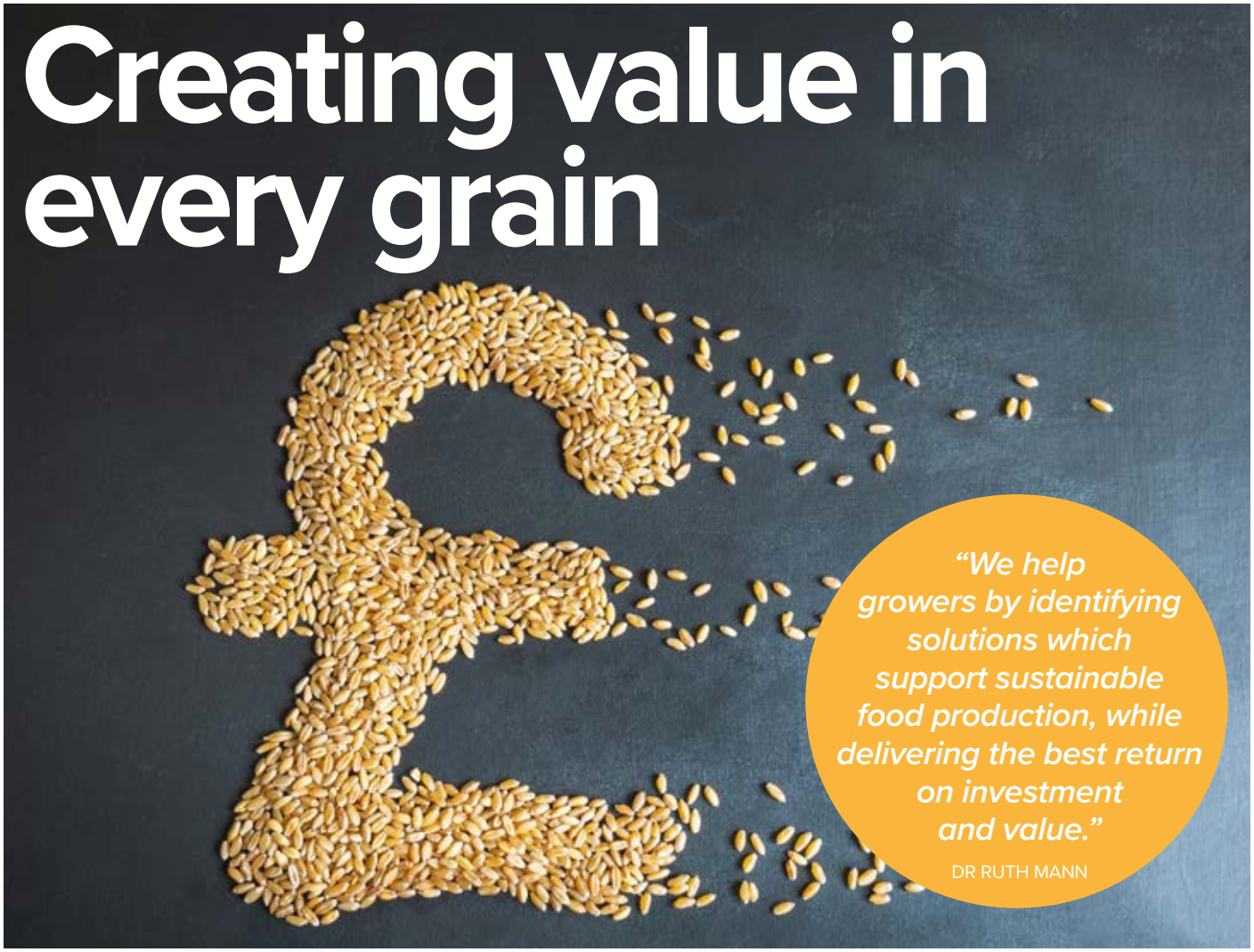
"It requires watching, particularly early on, but growers know what's coming with Skyfall. You can manage it with well-timed sprays at T0, and while later drilling can sometimes increase susceptibility, being proactive keeps it under control.

"The reality is, a lot of varieties that were considered 'safe bets' have shown weaknesses recently – with Skyfall, you know the rules of the game."

The variety's slightly earlier maturity is another bonus. "It's not the earliest on the list, but it does come in ahead of the pack which suits many growers. On lighter soils, being an OWBM-resistant variety is also a plus. And while a significant area is grown for feed, the end product continues to appeal to millers – there's still nothing quite like it in Group 1," he suggests.

That's not to say RAGT isn't pushing forward with innovation. "Of course, we're always looking at what's next," notes Andrew. "But Skyfall keeps us in touch with the end-user market; it complements the pipeline rather than competing with it. New genetics are important, but having a variety that people trust provides a foundation. Skyfall has bucked the trend of older varieties tailing off because it still ticks so many boxes." ●

Creating value in every grain



"We help growers by identifying solutions which support sustainable food production, while delivering the best return on investment and value."

DR RUTH MANN

Delivering for the triple bottom line – financial, social and environmental performance – is becoming increasingly important for farming businesses when success no longer equates to just yield. *CPM* looks at the concept of value, and what one agronomy company is doing to help growers achieve it.

By Charlotte Cunningham

While during the agricultural 'glory days' of yesteryear, yield was very much king, operating in today's highly volatile environment means there's been a gradual shift among UK farming businesses.

In being subjected to unpredictable externalities – whether that's in weather conditions, geopolitical-driven input prices, stop-start government support mechanisms or overall market demands – there's a general sense that success has to depend on much more than a harvest headline.

Dr Ruth Mann, head of R&D at Agrii, says while in some instances yield remains the primary goal, this isn't always the right approach. "Instead, our view is to focus on triple bottom line delivery – where success is measured according to a business' financial, social, and environmental performance.

"This acknowledges the concept of value rather than cost for all, whether that's the farmer, their customers or the wider public," she explains.

However, when it comes to financial performance, to operate at even a basic level, a farm business must be profitable. Consultant Paul Pickford believes this can only be truly understood when utilising gross margins. "Simply put, any business requires a budget, especially a farming enterprise which is complex and at the mercy of many externalities.

"In calculating a budget based on gross margins, growers can begin to grasp a level of control," he stresses.

Paul explains that gross margins mean the profitability of different crops or

Supporting all

Agrii's Dr Ruth Mann says trials are no longer a simple 'A versus B' – there are a breadth of desired end goals across many individual farms, which R&D now has to try and address.

livestock enterprises can be compared, stripped of overhead or fixed costs. This information can then be used after harvest to provide an accurate assessment of crop performance, and inform future planning.

"While there are still businesses that don't prepare gross margins each year, more are. With increasing pressure on farm finance and resources, the importance of understanding the quantum of variable costs for a growing season can't be emphasised enough.

"A budget won't change the weather or the value of grain, instead, it enables adjustments to be made to keep a business moving in the right direction, when factors beyond their control change."

The starting point is knowing what the end goal is, suggests Paul. "If you don't have this, it's impossible to predict what inputs are required and subsequently, the financial investment that'll warrant.

"This is intrinsically linked to understanding what your farm can achieve – including average yields – and critically, being realistic."

As well as providing guidance and advice regarding calculating gross margins (see box), a lot of Agrii's work begins before products or technologies even land on farm. Ruth estimates that hundreds of products are screened in the company's trials each year across various crops, programmes and sectors.

Furthermore, all of these trials are analysed for margin over input against the baseline of current on-farm prices, to ensure the subsequent advice offered by agronomists is relevant.

She agrees that it's critical to have a strategy in mind ahead of each season. "For example, the goal could be achieving milling wheat quality and the associated bonus; so how do you achieve that? It means selecting the most appropriate variety, being aware of disease risk, creating a robust fungicide programme and nutrition plan.

"Equally, the aim could be to reduce synthetic input use by migrating over to a more biological-based approach. This will require a different plan of action and the triple bottom line result won't necessarily be the same."

Ruth adds that trials are no longer a simple 'A versus B' – there are a breadth of desired end goals across many individual farms, which R&D now has to try and address. "This is why Agrii oversees 400 replicated trials per year, 100 unreplicated demo trials, 16 iFarms, six technology centres and four Digital Technology Farms.

"Testing novel product introductions in viable 'real-life' programmes enables us to identify their strengths and weaknesses across different environments, soil types and geographies. This keeps our agronomists on the technical front foot to get the best out of any crop."

According to Ruth, a key aspect of R&D is trying to predict how the future farmer might have to manage their individual business in light of chemical losses, technology gains, erratic weather patterns and more. "We de-risk the process to help growers make that transition by identifying solutions which support sustainable food production, while delivering the best return on investment and value."

Agrii's sustainability and environmental services manager, Amy Hardwick, points out that there are three pillars to the notion of sustainability – economic, environmental and social. She says in light of current challenges in the sector, it's highlighted those businesses which haven't paid enough attention to being efficient and making more from less.

"If you take nitrogen use efficiency and being adaptive to current conditions – in understanding what a crop requires and how it's being used, growers can be more efficient

Making the numbers count

Having a business budget is the foundation of all investment decisions, and it starts with gross margins per crop

Start small, but make a start, is the message from consultant, Paul Pickford. "It's getting in the mindset of proactively managing the business rather than the other way around.

"Start with calculating gross margins per crop, building up to the whole farm gross margin. Then, once confident, the goal is to devise a five-year business plan," he explains.

There are many sources of information that farmers can draw upon to produce gross margins for their businesses, but being able to refer to specific data from actual performance is the most accurate, adds Paul.

Additionally, Agrii has produced a comprehensive set of gross margin data since the late 1990s. It also has a low-cost service run by its business consultancy and agronomy teams, which produces arable crop gross margins with reference to detailed benchmark data.

Levelling up to a whole farm gross margin, this involves combining individual enterprise gross margins, including environmental scheme options. "This provides a function of the farm's rotation and Agrii has developed a tool which enables whole farm gross margins to be calculated quickly," says Paul.

He says this helps growers to understand the effect of cropping changes on the amount of investment in variable costs required, reducing the likelihood of unexpected cashflow shortfalls.

Taking control
Consultant Paul Pickford wants growers to get in the mindset of proactively managing their business, rather than the other way around.

"Once a whole farm gross margin has been prepared, the effect of changes to input costs, yield and crop value can be tested individually, or in combination, showing the resulting impact on output, variable costs and gross margin."

With the tools and support from Agrii, Paul believes it should be possible to bridge the gap between those who are already calculating gross margins, and those who don't. "Growers may require a little help in getting things underway, but suddenly it'll come together and they'll get a grasp of what they're trying to achieve."

What sustainability means

In many instances, economic and environmental sustainability are intrinsically linked, points out Agrii's Amy Hardwick.

or targeted in fertiliser applications.

"Not only does that have an impact on yield, but it also affects margin, and beyond this, the carbon footprint of a crop and its interaction with the environment," she says. "This demonstrates how in many instances, economic and environmental sustainability are intrinsically linked."

Amy highlights that her role essentially addresses two objectives: helping farmers to diversify their income, and, ensuring they're being paid for existing activities or minor tweaks to farming practices.

The former could mean engaging with biodiversity net gain, she suggests. "In taking unproductive land or areas not fit for conventional farming, we can start to explore other options for income.

"For example, Agrii is currently working with Biogains on a scheme which offers farmers a rental payment for such unproductive areas, where they'll manage the land with a nature-focus on behalf of the grower. This is ideal for those who are looking for a hands-off approach," explains Amy.

As for being paid for making adjustments to existing farming activities, she says Agrii is working with Bunge (formerly Viterra) and Whitworth Bros Flour Millers on its Sustainable Grain Programme. "The purpose of this is to reward farmers for reducing their environmental impact and therefore assisting supply chain companies to reduce their Scope-3 emissions. This could involve on-farm tactics such as using nitrification inhibitors, cover cropping or direct drilling.

"Because sustainability varies greatly across different farms, the programme isn't too prescriptive and has a tiered approach."

Looking outside the box even further, Ruth believes future farming systems will have to target alternative value concepts, as market demands shift. "In this case, R&D will have to look at new traits such as the quality credentials of grain rather than its quantity, for nutritional gains.

"This will involve identifying the products and technologies to help growers to achieve that goal. In finding new ways of creating value in a crop and increasing its worth, we have the potential to increase its margin. That's the future," she concludes.

Farm level results

Trial results provide hard evidence for what inputs and technologies can deliver

Aligning with the full picture of future crop production requirements underpins Agrii's R&D drive, and evaluating the benefit of products and practices for growers at farm level remains a key priority, says Dr Ruth Mann.

"We're all focused on long-term sustainability, but for farmers to really buy in to new technology they have to understand the financial implications of the choices they make in the short-term, particularly when there's so much pressure on costs.

"It's exacerbated by low commodity prices, so wherever we can we'll carry out a cost benefit analysis of our recommendations and R&D findings."

Recent Agrii trials during the past two growing seasons have shown the benefits of integrating the use of drone technology (Skippy Scout), robotics, RHIZA soil mapping, satellite imagery and disease prediction tools to deliver on the triple bottom line, she continues.

"Trials completed by Agrii's technology trials manager, Jonathan Trotter, for example, proactively managed the fungicide and fertiliser inputs using this integrated approach to technology.

"Representative results showed increases in yield of up to 16%, reduced CO2 equivalent emissions by up to 46%, reduced nitrogen input costs by up to 15%, and increased Nitrogen Use Efficiency by 12%.

"Even though at some of these sites the input costs were up to 7% higher, which included a combination of biosolutions and the adoption of technology itself, they also achieved an increased gross margin of up to 26% compared with the farm standard approaches.

"These results, therefore, indicate that the use of precision technologies in combination with Agrii's agronomic knowledge, can improve sustainability, enhance farm business resilience and drive productivity at scale."

Evidence for impact

With heavily marketed products and technologies regularly entering the agricultural sphere, often with bold accompanying promises, UK farmers have much to consider when it comes to selecting the tools to power-up their production systems.

Through an R&D-supported approach, Agrii aims to de-risk this selection process by providing hard evidence for what these introductions can deliver within real-life farming environments – and critically, whether the numbers stack up.

As such, this series of articles kindly sponsored by Agrii, will explore themes such as the importance of calculating gross margins, new supply chain initiatives, approaches to carbon foot-printing and how to best use new technologies.

***CPM* would like to thank Agrii for providing expert insight into these topics, and for the privileged access to the individuals involved.**

"During the past five years there's been an increase in European corn borer reports, including sightings in our own maize trials."

TIM RICHMOND

Boring into yields

A migratory pest appears to have capitalised on this summer's prolonged arid conditions, attacking maize crops and leaving tunnels of destruction. *CPM* investigates the rise of the European corn borer.

By Janine Adamson

Given increased sightings in UK maize crops this summer, the European corn borer – *Ostrinia nubilalis* – seems to be having a rather good year.

While it might not be the first pest that springs to mind when it comes to maize, its growing presence could be an early warning sign for what's on the horizon, suggests Limagrain's Tim Richmond.

He first heard of the pest around 10 years ago and admits given it was a specific, isolated case, he dismissed it at the time. "But during the past five years there's been an increase in ECB reports, including sightings in our own maize trials in 2022.

"This year, it appears to have spread further, even reaching the West Midlands and Lincolnshire. As with all moths, including beet moth, this is likely to be related to the weather – prolonged warm, dry temperatures enabling more generations and providing better flight conditions," explains Tim.

When assessing Limagrain varietal trials this year, where affected, around one in 20 plants have been infected with ECB, he adds. "So it's not at a level that we'd class as an economic problem yet, but if populations continue to increase as they have been doing it could be far more significant in 5-10 years," he suggests.

POLYPHAGOUS PEST

Looking in more detail, ECB is widespread across Europe, North Africa and North America. It's polyphagous, primarily of grasses, but also attacks a range of crops such as apples, strawberries, peppers, maize and sweetcorn.

ECB was first spotted in the UK feeding on mugwort in the 1930s, but it wasn't until 2010 that a grower in south west England contacted authorities regarding caterpillars boring into maize stems. The species was later confirmed as ECB.

As a mostly migratory insect, the adults appear in Europe in June, laying eggs on the underside of leaves. Once hatched, larvae feed on the leaves, and in the case of maize, bore into the upper part of the plant. Following this, second generation larvae tunnel into stem internodes before pupating in situ, or in the soil.

A growing problem
When assessing Limagrain varietal trials this year, Tim Richmond says where affected, around one in 20 plants have been infected with ECB.

High impact destruction

An ECB infestation in maize can reduce yield with fewer kernels per ear, increase harvest time due to lodging, and affect quality due to disease and mycotoxin contamination. *Photos: Tim Richmond.*

An infestation in maize in particular can reduce yield with fewer kernels per ear, increase harvest time due to lodging, and affect quality due to disease and mycotoxin contamination. Studies indicate that just one ECB per maize plant can reduce yield by 3-5%.

"If maize is being grown for grain it's a particular problem," states Tim. "Not only is there a yield loss, but there's also the visual impact too. In a forage scenario, it's more apparent as crops mature as this is when ECB bores into the stem, preventing the translocation of water and nutrients and creating weakness," he explains.

Maize Growers Association's Jon Myhill adds that he's seen ECB larvae exit just below the cob or even through it, causing unpredictable lodging that can resemble wildlife damage. "Insect excrement on the stem is often the first visible sign. With two generations per year and larvae pupating inside the stem, control is challenging."

Research suggests that ECB is active from 10°C onwards, which coincides with the recommended temperature for UK maize planting. Tim points out that this means in theory, the threat to maize is all season long.

While the pest is primarily migratory, risk level increases because it can also overwinter for up to three months, even in temperatures as low as -20°C, explains Koppert UK's Dr Richard Binks. "There appears to be a geographical hot-spot developing across the Isle of Wight and southern England.

"ECB might not be perceived as a huge issue in the UK at the moment, but with a reducing armoury of insecticides, we believe there's a growing demand for alternative control solutions," he says.

To complicate matters further, there are two races of ECB – the 'E' race which feeds on *Artemisia* species (mugwort, sagebrush), and the 'Z' race that preferentially feeds on *Zea mays* (maize, corn). Both are identical in appearance, but the female moths produce different ratios of pheromones.

According to the Defra website, there's no information currently available on the distribution of the different races within the UK.

So where do growers start in mitigating the risk of ECB? Because of its capacity to overwinter, one method could be to destroy maize stubble/residues and therefore remove ECB's host. However, Tim points out that because the pest tends to congregate in densely populated areas such as hedgerows and field margins, this won't necessarily eradicate the issue completely.

Then, sites which are most at risk are those which grow continuous maize. According to Jon, cultural practices such as 25cm ploughing and a one-in-three-year maize rotation are key to breaking the cycle, he advises.

There's also FMC's Coragen (chlorantraniliprole) – an insecticide which has a label recommendation for ECB in forage and grain maize, and sweetcorn.

However, biological products could prove a more sustainable solution long-term, comments Richard. "There are two potential concepts which are well established on the Continent; the UK is essentially playing catch up.

"The first is using a parasitic wasp of the *Trichogramma* species – which parasitises the moth's eggs. Application tends to be via drone which can release capsules containing *Trichogramma* eggs into the crop," he explains.

The second solution could be to apply entomopathogenic nematodes, continues Richard. "This is already being explored in UK vegetable crops to help combat wireworm pressure. We're looking to trial this in maize and sweetcorn as soon as next year, also utilising drone application but spraying a nematode-loaded solution.

"Both of these biological approaches are at the proof of concept stage of development in the UK. To realise their potential, we require growers to consider their value versus a more traditional solution, for example, using an insecticide."

MONITORING

As for knowing when ECB pressure is a problem, the starting point is to monitor. How this is achieved depends on the race of ECB (E or Z), points out Richard. "This has an impact on which pheromones are used to attract the pest.

"In terms of the trap itself, you can use a Deltatrap with a species-specific pheromone. You could also use a large Core trap, which is essentially a wire mesh cage hung from a tripod stand."

When considering the early symptoms to look out for, this involves inspecting maize crops for horizontal rows of holes in young leaves, caused by larval feeding. Later indications include waste and holes

> ***"There are two potential control concepts which are well established on the Continent; the UK is essentially playing catch up."***

Alternative control

ECB might not be perceived as a huge issue in the UK currently, but with a reducing insecticide armoury, Koppert's Dr Richard Binks believes there's a demand for alternative solutions.

which should be visible on stems, or on the apical part of maize ears.

Physically speaking, adult ECB moths are around 22-32mm in size, while the eggs are flattish around 1mm in diameter, and are laid in a mass which overlaps similar to roof tiles. Larvae are up to 25mm long with a pale body and dark spots; the head is brownish black (see main picture).

From a breeder's perspective, Tim says as the pest isn't currently economically damaging, it's unlikely pipeline maize varieties will be selected with traits to specifically overcome ECB feeding damage. "Although we do have to better recognise the symptoms when screening varietal trials.

"In the past, brackling may have been recorded in plots but it could have actually been ECB. I know this is something that our trial partners will be paying closer attention to in the future."

Perhaps interestingly, Tim highlights that when accessing Defra's UK Risk Register for *Ostrinia nubilalis*, the pest is considered low risk and as of July 2020, information associated with it was no longer being actively maintained.

It states that this will only be updated if new information is received that indicates the potential for a significant increase in risk to the UK. "Limagrain will be contacting Defra regarding our increased sightings and recommend that if anyone else has experienced a problem with the pest this season, that they do so too, or speak to their local APHA plant health and seeds inspector," concludes Tim. ●

Problem solving

The drone-delivered under-sowing occurred due to rapid crop growth in spring, making it difficult to broadcast or drill the grass seed before the maize was too large.

Taking to the skies for Carlisle maize

Using a drone to under-sow grass into a standing maize crop was showcased at the Hutchinsons Maize Regional Technology Centre open day

Hosted by the Fisher family at Smalmstown Farm near Carlisle, the aim of the day was to help farmers maximise the output of maize grown under film and in open ground, including demos of more than 20 varieties, placement fertilisers, and this year, a novel way of aerially establishing grass within maize.

Hutchinsons agronomist, Jim Clark, says the drone-delivered under-sowing occurred due to rapid crop growth seen earlier this spring, making it difficult to broadcast or drill the grass seed before the maize plants were too large.

"Drilling seed conventionally would generally still yield the best results, but we've been impressed with how well the drone has done," he adds.

Two 1.5ha plots were under-sown by agricultural drone contractor SAS Land Services after herbicides had been applied at the beginning of June, with one at 15kg/ha of grass seed and another at 20kg/ha. A 75% Westerwold, 25% Italian ryegrass mix was in both cases.

"The whole process was easy as we could export digital maps of the areas to be sown directly from Omnia to the drone operator, allowing them to create a flight plan.

"We found the downdraft from the drone's propellors helped to blow the seed straight onto the floor. Seed was then reliant on having sufficient moisture to germinate, which fortunately we had, and the cover it then established was more than good enough."

Finding ways to establish cover within maize, even when ground or crop conditions are more challenging, is becoming increasingly important given grazing requirements, the widespread adoption of stewardship schemes, plus new greening requirements for overwinter cover in Scotland, he adds.

Next year, Jim hopes to take the drone trials a step further by using the technology to apply nutrition. "We want to see if this could be an effective back-up plan for applying vital nutrition in seasons when you can't get onto the field with a tractor," he concludes.

Stacking the system: the technical case for mixed farming

As pressures mount on arable businesses to improve resilience, reduce costs and integrate environmental outcomes, mixed farming systems are seeing renewed interest. *CPM* speaks to one Staffordshire farmer balancing beef and combinable crops in a technically integrated system designed to strengthen margins, enhance soil health and deliver environmental services.

By Charlotte Cunningham

In the years after the Second World War, British agriculture was pushed towards specialisation. Arable farms became larger, more focused on combinables, and livestock often disappeared from rotations. Although efficiency improved, many farms lost the benefits that integration had once provided – nutrient cycling, soil fertility, labour continuity and resilience.

Today, with fertiliser and feed costs volatile, grain prices fluctuating, and the Sustainable Farming Incentive among the schemes rewarding practices that enhance soils and biodiversity, the pendulum is swinging back. Mixed farming is being rediscovered as a tool not just for tradition's sake, but for margin protection and future-proofing.

That's how Staffordshire grower Rob Atkin views it. Farm manager of 485ha at Field Hall Farm in Uttoxeter, he's built a system where crops and cattle are inseparable – each designed to support the other.

"It's not about maximising one thing in isolation," he says. "It's about how everything links together. Crops feed cattle, cattle provide muck for the crops, sheep graze stubbles and add fertility. It's a cycle that makes sense, especially now."

BALANCING ACT

At the core of Field Hall is a rotation that serves both the market and the livestock. Roughly 385ha are cropped, with the balance in grassland and margins.

The rotation includes wheat, barley, oats, oilseed rape, beans and maize.

"Feed wheat goes to local mills in Cheshire and Shropshire," explains Rob. "OSR heads north to Manchester or to Moy Park at Ashbourne for chicken rations. Barley – about 32ha of winter barley – is all for our cattle.

"Spring barley is usually around 80ha

A circular system
Rob Atkin, farm manager at Field Hall Farm in Uttoxeter, has built a system where crops and cattle are inseparable – each designed to support the other.

with 50% sold through Openfield, while the other half is kept for feed; oats follow the same pattern. The beans are one of our main protein sources, although we've cut back a bit in favour of maize which we reintroduced recently."

That flexibility matters, he points out. Beans are high in protein but variable in yield while maize provides reliable energy and fits well in the cattle ration. By adjusting crop areas annually, Rob keeps the ration balanced while also spreading arable risk.

"Technically, the only thing we're buying in to feed the cattle is a manufactured blend for calves," he says. "Everything else – protein, straw, cereals – is homegrown."

That choice isn't just a financial decision – by feeding his own crops, Rob creates a market for them regardless of world prices. And in return, the cattle generate manure that replaces a significant share of synthetic fertiliser.

Delving deeper into the arable enterprise and wheat is the backbone of the rotation. Yields average 8-9t/ha, realistic for the farm's medium loam soils, notes Rob. Fertiliser is applied accordingly: 200kgN/ha on first wheats, 185-190kgN/ha on seconds, with sulphur included based on tissue test results. "There's no point pushing more N – the land won't return it," he adds.

Variety selection is shaped by agronomy as much as market demand. "My top three asks are disease scores, yield, and spring and autumn vigour," he explains. "That's why we're growing Beowulf, Rebellion, Oxford and Bamford. They're clean and competitive, which helps us to keep fungicide and herbicide costs sensible."

OSR retains a place, although only after early-harvested barley, highlights Rob. "It all comes down to the drilling window. We'll subsoil deeper ahead of OSR to relieve compaction and give rooting depth."

Spring barley remains a key lever in the rotation, both for spreading workload and as a blackgrass suppression tool. "We can follow barley with stubble turnips for sheep, then go into maize or spring wheat. It keeps soils active and gives us flexibility."

Looking at how these crops are established, and the system has evolved over time to tie in with Rob's desire to move to a more sustainable system which has less impact on the farm's soils. "In a normal year we'd be min-till," he explains. "Shallow discs after the combine, straw removed, then low-disturbance subsoiling where required. We'll let it green up and spray off before drilling."

Beef benefits

Rob buys in both calves (4-6 weeks old) and weanlings (4-6 months old), aiming to finish around 100 cattle a year.

But the past two wet autumns forced a shift. "We've had to plough and combi-drill. It's not my preference, but it's the only way we could get crops established."

Uneven tramlines also mean some fields require pressing before drilling. "Where land is level we can go straight in, but where it's ridged or compacted, we'll run a press first."

WEED MANAGEMENT

Weed-wise, blackgrass is the dominant challenge. "Our biggest spend is herbicides," admits Rob. "We'll stack pre-ems – flufenacet, diflufenican, sometimes prosulfocarb – and support the programme with cultural controls. We drill slightly earlier at higher seed rates to smother it. If we drill too late, we end up with thin crops and weeds taking over."

Fungicide spend is managed carefully. "Normally we'll apply at T1 and T2, sometimes with a T0 or T1.5. This year we put on a low rate of tebuconazole early for yellow rust after the YR15 breakdown. I try to make the T2 or T2.5 carry the weight, covering both flag leaf and ear."

The livestock side brings the rotation full circle. Rob buys in both calves (4-6 weeks old) and weanlings (4-6 months old), aiming to finish around 100 cattle a year. In winter, sheds hold 330-350 head of cattle kept on straw beds. Finished cattle leave the farm between 20-24 months, targeting consistent supply rather than chasing maximum growth rates.

Rations are formulated with a strong emphasis on homegrown cereals and forages. A typical winter TMR includes maize silage, grass silage, rolled barley, homegrown beans, plus a Dugdale starter blend for calves up to three months old.

"We're aiming for 1.2-1.4kg liveweight gain per day," explains Rob. "Maize has been a game-changer because it ▶

Soil saviours

The benefits of the cattle flow back to the arable land, with the FYM from the cattle sheds supplying valuable nutrients, which across the rotation offsets significant bought-in fertiliser and builds soil organic matter.

Price protection

Having beef in the rotation to utilise the crops in their diets can help protect the arable enterprise from the volatility of fluctuating market prices.

stabilises the ration. When grass growth stops, performance would drop away – but maize keeps energy levels up."

By keeping rations largely homegrown, Rob shields the business from volatile feed markets. In a year when soymeal or purchased proteins spike in price, his system still ticks over.

Financially, the cattle provide a safety net too. "When prices aren't attractive on the grain market, we can get more return by selling the barley through cattle. Barley might be £130/t, while beef is still £6.40/kg. Walking it off the farm on four legs often makes more sense."

And the benefits flow back to the arable land. FYM from the cattle sheds supplies valuable nutrients, and across the rotation, that offsets significant bought-in fertiliser and builds soil organic matter.

"It helps with P and K values and puts organic matter back in. We can trim fertiliser bills and improve structure at the same time," says Rob. "It's one of the biggest advantages of keeping livestock."

Sheep provide another link in the chain as each winter Rob's father-in-law brings around 500 store lambs onto the farm to graze stubble turnips.

Turnips are established after winter barley on ground destined for spring cropping, he explains. "We'll drill them in late July or August, graze through the winter, then go into maize or spring barley the following April. It keeps the ground covered, generates an income from the sheep, and we're getting a payment from the water company because soils aren't left bare."

The grazing itself delivers benefits too. "Sheep recycle nutrients directly back into the field, trampling cover into the soil and contributing organic matter. Soil surface compaction is managed by adjusting stocking density and moving grazing blocks regularly, ensuring spring crops can be drilled straight in."

INCOME STREAMS

Financially, the system is comparable to growing a wheat crop, once lamb rent and scheme payments are factored in. "By the time you stack the rent from the stubble turnips and the water company payment, it makes up for the shortfall you'd get compared with winter wheat. And, the soil is in better shape for the spring crop that follows."

Alongside cropping and livestock, Field Hall is structured to deliver environmental outcomes, with payments where possible.

Grassland is now managed under a low-input SFI option, reducing fertiliser spend while still supporting the beef herd. Herbal leys with diverse rooting depths improve soil infiltration and provide resilient grazing in dry spells. Then, cover crops are chosen for rooting depth and nutrient capture – often a mix of radish, vetch and cereals – to prevent leaching and build soil organic matter.

Structural measures are also in place, with 6m margins to buffer field edges, contour cropping to reduce runoff on slopes, and bunds used to slow water and trap sediment before it leaves fields.

"These things aren't just ticking boxes," suggests Rob. "They give us payments but also mean healthier soils, less erosion and better infiltration. It all feeds back."

Exporting straw – around 60% of production – complements this by reducing slug pressure and removing grassweed seed from the system. "We sell to local dairies and keep the rest for bedding," says Rob. "It helps to break pest and weed cycles."

The mixed farming approach also underpins labour management. "We have three lads here, one of them a student; cattle give them work in winter so they're not going off elsewhere. It means I have a regular workforce who know the system, rather than retraining every year," says Rob.

That continuity pays off at busy times. A trained team familiar with both arable and livestock tasks can be redeployed seasonally – drilling in autumn, calving and feeding in winter, silage and spraying in summer. "It makes us more flexible and efficient."

Having the cattle mean all the farm infrastructure is used efficiently too, he believes. "Older sheds not suited for grain storage or conversion to industrial units are instead used for cattle housing. They're dry, warm and ventilated, which is all we require."

For anyone considering moving to a mixed farming approach, Rob's advice is to start by taking stock of what you have – no pun intended... "If you have grassland, sheds, straw, and staff with winter capacity, livestock could make sense. But it's not for everyone.

"You have to think about your market, your transport, your costs. The main thing is making sure each enterprise complements the others, rather than competing."

At Field Hall, nothing stands alone. Grain feeds cattle; cattle produce muck; muck feeds crops; sheep graze turnips; turnips cover the soil; and each link strengthens the next.

"There are a lot of little scenarios that make the system add up," reflects Rob. "When grain prices are poor, beef can carry us. When beef margins are tight, arable sales keep cashflow moving. We have resilience, soil health benefits, and staff continuity. That's the advantage."

In an era where farmers are being asked to produce food, improve soils and protect biodiversity all at once, Rob proves that mixed farming isn't about looking back. It's about closing the loop – and securing the future. ●

BVLOS and beyond – a new frontier for drones

Thanks to new legislation allowing drones to fly further than ever before, De Sangosse and AutoSpray Systems have brought spraying into the field with UK-first pod sealant trials. *CPM* finds out more.

By Charlotte Cunningham

Agriculture has never been short of innovation, but few technologies have stirred as much debate – and disappointment – as drones. A decade ago they were hailed as the next frontier, promising precision spraying, rapid scouting, and targeted inputs. Yet regulations, reliability and the practicalities of covering large fields saw them quietly parked at the field gate.

Now, with the Civil Aviation Authority's first permissions for BVLOS (beyond visual line of sight) operations in low-level rural airspace, drones may finally be poised to earn their place alongside tractors and sprayers in the UK arable system.

PIONEERS

At the forefront of the recent developments is AutoSpray Systems which became the first UK company to gain CAA permission for BVLOS operations in agriculture earlier this summer. But behind the scenes, SEAD Artists – a consortium of drone and data specialists including Autospray Systems, Skypointe, the University of Liverpool and DronePrep – has been instrumental in helping establish the regulatory framework for BVLOS operations, ensuring that drones can fly safely beyond the 500m line-of-sight limit.

"The point is to make the machine do the work so people don't have to," explains Andy Sproson of AutoSpray Systems. "That means flying further, safely – and doing it to a professional spraying standard."

So why exactly is BVLOS so important? Andy explains that conventional drone rules limit operators to 500m from the pilot, creating an invisible box that's quickly impractical in real farmland. Fields roll, woods interrupt sightlines, and in upland or restoration projects the terrain makes line-of-sight impossible. "However, BVLOS changes the picture, extending the operational envelope to entire landscapes provided they're pre-approved and risk-managed."

To secure permission, SEAD Artists worked with regulators to address both ground risk and air risk. Ground risk was relatively straightforward: ▶

Game-changing legislation

AutoSpray Systems' Andy Sproson says BVLOS changes the picture, extending a drone's operational envelope to entire landscapes – provided they're pre-approved and risk-managed.

▶ most agricultural sites are low population and low infrastructure. Air risk required more innovation, he explains.

"Drones are fitted with electronic conspicuity beacons so other air users can detect them, while ground units build a local air picture of nearby aircraft, alerting pilots to potential conflicts. Combined with data-declared environments – essentially dossiers proving that drones flying at 3m above a crop are unlikely to encounter other aircraft – the case was made."

The CAA granted the first approvals in 2023 following trials funded by Defra's Farming Innovation Programme. Each site still requires location-specific authorisation, but once approved, repeat operations are possible by issuing notice to airmen (NOTAMs) – a notification service to make airspace users aware of temperature changes to airspace. This makes BVLOS particularly suited to multi-year projects such as peatland restoration, habitat management, or in-field agronomy programmes like pod sealant sprays.

The possibilities of these new regulations is an area which AutoSpray Systems has been exploring in depth, most recently through a partnership with De Sangosse. This collaboration has specifically looked at the feasibility of applying De Sangosse's Pod-Stik pod sealant to both beans and oilseed rape.

The first major field trial under this new framework took place in June 2025 with drone-applied Pod-Stik on OSR at Andrew Manfield's farm on the Yorkshire Wolds.

At its core was the XAG P100 Pro – a quad-rotor, fully autonomous spray drone capable of carrying a 40-litre tank and covering up to 20ha/hr. The aircraft was programmed with precise flight paths and variable spray parameters: droplet spectra between 100-230 microns, a range of water volumes down as low as 25 l/ha, operating at a forward speed of 6m/s.

For Andrew, the trial addressed a very practical problem. "At 7ft tall, a crop like this can't be treated without damage; even a self-propelled sprayer on narrow tyres will break stems and bruise pods. The drone flew 3m above the canopy and left no trace of physical damage."

Stuart Sutherland, technical business manager at De Sangosse, explains the technical rationale: "Pod-Stik is a latex polymer designed to tack and seal the pod seam, preventing

premature dehiscence from the weather or mechanical impact. Its effectiveness relies on uniform coverage of the pod surface.

"With the drone, we used fluorescent tracer dyes to evaluate deposition patterns and were able to demonstrate not only full coverage across the top canopy, but penetration into the mid-zone where pods are highly vulnerable yet hard to protect with a conventional boom sprayer.

"A boom sprayer typically requires 150-200 l/ha for a pod sealant application, yet here we achieved desirable coverage even at rates down to 25 l/ha of water."

WINTER BEANS

A month later, in July 2025, the focus shifted to beans at Park Hill Farm in Cambridgeshire. Grower Richard Cobbald hosted a 4ha trial of winter beans where pod set extended right down to the base of the plant.

"This was the best bean crop we've grown in over a decade," says Richard. "Pods were set 6" (15cm) above the soil, which makes them incredibly vulnerable to shatter at harvest. Losing that yield simply wasn't an option."

In beans, pod shatter is often underestimated, adds Rob Suckling, commercial technical manager at De Sangosse. "The pods become incredibly brittle in hot, dry conditions, and losses can be extreme. Combines hitting ripe pods at harvest can scatter beans that are impossible to recover.

"Unlike OSR, where pod sealants are increasingly routine, beans haven't had the same attention. But in fact, pod protection in beans is vital to safeguard yield."

Again, the XAG P100 Pro was used, this time applying Pod-Stik at 1 l/ha under four spray regimes:

- 100 l/ha water, 350µ droplets, 6m/s
- 100 l/ha water, 230µ droplets, 6m/s
- 50 l/ha water, 230µ droplets, 6m/s
- 100 l/ha water, 230µ droplets, 12m/s

Deposition analysis revealed a critical difference in coverage between drone and boom application.

"We saw droplet deposits on the undersides of pods, especially those lower down – a target that conventional boom sprayers struggle to reach due to their horizontal spray angle and lack of directed airflow," explains Richard.

Boom sprayers may require 150 l/ha or more to push spray into the lower canopy, but even then, they can't lift droplets underneath the pods, where the seam needs sealing.

"The drone achieved that at 100 l/ha – delivering droplets down to the lower ▶

Expanding drone potential

With the Civil Aviation Authority's first permissions for BVLOS (beyond visual line of sight) operations in low-level rural airspace, drones may finally be poised to earn their place alongside tractors and sprayers in the UK arable system.

A UK first

The first major field trial under this new framework took place in June 2025 with drone-applied Pod-Stik on OSR at Andrew Manfield's farm on the Yorkshire Wolds.

pods and up underneath them," notes Rob. "That's critical, because those are the first to ripen and the first to shatter. The drone's rotor-induced downwash created a vortex effect, swirling droplets under the pods for complete coverage."

Richard was quick to spot the evidence himself. "You could see droplets glistening on the back of pods – something our 36m sprayer simply couldn't deliver. And all without wheelings or compaction."

A common assumption is that drones increase drift, notes Rob. "However, coverage wasn't compromised by speed. In fact, at 100 l/ha the 12m/s treatment gave better deposition than 6m/s."

Both trials underline the agronomic potential. Pod shatter in beans can strip up to 50% of yield, while OSR losses commonly run at 10-15%. With pod sealants increasingly routine in OSR but underused in beans, drones provide a new way to apply these treatments at optimum timing and with improved precision.

For growers like Richard and Andrew, the benefits should extend beyond shatter protection; reduced water volumes, zero crop damage, and no soil compaction can all add up. "It's not about replacing sprayers," says Rob. "It's about adding a tool that can do things sprayers can't."

The technology is now pointing towards wider uses with biostimulants, nutritional foliar products, and slug pellets clear candidates. "Slug pellets are a perfect example," says Andrew. "You have to apply them when soils are wet and machinery can't travel. With drones, you can just map the treatment zone and send it out."

Andy agrees BVLOS is the key enabler. "With BVLOS, we can now operate beyond field boundaries, scale up to farm or estate level, and do so with a data-driven safety case. It's the step that makes drones a realistic, routine part of UK crop production."

LIMITATIONS

However, drone spraying isn't without its constraints – payload capacity and battery endurance are among the limiting factors. A full payload typically gives 10-12 minutes of flight, covering roughly 1ha at 50 l/ha. To scale operations, ground crews must rotate multiple batteries through fast chargers and streamline tank refills.

For light-rate applications such as biostimulants, a single drone with efficient logistics may suffice, but for heavier inputs or larger sites, multiple drones flying in coordinated fleets will be required. AutoSpray Systems is already developing protocols for dual-drone operations, with synchronised flight paths to double effective capacity.

The trials mark a significant step towards normalising drones in UK agronomy, believes Andy. For now, their role is niche – applying pod sealants to pulses, biostimulants to OSR, or inputs in inaccessible terrain. But the technology and trained operators is moving quickly, he adds.

Both farmers see potential for drones in slug pellet application, where patchy treatments could benefit from aerial precision. Biocides in glasshouses and amenity settings are another opportunity already in operation. Longer-term, pesticides may follow, although regulatory approval could be more complex.

For Andy, the journey is about building confidence. "10 years ago, drones were hyped as the next big thing; that didn't happen because the practical pieces weren't in place. Now we have BVLOS permission, proper drift data, and real trials with products farmers want. It's a foundation we can build on."

Ultimately, as climate pressure shortens spray windows and soil protection rises up the agenda, drones offer something conventional machinery can't – access without compaction. Andy adds that they're unlikely to replace self-propelled sprayers, but could become a vital complement, stepping in where wheels can't go. He says the first UK pod sealant and OSR biostimulant trials show what's possible – and with further work on molluscicides, biologicals and pesticides, the sky may indeed be the limit.

"Drones aren't here to take work away from sprayers," concludes Andy. "They're here to give farmers another option. When the weather closes in, or the ground won't take a machine, that option could make the difference between losing yield and saving it."

Focus on beans

In July 2025, Cambridgeshire grower Richard Cobbald hosted a 4ha trial of winter beans where pod set extended right down to the base of the plant. (Pictured L-R: Rob Suckling, De Sangosse, Andy Sproson, Rob Pearson, Scott Dowell (AutoSpray Systems) and Richard Cobbald)

Keeping it personal

> *"If you don't know what personal data you're using, then how can you apply appropriate protection and handle it in accordance with the law?"*
>
> TORI LETHABY

While data is a hot topic in farming regarding who owns it and how it's used, the concept of adhering to best practice with personal data is a different kettle of fish altogether and can often be overlooked. *CPM* speaks to experts about its importance.

By Janine Adamson

As technology advances to enable greater data gathering and intelligence sharing in agriculture, questions arise regarding the potential risks associated with its security, sharing and liability.

From agronomic records and yield monitoring, to financial information and weather patterns, the amount of data that farms collect, use and generate, continues to build.

While the formation of Farm Data Principles (formerly the British Farm Data Council) strives to address concerns through a commonly recognised standard of data care, security and ownership, there's another swathe of information being managed by growers – personal data.

And it's this data pillar that legal experts believe is often overlooked or misunderstood when it comes to farm administration and management.

Kate Woolley is a senior associate at legal firm Knights and specialises in all aspects of data protection law. She says in the simplest sense, personal data is any information which identifies directly, or indirectly, an individual.

"It includes the obvious – name, home address, date of birth, email – but also involves business contact details, location data, CCTV footage, visitor badge information, job application details and employee information.

"Within farming especially, for the likes of harvest workers, it can feature proving right to work eligibility such as a copy of a visa or passport. This often involves the collection of special category data which can reveal race or ethnicity, adding an additional layer of complexity in how it should be handled and protected," she explains.

But why does how personal data is managed matter at all? In short, because the UK has an existing legal framework for its protection, including the UK General Data Protection Regulation (UK GDPR), the Data Protection Act 2018, and the Data (Use and Access) Act 2025 (UK data protection laws).

Although growers may assume UK data protection laws only apply to large companies and visible brands, this isn't the case. They apply to anyone who processes personal data, which includes collecting, recording, organising, using, storing, sharing or erasing personal data of any living person.

To be compliant with UK data protection laws, personal data must be:

- Used fairly, lawfully and transparently
- Used for specified, explicit purposes

What it means

In the simplest sense, personal data is any information which identifies directly, or indirectly, an individual, explains Knights' Kate Woolley.

Expert help

If growers have concerns or have identified a personal data-related problem, Knights' Tori Lethaby urges them to get some legal help.

- Used in a way that is adequate, relevant and limited to only what is necessary
- Accurate and, where necessary, kept up to date
- Kept for no longer than is necessary
- Handled in a way that ensures appropriate security, including protection against unlawful or unauthorised processing, access, loss, destruction or damage

If found to be in breach of UK data protection laws, Kate says the fines can be significant for cases of serious non-compliance. "But beyond this, a lot of money can be lost through interruption of service during an investigation by the Information Commissioners Office (ICO), which deals with UK-based breaches and complaints.

"For example, being unable to utilise a customer email database to invite the public to a farm event or open day, or to promote a special farm shop offer," she points out.

Tori Lethaby, partner at Knights, adds that while there may be justifiable reason for why growers captured personal data in the first place, it's how such data is handled after which is the critical part. Equally, when it comes to employees, what begins as good intention from an employer, can often incur risk if appropriate compliance measures haven't been put in place.

"For example, the use of tracking or monitoring devices on machinery assets as crime deterrents, or CCTV on or within premises, could be viewed as privacy intrusive to members of staff who are being monitored or their image recorded as a consequence – even if unintentionally. In particular, if the monitoring data or CCTV footage reveals an incident of misconduct which results in disciplinary measures or worse.

"While this could be seen as key evidence from an employer's perspective, if appropriate compliance measures aren't in place – such as a data protection impact assessment, having a CCTV or monitoring policy, displaying visible CCTV signage, and providing an employee privacy policy which clearly explains the nature of the monitoring and its possible uses – then the employer may not be able to rely on the evidence at all."

And of course, if personal data is stored incorrectly or without adequate security measures, it's at risk of attack by third party hackers (see box), she suggests.

So what are some of the simplest actions farmers can take to improve the robustness of their personal data storage and handling? According to Tori, an easy step is to start keeping records. "We recommend that all of our farming clients keep records of the data being handled, often referred to as 'records of processing activities'.

"Because if you don't know what personal data you're using, then how can you apply appropriate protection, handle it in accordance with the law, or, if the worst case scenario happens, deal with a potential personal data breach effectively?

"A record of processing activities is a core compliance document and more than likely one of the first things that the ICO will ask for during an investigation," she says.

Kate adds that the lifecycle of personal data should also be understood. "With certain clients there can be a tendency to want to keep data forever, sometimes in paper format, but under the UK GDPR that could be perceived as unnecessary and exposing the business to risk.

"An example being job applications for seasonal work – these are something that can be archived and kept well beyond their means."

Once all personal data being captured on-farm has been identified, subsequent core data protection-related policies and procedures can then be created, comments Tori. These include a data protection policy, external and employee privacy notices, a data retention policy/schedule, a data breach management policy, and a procedure and data subject requests policy.

While all of this may seem daunting and in some ways excessive, Tori says the ICO's website has plenty of information and toolkits to assist with all aspects of UK data protection compliance, in particular, under its 'advice for small and medium organisations' section.

Equally, she explains that it's something Knights regularly helps its farming clients with. "If you're concerned or have identified a personal data-related problem, get some legal help, whether that's us or other sources of assistance.

"At Knights particularly, we offer fixed packages for SMEs which help businesses to keep control of what they invest in this. All businesses will be processing personal data whichever sector they operate, so it's critical that handling such data in accordance with UK data protection laws is made a priority." ●

Halting hackers

Why it's critical to stay one step ahead of data predators

An online guide to support farmers in preventing and reporting cybercrime is available from the NFU, following a partnership with the National Cyber Security Centre (NCSC).

Perhaps frustratingly, cyber-attacks continue to be on the rise – exploiting human or security vulnerabilities to steal passwords, data or money.

And given almost half (46%) of businesses identified cyber security breaches or attacks during the past year, the guide – *Cyber security for farmers: Practical tips on how to stay safe* - continues to be a critical document.

To report a suspected cybercrime:

- **Report suspicious emails to NCSC's Suspicious Email Reporting Service, SERS, at report@phishing.gov.uk**
- **Suspicious text messages should be forwarded to 7726 – it's free of charge**
- **Report fraud to Action Fraud by visiting actionfraud.police.uk, or by calling 0300 123 2040**
- **Or contact Crimestoppers: crimestoppers-uk.org / 0800 555 111**

Nature **NATTERS**

The future is diversity

WITH MARTIN LINES

I'm writing this during the party conference season, during which I'll get the opportunity to attend a range of events for many different political parties. And in all of them, I'll be putting forward discussion points around and explaining why diversity in our countryside, in farming, and in life, is so important.

Our farm systems and food production are based on and underpinned by the diversity of nature, whether you farm in Cornwall, Cambridgeshire or Cumbria. Show me a farm that doesn't require the sun, the rain, or the life in the soil? Ecosystems thrive when they're diverse – from pests to predators, worms to wildflowers and beetles to birds. When nature is thriving, so are our crops.

Farmers, while they may invest time and energy into a single crop, are often delivering or responsible for many other public goods and services – the diversity providing resilience for their businesses. And while our guiding principles may be the same, the diversity of the geology, cropping field sizes and markets all combine to create unique challenges, opportunities and beautiful landscapes.

Diversity is about variety, and within that variety, we must find balance. When farmers implement a diverse cropping rotation containing multiple varieties, no one thing is over-dominant. Disease and weed pressures don't build up because the soil is being used in different ways with each crop, meaning we don't have to worry so much about lower yields or costly inputs. Finding that balance may take time – and mistakes.

This time of agricultural transition is a one to create diverse experiments. Learning which plants complement each other and provide desirable outcomes, or which are too complex, time-consuming or degenerative, with no benefits. If all farmers trialled one thing on their farms, and if all of those farmers then shared that new knowledge with their neighbours, think of the learning that could be done. After all, many roots make a stable tree.

Some years ago, I challenged myself to attend a range of organic events as a non-organic farmer, not knowing how I would be received by a community with very different thoughts and practices than my own. Being open to listening to a diversity of approaches and people, and how they're finding creative solutions to problems we all have, has certainly influenced the way I farm and has enriched me with a wonderful variety of experiences and knowledge. I wasn't 100% converted to any one person's ideas and approaches, but I did take a little gem of wisdom from almost everyone I met.

Throughout the past few years, I've watched some farmers I know and respect, change. They're growing more and more fixated on one method, or on a particular belief, and proceed doggedly with blinkers in that direction. This can sometimes be a reaction to the uncertainty and insecurity we farmers have been facing, but disengaging from the diversity of people and ideas that are out there will quickly become isolating, create echo chambers and shut you off from the business and wellbeing benefits of diversity.

Meeting MPs and policy makers from different parties certainly gives you an insight into the diversity of beliefs.

Meeting so many different MPs and policy makers from different parties certainly gives you an insight into the diversity of beliefs. Engaging in a dialogue with someone who, on paper, isn't aligned with your values or approaches, often opens your eyes to their perspectives, experiences and challenges. It helps you to piece together the bigger picture and foster understanding in unexpected places, which in itself can ease frustrations and be a catalyst for progress. Sharing personal stories and making sure there's a diversity of voices to be heard is really important.

Our challenge as farmers is to keep sharing the stories of our diverse farming systems to the wider public and decision-makers. One size doesn't fit all in our line of work, but we can agree on key principles and a direction of travel; some may sprint and some may plod.

Diversifying our crops and the nature on our farms builds business resilience. Diversifying the range of farmers and decision-makers we engage with – while helping to build a system fit for all – also helps bolster our mental resilience. What diversity is in your story? ●

YOUR CORRESPONDENT

Martin Lines is an arable farmer and contractor in South Cambridgeshire with more than 500ha of arable land in his care. His special interest is in farm conservation management and demonstrating that farmers can profitably produce food in harmony with nature and the environment. He's also chair of the Nature Friendly Farming Network UK.
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Shaking up farm business tenancies

A revolutionary type of farm business tenancy is aiming to help The Crown Estate supports its tenants to farm sustainably, manage the environment, and diversify businesses. *CPM* finds out more.

By Mike Abram

Some tenant farmers, and perhaps even landowners, might say that a reimagining of farm business tenancy (FBT) agreements is well overdue.

While traditional FBTs brought flexibility and helped reinvigorate the land rental market after their introduction as part of the Agricultural Tenancies Act in 1995, over time, they've unintentionally fostered short-termism, instability and rent inflation – which are all potential barriers to sustainable farming and rural resilience.

Furthermore, Defra's independent review of tenant farming in England – led by Baroness Kate Rock and published in 2022 – found FBTs were too short, insecure and commercially extractive, while impeding tenant farmers from participating in agri-environment schemes.

Known as '*The Rock Review*', this recommended through a tweak in tax policy, that tenancy agreements should be pushed to an average eight-year term, plus, improve access to environmental schemes, and for landlords and tenants to formally collaborate on whole-farm plans that are incorporated into tenancy agreements.

Those principles are firmly embedded in a new environmental Farm Business Tenancy (eFBT) that's been developed by the Crown Estate with the backing of the Tenant Farmers Association, with input from Burges Salmon and other advisers.

Developed over 18 months with 17 draft revisions, the new eFBT is predicated around shared ambition, explains Paul Sedgwick, managing director of the Crown Estate's rural portfolio. "It's trying to move away from the old adversarial landlord-tenant relationship to one that's more partnership-based."

Several factors have coalesced during the past few years to convince the Crown Estate to develop eFBTs, not least a recognition of the unprecedented level of change farmers are facing, adds Paul.

Another factor was the 'deeply polarising' discussion around land use. "We had to look at how our land could tackle some of these national issues and make brave decisions regarding how to do that."

There were two red lines: first, the long-term success of the Crown Estate's farming families had to be ensured, and

One vision

Developed over 18 months with 17 draft revisions, the new eFBT is predicated around shared ambition, explains Crown Estate's Paul Sedgwick.

secondly, that food production was still at the core of the farming businesses. "We'll never be better business managers than our on-site farmers, but we have access to a considerable amount of capital funding and the ability to take a long-term view," says Paul.

He believes that's been helped by a new act in parliament, which has reversed a previous restriction on the Crown Estate being able to borrow money. "From a long-term perspective, that gives us far more firepower to support our farmers."

Four aims have been targeted by the Crown Estate for its new strategy: to optimise the performance of the rural portfolio, which is important because profits are returned to the Treasury for the benefit of the nation; to lead in the delivery of the green agricultural transition; to lead in the delivery of nature recovery, and to replenish some of the land sold during the past 20 years, when the restriction on borrowing led to the sale of rural land to finance other developments.

Practically, it's led to aspirations to pivot from 'ditch-to-ditch' arable and veg farming plus a few dairy farms, to move the more marginal land, where appropriate, into nature recovery, forestry, renewable energy and diversifications.

"We want to shift our portfolio back to a more family-feel with real relationships. There was a realisation that we're dealing with not only people's businesses, but also their homes and livelihoods. From an institutional perspective, that 'human relationship' point has been missing," explains Paul.

Creating resilient farm businesses is key for the Crown Estate, he points out. "The old tenancy agreements were very much 'do' and 'don't' between landlord and tenant.

"We wanted to create the concept of income stacking to de-risk our farmers away from primary crop production, and the fact they were moving into a new no-subsidy world. Ultimately, we couldn't see a vehicle for delivering this through a standard farm business tenancy," comments Paul.

The rationale behind the eFBT is to recognise that achieving both environmental and commercial benefits aren't likely to be met by a series of top-down instructions or prohibitions, and that environmental ambitions are just that, and require co-operation to be realised.

That's resulted in a model where the eFBT focuses on the core legal matters for a tenancy, while the aspirations of both parties on environmental and diversification are set out in the Farm Green Book and the Farm Partnership Book, explains Kevin Kennedy, of Burges Salmon.

The 'Books' aren't legally binding and don't amount to a series of covenants between landlord and tenant, but are crucial to setting out what both jointly want to achieve, and how they might get there.

"It's anticipated the 'Books' will be agreed before the eFBT is granted and reviewed through the life of the tenancy, at least on three-yearly intervals," explains Kevin.

A key change within the new eFBT ▶

Key principles of the Crown Estate's eFBT

- **15-year term**
- **Covenant-lite – reduced protections for landlords other than baseline obligations including not leaving the land in a worse situation than started with**
- **Limited break clauses**
- **Open market rent review on three-year cycle**
- **Farm Green Book – sets out landlord and tenant's aspirations for environmental enhancement of the land, covering soil health plans, cropping, use of inputs, energy and water, livestock integration, and environmental certifications**
- **Farm Partnership Book – deals with landlord and tenant's wider aspirations for farm, including diversification and broader societal benefits**

Tenant Farmers Association view

Supporting a contractual revolution with the environment at the heart

The fact the 25 members of the Tenant Farmers Association executive committee agreed unanimously to the inclusion of the TFA logo on the eFBT documentation tells everything about the value the organisation believes it has, says chief executive, George Dunn.

"It's a contractual revolution which fully incorporates the landlord and tenant code of practice and embeds issues around environmental benefits," he continues.

Currently, entry into environmental schemes is sometimes prohibited, or where allowed, requires landlord permission. "If you're lucky, it might say that consent can't be reasonably withheld or delayed. It's rare that tenants can look at private markets for environmental benefits or natural capital."

In contrast, the eFBT from the outset expects tenants to come forward with ideas for how the farm can be managed in an environmentally sensitive way. "The Green Book sets out the joint aspirations about the parties will deal with those environmental issues. It's not a set-in-stone document – it'll be discussed, changed, reviewed and developed over time."

Similarly with diversification, tenants are fully expected to present ideas. "There's a mechanism for how that is to be discussed, with the Partnership Book the basis for how those aspirations is thought through."

In support

The 25 members of the Tenant Farmers Association executive committee agreed unanimously to the inclusion of the TFA logo on the eFBT documentation, points out George Dunn.

Alternative delivery model

The eFBT focuses on core legal matters for a tenancy, while aspirations on environmental and diversification are set out in two 'Books', explains Kevin Kennedy, of Burges Salmon.

is it has a 15-year term. "Most current FBTs, on average, are three years long," notes Paul. "That doesn't encourage tenant farmer investment and reserves all the 'goodies' back to the landlord.

"Our agreement is predicated around sharing, for example, in future natural capital and biodiversity markets, and for those farmers who want to, diversification. We have a lot of latent opportunity to optimise diversification opportunities on some, but not all, of our estates."

Some of the Crown Estate's tenant farmers want to solely focus on farming, which is within their rights, suggests Paul. "Others are keen to look at future markets around carbon, renewable energy and biodiversity, and it's how we can unlock those opportunities through our funding to support them. It's about setting guardrails in which our farmers can develop their businesses."

The 15-year term, which could even be extended to 20-years or more in the future, should also help to deliver a green agricultural transition, he adds. "One of our aspirations is to shift 15% of our marginal land into nature recovery."

That's prepared the way for one of the most eye-catching consequences of the eFBT introduction: lower rents. "We're lowering rents of land transitioning into nature recovery to help achieve better outcomes for the environment," highlights Paul.

"To provide context, on Grade 3 arable land, we've reduced farm rents from around £175/acre to £100/acre on land transitioning to nature recovery. This is to create a position where our farmers can make more profit from an acre of nature than an acre of wheat, where they choose to do so."

Lower rents on land transitioning to nature recovery could cost the Crown Estate around £2M/year across all land let on FBTs, admits Paul, but that's dwarfed by the latent diversification income, both traditional diversification and future natural capital markets on the Crown Estate, by a factor of 20.

"If we can unlock that latent diversification income with our farmers, then everybody will come out of this well."

The government's pausing of the Sustainable Farming Incentive earlier this year caused some challenges, as that funding was helping to underpin the transition, adds Paul. As a result, it's put more emphasis on the Crown Estate's Rural Environment Fund to plug that gap to support nature recovery. "We originally put in place a £10M fund in 2022, but we've doubled it to £20M."

In two years, the scheme has helped fund 300km of new hedgerows, 260ha of new woodland and other environmental enhancements, such as wetlands, pond creation and margins along dykes.

"It sounds like a large sum of money but for more than 200,000ac (81,000ha) it's only £20/acre/year – I'd argue any landlord of a rural estate can afford that, if they have serious ambitions to improve the natural environment," suggests Paul.

Further support is being made in the form of access to ecologists at the Crown Estate's expense. "We're asking them to help us pull together the estate and farm environmental plans in the Farm Green Book to ensure they go as far as they dare from an ecology perspective, and then in conversation with our farmers we pare it back to a workable pragmatic solution for each farm."

The Crown Estate is also working with Soil Association Exchange on a pilot project with six farms to capture baseline data. "We believe from a supply chain perspective, farmers are going to have to demonstrate what they are doing and have that data available in a consistent format.

"If the pilot is successful, we'll roll that out across all our let farms at our expense, so we have a consistency of data for everyone's benefit," says Paul.

While the eFBT has been designed for use by the Crown Estate, it considers the new model to be scalable. "We believe the old landlord tenant model in the rural sector isn't fit for purpose, which is one reason why we haven't protected the intellectual property, and made it available to the wider industry.

"We've sent out copies to every major institutional landowner and private estates that have requested it, and it's been listed by Westlaw as a precedent agreement. The model is scalable beyond our boundaries of ownership, and we hope it'll lead to real system change across the land sector," he concludes.

Zero rent potential

Depending on what happens with the relaunch of SFI, The Crown Estate might have to offer zero rents for land to be used for nature recovery

On the average traditional let estate, the percentage of total income from farm rents is diminishing as assured shorthold tenancy residential lettings, commercial lettings, leisure opportunities and natural capital markets increase, explains Paul Sedgwick, managing director of the Crown Estate's rural portfolio,

"So the impact of reducing agricultural rents to get better nature outcomes is relatively minor, although there are clearly estates that are predominantly agricultural rent-based where this would be more of an issue.

"We were one of them – 95% of our revenue came from agricultural rents and we were uncomfortable about the lack of diversification and our exposure to purely farm rents, hence why we're pushing diversification hard in the broadest sense."

Paul adds that they aren't wedded to any particular rent level on the nature recovery land. "We were flying with land transitioning back into nature recovery until SFI was paused, but if we have to base rents at zero for the next three years to continue the green transition, we'll do that with support from our Rural Environment Fund.

"Something has to change the dial in the tenanted sector, and I think it's not inconceivable that a future government could legislate to ensure that the right nature interventions are being made if landowners and farmers don't make that transition."

Biologicals bring balance on Zambian farm

"We had to explore ways to support soil health, optimise chemical inputs, and still maintain yields and profits."
DONALD BURTON

Despite having access to more plant protection products than his European counterparts, one Zambian farmer is opting to reap the benefits of biologicals. *CPM* visits Donald Burton in Zambia, to find out more.

By Niamh Tye

A commitment to innovation has seen Zambian farmer Donald Burton embrace biological inputs as a cornerstone of a more resilient, integrated crop management system.

Together with his wife Deborah, the couple farm 2400ha at Mafundzalo (translated to 'my funds are low') Ranch near Kabwe, around three hours north of the capital, Lusaka.

Having returned to the family farm in his mid-twenties after managing other commercial farming businesses in Zambia, and faced with a sub-Saharan climate delivering extremes of heat, drought and pest pressure, the couple were determined to take a more holistic and integrated approach to pest and disease control.

Specifically, one that would allow them to maintain high crop performance while rebuilding soil biology. This approach reflected a shift towards balance rather than replacement – where biologicals enhance rather than compete with chemistry, explains Donald.

"Our soils are sandy, slightly acidic, and low in organic matter, so we had to explore ways to support soil health, optimise chemical inputs, and still maintain yields and profits. The goal isn't just to grow a good crop – it's to leave the soils better for the next one."

Donald explains that farming at Mafundzalo Ranch was traditionally rain-fed, growing mostly maize and soya beans, while yields were always at the mercy of the rainfall. "In dry years, we may not have had a harvest, so our first step was reducing that risk by investing in water. That meant building a dam that would fill during rain, hold water during the dry season, and that

Farm challenges
With sandy, slightly acidic soils which are low in organic matter, Donald Burton says they had to explore ways to support soil health and optimise chemical inputs, while maintaining yields and profits.

Delivering the goods

Supporting potato yield targets through biologicals

The main cash crop at Mafundzalo Ranch is potatoes, sold into the open market for crisps and chipping. Growing between 65-95ha of varieties such as Donata and Jelly – depending on rotation and season – the emphasis is on maximising yield while managing cost per hectare.

However, the climate for growing potatoes is unforgiving, points out farmer, Donald Burton. "We battle against blight, blackleg, aphids, tuber moth, nematodes, and whitefly – and that's before we consider fall armyworm which can destroy a crop overnight.

"We rely on pesticides for heavy control, but we've seen how biologicals reduce plant stress from chemistry and enhance recovery by improving root architecture, manage nematodes better, and reduce reliance on some harsher chemistries," he says.

"Key to success is understanding the life cycle of the pest or disease and knowing where the biological product is best used in the programme, and we've worked closely with Colin Van Niekerk of Albida Agriculture to get this right."

Donald adds that last year, the farm struggled to control tuber moth with the chemistry available, so is now investigating the pest further to see if biologicals can help. This is because with a target yield of 70t/ha, Donald believes investing in biologicals early in the season can help to protect that margin. Consequently, biologicals are applied as drenches to new seed, on-farm.

"We see the most benefit from biologicals in the furrow – we try to avoid too much going on the leaf to reduce foliar shock.

"If we want a resilient crop, we have to establish a strong root system early. That's where biologicals really shine – particularly for nematode suppression and nutrient mobilisation, and these are mostly applied as seed treatments."

Where required, foliar applications are used as part of a tank mix using a John Deere 4730 sprayer. "It's a busy programme," acknowledges Donald. "But with such a high margin crop, we feel this level of input is justified to get the yields and quality we're after."

He also believes that an integrated approach using biologicals alongside more conventional fertilisers has improved the nutritional status of his soils. Donald explains that the sandy soils on the southern side of the farm present challenges in retaining potash and sulphur; copper, boron and zinc can also require addressing. He uses regular leaf sampling to track nutritional status.

"We'd noticed some calcium lock-up using a conventional fertiliser, despite applying relatively high levels of calcium nitrate. So we swapped to Albiina from Levity, which offers LoCal technology to help plants absorb calcium more efficiently.

Boosting rooting
With the aim of a resilient crop, Donald Burton focuses on establishing a strong root system early.

"There's definitely been some stabilisation in calcium absorption. Through the leaf sampling, we're actually seeing some excesses in certain nutrients for the first time," raises Donald. "That suggests the integrated approach is really starting to work.

"The best results come when you look at biologicals as part of a full rotation plan, not crop-by-crop. You spread the benefit and the cost across the farm – that's where the real value lies."

Biologicals in action

An example biological potato programme from Mafundzalo Ranch:

Product	Application rate	Active ingredient	Application timing	Key benefits
RhizoVital	0.5 l/ha	Bacillus amyloliquefaciens	At planting	Enhances water and nutrient uptake, improves stress resilience, suppresses nematodes and soil-borne diseases.
MycoUP	0.5 l/ha	Glomus iranicum var. tenuihyparum mycorrhizae	At planting	Increases phosphorus uptake, boosts soil biology, provides nematode suppression.
EcoT	N/A	Not specified	At ridging	Supports emergence, prevents damping off and root rot.
MBB10 Soil Revitaliser	N/A	Bacillus subtilis	At planting	Promotes rhizosphere development, suppresses soil pathogens, and assists in nematode control.

we could then pump from," he says.

Today, Mafundzalo is equipped with five centre pivots irrigating 310ha. The irrigated crops receive around 550-600mm of water/ha during the growing season. Critically, no longer being rain dependent means the rotation has changed to reflect this, now driven by wheat and potatoes.

Wheat at the ranch averages 10t/ha and is sold for milling, potatoes achieve 70t/ha and are grown for the local market, and seed maize yields 6.5-7t/ha for an international seed company.

Before each crop, an NRH Ripper is pulled through the soil breaking up any compaction, particularly where a hardpan has developed, to help aid water infiltration and drainage and allow for root growth. This is then followed by a Radium cultivator, manufactured in South Africa.

Donald points out that a cover crop of sunn hemp is planted between the wheat and potatoes, while 40ha of Macademia nut trees were sown around five years ago, for export to China, and are supported by a drip irrigation system.

However irrigation, despite mitigating drought, brings its own problems, he raises. "Warm, humid conditions are a breeding ground for pests and disease. That's become our biggest challenge after water," he adds.

Perhaps fortunately, Zambian growers operate with fewer chemical regulatory limitations than their European counterparts, comments Donald. "We have access to a much wider range of chemistry than growers in the UK, where many of the key actives we use here are no longer available.

"That said, we're starting to see increasing resistance developing. We're also aware that over-reliance on chemistry won't build long-term resilience for either disease control or soil health.

"Because of this, a new approach was required to enhance and complement the chemistry we have access to, and so we started to look at how biologicals could fit this requirement."

Working closely with Colin Van Niekerk of Albida Agriculture – a bio-solutions business based in Zambia – the Burtons have now developed integrated crop protection programmes combining chemistry with microbial and biostimulant inputs, with promising results.

> ***"During the past 3-4 years, we've had particular success using bio-pesticides across our wheat and potato programmes."***

"Biologicals are an increasingly important component in Zambia's commercial pest and disease management," says Colin. "We're not bound by the same registration frameworks as Europe – if a product is approved elsewhere and is formulated safely for transport, we can trial and use it.

"There's an exciting, enthusiastic transition into microbials, as conventional agricultural crop protection chemistry comes under increasing legal and environmental scrutiny and is withdrawn. This opens up opportunities for useful, modern microbe practices in agriculture.

"Bacteria, viruses, fungi and insects are all now well-recognised for their strategic roles both in the rhizosphere and phyllosphere," he explains.

Colin states that leading global R&D businesses believe biologicals will make up 25% of the overall global crop protection market by 2035, growing to more than three times to the value of £24Bn – as complementary solutions over synthetic chemistry.

"This will be through the drive for sustainable production, legislation, new modes of action and better efficacy. As a business, we want to be at the forefront of that."

Albida partners with familiar names such as Koppert, Lallemand and Levity, which means it can offer Zambian growers a diverse product portfolio ranging from seed treatments, fertilisers and bio-pesticides including bio-control agents.

With limited state-funded research and agronomy services, Colin says Albida works closely with farmers like Donald to trial and validate products. "While we have our own R&D lab to ensure that every product we put out on farm adheres to our strict quality protocols, we also work closely with growers to validate efficacy under real-farm conditions."

Donald believes he's farming intensively in nature's shadow "If we don't innovate, we don't survive. If a product works and gives us results, we use it. We don't wait for top-down advice," he stresses.

"During the past 3-4 years, we've had particular success using bio-pesticides across our wheat and potato programmes, and are now looking at how we can integrate similar products into the Macademias."

For him, the most important shift has been thinking holistically. "If soils are in good, aerobic condition then microbes will flourish, so that means cultivations and soil health are just as important.

"There's no point spending money on a product if it then can't work to its optimum. In heavy, overcultivated soils, anaerobic conditions will take over and biological activity will be reduced," concludes Donald. ●

Alternative approaches

Biologicals are an increasingly important component in Zambia's commercial pest and disease management, points out Colin Van Niekerk.

Irrigation investment

Irrigated crops at Mafundzalo Ranch receive around 550-600mm of water/ha during the growing season.

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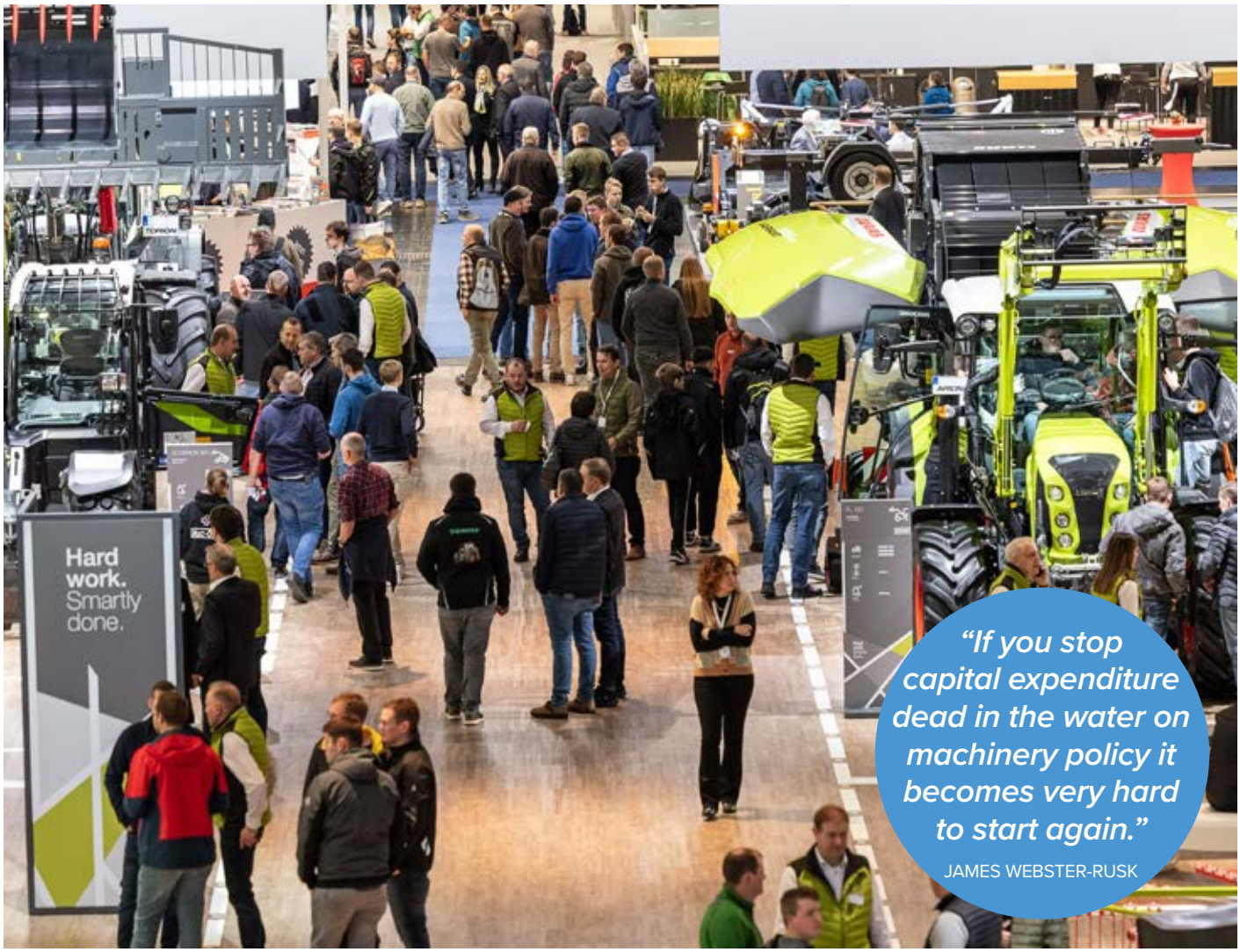

"If you stop capital expenditure dead in the water on machinery policy it becomes very hard to start again."

JAMES WEBSTER-RUSK

As Agritechnica prepares to open its doors to international visitors once again next month, *CPM* takes a look at what's new and how growers can be strategic with their future kit purchases.

By Charlotte Cunningham

With margins still tight, weather windows ever narrower and political uncertainty hanging heavy over British agriculture, there's a tangible appetite for solutions rather than slogans.

That's the backdrop as Agritechnica throws open its doors once again this November, promising a showcase not just of shiny new kit, but of ideas designed to make farm businesses more resilient.

Under the guiding theme of 'Touch Smart Efficiency,' the Hanover halls will bring together more than 2700 exhibitors and a packed programme which aims to give visitors direct access to innovative agricultural systems that use digital technologies to increase efficiency, sustainability and productivity.

For UK growers navigating the twin pressures of compliance and competitiveness, the timing feels apt. Whether it's tractors fuelled by methane, combines that think for themselves or cultivators that promise to balance blackgrass control with timeliness, this year's launches are rooted in real on-farm challenges.

The question is, which of these innovations will genuinely earn their place in the yard, and which remain solutions in search of a problem?

Of course, it has to be noted that after a difficult season for many growers, it may seem in poor taste to even float the idea of spending out thousands of pounds on new kit. Yields have been well below par, and – perhaps more unusually – hugely variable from farm to farm, explains James Webster-Rusk, senior agribusiness analyst at The Andersons Centre.

"It's been a challenging harvest in the context of volumes produced and prices received, rather than conditions ▶

A LONG WAY TOGETHER

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at harvest. The yield picture for many isn't pretty – against the five-year average, which itself contains some outlier seasons like 2020 and 2024, this year still looks poor."

The price outlook only compounds the challenge, he continues. "November wheat futures are sitting at around £165/t – a far cry from the values seen during the market volatility of 2022, and a drop compared with where prices were even as recently as at planting. Businesses have come out of harvest with less in the barn and a weaker return for it.

"That means replanning on cashflow, and in some cases, conversations around overdrafts. For those looking at machinery replacement, it's undoubtedly a difficult year."

Perhaps unsurprisingly, many arable businesses are already shifting their approach. Replacement cycles are being stretched, service agreements extended, and machines kept running for longer.

But James urges caution over pulling up the handbrake altogether, and instead advises growers heading out to Agritechnica to take a strategic approach to any potential purchases. "Yes it's tempting to rein in spending, but if you stop capital expenditure dead in the water on machinery policy it becomes very hard to start again.

"The key is being strategic. Every pound spent has to work – whether that's through labour savings, efficiency improvements, or productivity gains – and the payback period has to stack up under realistic market conditions."

That realism is essential, particularly as budgets suggest 2026 could be another lean year, he warns. "We can't benchmark investments against what payback might have looked like two or three years ago. The Russia-Ukraine market spike was an exception.

"Now it's about looking hard at the fine detail – if a drill claims to save fuel, how much will it actually save on your farm? If a sprayer promises fewer passes, does the data support it, and how quickly will it pay back?

"With Agritechnica about to open its doors, attention will inevitably turn to the latest launches, but for farmers in the UK the question shouldn't be so much 'what's new?' but instead, what truly pays?"

AGRITECHNICA 2025 LAUNCHES

Ahead of the event, here's a flavour of what visitors can expect.

One of the clearest threads through this year's launches is how manufacturers are pushing the envelope in tillage – from going shallower and gentler, to delving deeper where soil structure demands it.

Amazone's Catros+ 12003-2TX expects to take centre stage – a 12m trailed compact disc harrow, with a stronger folding frame and refined chassis. What makes it more than just wide is its design for controlled traffic farming (CTF) – longer disc arms, rear packers, the intention to let growers follow fixed tracks and leave the rest of the soil undisturbed.

For those UK farmers experimenting or already running CTF, the Catros+ 12003-2TX could reduce compaction, traffic damage, and so preserve moisture and structure in those parts of the field that matter.

At the deeper end, however, Lemken's Onyx subsoiler is among those making headlines. It goes well beyond shallow mixing or loosening; it offers versions that reach 60cm, with options for mixing or loosening shares, wings, and reconsolidating rollers. Particularly for farms on heavy clay, or those that have suffered from repeated compaction, this is the kind of kit that could restore infiltration and root penetration.

If soil is the foundation, the nervous system of modern farming are sensors, data and autonomy, and Agritechnica 2025 is placing several new such tools in the limelight, many with clear benefits for UK growers.

One of the new focuses announced is on (semi-)autonomous fieldwork, with machines that reduce human driver load but retain control and supervision. For UK farms this may mean better consistency in operations like spraying or tillage, especially when skilled labour is scarce.

Technologies like AutoLane on Amazone's Catros-2TX, that guide implements along pre-defined A-B lines or contours stand to reduce overlap, avoid damage to sensitive field edges, and improve uniformity. The less obvious benefit is saved fuel, fewer soil disturbances from rework, and better finish for following operations like drilling.

WEED MAPPING

Weed mapping could also be about to move to a new level with the launch of

Strategic shopping

With margins likely tight after a disappointing season, Andersons' James Webster-Rusk says machinery purchases should be strategic, with a justified return on investment.

New options from Amazone

Amazone's Catros+ 12003-2TX expects to take centre stage – a 12m trailed compact disc harrow, with a stronger folding frame and refined chassis.

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WE WILL FIND A WAY

Zoneye, an artificial intelligence system from Czech ag-tech firm Skymaps, due to debut at Agritechnica 2025.

Zoneye is embedded within the company's CultiWise prescription-map platform and uses high-resolution drone imagery to distinguish between crops and 37 common weeds across a range of species including cereals, sugar beet, oilseed rape and potatoes. Crucially, growers can also 'train' the system to recognise regional variants by uploading their own images, creating a field-specific dataset.

Drones equipped with RGB cameras fly at heights of 40-120m depending on weed size. Images are uploaded to the cloud where AI analyses them and delivers maps within minutes. These maps detail weed location, density and species, and can be exported directly to sprayer terminals, guiding spot applications or variable-rate treatments. Unlike conventional 'green-on-brown' tools, Zoneye can differentiate crops and weeds even under full canopy conditions.

According to Skymaps, the technology can cut herbicide use by up to 50% while boosting yields by 20% through reduced crop stress and more targeted control.

SEEDBED PREPARATION

When thinking about driving efficiency, drilling and seedbed preparation are areas where timing and accuracy are everything.

One of the products grabbing attention is Horsch's Avatar 12 LC – a large 12m drill with a triple tank, high capacity, multiple product capability and capable of combining seed, fertiliser, cover mixes or companion crops. For growers who want to reduce the number of passes, or do smart combinations such as seed and starter fertiliser, or seed and cover crop, flexibility should be attractive.

Deep cultivation innovation

For those seeking deeper cultivation, Lemken's Onyx subsoiler is among those making headlines. It goes well beyond shallow mixing or loosening, offering versions that reach 60cm, with options for mixing or loosening shares, wings, and reconsolidating rollers.

Amazone's Cirrus 8004-2C Grand continues this combinational trend, featuring 8m working width and a three-chamber hopper. It's designed for speed and flexibility, especially for those who want to sow multiple components simultaneously. For UK farms with medium-size tractors, this could reduce the gap between high output and soil risk, with fewer passes and better establishment.

While the glitz and glam of the new, shiny kit is often a draw to Agritechnica 2025, at its core, all of this new innovation is based around efficiency and integration to drive better production. For UK arable farms squeezed between regulatory demands, environmental expectations and the ever-present need to get a return, the new tools may offer more leverage than ever before.

Eyes in the sky

Weed mapping could also be about to move to a new level with the launch of Zoneye, an artificial intelligence system from Czech ag-tech firm Skymaps, due to debut at Agritechnica 2025.

New features: streamlining a super show

Anyone who's visited Agritechnica before will know walking the halls is a test of stamina. So in a new twist for 2025, Agritechnica has introduced a '7 days-7 topics' format, which aims to make navigating 23 halls of kit and concepts a little less daunting. Each day has its own theme, giving visitors the chance to home in on what's most relevant to them.

The week kicks off on Sunday (9 November) with an 'innovation and press day' – an early look at the latest launches and award-winning technologies, mainly for contractors, decision-makers and the media. Monday and Tuesday are billed as 'agribusiness days', tailored towards dealers, large-scale farms and contractors, with investment planning and networking front and centre.

Mid-week, on Wednesday (12 November), the spotlight shifts to the global sphere, with an 'international farmers day' focusing on France, Canada and the Czech Republic. Then, Thursday is 'digital farm day' – where robotics, automation and AI take over the agenda, and visitors can expect a heavy dose of smart farming solutions in action.

Friday is reserved for the next generation, with the 'young professionals day', offering sessions on careers, succession and a chance for younger visitors to connect – rounded off by the 'young farmers party'. Finally, Saturday closes the show on a high with 'celebrate farming' – a nod to the industry's achievements and a chance to take stock before the doors shut.

Going for gold (and silver)

For many manufacturers, a major highlight of Agritechnica is the possibility of being crowned a winner of the show's Innovation Awards – with both gold and silver medals up for grabs

The award is made on the basis of an innovation which demonstrates a new concept where the functionality has changed decisively and gives rise to a new process/marks a substantial improvement to an existing process. It has to be practical at a farm level and demonstrate both financial and environmental benefits, among other criteria.

Organisers say they received more than 250 entries this year, with two new launches taking gold and a further 22 receiving a silver medal.

Ahead of this year's Agritechinca, here's a look at some of the winners:

1. CLAAS'S OVERALL CONCEPT OF A 70T BALER

Claas took one of the two gold medals for what might at first glance appear to be a refinement rather than a revolution – a next-generation 70t square baler. Yet under the skin, it's a radical rethink.

The concept is aimed at merging ultra-high throughput and consistent bale density with reliable binding. To that end, Claas places a main gearbox inside the frame to enable a linear power path, slimmer drawbar, and shorter prop shaft. Two large flywheels (202kg each) spin longitudinally to act as energy buffers, and are engaged sequentially to reduce torque shock at start-up.

The drivetrain consists entirely of enclosed gearboxes and power bands and maintenance is minimal. Sensors continually monitor torque on the rotor and rake, shutting down feed when overload is imminent. A TIM (Tractor Implement Management) interface lets the operator select a strategy, such as max throughput or high density, and the system adapts tractor speed based on load.

Another AI-driven assist regulates bale length and weight in real time without needing a weigh cell. The knotter introduces a double knot based on the McCormick principle to retain 70% of yarn tensile strength, enabling greater yarn economy or more knots per metre for the same stability. ▶

2. DEUTZ-FAHR'S TRACTOR ASSISTED GUIDANCE SYSTEM (TAGS)

Bringing driver assistance into tractors is a stepping stone toward more autonomous machines, and Deutz-Fahr's TAGS (Tractor Assisted Guidance System) is one of the silver-level innovations the show has honoured this year.

TAGS offers a more sophisticated layer of safety and assistance by leaning on systems more typically seen in cars. It integrates electronic detection, lane keeping, object/person detection, and sensor-based control – akin to adaptive cruise – into a farm context. In practical terms, this means TAGS can help maintain straight-line travel, warn of obstacles, and reduce operator error in difficult terrains or headland work.

3. LEMKEN'S IQBLUE FAN AUTOMATION AND AUTOMATED FAN CONTROL

Lemken's iQblue Fan Automation earned a silver medal for bringing sensor feedback into pneumatic seeding in a new way. Conventional drills set airflow by fan speed, based on conservative manufacturer guidelines, with little adjustment if lines block, so fault detection is limited. iQblue instead measures intake air volume via a differential pressure sensor, relates it to calibrated vacuum, and adjusts fan speed in real time to seed/fertiliser flow and forward speed. This enables adaptive regulation, even in multi-fan systems or varied layouts. Clogging or leaks trigger anomaly detection. The modular system ranges from display to full ISOBUS/iQblue Connect control, ensuring precision airflow, reduced losses, better accuracy, and earlier fault detection.

4. HORSCH'S PROACTIVE BOOMCONTROL

Horsch's Proactive BoomControl earned a silver medal for introducing radar-based proactive height control in spraying booms – a refinement that can make or break spray consistency across variable terrain. Instead of reactive correction, it employs 3D radar sensors ahead of the boom to anticipate ground changes. Boom height is adjusted pre-emptively, keeping nozzles at the target distance from the crop. On uneven fields or rolling terrain, this ensures even coverage, reduces drift, and maintains efficacy across the span. In practice, it delivers fewer height jumps, smoother boom motion, and closer adherence to spray geometry. For high-speed spraying and large booms, anticipation improves uniformity and reduces chemical waste, crucial when margins are tight or drift risks high.

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What's driving implement development?

> *"Implement specialists have the experience and resources to stay in the sector through the cycles of agriculture."*
>
> THIERRY KRIER

Many long-line tractor manufacturers dip in and out of marketing implements, with few replicating the success of specialists in crop establishment and protection kit. *CPM* visited Kuhn at its pre-Agritechnica product launch event to reveal more and discover its latest developments.

By Martin Rickatson

For an implement specialist that 'doesn't specialise', the old generalisation that times of 'down corn' tend to be balanced with 'up horn' are something of a saving grace. French firm Kuhn makes or markets almost every machine that can be coupled to a tractor for all four seasons, and because it does so across both arable and livestock sectors, the current downturn in the former is being somewhat softened by slightly better times in beef and dairy.

There are plenty of other challenges that mean the manufacturer, like its peers, is experiencing some of the pain being felt by cropping farmer customers, explains Thierry Krier, global CEO of Kuhn Group.

"The fact the grazing livestock sector is enjoying reasonably good returns across Europe is – for us and others who supply them – at least countering the difficulties and uncertainty we know the arable sector continues to face, although of course that's no comfort to our arable-only customers.

"Agriculture as a whole and its supplying industries continues to face a broad range of challenges. They range from climate events to war, rising input costs compounded by more expensive fuel and shipping, the lingering effects of Covid on supply and demand, and agricultural policy changes, with support funding impacted by increased demands in areas such as defence spending," he added.

"During the first quarter of 2025, we could see improvement ahead but then the US began a trade war which is prolonging the downturn that began in the second quarter of 2023. This agricultural recession, and the machinery sector one it's created, have proven to be

Introducing Karl

Kuhn hopes to have its autonomous power unit, Karl, ready for production by 2028, explained Thierry Krier.

the longest in the industry for 40 years.

"We could see it approaching and adjusted accordingly without redundancies, but there was a lot of inventory for about two years."

Thierry pointed out that things are improving slowly, and by mid-2025 Kuhn was seeing new orders at rates above last year's. "Implement specialists have the experience and resources to stay in the sector through the cycles of agriculture, where long-line tractor makers often have to ask themselves 'why are we doing this?' when times are difficult and short-lines are underperforming.

"In the world market, it's generally necessary to sell 10,000 units of any machine for its manufacturing, marketing and support to be viable. And as our distribution is split fairly equally across the dealerships of the main tractor manufacturers, we have some insulation from any significant strategy changes among them."

On average, from 1500 base models, Kuhn estimates it sells 60,000 machines annually, with 40% custom-configured or built to order rather than being made for stock. That proportion is increasing, while unsurprisingly machines are also getting bigger with higher outputs, said Kuhn Group's Rolf Schneiden.

Highlander

Available in 6.0m and 7.5m models, the Highlander is designed to work from 3-20cm deep for tasks from shallow root scalping to residue incorporation.

"Some 40% of our machine sales across the board are now represented by what we call the XL/XXL sector," he explained.

"That means machines specifically aimed at helping the growing number of larger farm businesses do more in a single pass, whether in cultivator or drill width, or sprayer boom span. Although a grassland example, in Germany last year, the same quantity of triple mowers were sold as single ones.

"In addition to the 20 new products displayed here for 2025/6, we have pipeline developments in test such as a range of direct drills up to 8m – just one result of an R&D spend of more than €50m (£43m) in 2024."

Kuhn's biggest ever R&D project has already made its debut, although it's not quite yet ready for release. Although the firm is increasingly moving to XL/XXL implements, this takes a different direction, said Thierry.

"We hope to have our autonomous power unit, Karl, ready for production by 2028. While it's based around a diesel engine that powers a generator to provide electric drives, our plan isn't to compete directly in the tractor market, but to develop the 'swarm' concept of multiple smaller, lighter machines working together that use 'smart' integrated tools responding to data, mapping and conditions.

"We see such implements as a fundamental element of what an autonomous tractor should be able work with to get the most from its abilities and potential."

Here are some of Kuhn's other recent developments, as presented at the firm's pre-Agritechnica product launch event.

STUBBLE CULTIVATION

Aimed at the burgeoning market for high output shallow-working tine cultivators, the Kuhn Highlander is designed to work from 3-20cm deep according to task and intended effect, from shallow root scalping to residue incorporation.

Available in 6.0m and 7.5m models, it's targeted at tractors of 180-400hp; the Highlander slots in between the Prolander (intended for 3-12cm work) and the Cultimer (7-35cm).

Up front, pre-cutting discs with adjustable pressure are optional for pre-processing residue, cover crops and stubbles. These are followed by four rows of 20.8cm-spaced tines protected by a maintenance-free non-stop mechanical safety system with a 350kg point load.

Available point types comprise three Durakarb carbide types of 50mm, 65/35mm or 80/50mm, and two forged points measuring 60mm or 80mm, while all can have 280mm wings. At the rear, options include a 550mm diameter double-u roller with adjustable pressure, or a triple harrow with hydraulic tilt adjustment, designed to leave residues and roots on the surface.

Working depth is controlled by up to eight gauge wheels, and the machine features a floating drawbar and floating wings for front-rear and side-side contour-following. There are hydraulic or air braking options.

Elsewhere in stubble cultivation, Kuhn's 6.0/7.5m Optimer cultivators are now ISOBUS-compatible, which makes them operational with the firm's Smart Soil Technology (SST). This includes features such as Steady Control Ultimate which provides automatic ground contour tracking adjustment to maintain consistent and uniform working depth across the implement's full width.

Pressure and position sensors connected to a computer determine the optimum pressure in the hydraulic rams to maintain consistent working depth even on uneven ground and at high working speeds, claims Kuhn, while a 'Geo' function permits working depth modulation via uploaded maps or recording of the working depths achieved.

Power harrow

For tractors up to 350hp, also new is the HR6030 RCS 6m power harrow, which can work with general or precision seeding bars and single- or double-tank front hoppers.

Section Control automates headland raising and lowering, while a headland turn mode can be selected to use either the transport wheels or the rear roller.

PLOUGH DEVELOPMENTS

Kuhn's latest Master M mid-range 4-6 furrow ploughs for 100-240hp tractors feature developments primarily aimed at enhancing comfort and safety, both when ploughing and during transport.

Complemented by a 'Comfort' top link bracket, several headstock options include a new GoDrive oscillating front axle, combined with the 'Work and Roll' wheel, a new concept that uses large-diameter wheels to compromise between traction and compaction, while providing on-road safety and comfort, and allowing hydraulic management of working depth from the cab.

Tool-free switching from Roll (transport) mode to Work mode is said to take under a minute. Wheel oscillation during transport means the plough follows the tractor's movement, and is suited to speeds of up to 40km/h.

There's also an EasyDrive option for swift switching to lower link-only attachment for transport, which can be combined with GoDrive. A further option, OptiDrive, provides front suspension shock absorption during headland movements. In terms of the bodies, each has its own accumulator to enhance responsiveness and ground tracking. Furrow width settings span 14-20in (35-50cm).

At the largest end of the scale, the 12-14 furrow semi-mounted Multi-Leader XT can be operated at those same furrow widths. In terms of tractor widths, for those working with wide tyres or dual wheels – perhaps not so common now in the UK – the model is suited to working with widths of up to 4.5m or – when equipped with the offset position memory option – up to 5.5m.

Large-diameter transport wheels are said to enhance traction. The turnover rams are located on the central carriage, and the rear section, positioned after the wheels, is progressively engaged to minimise headland width to as little as 4m, while the front plough can be used alone if required.

TINE DRILL LINE EXPANDED

With mounted tine drills often providing all sizes of farm with a flexible drilling solution even in difficult conditions, Kuhn is expanding its Megant range with the addition of new 7.2m and 8.0m models to join the established 6.0m machine. The 7.2m model matches 36m tramlines over five passes, points out Kuhn, while the 8.0m version is reckoned capable of outputs of up to 8.0ha/hr.

All can be equipped with reversible forward-pointing coulters, straight coulters, or 12mm thin tines. Spacing is at 15cm (20cm on the 8.0m) and tine distribution is over four rows. Hoppers on all machines have 1800 litres capacity, while power requirement is said to be 180hp for the 7.2m version and 200hp for the 8.0m model.

Options include rear press wheels and an additional 110-litre hopper for fertiliser or a second seed type, which is injected into the flow of the main metering unit.

SPRAYER TECHNOLOGY

Kuhn has moved into the trailed sprayer 'big league' with the launch of its Karan range, a line of 4500, 5200, 6000 and 8000-litre models available with steel or aluminium booms from 18-45m and nozzle spacings of 50cm or 25cm.

Despite the capacity of the design,

Multi-Leader XT

The rear section of the 12-14f Multi-Leader XT can be engaged progressively to minimise headland width to as little as 4m; the front plough can be used alone if required.

Kuhn points to a compact overall length of 5.0m from hitch to axle on Karan 5200 and 6000 models. A Track-Matic steering axle offers a maximum steering angle of 28°, and up to 2.05m-diameter VF tyres are available, with optional central tyre inflation, plus mechanical or hydropneumatic suspension options.

In the right fields, Kuhn claims workrates of 100ha/hr are possible, matching the outputs of self-propelled alternatives.

The result of a four-year design and development project, the machine features Kuhn's Autoset solution system, with a tank fill rate of 900 l/min and an application rate of up to 500 l/min.

The Karan is capable of spraying at speeds up to 25km/h, courtesy of a new Eagle 'smart contour control system'. This technology automatically adjusts and actively controls the boom, and is said to be fully responsive at as close as 30cm above the crop.

A pulse width modulation-based AutoSpray system offers independent nozzle control, curve compensation and, claims Kuhn, the ability to maintain consistent droplet size across a wide speed range.

Induction hopper liquid intake rate is up to 220 l/min, and a closed transfer system is optional. Karan sprayers are available with Kuhn's Diluset solution system that automates management of filling, agitation, rinsing and assisted sequential dilution. Karan sprayers are available with PTO or hydraulic drive.

PRECISION WITH FERTILISER

Kuhn's range of ISOBUS Axis and Axent fertiliser spreaders are now available with the firm's OptiPoint Pro technology. The firm points out that outlet opening and closing at headlands varies typically depending on fertiliser type, working width and spreading disc type, and that with some fertiliser/working width combinations, the operator is already turning on the headland when the metering outlets close.

The result is that the spread fan pattern moves fan sideways, causing underdosing on the inside of the bend and overdosing on the outside.

OptiPoint Pro addresses this problem by simply closing the outlets sooner. At headlands, it adapts the spread fan by adjusting the application rate and the drop point. This increases the working width towards the middle of the plot, causing the outlets to close sooner, at the beginning of the headland turn.

Because spread fan doesn't pivot, the correct application rate is maintained right up to the field edge.

The OptiPoint Pro setting is specific to each fertiliser, with the operator entering the details of the fertiliser, the working width, and the type of spreading disc into Kuhn's SpreadSet app. The fertiliser spreader calculates the required application rate and drop-point settings automatically.

With a mobile version, settings can be transferred to the machine directly via an optional wi-fi module; manual data entry isn't necessary. ●

Alternative power taking different paths

"There are potential benefits to be gained from a lightweight battery powered tractor."

FENDT

For decades, tractor design was primarily about output, and while that remains highly influential, other productivity elements are increasingly driving the direction of development. *CPM* examines the alternatives design engineers are adopting to boost arable farm productivity.

By Martin Rickatson

Four-wheel drive, quiet cabs, powershift transmissions, electronic linkage and wheelslip controls, rubber tracks – the decade from the mid-1970s to the mid-1980s saw a proliferation of productivity-enhancing technology in tractors.

Arguably the most rapid progress was in power output – with the maximum available at the top of the tree more than doubling – to help large arable businesses cover more ground in less time.

But with the trend towards reduced tillage – in type, depth and passes – tractor manufacturers are increasingly responding to the shifting demands of large-scale arable farms with more than just extra power.

Arable tractor technology developments are being driven by newer concerns ranging from emissions and fuel costs, to soil health and compaction. Then, there are weather window challenges, the growth in farm enterprise sizes, cost, carbon and general environmental benefits of reduced cultivation and chemical use, and difficulties recruiting and retaining skilled operators. Each offers the potential to address some of those challenges.

SOLAR POWER

In the early 2010s, Danish brothers Jens and Kristian Warming set out to develop a technology-driven way of reducing the cost and labour requirements of weeding their organic sugar beet crops, combining autonomy and alternative power. Their first prototype was built in 2012, and after securing external investment, in 2018 they launched the FarmDroid v1.0, selling 12 units that year.

In 2019, FarmDroid expanded into Germany, Austria, Switzerland and the Netherlands, selling 38 additional machines, and the product made its first appearance at Agritechnica. By spring 2022, more than 250 FarmDroid robots were operating across 15 European countries, seeding and weeding more than 30 different crops.

The company's core FD20 model

Power recharge

Once the FarmDroid has exhausted its solar-powered batteries at night, it stops work, recommencing as soon as daylight returns and sufficient new charge has been accrued.

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is a fully autonomous, solar-powered precision seeding and weeding robot. Using sub-centimetre RTK steering correction, the machine plants seed and records the placement position of each one. Using as-planted mapping, this latterly enables the same machine to then later be used for not only inter-row weed removal, but also inter-plant weeding.

Although it requires trailering between fields, once set up via field mapping, the FarmDroid is fully independent with four solar panels delivering up to 1.6kWh, equivalent to 20 kWh per day. Surplus energy is stored in lithium batteries that generate enough power for 18-24 hours of daily operation, depending on weather and working conditions. The machine carries on working into the night until the batteries are exhausted, then moves off again in daytime once they're replenished by sufficient light.

Two electric motors producing 800w jointly propel the FarmDroid FD20 up to a maximum 0.95km/hr, translating into a potential maximum seeding/weeding workrate of 6ha/day.

In March 2022, Lincolnshire-based Opico began selling and supporting FarmDroid in the UK. To help cater for a broader range of soil conditions throughout the growing season, the Danish manufacturer recently introduced A-shares and L-shaped knives to fit to the machine's inter-row weeding arms.

Where previously the only option had been low-draft weeding wires, the new blades are designed to deal with larger, more mature weeds and to help get closer to the crop without damage.

Opico suggests this is especially valuable when poor weather broadens intervals between hoeing passes, allowing weed growth to get ahead of the crop. The more aggressive action of the new shares also helps to break up capping and surface compaction, particularly in the wheelings, aiding rainfall penetration and providing a flush of mineralised nitrogen for the crop, suggests the firm.

Tech spec

The AgBot 5.115T2 has an 8.0t capacity category III rear linkage and a 3.0t category II hitch up front, plus up to four spool valves and electric PTOs.

Weeding capabilities

In addition to crop establishment, the FarmDroid is capable of solar-powered inter- and intra-row weeding using the seeding maps created.

While the initial Farmdroid development was based around seeding and later mechanical weeding with the same machine, the latest development adds spot-spraying ability. As such, the manufacturer and importer aims to extend the FD20's appeal beyond organic producers to conventional growers looking to reduce herbicide usage, and those looking to apply micronutrients on a field or area basis.

FarmDroid engineers have designed a system that permits both in-row and inter-row product applications, providing targeted doses where required. The system can be configured to apply product to the plants or to the spaces or rows in between, and the manufacturer suggests selective herbicide rates can be cut significantly, with Danish studies pointing to a potential reduction of 94%.

The system also makes possible the use of cheaper non-selective herbicides between the crop rows where necessary, suggests the maker.

AUTONOMY WITH DIESEL-POWERED ELECTRIC DRIVES

Other farmers looking to autonomy as an answer to labour-sourcing challenges, but requiring a machine with greater power and traction for deeper work, now have a choice of tractors that require no direct operator but retain diesel engine power for more arduous operation.

As an example, from one manufacturer, AgXeed, there are three designs on offer to cater for different requirements. Imported into the UK by Cambridgeshire-based ASC Autonomy, the three-wheeled, four-wheeled and twin-tracked AgXeed AgBot models are built by the Dutch business that was founded in 2018, beginning commercial production in 2022.

Three-wheeled models are designed primarily for specialist applications, and like their four-wheeled counterparts, are powered by a 75hp Deutz four-cylinder engine. Arguably of more interest to UK arable farmers is the twin-tracked model, the 5.115T2, which features a powerplant of the same make and configuration, but which offers more than double the output, with 156hp of power and 610Nm of torque. Drive to the tracks (or the wheels on electric versions) is via electric motors, and track width is adjustable from 1.9-3.2m.

With regard to implement handling, the AgBot 5.115T2 is largely comparable with other tractors of similar power, with an 8.0t capacity category III rear linkage and a 3.0t category II hitch up front. Up to four double-acting proportional spool valves can be specified, as can a Power Beyond facility, and 85 l/min of oil is available at 210 bar pressure.

As with other robots on the market, the AgXeed models incorporate a multitude of features for maximum autonomous working safety to prevent contact with humans, animals or objects. These include an obstacle detection system combining a LIDAR (light detection and ranging) sensor on top of the machine, plus ultrasonic, radar and contact-sensitive sensors integrated into the safety bumper. These are complemented by visual indicator lights and an audible warning alarm, plus emergency stop buttons around the machine. Boundary geofencing ensures the AgXeed machines cannot leave an operator-set perimeter.

Initial set-up comprises supplier field surveys using GNSS technology, after which the geofences created are uploaded to the new owner's AgXeed portal account. Partner implements are also uploaded in terms of type, width and other detail. These are then connected virtually to the AgBot in the portal.

Task set-up then consists of selecting a field, choosing an AgBot-implement combination and defining desired process

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parameters such as working speed, working depth and hydraulic remote valve settings. The operator then selects a desired reference A-B line and the portal then takes over and automatically creates the routing and task, allowing the machine to then be set working.

To underscore manufacturer claims that autonomous tractors are just as capable of complex, high draught tasks as simpler topwork jobs, earlier this year an AgXeed AgBot 5.115T2 working with a Kverneland LO 300/85 five-furrow reversible plough set a driverless ploughing world record.

Balanced with a 1500kg front weight and working for 24 hours, with stops only to refuel, the AgBot ploughed 20.8ha – a task the partner firms suggest would typically require two days with a conventional tractor and plough. Working at 22.5cm (9in) deep, with a furrow width of 40cm (16in), the machine operated at speeds of 5.6-8.0km/h.

Diesel consumption across the 24 hours totalled 382.72 litres, averaging 18.4 l/ha, and is believed to be comparable with, or better than, traditional manned tractors. AgXeed attributes much of this to the efficiency of the AgBot's diesel-electric drivetrain, plus its path and headland planning abilities.

NATURAL GAS FUELLING

For almost 20 years, New Holland parent business, CNH, has pursued what it calls a 'Clean Energy Leader' strategy, seeking to develop machines which fit the model of a circular economy where fuel can be derived from on-farm and potentially carbon-neutral sources.

In 2013, following trials with biodiesel and hydrogen fuel cell power, New Holland unveiled a methane-powered version of the T6 series tractor built at its Basildon factory in Essex. Five years later, it announced its intention to put into production a methane version of the top T6.180 model by 2022.

Transport requirements

Like other autonomous tractors, the AgXeed robots require trailer transport to move between unconnected fields.

Record breaking

An AgXeed AgBot 5.115T2 plus Kverneland five-furrow plough set a driverless ploughing world record earlier this year, covering 20.8ha in 24 hours.

The T6.180 LNG (liquefied natural gas) Methane Power features a modified version of the standard turbocharged and intercooled 6.7-litre FPT six-cylinder engine used in the equivalent diesel T6.180, with no compromise in maximum power (145hp, or 175hp with transport/PTO boost) or torque (740Nm).

The primary difference is in a specific cylinder head for gas injection and spark plug ignition, while ensuring enough gas can be carried to maximise refuelling intervals means several saddle tanks totalling 183 litres capacity (comparable diesel capacity is 230 litres) are integrated around the chassis, supplemented by a front linkage-mounted 270-litre additional tank.

Acknowledging that many modern arable farms require tractors with significantly more than 180hp, in 2024 New Holland announced the expansion of its alternative fuels product portfolio with the debut of the T7.270 CNG (compressed natural gas) Methane Power, built like its T6 sibling at what the firm calls its Alternative Fuels Centre of Excellence – a specialist area of its Basildon factory complex.

Based on the latest 'T7 with PLM Intelligence' platform, the larger tractor features many of the same principles and similar technology, such as the 6.7-litre engine, but with peak torque of 1,160Nm and maximum 270hp output under all conditions. The T7's larger chassis enabled New Holland to maximise on-board gas storage – with a total of 1265 litres (219kg), the T7.270 CNG holds 178% more fuel than the T6.180 Methane Power (455 litres/79kg), considerably increasing productivity and range.

Like its T6.180 Methane Power LNG sibling, the T7.270 Methane Power CNG largely resembles its diesel-powered equivalent, but New Holland engineers made detail changes such as new supports beneath the cab with the battery relocated to the left-hand side, all intended to release space for more gas capacity.

Post-combustion of the methane, exhaust gas passes through a three-way catalyst which ensures sufficient emitted cleanliness without requiring typical exhaust gas recirculation (EGR) or selective catalytic reduction (SCR) treatments. Versus its diesel equivalent, particulate emissions are reduced by 98%, non-methane hydrocarbons by 90%, carbon monoxide by 75%, carbon dioxide by 11% and nitrogen oxides by 62%.

But what are the direct advantages for a potential arable farm buyer? Beyond general pluses including an engine noise reduction, running costs are believed to be up to 30% lower at current fuel prices. Maximum fuel efficiency is said to be achieved at around 1500rpm, so the methane-powered tractor is reckoned best suited to low draught tasks.

Perhaps the greatest potential appeal of methane power, though, is the prospects it offers for release from reliance on external fuel suppliers and exposure to diesel cost variations. There are estimated to be more than 17,000 anaerobic digester/biogas plants now operating in the EU, and a significant number in the UK.

Farm businesses with access to or operating their own anaerobic digestion plants have the possibility to invest in the equipment necessary to tap into the gas they produce as a fuel source, suggests New Holland. Since 2021, it's been working with Bennamann, a Cornwall-based natural gas power technology business in which its parent, CNH, has invested. Technology developed by the firm allows methane to be collected and processed from AD plants and slurry lagoons for use as fuel, using similar technology to that established in the HGV sector. On-farm fuelling is possible in-situ or via lorry tanker design that enables mobile/in-field deliveries.

BATTERY-ELECTRIC DRIVE

Previewed in July issue of *CPM* following its UK launch this summer, Fendt has taken yet another path to alternative power with the development of its e100 S Vario. Using similar principles to its vineyard-targeted e100 V Vario launched in 2024, the e100 S Vario is acknowledged to have been designed primarily for the utility, amenity and

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leisure sectors, with size and weight limiting the development of larger battery power packs for heavier-duty tasks.

However, Fendt believes there are potential benefits to be gained from a lightweight battery-powered tractor in certain sectors of mainstream agriculture, especially for those with their own energy production/electricity generation infrastructure.

The tractor's drivetrain uses Fendt's established continuously-variable Vario transmission powered by a battery driving an electric motor. In addition to its quiet-running and zero emissions advantages, this permits energy recovery from deceleration or downhill travel, which is used directly to recharge the battery and so extend operating time between charges.

The entire driveline system is again managed by a variation on existing Fendt technology, in this case the brand's Tractor Management System (TMS), which automatically regulates the motor and transmission to operate the tractor in the most economical manner. The operator sets the target speed, and TMS then continuously adjusts the transmission setting and motor speed for optimised energy consumption.

When the motor comes under load, the load limit control takes over the motor speed and transmission setting. Motor speed automatically rises in response to increased load. As soon as the operating conditions allow, the tractor runs at reduced motor speed.

Maximum power is 68hp in Eco mode and 75hp in Dynamic mode, while up to 90hp is available in Dynamic+ mode, but battery charge limitations mean this can only be sourced for short periods. With a battery capacity of 100 kWh, the tractor is believed capable of 4-7 hours operating time when used in the partial load range, such as for mechanical weed control or planting work. Energy-intensive operations such as trailer transport will reduce this, acknowledges Fendt.

In circumstances where a farm has the facility to generate its own electricity by renewable means, e100 S Vario operation is claimed to be potentially almost CO_2 neutral, while the tractor's running costs are also significantly reduced when compared with a diesel equivalent. With no exhaust gas after-treatment, engine filters or engine oil to service, the cost of maintenance and service parts is also reduced in comparison, suggests the maker.

Fuelling up

Refuelling the New Holland Methane Power tractors, such as the T6.180 model shown here, isn't too dissimilar to filling with diesel.

The more challenging aspects for arable farmers are the machine's limitations in terms of heavier tasks and its purchase price, but Fendt believes it may well find a place for lighter jobs among users seeking greater energy independence and a way of proving environmental commitment to increasingly demanding produce buyers. ●

Talking TATIES

WITH ANDREW WILSON

A new-to-us addition

Well, we started this month ahead of usual but things have a habit of upskittling themselves at times, and as things stand we've not yet started harvesting potatoes, despite half of them being ready.

Since we lost diquat, our desiccation method has been to flail and spray with carfentrazone on a sunny day. The important part here is the sunshine – if it isn't bright, it just doesn't work. The bonus to this approach is the press wheels on the back of our topper close up any ridge cracks where light might get in to prevent greening.

Yield digs suggest our heavier land will be better performing than the light, and land in a long rotation will fare better than that in a short one. This isn't a surprise, but has been exacerbated this year somewhat.

One pleasant surprise, given the heat and high physiological age, is the lack of daughter tubers sprouting in the row. Skins are mostly nicely set, but the dry matter of some varieties remains stubbornly high, so for all we now have some moisture, we must be gentle when harvesting and vigilant in store. There'll be no extra tonnage this year to cushion the blow of any mistakes, every taty counts.

Drilling has gone well this season, although we've parked the disc drill up and are currently using our strip-till to sow into subsoiled and cultipressed seedbeds in the main. This deeper cultivation alongside the leading leg-style drill ought to enable better drainage this winter, in an attempt to not lose a crop to flooding. Tungsten and Ferobide have shown their worth in the hard dry conditions we've had this autumn.

On the face of current prices, a wise farmer would perhaps restrain from sowing crops just now. The state of the market was brought to my attention recently when somebody pointed out that a tonne of grain used to pay a farmhand for a week, whereas now it barely pays for a day. Machinery has doubled in price in 10 years, and as for the fertiliser market antics in recent times, well, a man could swear!

In austere times like these it's easy to put the brakes on investment, lock the cheque book away and say no more. The bother with that is everything finishes up worn out at the same time. During the past 10 years or so we've grown our fleet of tractors rather than necessarily replace them. This has come about as new prices have risen to unaffordable levels, and we've tended to spend the 'cost to change' (or a bit less) on an addition to the fleet and retain what would have been the outgoing machine.

This has brought significant flexibility and convenience, particularly given we do everything here in-house except sugar beet harvesting, and have some tractors on row crop wheels for a chunk of the year. It allows flexibility, in-house back up and convenience too.

Average clock hours across our seven main tractors are around 8600, at an average age of 16 years, the newest being seven-years-old. None have under 5000 hours, only one has over 10,000 hours, but three have amassed more than 9000. We've considered various solutions including hiring or buying a new one, but a quote some months ago soon had that idea off the table.

In my experience, older tractors don't break much more than new ones if you keep maintenance up to scratch. So we try to keep on top of the niggly jobs that need doing so they don't become big ones, and like them to be tidy and fully functional.

Our most recent new tractor was purchased in 2015 and at this point I can't see a time when we'll repeat that experience, although I hope somebody does, or the supply of second-hand machines will dry up.

Depending on requirements at the time, we've bought young, old, high and low houred tractors, and have no issue running reliable machines into the teens of thousands of clock hours. I wasn't overly looking to make a purchase just now, but a very tidy 10-year-old example came up for auction locally which fitted the bill perfectly, so I did some research, spoke to my friendly finance company, and set myself a limit.

The trade was keen for such a smart machine, but so was I, and home she came. The reason for the auction is a sad one – the family hosting the sale was faced with a situation where its generations didn't pass on in the traditional order. Difficult decisions and changes had to be made to allow life to continue in a sensible fashion.

If nothing else, this illustrates the fragility of life. Us farmers farm as if we're going to live forever, but in reality, we are but a speck in time. I just aim to do my bit and leave this place in better condition than when I started, not dissimilar to a lot of people, I guess.

Still on the subject of machinery, you may remember 'Twinkle toes' joining our sprayer armoury last winter? It's a lightweight hydrostatic sprayer bought for flexibility and to increase capacity and capability to our operation.

What I underestimated was the convenience of having two sprayers – the larger trailed machine is currently still on narrow wheels as we finish desiccating potatoes, and Twinkle is on flotations doing pre-em herbicides on the cereals. The downside is 1990s technology is a step back in time.

Here's to a fruitful, hassle free (hah) and above all, safe, potato harvest. ●

YOUR CORRESPONDENT

Andrew Wilson is a fourth-generation tenant of the Castle Howard Estate in North Yorkshire. He has a strategic approach to direct drilling on his varied soil types and grows a wide variety of crops. He's passionate about the potato industry and having been utilising cover crops to reduce cultivation and chemical use since 2011, dipped his toe in the water of regenerative potatoes in 2021. @SpudSlingsby

Why detail makes the difference in sugar beet

With margins under pressure, sugar beet's future hinges on productivity. From seedbed conditions to stacked traits in varieties, *CPM* explores how detail and innovation can keep the crop competitive.

By Charlotte Cunningham

After a turbulent few seasons, sugar beet is once again under the spotlight. Growers and breeders alike are reflecting not just on the crop's challenges, but on how to sharpen its productivity and maintain its place in UK arable rotations.

For some, the crop's resilience and margins remain attractive. For others, rising costs and market volatility are forcing difficult decisions about hectarage.

What is clear, is that productivity – in its broadest sense – has become the critical factor. From seedbed preparation and nutrient management through to variety choice and trait innovation, every detail matters to extract yield and profitability from the crop.

"Sugar beet has had a tricky few years," acknowledges Martin Brown, sugar beet product manager at KWS. "It's been up and down, but in general, margins still compare favourably with cereals. British Sugar currently has good stock levels after a run of high-yielding crops, which has meant a dip in demand for 2026. But longer term, supply and demand look stable, so it remains a reliable crop to bank on."

The foundation of yield

Establishment is universally recognised as the foundation of yield, and getting the seedbed right is absolutely crucial, stresses KWS' Martin Brown.

Yet from the farm gate, the story looks more cautious. At Upton Suffolk Farms in Suffolk, farm manager Nick Sheppard says profitability is tightening. “Sugar beet was a very good margin crop, but the recent price shifts have taken the shine off. We’ll be reducing our area and confining it to heavier land where we know yields can get close to, or exceed, 80t/ha – that’s the level we require for an acceptable margin.”

It’s this tension – between broad market stability and on-farm financial scrutiny – that places productivity firmly at the heart of the debate. So how exactly can growers ensure sugar beet crops are as productive and profitable as possible?

Establishment is universally recognised as the foundation of yield, and getting the seedbed right is absolutely crucial, stresses Martin. “Too often, especially on heavier soils in dry springs, cultivations have been rushed or insufficiently refined. That leads to cloddy seedbeds and poor seed-soil contact. Given that you’re only placing 110,000-120,000 seeds/ha. Every seed has to count.”

Historically, lighter tractors and drills forced growers to prioritise fine tilths. However, today’s heavier kit coupled with a temptation to push on regardless of soil condition, can come back to bite growers, he warns. “You can ‘get away with it’ at drilling, but the penalty comes later when plant stands are patchy and roots are small.”

Nick adds that land choice is an important part of establishment discipline, too. “We won’t grow beet on our sands anymore, at the current pricing. On light soils, water drops straight through and you lose canopy resilience – opening the crop up to beet moth and drought stress. By sticking to heavier ground, we know we can hold onto moisture and achieve the 80t/ha threshold we want.”

For BBRO’s Alistair Wright, the early stages of the sugar beet cycle is also about hygiene. “Hygiene is one of the simplest productivity tools we have, but is often overlooked. Aphids can overwinter in a clamp on leaf remnant. That’s your inoculum source for virus yellows the following year.

“Resetting the clock each season – cleaning spoil heaps, putting waste back in-field, avoiding clamp sites on next year’s beet ground – is critical. It’s an age-old message, but one that still gets overlooked.”

Nutrient management is another cornerstone of productivity, and at Upton Suffolk Farms, digestate from the on-site AD plant is central to the system. “We apply digestate ahead of beet and combine it with starter fertiliser at drilling,” explains Nick. “On our high pH soils – often up to pH9 – nutrient availability can be tricky, so we’re also trialling Johnson-Su microbial compost extracts to enhance soil biology and make nutrients more available.”

Tightening margins

At Upton Suffolk Farms Nick Sheppard says profitability is tightening, meaning its imperative sugar beet productivity is optimised at every opportunity.

MANAGING LOCK-UP

The challenge with these high pH soils is that they lock up key nutrients, he continues. “Phosphate, manganese and boron are especially affected. That’s where placement fertiliser and foliar micronutrients come in. We’ll use manganese and boron foliar feeds, and increasingly we’re looking at biologicals to stimulate microbial activity and free up tied nutrients.”

Looking at some of the main challenges that threaten productivity in general, managing virus yellows remains key. “With neonicotinoid seed treatments unlikely to return, genetics are the only sustainable long-term solution,” says Alistair. “But genetics alone won’t deliver. We’re testing repellents, mulches and cultural tools to confuse aphids or reduce landing pressure. Every measure that delays the demand for insecticide helps to protect beneficials and prolong chemistry efficacy.”

Threshold-based spraying is becoming increasingly difficult too, adds Nick. “Aphid pressure doesn’t arrive uniformly; I’m walking beet at least once a week from mid-May, and twice a week in peak conditions. You’re trying to judge thresholds without missing the window – it’s a constant balancing act.”

Cercospora is another growing threat. “We’ve seen fungicide resistance emerge rapidly, particularly to strobilurins,” warns Alistair. “Our monitoring shows resistant populations reset each winter, suggesting a fitness cost. But resistance to other modes of action is only a matter of when, not if. Alternating chemistry, integrating tolerant genetics like CR+, and avoiding overuse are essential to slow the process.”

The onset of a beet moth issue has also forced a rethink, he adds. “It’s been the breakout pest of the past two ▶

Genetic solution

With neonicotinoid seed treatments unlikely to return, genetics are the only sustainable long-term solution, says BBRO’s Alistair Wright.

New generation of varieties

The most recent advance from KWS has been the introduction of CR+ varieties, such as Chyma KWS, designed to slow the onset and spread of cercospora leaf spot.

seasons. We're now using AI-driven smart traps with pheromone lures to capture moths and upload daily images. This allows near real-time monitoring of migration, helping identify optimum spray windows if intervention is required.

"It's far more effective than sticky traps, and we're aiming to expand this system in 2025 so growers can access the data on a central platform."

In terms of genetics and the role they play in mitigating the impact of some of the challenges, modern breeding has transformed sugar beet's resilience – and KWS has arguably been at the forefront of that shift, suggests Martin. "It wasn't long ago that rhizomania resistance was a niche trait, now it's universal. Since then, we've added BCN tolerance, Conviso Smart for weed beet control, virus yellows tolerance, and most recently CR+ for cercospora. Each trait addresses a specific on-farm challenge."

The most recent advance from KWS has been the introduction of CR+ varieties, such as Chyma KWS, designed to slow the onset and spread of cercospora leaf spot. In untreated trials, CR+ material has shown strong tolerance, maintaining green leaf area later into the season without the rapid senescence that often undermines yield.

Martin explains that this approach doesn't eliminate the need for fungicides, but does buy valuable time and ensures chemistry, when applied, is more effective.

Virus yellows tolerance is another area where breeders have made tangible progress. Maruscha KWS was the first tolerant variety on the UK Recommended List, followed more recently by Generosa KWS.

"While Maruscha carried a small yield penalty in clean conditions, it proved its worth under pressure, retaining more of its yield where infection was present," says Martin. "Generosa has closed much of that gap, offering stronger output alongside tolerance, reflecting the steady narrowing of the so-called 'yield lag' between tolerant and standard varieties."

TACKLING BCN

For growers wrestling with beet cyst nematode, options such as Katjana KWS provide both high yield and nematode tolerance, coupled with strong bolting resistance to support earlier drilling, he adds. "Meanwhile, the development of stacked-trait Conviso Smart varieties, like Smart Nelda, has opened up ground that was previously off limits. By combining weed beet control with BCN tolerance, these varieties allow growers to reclaim infested fields and manage them more efficiently."

With regard to advice for selecting the right variety, Martin advises starting by looking at the threats specific to the farm. "If BCN is present, pick a tolerant variety. If weed beet is limiting, Conviso Smart can open that land back up. For later lifts into December or January, canopy health and disease resistance are essential."

Reflecting on his own farm requirements, Nick adds: "We risk-manage lifting – a quarter in October, a quarter in November, a quarter in December, and the rest in January. That means crops must stand through to the new year without dropping quality. An erect canopy that protects the growing point is vital – not just for light interception, but also for pest resilience to reduce the likelihood of beet moth infestations."

It's Alistair's belief that varietal traits are increasingly setting the baseline for productivity. "You may still see some yield loss from virus yellows, but tolerant varieties take the edge off. Add in bolting resistance, priming and pelleting, and you have seed that's far better equipped to deliver when it matters most."

Nick agrees, pointing to his own experience. "We trialled Conviso in 2021 on a block that had historically yielded no more than 30t/ha because of weed beet. With Conviso it delivered nearly 89t/ha, and sugar content was the highest of the lot. It was a complete turnaround."

In terms of what lies ahead, while growers will always be at the mercy of the sometimes-cruel hand of Mother Nature; for breeders, the focus is on stacking traits without sacrificing yield; and for researchers, it's about embedding IPM strategies and harnessing new monitoring technologies.

For growers, it comes down to margins, resilience on-farm... and praying the season is kind. "It never fails to amaze me how we go from a small box of seed to 100t of beet," concludes Alistair.

"But that only happens if we get every stage right – hygiene, establishment, genetics, nutrition, monitoring. Productivity isn't one silver bullet, it's the cumulative effect of attention to detail."

Productivity Matters

In this new series, Productivity Matters, *CPM* has teamed up with KWS to examine the breadth and depth of how optimum productivity can be achieved within arable rotations.

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WE BECOME RAGT

Beating the virus

Ten years in the making, ST Tweed poses one of the first in a generation of new virus yellows-tolerant sugar beet varieties. Now entering its second season of availability, *CPM* speaks to breeder Strube, to find out why it should pique grower interest.

By Janine Adamson

According to Strube's Richard Cogman, ST Tweed is a prime example of what can be achieved following a 10-year, targeted sugar beet breeding programme. The variety – one of the first to deliver virus yellows tolerance – offers a robust package, he adds, and is expected to be reliable and stable in its 'real world' performance.

While Tweed became commercially available earlier this year, its story began long before, explains Richard. "Anticipating that the beet industry's reliance on neonicotinoid seed treatments was under threat, Strube commenced breeding and field trials for virus yellows tolerance in 2015.

"In ways this was timely, given the very high incidence of virus yellows in 2020 where the value of the loss was estimated at more than £65M – equivalent to around 25% yield loss."

EMERGENCY AUTHORISATION

This high pressure year did lead to an emergency authorisation for neonicotinoid seed treatments between 2022 and 2024, which had previously

Genetic power
Varietal tolerance is critical in the fight against viruses in beet, stresses Strube's Richard Cogman.

been banned in 2019. However, moving forward without this option leaves two main solutions, points out Richard.

"Although growers can use foliar insecticides to combat the aphid vectors of beet viruses, the insect's ability to adapt and develop almost complete resistance remains strong. This was a key reason why the industry turned to insecticidal seed treatments in the first place.

"So while these are currently applied in accordance to monitoring and thresholds, their long-term future is under question. This means varietal tolerance is critical in the fight against viruses in beet," he stresses.

Delving into more detail, Richard highlights that the earliest understanding of 'beet yellows virus' (BYV) dates back around 90 years, but it wasn't until the early 1950s that the aphid species responsible for transmission were identified.

At the same time, another less yield impactful virus was detected, now known as 'beet mild yellows virus' (BMYV). Then in the 1980s and 90s, a new virus was discovered, later named 'beet chlorosis virus' (BChV) – forming the three-virus complex faced by growers today.

Results from BBRO's 2024 Goliath trial suggest Tweed is highly tolerant to poleroviruses (BChV and BMYV) when compared with controls, raises Richard. "It's well documented that poleroviruses can reduce yield by 24-27%. This risk is increased by their greater prevalence in recent years when compared with closterovirus BYV, which is generally more fluctuating.

"Tweed is promising because in the trials it retained around 88% and 95% of its yield against 100% inoculation of BChV and BMYV, respectively. This demonstrates the variety's tolerance to both viruses; we knew it had potential, but the trial has provided hard, independent evidence.

"Furthermore, accompanied by aphicides applied at threshold before the crop reaches 'mature plant resistance' at 12-14 leaf growth stage, Tweed can offer a high level of protection against these devastating viruses."

As for the specific genetics involved in achieving this tolerance, Richard says they're derived entirely from Strube's own 'pool' and internal classic breeding programme. He also points out that they're based on a multi-gene tolerance mechanism, rather than single gene, to help future-proof.

But critically, has this genetic advancement come at a cost? Richard believes not. "Tweed is very low bolting and has excellent canopy health; it scores an 8 for cercospora (2026 RL) and is also better than average for rust and powdery mildew.

"Breeders must stack traits for cumulative benefits that align with the demands and challenges UK beet growers face. Maintaining yield and overall resilience is essential, which is what we were striving for with Tweed."

All-rounder

ST Tweed is low bolting, scores an 8 for cercospora, and is better than average for rust and powdery mildew.

FROM THE FIELD

Suffolk arable farmer, James Faulds, opted to grow Tweed this season for its virus tolerance. On heavy land, the farm's sugar beet crop is both drilled and lifted early, with risk management a key priority.

"Although we're not as exposed to virus yellows as other growers, I've seen the damage it can do so it's something I'm very cautious of. That's why I decided to add more diversity into our beet by growing Tweed."

Having just harvested the crop he says it's showing promise. "We drilled into good seedbed conditions at 15cm row spacing, although the weather meant the ground did dry up quickly.

"Even so, we achieved a stand of around 110,000 plants/ha with a decent canopy structure. Now at harvest, the crop's root size is surprisingly large despite the lack of moisture. Trial digs 10 days ago suggested 87t/ha at 18% sugar, so if we achieve that, I'll be happy."

James says based on these numbers, Tweed has delivered a solid performance that's on par with the other varieties he'd usually grow. "I don't see any negatives so far, it's a good all-rounder.

"The only other trait we require is low bolting due to our early drilling window. We had a few bolters in the crop of Tweed, but nothing consequential," he adds.

For those growers without a virus yellows problem, the relevance of Tweed may be questioned; Richard proposes there are two other Strube varieties which could appeal.

"Ultimately, varieties have to align with what growers are facing on their land, while respecting the requirements of British Sugar and BBRO. For those looking for an all-round yield builder, there's Morgan, which has a treated adjusted yield of 96.8 and demonstrates good all round resilience.

"While if the main challenge is beet cyst nematode (BCN), Button is a tolerant variety aimed specifically at that market," he explains.

For now, these three varieties are being marketed by Strube, but following the company's recent acquisition by RAGT, there's a transition to become one combined force.

Richard believes the move will enable greater investment and resource into the sugar beet breeding work Strube has conducted so far. "Growers can expect to see further progress to support yield stability from pest and disease pressure through resilient genetics and the combination of multi-tolerance traits.

"This will be the direction of our candidate pipeline into trialling for national (now VL) listing, then RL listing and commercial reality; breeding progress together," he concludes. ●

Being careful with Conviso

Why attention to detail is a must when it comes to Conviso beet

While interest in the Conviso Smart system continues to grow due to being a reliable and effective weed control method in sugar beet, crop husbandry still requires the same level of detail, stresses one agronomist.

Having advised on the system – which involves planting a Smart beet variety and using a dedicated accompanying herbicide – for around five years, Farmacy's Jack Richardson says spray timings are critical in achieving success.

Furthermore, this has been demonstrated acutely this past year, given challenging spring weather conditions. "It's not a case of it's easy and you can blanket spray herbicides regardless, Conviso varieties require good management.

"While the Conviso system is effective at weed control, including weed beet, careful husbandry in the crop is still required to time everything correctly. You can drill multiple fields on the same day, but due to soil type, condition and weed pressure, they'll develop very differently," says Jack.

Evaluating a crop of Smart Rixta KWS grown at WD Branton in Deeping Saint Nicholas, he highlights the importance of pre-emergence herbicides in preparing for Conviso beet.

"This crop received Goltix (metamitron) plus Efeckt (ethofumesate) with the purpose of buying some time. On siltier land especially, you can be waiting for weed beet to emerge and in the meantime, broadleaf weeds such as fat hen will become established and too big."

Regarding application of the Conviso One (foramsulforon+ thiencarbazone-methyl) herbicide, Jack believes in this instance, it could have been earlier. "There's maybe only one week in it, but once fat hen is 5-10cm tall and just above the sugar beet, it's very difficult to control, continues to grow and competes with the crop.

"We timed the application according to emergence of the weed beet, but you have to be mindful that in doing so, you must have controlled the fat hen adequately with the pre-em first."

Looking to the 2026 growing season, Jack hopes with some moisture in the seedbed, this should help with pre-em performance. "Then it's targeting the weeds when they're at 2-4 true leaf stage with Conviso One. It might seem a little strong for the sugar beet crop, but the damage won't be as bad as you'd perhaps expect."

Overall, he believes the Conviso system has been revolutionary, allowing sugar beet to be grown on fields regardless of weed beet pressure. "There's also the added benefit of the chemistry controlling volunteer potatoes.

"Having advised on the technology since it first came out, I've not noticed yield penalties in terms of the varieties; I believe there's more to yield than the variety or seed rate.

"However, it doesn't suit everyone and there are stringent stewardship requirements, such as staying on top of bolters within the crop to prevent carry over of resistant seed, as well as controlling any volunteers within following cereal crops."

As the 2025 sugar beet campaign is now underway, the importance of accurate harvester set-up has also been highlighted. This is due to variable root size and therefore potential harvester losses and subsequent volunteers.

Despite prolonged arid conditions, initial feedback is that yields are encouraging, although there's variability, says Andrew Dear, British Sugar's head of technical support. "Overall, this year's crop continues to develop well; we're expecting good yields and sugar contents in the Wissington area."

Accurate harvester set-up requires a skilled operator with good attention to detail, because if done poorly, the results are often highly visible, explains Stephen Aldis, BBRO head of field operations.

"Most contractors are experienced and use well-maintained machinery, so do a good job. Changing crop conditions often require harvester adjustments and this can be where issues occur such as over-crowning, broken roots and beet being lost through the machines," he says.

Losses of this type pose a risk to future crops through the proliferation of disease, virus and soil-borne pests, as do temporary clamps of field margins. Controlling these threats to future performance can be achieved through ploughing or spraying with Roundup (glyphosate).

Critically, where Conviso Smart volunteers emerge in the following rotation and the crop restrictions permit, these are best controlled with Group 4 herbicides, says Bayer's Roger Bradbury. This group includes mecoprop, 2,4-D, MCPA, aminopyralid, fluroxypyr, triclopyr and dicamba, meaning there should be a range of suitable products available, he adds.

According to Roger, the use of ALS inhibitors in sugar beet isn't new – triflusulfuron-methyl, a sulfonylurea used for the control of broadleaf weeds, gained approval more than 20 years ago. However, the introduction of the Conviso Smart system and Conviso One extended use of an already heavily utilised group of active substances, he stresses.

"ALS herbicides are often widely used because of the flexibility and efficacy they bring to weed control, but changing farming practices mean increasing reliance on a reducing number of products. Cultural measures and use of alternative modes of action are vital if they're to remain effective long-term."

Field management ahead of drilling is often the best opportunity to control problem weeds, and an important step in reducing the risk of resistance developing, he points out.

"Effective weed control and convenience of operation are strong justifications for choosing the Conviso Smart system, but without effective bolter control, groundkeeper management and diligent use of all available herbicide groups across the rotation, growers risk compromising its versatility."

Yield performance
Having advised on the Conviso Smart system since it first came out, Farmacy's Jack Richardson hasn't noticed significant yield penalties in the varieties.

Help required with potato survey

Call for all growers to participate in *CPM's* potato pest survey

To fill in the short survey, scan the QR code or visit surveymonkey.com/r/VKHNG88

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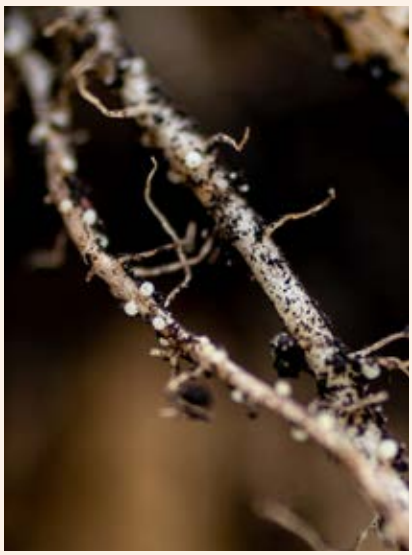

All UK growers are encouraged to participate in an independent survey which aims to gather insight about what farmers know about potato cyst nematode.

Microscopic yet catastrophic, PCN are a serious pest problem that continues to plague potato growers across the UK.

Following a recent article in *CPM*, whereby the importance was stressed to all who manage land with potatoes in the rotation, a survey has been launched.

By working with GB PCN Forum (a partnership between GB Potatoes and CUPGRA) and Harper Adams' Nematology Research Group on this independent survey, *CPM* wants to gather insight about what farmers know about PCN, with no pre-conceived thoughts on current levels of understanding.

But why? If UK agriculture ignores PCN, in 40 years there'll be no clean land left to grow seed potatoes in Scotland. Furthermore, with half of the UK's potato area grown on rented land, experts believe this is a conversation that involves more than just potato growers directly

Once complete, participants will be entered into a prize draw to win £100 of Amazon vouchers. However, perhaps more importantly, the insight gleaned from the survey will be used to help steer future priorities, as evidence for research funding applications, to support potential industry change, and more.

CPM's editor, Janine Adamson, says this requires a collaborative effort which should hopefully provide some telling insights. "This is the first time a survey of this nature has been conducted, purely with the purpose of understanding where the wider industry is with what may be perceived as a pest of no relevance beyond the potato sector.

"But this requires all growers and land owners to come together. Just as tackling PCN will require effort from all parties, so does this survey."

LASTWORD

WITH JANINE ADAMSON

Talk techie to me

Before I commence this month's instalment, I'd better provide an avian update. Our seven mini dinosaurs are still with us, having progressed rapidly through the raptor stage into almost fully feathered fowl. They advanced from the brooding box into a rearing pen rather merrily, munching their way through a rather obscene amount of crumb.

As of now, the end of September, they're in a rolling run on the front lawn next to the rain gauge – may as well combine tasks in a morning. Efficiency at its finest!

Now then, for those among you who partake in activities of the poultry kind, you'll understand that the devil is always in the detail. And with brahmas, it seems the detail becomes evident pretty early on.

Because, we're proud parents to not one, two or three brahma cockerels... but six. Yes, six out of seven hatchlings are indeed male. While I can usually make peace with being outnumbered, sadly even I can't find a viable way out of this one that doesn't involve a harsh decision.

Alas, for there is a positive! One of said lads is blue rather than gold – a rarer beauty. So having selected a potential winning goldie, we have 'Blue' and 'Buzz' the cockerels (my name selections aren't always ingenious), and Hilary the hen. In the meantime, if anyone has a pleasant home for what will end up being a rather large, majestic and handsome cockerel, please let me know.

The incubator and associated gubbins have been cleaned and disinfected; we'll give it another attempt in the spring.

Work-wise, I've experienced some delightful trips out and about this week, of which I'm rather grateful. It's the little things that count – maize trials on a sunny day, having a ride in the latest tractor release. The added benefit of both of these is they've been on home turf in Staffordshire; like buses, you wait years for an event on your doorstep then you're invited to two in one week.

Plus a peppering of interviews on topics such as an on-farm bird project and an emerging insect pest, chats with old contacts who've become friends, and it's enough to perk me back up.

Admittedly I've been flagging lately, I think it's the time of year. Equally, I've had too much time tapping at the computer, so much so, I've given myself golfer's elbow (tennis elbow's cousin) from operating the mouse. Who knew you didn't need to swing a club to get it? I'm the least sporty person I know...

If I ponder it, it's not the activity itself – the above essentially involved standing in a field – it's speaking to people with enthusiasm. Isn't it infectious?

I commend anyone with a deep-rooted passion: individuals who come alive when they discuss their area of expertise, who light up a room with their spark, who want nothing more than to share some magic. The specifics don't matter, I simply love hearing people wax lyrical about their 'thing'.

From agricultural design engineers to crop variety experts, my week has been loaded with passion and joy. I felt like I was trudging through mud last week, now I'm going to sprint to the finish line. In fact, I felt spirited enough to make something called a 'reel' for our Instagram channel. Wow, who even am I? ●

YOUR EDITOR

Janine Adamson began her journalistic career writing obituaries for a local newspaper but fast found her stride within agricultural communications. Now, more than 15 years later, she finds herself at the helm of *CPM*. A proud Staffordshire girl from the Moorlands, Janine takes pride in tackling subjects which although aren't exclusively farming, affect everyone.

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