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In this issue...

Arable farming 2050 page 8

What does the future hold for crop production?

Isoflex launch page 22

The latest herbicide to the market

Evolution of direct drills page 67

Soil pH survey page 95

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**Editor
Janine Adamson**

**Sub editor
Rachael Harper**

Writers

**Mike Abram
Janine Adamson
Charlotte Cunningham
Melanie Jenkins
Rob Jones**

**Martin Lines
Martin Rickatson
Guy Smith
Andrew Wilson**

Design

Focused on Design Ltd.

Publisher

Fiona Mercer

Commercial Director

Angus McKirdy



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Editorial & advertising sales

CPM Ltd, 1 Canonbury, Shrewsbury, Shropshire SY3 7AG
Tel: (01743) 369707 E-mail: angus@cpm-magazine.co.uk

Customer Service

Kelsey Media, The Granary, Downs Court,
Yalding Hill, Yalding, Kent ME18 6AL, UK

Reader registration hotline 01959 541444

Advertising copy

email: rob@focusedondesign.co.uk

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Editor's Pick

Here we are – we made it – celebrating CPM's 25th year in business. Cards on the table, our official anniversary was back in February, but somehow it didn't sit quite right with me given the extreme challenges growers have faced during the past 12 months. As a result, I chose to delay this special issue until September, which I stand by as the correct decision.

There's something about the month of September which fills me with hope, more so than ringing in a new year. Perhaps it's the combination of 'back to school vibes' plus the start of a new arable season which I find both uplifting and motivating. Even better, there are no resolutions to uphold!

As you'll have seen from our cover, I've flipped the notion of an anniversary on its head. Rather than casting back, we're looking forward 25 years, to question what arable farming might look like come 2050.

This is important to me. It's easy to chew on times gone by and although in ways it's very useful to refer to history, I think a more impactful approach for right now is to look forward, even if it is with trepidation and tempered positivity.

On a personal level, I very much hope the magazine continues to serve the industry come 2050... but with someone else in the driving seat. This is because CPM thrives on innovative ideas and fresh ways of thinking – I refuse to be a bed blocker for the next generation of talent. I'm under no illusion that it's unlikely I'll offer the same level of energy and creativity in 25 years' time – my pencil will be very much running blunt.

However, while I'm at the mere beginning of my editorship, the power is in

my hands to steer things forward without hitting an iceberg. As such, this issue's lead story combines the views of industry stalwarts with some of agriculture's brightest young stars. I took this approach because I wanted to show that the future of crop production is in safe hands, whether that's in respect to next year or 2050.

When I conducted the interviews for this piece, what struck me was how inspiring each individual is in their own right – from those with 40 years' experience, to those who are in their twenties. Also, the willingness to participate and contribute towards what in many ways, has become Janine's passion project of the moment.

Furthermore, some of the sagest advice came from the most unlikely of places; it's been a joy to curate, it really has. I could have spoken to twice as many people across a broader range of sub-sectors, but space limitations do come into play. As such, we'll be following up on all of the interviews for that article with solus online features, so watch this space.

Much of the magazine is striving to have a forward-focussed approach, whether that's the launch of Isoflex active (page 22) or the future of milling wheat (page 44). We have the evolution of Claydon drills on page 67 and the results of our latest survey, this time on soil pH, on page 95.

Apologies to anyone with a spider phobia, you may wish to avoid page 63 if so.

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Opinion

- 6 Smith's Soapbox** – Views and opinions from an Essex peasant.
- 66 Nature Matters** – A nature-friendly perspective from a Cambridgeshire farmer.
- 88 Talking taties** – Plain talking from a Yorkshire root grower.
- 98 Last Word** – Thoughts from *CPM's* editor.

Technical

- 8 Future of crop production – Arable farming 2050**
CPM marks its 25 years in the business by exploring what the future could hold for crop production come 2050.
- 14 Ghent visit – Biotech pioneers**
We report from the birthplace of GM crops, Ghent, to learn about the latest outputs from its world-leading plant science research facilities.
- 18 Pushing Performance – Saving soils this autumn**
Looking at the impact soil conditions may have on herbicide performance in helping crops to get up and away while being weed-free.
- 22 Cereal weed control – Bolstering control**
With the recent GB registration of Isoflex active, growers will soon have another product ready to add to the mix.
- 30 Real Results – Patience prevails**
How a consistent approach year-on-year is helping one mixed farmer to manage resistant ryegrass populations.
- 33 Forward-thinking farmers – Keeping glyphosate going**
Investigating the critical role stewardship is playing in protecting glyphosate's long-term future and keeping resistance at bay.
- 36 BYDV control – Making an informed choice**
Finding out what happens when high aphid pressure means there's little choice but to consider a solution from a can.
- 38 Harvest review – A season in review**
After a year many will want to forget, we scrutinise the results of Harvest 2024 and how this might influence future decision making.
- 44 Milling wheat – The quality conundrum**
Another challenging season plus a drop in the UK wheat area highlight the challenges Group 1s face. We weigh things up.



- 49 Digital Direction – All in one**
Initial feedback following the launch of Omnia's upgrade and its transformation to an integrated farm management system.
- 52 OSR diseases – What's the score?**
Looking at what was involved in the AHDB Recommended List's new verticillium scoring system and how breeders feel.
- 56 OSR weed control – A CCASE of control**
Despite the shrinking area, OSR offers value in the rotation, particularly for weed control. We tell the story of clethodim.
- 60 Nutrient plans – Planning for success**
How creating a nutrient plan can deliver benefits on the bottom line, with new technology set to make the task even simpler.
- 63 Agricultural spiders – Wonders of the web**
Why spiders are one of the most underestimated groups in nature, particularly when it comes to arable pest control.

Machinery

- 67 Direct drills – Direct seeding tech evolution**
25 years ago Jeff Claydon had to rethink crop establishment to address falling returns which led to a step change for the company.
- 73 Combines – Mastering harvest**
A review of the latest machines on the market including a report from John Deere's recent press day in Germany.
- 82 Applied Innovation – A unique approach**
Exploring the results of optimised tyre selection and what it means for both soil health and business profitability.
- 85 Muck/soil additions – Capitalising on spreading capacity**
How trading in smaller manure spreaders for two larger ones has increased output and improved application.

Roots

- 89 Potato – Lowering cultivation intensity**
Investigating the latest research around lower intensity potato cultivations to help growers improve soil health and save money.
- 95 Soil pH survey – Lucky number (pH) 7**
Results from our latest survey, conducted in partnership with LimeX, to understand the current perceptions of soil pH.



smith's soapbox

by Guy Smith



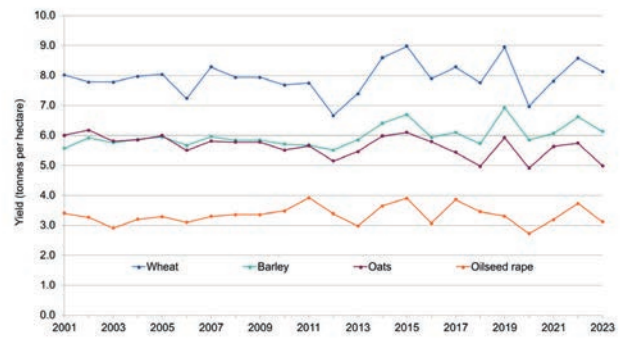
give way to the 'gen Zs' in rather quick succession, it seems we get a new generation before the current generation have left school let alone started breeding. Nonetheless, 25 years is a good moment to mark time and look back as well as forward.

When you track yields of UK arable crops during the past 25 years, the line looks remarkably flat with wheat yields consistently hovering around 8t/ha.

In contrast, in the preceding 25 years before that, there was a 30% increase as average yields improved from 5-6t/ha mark in the 1970s. So you could suggest the current generation of UK arable farmers who've held the management reins

Yields

Figure 2: United Kingdom crop yields



UK crop yields over time. Source: DEFRA.

Behold the flatliners

It's a pensive moment to be writing in *CPM* magazine on its 25th birthday – a quarter of a century is a notable passage of time. It used to be the definition of 'a generation' which made sense in that 25 was roughly the average age for couples to bring a baby into the world, and thereby start the next generation. But now as the 'millennials'

since the millennium, should be known as 'the flatliners' whereas their parents could take the label of 'the improvers'.

The question now is, what will the trend line do during the next 25 years and what'll be the drivers? One possible scenario may be that due to the sea change in UK agricultural policy, the arable area will shrink back to the best, highest yielding land. And conversely, the more marginal stuff will sit in ag-environment schemes where state payments prove more attractive than growing crops for the market.

This shift would see the yield graph start to climb again pushing up towards the 10t/ha mark, but it wouldn't see much improvement in overall production. The UK combinable crop harvest has also flatlined at around 22M tonnes during the past 25 years. It seems hard to believe the current policy drive to pay farmers to take land out of arable production won't reduce the size of the UK harvest.

Of course, policy isn't the only driver here – price and weather are also key. But what's notable is that while prices and weather can severely dent or boost the graph line, things seem to even out over time. Having said that, the lines have notably grown

bumpier in recent years. Maybe the one thing we can predict for the next 25 years is greater unpredictability in the short-term.

So as we look forward to the year 2050 when thanks to age-reversing medical breakthroughs in the 2030s, nimble and fresh faced 90-year-old farmers will be pictured in *CPM* walking their crops and chewing the fat with their 80-year-old agronomists – will we still be known as the 'flatliners' or will 'Gen Z' have seized power and revitalised UK arable agriculture in the way their grandparents did?

If there was one thing I'm sure of here, it's that farmers will still lack that key management tool which has eluded them for centuries – that being a good crystal ball.

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.

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Arable farming

Future of crop production

2050

Rather than look back at times gone by, *CPM* marks its 25 years in the business by exploring what the future could hold for crop production – sharing the valued viewpoints of those at the helm now, as well as the next generation of industry experts.

By Janine Adamson

It'd be easy to reminisce about the times when *CPM* first came to fruition as means of marking each significant birthday for the magazine. But to truly live by its values, the publication has to look forward and present new ways of thinking which inspire, stimulate and inform.

It's now been 25 years since *CPM* first entered the world of agricultural publishing. Should the magazine continue for a further 25 years – or should that be 25 harvests – what might arable farming look like as society approaches 2050?

Plant health

According to SRUC's Professor Fiona Burnett, the direction of travel is shifting disease control from being input intensive with one-size-fits-all spray programmes, to knowledge intensive with clever tailoring to the context and field or sub-field.

"The drive and desire to be less reliant on pesticides and to manage disease in more integrated and regenerative ways are very real. New tools and techniques keep being added and we're learning more and more each season," she says.

For Fiona, the concern is disease burden as new threats, as well as new strains of existing pathogens, continue to mount. "Fungicide-resistant strains of pathogens such as potato blight and septoria will remain a challenge. Our move to more integrated crop practices

brings many benefits, but we also have to be aware that with new approaches, we'll see greater diversity. For example, with more grass in arable settings we'll experience more issues like ergot.

"And as the climate changes, this brings additional threats – black stem rust in wheat is just one example of a pathogen we think is possible under warmer conditions."

Fiona believes it's time to move away from the current binary approach to certain technologies. "The likes of gene editing remains contentious with strong opinions on both sides; pesticides are similar. If we could have more of a meeting in the middle, we could really change mindsets across the board.

"We absolutely can't use these innovative solutions to prop up otherwise unsustainable production methods, but carefully integrated into lower input and regenerative systems, they could be key in getting the balance right between yield and environmental gains."

A broader issue for Fiona is that research science and applied practice are drifting apart. "Academics with fantastic innovations are rewarded for scientific papers but not so much for getting out and about in practice. This means there's a real opportunity for people who are prepared to fill that connected middle ground," she adds.

Agronomy

The Agricultural Industries Confederation (AIC)'s head of crop protection and agronomy, Hazel Doonan, recently celebrated 20 years in her role. She believes the future of agronomy centres around precision farming and attention to detail. "Access to new technologies will enable much more detail and granularity, while pinpointing and improving the efficiency of inputs.

"With that comes data and it'll be down to advisors to help translate that information, guide interpretation and identify trends at a per farm level," she says.

Recognising the growing importance of environmental management and its ranking on the government's agenda, Hazel adds that this will continue to instigate change. "As rotations widen and diversify to include more cover crops and niche options, with that comes a demand for agronomic advice.

"But the current lack of policy is a

“ We should all keep our minds open to change and allow technology to dictate a little. ”



SRUC's Professor Fiona Burnett believes innovative solutions can't be used to prop up otherwise unsustainable production methods.



As rotations widen and diversify to include more cover crops and niche options, with that comes a demand for agronomic advice, says AIC's Hazel Doonan.

huge threat – farmers have to forward plan and therefore require clear direction from government on land use whether that be for food, fibre, energy production or housing. We're being asked to produce more food than ever before yet all of those aspects are competing for the same land," stresses Hazel.

Managing director of Agrovista, Chris Clayton, agrees: "The greatest threat we face isn't to agronomy, it's to UK food production. For one, Dibley's National Food Strategy which was meant to be an independent review for government, has sat gathering dust. We still haven't worked out what we actually want for UK food production.

"If we continually create hurdles for ourselves – for example, greening policies to give society a 'warm feeling'



According to Agrovista's Chris Clayton, it's part of an agronomist's role to take growers on the journey to digitisation.

Changing the game

CPM posed the question – with respect to your specialism, what's the one problem or dilemma which if solved in the next 25 years, could really change the outlook of arable farming?

Professor Fiona Burnett: "Understanding the best way to use data to inform management decisions, lighten the load of assurance scheme inspections and better evidence practices."

Hazel Doonan: "If government set out their land use ambitions for the UK it would help immensely; focusing on priorities and hopefully remunerating farmers for delivery too."

Chris Clayton: "An absolute congruent National Food Strategy with clarity on what we want to achieve including robust guidance in regard to regulation, which is all based on science and not emotion."

Belinda Clarke: "A clear way for farmers

to understand and improve soil health."

Dave Hughes: "Climate change is the most significant existential risk to global society, so reducing greenhouse gas emissions in food production and sequestering carbon in soils at scale will be crucial."

Mark Dodds: "Improved knowledge of plant genomes would take genomic selection to the next level."

Nigel Padbury: "The arrival of a safer insecticide to replace neonicotinoids, or, the development of a resistant variety to help overcome cabbage stem flea beetle."

Peter Scott: "De-commoditise fertiliser so more thought goes into its use to influence buying decisions."

Pamela Chambers: "Varieties – tailored for every situation – but we are well on that journey!"

while importing instead – there's a threat to UK farming as we know it."

Even so, Chris believes there'll long be a role for agronomists. "Simply put, agronomy is the provision of advice and support to a grower base to help maximise returns from growing crops. Assuming as a nation we want to continue producing food, the demand will be there.

"However, what this provision looks like will constantly evolve. You only have to take the past 12 months and development of SFI, and how this has become a staple part of an agronomist's role, to illustrate that point," he continues.

"Right now, the speed of change is at its greatest and that's likely to continue. What's evident is it's important an agronomist has a full set of skills if they wish to be successful in this dynamic industry."

According to Chris, it'll be part of an agronomist's role to take growers on the journey to digitisation. "There's huge scope here – increasing productivity and steering towards better farming practices. Make it your place to fully understand the tactical and strategic challenges that growers face to help ensure their farming business can be passed on to the next generation."

Whereas Hazel believes the growth of agronomic specialisms will come to the fore. "Whether that's related to technology, soils, crops or climate, agronomy is a whole-farm approach, not just crop management anymore.

"It's time to embrace new technologies – some of which will be doing things we never thought of in 25 years – and learn how they



AgriTech-E's Dr Belinda Clarke isn't convinced AI will completely replace aspects of agriculture, more that it'll supercharge and enhance.

can work for you. Surround yourself with experts who can help you, whether that's advisors or peers, and be open to change across the whole supply chain," she says.

Technology

A concurrent theme across all segments of crop production is the role of technology, and as such, Agri-TechE's Dr Belinda Clarke believes the greatest opportunity lies in artificial intelligence (AI). "We're just beginning to harness this as an industry and increase our understanding of how it can be used, for example, digital twinning.

"I'm not convinced AI will completely replace aspects of agriculture, more that it'll supercharge and enhance. But with this comes the requirement to train data

Future of crop production

► to be appropriate and relevant – which is both exciting and challenging,” she says.

However, Belinda suggests a threat to the uptake of digital options is the current lack of interoperability between tech solutions. “We see increasing farmer cynicism as a result. The onus has to be on developers to make their solutions work better while managing user expectations.”

In future years, she predicts an inevitable consolidation across the agricultural sector. “There’ll be fewer players whether that be farmers, manufacturers or technology providers. This could mean we lose diversity of business and entrepreneurial thinking,” she warns.

“But we should all keep our minds open to change and allow technology to dictate a little. Be curious and have attention to detail in every aspect of life, especially

agriculture. Developing your absorptive capacity to take on new views and ways of doing things will be a valuable skill.”

Syngenta’s head of technology identification and evaluation for crop protection, Dave Hughes, suggests with agriculture undergoing a blistering pace of change, it’s hard to predict where things may lead. “It’s clear we’ll be doing things very differently in 25 years’ time – almost certainly applying exactly what’s required, only when and where it’s required, to achieve better results with fewer inputs.

“Furthermore, I see inputs becoming more biological-based, particularly for pest control. History tells us inventing and commercialising novel, highly effective biological products is really hard. However, dramatic improvements in the technologies we use coupled with an increase in demand



The worry for Syngenta’s Dave Hughes is, if the anti-tech voice becomes loud enough, politicians could react accordingly.

Rising stars of the trade

As with the first issue of *CPM* released in 1999, the experts who contribute to the magazine come 2050 will likely be a new breadth of names all over again. Despite a reported ‘lack of talent’, a new generation of skilled specialists are waiting in the wings, preparing to become the future custodians of crop production.

As these individuals continue to graft, ready to receive the baton from those who’ve rightly earned their kudos, what are their hopes for the future and what’s fuelling their fire?

Will Smith, Gowan’s technical lead, specialises in weed management and hopes to see that growers and agronomists continue to receive evidenced and accurate advice around the topic. “I’d like to be in a position where I’m central to the development of and communication of weed management research, so driving the industry forward.”

According to Will, at its heart, weed science is all about plants – understanding how they function, adapt to the conditions they inhabit, and the subsequent design of strategies to control them in an efficient manner.

“This reaches all the way from fundamental biology such as germination patterns and understanding metabolic systems of plants, to engineering of seed mills, inter-row hoes or electronic engineering. This breadth of opportunity is exciting and always gives you the chance to learn something new.”

Hutchinsons’ head of integrated crop management, David Howard, believes right now is a really interesting time which should drive innovation. “Central to this is asking how we can add value to a crop without chasing

more output. Many are reaching a yield plateau – it can’t feasibly keep increasing.

“So we’re seeing a change in perception – using precision farming techniques and data to improve efficiencies. The ability to lift on-farm averages overall may address how to improve margins.

“Equally, opportunity lies in rationalising what integrated pest/crop management looks like for farmers. It’s often viewed as very intricate, but with the application of technology, it should be possible to achieve.”

Admittedly not a fan of milestones, David Howard says his aim is simple – to make a positive impact on the industry during his professional career. “But I like to constantly challenge my views and insights – there’s so much resource to tap into, especially since knowledge transfer has improved from academia.”

Amy Watkins, Agrii’s sustainability manager, agrees with the shift towards margin rather than yield. “With that has to come alternative sources of income beyond food production to ensure the best gross margin/ha. However, with a new government there’s an even greater pressure on land use – there’s a lot of change but it should be viewed as an opportunity instead of a threat,” she says.

In terms of her career aspirations, rather than a job title, Amy strives to live by two mantras. One – work smarter, not harder, and two – success isn’t when everyone depends on you, but when you’re no longer needed.

“For me, I think it’s important to aim for a more balanced lifestyle where work, hobbies and family all have a place. I also hope to

empower a team to deliver a cohesive vision, which is all about how you judge success – it’s when everyone has adopted your lead and you can leave them to it,” she says.

While in plant breeding, RAGT’s David Schafer predicts more intention – where breeding will move in a more deliberate direction – and new technology will allow the environment to be decoupled from genetic influence using techniques such as genomic selection. “A further move away from single trait characterisation would also likely be part of this, looking to enhance many traits and stacking effects simultaneously.

“Ultimately, artificial intelligence (AI) and machine learning can recognise patterns which humans can’t – we have to direct breeding programmes to best utilise this vital insight,” he comments.

From a professional perspective, David Schafer identifies his ultimate trophy to be the delivery of a very high quality, bread making variety. “As a plant breeder, my interest will always be skewed towards delivering varieties. But I’m also keen to contribute to how breeding programmes are set up so greater success can be achieved more readily and genetic gain driven more quickly and reliably.”

But even now, David Schafer considers himself to be a dinosaur, as far as science is concerned. “We definitely have to encourage younger people into this industry with new ideas and perspectives,” he laughs.

FMC’s marketing & plant health lead UK & IE, Geoffrey Bastard, believes with the current rate of crop protection revocations being faster than new product launches, the

for biology-based solutions, is likely to change the landscape considerably.”

Along with others, he cites climate change as a significant threat to global agriculture, plus society’s attitude to the use of technology in food production. “Many are deeply sceptical about new technologies and believe we should return to growing food as we did 100 years ago, but it’s surely obvious that such systems couldn’t feed the future global population without destroying huge areas of the planet’s remaining wildlands. The worry is, if the anti-tech voice becomes loud enough, politicians could react accordingly.”

Instead, Dave believes technology should be used to improve both productivity and sustainability at the same time. “For example, how to truly sequester carbon and reduce greenhouse gas emissions

while actually improving crop yields. A lot of smart people are thinking about how this might be done, so providing the ideas come through, this will prove a major growth area.

“But if we’re serious about eliminating fossil fuel use, we have to think about carbon-based raw materials for things like medicines, plastics, fibres and liquid fuels which we all depend on. The only feasible way of producing these raw materials at the scale required will be to extract from plants, so in the future, food will be only one output of many which are derived from crops,” he says.

Varieties

With coming up to 30 years’ experience in plant breeding, KWS’ Mark Dodds foresees the role of policy as a means of making or breaking the sector. “The



Consumer demand for crops with positive environmental credentials is a big driver for change, believes Premium Crops’ Nigel Padbury.

future lies in more targeted solutions. “In a way this is positive because with greater scrutiny comes better environmental profiles which should be more accepted by consumers.

“Equally, there’s the potential for technology to compensate – anything which improves environmental or operator safety is a good thing. This includes modelling for pests and diseases, or high-tech detection methods, to ensure products are applied at optimum timings,” he says.

With farming being influential in Geoffrey’s life from a young age, he says his career goal is to launch a new technology to the market. “Providing farmers with a means of making their lives easier is a very rewarding thing to do,” he adds.

For ProCam agronomist Harry James, it’s all about taking pride in doing a good job. “Having a positive impact on businesses on a daily basis is what keeps me in the game. I take a pride in my work and the opportunity it gives me to interact with such a diverse range of stakeholders; farming is my obsession,” he says.

Harry sees the direction of agronomy mirroring UK agriculture. “Here I’m talking about scale – we can’t avoid it – businesses will grow and agronomy will have to reflect that. This could mean losing attention to detail, but by using all of the tools available to us, we should be able to avoid that.”

In the future, he sees his role as an interpreter of technology and automation. “With this, I’ll be able to service a greater area more efficiently,” he comments.

Fresh Produce Solutions’ trial manager,



Clockwise from top left: Geoffrey Bastard, Dr Bill Watts, Amy Watkins, David Schafer, Will Smith, David Howard. Centre: Harry James.

Dr Bill Watts, says with the closure of AHDB Potatoes in 2021, it’s become challenging for the potato industry to track and estimate national market and production trends. “It seems likely, however, that we’ll see a continued trend for declining numbers of growers during the next 25 years with larger and more specialist operations remaining.”

Bill perceives the most pressing worry to be late blight, although he says major

agrochemical manufacturers are ‘industrious’ and already bringing alternative actives to the market including biostimulants.

As for his field of work, he says crop production research is fascinating. “To be an applied crop researcher you have to have a mix of skills. Add in international travel opportunities and a role in teaching young people to be researchers, and it’s a particularly potent cocktail,” concludes Bill.



Origin Fertilisers' Peter Scott hopes future disruptive thinking will change the nutrition market for the good.

- ▶ oilseed rape area has halved following the ban of neonicotinoid seed treatments whereas with SFI, this will add pressure to smaller crops such as winter barley.

"With a reduction in area comes less income, investment and innovation in these crops making policy their biggest threat," he suggests.

Mark believes technologies such as genome editing and AI will make the plant breeding of the future more efficient, whereas the use of drones will be complementary. "Using drones in disease scoring would certainly speed up and automate the evaluation of new varieties if the technology can get to a standard where it can score as well as people.

"It's about deciding which technologies are useful and which aren't, remembering



British Sugar's Pam Chambers believes in the future, mavericks should be allowed to flourish.

there's no substitution for field work and seeing crops in a practical scenario."

Premium Crops' Nigel Padbury believes consumer demand for crops with positive environmental credentials is a big driver for change. "UK farmers are already extending rotations with a greater diversity of break crops.

"The move away from the wheat-rape rotations of the 90s and 00s, not only makes agronomic sense, but such variation in cropping brings a greater diversity to the general farm environment."

However, he agrees with Mark: "For all its potential benefits, SFI and similar political measures can represent a threat to a diverse crop environment. Schemes that pay support for not cropping an area can skew the market away from minor crops as farmers retain their acreage of the all-too-familiar wheat and barley and use SFI as a so-called 'break'.

"But, the successful growers of the future will be aware of their value in the supply chain and focus on providing products and services that end users actually want. The alternative is to stick with supplying basic commodities at the lowest possible price," he says.

Nutrition

For Peter Scott, technical director of Origin Fertilisers, the future lies in finding a balance beyond nitrogen reliance. "Yes nitrogen is a primary driver in food production, but it's a leaky system in terms of the environment – it's at the pivot of the sustainability seesaw.

"And although NUE is a useful KPI, we have to know what it is before we strive to improve it, by measuring and benchmarking to understand seasonal and crop variation. That'll take at least 2-3 years at scale and only then can we consider mitigation actions," he says.

He believes a current over-simplification by some retailers and food processors is a concern. "Nutrition is a complex series of processes beyond just aiming to reduce nitrogen use in production. A more sophisticated solution would be to reduce nitrogen 'leakage' instead and reward it."

Peter also sees gains to be had from a better approach to secondary and micro nutrients. "To unlock the correct balance to crop nutrition, we have to think beyond nitrogen and be more prescriptive. We could achieve this through broad-spectrum soil testing as well as plant tissue testing and then analysing the nutrient content of the harvested crop.

"This tells us what should happen, what is happening and then what did

actually happen. By identifying and addressing the limiting factors, the result will be better quality crops which are more nutrient-dense," he explains.

Ultimately, Peter hopes future disruptive thinking will change the nutrition market for the good. "At the heart of this is communication, to effectively filter new innovative approaches down to farm level."

Roots

British Sugar's Pamela Chambers anticipates there'll be fewer sugar beet growers in the future with varieties being the key to the crop's success. "It'll be interesting to see how varieties are allowed to develop, for example, the use of gene editing would allow traits to be introduced that'd be of benefit for pest, disease and weed control, as well as other criteria such as drought tolerance."

She highlights emerging threats such as beet moth and cercospora, but that the industry is likely to see more new pests and diseases which won't be known until they arrive. However, it's weeds which are of greatest concern.

"In my lifetime we've seen resistance issues increase and different weeds become a problem. We must learn from the mistakes made in the past and work together across the entire arable rotation, not just in sugar beet," she stresses.

Equally, Pam believes for all crops, customer demands will increase and as a result, the industry has to listen. "We'll be competing with European and global producers so have to be aware of the direction they're travelling – likely to be less reliant on plant production products while reducing the carbon footprint of production."

She hopes that in the future, mavericks will be allowed to flourish. "Give people the opportunity to do strange and weird things and to have an opinion. Equally, we shouldn't cut down the 'tall poppies' or over-criticise those who are being successful, rather observe what they're doing and learn.

"During my career it's been my network of friends and contacts who've helped me. It doesn't matter who you work for, we should all be able to offer help and respect each other," she concludes. ■

Grower POVs

For grower perspectives on the future of crop production, read this issue's opinion columns from Guy Smith, Martin Lines and Andrew Wilson.

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GROWING TOGETHER



“ We’re breeding soy which is adapted to northern latitudes.”

Ghent visit

Where better to visit than the birthplace of GM crops, Ghent, to learn about research coming out of its world-leading plant science research facilities 50 years later.

CPM reports.
By Mike Abram

It was in 1974 that two Belgian scientists, Marc Van Montagu and Jeff Schell, discovered how to transfer genes to plants, thereby starting the genetically modified crop revolution which has transformed agriculture in many parts of the world.

While that technology has never been used particularly widely on their home continent, it led to the place where they made the discovery – Ghent – becoming a global biotech capital.

It’s a legacy which continues today, with Europe’s largest agricultural biotech campus home to many of the world’s most innovative companies, while both the University of Ghent and VIB Center for Plant Systems Biology have a long-standing tradition of converting basic science into successful commercial technologies.

Perhaps unsurprisingly, the scope

Biotech pioneers

of researchers and companies in the Ghent biotech valley has widened as new breeding technologies such as gene editing using CRISPR-Cas9 technology have pushed new boundaries in plant science.

But while innovation in plant breeding remains a key goal for the region, it also uses its resources to push boundaries in other areas such as the creation of next-generation biological products.

Llama antibodies

Spin-off companies from VIB (Flanders Institute for Biotechnology) and other institutes are now starting to bring those products to market. One such example is Biotalys, founded in 2013, which is developing novel biofungicides based on antibodies produced by llamas.

“Thirty years ago, the University of Brussels saw that llamas and camels have a very particular immune system,” explains Toon Musschoot, head of investor relations and communications for Biotalys. “This means they create very specific antibodies to fight off diseases.”

That knowledge has been used to develop medicines for humans, animals, and now, through Biotalys, plants. “If you immunise the llama with a certain fungus, for instance, or a part of a fungus cell, the llama’s immune system will create antibodies against this foreign element. We copy these antibodies into proteins which we develop into crop protection products,” says Toon.

The firm uses fermentation to produce

the protein in large scale volumes to create a powder which when mixed with water, can be sprayed over crops. Ideally, it has to be sprayed preventatively, adds Toon, and works by interfering with the fungus cell wall which bursts and the fungus dies off.

Protection lasts around 10 days with Toon suggesting the technology should be used in alternation with other pesticides to reduce the risk of resistance.

An initial product, Evoca, targets



Knowledge regarding the immune system of llamas and camels has been used to inform the development of medicines for humans, animals, and now plants, says Biotalys’ Toon Musschoot.

diseases such as botrytis and powdery mildew in high value fruit and vegetable crops including strawberries, grapes and cucumbers. Further down the pipeline is a product for use in potatoes against late blight which the company is developing in conjunction with the University of Aberdeen.

In total, six products are in progress, with Evoca submitted for registration with both the EU and US authorities. "In time we'd also like to focus on row crops, but to achieve that we have to bring down production costs. Producing through fermentation is still expensive for commodity products, whereas for fruit and vegetables it's much smaller hectares," explains Toon.

Another spin-off from VIB and the universities of Ghent and Leuven, Apeha Bio, is also searching for future biological products, whether that be biostimulants, biofungicides, bioinsecticides or bioherbicides.

"We want to help farmers to replace fertiliser use on one hand while also replacing or complementing their chemical crop protection use," says Dr Isabel Vercauteren, Apeha Bio's chief executive officer and co-founder.

The firm has developed a platform to isolate naturally occurring microorganisms mainly from soil, but also from plants. "We define a product concept driven by what farmers and the industry require and then develop an isolation campaign, which involves a lot of bioinformatics, metagenomics, microbiology, formulation and production scaling."

Its first commercial product is a biostimulant for wheat called Activ which is being marketed in Poland by Syngenta, with Italy and Hungary likely to follow. Based on a bacterial strain of the species *Stenotrophomonas rhizophila*, it helps with the uptake of nutrients, especially nitrogen, with suggested yield increases of 5% even with reduced fertiliser use.

A second pipeline product,



Evoca (pictured) targets diseases such as botrytis and powdery mildew in high value fruit and vegetable crops including strawberries, grapes and cucumbers. Photo: Biotalys.

Initiv, is for maize and is a fungus strain that provides phosphorus solubilising activity, whereas the firm also has two biofungicides – Virtuosa and Valoria – in regulatory approval.

"These are broad spectrum biofungicides for fruit and vegetables in one instance, but also control diseases like fusarium and septoria in wheat," says Isabel.

In fruit and vegetables, she claims Virtuosa's performance is on a par with chemicals and could be used as a replacement. While in wheat, Valoria, a different formulation of the same actinobacteria streptomycetes strain is being developed, which she says should be used in an integrated way with conventional fungicides.

As a protectant in wheat, Valoria could be used as a T1 spray – as well as septoria it also has activity against rusts and possibly mildew, with registrations expected first in the US, followed by Europe, adds Isabel.

Further away are potential bioherbicides. To identify these, Apeha Bio screens metabolites produced by microorganisms for herbicidal activity. "We have a portfolio of around 100

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▶ different metabolites that are now being tested in the first year of field trials.”

The initial aim is to find a non-selective herbicide, she says. “The tricky thing is to completely characterise the metabolite soup to be sure we understand what the active ingredient is, which we have to know to a certain extent for regulatory approval.”

Approval of bioherbicides is a little more complicated than a biostimulant, she acknowledges. “It’s closer to that of a chemical but should still be quicker due to the nature of the product being inherently lower risk.”

The latest spin-off from VIB is legume breeder Protealis, which is also commercialising research from the Institute of Agricultural Fisheries and Food Research (ILVO). Its key focus is soybean with programmes also looking at yellow peas and fava beans. “We’re breeding soy which is adapted to northern latitudes,”

explains Protealis’ Renate Degrave.

Europe is more than 70% dependent on imports of protein-rich crops, with millions of tonnes of soy annually imported from South America which contributes to the destruction of rainforests. “If protein crops were grown on 10% of Europe’s arable land it could become independent of imports from other continents,” she suggests. “But soybean varieties bred up until now don’t typically thrive in our local soil and climate.”

Market demand

Typically in Europe, soy is grown in southern latitudes such as Spain, Italy and the south of France. But with an evolving food market demanding sustainable, local high-protein plant based foods as well as increasing regulation on nitrogen use and soil health, investment is being made to grow the crop at more northerly latitudes.

As a result, Protealis is using speed

breeding techniques to develop varieties which are more suited to the longer day lengths further north, as well as the cooler temperatures, says Renate.

The firm uses facilities where light, humidity and other factors are controlled and adapted, reducing the breeding cycle by producing many generations within a short period. “We can reduce the time by 2-3 years and have varieties that can be harvested earlier.”

But just like the plants have to be adapted to the local environment, so too do the key soil rhizobium bacteria that work symbiotically with the soy plant to form nodules which can fix nitrogen from the atmosphere.

That’s where innovative research led by VIB’s Professor Sofie Goormachtig has helped. Her team uses the principle that every microbe is everywhere, but it’s the environment which enriches them.

Potato farm fuel

Installing solar panels on the roofs of two potato stores and other outbuildings to convert excess energy into hydrogen could bring energy independence for a Belgian farm.

That’s the plan for Pieter Van Wilderode who grows 400ha of arable crops including 210ha of potatoes alongside maize, winter wheat and sugar beet at Hof Te Katterem, approximately midway between Ghent and Brussels.

He also raises 1000 organic pigs annually, buying piglets from a local producer to fatten who buys them back to sell into a retailer in a closed loop system, with a few going to a local butcher.

Organic pig production fits in effectively with an independent 200ha organic arable farm which Pieter manages – manure from the pigs is spread on the land and any grain which isn’t fit for the organic farm owner’s brewery is fed to the pigs.

With current high variability in energy pricing and potential supply problems in the future, he’s continuing collaboration efforts by starting a cooperation with Belgian start-up Kioz, which is pioneering delivery of total energy independence.

Kioz co-founders Trees Loncke and Ronny Schelfhout currently have 47 active projects on farms in Belgium, where they install solar panels on the roofs of farm buildings as part one of a three-step process. “We’re trying to make the farms independent of the grid,” explains Trees.

As well as price volatility and potential supply issues as electrification replaces fossil

fuels, Belgian producers of renewable energy are charged for placing excess energy back onto the grid. This usually dissuades individual farms from over-installing solar panels as there’s no easy way to store excess energy.

The trade-off, however, is that solar panels don’t typically produce enough energy for the farm during winter months. But in the Kioz decentralised hub scheme, an overload of solar panels is installed – amounting to 1.2 megawatts peak production at Pieter’s farm, which easily meets energy demand.

Excess energy is stored in batteries for optimal utilisation as well as being sold by Kioz to other businesses which require green energy; this is the second step in the process, says Trees. “Having multiple farms producing excess energy makes it much easier to handle such transactions.”

Batteries aren’t the only solution, however, with Kioz’s ultimate goal being to produce hydrogen on-farm for multiple uses including tractors and other machinery.

“Batteries will never be a solution for heavy machines on farm,” suggests Trees. “They’ll only make heavy kit heavier leading to more soil damage, and secondly, they don’t last for long enough. If you have to go back to the farm after four hours for a battery swap, there’s too much downtime.”

Hydrogen has to be made on farm though, she says. “It’s too expensive if you have to transport it as it takes too much volume.”

Converting solar energy into hydrogen would require an electrolyser and water,



Belgian farmer Pieter Van Wilderode is collaborating with start-up company Kioz, to help achieve total energy independence.

adds Trees. “It’ll be in the gaseous form and stored in vessels under pressure as you do other gases, such as propane.”

But for now, there’s no immediate cost for Pieter, with Kioz covering the price of installation. Instead, he’s charged for the energy used both directly from the solar panels and for that which is stored in batteries, explains Trees. “It’s a fixed price with an inflation rate of 1.8% for 25 years.”

There are two advantages – one, he can vary the volume and price won’t change, and secondly, he avoids a lot of fixed costs that he would pay today, such as grid distribution costs and taxes. “It’s at least 50% cheaper,” concludes Trees.



Soil rhizobium bacteria work symbiotically with a soy plant to form nodules which can fix nitrogen from the atmosphere.

"There might be rhizobia capable of forming nodules on soybean in Belgium that we weren't aware of," says Sofie.

To find out, a project asked 100 citizens to grow soybeans in their gardens with a second round expanding that to 1000 participants, and ultimately 1200 gardens, she says. Sites were distributed across the Flanders region where people grew 1m² of soybeans. "We connected them through a website and they measured the growth of the plants."

Citizen project

The project also measured soil parameters such as nutrients before the gardeners brought five plants to Sofie's lab for the team to look for nodule formation. "From the nodules we isolated bacteria with the idea that there'd be bacterium adapted to our climate," she explains.

Once isolated, the bacteria could be inoculated onto soybean seed to check for activity, first in the laboratory and then in field trials. "Where the plants grew dark green we knew we had good bacteria," explains Sofie.

It's this type of basic research that commercial firms like Protealis are picking

up to develop into seed inoculants which can be used more widely in northern Europe climates. Protealis is also developing a proprietary seed coating with the aim of increasing yield and consistency of performance, adds Renate.

Six new varieties have been registered in Belgium, France and Germany by Protealis during the past few years, significantly reducing the yield gap to soy grown further south.

All in the triple zero maturity category suitable for northern Europe, Pro Helicon has a very high protein content in the region of 44% – the highest on the Belgian soybean variety list – and a yield of 108%, while Pro Jacinto has the highest relative yield of 114% at protein of around 40%.

The admission of the varieties onto the list brings profitable soybean cultivation a step closer, believes Renate. "Farmers are still a little hesitant because it's a new crop for them, but with every variety registered, we're bringing better performing varieties to the market. There's a lot of interest."

Mike Abram visited Ghent as part of a European Network of Agricultural Journalists / EU-FarmBook press trip in July 2024. ■

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“Inconsistencies in the soil profile can result in areas where herbicide concentration is either too high or too low which reduces efficacy.”

Pushing Performance

Saving soils this autumn

With many soils looking in a sorry state following a difficult year, taking action is vital to minimise the risk of suboptimal herbicide performance. CPM finds out more.

By Charlotte Cunningham

As a difficult season comes to a close and focus turns to the 2024 autumn drilling campaign, giving careful consideration to the impact soil conditions may have on herbicide performance will be imperative to get crops up and away and weed-free.

This is according to Ian Rudge, sustainability trials manager at Agrii, who says off the back of a challenging year due to the amount of rainfall the UK has had, soil structure could be an issue for both crop establishment and early weed control. “As we head into autumn, it’s gone from being as wet as old boots right the way through the growing season to now looking slightly drier. While there’s still plenty of moisture about, a lot of it is in the cultivation zone and soils are looking very sad and blocky at the moment.

“There are still a few weeks before we get into the main drilling window, but the reality is that we’re going to have a lot of less-than-ideal seedbeds in many situations.”

Aside from suboptimal crop performance and growth, poor soils can have a major impact on herbicide performance, he continues. “When we think about poorly structured soils, we’re talking about the presence of clods, compacted layers and lack of porosity. Where these features are present in soils, it can significantly affect both herbicide efficacy and adsorption/desorption,” explains Ian. “Inconsistencies in the soil profile can result in areas where the herbicide concentration is either too high or too low which reduces overall efficacy.”

What’s more, poorly structured soils especially sandy soils with low organic matter, are prone to leaching, he adds. “Herbicides can move more quickly through the soil profile, reducing the time they remain in the root zone where they are required to control weeds.”

Lower organic matter

With regard to adsorption and desorption, suboptimal structure often correlates with lower organic matter and clay content, both of which are vital for adsorbing and holding herbicides. “Low adsorption can lead to more herbicide being available in the soil solution, potentially increasing

herbicide movement out of the weed germination zone – especially after heavy rainfall in lighter soils – which in turn reduces residual control,” he adds. “There’s also a crop safety issue here, as many noted last autumn.”

Adding to this pressure is the fact that many growers are likely to drill earlier, through fear of getting caught out like last autumn, meaning there’ll be additional pressure on herbicides



Ian Rudge says in his book, *Backrow Max* is an essential part of a considered approach to herbicide programmes and grassweed control.

Peter Cartwright,
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Challenging soils in the Cotswolds

Sean Perry farms 485ha in partnership with his father and brother on the edge of the Cotswolds in the Vale of Evesham, a landscape which is dominated predominantly by heavy clay soils which can make weed control a challenge.

Cropping typically consists of winter wheat, spring linseed, winter beans and 61ha of land dedicated to SFI to replace oilseed rape, which has recently been dropped from the rotation. In terms of establishment, Sean operates a stripped back approach where possible using a Cousins V-Form subsoiler followed by a Horsch Joker and then drilled with either a Horsch Sprinter or Horsch Avatar.

Looking to the challenges on farm, weed



While Sean Perry utilises methods for improving soil structure to improve herbicide performance – such as applying muck via an agreement with a local dairy farmer – control of grassweeds is reliant on the use of good chemistry.

control is a considerable one, with blackgrass being a key burden, notes Sean. While he utilises methods for improving soil structure to improve herbicide performance – such as applying muck via an agreement with a local dairy farmer – control of grassweeds is reliant on the use of good chemistry.

“We used Luximo (cinmethylin) for the first time this year on farm but we didn’t have the best conditions as the weather beat us slightly. However, where we did manage to get in a bit earlier, we saw some really good results.”

To get the best from the chemistry, Sean paired it with Backrow Max – a decision made alongside his Agrii agronomist Peter Carr in order to push the performance of the active.

“Last year was a difficult season so we made the decision to use Backrow Max in the tank mix for two key reasons,” explains Peter.

“Firstly, because of its drift-reducing abilities – it changes the droplet spectrum upon exiting the nozzle which reduces drift, and by taking those small droplets out you’re essentially increasing spray coverage. Especially in challenging soil conditions, having less drifty small droplets reduces the chances of poor targeting of herbicides.”

The second element that Peter felt would be useful is Backrow Max’s ability to bind to clay particles, he explains. “This basically means we’re able to manipulate the adhesion of the herbicide to the clay to again improve coverage and also reduce leaching.

“By holding the herbicide, in this case Luximo, in the top 5cm of the soil, we were able to reduce both crop damage and increase persistency due to the higher concentration



Using Backrow Max with Luximo at the Perry’s farm meant they achieved 95% control of blackgrass last season despite difficult soils and a particularly challenging weed picture.

of the chemical in that active zone. It might be the case that some soils are more prone to leaching and run off this year, depending on how they cultivate up, so anything you can do to avoid this has to be a good thing.”

Thinking specifically about blackgrass control, Peter says Backrow Max has a proven, consistent track record of aiding an uplift in control in their own trials. “For something that’s as cheap as it is, to get an uplift of about 9% in blackgrass control, is a no brainer.”

This enhanced performance has also been noticed when used alongside Luximo at the Perry’s farm, with the farm still achieving 95% control last season despite difficult soils and a particularly challenging weed picture, adds Peter.

Going forward, Sean says Backrow Max will now remain part of the programme and will be used alongside an IPM approach to keep weed levels as low as possible as they venture into what could be another high-pressure year.

- ▶ to remain active in the soil for a longer period of time, warns Ian. “There will be a lot of growers banking on a really robust pre-emergence stack. But there are lessons to be learnt from last year, too.

“With excessive rainfall last autumn washing herbicides out of the weed zone, we saw crop damage and reduced plant counts as a result of big stacks, especially where growers had rolled for slug control. So it’s a tricky situation to be in which has to be managed carefully through various actions.”

So what can growers do to mitigate the risk? “Taking remedial action to physically correct any structural issues and get soils in better condition should be the immediate priority,” says Ian. “For example, I’ve been ploughing after barley recently where there was a lot of ground compaction.

The ground is very tight and definitely not as friable as last autumn. If growers even move just that top 5-10cm – to take out any surface compaction – it will definitely help.

“Carrying out some drainage work – using a mole drain – will also likely be beneficial. It’s vital to get soil structure in a good state to help get crops off to the best start and maximise stale seedbed opportunities as they’re likely to be limited in some scenarios this year.”

Traffic light ranking

Ian recommends using a traffic light system to rank the weed risk level of individual fields and guide the best course of action when it comes to rectifying soil issues. “If you have a red field – ones which have had excessive levels of weeds this year, for example – it might



Backrow Max helps increase herbicide retention in the weed germination zone better than any other adjuvant tested – enhancing residual herbicide activity, claims Stuart Sutherland.

be worth doing something completely different. This could include ploughing the soil or even just switching to spring cropping. In the current conditions, ploughing might be really beneficial, though it does pose its own challenges and isn't suitable for all soils and farms."

As it's unknown how the coming weeks and months will play out in terms of the weather and conditions going into the autumn, having a proactive plan – where possible – is key, believes Ian. It's his view that part of this plan should include incorporating an adjuvant into the tank mix to keep herbicides working to the best of their ability in what could be another challenging season.

Economic insurance

"Having an adjuvant as part of the herbicide programme is very economic and is an insurance giving an added benefit of better movement of actives to compensate for any poor establishment conditions."

In terms of products, he advocates the use of Interagro's Backrow Max which he says has proven itself across a variety of crops both winter and spring.

So how exactly does Backrow Max work and how can it help to mitigate the negative impacts of poor soil structure on herbicide performance? "Backrow Max is a specialist activator adjuvant, which is designed to aid application efficiency," explains Stuart Sutherland, technical manager at Interagro. "It does this in a number of ways, firstly by the reduction of drift which ensures more of the herbicide reaches the target area.

"It also helps to create a more optimal droplet size for pre-emergence herbicide application, leading to improved coverage on the soil."

Critically, in terms of absorption and retention, Backrow Max helps increase herbicide retention in the weed germination zone better than any other adjuvant tested – enhancing residual herbicide activity, claims Stuart. "Although we've not been short of rain this year, it's important to know that Backrow Max can also be beneficial when we do inevitably find ourselves in a dry situation again as it slows drying on the soil surface – helping to maintain soil moisture levels – aiding the consistent release and uptake of herbicides."

It's for these reasons that Ian says most of the farms he works with now use Backrow Max across the board. "It's just an inherent part of the pre-em programme now."

Although the inclusion of the adjuvant can be hugely beneficial, it's important



Agrii trials have shown an uplift of about 9% in blackgrass control when chemistry is paired with Backrow Max.

to be realistic and Ian warns that it's not a 'get out of jail free' card in severely compromised situations. "In suboptimal situations you'll definitely improve herbicide performance with Backrow Max, but it won't mitigate a poor, compacted seedbed, so it's important to carry out other actions to correct this as much as possible prior to drilling."

With so many scarred from the previous season, Ian says it's understandable that justifying an added cost like Backrow Max can be a difficult decision – particularly when many are already spending around £100-140/ha on their early weed control programme.

"But growers ought to think about how much of that investment they could be losing in extreme conditions. With the amount of money spent on the herbicide stack – both pre- and post-em – these products should be given the best opportunity to work to their potential.

"For the sake of a few pounds per hectare with the inclusion of Backrow Max – i.e. an additional 3% spend – the efficacy and safety advantages of the product makes for a cheap insurance. There are those who are sceptical about how it works, but in my book it's an essential part of a considered approach to herbicide programmes and grassweed control." ■

Pushing Performance

At the heart of good crop production lies careful use of chemistry to protect the plant and maintain performance, right through the season.

But optimising the efficacy of plant protection products can be challenging, while increasingly restrictive regulations limit just how far you can go.

This series of articles explores the science behind the use of adjuvant and biostimulant tools to help power both chemistry and crop performance, as well as increase understanding of why they're needed and what they do.

We're setting out to empower growers

and drive crops to reach their full potential. Backrow Max is a specialist activator adjuvant designed to power residual herbicide performance in the toughest of weather and application conditions, helping to take down yield-robbing weeds once and for all.

CPM would like to thank Interagro for kindly sponsoring this article, and for providing privileged access to staff and material used to help put the article together.





“It’s rare a new active comes to market and probably even more rare that two come at the same time.”

Cereal weed control

Bolstering control

Grassweeds are going to have to put up an even bigger fight to conquer chemistry thanks to the recent registration of a new active in cereals.

CPM finds out more about Isoflex.

By Charlotte Cunningham

Two years on from *CPM*’s first look at Isoflex active (bixlozone) in FMC’s French trials, it’s good news for growers grappling for grassweed control solutions as the active has now received registration in Great Britain, with products expected to be filling tanks by next autumn.

The journey to market has been a lengthy one, concluding most recently with three years of extensive trials with growers, distributors and industry bodies to see if Isoflex

really can ‘flex’ its potential when it comes to controlling some of the most yield-robbing grassweeds.

Delving into the details, Isoflex active is based on FMC’s novel new herbicide, bixlozone – from the isoxazolidine family – which has been classified by the Herbicide Resistance Action Committee as a Group 13 herbicide, explains Geoffrey Bastard, marketing and plant health lead (UK and Ireland) at FMC.

“Bixlozone was discovered a while ago and when we began looking at it, we quickly realised it had some really interesting levels of control against key grassweeds – specifically blackgrass and ryegrass, but also annual meadow grass which will also be on the label,” explains Geoff. “I think there are now only 11 primary autumn cereal herbicide active ingredients available at the moment, but there’s likely to be some significant changes to that space between now and 2030. So to be able to bring a new mode of action in cereals to market is something we see as being really important, especially given that the product will have both winter

wheat and winter barley on label.”

Mode of action

So how exactly does bixlozone work? “It inhibits susceptible plants from producing carotenoids – pigments that



To be able to bring a new mode of action in cereals to market is something Geoffrey Bastard sees as being really important.

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Adding in diversity to your early residual soil acting herbicide stack should be a priority – particularly at the moment – so it's quite neat that Isoflex active has come along at this time, believes John Cussans.



Bixlozone works by inhibiting susceptible plants from producing carotenoids – pigments that are critical to protecting photosynthetic processes and ensure normal plant growth and development.

▶ are critical to protecting photosynthetic processes and ensure normal plant growth and development. Essentially, it's a bleaching herbicide as it stops the photosynthesis in target weeds," explains Geoff. "Trials have shown that where it's used pre-emergence or early peri-emergence in wheat, we

get either lack of weed emergence, emergence with bleaching or, particularly in blackgrass and ryegrass, this pinky/purple colour before dying."

Studies of tolerant crops show that these symptoms are transient with little to no effect on the vigour and yield, continues Geoff. "In addition

to inhibiting the production of carotenoids, Isoflex active slows down the production of key amino acids in susceptible plants. It's also able to control weeds through the combination of disruption of light reactions as well as protein turnover and degradation."

ADAS' John Cussans says having this ▶

Isoflex in the field

An important part of the extensive trials process has been testing Isoflex on commercial farms with varying degrees of grassweed and broadleaf weed challenges, says Geoff.

Among the growers involved in these trials is Andy Meecham who runs a 1130ha arable farm near Wimborne, Dorset. The rotation typically includes winter wheat, winter barley and oilseed rape as well as spring crops like barley and oats to help tackle problematic grassweed issues, says Andy. "Blackgrass is our main weed problem here, and we're starting to see more wild oats."

As well as using management strategies such as rotational planning, careful variety selection and hand rouging, a robust herbicide programme is vital and it's for this reason he was particularly interested in trialling Isoflex.

"The trials took place last year, in a particularly high-burden field," explains Andy. "We set up split blocks around the field where Isoflex was trialled with various partners, and then applied the usual farm approach around the outside which typically includes flufenacet, diflufenican and pendimethalin and we've just moved to using Avadex granules (tri-allylate).

"We left a stale strip where no products were applied to be able to compare control levels. This was really interesting as we didn't quite realise just how bad the blackgrass was in that field and it showed that what we'd been doing up until now has been doing a good job. But there's obviously still quite a lot of seed burden there.

"The good news is we saw really good levels of control where the Isoflex was applied, too. Having another product is going to help us bolster



Trials at Andy Meecham's farm in Dorset saw Isoflex bolster blackgrass control (L - Geoffrey Bastard R - Andy Meecham).

our overall control – there are not many products available for blackgrass so having something else we can include in the programme and we know works will be really beneficial.

"We use a traffic light system to rank blackgrass pressure in individual fields, so we'll definitely be adding this to the programme at pre-emergence to bolster control in the worst affected areas of the farm."

The addition of the beflubutamid in the co-form is also likely to be beneficial due to broadleaf weed pressures on farm too. "We have weeds like groundsel which can be a bit of a challenge, so Isoflex will just bring a bit more to the control party which will be really helpful."

1+1=

3

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Cereal weed control

► family of actives available in a cereal herbicide for the first time is a real positive for growers. “What this means for grassweed control in cereals is that we’re bringing in a totally new mode of action – a very different piece of chemistry. In order for herbicides to be sustainable in crops we really have to maximise the diversity of what we’re applying, so this is a really welcome addition.”

“Adding in diversity to your early residual soil acting herbicide stack should be a priority – particularly at the moment – so it’s quite neat that Isoflex active has come along at this time.”

The first Isoflex-containing herbicide coming to market – and expected to land next autumn – is a co-formulated product which actually brings two new herbicide active ingredients to UK markets, explains Geoff. “What we’re offering is a co-formulation which brings together bixlozone and beflubutamid – which is also new. It’s rare a new active comes to market and probably even more rare that two come at the same time.”

By pairing it with beflubutamid, growers will also benefit from enhanced



Isoflex has been proven in a rigorous trials programme which have incorporated commercial farms, including at David Jones’ farm (pictured left, with Geoffrey Bastard).



Isoflex active will have 21 broadleaf weeds on the label including cleavers, groundsel, mayweeds, red-dead nettle and speedwells, and four grassweeds – blackgrass, Italian ryegrass, annual meadow grass and rough meadow grass – making it one of the broadest labels in the autumn cereal herbicide market.

broadleaf weed control too, points out John. “That’s something we’ve missed as we’ve lost products like trifluralin and isoproturon. As a result, we’ve landed with programmes that only deal with grassweeds and consequently, growers end up with broadleaf weeds emerging. I’m quite keen on co-forms because they bake in multiple modes of action and diversity of chemistry in one ready-to-go product.”

Looking at this weed control spectrum in more detail, Geoff says Isoflex active will have 21 broadleaf weeds on label including cleavers, groundsel, mayweeds, red-dead nettle and speedwells, and four grassweeds – blackgrass, Italian ryegrass, annual meadow grass and rough meadow grass – making it one of the broadest labels in the autumn cereal herbicide market.

Integrated approach

While Isoflex will provide good activity across a broad range of weeds, John warns that it’s important to be realistic about the expectations of products alone and advocates using Isoflex as part of a programme and integrated weed management strategy. “It will add an option and diversify the herbicide base,” he says. “In some scenarios it might be an alternative to existing approaches, but in high grassweed pressure situations I don’t see it as necessarily replacing

things already in the programme, in every single field. Instead, its inclusion as part of a programme will bolster control and bring in a great diversity of controllable weeds.”

Geoff agrees and concurs that Isoflex should be used as part of a programme, rather than alone. “I think Isoflex active will be a nice confidence tool for growers,” he says.

“Every farm, every field, every patch of ground has a different dominant set of weeds and this is a product that, in the pre-emergence slot, will give growers the confidence that they’re covering a broad base with one product, which they can then build on as a part of a sequence to make sure they get crops off to a good start and stay weed-free. The autumn slot is the first chance to control weeds so getting that off to a good start is vital.”

Considering how Isoflex active has performed in trials, FMC has looked at the levels of control possible when used alone and as part of a programme. “Firstly, looking at blackgrass control and, based on 64 UK trials at a rate of 1 l/ha pre-emergence, Isoflex active alone gave an average control of 53% on high-pressure sites – where blackgrass counts were on average 332/m², which would be considered quite high-pressure sites,” explains Geoff. “This level of control increased to 65%, compared with untreated, where

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- ▶ blackgrass headcounts were $<150/m^2$.”
On ryegrass, the performance has been particularly strong, giving an average of 64% – across 27 trials – when applied alone in similar high-pressure ryegrass fields. “However as mentioned, solo use isn’t advised, especially when targeting key grassweeds such as blackgrass and ryegrass, and should always be used

as part of a herbicide programme utilising other modes of action,” says Geoff. “Where we’ve trialled Isoflex active in typical mixes/programmes with other available actives, significant control – over 95% – can be achieved. “Alternating modes of action is vital for both herbicide efficacy and resistance management. There’s no silver bullet.”
During the coming 12 months ahead

of its official launch on the market, Geoff says FMC will be continuing to trial Isoflex active to fineness how and where it’s best used, with demo sites across the country to showcase the product to growers. “If we use this active correctly, I’m confident that we’ll be able to keep it on the market for a long time – which is absolutely vital for long-term, sustainable weed control.” ■

Risks and rewards

Following last autumn, the idea of delaying drilling could seem little short of lunacy to some farmers, but sowing in September comes with its own drawbacks in terms of weed control, warns Bayer’s Darren Adkins.

“I think everyone is aware of how it works – you wait for the first significant flush of grassweeds in early October, spray them off and drill after that meaning the residuals have an easier job.

“However, we know the effects of a wet autumn and if, like many farmers, there are hopes for bigger wheat yields next harvest, the crop will likely go in relatively early,” he says.

Drilling strategy can give farmers the opportunity to see the benefit of herbicides, continues Darren. “That starts with Roundup (glyphosate), which is the most effective way to kill difficult grassweeds so having at least one stale seedbed before drilling is a must. The key thing is to keep soil disturbance at drilling lower than for creating the stale seedbed, to minimise weed germination in the crop.”

Then, focus turns to the residual programme which requires moisture to perform well. “Soil-mobile actives like flufenacet require moisture in the germination zone to control weeds.



Peter Waltham expects some ‘fairly hefty’ herbicide programmes this autumn to cope with the increased weed burden.

Dry seedbeds, which are much more likely in September, will result in less germination and lower herbicide performance,” explains Darren.

Longevity is another aspect to consider as crops are in the ground for longer. As such, Darren recommends that the first residual application should contain actives with a long half-life and in earlier-drilled crops, a second spray will almost certainly be necessary.

“The first residual has to have some staying power because it’s possible the second spray will be delayed or not go on at all. Liberator (diflufenican+ flufenacet) plus Proclus (aclonifen) is an option at this stage. Then there are more options for the follow-up spray to bring in different actives and think about broadleaf weed activity too,” he suggests.

As the season progresses, Darren believes flexibility is key. “Delayed drilling isn’t all or nothing, even one week can reduce germination in the crop.”

Agrovista agronomist Peter Waltham is sticking with this strategy this autumn. Advising farmers across Dorset, Somerset and Wiltshire, he’s keen to point out that contrary to received wisdom, blackgrass is a serious problem in the West of England.

“The idea that blackgrass mainly affects the East is a myth, it’s pretty bad here and the biggest increases are in this part of the country. There’s been a noticeable hit on yield where there’s bad blackgrass and that’s in a season where the harvest has been generally poor with one or two exceptions,” he says.

Peter adds that there have been two years of difficult weed control – many crops have gone without residuals last autumn and the generally wet weather has made it tough all round. “It’s going to be make or break for many this time because of the build-up in the weed population.

“One or two might delay, whereas most won’t want to leave it too late and take too much risk. This is a wetter part of the country so delaying drilling is inherently a riskier tactic. I think the main thing is to not go too early – waiting until at least 20 September – and avoid using pre-emulsions on very dry seedbeds.”



Sowing in September comes with its own drawbacks in terms of weed control, warns Darren Adkins.

Furthermore, Peter expects some ‘fairly hefty’ herbicide programmes this autumn to cope with the increased weed burden. “Against blackgrass, Liberator plus Proclus with Avadex (tri-alleate) is the starting point. For brome, I’ll use pendimethalin instead of Avadex to avoid a second pass. Follow-up will be cinmethylin plus picolinafen, or Octavian Met (flufenacet+ diflufenican+ metribuzin).”

He suggests two weeks is a sensible starting point for the gap between the two applications, but a lot depends on the season. “If you see a good opportunity with the right weather and crops are up and looking okay, then get in there with a follow-up. You could also use a spring Atlantis (mesosulfuron+ iodosulfuron) application instead if you have a susceptible population.”

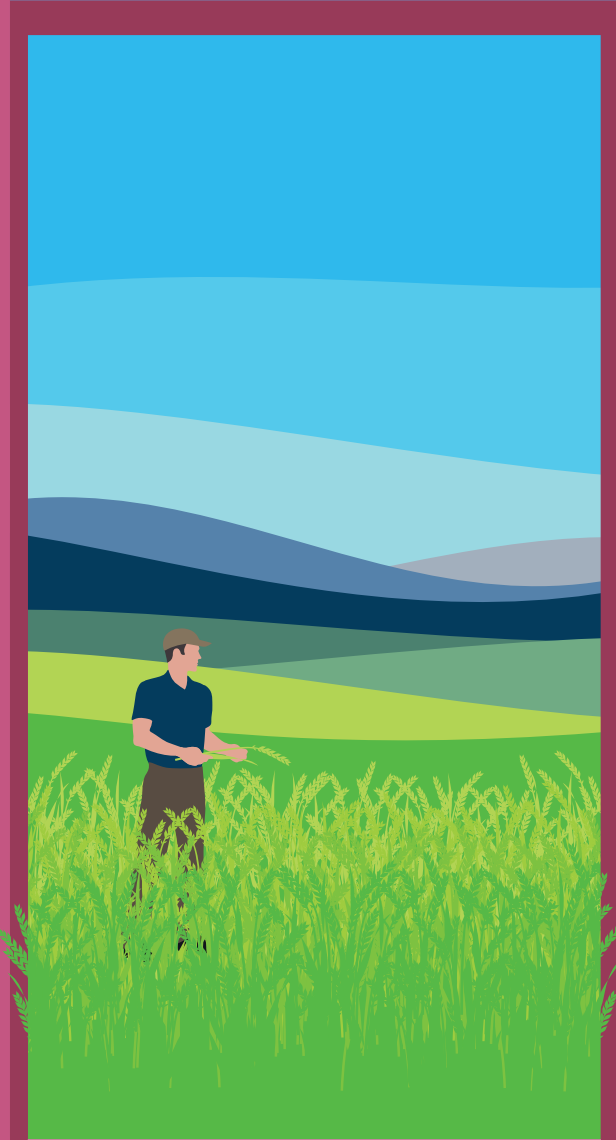
But importantly, Peter anticipates a lot of work will be required ahead of drilling this year. “Soils have taken a hammering; in many places the top layer has no structure and is lacking microbial activity.

“It’s simple advice, but get a spade and check where there the problems are and what implement you should use. Mineralising some nitrogen with cultivation will help things to get up and running which is what everyone will want to see this autumn,” he concludes.



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Real Results

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Patience prevails

“Whether drilling early or not this season, the most important aspect is ensuring a healthy, well-established and competitive crop.”

Understanding that consistency year-on-year is the cornerstone of effective grassweed control is helping one mixed farmer to manage resistant ryegrass populations, despite testing seasonal set-backs. CPM finds out how he remains focused on the end goal.

By Janine Adamson

Five years ago, mixed farmer Rob Barlow and his father Peter took on an additional 160ha of rented land to bolster their farming operation at the Crown's Bingham Estate in Nottinghamshire. As they were passed the baton of guardianship, it soon became apparent that traditional farming techniques had facilitated a ryegrass proliferation.

But armed with an integrated approach including both cultural and chemical controls, populations have dramatically decreased during the subsequent years despite the weather not always being on side. As focus turns to drilling the coming season's crops, Rob says they'll continue with this mindset regardless of recent set-backs.

“The weather really hasn't played ball at all this past year with some areas under water for a considerable length of time,” he says. “Until then, our ryegrass control had been looking very promising despite some high pressure areas, but we find consistency is key as well as not over thinking things.”

Management constraints

This is because the land lies on the edge of the River Trent which means soil types range from heavy loam to gravel, with some prone to flooding, meaning that not all management techniques are appropriate. As a result, Rob explains that it's more about making the most of what they can do, rather than what they can't.

“We don't direct drill due to the silt content in our soils so aim to be min-till with rotational use of the plough where necessary which seems to work well. We drill reasonably late from 25 September onwards, although can't risk delaying it as much as others might due to the catchy weather,” he says.

“It's keeping things simple but timing is very much key – optimising spray windows and our application techniques.”

ADAS weed scientist, Dr Sarah Cook, says such discipline is critical in managing ryegrass which is fast becoming a widespread problem. “In ways it's the new blackgrass but is a far worse weed – ryegrass generates more seed and is more competitive. The most effective way to manage it is through prevention in the first place – don't let it get onto farm.

“Like blackgrass, ryegrass travels in the usual ways – with straws and manures, via machinery and on the wheels of vehicles, and of course through home-saved seed,” she advises.

“An additional means of transmission we're finding is with cover or companion crops which are increasing in popularity due to SFI. These are difficult to clean and are less regulated than cash crop seed,” she stresses.

Then if in the case of Rob, ryegrass is indeed present or an inherited problem, avoiding further transmission is vital, adds Sarah. “You must prevent it from moving field to field and then between farms by exercising good hygiene measures. Control-wise, the same cultural methods for blackgrass apply to ryegrass such



When Rob Barlow (R) and his father Peter (L) took on 160ha of rented land it soon became apparent that traditional farming techniques had facilitated a ryegrass proliferation.



According to ADAS' Sarah Cook, ryegrass is the new blackgrass but a far worse weed – generating more seed, while being more competitive.



Because the farm's standard herbicide programme wasn't working on the new rented land, ryegrass samples were sent to ADAS for resistance testing.

as delayed drilling, for example.”

However, because of the greater levels of spring germination in ryegrass, this means more attention is required when it comes to the management of spring crops. “Historically, there's been less focus on herbicide use in spring crops, particularly when stale seedbeds are successful. But where ryegrass is present, using a good pre-em will still be necessary,” she suggests.

At Rob's farm, due to the soil type, much of the land isn't suitable for conventional spring crop options, although maize is grown as a break crop which is used as feedstock for a local anaerobic digester. For a while this has included sowing a Westerwolds ley prior to the maize, however Rob says timings are becoming increasingly pressed to make this work.

On areas where ryegrass is particularly prolific, a five-year grass break is being used to avoid disturbing dormant weed seed, which complements the feeding requirements of the livestock.

With the farm successfully maximising its cultural options, Rob says it was time to re-evaluate the chemistry being used. “We'd conventionally opt for a flufenacet+ diflufenican plus pendimethalin mix at pre-em followed by a post-em pinoxaden in the spring. However, this didn't seem to be as effective on the new ground with high ryegrass pressure and we wanted to find out why,” he explains.

Working alongside independent agronomist Graham Partington, the decision was made to send weed samples off to ADAS for resistance testing. Unsurprisingly, the results indicated RR resistance for flufenacet (62% control) /

pinoxaden (64% control) / pendimethalin (80% control) and RRR resistance to mesosulfuron+ iodosulfuron (37% control).

This meant the farm's go-to programme simply couldn't overcome the resistant ryegrass population present. Reflecting on this, Sarah says ADAS has been receiving greater numbers of ryegrass samples for testing recently. “Resistance tends to be more aggressive in ryegrass than blackgrass due to the sheer quantity of seed – the weed can take on resistance much faster and there's a greater chance of genetic changes,” she explains.

On-farm trial

With the results confirming initial suspicions and having seen the launch of a new mode of action in the form of Luxinum Plus (Luximo/cinmethylin), Rob was happy to accept the offer of an on-farm trial from BASF's agronomy manager, Colin Mountford-Smith.

The work, which focused on winter wheat with high ryegrass pressure, involved comparing an area treated with 0.7 l/ha Luxinum Plus and 2.0 l/ha Stomp Aqua (pendimethalin) at pre-emergence, with untreated. A further treatment of the farm standard (flufenacet+ diflufenican plus pendimethalin) was also assessed. Both treated areas were followed up with a spring post-em application of 0.8 l/ha pinoxaden.

Colin says when the weed plant counts were undertaken the following May, the untreated plot had more than 670 ryegrass heads/m² whereas the Luxinum-based treatment had just 89 heads/m². “This shows a high level of control and demonstrates why Luximo

is such an effective building block of ryegrass management strategies. The farm standard actually had the highest count at 736 heads/m², but that's likely to be seed-bank related.”

According to Colin, inheriting such a significant grassweed problem on rented land means seed return has to be strictly managed each year. “If we can achieve 95%+ control from each application of Luximo, this will begin to deplete that historical seed-bank,” he stresses.

“In the case of where a five-year grass ley break is being used, using Luximo this year will be an effective way of mopping up any leftover weeds after that dormant period, for example.”

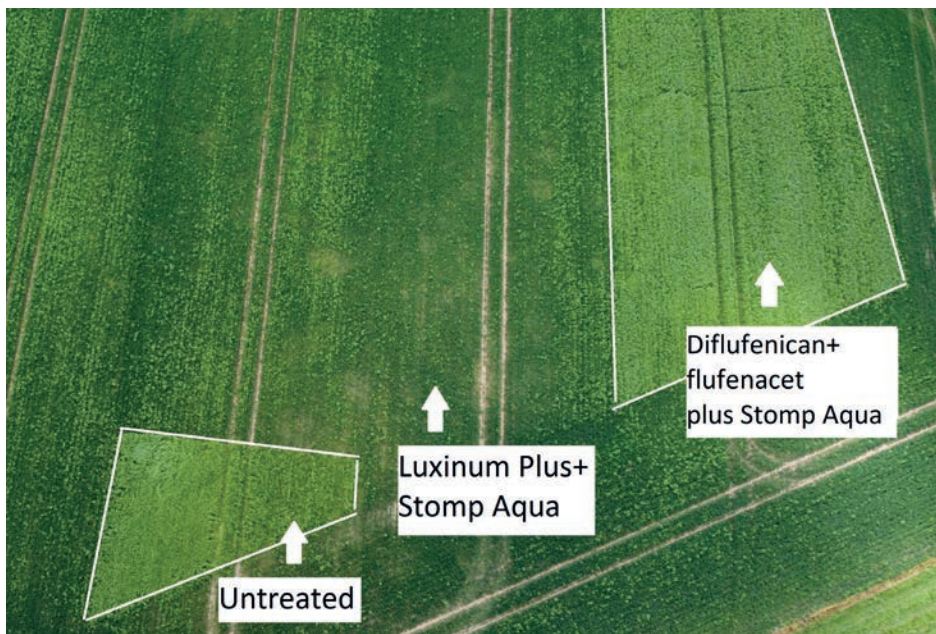
Rob agrees that visually-speaking, it was clear how effective the product can be. “You could see how well it had worked in the autumn – it was difficult to find any remaining ryegrass plants.

“The only reason why we didn't achieve optimum control overall was the spring



BASF's Colin Mountford-Smith instigated an on-farm trial to understand the performance of Luximo in a resistant ryegrass situation.

Real Results



When weed plant counts were undertaken in May, the untreated plot had more than 670 ryegrass heads/m² whereas the Luxinum-based treatment had just 89 heads/m².

flush everyone experienced last year. That aside, we'll definitely use Luximo this coming autumn as part of our clean-up tactics to try and get back on-top of things."

Colin commends Rob's persistency. "The past 12-months have disrupted many people's plans and rotations have had to be tweaked accordingly. What's become evident is that even with excellent efficacy from Luximo, it isn't an overnight fix for high pressure situations. It's part of a long-term strategy offering an improvement over time when used alongside relevant cultural techniques.

"Although the trial at Rob's couldn't be repeated last year due to the weather, we're hoping to undertake the work again so we can build the data set further," he adds.

On the back of a difficult year, Rob,



It's hoped the same on-farm trial of Luxinum will be repeated again this coming season.

like many, is facing financial pressure with a growing incentive to return to more profitable wheat crops as soon as possible. He says this is one of the reasons why this year's set back has been so keenly felt.

"I was looking forward to discovering what impact the combination of IPM, planned cultivations and Luximo would have had. It's not only put the trial out of sync but has had consequences for the farm's economics. It's very disappointing."

Even so, Rob feels he's using all of the viable options available for his farm and soil types. "The only potential option left is to bring Avadex (tri-allate) into the mix, however, that comes with cost implications," he adds.

Colin supports this concept: "BASF has trial data which shows a timely application of Avadex granules prior to a pre-em of Luximo plus pendimethalin, gives around 10% additional control.

"It's a programme that we support as a manufacturer in high pressure situations, along with an alternative approach of adding the liquid formulation, Avadex Factor in the tank with Luximo at pre-em."

According to Sarah, many growers may throw the weed control rule book out of the window this autumn following two testing years. "Whether individuals drill early or not this season, the most important aspect is ensuring a healthy, well-established and competitive crop. This could mean a higher seed rate in some instances.

"Then, aiming for a timely pre-em application of effective chemistry will be the best starting point," she stresses.

Colin agrees that for those who don't want to risk waiting, more attention to detail will be required including ensuring a pre-em is applied within 48-hours of drilling. "Even so, it's likely that those with a historical grassweed problem will know to avoid drilling early. Experience shows early drilling sets back grassweed control, equally, data suggests that delaying, even by just a few days, can make a tangible difference.

"We've seen some growers explore using Luximo at pre-em or early post-em and although this can be successful, there's usually a drop off in control. The most effective use of the chemistry is at pre-em followed by a timely post-em top-up of an active such as flufenacet, in high pressure scenarios," he advises.

According to Colin, this is due to Luximo being root acting, although the product also exhibits activity on seed too. "Rather than penetration through foliar tissue, Luximo disrupts the root meristem to prevent elongation and cell division. This is why pre-em application is so critical," he concludes. ■

Real Results

BASF's Real Results Circle is a UK-wide agricultural network now in its eighth year. The initiative is focused on bringing together growers, industry experts and BASF to create a more resilient farming system that's sustainable for farm business profit, for the people we feed and for the planet we live on.

Working alongside CPM, BASF explores related topics such as resilient disease control, environmental stewardship and return on investment. Discussions centre around Real Results Circle farmers and associated experts from the wider industry.

By coming together to openly discuss and therefore face challenges as one, we can find out what really works and help to shape the future of UK agriculture.

CPM would like to thank BASF for kindly sponsoring this feature and for its assistance in providing access to the relevant experts and contacts required to produce it.





Keeping glyphosate going

Forward-thinking farmers

With glyphosate remaining a stalwart in crop protection programmes – despite being more than 50 years old – CPM seeks advice from the experts on stewardship to keep it in rotations.

By Charlotte Cunningham

For most farmers, glyphosate will be an integral part of the crop protection programme – having provided growers globally with high levels of weed control for more than 50 years.

That said, there's no denying its usage has been a topic of great controversy during recent years – a burden worsened by resistant weeds appearing in other countries including the US and Australia – highlighting the importance of good stewardship and best practice to preserve the herbicide now and in the future.

"Glyphosate is still very much a cornerstone of integrated weed management – for most people, it's still incredibly important," says Bayer's Roger Bradbury. "Therefore, maximising its efficacy short-term and protecting it in the long-term should be a key priority for everyone.

"It's a unique mode of action – there are no alternatives coming," he continues. "It's the only active in the HRAC Group 9. This year Roundup brand is celebrating 50 years of use since its launch in the UK in 1974,

and in that time there hasn't been anything launched that's equivalent to glyphosate, so it's important to bear that in mind when it comes to protecting it.

"What's more, there are issues with resistance to the chemistry in other parts of the world and it's important to remember we're not immune to that happening here."

So what can growers do practically in terms of stewardship to both maximise efficacy of applications while protecting the future of the chemistry?

Weed targets

"Thinking about the target weed spectrum is vital," explains Roger. "While glyphosate is a broad-spectrum herbicide, it's not equally effective against all species. They do all have a different inherent susceptibility to glyphosate and this comes down to a number of factors, such as the nature of the waxy leaf surface or the innate physiology of the plants, for example.

"Having a good understanding of this will enable growers to tailor their dose rates accordingly."

It's also important to consider the size of weeds, says Roger. "This is where I think we've become a little complacent," he warns. "There's a tendency to think that glyphosate will be able to deal with really big weeds. While yes, it can kill larger weeds, smaller weeds are much easier to control reliably, so timing of the application to target them while they're smaller can also help to protect the chemistry."

Conditions at the time of application also should be considered, as well as sprayer set up and nozzle choice. "Where

“ There are issues with resistance to glyphosate over the world and it's important to remember we're not immune to that happening here. ”

this isn't optimal, the plants are more likely to be subject to sub-lethal doses and therefore perhaps not as good efficacy as you'd expect. This is also a risk factor for resistance development, so where there are survivors, don't be tempted to apply another dose of glyphosate; instead incorporate an alternative mechanical means of destruction."

Water source and volumes will also play into the efficacy of the herbicide, adds Roger. "Harvested rainwater is the most ideal choice, although we know this isn't something everyone has access to. However, where this is possible, it avoids all those queries around hardwater.

"If you're drawing water from the mains, it's important to understand the water hardness. For Roundup-branded products, in most situations, you don't have to use a water conditioner – but that doesn't apply for other glyphosate products and for many of

these you absolutely should."

Delving deeper into how application can impact glyphosate performance and another factor which can influence it is nozzle choice and boom height – something independent application specialist Tom Robinson has been researching.

The driver behind the research was to reaffirm the theories on how application techniques can implicate glyphosate. As such, Tom has conducted trials for Bayer during the past few years which have looked at how both of these factors affect drift and



Repeated applications of glyphosate is a risk factor for resistance, so it's important to deploy a range of weed control tactics, says Roger Bradbury.



Sarah Cook says good glyphosate stewardship comes down to using the right rate of the right product at the right time.



Experts say judicious use of the plough to aid herbicide performance may be wise this year, given the poor state of soils.



Independent trials carried out in 2022 have looked at the impact of four different nozzle types – Lechler ID3, Hypro Guardian Air, Hypro 3D and a 110 Fan Jet – on glyphosate application and performance.

► efficacy of the herbicide. The goals were to ascertain the effects of application factors on the performance of Roundup when applied through a commercial sprayer.

Applications were carried out at a rate of 100 l/ha at 12km/h to KWS Kilburn spring wheat during late tillering. Four different nozzle types were used – Lechler ID3, Hypro Guardian Air, Hypro 3D and a 110 Fan Jet (see table) – with observations

including spray coverage percentage, control percentage, distance of drift damage and area of drift damage.

Based on the research, Tom was able to make three key recommendations when it comes to the best nozzle selection when applying glyphosate – assuming a stable boom and a nozzle height of 50cm:

1. Under good spraying conditions – Hypro 3D
2. Under less stable conditions – Guardian Air
3. Where gusts are variable – Lechler ID3

“I’d also never recommend using traditional Fan Jet nozzles,” adds Tom. “That was the worst for drift. As a good all-rounder, the Hypro 3D is a really good choice but

it really does depend on the conditions.”

But above all else, and regardless of nozzle choice, Tom stresses that maintaining a straight and stable boom with a nozzle height no greater than 50cm is imperative.

For longer-term management, Roger says it’s vital that growers monitor the success of their weed control on an annual basis. “With grassweeds, this can be quite obvious – you’ll be able to see them sticking out of the top of the crop. If control is poor, consider what the reasons for this are – dose rate? Timing? Poor application? The conditions? A good summary of best practice is available in published WRAG

Glyphosate guidelines

ADAS has looked in detail at best practice for managing resistance to ensure the long-term effectiveness of glyphosate in the UK, including a five-year study which concluded in 2020. ADAS’ Dr Sarah Cook was one of the key researchers involved. “Glyphosate is the most frequently used herbicide in the UK and is very important to the industry,” says Sarah. “As such, this research was very important to quantify how to get the best control from glyphosate and reduce the risk of resistance development by using best practice on grassweeds. This in turn helps to be able to protect it in the future.”

As a brief background recap, the study was carried out to build on and improve the current evidence at the time surrounding risk management with glyphosate. Specifically, the team wanted to scientifically quantify the four key management principles: preventing survivors, maximise efficacy, use alternatives and monitor success.

Practically, the research started with a survey into how glyphosate was being currently used followed by experimental work which included both field and container-based studies.

The end goal for the project was to produce guidelines which would allow growers to minimise the risk of resistance while also optimising the efficacy of glyphosate, and as such the key take homes were:

- Optimum application timing for blackgrass and Italian ryegrass is GS12–13
- Glyphosate rate >540g is critical for optimal control
- If target weeds are tillering (from GS21), a higher glyphosate rate (>720g) is required
- Temperature at application is extremely important for both enhancing or reducing control
- Cultivation of stale seedbed at a depth of 5cm is essential to increase blackgrass control
- Maximum of two glyphosate application timings for a stale seedbed

But four years on, is the advice still relevant? Very much so, says Sarah. “It’s still all about the right product, for the right situation, applied at the right time.”

Something that’s increased in popularity since the initial research is experimentation with alternative products that are naturally derived to try and reduce rates of glyphosate.

However, ADAS’ research scientist Katy Hebditch warns that the evidence is lacking on these alternatives at present as no data have been published.

“At the moment, there’s not the robust experimental evidence for these additional products to justify reduced rates. So until we can see that, we’re very much still pushing key messages in the guidelines to not reduce rates at all – although we’re always interested in new proven solutions that’ll help farmers if the scientific evidence is there.”

With some evidence of increased tolerance to levels of glyphosate in ryegrass, Katy continues that it’s vital to monitor resistance levels to all chemistry. “Generally, we’re now seeing so much resistance with ryegrass and blackgrass to other modes of actions that it’s increasing the reliance on glyphosate.

“We don’t want this to increase further as it could endanger the availability of the chemistry in future. If you do see glyphosate failure developing into a pattern, and obvious patches of glyphosate survivors it’s important to speak to your agronomist and/or the ADAS weeds team as soon as possible.”

Glyphosate application trials treatments

Product	Dose l/ha	Nozzle	Characteristic	Water Volume l/ha	Speed km/h	Pressure Bar	Nozzle Height cm
Untreated							
Roundup	TBC	Fan Jet 110-025	Standard	100	10	2.2	50
Roundup	TBC	Guardian Air 025	-75% Drift	100	10	2.2	50
Roundup	TBC	Lechler ID3 025	-90% Drift	100	10	2.2	50
Roundup	TBC	Hypro 3D 025	-50% Drift Angled	100	10	2.2	50
Roundup	TBC	Fan Jet 110-025	Standard	100	10	2.2	100
Roundup	TBC	Guardian Air 025	-75% Drift	100	10	2.2	100
Roundup	TBC	Lechler ID3 025	-90% Drift	100	10	2.2	100
Roundup	TBC	Hypro 3D 05	-50% Drift Angled	100	10	2.2	100

Source: Tom Robinson, Roundup Application Trial 2022. Green = recommended nozzle/treatments.

guidelines which growers should reference for advice when it comes to minimising the risk of glyphosate resistance.”

Thinking about performance this spring, Roger says a combination of factors led to poor levels of control. “From what we’ve seen, a lot of this came down to dose rates and timings,” he explains. “We did have some situations where farmers had been written a recommendation in January but didn’t apply it until April – so there’s a message there to revisit recommendations where appropriate and change dose rates accordingly.

With unavoidable delays to applications last spring, many plants were also in stem extension phase of growth which is notorious for variable performance. It’s not recommended to apply glyphosate when plants are at this stage as efficacy will be compromised.

Anaerobic conditions

“A lot of fields were very wet and saturated and roots were sat in anaerobic conditions for quite some time. So when glyphosate was applied plants were stressed, not always actively growing and mobilising glyphosate into the roots. Where this didn’t happen, control was poor and regrowth in the base of the plant occurred.”

Thinking more broadly, careful planning of the whole cropping system is also important in glyphosate stewardship, he adds. “Ask yourself, do you have diversity in there? This includes autumn and spring crops, monocots, dicots – essentially opportunities to give you other ways to control weeds than glyphosate.

“Also managing that overall weed

burden in the field is crucial. Knowing what you’re dealing with on a field-by-field basis is optimum. For example, fields carrying a high weed burden are at higher risk of resistant individuals appearing.

“Cultivations can help manage weeds away from chemistry too. For some, the plough is a dirty word but in a year like the one we find ourselves in currently, judicious use could be beneficial from a weed management perspective.”

For those operating a more regenerative or reduced tillage system – and therefore limited with what they can do cultivation wise to control weeds – there are still alternative approaches other than over relying on glyphosate; something which Essex farmer David Lord advocates.

Farming 600ha on the coast, David says he deploys a typically no-till strategy. “That said, we will do some remedial if we get a



With resistance to glyphosate now noted in other parts of the world, it’s vital growers maintain good stewardship of the herbicide to keep it in programmes.

particularly wet year and have had a really poorly established cover crop, for example.

“In terms of glyphosate usage, I think direct drilling gets a bad reputation. However, we’ve found the key to avoiding multiple applications is to ensure there’s a lot of diversity in the system.”

For David, this diversity includes winter and spring cropping, using spring oats, canary seed and Wildfarmed spring wheat. “We don’t do second wheats or have oilseed rape anymore. We’re probably about 50/50 on our winter to spring cropping ratio now, just to de-risk the system where we can as blackgrass has typically been our biggest issue. Now, grassweeds aren’t generally a concern.”

As a result, he only uses a maximum of two applications of glyphosate – one to kill cover crops ahead of drilling and then potentially another at or after drilling, depending on the season. “We don’t tend to see repeated applications on bare ground, which is where I see the main risk as being. Good glyphosate stewardship is all about attention to detail and looking at the system as a whole, which is very possible to achieve.” ■

Forward-thinking farmers

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Making an informed choice

BYDV control

As growers strive to reduce insecticide use spurred on by the incentives offered by SFI, what happens when high aphid pressure means there's little choice but to consider a solution from a can? *CPM* talks pyrethroids.

By Janine Adamson

With poor autumn weather conditions last year meaning many were unable to travel and spray crops, growers in the North West observed some of the worst barley yellow dwarf virus (BYDV) symptoms for decades. That's according to Peter Clare, managing director of agronomy company Environmental Crop Management (ECM).

And despite advancements in plant breeding resulting in BYDV-resistant wheat varieties, he says if growers in his area (Cheshire and Lancashire) didn't use autumn insecticides, subsequent wheat and barley yields would be down 20-30% if infected with the virus.

"In the North West, conditions can be very mild coupled with large hectarages of grassland plus a lot of trees and hedges. Because one way in which BYDV is vectored is by winged aphids which have been infected with virus from grass – and which require habitats to overwinter – this makes for a high risk scenario.

"Growers in other parts of the country may be able to get away with reducing their insecticide applications, maybe even eradicate use altogether, but for those who can't, left untreated, aphid-vectored BYDV can result in complete crop losses in extreme cases," he stresses.

In fact, Peter believes growing cereal crops without insecticides in the North West isn't feasible at the moment. "You can't afford the damage which results from infection; it plugs the plant up preventing sugars from moving around to sustain growth. It's also not possible to delay drilling before the rain closes in for the season, which is a key cultural control technique."

Green bridge destruction

"The only option is an integrated approach of other cultural methods – of which destroying the green bridge is most critical – alongside considered pyrethroid use," he continues.

In terms of the green bridge, Peter notes volunteer cereals and infected grassweeds pose additional threats. That's because BYDV is also spread directly by wingless aphids which survive on this material post cultivations.

"Start by destroying the green bridge from last year's stubble using glyphosate. Then once drilled, growers and agronomists have to regularly field walk with an application of an insecticide as soon as a crop is at 2-3 leaves if aphids are present," he adds. "It's important to note that resistant ryegrass must also be controlled effectively or it's prime for hosting the virus."

Pyrethroids are the go-to synthetic option

for aphid control, but concerns have been raised regarding their impact on beneficial insect populations as well as potential resistance issues. Rothamsted Research's Dr Steve Foster says it all depends on which species of aphid is the vector as to whether resistance could be a problem.

"We have some concerns regarding the development of moderate pyrethroid resistance in *Sitobion avenae* (grain aphid). This species carries a gene mutation known as 'knock-down resistance', or *kdr*, which means pyrethroids don't bind to it as well and are therefore less effective.

"In the thousands of aphids that have been screened during the years, there's been no evidence of strong pyrethroid resistance above and beyond that yet, which means when applied at the correct and full rate with good aphid contact, pyrethroids should still provide control," he explains.

Despite this positive message, recent samples from Norfolk could suggest otherwise. "Tested in lab-based bioassays applying a pyrethroid, these had the highest resistance ratio versus a fully susceptible sample – more than double what's been seen before. Although unusual, it would suggest something is happening with that species which requires further clarification," explains Steve.

However for principle BYDV vector *Rhopalosiphum padi* (bird cherry-oat aphid), there's yet to be any reports of resistance or control failures which is good news for pyrethroid use, he adds. "Even so, BYDV hasn't gone away – levels have

“BYDV hasn't gone away – levels have remained stable for the past two years with around 20% of aphids tested being infected.”



According to Environmental Crop Management's Peter Clare, growing cereal crops without insecticides in the North West isn't feasible at the moment due to various reasons.



Unlike most pyrethroids which have a pyrethrum core, esfenvalerate has a unique radical phenyl-acetate at its heart, says Sumitomo Chemical's Simon Leak.

remained stable for the past two years with just under 20% of all *Rhopalosiphum padi* samples tested being infected."

But what about the risk to beneficial insects and invertebrates? According to Peter, one pyrethroid in particular poses less of a threat. "Being focused on environmental best practice, ECM instigated a study with Manchester Metropolitan University to understand the impact of esfenvalerate (as in Sven and Sumi-Alpha) on web-spinning spiders – the main predator of aphids.

"The results suggest that although the insecticide is initially disruptive to spiders, after a few days it's back to business as usual. This is important given the role these beneficials play in integrated pest management," he says.

Although the reason behind this outcome isn't currently clear, what makes esfenvalerate different to other pyrethroids such as cypermethrin, is it has a different core make-up. Sumitomo Chemical's Simon Leak explains with a different structure comes different properties. "Unlike most pyrethroids which have a pyrethrum core, esfenvalerate has a unique radical phenyl-acetate at its heart.

"This offers higher repellency and better stability which are useful properties in an insecticide. At the end of the day it's a pyrethroid, but relatively speaking it's definitely less aggressive and poses a lower toxic risk to bees."

Stevenson coefficient

Work conducted by Rothamsted Research confirms this hypothesis, demonstrated using the Stevenson coefficient as a means of quantifying toxicity levels to bumblebees in field conditions. The calculation is based on LD50 (lethal dose) and field use rate (g/ha) – the higher the coefficient, the more toxic the compound is (see table below).

Simon believes this data, coupled with greater awareness of how to target spray applications, means growers can make more informed choices. "Blanket spraying and adding insecticides to tank mixes just in case are becoming less commonplace on the whole. The impact of all synthetic plant protection products on the environment is far better understood.

"At the same time, varieties with resistance traits aren't a silver bullet and



Rothamsted Research's Dr Steve Foster says it depends on which species of aphid is the BYDV vector as to whether pyrethroid resistance could be a problem.

require the back-up of chemistry – the two work hand-in-hand. This means we have to carefully manage the use of pyrethroids such as esfenvalerate to avoid resistance building up, or losing the active through revocation," he says.

The latter point being important because at the moment, esfenvalerate is undergoing renewal by the Chemicals Regulation Division (CRD) with an outcome expected within the next 12 months. Even so, Simon says Sumitomo – the only manufacturer of the active ingredient – is confident the product will remain.

"As with other pyrethroids, esfenvalerate has been around for quite a long time so it's an important product both globally and for the UK. It's a quality product and it continues to deliver," he adds.

To back this statement, applied in optimum conditions, esfenvalerate has the potential to last longer due to its persistency – something which Peter also commends. "We've had many years of success with Sven – it's a low dose, very rainfast and persistent pyrethroid. If there's a spray miss in a field, it's completely obvious where the virus has taken hold. Equally, it's rainfastness is an important quality when the weather can be as catchy as it is," he concludes. ■

Wheat dwarf virus

As a consequence of climate change, there's a new viral threat on the horizon for UK growers – wheat dwarf virus (WDV).

Rather than aphids, WDV is primarily vectored by leafhoppers – plant feeders that suck sap from grass, shrubs and trees. Whereas previously, leafhoppers were an insect prevalent on the Continent, the picture is now changing, says Rothamsted Research's Dr Steve Foster.

"This pest is happier in warmer temperatures, which is why we're starting to see increasing populations in the UK. Concerningly, a recent sample from the East of England has tested positive for WDV.

"We're yet to undertake a full assessment for pyrethroid resistance, but have to recognise that this is another insect threat to UK cereal crop production," he stresses.

With this in mind, Steve believes greater onus will be placed on plant breeding. "With the potential loss of further active ingredients, new resistant varieties for both BYDV and WDV are very important – it's the way forward," he concludes.

Active ingredient	Dose g/ha	LD50 µg / bee	Stevenson coefficient
Pirimicarb	125	54	2.31
Esfenvalerate	7.5	0.21	35.7
Deltamethrin	6.25	0.051	122.5
Lambda-cyhalothrin	6.25	0.027	231.5
Cypermethrin	25	0.056	446.4



“ There have been good crops, bad crops and indifferent ones. ”

Harvest review

A season in review

As another harvest draws to a close it's not only worth looking back at the past year, but also casting forward to what's ahead. CPM assesses the results while considering the potential for 2024/25.

By Melanie Jenkins

This season has presented challenging conditions for growers with talk circulating about whether the wet autumns and dry springs will become the norm, but there are still positives and key lessons to take away, say experts.

Although irregular establishment may explain the variability in wheat yields seen this harvest, Hutchinsons' Neil Watson observes that there are a number of other lessons emerging which could help to clarify.

“What's most evident so far this harvest is the significant variability in yield with some crops performing well considering the circumstances, while others have barely reached half their potential – and occasionally within the same field,” he says.

“The trend seems to be better on freer draining soils which have maintained their yield capabilities, albeit with no record yields. Conversely, the

heavier and poorer structured soils have seen their potential plummet.”

So much so, Neil believes soil drainage and root development to be the more significant issues. “The ratio of 20:1, the final above ground biomass production to below ground root production tells you everything. If you hinder root development, the knock-on effect on biomass will be all too evident. The effects of temporary root drowning were not only limited to the winter – in some parts of the country heavy rain late on in the season, just as the crop approached ripening, caused premature senescence.”

Spring challenges

This lack of biomass was all too apparent from early spring onwards, where wet soils impeded uptake of nitrogen at a vital stage, while the lack of sunshine has significantly limited biomass production, particularly early in the season at the construction phase, he says. “The latter stages of the season didn't help with grain fill either, subsequently bushel weights have suffered. Elevated temperatures towards the end of the growing season also meant accelerated leaf aging leading to negative effects in the grain filling phase.”

However, he feels that in general, the lower temperatures through most of the critical spring/summer growth period helped reduce stress on crops.

Neil also believes that blackgrass control, or lack of it, will have impacted yield. “Not because of poor residual control in the

autumn, quite the contrary, but because the wet spring surviving plants were able to negate the effects of the autumn residuals.”

Disease played a key part in most areas as well, he notes. “Septoria pressure was high in the early part of the season, continuing through the critical months of April and May. The early drilled crops were at the greatest risk with many growers struggling to keep leaf two clean.

“Both yellow and brown rusts were a major risk in susceptible varieties this season – once in the base of the crop, fungicide programmes struggled to hold the disease at bay beyond three weeks,” says Neil. “And fusarium and ergot were more



Hutchinsons' Neil Watson notes that some wheat crops have performing well considering the circumstances, while others have barely reached half their potential.

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* The highest wheat yield is 17.95 tonnes/ha (39572.97 lbs/ha) and was harvested from 8.2920 ha (20.49 acres) by Tim Lamyman (UK) in Louth, Lincolnshire, UK, on 10 August 2022. Data from Guinness World Records.

▶ prevalent this year than most, primarily because of a wet flowering period.”

He also believes that partly because the wet soils delayed applications, BYDV was more common among winter than spring crops this season. “The wet winter didn’t help with take-all in cereals this year either, it’s even shown through in first cereals.

“When you consider all of the issues that the season has thrown at crops, it’s no wonder we’re seeing a range of yields across farms and even fields,” he adds.

But while variability appears to be the theme of this harvest, ProCam’s Lee Harker has observed a number of standout varieties this season. “LG Beowulf has performed very well in its first season, while Champion has also stone out with some excellent yields and KWS Dawsum doesn’t appear to be letting anyone down.

“Bamford is another really good variety and there’s still plenty of seed around. I think a number of growers may have passed it up because it’s a Group 3, but it’s almost worth forgetting this. Bamford is simply a very high yielding, good wheat that’s suitable for most growers and if they can get a premium on it, that’s just a bonus.”

It’s not a dissimilar picture when it comes to barley, with Lee noting that variability is again the key take-home from this year’s harvest. “There have been good crops, bad crops and indifferent ones,” he says. “Variability has been evident in the yields, quality and specific weights we’ve seen.”

A lot of crops have produced below par yields, with reports coming in that some conventional varieties have delivered noticeably thin grains. “Although there are a few conventional varieties which have



Variability has been evident in barley yields, quality and specific weights, according to ProCam’s Lee Harker.

Golden wheat

Northamptonshire grower Andrew Pitts’ first experience with new quality wheat RGT Goldfinch has gone very well this year and he now has plans to grow it commercially.

“We’ve had a terrific time with it,” he says. “It’s produced high yields and great milling quality, it’s resistant to BYDV and orange wheat blossom midge and has the best disease resistance profile out there. It’s ticked all of the boxes in what’s been a very difficult year.”

The 40ha seed crop was direct-drilled at the end of September after peas on medium-bodied land at The Grange, Mears Ashby. “Goldfinch looked good from the outset and tillered prolifically,” says Andrew. “And it survived the really wet autumn and spring very well.

“The field is actually our most lodging-prone area, so this was a tremendous test for Goldfinch. Of the area we planted, only 0.4ha on the most exposed steepest slope leaned, but it remained easy to harvest.”

The variety was easy to combine thanks to its short straw and good standing, and was a couple of days earlier than the farm’s Skyfall, he adds. It averaged 10.1 t/ha and surpassed full milling specification, with a specific weight of 76kg/hl, a Hagberg of 350 and 13.1-13.7% protein across the board.

“This year especially, that’s a really good performance,” says Andrew. “The thing that thrills me most of all is the protein, in



RGT Goldfinch has performed well on one Northampton farm, achieving 10.1t/ha and making full milling spec.

a year when everything else is struggling. To make full milling spec in a difficult season is a very good sign to me.”

Goldfinch yielded about 0.5t/ha less than the farm’s Skyfall, but its better protein level made all the difference, he comments. “Skyfall achieved 12.6 to 12.9%, which was pretty good this year, and overall it put in a terrific performance. But Goldfinch secured a £600-£650/ha premium for making full spec milling and it was £50-60/ha cheaper to grow as we used more fungicide on Skyfall.

“We’ll certainly look at Goldfinch commercially this coming season and we’ll have a lot more double-break ground in 2025/26, so I imagine we’ll be growing plenty more pre-basic seed then,” he concludes.

caught up with hybrids in terms of yield, the hybrids have definitely performed more consistently over the past few years.”

Grain quality

Hybrids have also improved in terms of grain quality. “For example, LG Canyon has a very strong specific weight – only second to LG Caravelle on the current AHDB Recommended List – which is a really good selling point.”

Caravelle, LG Capitol and KWS Tardis have been the best performing conventional varieties, according to Lee. “Caravelle has looked very good and consistent, so I think that’ll be very popular this year, plus there’s plenty of seed available. Capitol has almost gone under the radar a little but it’s on a footing with Caravelle and Tardis is selling well again.”

After last year’s disastrous drilling conditions, the assumption is a lot of growers will have elected to drill early this time round, says Lee.

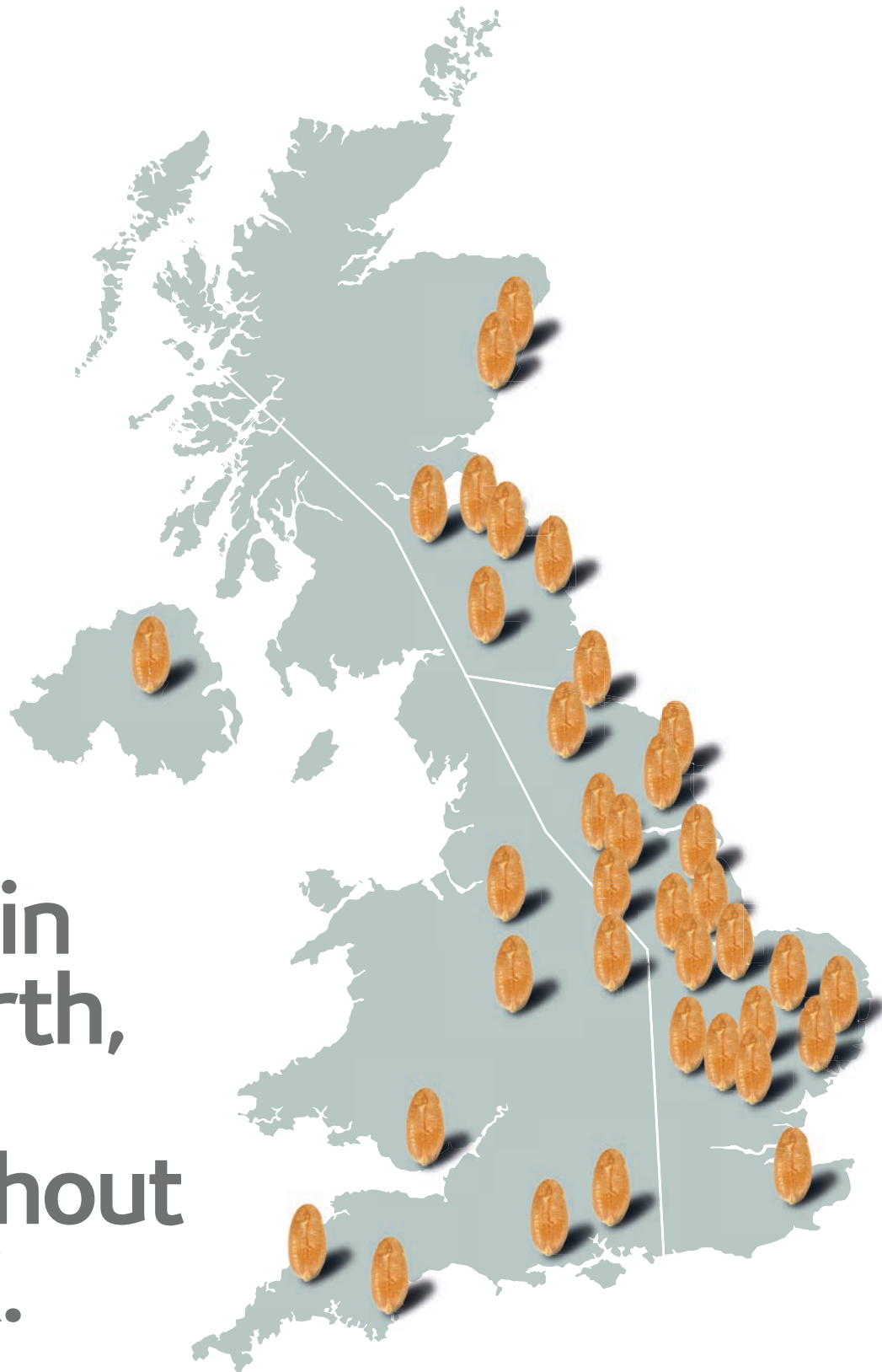
Despite this, he highlights that the

barley area is predicted to fall this coming season. “The end prices aren’t great – we’re seeing wheat at about £180/t and barley usually trades around £20/t below this. Barley plantings are also linked to the oilseed rape area due to it being such a good entry for it, and with growers turning away from this break crop the fall in barley goes hand-in-hand.

“But should we see a strong OSR crop this autumn, it’s good to remember that barley will open the door to planting it next year. We tend to farm based on the year we’ve just had, but really we should be farming for the year or more ahead.”

Lee also points out that hybrid barley is a suitable option for those looking at whole cropping. “There are issues with the lack of available forage and we’re seeing maize crops that haven’t had enough sun just not delivering. But if you plant hybrid barley, you have the flexibility of deciding what to do with it later down the line, whether that’s taking it through to harvest or whole cropping it earlier in the year.”

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Harvest review



NPZ UK's Chris Guest advises growers to move away from having a 'drill by' date for oilseed rape and instead target optimal conditions.

▶ Looking at it from a different angle, hybrid barley is also the best option for grassweed competition, he adds. "It's the most competitive cereal crop for smothering weeds and this is of paramount importance if you're drilling really early, plus it could be a better option than a second wheat in this timeslot. Not all wheat varieties will be available on time for early drilling either, whereas hybrid barley is packed and ready to go."

"Then there's the straw to consider, with hybrids tending to produce more

straw than conventionals. If you're yielding 4-5t/ha of barley straw, at the current value of around £80/t, that's extra to add to the gross margin."

Lee feels that OSR is full of ups and downs and the challenge now is to persuade growers that it's still a good option. "We've only sold around half the seed that we had this time last year and ironically there's few reports of active cabbage stem flea beetle currently. I think we could only have around 230,000ha planted this year.

"What we saw at harvest was that even those crops which looked good and had apparently grown well through the season, still only achieved passable yields. Because of this some growers are taking a minimalist approach to the crop in case it suffers from CSFB and this almost sets it up to underperform. However, this is where the benefits of the breeder establishment schemes can come in handy."

NPZ UK's Chris Guest has been pleased with the results he's seen this harvest though. "Maverick has done very well – we've seen good results from official AHDB trials data, and two of our growers, Ben Cannon near Buntingford, and James Thompson near Louth, have reported that it was the highest

yielding variety on his strip trial."

But Chris admits that where CSFB, drought or waterlogging have impacted crops, this has pulled farm averages down. "Looking forward we have to move away from a 'drill by' date and instead target optimal conditions. I'm not suggesting that growers drill everything late, but to instead avoid bone dry conditions when there's been no rain for several weeks.

"In difficult years we're always more likely to hear about the bad than the good, but we're still seeing people average more than 4t/ha across decent areas, so there's very much still potential with this crop," he adds.

And there's also the inherent market opportunities presented by any commodity crop to take advantage of, says Chris. "For example, you could drill OSR now and still be marketing it in June 2026. And yes, you might have to deal with pests such as pigeons but being in the right place at the right time can yield a reward."

Lee agrees: "We consume about 2M tonnes of rapeseed oil in this country each year yet we're only producing about 1M tonnes of that requirement, plus the oil is used in all sorts of processed foods. And with the government focusing more on domestic food security, OSR still has a valuable position." ■

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Despite a double whammy of tough autumn establishment conditions and high septoria pressure, Bamford has an average 11.66t/ha with overall bushel weights of 79kg/hl on one Lincolnshire farm.

Despite a double whammy of tough autumn establishment conditions and high septoria pressure, Lincolnshire farmer Alex Jasinski was delighted with a first-time crop of Bamford, which produced an average yield of 11.66t/ha with overall bushel weights of 79kg/hl.

Alex, who's based in Ingoldsby, Lincolnshire, grows 400ha of arable crops on a mix of soils ranging from heavy blue clay to limestone brash soils. He drilled 22.5ha of Bamford on 2 October last year alongside two other winter wheats – Dawsum and Skyscraper – successfully overcoming very challenging wet autumn weather.

"It was certainly a tough start to the season. I just about managed to get our pre-emergence spray on two days after we drilled Bamford before the never-ending rain came again. Although we farm predominantly on free draining soils, the moisture levels were so excessive that I was seriously concerned about the amount of rain the new crops were taking.

"Nevertheless, Bamford survived, getting away pretty well in fields where our overall blackgrass burden isn't too bad. There were no hard frosts during winter and the crop progressed well through its early growth stages. Despite very high septoria and yellow rust pressure, Bamford remained remarkably clean all the way through to harvest.

"The crop was harvested mid-August, yielding miles ahead of our five-year farm average of 9.75t/ha for winter wheats, and early grain samples indicate a very large grain. It's certainly been our most impressive winter wheat and we'll be increasing our drilled area to 50ha this Autumn" concludes Alex.



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“ We require varieties that perform across all applications rather than just the white loaf that we’re used to. ”

Milling wheat

The quality conundrum

In a growing season which some have described as ‘savage’, many commentators believe the most profitable wheats on many farms have been Group 1s, with some varieties performing better than others. *CPM* explores the potential future of this market segment.

By Rob Jones

While Group 1 wheat varieties remain the cornerstone of UK flour millers’ demands, another challenging year and the drop in the UK wheat area once again highlight the challenges the sector faces, says KWS’ Dr Kirsty Richards.

Although the weather was warm, overall levels of sunlight were poor and disease was rife, so both yields and quality of all wheats have been variable, not just from region to region, but even field to field on the same farm, she continues.

“It’s certainly nowhere near a universal collapse of the UK crop, but there’s a wide range of variability out there which is prompting many to ask, what can we do to improve and safeguard the

viability for the UK milling wheat?
“We’re increasingly dependent on a small number of high quality milling wheats in Group 1 and when growing conditions are so variable, that lack of diversity is really tested,” suggests Kirsty.
Furthermore, many growers found it difficult to get nitrogen on at the right time because of wet weather with crops struggling to retain it, while brown rust levels were higher than usual due to above-average overnight temperatures, she says.

Quality concerns

“Although traders are forecasting around an 11-12M tonne wheat crop for the UK, the big question is, what condition is it in, as much of it was planted in less-than-ideal conditions.
“Given French and German crops were also affected by poor weather, supplies to millers will be tight and premiums for wheat which meets their stringent specifications will be high due to supply and demand pressures.
“The second question concerns grain quality – how have proteins formed; will specific weights be any good and what will Hagbergs be like? They’re important questions now, but they’ll continue to be repeated in the future,” adds Kirsty.
Jim Brennan, head of technical and regulatory affairs at UK Flour Millers, shares these concerns and points out that Group 1s remain the backbone of UK

flour millers’ demands, accounting for the majority of the homegrown wheat used.
“A Group 1 rating is only assigned to varieties which show consistent, good breadmaking functionality across seasons. This attribute is crucial as millers must meet very stringent requirements from customers on flour performance, while the quality of the crop varies significantly from year to year.



The UK is dependent on a small number of high quality milling wheats in Group 1 and when growing conditions are variable, that lack of diversity is tested, suggests KWS’ Dr Kirsty Richards.

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Zyatt's baking performance and versatility has been commended across a range of applications.

► “The drop in the wheat area is a major challenge for homegrown wheat supply. The AHDB planting and variety survey indicates the UK wheat area is down almost 10% on 2023 and is the second smallest in more than 40 years,” he says.

Group 1 wheats are particularly affected because these varieties have been declining as a proportion of the wheat area, steadily dropping from 31% in 2020 to an estimated 24% in 2024, suggests Jim.

But for Group 1 wheat it's not just production which affects availability, but also the proportion of the crop that achieves intake specification, he points out. “During the previous season only 13% of samples met the typical Group 1 milling specification of 13% protein, 250s Hagberg Falling Number, and 76.0kg/hl specific weight.

“While mill intakes are flexible in terms of the wheat they accept, for example, offering fallbacks for lower protein breadmaking wheat, there was a challenge in procuring wheat at the right headline quality and this has been reflected in near record milling premiums.”

The high milling premiums in the forward market indicate Harvest 2024 is expected to provide little relief to the

tight supply and demand for Group 1 wheat during the coming season, believes Jim.

“It's difficult to know the quality impact at this stage, but just as the extreme wet weather prevented many farmers from drilling wheat crops, it also restricted the ability to apply inputs at the right time. The low sunshine may also have an impact on protein levels.

“It's also difficult to know the yield impact given the relatively late, slow UK wheat harvest. Initial reports have been variable and if Western European wheat yields are an indicator, having suffered similarly poor weather conditions during the season, then expectations should realistically be set low,” he continues.

“The UK milling industry reliance on Group 1 varieties is not going to change. These are the crucial building blocks for breadmaking flour quality and will continue to make up the majority of our wheat demand.”

According to Jim, a Group 1 rating gives farmers the confidence to grow a variety knowing it'll be accepted by mills and achieve a premium providing the quality is achieved. “As a sector we're sometimes challenged on why we haven't assigned Group 1 ratings to new breadmaking varieties to

address the decline in popularity.

“But this misunderstands our quality assessment process, wherein a variety is tested in a controlled manner across three seasons and group ratings are assigned only on the basis of the observed quality and functionality.

“Fundamentally, a variety has to meet our functionality requirements for a Group 1 to be assigned, or confidence in the rating would be eroded,” he stresses.

Ensuring ROI

Kirsty points out that with Group 1 milling wheats costing around £141/ha more to produce than feed varieties, it's critical to achieve a much greater return from the additional investment. “With 80% of the potential crop production in-built in the seed, choosing the right variety for your situation is critical.

“Many growers focus on yield without considering the management attributes which define a variety's character, so consequently may fail to make the most of its full potential. Every farm is unique and every farming business has differing goals, making variety choice a personal decision.”

She adds that maximum output potential and profitability can only be achieved when a range of factors are considered, for example, rotational position, soil type, desired chemical spend, local markets and personal experience.

“Seed represents a very minor cost of production compared with other inputs such as chemical, labour and fuel. When a variety's potential is fully exploited, the return on investment will outperform that of any other input.”

Group 1 milling varieties are mostly grown as first wheats to maximise performance, but are also popular in the second wheat slot too, she adds. “This is because they tend to maximise grain quality and produce higher yields with better disease resistance than other cereals in this position.

“It's important to select the right variety for the selected drilling date due to the agronomic challenges. Take-all becomes the most apparent disease in second to fourth cereals, although Latitude (silthiofam) can be used as a risk management tool.”

According to Kirsty, it's hard to believe, but seven years after making its first appearance on the AHDB Recommended List in 2017, KWS Zyatt (KWS Quartz x Hereford) remains the highest yielding Group 1 winter wheat on the current RL.

“This, combined with its good protein levels and agronomics, means the variety continues to be a first choice for

professional milling wheat growers, many whom have favoured it from the outset.

“However, new and exciting Group 1 milling wheat are coming including SY Cheer, which has been delayed with the millers and will be assessed after harvest, together with KWS's potential high quality wheats KWS Vibe and KWS Beste, may offer good potential for the future.”

The message for autumn 2024 is to stick with what you know, however. Even with newer Group 1s in the pipeline she believes there are many reasons for continuing to choose Zyatt. “A key consideration is its consistent performance over different sites and seasons. This was highly significant in 2023/24, which brought substantial challenges.

“Its excellent physical grain package, including on-farm yields which are 2%



Jim Brennan from UK Flour Millers says high milling premiums in the forward market indicate Harvest 2024 will provide little relief to the tight supply and demand for Group 1s during the coming season.

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According to Duncan Durno, a fall in nitrogen price has improved the economics of growing milling wheats.

ahead of the next-best Group 1 wheat, is supported by the variety's tried and tested performance in the bakery, where Zyatt continues to deliver a wide range of top-quality bread products," she suggests.

Openfield Agriculture's arable technical manager, Duncan Durno, believes milling wheat production is back in the hands of specialist growers with the knowledge and experience to deliver what end-users require. "The declining market share of Group 1 varieties is reflected in the current premiums of £50-70/t which are on the table.

"These levels allow core milling wheat growers to achieve a significantly greater return – which rewards their additional investment, risk and expertise – which often hasn't been the case in the past. That's a good thing and I see that trend continuing for Harvest 2025."

Duncan says 2023/24 was a very difficult season in which all Group 1 wheat varieties faced challenges. "The adverse conditions last autumn which resulted in later drilling in some areas were compounded as soils remained wet through the winter months.

"During that time there were limited frosts to suppress foliar diseases, while a lack of sunshine in the spring meant some crops lost tillers early on and struggled to achieve their full yield potential. The lack of sunlight remained a factor right through to harvest.

"The bright spot was that nitrogen prices fell back significantly from their 2022 peak to approximately £1/kgN. This improved the economics of growing milling wheats which require 40-80kg/ha more than feed varieties to achieve the required protein."

Choosing which Group 1 variety to grow depends largely on individual farm conditions and risk tolerance, he points out. "Zyatt continues to be very popular

and many of our customers have stayed with the variety ever since it first made it onto the RL. They know what they're doing with the variety and how to manage it.

"In common with RGT Skyfall, Zyatt has a low yellow rust rating, so specialist milling wheat growers accept management of the crop will have to be spot on in terms of product selection and timing, and that they'll have to spend more to control the disease. It's not a big issue and these higher milling premiums justify the additional investment."

Yellow rust control

Where yellow rust is well controlled, Duncan feels Zyatt performs consistently. "Control measures have to start early with T0 products which are tailored to the disease – the fungicide programme through the season also has to reflect that.

"Zyatt will continue to be one of our staple Group 1 milling wheat varieties for 2024/25, along with Skyfall and LG Crusoe which is more susceptible to brown rust.

"Where a farming business is growing a large area of milling wheat we discuss the optimum balance between varieties to help them manage and mitigate disease risks as well as spread the sprayer's workload to ensure timely application," he says.

Changes in the bakery market are leading bakers and millers to take a more detailed approach to variety assessment that considers performance across a range of products, says Shaun Taylor, technical director of Rank Hovis Milling.

"Whereas the nabim assessment focuses on producing a sliced white loaf, commercial bakers want to know if a variety is suited to specialist products or processes. Characteristics

such as stickiness and elasticity of the dough, or product texture and volume, have different levels of importance depending on the process followed or products being produced.

"This is why bakers are increasingly talking about varieties rather than nabim groups. Bagel production, for example, is one of the most complex manufacturing processes in baking, so specific performance considerations for this application are particularly important," he says.

According to Shaun, Zyatt's baking performance and versatility are impressive across a range of applications. "It's a solid Group 1 variety with some unique qualities which extend its appeal to categories which are growing, such as sandwich thins, brioche and bagels.

"Rank Hovis has tested flour made from KWS Zyatt in a range of applications including white and wholemeal bread, morning rolls, pizza bases and bagels. We've been impressed with its versatility across a range of products where it either matched or outperformed the commercial flour controls.

"This is because we require varieties that perform across all applications rather than just the white loaf that we're used to," he comments.

As such, Duncan believes the range of Group 1 varieties available to growers could well increase in the future. "New Group 1 varieties are in the pipeline. Cheer will be assessed in September, while Vibe and Beste are RL candidates which appear to have good potential for the future.

"If those gain approval, then growers should benefit from higher yields with lower risk and costs," he concludes. ■



Bagel production is one of the most complex manufacturing processes in baking, so specific performance considerations for this application are important.



“It’s been designed with farmers in mind and I believe that shows.”

Digital Direction

All in one

Following the official launch of Omnia’s EasyPlan upgrade at this year’s Cereals Event, how has the newly packaged all-in-one farm management system been received so far? CPM garners initial feedback from those using the tool on a daily basis.

By Janine Adamson

Easy by name, easy by nature – that was the promise from Hutchinsons earlier this year when it launched its Omnia revamp in the guise of the EasyPlan upgrade. But is the farm management software really as simple to use as it suggests?

According to Suffolk farmer Tom Jewers, he’d found it difficult to appreciate any benefits above and beyond the tool he’d been comfortably using for years, until Omnia came along. And now with the upgrade he’s fully reaping the advantages.

From tracking farm-scale trials to scrutinising yields, Tom says data is at the heart of the family’s farming business. “Data is integral to what we do – I regularly interrogate yield maps to understand under-

performing areas to help inform remedial action. This could result in going out with a spade or instigating soil mapping.

“We also have various small-scale trials on the farm for the benefit of both ourselves and third parties which can be difficult to keep on top of. And now there’s the Sustainable Farming Incentive (SFI) to add into the mix as well,” he says. “So it can be daunting to manage so much information.”

Having everything in one place is a core attribute which gave Omnia its initial appeal, adds Tom. “You don’t want to be diving across systems all of the time. With so many layers of data to view on a daily basis, we’ve found ourselves using the platform extensively because everything is in a central place.”

Although on the market for the past eight years, it’s Omnia’s recent upgrade – revealed to the public at this year’s Cereals Event – which has proven a significant development for both Hutchinsons and those who use the digital tool.

Suite of services

In fact, at the press launch in London, Hutchinsons managing director Gordon McKechnie explained the aim was to produce a new style of farm management software which provides a suite of services. He added that it’s more than a technology tool – Omnia’s upgrade is a fundamental shift in agricultural practice to ensure productivity and sustainability gains.

Reflecting on the recent upgrade, Tom says it’s noticeably stream-lined management of the 380ha farm even

further. “An example of this is attributing variable rate input costs to variable rate yield maps to calculate gross/net margins spatially. Until now that involved a level of manual input but is now fully automated which avoids duplication.”

For this, users can compare variable and fixed costs at a sub-field granular level with traffic light labelling from red to green. The automation is achieved through prices being updated as crop protection plans are inputted and completed, this is then pulled



Farmer Tom Jewers says he’d found it difficult to appreciate any benefits above and beyond the tool he’d been comfortably using for years until Omnia came along.



Omnia has revolutionised the speed at which Farmacy agronomist Toby Clack can deliver crop recommendations, he says.

now requirements such as soil and nutrient management plans can be generated at the click of a button once the relevant data has been inputted into Omnia.

From an agronomic perspective, Farmacy's Toby Clack says this alleviates pressure on his side too. "For something like a Red Tractor audit which can be quite stressful, you know when you get the phone call that everything will be ready in one place which is a relief for all involved.

"But from a very practical perspective, Omnia has revolutionised the speed at which I can deliver crop recommendations. For something simple, I can even do it from my truck, which just wasn't possible before," he explains.

"Being a live platform it enables greater agility. In a season such as the one we've just experienced, you have to be able to react quickly to changing conditions and this could mean recommendations being delayed. With updates being instantaneous in Omnia, it avoids any confusion or paperwork duplication, and increases speed."

Toby also highlights the tool's stock management feature, which he believes is particularly useful as portfolios change. "It automatically flags if products are nearing expiry or use-up date. With the armoury continuing to dwindle, this helps to both avoid wastage and ensure regulation is adhered to."

The stock module is a new feature following the recent upgrade and allows users to create and manage input orders, manage suppliers as required and track orders with automatic status updates. It also includes dedicated stores depending on product type (seed, chemical, fertiliser

etc) with the facility to have multiple location options across a business.

Finally, the feature is automatically updated with a stock taking mode for auditing purposes. With all of this function, the stock module is something which Tom is looking forward to using during the coming season. "We've played with it during the past few months but are now migrating over to help manage all our inputs for Harvest 2025," he says.

Despite Omnia being a live digital tool which can be accessed remotely by all involved, which in theory could reduce direct communication, Tom says it's actually improved how he works with his agronomist. "It can be so easy to miss an e-mail but now we're all working from the same information."

Making connections

Toby agrees that rather than create a disconnect, it's helping to build customer relationships. "With so much data at our fingertips, from variable rate maps to satellite imagery, it generates more conversations than not because that information has to be interpreted.

"Plus it still has to be ground-truthed by a farmer, who often has a wealth of historical knowledge about the farm which the data doesn't necessarily reveal," he adds.

According to Toby, he's now more prepared when he arrives on farm and in a better position to support his growers. "Through the phone app I can see the status of different tasks such as sprayer jobs so there's far less guesswork.

"All-in-all, Omnia is enhancing my work as an agronomist and with a pipeline of future developments,

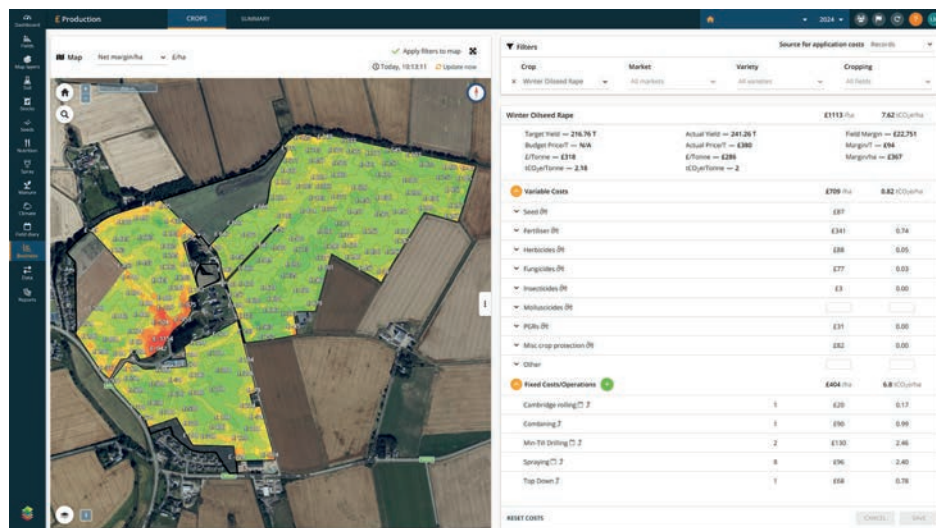
through to Omnia's business module.

Tom also commends improvements which have been made to the system's task and operation management provision. Not only does Omnia offer three levels of flexible record management depending on the person involved and their seniority in the business, but through the Scout app it's now possible to record live operations and update work orders 'on the fly' as they happen in the field.

This includes the ability to take photographs of a crop or problem, draw points on the site map, log issues and add comprehensive notes. "Logging straight into the system via the Scout app is a big plus and with Omnia being cloud-based, you don't have to be in the farm office to use it. It's a one-stop shop," comments Tom.

"Equally, with new initiatives such as SFI, it can be easy to forget to record when operations such as topping have been done, but now we can take a photo for evidence and attach that to the work record so everything is fully traceable. Your mind is at ease that the evidence for each of the various actions is in one place and easily accessible."

It could be argued that compliance and the associated administrative work will weigh heavy on many farmers' minds, but



The Omnia upgrade has streamlined data input, for example, variable rate input costs can be assigned to variable rate yield maps to automatically calculate gross/net margins.



Following the Omnia upgrade, users can now assign SFI actions to each field and then populate specific reports.

it's exciting to see it all unfold."

One such development, which was in response to market feedback after the upgrade launch, has been undertaken to help growers better navigate SFI, explains Hutchinsons head of field-based IT, Lewis McKerrow. "For each field, users can assign one or multiple SFI actions, for example, no insecticide (IPM4/CIPM4). A report can then be populated specifically for SFI.

"This is then integrated into the spray module – during the Halo audit (Omnia's back-end pesticide database), the system will warn you if you try to select conflicting products," he says.

Another change has been to the machinery shed in the business module to help oversee the maintenance of kit such as sprayers. "Users can now add MOT certificate information including expiry dates; in a future update Omnia will then provide a reminder when that's coming up for renewal. Feedback suggested this is important due to the information being required during inspections," highlights Lewis.

As well as new functionality, Lewis adds that recent user feedback has resulted in minor tweaks being made to most aspects of the tool, all to improve user experience. "The upgrade has been really well received by both existing and new customers.

"From our own customer base we're seeing more switch over to Omnia as time goes on. We believe this is because there was a desire for a simple to use system with an intuitive, fresh design. The upgrade has delivered on that."

Beyond all of the function and snazzy features, Tom believes the most valuable



Hutchinsons' Lewis McKerrow says recent user feedback has resulted in minor tweaks being made to most aspects of Omnia, all to improve user experience.

USP (unique selling point) of Omnia is the fact it's been developed in the UK for UK farmers. "The level of support you receive is impressive – the service desk team is extremely responsive even at weekends.

"I think that's its best attribute – there are specialists in the UK working solely on Omnia to provide speedy responses to queries. It's been designed with farmers in mind and I believe that shows," he says. "Even down to the training videos which walk you through each function, step-by-step."

The only negative Tom can identify is that the back-end data set is still developing, which can cause hiccups in terms of minority crops. "For example, we're growing a crop of buckwheat and I had to log a help query when it came to inputting that into the platform. However, the speed at which the response came

back means it wasn't really an issue.

"Our rotation is becoming very fluid so we're having to grow more niche crops as cereal breaks. But the more users that do this and contribute to the data behind Omnia, the less individual queries will have to be raised," he suggests.

This is because the software is constantly evolving, adds Lewis. "We're in the process of redesigning the nutrition module to reflect how we've upgraded the spray module. Part of this will be to expand the Halo database to accommodate nutrition audits.

"We're also about to launch smart phone push notifications which are ideal for task management and grabbing attention when users don't have Omnia open on a device," he comments.

Omnia is available at three service levels – Omnia Access (£0), Omnia Field Manager (£3.15/ha) and Omnia Business Manager (£6/ha). These range from a free service for basic farm mapping (Omnia Access), through to full analysis of information for a range of variable input applications (Omnia Business Manager).

"We've committed a lot of resource to help on-board new customers and ensure they're supported. Receiving such positive feedback from the industry means we're delivering what we set out to achieve," concludes Lewis. ■

Digital Direction

As arable farms progress towards a digital future it can be difficult to know how to navigate data generation, capture and analysis, in order to provide worthwhile benefits to a business.

Through its Digital Direction series, CPM is working with some of the industry's leading companies to understand the latest data-driven solutions from an on-farm perspective.

CPM would like to thank Hutchinsons for sponsoring this article and for providing privileged access to staff and the material used to help bring it together.



What's the score?

OSR disease

It's been almost a year since AHDB first published its new verticillium scoring system on the Recommended List, but what was involved in getting there and how do breeders feel about it? CPM delves deeper. By Melanie Jenkins

It's a disease which can often be misidentified, and work undertaken by AHDB, NIAB, ADAS and many plant breeders is helping to not only bring the intricacies of verticillium to growers' attention, but to also put more power into the hands of the grower when it comes to variety selection.

Verticillium longisporium, commonly referred to as verticillium stem stripe, was



The most severely affected crops tend to be located in eastern England, however symptoms have been reported in other OSR cropping areas such as Lincolnshire, Yorkshire and Herefordshire explains ADAS' Philip Walker.

first confirmed in 2007 in winter oilseed rape in the UK. It typically presents symptoms in crops as they ripen and can be present on stubbles after harvest, explains ADAS' Philip Walker. "Although initially it was only reported sporadically, the disease has spread since 2007 with increasing reports of both new and severe infections. The most severely affected crops tend to be located in eastern England, however symptoms have been reported in other OSR cropping areas such as Lincolnshire, Yorkshire and Herefordshire."

Persistancy

Verticillium is a soil-borne pathogen which survives as microsclerotia on infected plant debris, says Philip. "Once incorporated into the soil it can persist for more than 10 years. When an OSR crop is planted on infected land, the root exudates of the seedlings stimulate the germination of the verticillium fungus which invades the plants through the root tissue and spreads within the plant's vascular tissues. Typically, symptoms then present close to harvest as yellow or brown vertical stripes on the stem surface, grey or silver discolouration under the stem surface, and visible microsclerotia. When the stem debris breaks down, this returns the microsclerotia and infection back into the soil."

The persistent nature of verticillium makes it difficult to control with rotational practices alone unlikely to be an effective control measure, he warns. "Significant yield losses have been known in periods of high temperatures and drought stress in the run up to harvest. Currently there are no fungicides available with specific label recommendations for the control of verticillium in OSR, therefore interest has been driven on the effect of varietal resistance against the disease."

ADAS has run independent variety screening trials sponsored by breeders

since 2014 – the assessment method developed for these trials showed that varietal differences for verticillium could be easily differentiated, explains Philip. "An AHDB project funded from 2016-18 validated this method and showed that variety reactions to verticillium were significantly and consistently different enough for them to be included for RL testing."

According to AHDB's Catherine Harries, the AHDB project came about in response to concerns raised by levy payers about the future control of verticillium in the absence of fully effective cultural or fungicidal control.

Subsequently, AHDB's verticillium project tested and validated the assessment method for verticillium during a three-year period and provided the recommendation that the differences seen in varieties response to verticillium was great enough to enable a ratings system to be introduced, says Philip. "The methodology devised involved assessing OSR stems from early July onwards when the symptoms of verticillium are most visible and differences between varieties are easily distinguishable."

According to Catherine, the trial sites selected are judged to have a relatively uniform distribution of the disease, with artificial inoculation used (as appropriate) to help ensure this. Each site

“ Hopefully as more data is collected, this will allow for the introduction of the numerical scale.”



Verticillium longisporium, commonly referred to as verticillium stem stripe, was first confirmed in 2007 in winter oilseed rape in the UK.



According to AHDB's Catherine Harries, the RL verticillium trial sites selected are judged to have a relatively uniform distribution of the disease, with artificial inoculation used (as appropriate) to help ensure this.

the usual 1-9 disease ratings could be robustly produced, so for the time being the information is presented in three disease-rating categories: moderately resistant (MR), intermediate (I), and susceptible (S). Those in the MR and S categories are statistically significant from each other — so growers can be fairly sure that if they grow an MR variety this will get less disease than if they grow an S variety.”

This assessment method is now used to define resistance ratings for varieties tested on the RL. The varieties currently on the RL have been included in RL verticillium trials since 2022 and up to 44 varieties have been tested across the three years altogether, explains Phillip. “In each year, there has been one trial conducted by ADAS, two by NIAB and one by NPZ UK Plant Breeding, either on naturally infected land or inoculated trials.

The dataset showed that there's a clear separation between the worst and least affected varieties for verticillium infection, and the relative rankings of the varieties were consistent between sites,” he continues.

Greater choice

“The introduction of the rating systems gives farmers more options to consider when assessing the influence of verticillium on their land and their selection of which variety to grow. Those with a known history of verticillium infection may want to avoid growing susceptible varieties, equally, varieties with better resistance grown on land affected by verticillium are likely to show lower levels of infection, mitigate against yield losses and reduce the potential return of the disease back into the soil.

“It should be noted that the resistance

features four replicates of each variety to minimise site variation effects.

Trial management is similar to the AHDB's main OSR trial series, except fungicide applications are limited to a single autumn treatment targeted at stem canker. Additionally, plots aren't harvested, as plants are pulled up early as part of the disease assessments. Crops are carefully monitored to determine the optimum assessment timing – too early or too late would potentially underestimate symptom incidence and severity.

In each plot, 30 stems are assessed for external (shredding and black microsclerotia) and internal (grey discoloration, revealed by scraping stems) symptoms, with the percentage of the stem circumference affected recorded. These are then assigned to infection classes, which are then calculated for analysis using a 0-100 index scale for verticillium infection, explains Phillip.

The 0 of the index represents no symptoms on any stem whereas 100 represents all stems severely affected or dead, adds Catherine.

Working with NIAB and ADAS allowed the project to identify consistent and reproducible differences in verticillium infection levels between varieties, says Catherine. Following this, RL trials commenced with a view to producing information in the RL from 2023.

“The initial dataset had a large LSD and our consultant statisticians didn't think



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- ▶ data does not indicate tolerance, as it has been known for some susceptible varieties to yield well even under high disease pressure.”

According to AHDB's Paul Gosling, there's been a positive response to the ratings. "Although there's limited data,

they do give farmers guidance on which varieties to avoid if verticillium is a problem for them and which ones to favour.”

And while breeders are keen to see a 1-9 scale on the RL as soon as possible, this is something AHDB also has aspirations to achieve. "Sourcing more data may

enable us to develop a more precise ratings system such as the 1-9 scale," says Paul. "Getting disease assessments for verticillium in the national Variety List (formerly National List) trials would be a good start, but that's not a decision AHDB can make," he concludes. ■

Keeping up the conversation

Many OSR breeders have been working to raise awareness around verticillium for numerous years and with the introduction of the scoring system to the RL, their efforts are paying off, but what does this mean to them and what would they like to see next?

RAGT's Lee Bennett points out that verticillium can cause losses of up to 34%, so is a potentially serious disease of which he believes varietal resistance is the only way to deal with it. "While we don't specifically breed for verticillium resistance within our varieties, we've had a number that have performed well against the disease, namely RGT Ceos and RGT Blackmoon.

"Although we're focusing on niche aspects such as sclerotinia, if we have good verticillium resistance in parents of new varieties, then it becomes intrinsic within our wider programme. I can see that the RL score brings new knowledge to farmers, but I'm also aware that many are likely to have other issues that'll be their key focus when selecting an OSR variety."

NPZ UK's Chris Guest, who's been keen to promote conversations about verticillium, feels it's useful that there's now a publicly available scoring system in place. "We perceive verticillium as a very important disease because it's a hidden thief of yield. We're seeing the hotspot areas expanding in the UK, and as drilling practices move earlier and earlier, this is exposing crops to a higher risk of the disease. This is one reason why varietal



NPZ UK's Chris Guest, who's been keen to promote conversations about verticillium, feels it's useful that there's now a publicly available scoring system in place.

selection is important – the other reason being that there's no chemical spray to overcome it.”

While Chris understands that the RL letter score is still in its infancy, he's somewhat cautious about the limited data available so far. "The data can be utilised to benefit or discredit – potentially wrongly – when it's limited. And if incidences occur where scoring isn't done at the correct time, inconsistencies could influence results.”

Limagrain's Kurtis Scarboro is in agreement, noting that the data presented this year is very limited and only comes from a small number of trial sites. "For it to become more representative we'd like to see more sites scored for verticillium.”

Although Chris does want to see a numerical scale like those used to score other diseases, he understands that the data is new and there are a low number of data points to work with. "Hopefully as more data is collected, this will allow for the introduction of the numerical scale. It's important to know which the susceptible varieties are to help spread risk, and improving verticillium tolerance is a key part of our late season stem health breeding focus which can be seen in varieties such as Murray and Maverick.”

One aspect of AHDB's scoring system that RAGT's Lee Bennett is looking for clarity on is whether the trials are only being scored on the clinical level of verticillium in the field, rather than the impact to yield from the disease. And while Elsoms' Mark Nightingale sees the benefits of the RL scoring system, he highlights that verticillium is notoriously difficult to identify. "It can be quite problematic to get good reliable and repeatable data. And because there are lots of different pathotypes, or races, of verticillium, depending on the type you have in the field this can lead to variations in resistance behaviour.

"We've been looking at verticillium across the UK and Europe in our own trials for about 15 years and what we've seen with our conventional variety Hallmark – which has good verticillium resistance – is that it's a strong variety which performs consistently well across different locations.”

Kurtis concurs that verticillium symptoms can sometimes be mistaken for other diseases, so ensuring there's a system in place to guarantee results are being accurately assessed is important. Mark reaffirms that AHDB is right to be scoring the disease, especially with both changes



RAGT's Lee Bennett points out that verticillium can cause losses of up to 34%, so is a potentially serious disease of which he believes varietal resistance is the only way to deal with it.

to farming practice and the climate. "The RL now provides a good guide to resistance and with the increasingly changing climate, the introduction of verticillium scores is a really good example of it being adapted to reflect this.”

But he also feels it would be beneficial to add verticillium testing to the Variety List testing system in the East/West region. "This would provide two more years of additional data to improve the dataset for recommendations going forward. Giving farmers and growers greater confidence in variety choice if this is an issue in their area of the country.”

According to Limagrain's Florentina Petrescu, before verticillium scores were added to the RL, farmers affected by verticillium would approach the firm to ask about how varieties performed against the disease. "We have our own dataset and can advise growers to a certain extent but having access to scores on the RL will make things much easier for them.”

Kurtis suggests that although Limagrain and other breeders do their own screening trials, it's important that this is backed up by independent data. "We've seen good results with a number of varieties such as Attica, LG Auckland and LG Academic, so the RL can now help to independently confirm what we're seeing and presenting to growers.”

Another aspect all of the breeders agree on is that they'd like to see an update to AHDB's distribution of verticillium incidences map. "We'd like to see an update to this as the data is more than a decade old and there's a lot of discussion that the key areas for the disease could have moved or spread," concludes Chris.



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“ Drilling early can remove one of the key tools for grassweed control in OSR. ”

OSR weeds

A CCASE of control

With talk circulating of a severely low planted area of oilseed rape going into autumn, industry experts are highlighting why it's a vital break crop – namely, the opportunity it provides for grassweed control. As such, CPM looks closer at one graminicide's journey.

By Melanie Jenkins

Anyone regularly applying plant protection products will be familiar with conversations regarding resistance build up. However, by-and-large, despite clethodim's long stint on the market, it's still proving itself as a key product in the control of blackgrass.

It was more than 10 years ago when Centurion Max (clethodim) first received UK authorisation for application on a number of crops such as oilseed rape for grassweed control, and although other actives have succumbed to resistance, had their authorisation revoked or haven't been renewed, clethodim continues to perform.

An ACCase inhibitor in group 1A, clethodim has the same mode of action as other FOPs, DIMs and DEN actives, says UPL's Stuart Jackson. "They work on grassweeds by blocking the enzymes which catalyse fatty acid synthesis, which are

required for processes and metabolisation within the plant, stopping further growth. However, clethodim's slightly different in terms of its resistance profile, which is why it's still working so effectively and is integral to grassweed management programmes."

Target site mutations

With ACCase chemistry, the most common resistance mechanism is target site whereby a mutation at the site means herbicide can no longer bind with enzymes in the plant and so efficacy is reduced or voided, explains UPL's Dr Alexander Zeller. "But to further complicate matters, there are a range of target site mutations which can result in varying activity between the FOPs, DIMs and DEN herbicides."

Clethodim is unusual in that it's less affected by target site resistance than other ACCase actives, in particular the I-1781-L mutation. This incurs resistance to cycloxydim (Laser) but not clethodim, despite both being DIMs, adds Stuart.

According to ProCam's Rob Adamson, clethodim is therefore still useful for the control of both blackgrass and ryegrass. "ACCase chemistry is generally of little benefit in break crops when targeting blackgrass and ryegrass, however, clethodim is an exception to the rule and is a valuable tool. Although we're likely to see a greatly reduced OSR area planted for 2024/25, it's important to remember that this break crop gives the opportunity to deploy this option."

Once Centurion Max has been applied, it targets the growing sites within the weeds and symptoms will start to appear after

a week to 10 days, says Stuart. "What you'll start to see is a yellow-green tinge to grassweeds and a brown discoloration at the base. The youngest leaves will pull away easily and the inner stem will go brown and mushy. In warmer conditions, symptoms will appear quicker."

From survey work conducted by Dr Stephen Moss between 2011 and 2014 — which Stuart believes is still relevant today — a range of blackgrass populations across England were assayed. "This determined the make-up of gene mutations that were in those samples, purely looking at ACCase mutations that would confer resistance to the FOP and DIM chemistry."

The survey involved taking samples from 132 fields in England where 2574 plants assayed. "The results showed that



To get the best out of Centurion Max and to maximise herbicide uptake, the product should ideally be applied when the weed is at the correct growth stage, says UPL's Stuart Jackson.



If clethodim is applied after flower buds have formed it becomes phytotoxic to the plant but symptoms won't be evident until flowering the following April.

in blackgrass, the dominant mutation is I-1781-L, being present in around 85% of the samples. The percentage points might have moved slightly since the survey was conducted, but they won't have markedly changed," says Stuart.

Present at low levels of around 8% in this study was a second mutation, A-2078-G. This is a mutation which is resistant to 120g/l of clethodim as well as the other FOPs DIMs and DEN herbicides.

From earlier ryegrass survey work conducted by Dr Stephen Moss in 2006/7 — 384 resistant plants were assayed from a sample of 54 populations across England.

"The overwhelming mutation with resistance to clethodim was A-2078-G, and essentially more than 50% of the sampled population has this gene, so it's likely that in half of the ryegrass situations, clethodim could deliver disappointing results, if used as a stand-alone treatment," he notes. "The second most common gene in the sample was still I-1781-L, which means clethodim has a role to play, but it does have to be supported."

A more recent study conducted by Stephen in 2022/23 looked at two different elements. First, taking blackgrass and Italian ryegrass samples from fields and assessing petri dish assays after treating these with Centurion Max, and then taking any surviving material and retreating it to confirm resistance. The study looked at two different DIM products, clethodim and cycloxydim, at high and low doses, explains Stuart.

In the ryegrass samples, the I-1781-L mutation reacted better to

higher levels of clethodim (0.4ppm and 1ppm, representation of field rate recommendations), showing the importance of using the correct dose, says Stuart.

"But where the A-2078-G mutation was present this didn't provide complete control during the assay tests. When retreating the survivors, all of the plants with A-2078-G survived but the I-1781-L mutations all died, demonstrating why we still see the performance in the field against 1781 but not A-2078-G," he adds.

"The fact that low doses in the assay weren't as effective on the I-1781-L population however, is a good reminder of the importance of dose, and adequate plant contact to ensure enough active ingredient is applied to the blackgrass."

To get the best out of Centurion Max and to maximise herbicide uptake, the product

should ideally be applied when the weed is at the correct growth stage, says Stuart. "Apply from three leaves to early tillering when the weed is actively growing."

Air temperature should be 8-25°C as this provides optimum growing conditions, and clethodim shouldn't be applied when there are frosts because the weeds won't be actively growing, he explains. "It's also recommended to always apply with a water conditioner such as X-Change, because this will provide improved performance of the herbicide."

According to Rob, water conditioners and pH buffers help to improve the amount of the active ingredient that's available to the weed and therefore more likely to kill it. "Where there's 120g/l of clethodim in Centurion Max, you could lose a proportion of this to lock-up with minerals such as

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Combine this with a tiny weed plant with little surface area to absorb the product, this can be where resistance starts.”

To achieve optimal coverage, Centurion Max should be applied with a minimum water volume of 200 l/ha of water. Stuart also warns growers to not trim the dose but to also not go above the 1 l/ha max dose rate.

Equally important to get the best out of the product is the growth stage of the crop. “Clethodim can be detrimental to OSR if an application is made too late when the flower buds are forming, therefore there’s a cut-off date of 15 October or at six leaves, whichever comes first,” explains Stuart.

“OSR forms its flower buds at about eight leaves which should be by late October or early November. But if clethodim is applied at this point, when the OSR is shutting down for winter and growth is slow, the plant can’t metabolise or break down the herbicide meaning clethodim becomes phytotoxic to the plant. This is expressed in the flower buds because

they are the growing part of the plant, however, you won’t see symptoms until the flowering the following April,” he warns.

For those growers drilling early, this can severely limit or exclude the opportunities to apply the product, says Stuart. “For those planting in early August, OSR is likely to be past the six-leaf stage before the grassweeds are at the optimum size, or even emerged at all if the crop is rapidly growing. And although clethodim can be applied before October, there’s a risk of a second flush from grassweeds when applying it earlier. This means drilling early can remove one of the key tools for grassweed control in OSR.”

Rob concurs that drilling early limits the period growers have to apply Centurion Max. “Growers might find that by drilling early, they have a rapidly growing crop which reaches the six leaf cut-off before there’s sufficient emergence of the target grassweeds. Although it’ll control cereal volunteers which have emerged, there are other ACCase products which can be used

to control these; clethodim has to be used to target blackgrass and ryegrass which generally won’t flush until October. You also have to factor in that clethodim is a nuanced active – it’s really good but works better on larger blackgrass plants than smaller ones.

“Waiting until the grass is starting to tiller is therefore beneficial, however with only a narrow window when OSR will be between growth stages 14-16 – as specified on the Centurion Max label – there’s a fine balance in getting adequate sized grass while avoiding exceeding the six leaf cut-off where the crop is then at risk of phytotoxicity.”

The earlier sown crops will have grassweed flushes within the crop because these won’t have been caught in a stale seedbed with glyphosate, warns Stuart. “And because the OSR will be too advanced to apply Centurion Max, growers are then relying on propyzamide – although it’s a residual, it only penetrates 5cm into the soil, while grassweeds can put down deep root systems by the time it’s applied.”

This is a situation that’s putting greater

Sequencing solutions

The past few years have seen much earlier drilling of OSR as growers fight to establish a viable crop ahead of cabbage stem flea beetle migrations. But when it comes to crop protection, this creates a conundrum, highlights Adama’s Bill Lankford. “Growers are getting crops in early and waiting until they’re viable before spending money on aspects such as weed control, but by the time they’re satisfied the crop is worth investing in, there can be too much biomass for effective contact control at post-em.”

A study conducted by AHDB (then HGCA) in 2014/15 found that during a three year period across two sites, the average yield response to herbicides was 0.94t/ha — which is around 40%, says Bill. “So by delaying everything, there’s a concern that underperformance of the crop is guaranteed. I can understand the desire to delay spending, but there are a few scenarios where pre- or early post-em herbicides are very helpful for weed control.”

And as much as clethodim remains an important herbicide for the control of blackgrass and ryegrass, it’s only one cog in the weed control system. “When crops are planted in early August, there’s quite a gap to bridge before you can apply clethodim and this is where metazachlor herbicides, such as Sultan (metazachlor) and Legion (metazachlor+ quinmerac), could be used.

“Metazachlor is the same mode of action as flufenacet which is useful to start to get control of blackgrass and ryegrass, and it can

also help with annual meadowgrass which some ACCase inhibitors don’t target.”

For best efficacy against grassweeds, he recommends a pre-em of metazachlor, applying the label rate of 1.5 l/ha for or 2 l/ha for Legion. Legion can also help control tall and aggressive broadleaf weeds such as cleavers and bur chervil which require an early herbicide interaction, says Bill. “Both of these products can be used early post-em as well – with up to four leaves on OSR – so there’s some flexibility if there isn’t good moisture pre-em.”

A watch-out from Bill is volunteer cereals. He says they’re incredibly competitive and used to be easy to control with FOP herbicides, but now dry early autumns mean plants aren’t necessarily actively growing due to stress, so the herbicides aren’t working. “In the past we’d have used very low rates of herbicides but these aren’t robust enough if the conditions are too dry. Adama produces a guidance card for the best rates for all volunteer cereals with Falcon (propaquizafop) to help manage the changeable climate conditions and earlier OSR drilling date.”

And while adjuvants weren’t historically recommended with Falcon, Bill says these can now help more of the product to get into volunteers in drier conditions. “There can be a temptation to leave volunteers until they’re completely emerged – which is fine with wheat – but hybrid barley can easily get too far ahead so it’s important to monitor its growth stages.”

Charlock is another weed to consider because



When crops are planted in early August, there’s a gap to bridge before applying clethodim which is where metazachlor could be used, explains Adama’s Bill Lankford.

it’s the most similar in seed size to OSR so can be a difficult contaminant, he warns. “Fox (bifenox) has unusually high levels of activity against Charlock and is able to control large plants. It’s typically used after frosts because there can be a fine line in the selectivity between the crop and the weed.”

In situations where growers have planted companion crops, such as buckwheat, to help mitigate the issues with CSFB, Adama has undertaken work that’s determined metazachlor, propaquizafop and bifenox can be safely used. “We’ve screened multiple companion crops and the only one which is badly affected is fenugreek, so growers can still apply their weed control programmes safely where other companions have been planted,” he concludes.



According to ProCam's Rob Adamson, an application of clethodim with propyzamide can be helpful where grassweed emergence is incomplete or the plants are small or shaded by OSR.

pressure on valuable chemistry, he warns. "In this scenario, the grassweeds are bigger and stronger and you're then exposing them to propyzamide but not actually killing them with it."

In the opposite situation, where OSR crops are drilled late and only emerge from the ground in mid to late September, from a clethodim stewardship point of view, plants might not reach the label stipulation of four-six leaf, before the 15 October stewardship cut-off.

After several years without severe phytotoxicity issues in OSR, Rob warns there could be some complacency regarding the product's stewardship. "It's easy to forget why these guidelines were set, however, it's dangerous to ignore them because the impact on overdosing or badly timed applications can be dramatic in OSR."

Alexander advises growers to ensure overlap is eliminated, spots aren't missed, application speeds and boom heights are optimised and adds that it's suitable to be administered with low drift nozzles.

Furthermore, the product shouldn't be applied when the target weeds are wet or there's a high dew. "First let it dry before making an application," says Stuart. "Ideally you want it to remain dry for the following 12-hours to allow time for it to be fully taken into the plant."

In situations where growers have opted to omit a pre-emergence herbicide and wait until they feel there's a viable crop before spending on pesticides, they could be faced with a dilemma between controlling broadleaf weeds or grassweeds, highlights Stuart.

"If broadleaf weeds are the main

issue, growers might apply Belkar (halauxifen-methyl+ picloram) however, they should determine that there are no impacts to the OSR crop before going in with Centurion Max after leaving a 10-day window between applications."

But if blackgrass is the main issue, Centurion Max is likely to be applied first and growers should then leave 14 days before applying another plant protection product to ensure there's no impact to the crop, he adds. "It's also important to make sure the following herbicide isn't having an effect on the weed you're aiming to control with Centurion Max."

The next stage in the grassweed programme would be to target them again in November or December with a propyzamide product, says Stuart. "From a stewardship and resistance management point of view, it's important to follow up Centurion Max with propyzamide, especially where there are 2078 mutations present."

Centurion Max plus a water conditioner can be tank mixed with an insecticide or with propyzamide, but not with both, he highlights. "It's a case of mixing it with one or the other depending on the situation and what's most critical."

For those wishing to combine the benefits of a contact and a residual herbicide, there are a few limiting factors. "Clethodim can be safely tank mixed with Kerb (propyzamide), but propyzamide can only be applied from 1 October and if you want to achieve the best results from both products, clethodim is best applied in early October and propyzamide in November," adds Stuart.

Rob adds: "An application of the clethodim and propyzamide mixture can

be helpful where grassweed emergence is incomplete or the grassweeds are small or shaded by the OSR plants, but the growth stage of the OSR means the application of clethodim can't wait any longer.

"In these situations, propyzamide is a useful complementary mode of action to ensure the herbicide application is effective. The mixture will be an equally useful tool where the A-2078-G mutation is present," continues Rob. "Mixing clethodim with propyzamide to aid the control of resistant populations is a useful way to restrict the spread of resistance. In ryegrass in particular, clethodim can't reliably be used as a stand-alone treatment, but as last autumn has taught us, it's not always possible to apply a follow-up application and if you don't, you can soon select for a completely resistant population."

Although Centurion Max is the main product containing clethodim growers are likely to be using, Rob highlights that there are others on the market, some of which are exclusively for use on sugar beet, while others have different concentrates of clethodim in them or have different application rates. "It can't be assumed that 1 l/ha is always the full label dose, and with 180g/l products available, it would be an easy trip hazard to not read the label, and exceed the maximum dose - resulting in likely crop effects," he comments.

In addition to blackgrass and ryegrass, Centurion Max will also control a wide range of other grassweeds including annual meadow grass, rough stalked meadow grass, volunteer cereals, rat's tail fescue, creeping bent and has good activity on brome species, concludes Stuart. ■



Clethodim still has a place for the control of blackgrass, say experts.

Planning for success

Nutrient plans

It's sometimes regarded as a compliance 'tick box' exercise, yet creating a nutrient plan can deliver tangible benefits on the bottom line for a business, with new technology set to make the task even simpler. *CPM reports.*
By Rob Jones

While there are many reasons to complete a nutrient plan including a fairly compelling legal obligation, investing the time and resources into really making it work can deliver significant benefits to an arable business, believes AHDB head of farming systems and agronomy, Ollie Johnson.

With a sharpening focus on NUE and the development of new farming practices designed to make crop nutrition work as hard as possible, efficient nutrient planning should be at the heart of every crop production system in the future, he suggests.

"There's obviously the environmental aspect with its emphasis on making sure applications are matched as closely as possible to crop requirements, so nutrients don't, for example, end up in water courses, but that's really just the start of it.

"One of the most important things for the grower is it allows them to target costs – nitrogen has reduced in price recently as gas prices have come down from the high of two years ago, but it's still an expensive input."

Ollie believes a comprehensive nutrient plan can help growers to get the most from every kg of nitrogen and other key nutrients applied, which is essential to future sustainability.

"Most growers have NUE very much on their radar and realise they may have been a little too focused on yield in the past, but what really matters is profit.

"Increasingly, considerations are being made regarding how to convert as much of the fertiliser that's applied into grain, rather than just applying a whole load of nitrogen which might increase the heap a little, but not necessarily improve profits."

Beyond nitrogen

It's not just about nitrogen either, as much can be done to improve the efficiency of phosphate and other key nutrient use too, he suggests.

"If you have an index of 5 for P, for example, while many might perceive that as good, all it means is you've been paying into the bank without making any withdrawals which might not be the most cost-effective thing to do."

Chair of the RB209 arable technical group committee and independent advisor, Allison Arden, says such a mindset plays into the latest thinking on nutrient planning, with the new Sustainable Farming Incentive (SFI) helping to drive this.

"Every farm has a legal requirement to produce a nutrient plan, but growers have to move on from a simple 'compliance' mindset. People always think of it from an inspection point of view – whether it's the Environment Agency (EA) or Rural Payments Agency (RPA) – and that it's just about keeping nutrients out of water,

clean air and managing the soil, which is important but not the only story."

Allison stresses that although RB209 is the initial step in nutrient planning, it serves as guidance only. "You have the flexibility to create your nutrient plan according to your farm situation, but it must be evidence-based. A basic plan may meet the requirements, but it might not provide valuable insights into enhancing productivity.

"Investing in a more comprehensive nutrient plan will, however, help you to reduce your cost of production, increase recovery of nutrients and achieve better management of the organic resources at your disposal such as muck, digestates and slurry. "It's also a way of lowering the carbon footprint of production, which is a key aim of government in achieving its net zero targets while also likely to attract marketing premiums in the future as grain buyers strive to reduce their scope-3 emissions," she says.

According to Allison, SFI is a good mechanism to encourage farmers to engage with nutrient planning. "With £652 available for this, it's likely to go a long way to financing a plan – particularly on arable farms which tend to be simpler in this respect than livestock ones."

Ollie adds that a key part of responsible nutrient planning is safeguarding against the possible implementation of future legislation in the area of fertiliser use. "We're seeing more laws being introduced around protected ureas, for example, and

“ Good nutrient planning can fundamentally improve your business for the better. ”



AHDB's Ollie Johnson believes a comprehensive nutrient plan can help growers to get the most from every kg of nitrogen and other key nutrients.



According to independent advisor, Allison Arden, SFI is a mechanism which encourages farmers to engage with nutrient planning.

that's all to be respected while meaning farmers are getting more out of their urea.

"But I think we're all keen that government doesn't create additional legislation around how we farm. Growers can play a key role in this by making the correct decisions themselves around fertiliser use and recognising the value isn't just to the environment, but also to them," he says.

Furthermore, Ollie adds that he sees

this approach in the plant protection product sector through the Voluntary Initiative (VI), which fulfils this exact role and acts in lieu of additional legislation by encouraging best practice and demonstrating farming is capable of self-regulation and responsible use.

"It's the industry putting its hand up and saying, look, we don't always get it right but we're going to do what's necessary so you don't have to step in with additional legislation at this time."

RB209 is an opportunity for that to continue, he says, with continuous updates and a major review now underway. "Stakeholders in the industry were recently invited to submit their views and thoughts on how RB209 can be improved, with some early areas of interest being around biostimulants, cover crops and other new technologies.

"Growers are definitely keen to make more use of organic sources too, and with this in mind we've already developed a new manure calculator for the AHDB website which will allow farmers to more easily calculate the financial value – this should be available for use in the coming weeks."

The calculator will rate the value of manures not only on the material

used, but also how they're applied with other new technologies, he adds. "The increase in nitrogen prices did make people think when they realised they couldn't afford to use so much.

"Many decided the crop was going to have 150kgN/ha rather than 220kg of bagged N, with the difference being made up through biostimulants and long-chain methylated ureas. When it came to harvest, some were relieved and perhaps surprised that yields weren't that different. So, a lot of this new thinking is being taken onboard in RB209."

Allison says new technology can also be used to both simplify the process of nutrient planning and improve its overall value to the farming business. "If you've never done a nutrient plan or have but not really followed one in the past, using a simple digital system to take the complexity out of the process is a real benefit to growers. Simple to create, simple to action and simple to understand are key drivers of actually implementing a plan.

"NavigatePro, for example, digitally connects to RB209 so users can access all of the experience and research which goes into that, but they also have the flexibility to adapt their plan to match

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Nutrient plans

► their own farming situation,” she adds.

According to Allison, who's also technical lead for software company Navigate Eco Solutions, if it's known a farm produces higher yields than RB209 suggests, for instance, and support is being provided by a FACTS trained advisor who can provide evidence, then plans can be tailored accordingly.

“While RB209 provides the default guidance, NavigatePro allows you to input specific data such as soil, manure, and fertiliser analyses so the resulting nutrient management plans are tailored specifically to meet farm or field requirements.

“That's perfectly acceptable, but you have to be sure of the process and be able to demonstrate how you've arrived at the decision that your crop needs 50kgN/ha more, for example, than RB209 suggests.”

A good system should also show where excess might have been in the past, and how and where to save money on choosing the best products to fit the job in the future, she points out.

“With this in mind, we have functionality about to come online which analyses your cropping, soil analysis and system, and looks on the market for optimum products in the correct ratios to best match the nutrients required by the crop so you're not at risk of over or under supplying nutrients.

“It also ranks these on their carbon intensity so you can choose the best product analysis for the job as well as being able to select the ones with the lowest carbon footprints. We're also involved in a project called 'From Nitrogen Use Efficiency to Farm Profitability' (NUE-Profits),” continues Allison.

“The project's objective is to enhance nitrogen efficiency by providing farmers with a digital management system that utilises data from field measurements



Software NavigatePro allows the input of specific data such as soil, manure, and fertiliser analyses so resulting nutrient management plans are tailored to meet farm or field requirements.

and sensors and crop and weather modelling to offer in-season real-time advice on the best approach to applying nitrogen for its optimal utilisation.”

Collaborative approach

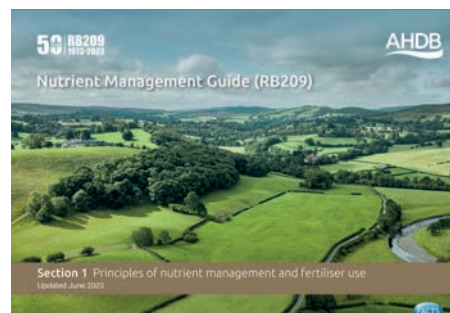
While NavigatePro can be used by farmers that are FACTS trained, it's at its most effective when used in conjunction with an advisor, she says, with Zantra being amongst the first to arm their team with the system.

Zantra's Oliver Bennetts says the system helps him to optimise nutrition advice for his customers and is particularly useful in NVZs, which account for nearly 60% of all UK farmland. “NavigatePro calculates all the necessary farm and field limits for organic manure and fertiliser applications of N and optimal P and K.

“It then guides users through inputting the right data to calculate farm storage capacity with ways to enter manure/fertiliser values which are bespoke to each farm and even each pile or slurry store. It then determines if the farm is NVZ compliant or requires an alternative solution to stay legal.

“We can also ensure that recommendations meet the crop N-Max rules and closed period limits. Clear reporting really helps to understand whether operations are within the rules in advance of seasonal applications.”

Andrew Clarke of C. E. Clarke and Sons near Inkberrow in Worcestershire, says the technology has enabled his business to target nutrients where they are required, resulting in substantial savings on fertiliser input costs. “At one time we'd have applied MOP routinely across the majority of the land we farm, but increases in prices and market volatility have meant we've been constantly reviewing our costs of production.



Although RB209 is the initial step in nutrient planning, it should serve as guidance only.

“By using the results from strategic soil sampling of the home farm and the land we farm under contract, we've been able to make input savings and importantly target all nutrition applications, not just nitrogen.

“Trying to balance P and K inputs with offtake isn't something which we considered in the past, but NavigatePro calculates an overall balance by automatically accounting for nutrients removed in the crop at harvest and balancing them against those supplied by fertiliser, muck and imported biosolids,” he says.

Andrew points out that because the system connects to RB209, his crop requirements are automatically kept up to date when recommendations are reviewed and updated by AHDB. “This means crops are optimally supplied with nutrients from the soil, the bag, and organic inputs.

“We now perceive the nutrient management plan as a living document, evolving through the spring. It allows me to quickly adapt when best made plans have to change.”


Allison believes such knowledge is empowering. “Growers should take pride in producing a comprehensive nutrient plan knowing they're not just doing their bit for the environment, but also managing some of the most costly and carbon intensive inputs on their farms as efficiently as possible.

“And if you are uncompliant, don't bury your head in the sand, be brave. Work out where you're going wrong and remedy it. It's not the end of the world and there might even be a grant available to help you; the EA is usually very positive about such thinking and wants to work with farmers.

“Good nutrient planning can fundamentally improve your business for the better – it's not just about a tick box exercise to meet current legislation. It can have a major impact on your short-term profitability as well as long-term sustainability,” she concludes. ■



NavigatePro helps agronomist Oliver Bennetts to optimise nutrition advice for his customers which he says is particularly useful in NVZs.



“ Spiders are all-round amazing creatures. ”

Wonders of the web

Agricultural spiders

Despite all UK spider species being harmless to humans, these eight-legged creatures continue to be one of the most underestimated groups in nature, particularly when it comes to pest control. CPM learns why these heavy-hitting beneficials should be given more credit.

By Janine Adamson

When asked to name beneficial invertebrates in agriculture, it's unlikely spiders will be the first to spring to mind. But despite their bad reputation – 6% of the human population is reported to suffer from acute arachnophobia – to those in the know, spiders are regarded as the true superheroes of the undergrowth.

Beyond simply catching the odd fly, what is it about spiders – which belong to the order Araneae – that makes them so useful to arable farming and why are they classed as beneficial? Molecular entomologist, Dr Jordan Cuff, believes many may underestimate the abundance and skill of spiders within crops.

“In the British Isles, money spiders are the largest spider family – comprising about 290 of the around 700 British

spider species. They're vastly abundant, with estimated populations of up to 2M individuals per acre of grassland.

“But aside from money spiders, different species exhibit diverse hunting strategies and not all spiders spin webs, there's a lot going on,” he says.

In the field, farmers are most likely to observe either money spiders or wolf spiders, the latter of which hunt on the ground during the day. However, it's the ability of money spiders to drift through the air using a technique known as 'ballooning' or 'kiting' which Jordan credits as one of their 'coolest' attributes.

“This involves casting a line of silk to catch the wind and drift at the mercy of air currents and electric fields. Spiders can travel hundreds of kilometres using this skill, regularly flying into different areas and eating pests. Ballooning means they can quickly colonise a new area and predate pests,” he explains.

Investing nutrients

There's also diversity within the webs of money spiders which can vary wildly in size and location as well as between species, adds Jordan. “Webs are effectively an investment of nutrients, so tend to be where prey are highly abundant. Money spiders can adjust the structure of their webs to suit their target by attaching the silk to different surfaces.

“Spiders have also been observed competing against each other to hold the best 'web-site',” he says.

In terms of prey, agroecological

consultant, Professor John Holland, proposes for aphids carrying BYDV, money spiders are the most effective predator due to their fine webs and ability to operate successfully at low temperatures. “As a group, spiders eat pretty much anything – from aphids and midges to pollen beetle and cabbage stem flea beetle. Of course the webs are non-selective and can catch even large insects, particularly those which fly,” he says.

Spider webs can also be used to help line and strengthen the nests of songbirds such as blue tits. But according to John, one negative is that when in situ, webs will also catch beneficial insects such as parasitic wasps. “That's the balance



Money spiders can travel hundreds of kilometres using a skill known as ballooning, regularly flying into different areas and eating pests, says entomologist Dr Jordan Cuff.



According to Professor John Holland, for aphids carrying BYDV, money spiders are the most effective predator due to their fine webs and ability to operate successfully at low temperatures.



Connected habitats are particularly critical for ground-dwelling groups like wolf spiders.

of nature though,” he suggests.

As for hunting skills, money spiders target prey using different techniques whether that be sitting and waiting for the pest to come to them, or, by actively stalking. Jordan says this is why money spiders have been considered biological control agents for cereal crops for decades, reaching densities of 200-600/m².

Although spiders can utilise ballooning to travel between areas, Meg Skinner from the British Arachnological Society (BAS) says they and their prey still require habitats to be ‘connected’ including to the wider landscape, which is particularly critical for ground-dwelling groups like wolf spiders.

“Furthermore, studies have shown that intercropping, under-sowing or allowing weeds to grow in some areas will increase structural diversity and encourage spiders to utilise crop areas,” she explains.

Habitat niches

“It’s also important to consider microhabitats within semi-natural habitats – so within a field margin there are several niches occupied by different spiders. Although they don’t depend on specific plants, their prey do and rely on certain structures.”

To help boost spider activity further, Meg refers back to connectivity: “Farmers can assist by providing connected areas so spiders can easily move between crops within the rotation such as via field margins and hedgerows. But the great news is, if you build it, they will come.

“Spiders colonise new areas very quickly and when a habitat is first established, you can bet that spiders will



Money spiders are the largest spider family – comprising about 290 of the around 700 British spider species.

be the first ones in there,” she says.

Edaphos agronomist, Ben Harrington, says he’s been working with some customers to create large-scale green bridges to help facilitate the movement of beneficials across longer distances. “This is alongside insect-boosting management techniques such as cover cropping, min-till, leaving stubbles/crop residues and planting hedgerows,” he comments.

John points out that spiders are happy to travel. “Once a crop has been harvested, spiders will move to nearby grassland or field margins and then migrate back once a new crop is established. Consequently, providing a diversity of habitats on individual farms and across landscapes is crucial to encourage all beneficial invertebrates, with grassland being particularly important as a source of money spiders,” he adds.

Despite this useful migratory behaviour,

50 years’ of research indicates that spiders in agriculture are seriously on the decline. The Sussex Study, which has monitored changes in invertebrate abundance in the cereal ecosystem of the Sussex Downs, has recorded a 43% decrease in Araneae since 1970.

The work was conducted by the Game & Wildlife Trust (full report available on the GWT website) and also shows that overall invertebrate populations have dropped by 37% across all groups monitored, making the decline in Araneae species even more significant.

However, this research supports other studies by suggesting rotational grass, such as that established through undersowing cereals, is associated with higher abundance of intensification-sensitive taxa—those which have declined over time in the study.

But what else can be done to boost spider populations? As often cited as the reasons behind general insect decline in farming, John says the reduction is likely due to a combination of simplified crop rotations – especially the loss of grassland in arable areas – and agricultural intensification. One critical aspect of this, he believes, is pyrethroid use.

“Spiders are very sensitive to pyrethroid insecticides like cypermethrin, so to increase their populations, such products should be avoided.

“Of course in some instances, it’s difficult to not use insecticides on crops at all, so being more targeted through crop walking and only using pyrethroids when insect pests are at threshold is

advised. Leaving less susceptible areas unsprayed can also provide a refuge for beneficials such as spiders – the key is to avoid blanket spraying,” stresses John.

Ben believes that although some farmers are switching to being insecticide-free, beneficial invertebrates aren't always considered when it comes to spraying. “Or in cases where the awareness is there, it's not always understood how best to encourage populations back to optimum levels. With farms and fields becoming larger, it can be difficult to integrate the management of beneficials into those systems,” he says.

Using biologicals

“What we do know is building crop health and resilience through using biological solutions and therefore reducing the reliance on synthetic chemistry, will help to nurture beneficials including spiders.”

Yet unlike other beneficial invertebrates, the resilience of spiders can work in their favour, points out Meg. “Use of insecticides including pyrethroids is a very difficult conversation but spiders do bounce back really quickly.

“What we desperately require is a similar success story to that of pollinators – the surge in public interest in bees has enabled greater investment and therefore new research to take place. There's no reason why the same couldn't happen with spiders,” she adds.

An example of such spider-specific research is work which has taken place to investigate the effects of glyphosate on arable field margins with relation to spider abundance. The study highlights the impact of spray drift on surrounding margins, which are important habitats for spiders.



Use of insecticides including pyrethroids is a very difficult conversation but spiders do bounce back really quickly, says the British Arachnological Society's Meg Skinner.



A good basic indicator for spider abundance on farm is early morning dew.

“Increased glyphosate use reduced the number of web-spinning spiders but not ground-dwelling species. Having analysed the data, researchers believe that rather than the herbicide itself, the decrease in spider populations is due to the change in microhabitats and overall vegetation structure,” explains Meg.

“The application of herbicides can affect different spiders in different ways. Although they may be less sensitive in regard to mortality, they can experience secondary effects such as altering their behaviour including web building, courtship and hunting. Many spiders are also active during the winter so can be affected by early herbicide applications,” she suggests.

According to John, a good basic indicator for spider abundance on farm is

early morning dew. “You should be able to see thousands of webs within a crop – that's what we're aiming for. Minimum tillage can help as a more uneven soil surface with crop trash provides features across which webs can be spun.

“Spiders provide much value within the food chain and are hugely underestimated, particularly in terms of their pest control capacity. Not only that, they're food for birds and are all-round amazing creatures,” he comments.

Jordan agrees: “Spiders are incredibly beautiful and are, in my opinion, one of the greatest examples of species diversity and subsequent behaviour. Look more closely at a macro level and it becomes easy to appreciate their wonder – it's time to turn fear into fascination.” ■

British Arachnological Society

The British Arachnological Society (BAS) is a lesser known charity run by volunteers which aims to raise public awareness of all arachnids, says media officer and harvestman recording scheme organiser, Meg Skinner.

The BAS is Britain's only charity dedicated exclusively to spiders and their relatives – focussing on more than 670 species of spiders, 31 harvestmen and 27 false scorpions.

One element of the society's work is running the national recording schemes for spiders and harvestmen, which farmers are encouraged to participate in. “We welcome records from anyone and these are critical in helping to indicate species distribution and will therefore help to steer future conservation requirements,” says Meg.

“It's important that we look at spiders

more closely, learn of their benefits and debunk some myths. The only way to achieve this is through improving awareness.”

There have been two recent conservation success stories, she adds, with varying publicity in the general media. “The headlines don't always help the cause, but it's hoped the fen raft spider and great fox spider might be making a come-back.”

After facing near extinction, the UK's fen raft spider population is steadily increasing following conservation work by the BAS alongside RSPB, Suffolk and Sussex Wildlife Trusts, Natural England and the Broads Authority.

Whereas the great fox spider is red-listed as ‘critically endangered’ and hadn't been seen since 1999 until it was spotted at a Ministry of Defence training area in Surrey in 2020.



nature matters

by Martin Lines

2050: A walk around my farm

It's now 2050 – as I step outside the farmhouse door on a September morning, I think to myself what tremendous changes have taken place.

The first thing that hits me is the noise – swifts screech as they swirl above me and somewhere too high to see in the sun's rays are skylarks and corn buntings. The swallows and other migratory birds join us for much longer during the summer now, others a rare sight as their territories have moved beyond my Cambridgeshire farm.

As I walk through the garden, insects buzz, click, and chirp, joining the cacophony. Birds-foot trefoils and red clovers buckle under the weight of newly emerged bumblebee queens.

I step into the fields beyond the garden, stop and stare. I notice the variety of trees in the landscape: our ash trees are gone due to disease. Other older trees are also dead, but trunks are left standing to provide homes for the beneficial insects that help to keep crop pests down now insecticide spraying is banned.

Thankfully, we used the SFI action of planting on-farm trees in 2025-40 which offer shade to crops and livestock, sequestering carbon and helping slow the flow of water from the warmer, wetter winters. They don't take much to oversee – many of my hedges are managed by rotational coppicing for compost making.

I turn my attention to the ground. In the past 25 years

it's been a challenge to adapt and refine our approaches, but it would have been far greater if I hadn't already started to make small changes such as spraying less and direct drilling.

Years ago we moved from using land to grow animal feed as the demand reduced dramatically, with people eating less white meat and choosing red meat that's grazed the landscape using regenerative methods. As the UK government also banned crops grown for fuel or energy production, we now grow milling, biscuit and pasta wheats, as well as malting barley.

We stopped growing single varieties due to the increasing costs of license fees and genetics in breeding that prevent us from using home-saved seed. During the 2030s and 2040s, the unpredictable and extreme weather in autumn and winter – including higher rainfall, combined with having to reduce the risk of overhead costs – meant I transitioned to growing blends, which has greatly reduced the risk of disease.

I also have an army of minibeasts: beneficial insects such as lacewings, ground beetles, hoverflies, soldier beetles, and ladybirds, all thriving in the restored habitat we now provide. These predate the pests I used to spray for including aphids and pollen beetle, at no cost to myself. Plus many pollinate crops, helping to increase yields whereas 30 years ago, they didn't have a home. Glyphosate was banned firstly for use on crops for the human food supply chain, and then as weed-resistance levels grew, it was banned for general use also.

I dig my hand into the earth, pulling out a chunk in my fist. It smells...almost of nothing, but also musty and appealing. It crumbles away between my fingers and I'm careful to not squash the worms. These

days, we know a lot more about soil health, such as the importance of living roots in the soil, minimising disturbance and growing a diversity of plants, and we can act accordingly.

I walk past a small pond, shimmering with pond skaters and damselflies, and into a larger field. We used to grow oilseed rape here, but stopped due to the lack of moisture during establishing in our hotter autumns. We now grow soybeans and sunflowers as break crops.

In the autumn, we'll terminate the catch crops that are in the ground. These days, they're terminated mechanically and sometimes with the aid of livestock grazing. The move to mechanical weeding with robotics and AI means we only have to remove weeds to a competitive level, we don't get rid of everything.

It's not just weeding that's automated. In addition to the birdsong and percussive rhythms of beneficial insects, I can hear the faint hum of a drone, fading in and out. All field operations now use drones and driverless tractors which send data straight to the central data hub which we can access anytime.

Rather than synthetic inputs, we use biology and micronutrients to keep crops healthy. Carbon taxes on fossil fuel fertiliser meant we stopped using these, but as my soil health has been steadily improving, this hasn't been as much of a problem as you might think.

The field I'm standing in used to be tied into ELM schemes – SFI and CS. I'd signed up for actions such as wildflower margins, birdseed mixes, and beetle mounds. I gradually saw the field, the soil, and the hedgerows come back to life, networked together in a patchwork of habitats, food, and shelter.

ELMs is a distant memory and all public money supports various

landscape approaches for nature restoration and climate solutions. The financial returns from food production have greatly improved as the impact costs to climate and biodiversity and human health are increasingly recognised.

As I return towards the yard, I think back to 2024. I'd made quite a few changes to my farm practices then – spraying less, SFI actions, direct drilling – I was doing my best to prepare for the future. But others around me thought nature-friendly farming wouldn't be enough to restore the land to its former fertility and to impact the resilience of the farm business.

It was scary for me to risk changing our long-established ways; some things I tried didn't work, but I learned from these mistakes and was supported by others transitioning to more regenerative methods.

Today, I'm glad I prepared the farm for what was to come so the business can thrive in 40°C summers and warm, wet winters – where once it wouldn't have. Farmers are now valued for more than just food production, because as custodians of 70% of UK land, we also nurture the spaces that provide ecosystem services for everyone. That's something to be proud of.

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.

@LinesMartin
martin.lines@nffn.org.uk

“ From our beginnings 20 years ago when users simply wanted to put a seed in the ground, we can now help them place multiple seeds, fertiliser and micronutrients in one pass. ”

Direct seeding tech evolution

Direct drills

As *CPM*'s first issue dropped onto doormats, Suffolk farmer Jeff Claydon, already a successful yield-monitoring equipment manufacturer, was beginning to rethink his crop establishment to address falling returns. *CPM* reviews the evolution of Claydon products and the company's business.

By Martin Rickatson



Spencer, Jeff and Oliver Claydon now run a business with an 80-strong workforce and exports around the world.

Just two years after *CPM* was first published in the late 1990s, UK wheat prices plummeted having been exposed to an oversupplied world market. It was the catalyst for significant change in farming techniques, as many growers sought to share machinery and cut establishment expenditure by making fewer passes.

It was this scene that set Suffolk farmer Jeff Claydon to consider ways to maintain decent margins, especially with input prices – particularly fuel – heading in the opposite direction. Having in 1980 invented and introduced the combine elevator-mounted Yield-o-Meter

measuring device, he already had product development and marketing experience.

“When direct drilling was first tried in the 1970s, burning stubbles provided a clean start – while we had Gramoxone (paraquat) it wasn't until 1974 that Roundup (glyphosate) was launched,” points out Jeff.

“There was no surface tillage because the fire had removed all moisture, and with no organic matter remaining, worm activity declined. Disc cultivations used to recreate tillage produced powdery soil surfaces that then baked hard, and when it did rain fine, surface soil and ash washed into drill slots, soil cracks and

worm holes, preventing water percolation and creating ideal conditions for slugs.

“We tried both disc and tine drills, finding the latter performed better on our heavier soils, but depending on the conditions, the results were either fantastic or disastrous,” he continues.

As wheat prices rose in the early 1980s aided by intervention, like many others, the Claydons returned to ploughing, but burning of spread straw often continued to aid residue management and weed and pest control.

“This meant we still weren't feeding the worms and the soil, and even after



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Direct drills



The Claydon manufacturing facility on the family's Suffolk farm has changed a great deal from the period when Jeff Claydon made his initial V-Drills (inset).



► moving to chopping before the 1993 straw-burning ban, soil surfaces often remained anaerobic with insufficient oxygen to break down the straw. And because we were often ploughing early as workloads grew, we were incorporating prime blackgrass seed and levels started to increase.

“But we had a broad herbicide armoury, cheap diesel and good commodity prices, and by the mid-90s we’d developed the market for the plough-mounted Furrow Cracker, which helped initial break-down of heavy land for conventional drilling.”

However, the EU move in the early 2000s to reduce intervention purchases as a method of price support, saw commodity prices drop heavily to world levels. “That made multiple-pass cultivation systems unviable and led to equipment-sharing and consolidating of operations,” recalls Jeff.

Through his family’s 1970s direct drilling period, he’d experienced its pros and cons. But it was seeing a neighbouring farmer’s subsoiler-sown oilseed rape in the late 1990s which convinced Jeff that coulter type and arrangement were key to direct drill success.

“A neighbour established OSR using a subsoiler in a field adjoining one of ours that we’d drilled following multiple passes. In November ours looked the better crop, but by February his did, and

the length of its tap roots was impressive.

“I decided to create a drill using similar principles but with a leading breaker tine for creating tilth that’d allow the passage of roots and water, followed by an A-share with coulter for seed placement on clean soil with 30cm row spacing to improve ground coverage, all on a V-shaped frame to aid trash flow.

“Originally I tried 200mm/8in A-shares, but after a 50-yard test-run the prototype drill blocked. I cut the A-shares down to 125mm/5in, realising we had to move only the soil in the rows to give the plants sufficient rooting room and leave the land between unmoved, cutting fuel use and supporting subsequent traffic,” he explains.

According to Jeff, pre-production

trials impressed, aided by higher soil organic matter levels from a decade of ploughing-in chopped straw.

“Establishment straight behind the combine significantly cut the time involved and accelerated emergence and early growth because we were planting into undisturbed moist topsoil. My agronomist initially suggested I was mad, but after seeing the OSR crop again in November he reckoned it was the best on his patch.

“Another company agronomist suggested trying drilling some wheat the same way, so we trialed a split-field, half sown into unmoved ground and half into ploughed/cultivated land. I wasn’t convinced given the surface straw load and initially it didn’t look good.

"It came on well though and by spring there was no clear difference. The next year, while we'd continued establishing second wheats starting with the plough, this time we drilled half directly."

Jeff says that harvest, having seen no yield difference, they switched the entire farm to the system. "By 2002-03, with neighbours asking us to supply them with machines, we'd made 12 V-Drills. We sourced key components such as the metering unit and hopper from Sulky, had other parts contract-manufactured, and assembled the machines ourselves."

In the early years of the Claydon drill's development, challenges soon arose, acknowledges Jeff. "Because we'd previously been burning, and latterly ploughing and cultivating, slug numbers were low, but by year two or three of direct drilling, while more surface organic material was aiding structure and moisture retention, it was attracting slugs. A farmer friend, Tim Ingles, suggested I try a straw harrow, popular in the USA, as a way of tackling them."

"We purchased one but initially I was unsure – there was little to see after a pass. Sometime afterwards though my brother Frank began drilling second wheat – some into baled ground and some into chopped straw – only some of which had been harrowed after I'd stopped, thinking the harrowing wasn't achieving anything."

"On the unharrowed ground the drill began blocking, while elsewhere in the field the harrow's ability to put the straw into the surface and help the worms to harvest it was obvious – it was as if it had been baled. As crops began to emerge, we saw further benefits from



Jeff Claydon quickly became convinced of straw harrowing's ability to incorporate material into the surface, helping worms to harvest it, while also destroying slug eggs and weed seedlings.

slug egg and weed seedling destruction. From then on I was convinced of harrowing's value and that we had to offer one alongside the drill," says Jeff.

A family affair

At this point, in 2003, Jeff's eldest son Oliver joined the business following his engineering degree and designed Claydon's own 7.5m mounted straw harrow, to a low power, high speed format that would carry just a little straw to aid spread and disturb weed seedlings.

Equally, V-Drill production soon reached 80 units and interest grew not only from UK farmers, but also in mainland Europe. With a broader customer base, the drills were tested across a wider range of conditions including some

with significant large stone content.

"That underlined the demand for a design that'd handle stonier soils. Oliver and I decided to move to a square rather than V format with more clearance and separate cultivation and seeding frames on a parallel linkage, with the loosening tine depth controlled on one chassis through the tractor linkage, and the seeding tine depth on the second floating chassis governed by the depth wheels. We also moved to bigger tines with spring rather than shearbolt protection and in 2006 launched the update as the SR, for Stone Release," explains Jeff.

The compromise was its rigid format, restricting widths to 3m or 4m. "We knew larger farms required wider units, while even at 3m the drills were heavy, exacerbated by their length."

"So in 2009 we introduced the Hybrid – blending key V-Drill and SR aspects. Available in shearbolt or auto-reset formats and with a single chassis and a longitudinal hopper, it allowed fitment of wider folding wings to go to 6m."

"My other son, Spencer, joined us to oversee commercial activities having graduated in business management, and a more concerted focus here helped us to triple our turnover, aided by a significant commitment to exhibit at Agritechnica and grow our exports."

Wider widths meant handling more trash and after reading a New Zealand report on direct drills which suggested 600mm clearance between any two points was the ideal to handle high trash conditions, Oliver designed the new single chassis concept for the Hybrid.



With the Claydon system's ability to sow in bands, in 2015 the firm launched the Terrablade as a simple tool for mechanical weeding between rows.

Direct drills

► “By moving from the SR’s second floating chassis to a single design, we could create a wider trailed drill with increased stagger, giving the 600mm clearance for optimum trash flow and with a reduced weight,” says Jeff.

“We also replaced the press wheel and small harrow arrangement used for seed firming on the V-Drill with the levelling boards from the SR, aiding the finish particularly on heavier soils by simply filling the slot with loose soil.”

As the Hybrid market evolved, customers sought to do more in a single pass and Claydon added the ability to apply fertiliser, micronutrients and companion crops via split and additional hoppers. A trailed design followed in 2015, taking working widths up to 8m and hopper capacity to 5500 litres.

Shallow tilth

Other developments included wider straw harrows and the TerraStar surface cultivator, for creating a light seed furrow-filling shallow tilth ahead of drilling into baked-hard soils. The company also developed the TerraBlade, a simple tool for mechanical weeding between band-sown rows to aid other weed control measures.

But drill development didn’t stop there and the next evolution of the mounted range was called, appropriately enough, the Evolution. Launched in 2022, the 3-6m mounted models feature a longer chassis allowing the fitment of leading discs to slice through trash or cover crops, hydraulic depth control, and longer, higher-capacity hoppers, plus the ability to add a further



Mounted on the tractor’s rear three-point linkage, the Claydon Mole Drainer features an oscillating headstock.

small seed/micronutrient hopper.

“With the introduction of SFI and more focus on things like multi-cropping and seedbed fertilisers, these developments were an obvious step,” says Oliver. “From our beginnings 20 years ago when users simply wanted to put a seed in the ground, now we can help them place multiple seeds, fertiliser and micronutrients in one pass.”

Jeff acknowledges that while the majority have enjoyed success with Claydon-based direct drilling, a small

number of farmers have tried it but latterly decided it wasn’t for them.

“Good preparation, alleviating compaction and drainage issues – the driver for launching our own mole plough – plus proper stubble management with the straw harrow and giving the system time to improve the soil, all combine to make it work. Confidence and commitment are crucial. But we recognise we can always improve and every year we try something a little different to investigate new ideas.

“The 2023-24 season tested every system, but minimal passes and low establishment costs helped ours to protect margins,” says Jeff.

Oliver believes government agricultural policy will be a key driver of drill design during the next 25 years. “We already have the features to enable fertiliser placement and cover crop establishment. Robotics and automation may also become more significant, and our equipment may have to integrate with such systems.”

The past 25 years have seen the loss of many crop protection products, notes Jeff, but farmers have adapted and adjusted.

“Who knows whether we’ll still have glyphosate in another 25 years. I think the roles of machine tech and crop blends will grow significantly and with our latest drills now incorporating the ability to place crop, companion, fertiliser and crop protection products in one pass, I think we have a design set for the challenges of the coming quarter-century.” ■



Claydon’s most recent product development is this front tank/rear 3-6m toolbar version of the Evolution mounted drill.

“ We’re seeing a 20% increase in productivity using this technology. ”



Combines

Mastering harvest

Not only has combine capacity in terms of volume hit new highs recently, but manufacturers are also introducing technology to machines that promises to predict the process. CPM delves into some of the latest developments likely to be traversing fields soon.

By Melanie Jenkins

Those who attended the Cereals Event in June will likely have taken a stroll around the sea of green and yellow combines nestled on John Deere’s stand. While CPM was given a breakdown at the show, it was also invited to see the combines in action near Frankfurt, Germany, in early August.

A key point to note with John Deere’s new S and T combines (the firm’s dropping the ‘series’) is their uniformity, both with one another, and with the X9 – standardisation is the theme of the moment. “From a visual aspect, the S7 and the T5 and T6 have taken a lot from the X9,” says John Deere’s Jonathan Edwards. “Even those that purchase the entry level combine can get the same harvesting experience as with the X9.”

So why has John Deere done away with ‘series’ in its combine naming?

Jonathan points out that the new name and number system provides an explanation.

“The first letter identifies the separator technology – ‘T’ represents a multi-drum walker, ‘S’ a single rotor and ‘X’ a dual rotor. The first number indicates the family while the second number identifies the performance group. Any subsequent numbers will represent the series or generation of machine.”

New names

It’s not just the combines that have a new naming system, the front end equipment is also now identified differently, he adds. “The 622R has become the RA 22 (ridged auger), the 730X is now the XA 30 (extendible bed on the ridged auger), and the 635F has been renamed the FA 25 (flexible auger), with the numbers after each letter indicating the width in feet.”

John Deere’s standardisation of architecture across its different machines is part of its ‘DNA’ – or ‘DeereNA’ as the firm refers to it – approach. “From 2025, there’ll be brand new electrical architecture on the T5, T6, S7 and X9. This has enabled us to include more sensors and better ethernet communication ability to aid in the move from automation towards autonomy.”

Enabling technology has also been improved to tie in with John Deere connected support to help predict any potential downtime and fix problems before they become an issue, explains Jonathan.

Technology on the combines has also been advanced and includes AutoTrac, AuthPath Boundaries, AutoTrac Turn Automation and MachineSync.

“MachineSync allows the combine to communicate with the grain carts to ensure there’s no spillage, and if there’s more than one combine in the field, in-field data share can optimise coverage maps.”

While yield documentation has been available on combines for some time, Jonathan highlights that John Deere has worked to advance this so all machines from 2025 have grain sensing to allow for the quality of grains and oilseeds to be measured on the combine.

“This will allow farmers to make fact-based decisions off the back of what the combine harvests in the field.”



With Ground Speed Automation and Harvest Settings Automation, John Deere’s aiming to allow operators to utilise 100% of the capacity of the combines, says the firm’s Jonathan Edwards.

New Holland

At Agritechnica in 2023, New Holland launched its flagship and largest ever combine, the CR11, and this year the firm has introduced its younger (and slightly smaller) sibling, the CR10. For those familiar with the CR11, the CR10 is essentially a mirror image inside and out – barring a few size-related details – but will suit those who don't quite require the full force of the CR11 on farm.

The CR10 was launched at the Cereals Event, with New Holland's Nigel Honeyman dubbing it the 'baby sister' to the CR11. "It runs on the same architecture as the CR11 including the same rotors, cleaning shoe and residue management system but it's a smaller machine. The CR10 is going to be useful for UK conditions – notably in Scotland – primarily due to its ability to run at 12m for controlled traffic farming."

Designed with a 13-litre FPT Cursor engine, the CR10 produces 635hp and operates a 16,000-litre grain tank. In comparison, the CR11 runs a 16-litre FPT Cursor engine, capable of generating 775hp, and has a 20,000-litre grain tank. Both feature a two-speed hydrostatic transmission and TerraLock semi-automatic diff lock which is engaged manually and disengaged automatically depending on the steering angle and forward speed.

The CR11 has an unloading rate of 210 l/sec while the CR10 tank unloads at 159 l/sec. Cross-auger shut-off allows the unloading auger to be fully emptied even when the grain tank still holds grain. On the CR11, an option allows unloading speed to be reduced by 50% by disengaging the front cross auger, aiding topping-off of trailers.

Nigel points out that although the CR10 is a replacement for the CR10.90, there aren't many components that carry over from this machine. "Instead, the CR10 and CR11 have been built from the ground up to remove bottlenecks in the machine's capabilities."

From the front, these new flagship CR combines are designed to handle greater volumes of crop. Cutterbar widths of 10.6-15.0m (35-50ft) are available in fixed, flexible knife, movable knife and draper formats. Maize heads of 12-16 rows are also available, and unloading auger lengths can be specified to match all header widths. There are three driveline options to meet all header requirements.

Both combines can be equipped with either a standard integrated chopper or a high hood-mounted fine-chop unit. While the first of these is intended for dry conditions, the high hood-mounted unit is targeted at users looking to process high straw volumes to a fine chop and distribute material across a wide cutting width.

The standard integrated chopper features 60 fixed blades which work in



The New Holland CR11 runs a 16-litre FPT Cursor engine capable of generating 775hp and has a 20,000-litre grain tank.

conjunction with 52 counter knives working at 3000rpm for chopping, or at 800rpm for straw swath laying. Manual adjustment of the counter knives is standard and remote hydraulic adjustment is optional.

A driven roller assists straw ejection when swathing or into the spreader impellers when chopping. The two hydraulically driven 800mm impellers, each equipped with three paddles, spread chopped material at widths up to 15m (50ft). An oscillating deflector behind the spreaders creates a dynamic pulsating effect on the residue spreading to ensure even distribution over the full cutting width.

The high hood chopper option leads with a 500mm beater with two rows of spikes and two rows of blades, plus a non-perforated beater pan. This is followed by a six-row chopper with 88 flail knives and 67 counter knives. The chopper can operate at low (900rpm) or high (3600rpm) speed, with a neutral position for free movement when servicing is required. Remote chopper speed selection is optional.

The pair of hydraulically driven 970mm diameter impellers on this unit each feature five paddles, capable of distributing material at up to 18m (61ft). As on the standard unit, an oscillating deflector is again fitted behind the spreaders on the high hood chopper, to dynamically pulse the residue across the full cutting width.

The IntelliSpread option uses radars to continuously assess the full width of the residue spread and automatically adjust left and right spreader speed to guarantee full width spreading. Further options include remote selection of chopper door position, chopper gears and counter knives. Also optional is a chopper load indicator, which provides information on chopper power consumption.

The elevator is equipped as standard with front face adjustment and lateral tilt remote control from the cab. From here, the crop is

fed to New Holland's proven Dynamic Feed Roll system, which can now be reversed – simultaneously with the elevator and the rotors – in the event of a blockage. The DFR accelerates the crop and splits it into two even streams to feed the two longitudinal threshing and separating rotors that follow. A large stone trap in front of the DFR can be emptied either manually or, optionally, remotely via hydraulic activation from the cab.

One aspect the design team has worked to optimise in the new machines is separation power when working with slightly damp or green straw. "We aimed for zero losses, or as close to this as possible," says Nigel. "It's meant a complete redesign of the rotor system and the cleaning shoe. Losses are an insidious cost when combining because you don't sign a cheque for them, they just disappear out the back. So in targeting zero losses, we've aimed to bring down the cost of harvesting."

In the new combines, the two 600mm (24in) rotors have increased diameter and length, providing greater capacity for the crop to circulate and the grain to be threshed and separated. Each rotor features 40 standard rasp bars, eight HX rasp bars and 12 spiked rasp bars. New rotor cages feature a stepped design with a broader cage and higher vanes in the separation area to allow greater crop movement, improved separation and enhanced power efficiency.

The new TwinClean cleaning shoe incorporates multiple features to boost throughput and minimise grain loss. It consists of two sieve systems in sequence, each having its own upper and lower sieve and clean grain auger, and is based around a large grain pan with an increased fall to the first upper sieve.

Airflow is provided by a high-power cleaning shoe fan; two automatic cross distribution mechanisms should guarantee an even cleaning ▶

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New Holland cont.



New Holland's CR10 is going to be useful for UK conditions – notably in Scotland – primarily due to its ability to run at 12m for controlled traffic farming, says the firm's Nigel Honeyman.

► shoe load in all conditions. Two sets of pressure sensors continuously measure the load and detect any anomalies in material distribution between left and right. A side-shake mechanism adds a lateral component to the grain pan and sieve movement which evens out the material over the cleaning shoe's full width. As such, the cleaning shoe can compensate for uneven feeding and side slopes up to 28%.

A further change is the elimination of drive chains in the new machines. “Our previous machines had multiple drive chains that required servicing and replacing, but now these are gone, there are only two chains: the elevator chain and the clean grain elevator chain,” says Nigel. Operation is made easier

through incorporation of twin IntelliView 12 touchscreen terminals in the cab. With the primary monitor on the right-hand console providing management and monitoring of the combine's key controls, the secondary monitor on the A-pillar is configured for mapping and guidance.

Both combines are equipped with the Core PLM Intelligence package which covers the most commonly specified requirements such as IntelliSense. The second option is an Advanced PLM Intelligence bundle aimed at those with the most complex demands. Correction signal packages for IntelliSteer automated steering and other functions such as yield and moisture mapping are available from the factory in two accuracy levels with three delivery options.



John Deere's T5 and T6 combines have new grain tank options including a 13,500-litre tank option on the T6 and an 11,500-litre tank on the T5.

▶ Looking specifically at the T combines, 2025 will see an expansion from four models up to eight: with the new machines consisting of the T6 800, T6 700, T6 500, T5 700 and T5 500. “In terms of operator experience, there’ll be a new cab which has been taken from the X9,” says Jonathan. “This is a significant update for the T5 and T6. New LED lights are 25% brighter, the electronic door cinch keeps the cab pressured and doesn’t require force to shut. There’s a new corner post display with the G5 display and extended monitor in the command arm, a new joystick, plus Apple Car Play and Android Auto.”

In terms of grain handling, there are new grain tank options including a 13,500-litre tank option on the T6 and an 11,500-litre tank on the T5. There’s a larger auger diameter – the same as that on the X9 – and an adjustable spout, however the S7 has an unload rate of 150 l/sec, he adds.

The residue management system has also been updated with new knives to improve the quality of the chop, says Jonathan. “The XFC (extra fine cut chopper) T6 has 124 knives while the T5 has 100 and the FC T6 and T5 have 68 and 52 knives, respectively. These machines have moved to a common knife design and are Xcel knife ready,



Residue management on the S7 combine has been updated in line with the X9 concept so it's mechanically driven.

which can save 7-8kW of power. Spread capability is now also achievable at up to 35ft without wind paddles.”

And as far as residue management automation goes, there’s now remote counter knife adjustment, tool-less cross bar (grouser) engagement and residue AutoSwap.

In addition, Terrain Settings Automation (previously Active Terrain Adjustment) brings new features to the T5 and T6 including adjustment of the chaffer, sieve and fan speed while driving up or downhill, taking the pitch from the StarFire receiver.

The S7 combine line-up includes the S7 900, S7 850, S7 800 and S7 700. “When

we looked at bringing something new to market, the two key areas we focused on were automation with optimisation, and productivity with efficiency,” says Jonathan. “The S7 features the JD14X engine (or the JD9X on the S7 700), which has a single turbo and introduces Harvest Motion to optimise drive from the engine to the combine. Users will see that it sustains the power in tougher harvesting conditions, keeping the rpm higher.”

Residue management has been updated in line with the X9 concept so that it’s mechanically driven, has second air vents for the shoe, residue spread performance has increased with the introduction of

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Combines

Case IH

Previewed at Agritechnica 2023, Case IH's latest Axial-Flow 260 series will be available for Harvest 2025.

For growers looking to purchase a combine with more than 500hp, the 260 series provides larger, high-resolution displays and automated efficiency. The dual Pro1200 displays enable intuitive automation via Harvest Command technology, as well as new advanced guidance and mapping capabilities. The Pro1200 also offers connectivity to other Pro700-enabled machines within the same field.

The 260 series enables growers to cover more hectares in less time with Axial-Flow rotor and self-levelling cleaning technology. These features are designed to increase throughput, improve grain handling, and simplify maintenance for a more productive harvest. The 260 delivers exclusive Power-Plus CVT rotor reversing capabilities, allowing operators to clear blockages without leaving the cab.

For those requiring slightly less horsepower, the introduction of the 160 series to the Axial-Flow line-up signals the addition of Harvest Command automation to combines with more than 400hp. The proven Harvest



Case IH's Axial-Flow 260 series enables growers to cover more hectares in less time with Axial-Flow rotor and self-levelling cleaning technology.

Command system makes automated adjustments as field conditions change and reduces the number of decisions operators must make, to help ensure consistency.

The 160 series has been designed to retain the simplicity expected from the Axial-Flow combine line while adding additional benefits. Boasting a higher-capacity grain tank, holding up to 12,500 litres (available only on the AF 7160) combined with better fuel efficiency, should allow operators to keep moving during harvest. And while grain is being harvested, the in-cab adjustments and grain-on-grain threshing design maintains

quality of the crop throughout the fields.

The Axial-Flow 160 and 260 series combine models include Safeguard Connect – a comprehensive package of Case IH added-value services. This includes an extended three-year Safeguard warranty and a lifetime subscription to AFS Connect, Case IH's advanced telematics portal. AFS Connect enables remote monitoring and management of the farm, the fleet and the data. Safeguard Connect also includes a three-year subscription to Case IH MaxService – premium access to around the clock dealer service during peak season.



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► Premium Powercast (PPC), and there's also the option of the Xcel chopper knives.

Active Slope Adjustment (ASA), which was introduced at Agritechnica, is the belt system on the cleaning shoe and can be added to models which aren't HillMasters, says Jonathan. "The base machine can deal with slopes up to 7%, while adding the Sidehill Kit will allow it to manage 14%. Including ASA gives it capability on slopes of up to 18% while the full HillMaster can manage 22%," he explains.

"Loss sensing has been updated to provide better delivery to the pad design with one sensor per shoe bay, which increases accuracy for automation and for loss sensing."

Ground Speed Automation

New for 2025, Ground Speed Automation will be included with the T, S and X combines. "This is completely new, and replaces HarvestSmart," says Jonathan. "In the past, the systems were reactive but they now work on a proactive and predictive approach. The new algorithm looks at the loss level of the combine, the engine power and any rotor or variative pressure. This is utilised to send speed commands to the combine. But on top it also looks at the cover maps, header height and terrain information from the GPS receiver to optimise commands."

As far as predictive information is concerned, crop information is collected by satellites and sent via Operations Centre to the combine. "In addition, forward looking cameras work with satellite biomass maps to assess what's happening in front of the combine," says Jonathan. "We're seeing a 20% increase in productivity using this technology."

Harvest Settings Automation is the replacement for AutoMaintain with the new system allowing operators to accept their own acceptance limits, whereas previously they'd have had performance targets to achieve, he adds. "AutoMaintain required very skilled combine operators but with Harvest Settings Automations we're driving towards outcomes, whereby the operator sets the acceptance limits of grain loss, foreign material and broken grain. From these settings the combine will adjust aspects such as the ground speed, engine power, concave, clearance and rotor speed.

"With Ground Speed Automation and Harvest Settings Automation we're aiming to allow operators to utilise 100% of the capacity of the combines," he concludes. ■



John Deere's front end equipment has been renamed with the 622R becoming the RA 22, the 730X is now the XA 30 and the 635F has been renamed the FA 25.

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Combines

Fendt

Fendt's Ideal range, which includes the 7, 8, 9 and 10T models with power outputs starting at 475hp for the 7 and topping out at 790 for the 10, has been kitted out with a number of new developments to help improve harvest. The latest MY24 models feature a plethora of technology and engineering that have been designed to reduce operator fatigue and maintenance while also increasing output and efficiency.

"From the IdealDrive cab concept which removes the steering wheel in favour of joystick mounted controls to improved forward visibility and comfort for operators, to the fully enclosed exhaust system that uses filtered and pressurised air to keep the exhaust clean and cool, the Ideal is packed with features to improve harvest efficiency," says Fendt's Ant Risdon.

Fendt's AirSense, an innovative cooling system fitted as standard on all Fendt Ideal models, is designed to significantly reduce the daily cleaning required around the engine bay and exhaust system.

The AirSense system cuts the requirement for a thorough daily clean near the engine thanks to an eight blade, 950mm reversible fan that engages based on engine temperature and

time parameters. The total ventilated area is 2.7m², and the regularity of fan engagement means that dust and chaff shouldn't have the chance to build up around the engine.

"AirSense has multiple benefits for both operator and machine. Most important is the reduction and shortening of cleaning times to boost productivity and operator efficiency," says Ant.

AirSense enables the fan to invert the air flow, changing it from sucking in air to cool the engine, to blowing air back through the radiators at selected times, to clear any debris. "It inverts by changing the pitch of the fan's paddles. This is activated by parameters including engine temperature or the time since the last inversion, and a visible plume of dust is seen rising from the engine bay when engaged. Manual activation is also possible" he adds.

Fendt has also introduced a new pressurised exhaust box to prevent dust accumulation, which helps reduce cleaning times and chaff build up in the hottest areas of the machine. The new AirBox is available on Ideal 8, 9 and 10 combines. "The key is there are no hot spots because filtered, pressurised air is being blown through



Fendt's AirSense cooling system, which fitted as standard on all Fendt Ideal models, is designed to significantly reduce the daily cleaning required around the engine bay and exhaust system.

the box to keep it clean and cool," he says.

Ant notes this could be a significant advantage in the UK because when harvesting crops, it's common to see temperatures exceed 30°C.

Onboard digital technology in the latest Ideal models has been updated to include TI Turn, a fully automated headland turning system that, once set, requires no operator input. "The machine will switch out of work mode automatically, make the headland turn and resume work mode automatically. This helps reduce operator fatigue but also ensures optimum output from the combine, especially in irregular shaped fields," he adds.



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Leaders drive Fendt.



“ The farm already had a few tractors running BKT tyres and I had only heard good things. ”

Applied innovation

A unique approach

Tyres are always more than they appear, acting detrimentally to soil health or, when the correct wheels, tyres and pressures are used, in a way that can minimise compaction, improve operations and cut costs. CPM speaks to a farm manager who’s optimised tyre selection.

By Melanie Jenkins

Prioritising both tyre and wheel suitability for the machine, the job at hand and on-farm challenges is all part of Leopold Stolberg’s tactics to minimise soil compaction and manage blackgrass, something he has done by closely working with Brocks Wheel and Tyre (BWT).

Family owned Eaubrink Farms (GmbH) is located just west of Kings Lynn in Norfolk, and consists of just under 4500ha of diverse crops, including sugar beet, winter and spring barley, beans and winter wheat. Farm manager Leopold, has a robust background in agricultural business management, having completed his farming apprenticeship

and an agricultural business management school in Germany. After starting as a farm worker in 2014, he’s since progressed to the management role and has worked closely with BWT to make improvements on the farm by seeking advice on fitting the correct wheels and tyres on the farm’s machines.

Heavy soils

One of the most significant challenges faced by Eaubrink Farms is the heavy clay and loamy soil, which causes compaction issues and complicates crop management. “Compaction is an issue, but the big enemy is blackgrass, so everything we do is based on our fight against it.”

This means Leopold operates a conventional system with a focus on spring cropping, relatively intense cultivations and lots of stale seedbeds to achieve as much control over weeds as possible. “We don’t run controlled traffic farming (CTF) because it’s too complicated with too many people involved, and we can’t run 12m cultivators on our soils – it’s impossible,” he explains.

However, to mitigate these issues a hybrid-type tramline system has been developed on Eaubrink Farms to ensure that compaction occurs consistently in designated areas, thereby minimising the impact of traffic. “We use RTK Autosteer to make sure that tramlines are in the same place every year, meaning that compaction is only occurring in this assigned area. It means that if we do subsoil the tramline we don’t have to worry about knowing where it was because



Operating an unusual track width as well as trying to minimise compaction led farm manager, Leopold Stolberg to working with BWT to fit more BKT tyres across the farm’s machines.

the system will have it recorded. This also makes operations easier when we follow up with ploughing or cultivations.

“We’ve got a good range of different machines to utilise on farm and every year we manage fields differently, depending on what each block of land requires,” says Leopold. “Obviously we have to work with the weather and sometimes we have to wait for a rain event to achieve the right soil structure and to get seedbeds ready. This is the only way to work with the types of soil we have on farm and there are only a few days where the timing is just right, and soil is in the ideal condition to work on.”

One of Leopold’s favourite machines is

Farm facts

Eaubrink Farm GmbH, Kings Lynn, Norfolk

- Farm arable area: 2480ha
- Soil type: Heavy clay loams
- Tractors: John Deere 2 x 6250R; 1 x 8370R; 1 x 8RX410; 2 x 9RX620; 1 x 612R Fendt 2 x 936 Vario; 1 x 930 Vario; 1 x 933 Vario; 1 x 939 Vario; 1 x 1050 Vario
- Telehandlers: 3 x JCB
- Combines: John Deere 3 x X9
- Cultivation equipment: Horsch Tiger AS 6m; Väderstad Opus 6m; Väderstad Carrier with CrossCutter disc; 1 x Väderstad Rexius Twin 830; Keeble Progressive; 2 x Köckerling Vario; 3 x Lemken power harrows; 2 x 9 furrow Lemken ploughs, 1 x 6 furrow Lemken plough; 1 x 5 furrow Lemken plough



A John Deere 8R tractor was fitted with wider BKT 900mm rear wheels with BKT 710mm front wheels to support the heavy front axle, thereby decreasing compaction and increasing traction.

the Köckerling Vario cultivator. “We have two of these because they’re so versatile and really well built. We don’t bale any of our straw anymore because we don’t want contractor wheelings all over the fields and to help prevent compaction, but using the Vario allows us to mix the straw while doing shallow cultivations to get the blackgrass and volunteers to chit,” he explains. “We then often do a second pass with the Vario a bit later and deeper to start creating the base for good seed beds through loosening, mixing and mechanical weedkilling.”

However, having a wide range of both tractors and cultivators to help minimise compaction and manage blackgrass can only go so far if the wheels and tyres aren’t suitable to the track width system that’s in place. This led Leopold to working with BWT to fit more BKT tyres across the

farm’s machines. “The farm already had a few tractors running BKT tyres and I had only heard good things,” he notes.

Understanding the specific requirements of Eaubrink Farms, BWT advised and supplied wheel solutions that included BKT tyres with VF (Very High Flexion) technology, significantly reducing soil compaction. For example, for a John Deere 8R tractor on the farm, BWT supplied wider BKT Agrimax V-Flecto 900mm rear wheels with BKT 710mm front wheels to support the heavy front axle, thereby decreasing compaction and increasing traction. “With VF Technology, you can go to much lower pressures without damaging the tyres, which was a massive improvement. This technology is especially helpful for cultivations and trailer work as this is a big part of our operations,” explains Leopold.

The previous tyre set up on the 8R involved using 650 front tyres but BWT has now set them up with BKT Agrimax Force 710 tyres which work better, and the pressure data has improved, plus it’s cost the farm less than other premium brands might, explains the firm’s Will Brock. “And the tyres we fitted to this tractor are in a size that not all other brands produce, so using BKT tyres allowed the farm to fit exactly the size required.”

BWT positions itself as aiming to fit the right wheels onto the right tractor, he says. “We often get calls asking for wider, narrower tyres or tyres capable of working at lower pressures, rather than just replacing tyres like-for-like or based on price.”

To do this, BWT assesses technical tractor data to match up a product with customer requirements such as working widths and tyre pressure information from the field. “The price is just one aspect of tyre and wheel selection and it’s not the most important one,” says Will. “Instead, the focus is on solutions that will be time saving, performance driven and able to aid yield because these elements all outweigh the upfront cost of a tyre and can also be more valuable than how long it lasts.”

With this in mind, BWT helped Leopold convert one of his John Deere 6250R tractors to run on dual wheels with BKT Spargo VF tyres to avoid drilling into the tyre tracks. “Because we run on 2.25m track spacings, it’s not as straightforward as standard track spacings, but it’s worked out really well and so far we’ve haven’t come across a tyre sizing that we can’t get with BKT,” says Leopold.

Will points out that the track widths at



Blackgrass is one of the biggest challenges at Eaubrink Farms and most management decisions are made based on the fight against it.



According to BWT's Will Brock, price is just one aspect of tyre and wheel selection and it's not the most important one.

▶ Eaubrink Farm is unlike what most other farmers are likely to be working with. In order to provide the correct widths for the row crops on the farm, Will helped fit 2m, 2.25m and 3m specialist wheels. "Eaubrink Farm is quite unique, not just in its scale – which brings its own set of requirements – but it also has a different track width system in place. It's not quite CTF but is a hybrid set up consisting of wider track widths, so that more machines can run in the wheelings. The missing link to optimise this system was the expertise required to get the correct wheels and tyres that would allow this set up to work as well as possible – it wasn't something that was an 'off the shelf' solution."

Two of the farm's Fendt tractors have Fendt's integrated tyre pressure regulation system, VarioGrip, which is designed to quickly adapt tyre pressure from 8.7-36.3psi, including while the tractor is being driven. "These tractors have been fitted with BKT tyres, and when the VarioGrip works, it's a brilliant system," says Leopold. "However, it must be used frequently to keep it going. But it does make things easier on the tractors which it's on. On other tractors which are doing field work we have sets of dual wheels that we run on low pressures because these rarely go on roads and when they don't travel fast, so we don't have to alter the pressure."

Leopold emphasises the value for money offered by BKT tyres: "I just can't see what justifies double the price for a premium tyre on a trailer. The quality of BKT Ridemax tyres is very good, and for what we do, we're very happy with what we have installed on all our grain trailers. These triple axle trailers came fitted with



The farm's triple axle trailers came fitted with another brand of tyre but now run on BKT tyres.

another tyre brand but we've now started running them on BKTs and want to move most of our trailers to BKT tyres."

Sweet spot

When weighing up price over premium product, Will suggests that there's a value proposition sweet spot to achieve the technical performance required versus potential tyre lifespan. "Think of it this way, you might be getting 80% of the lifespan, but it's cost you 60% of the price. And what we've really noticed is that the incidence of warranty claims with BKT have been minimal and the firm does produce reliable tyres."

He advises farmers to take the technical data into account and to not just stick with a brand because it's what the tractor has always run on. "One example of assessing technical data is when people look at the highest load rating of a tyre but don't necessarily realise that this is the weight it'll carry at operational pressure. But there are charts for this, as well as data on hill performance, road speed, dual wheels and more besides. All of this can be evaluated to help improve performance on farm and for specific uses that the tyres might be required for."

At Eaubrink Farms, using BKT tyres in accordance with BWT's suggestions, has not only improved productivity but also contributed to sustainability through reduction of fuel consumption and increased crop yields through optimised tyre pressure management, says Will. "The pressure characteristics are pretty much identical between all makes, so those intangible benefits are the same regardless of make. In this regard, BKT is right up with any other manufacturer."

Overall, Eaubrink Farms' experience with BKT tyres shows how the right wheel and tyre combination can address the unique challenges faced by modern farmers, he adds. "The customised approach of BWT's advice, along with the cost-

effectiveness and high quality of BKT tyres has enabled Eaubrink Farms to enhance its operational efficiency and sustainability. This emphasises the importance of the correct solutions in agriculture, ensuring that farms can overcome challenges and thrive in a competitive environment." ■

Applied innovation

Whether farmers are in the agricultural, industrial or OTR industry, BKT tyres are designed to help machinery perform at its best, even on the toughest terrains. Find the ideal tyre today by browsing BKT's wide range of tyres, or filter the search by industry, application or features.

BWT is passionate about getting wheel technology right. While the gains are often not tangible with a hard monetary value, the savings and benefits associated with minimising fuel usage, tyre wear and compaction along with the gains from yield increase, time saving and tyre safety are critical when margin is under pressure.

BWT's relationship with BKT has been invaluable in its product development where BWT has worked together to introduce new sizes to the market such as the 420/80R50 tyre which is very popular on root crop farms or as a general-purpose narrow tyre. BKT's product development is rapid which is great in a changing market, making them a go-to brand for all farmers' requirements.

CPM would like to thank BKT for kindly sponsoring this article, and for providing privileged access to staff and material used to help put the article together.

The BKT logo consists of the letters 'BKT' in a bold, white, sans-serif font, set against a green background that forms a stylized shape. Below the logo, the tagline 'GROWING TOGETHER' is written in a smaller, black, sans-serif font.



Capitalising on higher capacity



Farm operations manager at AT Bone, James Ashley says the output and accuracy increases from the new Bunning Lowlander HBDs have been highly advantageous.

Muck

Trading in three smaller manure spreaders for two larger models has increased daily outputs, improved application accuracy and allowed variable rate application for a large farming and contracting company. *CPM* finds out more.

By *Melanie Jenkins*

Accurately applying more than 50,000t of compost and sewage sludge meant James Ashley, farm operations manager at AT Bone, required precise machines that could cope with an intense workload at peak periods and match existing tramline widths to reduce compaction.

AT Bone is a farming and contracting operation, working across 3100ha of combine crops and a further 600ha of maize and sugar beet. The business is based in North Hertfordshire and operates across a 40-mile radius along the A1 corridor, with land inside the M25 motorway.

The firm traded in two Bunning Lowlander 150 HD TVA machines and a Lowlander 150 HBD to upgrade to the two Lowlander 280 HBD spreaders, which were launched last year to suit users spreading large volumes of lighter products such as compost. It increases the carrying capacity over the previous largest Lowlander 230 HBD and means each

machine can carry up to 28t of compost per load, depending on the product.

"We spread a mixture of compost, gypsum and sewage sludge this year and as a business we don't see the benefits of blanket applications so require variable rate technology to maximise these products," explains James. "These are large fertiliser spreaders and the manures are having a greater role in how we farm each year."

Reliable machines

"We've run Bunning spreaders for 12 years and have always been impressed with the reliability and build quality of the machines. A key part of the investment in the two Lowlander 280 HBDs was to increase capacity and accuracy but also utilise our on-farm soil mapping data through variable rate. Bunning's Lowlander machines offered all of this technology and, although we looked at other makes, the HBD models have everything we require and a brand we have confidence in.

"The new spreaders have to be as accurate as other machinery on the farm and operate technology seamlessly. Our older TVA models had a smaller spread width and we were running across more of the land than we wanted to. We knew to achieve the accurate spread pattern at a wide enough width for us to apply vast quantities of manures, we had to invest in two high-capacity, spinning disc spreaders," he explains.

The investment in the two Lowlander HBD models has increased carrying capacity by an average of 8t per load, but the improved accuracy of the twin disc application means spread width is now a comfortable 18m to allow a single run in-between the 36m tramlines.

"We've managed to complete the spreading around 10 days earlier than with the old machines."

Both models have weigh cell application via ISOBUS control which allows easy setting changes and clear displays of machine readouts.

Rate control is adjusted via the screen and the spreader will automatically match the floor speed to achieve the required rate. Variable rate application via prescription maps was a key addition for the farm to maximise the soil and crop data already gathered.

James says the output and accuracy increases have been highly advantageous. "The weather dictates our work, so we have to cover the ground quickly and accurately when we can. We've managed to complete the spreading around 10 days earlier than with the old machines, which has huge advantages to the rest of the business.

"The farm invests heavily in nutrition as we believe it's essential to build soil health and improve the following year's crops, and this is only possible with precise application. Using technology such as weigh cells and variable rate ensures it's spread evenly and to the rate required. We have soil mapping data, so applying manures based on this to increase nutrient values is essential for us."

Some basic tray tests, similar to those



Investing in the two Bunning Lowlander HBD models has increased carrying capacity by an average of 8t per load at AT Bone.

► carried on granular fertiliser spreaders, were undertaken when the spreaders arrived in 2023 and the results highlighted an even application across the 18m width.

Given the complexities that the business has regarding location, the operation runs like clockwork and the pair of spreaders apply products efficiently following the combines to avoid any hold ups with the cultivation team, he explains.

James highlights this is what they require to match the efficiencies elsewhere on the farm. "We run three combines with chaser bins supported by our own lorries so we can clear fields quickly. We required spreaders with outputs that could slot in neatly between the combines leaving the field and the cultivators arriving. By handling the work in-house, we have complete control of the full harvest process."

Maximising opportunity

The 2024 spreading team started early, allowing a maximum window to achieve high daily outputs and maximise the available daylight, continues James.

"We keep three operators on the spreaders all season, one to load and two on the spreaders, as we feel they can then get the most from these machines. Some may think the loader is sat there waiting a lot of the time, but the guys manage it so one spreader is completing fields close to the pile, whereas the other machine starts at the furthest point, and they end up meeting in the middle. The spreading process and moving between fields would be much slower if we only had two drivers."

Loading is handled by a Volvo loading shovel and the spreaders are powered by two hired John Deere 7R series tractors, which offer the capacity to spread wider than 18m should it

be required when contracting. The spreaders have the optional border spreading deflector to maintain product accuracy on headlands.

Additional work is possible in the future as the spreaders have been purchased to offer contracting support to other growers in the area. Yearly tonnages have increased with 40,000t in 2023, to 50,000t in 2024 and a predicated 55,000t in 2025, with the spreaders capable of more if required.

"Daily output can be more than 1000t per spreader when we're spreading close to the heap, so we have the capacity and accuracy to help growers on a variety of widths and products. The investment in the two Bunning HBD spreaders will be set across a 10 year stay on the farm. We're confident to run them for this period as the build quality, technology and reliability have future-proofed them for years to come," adds James. ■

Heavy duty handling

Early this year, Richard Western launched a number of new products at Lamma including the release of a new trailer design in answer to demands from farmers and contractors requiring a universal option built to handle high workloads and demanding conditions yet retaining a high payload.

The new MP18 Multi-Purpose Trailer shares many design principles with Richard Western's SRT20 Stone and Rubble Trailer, a 20t-capacity model for construction, track creation and similar tasks. The 18t-capacity MP18, which has the same 29.58m³/17.71m³ silage/grain capacities as the firm's SF14HS Suffolk standard trailer, incorporates a number of additional heavy-duty features as standard to meet the requirements of particularly demanding agricultural applications.

"Customers have been asking us for many of the heavy-duty features of our SRT Stone and Rubble trailer in a more universal model, so that's exactly what we've designed here," says Richard Western's Amy Taylor.

The MP18 body is constructed from Hardox steel to reduce weight and increase strength, while enhancing wear resistance above the high-grade steel used in the firm's other trailers. Heavy-duty features include a sprung drawbar with hitch ring secured by an eight-bolt flange, 10-stud commercial axles and 100mm-wide twin-leaf spring parabolic suspension. Further specification extends to heavy-duty galvanised mudguards and mudflaps, plus a comprehensive lighting package including LED road lights, side markers that also serve as downlights, and a flashing LED beacon. Standard tyres are BKT Ridemax 560/60 R22.5 165D units, and brakes can be specified as either air or hydraulic with load-sensing.

Optional equipment includes silage sides, a headboard-mounted front-to-rear sheet, grain chute, small perspex window, ABS and auto slack adjusters, and 600/55 R26.5 BKT Ridemax 177D tyres – which with their higher load rating, are highly recommended for maximum payloads.

Among other updates from the firm this year, the



The MP18 body is constructed from Hardox steel to reduce weight and increase strength, while enhancing wear resistance above the high-grade steel used in the Richard Western's other trailers.

full range of Suffolk tipping trailers are running new lights. Mounted along the side of the trailer, these cast a beam down onto the road or field surface, marking out the extremities and enhancing visibility and safety. Meanwhile, all Suffolk trailers of 15t capacity and above now feature an uprated suspension to enhance ride and stability. This sees the 76mm single springs previously fitted replaced with new 100mm wide double-leaf parabolic springs with a suspension equalizer featuring outboard bushes.



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talkingtaties

by Andrew Wilson

Threat means opportunity

Before I get my crystal ball out, I think we should consider the past – 25 years ago feels like it should be 1985, but it's actually 1999 – scary!

After safety cabs, power steering and dual power in the 70s and 80s, came air conditioning, powershift and suspension in the 1990s. This morphed into constantly variable transmissions, greater versatility and GPS. And precision – accurate ridges, arrow-straight drilling, section control and variable rate.

So, is tech the future? Personally, the more complicated the kit, the lower the reliability. Every cost to my business has to be balanced by at least equal value or we go backward fast. Tech is ever more expensive yet no more reliable than it was in 1999.

There are lots of 'nice to have' extras, but how much of it makes money for the farmer rather than the service providers? Downtime is phenomenally expensive. Robotics have a place, but I think they're unsuited to UK broadacre arable farming – belonging in labour-intensive, slow-speed, high-precision vegetable work, and on the wide plains of eastern Europe, America, Canada and Australia, but perhaps less so in increasingly urban Britain.

Chemistry is an emotive and interesting element of the present and the future. Since 1999,

we've lost once familiar products like paraquat, diquat, aldicarb, oxamyl, CIPC and chlorpyrifos. Mancozeb is next on the hit list and fosthiazate not far away.

Fortunately, we've seen some new blight fungicides come through in recent years, but so too have new and more aggressive blight strains. Crop nutrition concerns me less than disease control, but to stay economically viable, our markets must respond.

In my view, the future lies in plant breeding, genetics and education. Through my own trials I've learned the power of not just potato cyst nematode resistance, but arguably more important, PCN tolerance, as well as drought, temperature and pest resilience. Plus, the effect of stewardship and the wider rotation on free living nematodes and tobacco rattle virus.

Blight resistance seems to have had a greater focus recently but has a way to go before spraying returns to the less intensive ways of 40 years ago (we're back to 1985!).

One of the greatest hurdles is that of education. In the same way Hoover is the proverbial vacuum cleaner and JCB the digger, glyphosate is arguably the ag chem name most recognised by the masses and equally, Maris Piper and King Edward are the familiar potato varieties. This must change.

For potato production to go forward, some of the older, traditional PCN-multiplying and warm-stored varieties must become rare breeds. The processing market is less affected by this than the fresh market, but there's a way to go before UK potato volumes become less reliant on chemistry to deliver the quality of crop required.

So then, to regen – is it the answer? As ever, going extreme with anything rarely comes to acceptable fruition, but there are always better ways of doing

everything. Constant evaluation and structured change are necessary to remain resilient and viable, never more so than in potatoes – if I still produced my crops via the methods employed in the 1990s with today's costs, we'd very quickly be in an unattractive position.

At one time we ploughed in October then struggled with slumped soil in spring so either superflowed repeatedly, ploughed again, or both. It was ridged, then bed tilled usually twice in front of the old webbed destoner. Whereas now, we cultivate after the cover crop in spring, plough shallower, Simba TL, ridge and destone with a mostly starred machine. We bed till about a quarter of the area rather than 150%. Both the planet and overdraft are better for it!

Cover crops are a noticeable change for us on time gone by and have resulted in less fuel per hectare to grow the crop, reduced nematicide use and better tuber quality, mostly from improved soil health and higher physical organic matter in the ridges. This is a constantly evolving feat as science and knowledge grows, and I foresee this area developing further in the future as strategic plants replace synthetic chemistry. This doesn't mean organic is the way forward, but soil fumigants will be found in the rare breeds section if they exist at all in future.

Livestock integration has recently become more commonplace, but I think it unlikely we'll get back to most farms having a yard of bullocks and fields of fat lambs in 25 short years. Muck is valuable, but infrastructure, staff and skills take huge commitment that not everybody has or desires.

Green manure, however, has more legs and ties in better with things like government policy. Short-term high-administration-demanding box ticking schemes

like SFI, I feel, will be a flash in the pan, but legislation adhering measures like water course margins (that we've had here at least 25 years) are something which I think will and should stay.

Which leaves me with politics – arguably the greatest threat to British agriculture. Short-term politics never was and never will be compatible with a long-term industry like agriculture. Most of their crack pot ideas are short-term, ill thought out, impractical and lack any consideration of consequence – solar panels belong on roofs not fields, land should produce food, moving water should produce power. It's really not complicated.

Will we see a repeat of the 1930s by 2050? Who knows, but the decreasing number of farmers feeding an ever-greater population trend will have to adjust by then for sure. A few huge corporate agribusinesses and a handful of small-scale peasants won't be a desirable goal for many of today's farmers, but is a possible, if undesirable and arguably inefficient outcome.

Where there is threat, there is opportunity. It's our job as farmers to bolster the strength and navigate the weaknesses. We've always found a way forward; I guess we always will.

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.

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“ If we want to have very low soil disturbance, we have to stop destoning and bed tilling.”

Lowering cultivation intensity

Potato-LITE project

Developing lower intensity potato cultivations could help growers to improve soil health and save money, but stone content remains a challenge. CPM investigates the latest research which aims to address this.

By Mike Abram

A multi-million-pound project is starting to show that reducing the intensity of potato cultivations is possible without impacting yields. But better understanding of stone content in soils is likely to be required to unlock wider adoption.

The four-year Potato-LITE (Low Intensity Tillage Enhancement) project was awarded £2.83M to explore optimised systems for potato cultivations through the Innovate UK Farming Innovation Programme in March 2023.

While reduced tillage technologies have enabled regenerative agriculture in cereal systems, they've not been particularly well-developed for root crops, where production systems require the soil to be cultivated to create a deep seedbed – free from stones and clods

– to provide a favourable environment for growth and damage avoidance.

Typical 'maxi-till' for potatoes involves multiple passes of primary cultivations, such as the plough or deep non-inversion cultivators, followed by bed formers, bed tillers and destoners before the crop is planted.

Deep cultivations

“Many of these operations are excessively deep,” says Mark Stalham, an independent potato consultant and researcher working on the Potato-LITE project. “A destoner can typically sieve 6500t/ha of soil and stone. A bed tiller cultivates a similar amount of soil while a plough would invert that volume of soil involving more energy and more disturbance.”

One key aspect of the project has been to find a method for quantifying the intensity of various potato cultivation operations to give a baseline to work from when reducing cultivations.

A metric used by the US Department of Agriculture's National Resources Conservation Service proved ideal, says agricultural engineer Philip Wright of Wright Resolutions, which he's been developing for use in the potato crop with McCain for some years. “It's part of an algorithm used to look at soil loss and indirectly, trends in soil carbon,” he explains.

As part of that calculation, it uses a soil tillage intensity rating (STIR), assessed using

the operational speed of tillage equipment, tillage type, depth of tillage operation and percent of the soil surface area disturbed.

“STIR is driven by the type of operation. For example, mouldboard ploughing is quite intensive; low disturbance soil lifting and loosening will have a lower factor, and if we only tilled strips across the field rather than the whole field, it would be even less.”

Speed is also a key factor. For non-powered operations, the faster you go, the more intensively you move soil and the more energy you put in, so the higher the STIR. The depth you work at and the



A soil tillage intensity rating (STIR) can be calculated using the operational speed of tillage equipment, tillage type, depth of tillage operation and percent of the soil surface area disturbed, explains Philip Wright. Photo: Agrovista

Potato-LITE project

▶ amount of soil moved across the working width also comes into this, says Philip.

For powered operations such as bed tilling, the slower you drive the higher the intensity. "It has more time to deliver energy to the soil," he explains. Destoning also has an inverse relationship with working speeds. "The closer the web or star spacing, the longer it takes to filter out soil and the slower you have to drive."

Soil tillage intensity ratings have been calculated for each operation and machine according to depth, including planting and harvesting.

"Harvesting is effectively like a destoner at the end of the season," adds Mark. "But

the soil might be in a very different state, either extremely dry or extremely wet. The level of impact is related to the dryness of the soil but if the harvester is moving very slowly, then this is likely to have a greater impact. So it's possible to compromise soils at both ends of the season."

Even within a traditional establishment system there'll be potential for optimisation, stresses Mark. "We can work soil more shallowly, use wider pitch webs, and run powered rotary equipment less aggressively."

Destoning, however, normally has the highest STIR along with bed tilling. "If we want to have very low soil disturbance,

we have to stop destoning and bed tilling as the default practice," he suggests.

Using STIR for maxi-till establishment as the benchmark, the project team has tested three novel alternative establishment methods with much lower STIR values on four potato farms.

The 2023 trials involved growing an overwintered cover crop provided by Kings ahead of the potato crop, and then using either a rotary cultivator or low disturbance tine ahead of the planter. The last option was using the low disturbance tine without a cover crop.

"We envisage the rotary cultivator system being able to create ridges

Single-pass establishment intrigue

Shropshire potato grower John Bubb says he's impressed by the potential of one-pass establishment, as demonstrated in the Potato-LITE project. "It definitely works and I'd have no problem doing it. It's good for soil health, definitely cuts costs and is so simple compared with what we do now.

"But there are two questions – bruising from stones, and secondly, will it work in all scenarios? We haven't seen it in a heavier clay field or in really wet or dry conditions."

John grows 184ha of potatoes for McCain alongside wheat, oilseed rape and flowers for drying. During the past few years he's made changes to the farm's practices towards a regenerative system after recognition that years of using various pesticides, especially soil sterilants and nematicides, leaving soil bare over winter and intensive cultivation, had left the farm's soils in poor health.

Examples include the adoption of growing multi-species cover crops before potatoes and flowers, growing catch crops between OSR and wheat and using strip-till to plant flowers and OSR.

The use of targeted nutrition, sap analysis, clover in cover crops, and in-field beneficial strips have contributed to reduced fertiliser and pesticide applications across the rotation, including potatoes, while growing cover crops has helped to reduce bed tilling to just 25% of the area and improved conditions following primary cultivations.

His push towards a more sustainable system made him a natural choice to be involved in Potato-LITE. "While cultivations are only a small part of regenerative farming in my view, it's obviously of interest and there are potential cost savings to be had," he says.

His current establishment system uses a DTX for primary cultivations to around

30cm depth, bed tilling where required, followed by destoning and the planter.

"One of the challenges is getting the soil dry enough because with a plough you do dry soil quicker. But we're in transition and in five- or 10-years' time, I suspect it'll be less of an issue because the soils will drain more freely as we grow more cover crops and use fewer chemicals."

The Potato-LITE trial this season covers around 1.2ha with the four systems compared across replicated 60m strips of four rows. The sandy loam field is quite stony in places, comments John.

Planting this season, unlike last year when planting into a green cover crop proved difficult, was no problem with any of the systems, he says.

"The massive benefit of a one-pass system is that when 10 March comes and we want to start planting, currently it's a big decision since we require at least two days of dry weather to start even thinking about it so we have time between each operation.

"With one machine you can literally go out and do a few hours and maybe plant 4ha. That's worth its weight in gold."

That benefit and the one to soil health, within reason, should counter any harvesting challenges, he believes. "I'm not sure it should slow harvesting down that much. It has to stack up, but if we can create more efficiencies at planting and gain soil health, we'll try and sort out harvesting afterwards, although we have to grow quality potatoes and can't have more bruised."

Optical grading, for example, could be one solution on farm to removing stones, while delivering into the factory immediately post-harvest could also allow crops to be processed before bruising develops. Both are options being considered by McCain, suggests Matt Smallwood, the firm's head



Farmer John Bubb says he's impressed by the potential of one-pass establishment, as demonstrated in the Potato-LITE project. Photo: Hutchinsons.

of agronomy and applied research.

"In parallel with this project we're looking at commercial grading solutions to remove a low stone content prior to delivery to the factory," he says. "There is a land base that has a low enough stone content to enable that.

"But we also appreciate that a large area will still likely require destoning and this project is also looking at alternatives or modifications for that."

McCain already has a few growers no longer destoning, grading out stone post-harvest and then delivering to factory before bruising becomes apparent, but that could be expanded as an option once commercially viable cultivation and grading options have been developed, he says.

It's all part of McCain's plan that 100% of its potato crop will involve regenerative agricultural practices by 2030. "Part of regenerative agriculture is reducing soil disturbance, and so within commercial limits, we want to enable growers to achieve that," he concludes.

where we have the potential for cloddy soil, so sandy clay loams or heavier, where fixed tine tillage would not create enough fine tilth,” explains Mark.

The STIR value for that system is just 40% of conventional establishment with work rates almost doubled while using two-thirds of the fuel.

Using the prototype Grange toolbar with low disturbance tine following a cover crop reduces tillage intensity to just 15%, with further improvements in work rates and fuel use, while removing the cover crop brings the STIR down to just 7%.

“The key thing is work rate. If we can work soil faster, we can target cultivation into windows when the soil is in a fit state,” stresses Mark. “Coming shallower conventionally will be an improvement, but the work rate improvements from this more min-tillage approach are massive. You can plant areas very quickly.”

It may also have a knock-on impact on reducing greenhouse gas emissions (GHG), he points out. This is being measured as part of the project, although data is yet to be analysed. “Current understanding is that STIR and GHG emissions go hand-in-hand – if you move a lot of soil intensively when it’s warm and wet, you’ll get a lot of gas losses.”

Yields were marginally lower on average



Grimme has provided the project with a new Prios planter for less passive sliding and more rotating disc type action which moves the soil during ridge formation.

for the experimental systems, although they weren’t significantly different due to considerable variation between the three farms where the systems were tested in 2023. Some practical observations taken in the first year should help improve yields this season, suggests Philip.

For example, in the first year, some of the novel establishment systems were used straight into a living cover crop which created significant challenges

for both the cultivations and planting, with the cover crop holding on to aggregates bound to its root system.

“If you have a non-powered piece of kit, it’s difficult to shake those aggregates off, and form a ridge when there are big lumps of root mass glued together,” he says. “You have lumps of root ball going through a planter not designed to cope with it. It doesn’t take much for soil flow to be slowed and result in a poorly formed ridge,



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Potato-LITE project

▶ where tubers aren't covered properly."

Those problems have resulted in two changes for 2024. Firstly, terminating the cover crop earlier – around 4-6 weeks ahead of planting – to allow its roots to die and not bind aggregates.

"A cover crop has to condition the soil over winter to be able to use a minimum tillage system," comments Mark. "But a cover crop creates virtually all its porosity in the soil by the end of January – killing it then results in 95% of the benefit."

Leaving it until later, as well as creating potential issues with establishment in this system, also adds more workload for growers, he points out.

The second improvement is a planter which could process that type of soil better. Working with project partner Grimme, a new Prios planter has been provided with less passive sliding and more rotating disc type action which moves the soil during ridge formation, explains Philip. "It's a planter for minimum tillage and has the capability for material to flow through. Albeit, it still requires the right soil aggregation and quality, which is where cover crop termination time comes in."

Greater clearance

Another tweak was to the Grange toolbar,



The aim of the Grange toolbar is to zone cultivate where required with a leg in line with where the potatoes are being planted.

which now has greater clearance and can undertake some surface cultivation, adds Philip. "The principle with the Grange is to zone cultivate where required with a leg in line with where the potatoes are being planted. Between those deep legs the Grange can now cultivate shallowly to provide tilth. We've made a big jump forward with the improvements this season."

Indeed, Mark suggests it's difficult to

see differences across the cultivation systems this season to the extent he thinks yield differences should be unlikely.

That leaves two major challenges: harvesting speeds and efficiency, and stones. Harvesting rates in 2023 were on average 14-18% slower. "That concerns me," admits Mark. "There's no point in being three times quicker at planting if you can't get the crop out of the ground in time."

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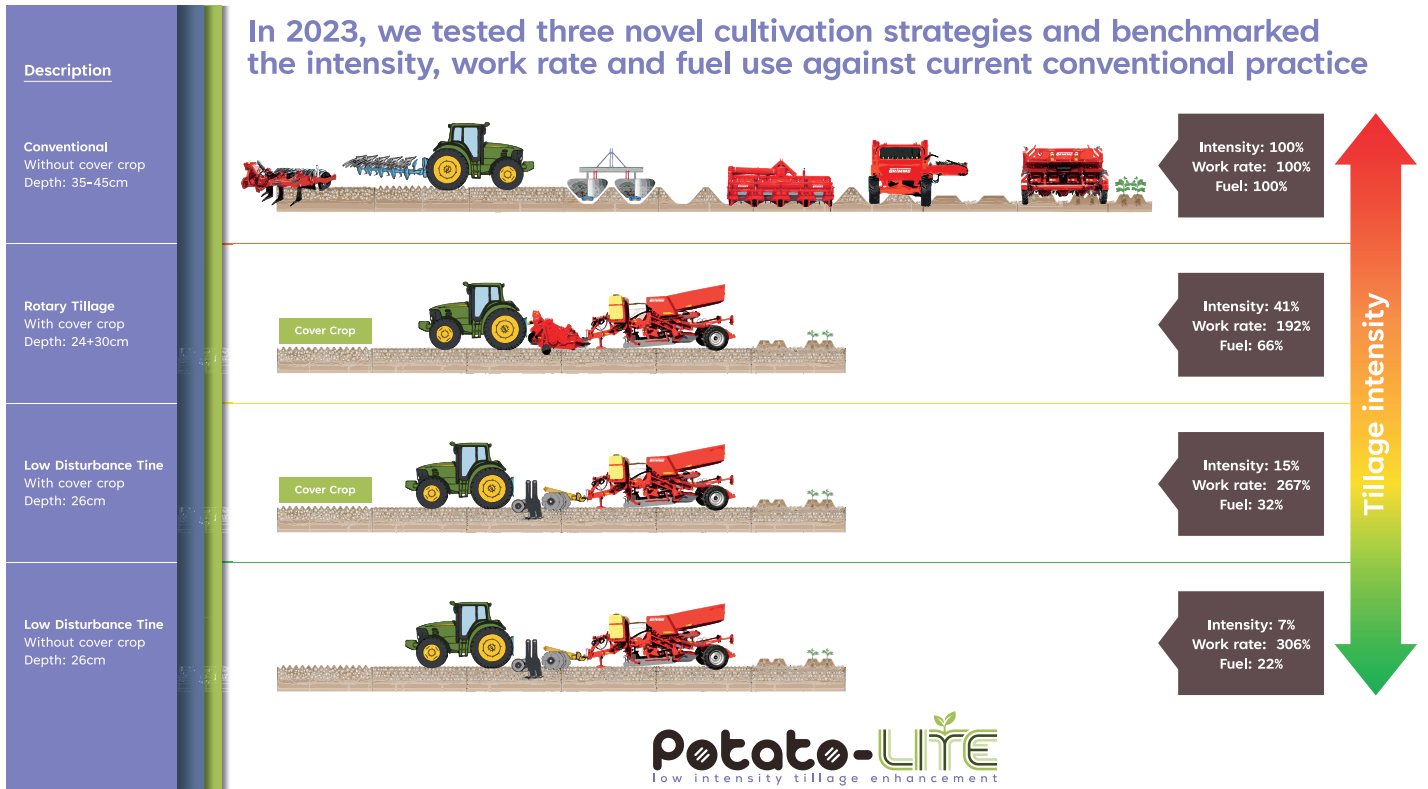
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The Potato-LITE project has tested three novel alternative establishment methods to benchmark intensity, work rate and fuel rate against conventional practice.

Beet moth pressure concerns

Warm, dry weather in August which caused sugar beet canopies to wilt and open has led to the re-appearance of beet moth, growers heard at BBRO's BeetField24 events.

Furthermore, low levels of beet moth have been present for the past couple of months, reported Prof Mark Stevens, BBRO's head of science. "We know numbers started to move around six weeks ago, but during the last week where the canopy has gone down [due to wilting in warmer, dry weather] it's opening up hearts for the adults to get in and start to load their eggs," he said.

"If you walk in tramlines or where there are any flat patches on farm, which clearly has been the case on lighter land, keep an eye on it as we don't want the situation we had in 2022."

This season was different, he stressed, as there hadn't been a prolonged drought, but continued warm and dry autumn conditions would favour the spread and development of the moth potentially into early October, while rain and cooler weather would slow or halt it.

Check sugar beet crowns for caterpillars feeding – early symptoms can resemble boron deficiency or downy mildew – and control if necessary, he said, although be aware that using a pyrethroid insecticide has consequences on beneficials and high water rates are required as there's only limited evidence of efficacy.



Warm, dry weather in August has led to the re-appearance of beet moth.

Currently, there's no threshold for treatment, which BBRO is working on providing as well as trying to identify alternative approaches for beet moth caterpillar control.

A second moth, Silver Y, has also caused some sporadic damage in factory areas this season, added Mark. "I believe these moths are now overwintering not just on the south coast but potentially around the East Anglian coastline."

With the potential for a second generation, it also requires keeping an eye on, he said. "There's a threshold for treatment of five caterpillars per plant, again with pyrethroids, although we do have to look at alternative chemistry."

Last year's results had an element of drivers being a little cautious about what they might find and perhaps in future could go quicker, he suggests. But ultimately, not destoning where required will always create harvesting issues. "There's not much harvester drivers can do if they pick up stone – it will damage the crop and harvesting will be slower."

While in the trials in 2023 there wasn't any consistent bruising difference between systems, the exception was on very stony sites where higher levels were seen which Mark says is pretty obvious.

On those types of sites, destoning is likely to be required. But commercially, destoning depths have started to reduce – finished beds of 28cm depth are becoming more of a standard than 35cm – following research by Mark and Philip.

The project is also looking at whether alternative destoning techniques could be an option – understanding the stone content of soils is going to be critical for knowing what establishment system is most appropriate, says Mark.

"We don't know what the minimum stone content should be to advise growers whether they should destone or not."

With the ultimate aim of creating a decision support tool for growers to use to decide on cultivation strategy, such an ability will be vital to enable the right advice to be followed, he concludes. ■

Get your ducks in a row



The past few years have seen some challenging conditions for Sugar Beet, but **Gadwall** excelled; delivering superb yields in the **APHA Sugar Beet Variety List for UK and Northern Ireland** and in field testing on **Club SV** farms.

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“Regular sampling helps build a picture over time of what’s going on in the soil.”

Soil pH survey

Lucky number (pH) 7

Good soil health is down to an amalgamation of factors. *CPM* explores how growers can optimise these in order to achieve the best performance.

By Charlotte Cunningham

Soil is often thought of as a farmer’s greatest asset, but the health of this brown gold can greatly impact the performance of the crops grown in it.

Of course, soil health encompasses a number of factors, as highlighted in a recent *CPM/LimeX* survey which showed that structure, pH, nutrient indices and organic matter levels were all deemed by growers to be similarly important aspects.

“Soil health is a balance between good structure, good biology and good chemistry – a balance between physics, chemistry and biology,” explains Elizabeth Stockdale, head of farming systems research at NIAB. “One isn’t more important than the other – we often use the three-legged stool analogy and soils require all of these things together to work at their optimum.”

Although soil health has arguably always been important, there appears to have been a tangible shift in mindset and priorities during recent years, with 54% of growers revealing they believe it’s more important than they

thought it was five years ago.

However, for Suffolk farm manager Edward Vipond, good soil health and management has long been a fundamental part of the 1800ha system at Troston Farms. “I’m not a lover of the word regenerative – I think it’s an overused phrase which has become fashionable. This fashion has resulted in a tidal wave of opinion on the use of various techniques which have been used for years, so from that perspective, good soil health is nothing new.”

Elizabeth concurs: “Five years ago we were at the beginning of the Soil Health Programme funded by AHDB, which was responding to farmer questions and needs about soil health and actually, I think this increase in interest has been growing steadily during the past 20 years,” she says. “In the past five, it’s almost become normal to talk about soil health – not just nutrients, but having a more rounded, holistic discussion around soil management.”

Soil management

This shift in mindset over time has also triggered a change in soil management, with 87% of growers saying they now carry out fewer cultivations and the same percentage noting they’re now actively increasing organic matter levels within the soils.

Correcting pH issues is something 61% of growers say they’re now doing – with the majority (71%) sampling soils every 3-5 years – while others noted fixing drainage, improving nutrient indices and the use of cover/catch crops as other key changes they’ve made.

“The adoption of these practices is

definitely helping to get the overall balance right and it’s all about going back to basics with good old fashioned soil husbandry,” says Elizabeth. “There’s not one perfect thing to do – it’s all about adopting a range of practices which put your soils in the best position possible on your farm. This will mean a slightly different combination of factors on every farm.”

When it comes to making changes to soil management to prioritise health, Edward says he decides which measures to carry out on a year-by-year basis. “Soil health to me is all about keeping the soils busy. The area I farm has massive variation – from Breckland blowing sand to heavy clay and everything in between. I have to treat these soils so differently depending



Nitrogen use efficiency reduces by 10% at pH 6.0 and phosphate use efficiency reduces by 50%, so pH management is vital for productive crops and ensuring valuable nutrients aren’t wasted, says Glenn Carlisle.

The value of calcium

With nutrient analysis tests able to reveal a myriad of data, experts say including a calcium analysis in this metric could be useful – despite 52% of growers saying this isn't something they've done during the past three years.

“Calcium is almost the forgotten macronutrient, but it's really important for all plants – particularly for cell wall structure where calcium binds the pectin molecules together creating stronger and more malleable cell walls. This helps the plant's natural defence against pathogen attack,” says Glenn.

Elizabeth adds: “You don't have to test for it every time – not every 3-5 years – because

what it's essentially telling you is something about the parent material that your soil comes from; the skeleton, the bones of your soil.

“In the AHDB soil scorecard we looked at calcium, and although it doesn't have a set of indices, there's a typical range within UK soils. While 80% of soils will fall within this range, there's a minority that won't and so soils with very low calcium – a score of less than 1000ppm – suggests that it might be being constrained by the availability of calcium, which is important for some crops including potatoes and sugar beet.

“This is particularly likely in light soils and is an issue in Wales. The rocks in Wales don't contain a lot of calcium, so it's often

worth carrying out an analysis in these scenarios as it may help guide some different decisions for liming, for example. It's not a costly addition and this analysis requires the same extraction as a normal routine test.”

Glenn picks up the point about liming decisions in relation to calcium and concludes: “There are subsequent benefits from liming for calcium too. The very fine particle size in a product like LimeX increases the available calcium in the soil which benefits soil structure particularly in heavier, high clay soils. The benefit of good structure is good drainage and aeration which, when paired with neutral pH, are the key properties of a soil that allow biology to thrive.”



Testing soil pH and correcting any issues are regular parts of Edward Vipond's strategy.

regularly testing and correcting issues. “We routinely test for pH every four years and more frequently when ahead of sugar beet. Any issues are corrected with lime immediately after testing.”

pH benefits

Delving deeper into the value of correcting pH – 92% of growers said optimum pH improves nutrient use efficiency, 84% believe it helps to optimise crop yields and 72% highlighted the importance pH plays in creating the best conditions for soil microbiology to thrive. “pH is really important for nutrient use efficiency and maximising what we have in the soil to make it as available as possible for crops,” says Glenn Carlisle, business manager at LimeX.

As such, keeping it at target level is vital and where soil sampling shows pH to be suboptimal, 65% of growers say correcting this with lime is essential and should be done at the first available opportunity.

In terms of the trigger point for them

applying lime, the majority of growers (50%) said they'd do so at a pH of 6, while 40% said they'd do so when pH levels reach 5.8. “Most arable crops function best at pH 6.5 and above, so anything below this could lead to yield impacts and lower nutrient use efficiency.

“Nitrogen use efficiency reduces by 10% at pH 6.0 and phosphate use efficiency reduces by 50%, so pH management is vital for productive crops and ensuring valuable nutrients aren't wasted,” says Glenn.

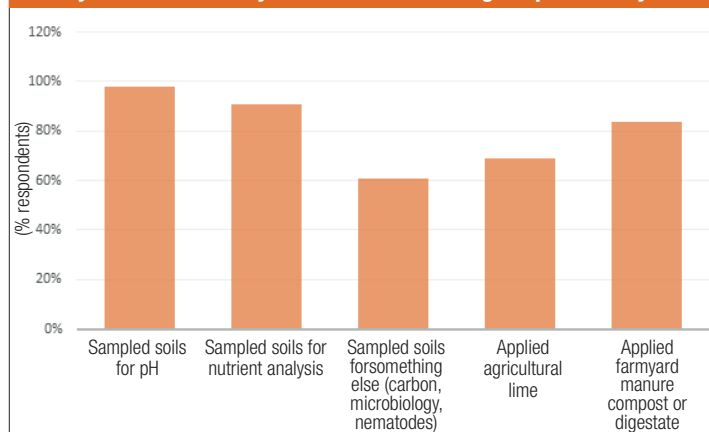
Elizabeth adds: “The direct effect on crops of keeping pH in the optimum range is predominantly about the mediation of nutrient availability – only at really low levels do we have toxicity issues where iron or aluminium become a problem.

“Because pH also affects biological activity – which has a very similar optimum to plants – that means it has a knock-on effect for factors like soil structure. If we slow the breakdown of organic matter and the activity of

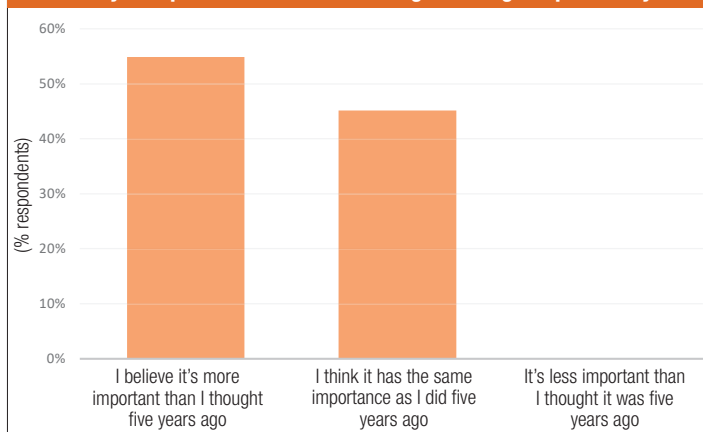
▶ on what's in front of me that season. “This season crops established behind the plough have outyielded others drilled after non-inversion tillage, next autumn the reverse might be true, being flexible is a major part of my strategy.”

Testing soil pH is a regular part of the strategy, however, with Edward

Have you undertaken any of these actions during the past three years?



How has your opinion of soil health changed during the past five years?





In the past five years, it's almost become normal to talk about soil health – not just nutrients, but having a more rounded, holistic discussion around soil management, believes Elizabeth Stockdale.

microorganisms, we get poorer structure. So getting pH right will also positively impact the wider soil health picture.”

While there are growers who may say they don't have to lime – those who might have soils that are naturally high pH, for example – it's still vital to measure this regularly to keep track of any changes, warns Elizabeth. “The natural processes we have in the UK – the rainfall we have – are slightly acid, meaning that a soil which is only just buffered from its underlying material could actually become more acidic over time. Regular sampling helps to build a picture over time of what's going on in the soil.

“That said, except soils with low buffering capacity, such as very sandy soils, pH changes relatively slowly so having a plan to maintain pH plan and checking this by measuring every

3-5 years is perfectly adequate.”

In terms of sampling accuracy, Elizabeth adds that it's important to carry out testing at the same time of year ideally using geolocated sites.

Then, when it comes to product of choice, key grower priorities included locality and availability (33%), neutralising value (26%) and fine-ness and reactivity (11%), with 44% of growers opting for straight ground limestone products. Almost a quarter (20%) noted LimeX as their go-to, so what are the benefits of using this co-product?

LimeX product

“LimeX is a co-product of sugar beet manufacturing derived from high-purity limestone that's used to clarify and filter 'raw juice' – the liquid sugar that's produced when sliced sugar beet are diffused with hot water,” explains Glenn. “Once the precipitated lime has purified the juice, it's pressed, conditioned and stored at the factories as LimeX.

“As a product, LimeX has the combination of a good neutralising value and high reactivity. It's 100% reactive where a lot of ground limestone alternatives are only around 60-70% for comparison, which means 100% of the tonne of LimeX applied to the soil will do the job of raising the pH.”

Glenn explains that this is due to the product's very fine particle size, where 100% is finer than 150microns. “Other ground limestone products can contain large proportions of larger particles which don't break down in the soil and don't have an effect on acidity.

“What's more, LimeX also contains valuable quantities of phosphate, magnesium and sulphur that can be included in nutrient management plans.”

LimeX is a go-to product for Edward, particularly ahead of sugar beet, he explains. “Neutralising value is what

we're looking for but also the location of the product is key for us. I like LimeX, it's a good product and it's local – I'm only six miles from the factory.

“I also like that it's a recycled product – it makes sense to use that. As soon as the previous crop is clear, we test and then lime is spread; it's the bread and butter of our system. Soil is my medium – if I abuse it, I'm a fool.”

Turning focus to this season, with talk of the unprecedented rainfall likely to have impacted pH and nutrient levels, carrying out additional pH testing this year may be wise in higher risk soils, says Glenn.

“Soil testing every 3-5 years is a good rule of thumb, but it also depends on past issues in specific fields, if you're growing acid-sensitive crops like sugar beet or barley, and if we've had a tricky year like the one we've just been through with high rainfall. It costs little to do, but might reveal some pH issues which could prove to be very costly if not rectified.

“A lot of the results we're getting in through our soil sampling service at the moment are showing a significant impact of the weather on pH levels, so there's definitely a lot of value in sampling soils early and applying lime where required this year in particular.” ■

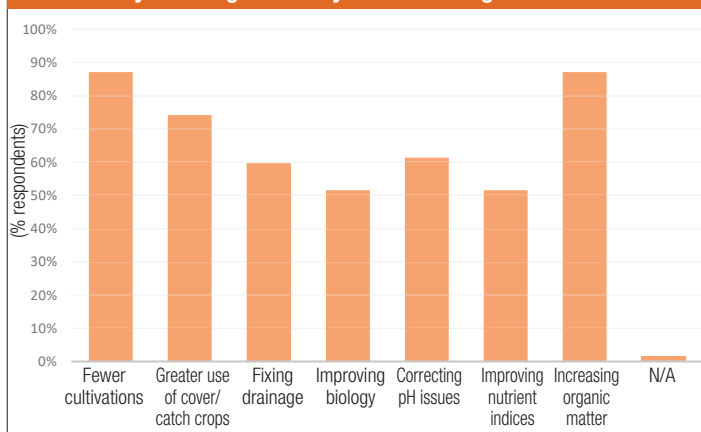
Winner announcement

Congratulations to prize winner Chris Blaxell from North Walsham who responded to the CPM/LimeX survey and provided insight on soil pH. Chris has won an OONI Karu multi-fuel pizza oven, worth £699.

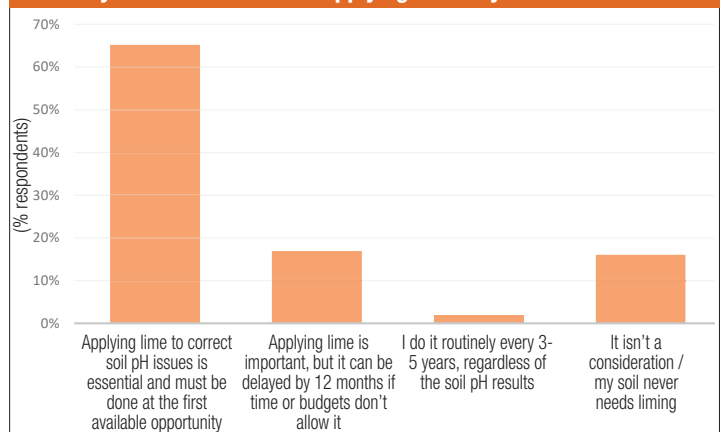
He correctly answered the tie-breaker question of “According to RB209, what's the target pH for arable soils?” With: “6.7.”

To engage with future surveys, visit the CPM website and sign up to the newsletter.

What have you changed about your soil management since then?



What's your attitude towards applying lime to your soils?





lastword

by Janine Adamson

The future is feeling

During our latest readership survey, one thing was apparent – CPM readers treasure physical copies of the magazine. In fact, 65% of those who participated answered ‘no’ when asked if they’d be happy to receive a digital only version.

However, part of me questions whether this’ll continue to be the case when we’re celebrating our 50th birthday and our audience demographic has subsequently shifted. In many ways, I’d like to think we’ll still hit the presses (and on a personal level, I really rather hope so), but in time, reality may suggest otherwise.

For me, technological advancements fall into two broad camps – those which truly address a need which otherwise would remain unanswered, and are thus adopted with little reticence. And then those which although assist, seem to sap some of life’s precious enjoyment.

Similar to a magazine, let’s take books. Yes I can read a book on an electronic device, but do I want to? The answer is no. Books provide a joy that many of us human beings crave – to be whisked away from the doldrums of mediocrity so we can submerge ourselves in an alternative world. With a book, it’s almost physical, as you

turn the page on each chapter and lose yourself to literary escapism.

Call me an old romantic, but I partake in much book swapping and purchase my material from second-hand book purveyors or my favourite, ‘chazzas’ (charity shops). So there’s nothing I adore more than imagining who perused the pages before me; I often chuckle to myself when I’m about to fold down a corner on the same page as the previous owner.

Like an imaginary friend, you can take a book anywhere – it doesn’t require charging. You can lend it to a neighbour, and en masse, books evoke a sense of grandeur that a tablet could never realise.

As with fashion trends like flared trousers and tasseled lamp shades, I’ve noted that some ‘advancements’ appear cyclical. For example, I’m sure we’ve all been graced with stories from our elders about self-service check-out blunders. Initially hailed as the speedier approach to supermarket shopping, the fact you have to seek human intervention to bag a cabbage says it all. And now, some retailers are re-instigating ‘archaic’ conveyer belts – my mum will be especially pleased!

I have another example – the death of the high street – although I’m unsure this one is truly reversible. It was only last week when I saw a petition to bring back physical stores in response to online shopping fatigue. I have to agree, I’ve been cat-fished too many times by a highly edited marketing photograph. You can’t mistake the quality when it’s in your actual hands.

Maybe I’m completely wrong here, but I don’t want to live my life as an android;

I want to feel something real. That’s why I believe this magazine can’t be written by AI or some form of bot.

Collating ‘facts’ about a topic is one thing, but interpreting it correctly and delivering it with character and sometimes wit (yes, we try), surely can’t be possible? Will AI evolve so it can truly evoke emotion? Or curate a topical and engaging magazine which addresses the here and now of arable farming with absolute technical accuracy?

If that does indeed happen come 2050 I probably ought to start worrying, although if I’m still your editor by then, something has likely gone wrong – I hope to be on the cusp of retiring my pencil.

For now, I’m in this trusted position because I’m passionate about our industry and want to get it right. Will a machine feel the gravity of what’s involved like I do? Will a digital-only version of CPM

be passed around the farm kitchen table in the same way?

What will undoubtedly change is how our website and wider online presence functions – something which we’re already in the process of addressing. I know we’re the poor relation in comparison with other knowledge-based sites; I hope we can improve such in a few years rather than it taking 25. I’m almost certain technology, in some guise, will help to facilitate.

Nevertheless, as our lead article suggests, we should allow technology to dictate a little. Where we’re making our industry more efficient in ways humans couldn’t dream of, I’m all for embracing that. But I’d also like to propose we don’t forget our hearts and minds along the way either – recognising what brings us joy.

Farming is hard, life is sometimes even harder...but please, can we let a girl have her magazine?



As an aside, I was sent this wonderful photograph of 87-year-old Peter Simpson who is still advising growers in the South West, including on the latest oilseed rape varieties. Images like this bring me much joy.

Stand out from the crowd



Beet Cyst Nematode continues to spread, threatening yields. **Hoopoe** has been tested thoroughly in the presence and absence of BCN consistently giving excellent performance. It allows growers to mitigate risk of this damaging pest and lack of genetic diversity currently available. Following on from **Jura** and **Jackdaw**, **Hoopoe's** excellent performance against BCN is why it has been fast tracked for UK Beet growers. **Hoopoe** is available for 2025 sowing with a wide range of seed treatments against pest and diseases to help you stand out from the crowd (and ruffle some feathers on the way).



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Farm Director,
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