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### Volume 26 Number 10 **October 2024**



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### **Editor's Pick**

Well, hasn't autumn made its intentions clear? To be honest. I should have known we were due a deluge – a split suddenly appeared in my work boots (brand begins with Blund) just as the weather broke. Typical.

Despite rarely questioning spending my hard-earned cash on others, when it comes to treating myself, that's another matter altogether. So I stubbornly traipsed on several off-road dog walks in the rain - wearing my sad looking boots – only to find that split wasn't going away.

They didn't even last three years, I cry! And the oddest thing? Having now reluctantly purchased a replacement pair, someone went and bought my crusty old boots for £20 on Vinted (Gen Z's eBay). So there's my tip of the month - one woman's trash and all of that.

Back to the magazine. I feel as though I'm on a comedown after September's CPM - our 25th anniversary issue. However, we've curated a varied spread of content for this issue to hopefully maintain momentum as the nights draw in.

So in a bid to switch things up, as per our cover image, we're having a mini focus on machinery this month. Despite not being a machinery mag per se, we appreciate the importance of kit on farm and the impact it can have on crop management.

Content for this starts on page 49 where Charlotte explores profitability and what this can mean for those with tighter budgets. Many of our readers love shiny toys, but with industry projections indicating a downturn in machinery spend, there has to be more than one way to peel a turnip.

Then on page 54, Melanie looks at the benefits of tracked tractors including an on-farm case study. She also shares the story of one farmer's loyalty to the Claas Jaguar forage harvester three decades of successful

silage making (page 60).

To conclude our machinery special, Melanie conducts a special interview with Amazone's Simon Brown (page 64). Simon epitomises the concept of having a career rather than a job something that I believe we're all aiming for in life.

As for the rest of the magazine, a story which really tested my grey matter is on page 16 – understanding residual herbicide chemistry. I'll admit I'm no expert in technical agronomy, but I do find this type of content rather fascinating. A contributor also commented that this type of feature is justification for the BASIS points which individuals can claim for reading CPM. I'll take that as a win.

Charlotte has written a cracking story about grazing arable crops (page 27). Again, this is slightly off-piste for *CPM*, but more growers are integrating livestock into rotations and mixed farmers remain an integral part of UK agriculture. If it's a tool for best practice in crop management, we're here to report it.

Then, on page 40, we explore how listening to soils could be used as an indicator for on-farm soil health. Believe it or not, my undergraduate degree is in sound technology, so in many ways, a past life was given a chance to rear its head! That said. I won't be returning to the studio any time soon.

Last month we had spiders, this time we have rodents although rather than boosting populations, Melanie reports how to keep these furry blighters at bay (page 45). I'm all for wildlife, insects and alike, but even I draw the line at Roland Rat and his pals.

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smith's soapbox

### Of naturists and naturalists

Being a coastal farm brings benefits and burdens – it means you get more wind and less rain as storm clouds rush to the magnetic attraction of the sea. So in September, while the English interior was suffering from endless inches of rain, we ended up with a paltry 20mm.

Usually that means drought stricken oilseed rape seed

and seedlings which get the worst possible start to life. By the time flea beetle have had their fill, the effect on the crop is miserable, costly and terminal. But this year we've finally given up trying to grow OSR and have switched to SFI options instead. While these mixes haven't been helped by the dry September, fortunately there's plenty of time left for them to establish.

The other thing that being a coastal farm brings is exotic neighbours. To the immediate south of the farm we have two reserves which adjoin each other – one is a naturist beach reserved for nudists, while the other is a wildlife reserve for naturalists. I have to admit, I



sometimes struggle to remember which is which when it comes to naturists and naturalists.

My grammatical instincts tell me that naturalists prefer life 'au natural' and naturists are interested in the nature. This mix-up is a fundamental error which could lead to the fully-clothed innocently strolling around with a pair of binoculars and notebook to be confronted by folk without a stitch on.

I should quickly add that this has never happened to me because I've never set a foot on St. Osyth nudist beach, nor have I trained my binoculars on it. This is partly because I'm not that way inclined and also because I've heard the ugly rumours.

As such, my focus is firmly on the wildlife reserve. It never ceases to amaze how the wildlife lobby and the media, particularly the BBC, maintain a strictly polarised twin track when it comes to farms and wildlife reserves. While farms are portrayed as barren wastelands devoid of all wildlife, in contrast, the neighbouring reserves are seen as seen rich havens awash with bio-diversity.

In short this isn't just an exaggeration, it's blatantly untrue. This wild distortion is a result of the careful politicking of the wildlife lobby. On the one hand, they feel they have to promote the idea that the wildlife of the UK is in a state of crisis, while at the same time insisting this certainly isn't true of the reserves run by the same wildlife lobby. Hence we hear of exciting news of the return of species such as sea eagle and otter on wildlife reserves, while in the same breath we hear that UK wildlife is a fraction of its former self.

You hear the word 'extinction' bandied around with increasing regularity. But the fact of the matter is, the only British mammal to become extinct in recent times is the copyu, and that was because it was the subject of a government eradication programme – not forgetting it wasn't native in the first place – it was introduced from Brazil 100 years ago.

What's probably more serious is when you hear Defra blindly cutting and pasting this tale of doom and gloom into its own rhetoric. Given this institutional bias, the key question is who is to act as judge and jury when it comes to the current proposition that farmers should be paid for the delivery of public goods, a key metric of this being wildlife numbers?

I was struck recently by a key conclusion drawn by Nuffield Scholar Chris Taylor, who looked at the net zero challenge for UK agriculture. Chris identified soil organic matter as a key metric here, but wryly and wisely noted that 'The best time to sample fields for organic matter was 20 years ago, the second best time is now'.

Similarly, I'd suggest it to farming's detriment that during recent decades very few farmers took the trouble to undertake regular wildlife audits. Maybe with the policy sea change at Defra, farmers ought to be more proactive when it comes to establishing the status of wildlife on their farms, rather than the current practice based on bias confirmation by the wildlife lobby.

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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66 In reality, we've not seen the rush of early drilling that was anticipated.99

### Autumn crop management

With concerns circulating among industry that growers might risk early drilling in a bid to avoid déjà vu, it appears Mother Nature has yet again demonstrated who's in control. But could pausing proceedings actually be a blessing in disguise? *CPM* reports. *By Janine Adamson* 

One minute it's bone dry, the next there's a deluge. At the time of writing (end of September), some growers might have had plans to crack on and get drilled up. However, heavy rainfall in parts of the country mean for many, it's back to playing the waiting game.

According to Hutchinsons technical manager, Dick Neale, pausing for a few weeks could prove no bad thing. "In reality, we've not seen the rush of early drilling that was anticipated – growers are aware of rotational issues such as

# **Stop-start conditions**

barley volunteers and then blackgrass, which is only just beginning to emerge.

"So whether it's been a management decision or purely because the weather has halted plans, there hasn't been the wholesale move to early drilling which some were predicting," he says.

### Waiting game

Reflecting on longer term weather forecasts, Dick suggests it's likely the next sensible drilling window for wheat will be around 10 October onwards, particularly for those in the East. "All-in-all, growers are in a better place than last year because many have been out conducting remedial work such as mole draining.

"Whereas they may have been aiming to drill the last week of September, once it's stopped raining and seedbeds have dried out a little, it'll be more around 10 October – that's still nearly a week earlier than usual." he adds.

Dick highlights that for those who drilled really early this year and already have wheat in the ground, it's likely there'll be a mixed bag of success depending on how it was approached and what the previous crop has been. But his main concern for the season is grassweed control.

"A few years ago blackgrass control was superb, but 2023 aside, we've started to see cracks emerge recently and low levels of plants sneaking through. However, the issue isn't control of plants – we're mostly achieving 90%+ success – it's what's left. Those survivors are tillering hugely in the spring and they have to be the focus, along with the spring emerging population," he stresses.

The problem lies in herbicide choice and inadequate sequencing, proposes Dick. "We're seeing blackgrass emerging much later in the season and we appear to be selecting for the survival of those plants.



There should be a more tempered approach to herbicide use with optimised sequencing through winter and early spring, stresses Hutchinsons' Dick Neale.

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### Autumn crop management



Frontier's Dr Paul Fogg says if seedbed conditions aren't right to ensure pre-ems will work, then they're simply not right full stop.

"As such, the worst-case scenario this year would have been the bulk of preem applications going onto early drilled crops. Luckily due to conditions, that hasn't happened. Even so, there has to be a more tempered approach to herbicide use with optimised sequencing through winter and early spring," he says.

And it's not just blackgrass – Dick notes greater brome pressure too. "Brome is flying out of the ground at the moment, so selecting the correct herbicide for the weed present, will be critical."

#### **Seedbed conditions**

Crop production technical lead at Frontier, Dr Paul Fogg, agrees that protracted grassweed germination is becoming a significant problem. "Even more so if you have chosen to drill early this year," he says.

"But it all comes down to seedbed conditions – if they're not right to ensure pre-ems will work, then they're simply not right full stop. It's important to not forget the basics of integrated grassweed control."

The temptation of early drilling plus a

shift towards direct seeding and 'drilling on the green', means Paul also has concerns regarding barley yellow dwarf virus (BYDV). "Transmission risk from aphids is greater in these scenarios and with many having signed up to SFI actions for the first time this year – in this case no insecticide (CIPM4) – it's another dynamic which has to be considered."

In a similar vein, he highlights the importance of companion crop management which should also influence drilling date. "For those signed up to CIPM3 (companion crop on arable and horticultural land) and aiming to grow something like beans with wheat, sowing date will have to be optimised to ensure that action is successfully delivered in the autumn," he explains.

Paul points out that one success story appears to be oilseed rape. "There seems to be fewer cabbage stem flea beetle around than usual. With the hectarage projected to be low, no doubt growers will be wishing they'd drilled much more OSR this year," he concludes. ■

### Lower CSFB pressure

In recent months, United Oilseeds has been leading the charge to revitalise oilseed rape production in the UK, following a significant decline in area. One of the major factors behind this decline, the company states, is the relentless pressure from cabbage stem flea beetle.

As part of its OSR Reboot initiative, United Oilseeds has established a network of MagicTraps – a monitoring tool from Bayer which uses Al to track CSFB's migration and behaviour. United Oilseeds has been encouraging members to contribute data from their traps, with 42 now in situ across the country.

Reporting began in early August and the overall data so far indicates lower CSFB numbers compared with previous years, largely attributed to climate conditions particularly the recent wet weather. However, as this is the first set of comprehensive data, it's challenging to pinpoint trends across specific regions, says United Oilseeds.

Even so, bi-weekly member polls and information from AHDB monitoring sites suggests a broader picture of reduced pest pressure, with occasional regional spikes.

For example, during the week of 4-10 September, a notable spike occurred in the East Midlands, confirmed by United Oilseeds growers and the nearest AHDB monitoring



Monitoring data and grower feedback suggest an overall picture of reduced CSFB pressure this year.

station. The trap data recorded 29 individuals during this period (with a 7-day buffer either side), but which still falls below Bayer's surge threshold of 50 beetles in 21 days.

United Oilseeds managing director, James Warner, says the aggregation and transparent sharing of data whether from MagicTrap, surveys, anecdotal reports or the recently launched ADAS pest and disease platform, is vital in the fight against CSFB. "Reliable data will be key not only in fast-tracking approval for new chemistry, but also in ensuring its use meets a necessary threshold of pest pressure."

North Yorkshire farmer Andrew Pearcy is a regular contributor to the CSFB polls. "I'm fortunate to be able to monitor my OSR visually, but I've found the MagicTrap updates useful. Comparing national and regional trends is a valuable support tool for making informed decisions."

To join the monitoring network, visit www.unitedoilseeds.co.uk/magictrap

### Autumn crop management

### Last season's impacts

Grassweed management will continue to be top of Ed Ford's agenda this autumn, as he strives to defend against both blackgrass and ryegrass.

Up until this past year, he explains that management techniques had isolated the ryegrass burden to just headlands, but now the problem is starting to encroach. "While it's not much, we pulled 15 plants across a 16ha field. We know how competitive ryegrass is and that we're going to have to change a few things to ensure it doesn't get a hold," explains Ed.

For context, the 600ha Essex farm sits predominately on heavy London clay, is no-till and has a rotation which includes winter wheat, winter beans, spring barley, linseed, and oats. "Last year was horrific – as such, the farm is now the dirtiest it's been for 10 years," says Ed. This is despite successfully drilling all of the winter wheat area last autumn with all pre-ems applied, he adds.

"However, many of the peri-emergence herbicides weren't sprayed and come spring, it was so wet that we couldn't get on quick enough with Atlantis (mesosulfuron+ iodosulfuron)."

According to Ed, the farm's cleanest crops were the first wheats which received Luximo (cinmethylin) and a top-up at peri-emergence of flufenacet+ diflufenican plus prosulfocarb. Second wheats received a programme featuring Crystal (flufenacet+ pendimethalin) plus Hurricane (diflufenican) and Avadex (tri-allate).

Come early summer, Ed says he had to make some tough decisions and, given the high levels of seed return from this year, he has more to make this coming autumn. "Even with relatively high wheat prices we sprayed off 3ha due to unacceptable levels of grassweeds. That included the worst patches of ryegrass and unrogueable areas of blackgrass destined for a second wheat."

The recent hire of a 7m rake reflects a change in approach for autumn cultivations at the farm. "Although we hired it to deal with an accumulation of straw rather than grassweed control, it should help the breakdown of trash which will inevitably help to improve pre-em performance. Everything is being raked twice, once soon after the combine and again six weeks later," he says.

Ed also plans to grow fewer second

wheats and is considering splitting fields. "I hate doing it, but I know it'll be worthwhile," he comments. Furthermore, he anticipates a reduction in oat hectarage, which he says is because of a lack of grassweed control options such as Luximo.

"Luximo performed well on the blackgrass here and notably well on the ryegrass at my brother's farm. It stands out in trials too especially when used alongside Avadex. Alone, it offers good control of ryegrass, in conjunction with Avadex, it's really good."

Ed concludes that with ryegrass populations increasing on farm, he has no choice but to get a grip of it by using the optimum chemistry.



Essex farmer Ed Ford is having to adjust his approach to grassweed management this season as a result of increasing ryegrass pressure.



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66 The results provide a steer on areas where we might require more research to underpin changes, as well as around presentation and usability. 99



### from theory to field

## **Balancing nutrient management priorities**

A time of change for AHDB as well as on farm has led to a major strategic review of RB209, the industry's nutrient management guide. *CPM* reports on findings so far. *By Mike Abram* 

In the words of Ancient Greek philosopher Plato, everything changes, nothing stands still. And it could be said that's very much the case with nutrient management in farming.

Whether it's more volatile fertiliser markets causing swings in prices, societal pressures to reduce the potential environmental damage from applying nutrients to crops, or the consequences of changing farming methods to more sustainable practices, how to manage nutrition requirements of crops keeps shifting as priorities change.

While the key goal of AHDB's Nutrient Management Guide RB209 remains the same – helping farmers to make the most of organic materials and balancing the benefits of fertiliser use against the economic and environmental costs – these changing priorities are part of the reason why AHDB is constantly revising RB209, the most recent being a major review undertaken in 2024.

AHDB first published RB209 in 2017, which was previously managed and published by DEFRA, with the intention that it'd be kept more up-to-date and published more frequently with guidance covering all the cropping and grass sectors, explains Dr Amanda Bennett, AHDB senior environment manager and project lead on RB209.

That review resulted in the then newlook RB209 split into seven sections to make it easier to use. Since then, the guide has been updated annually, including with changes made as the result of various research projects identified as information gaps (see "Key Updates in RB209 from research projects").

### **Collaboration**

Updating RB209 is coordinated and managed through the Crop Nutrient Management Partnership, says Amanda. "The Partnership consists of a steering group with representation from all four nations, as well as various other bodies. Underneath there are technical working groups – arable, livestock covering grass and forage crops, and in the past a horticultural group," she continues.

"These technical working groups help identify gaps in knowledge and the AHDB is then responsible for leading new independent research to cover those gaps."

Once that work has been completed, the researchers present findings to the relevant sector technical working group where it's reviewed, and a recommendation is passed back to the steering group.

"If changes to RB209 are agreed, then AHDB makes the necessary adjustments in the publication. It's a very robust process," stresses Amanda.

However, with the vote to cease AHDB activities within the potato and horticultural

sectors, changes to that structure are required. That, combined with a seven-year period of research and technical updates coming to an end, led AHDB to feel it was the right time for a strategic review of the guide and its technical guidance to ensure it continues to meet levy payers' requirements in a changing farming world.

"There are three main parts to the review," explains Amanda. "The first is looking at the governance of RB209 including the Crop Nutrient Management Partnership."

The second part relates to the scope and use of RB209 by farmers, agronomists and the wider industry, while the third focuses on updating technical content in



There are three main parts to the current review of RB209 with the first looking at the governance of the guide, including the Crop Nutrient Management Partnership, explains AHDB's Amanda Bennett.

### Theory to field



The key goal of RB209 has remained the same – to help farmers make the most of organic materials and balance the benefits of fertiliser use against the economic and environmental cost.

the guide. According to Amanda, some changes are required within the Crop Nutrient Management Partnership, not least because of the vote on the future of AHDB Potatoes and Horticulture.

"We require a new way of working with the horticulture and potato sectors, as we no longer collect a levy for those crops," explains Amanda.

The changes mean AHDB will no longer convene a Horticulture Working Group, although Amanda says the Crop Nutrient Management Partnership will continue in its role with a steering group and the other two working groups, albeit with a new list of members.

It's important to find a solution for delivering updates for the potato and horticulture sectors, stresses Dave Bell, a mixed farmer from East Fife and AHDB Cereals and Oilseeds sector council member, who is chairing the RB209 review.

"Many farmers are multi-enterprise and multi-sector," he points out. "If a non-levy collecting crop is in the rotation, nutrient management benefits the other sectors we do collect a levy on. So we're welcoming input from the potato and horticultural sectors and to work with us."

Funding, however, must come from those sectors. "We can't invest our levy on sectors that aren't supported by AHDB," adds Dave.

Until a solution is found, which is more difficult with no single go-toorganisation to speak to, the relevant potato and horticulture sections of RB209 – five, six and seven – won't be updated, confirms Amanda. "However, they'll still be hosted on the AHDB website." While those conversations are happening in the background, the levy payer-facing part of the review has been sourcing feedback of what users of the guide want to see from it, its scope, and in what format.

Levy payers have had the chance to provide that feedback through three activities during 2024, says Amanda, including questionnaires and targeted stakeholder consultations.

An initial questionnaire, which received 250 responses, asked simply what RB209 did well and what could be improved. This shaped a second survey to delve a little deeper into the initial responses, providing Amanda and the team more nuanced information. "We had 660 responses to the second questionnaire, which we're still analysing," comments Amanda.

### Key findings

Initial top-line findings include profitability – rather than either yield or reducing inputs – being the primary driver for using RB209, while the most requested improvements included more information to tailor recommendations for different farming systems, more worked examples in the guide, more photos of nutrient deficiency symptoms, and the development of an app to improve usability.

Perhaps unsurprisingly, guidance on nutrient availability to following crops from cover crops, rather than nutrient requirements for establishing cover crops or how much nutrient is captured, is a priority for growers and agronomists, who made up around 85% of responses to the second survey.



AHDB has been discussing the development of RB209 at events across the country, such as Cereals (pictured).

With more than 80% of respondents using organic manures, the top area requiring more information was around the availability of nutrients from such, followed by the impact of cultivation method on nutrient losses and uptake, summarises Amanda.

"The results are giving us a steer on the areas where we might require more research to underpin any changes, as well as around the presentation and usability of the guide."

Some areas will require careful thought about whether it should be delivered through RB209 though, she points out. "One of the top requests is more information to tailor recommendations. But that's very much an on-farm piece rather than what would potentially be in the guide.

"That response is informing AHDB's programme around nutrient management, but whether it would go in the guide itself is another question."

### **RB209 knowledge gaps**

Survey participants from the recent review were asked for the most important nutrient management knowledge gaps in various categories\*. Preliminary analysis has highlighted the following:

- Nutrient use efficiency (environment)
- Nutrients through the rotation (systems)

• Soil type and nutrient availability including cation exchange capacity (nutrient availability)

• Soil analysis and interpretation (analyses to guide decision making)

• Tissue analysis and interpretation (analyses to guide decision making) \*Categories in ()

### **Theory to field**



It's important to find a solution for delivering nutrition management updates for the potato and horticulture sectors, stresses mixed farmer and chair of the RB209 review, Dave Bell.

Cover crops are a case in point, with Amanda noting the core task of RB209 is identifying a crop's nutrient requirement.

"How you supply that has to be tailored to the individual farm situation, and while it'd be nice in future to add information about what level of nutrients are supplied by cover crops or, for example, biostimulants to RB209's soil supply and organic manure information, there are practical challenges in being able to do so," she explains.

For example, it's unlikely, that RB209 will be able to include detailed information about nutrient release from all different types of cover crops or mixes as it's just too complex, continues Amanda.

Although potentially, AHDB could commission research to see if repeatable standard values for cover crop supply of nutrients could be found – as used for organic manures, she suggests. Alternatively, AHDB could signpost to research or other sources of information for further reading.

It's a tough line to tread, adds Dave. "Where do you start and stop? Cover crops are rarely grown as a straight and mixtures have different percentages of different species. It's a minefield – we could use a lot of time and levy payer funds going down a rabbit hole for different mixtures, which then react differently to location, soil type and rainfall.

"There's already a plethora of complementary research projects, such as AHDB's GREAT Soils and other cover crop research that will help users of RB209 towards best applications," he says.

Ultimately, AHDB provides independently funded research in RB209 for levy payers and trained advisers to use but can't give a prescriptive recommendation 50 MB209 Nutrient Management Guide (RB209) Section 1 Principles of nutrient management and fertiliser use Listered area 2020

Last year, AHDB celebrated 50 years of RB209.

for every farmer, he stresses. "It'll always require some interpretation from agronomists or FACTS-trained advisers."

Understanding the perspective of those key users of RB209 in more detail have also been sought in more detailed stakeholder consultations with around 50 organisations in the past couple of months, says Amanda.

### **Qualitative research**

"These were one-to-one interviews with more probing questions about RB209. The first 35 were focused on farmers, agronomists and FACTS trainers – people who use RB209 – plus other organisations that have different perspectives around the guide," she adds.

"The last 15 or so were focused on our non-levy crops including potatoes and horticulture, but also BBRO for sugar beet and PGRO for pulses, who we already work with."

One area AHDB is keen to strengthen in the future is farmers' understanding of when they're using information from RB209, following feedback during the 'Shape the Future' levy engagement process about a lack of brand recognition.

For RB209, that can be as simple as not recognising that a FACTS-qualified adviser helping a grower with a recommendation is often using RB209 as an information source or that a third party's nutrient management planning software often has an API link to pull information from the digital version of the guide.

"We have to make sure those APIs recognise our brand as much as possible," stresses Dave. "Historically, AHDB was less concerned about recognition as long as the information gets to the grower and benefits the levy payer. But we have to make sure levy payers know the information they're utilising is funded by their levy."

As a result, AHDB is pushing commercial third parties to incorporate phrasing such as "Powered by AHDB" into their products, adds Amanda. "The review is now looking at the licence agreements we have for the API and renewing those with terms which include a requirement for AHDB branding as part of the agreement."

Ultimately, that'll help AHDB to demonstrate when information is being used that's been generated by levy payer funds, and also help prevent levy payers from being double charged to access the same information, concludes Dave.

### **Research roundup**

From Theory to Field is part of AHDB's delivery of knowledge exchange on grower-funded research projects. *CPM* would like to thank AHDB for its support and in providing privileged access to staff and others involved in helping to put these articles together.

For more detail about this project, visit ahdb.org.uk/rb209





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**66** Residual chemistry interacts with the environment, and the environment plays a considerable part in its performance.**99** 

### Residual herbicides

Solubility, adsorption, mobility and persistency – considering herbicide properties is all part and parcel of informed decision making, but how do current options stack up? *CPM* goes back to basics with residual herbicides. *By Janine Adamson* 

As growers face increasing pressure from resistant grassweed strains, coupled with a lack of contact herbicide options, ensuring residual chemistry hits the spot is critical in maximising the establishment potential of cereal crops.

But with a raft of properties to consider – from persistency to mobility – plus ever unpredictable weather conditions, is there an easy formula to follow to help growers with product

# From the ground up

choice depending on the season?

Some might say so, although according to BASF's cereal herbicide & PGR technical lead, Stuart Kevis, it's rarely black and white when it comes to interactions with the environment.

"Residual chemistry interacts with the environment, and the environment plays a considerable part in its performance – both efficacy and selectivity – it becomes much more complex than if you were talking about a contact-acting herbicide or perhaps a fungicide where it's about hitting the leaf of the plant."

### Soil coverage

"Whereas for residual chemistry, soil coverage is the target. Equally, no treatment for blackgrass control in winter wheat should be applied as a single active – they're used in combination. So as that mix hits the ground, each active ingredient's individual soil properties all start coming into account," he explains.

"Some have different solubility, mobility, adsorption or persistence, and they all then act independently of each other."

According to Stuart, two properties which are worth paying particular attention

to are how persistent a product is (soil degradation) and how well it binds to soil particles, known as adsorption.

Soil degradation is evaluated using a DT50 value – also known as 'halflife' – which is the time required for a chemical to decline to 50% of the amount at application. Critically, because



According to BASF's Stuart Kevis, two properties worth paying particular attention to are how persistent a product is and how well it binds to soil particles.

### **Residual herbicides**

environmental conditions have an impact on this number, Stuart says this is why the figure should be presented as a range.

"With persistency or soil degradation, it's not a linear line of decline and depends on the soil conditions and moisture as well as how each active is degraded. Many of the residual herbicide actives are broken down by microbial activity and so in general, provided there's sufficient soil moisture, the warmer it is, the shorter the persistency; the cooler it is, the longer a product lasts.

"This means it depends on when a farmer actually applies a herbicide and what the environmental conditions are at that time, as to how persistent it will be."

Considering current options on the market, prosulfocarb has one of the shortest half-lives with a DT50 value of 6.5-13 days making it non-persistent, whereas at the opposite end of the spectrum are tri-allate (8-205 days) and diflufenican (44.3-248.5 days).

"Two key grassweed actives for soil residual chemistry – Luximo (cinmethylin) and flufenacet – are actually very similar in terms of their moderate persistency," adds Stuart. "But it's important to remember that persistency only really matters if a product



With residual chemistry, soil coverage is the target rather than a plant leaf.

is effective at killing the target weed. "So although some products are persistent, they aren't out and out grassweed killers and should be used alongside other active ingredients. This is because of the relatively low inherent activity they exhibit which means even though they might last in the soil for longer,

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### **Residual herbicides**

they aren't strong enough to provide a high level of control. That said, they do contribute to broadleaf weed control at relatively low doses," he explains.

Moving to adsorption, this is an active's ability to bind to soil particle surfaces, particularly clay fractions. This is important because residual herbicides are applied to the soil and then taken up by the weed from the soil moisture.

And how this works is, water is held within the crumb structure of the soil. Following application, the herbicide is held on the soil by its clay content, after which it's gradually released into the soil water where it's taken up by the germinating weed. This also makes soil type and condition significant contributory factors to the efficacy of soil-applied residual herbicides.

"There's a wide range in the ability of herbicide actives to bind to soil. You have products which aren't good binders like flufenacet through to those which have strong adsorption characteristics such as pendimethalin and picolinafen, with the rest somewhere in between. On top of this you also have mobility (how the active moves through the soil profile), which adds another complicating factor to the way in which actives behave," says Stuart.

"Products which don't bind as strongly have the potential to move through the soil profile more freely, particularly if there's high levels of soil moisture. Solubility also plays a role – the greater the solubility, the more the active dissolves into the soil pore water," he explains.

Stuart says this idea is used to consider



Herbicides are more effective when there's soil moisture because this is when grassweeds are actively growing.

which products might work better in drier conditions, because they require less available soil moisture to get to the target zone. "Although that's not always true, due to all of the other properties which should also be considered."

As a result, he says it's how the four main properties of residual herbicides work together (persistency, adsorption, solubility and mobility) as a collective, plus overall efficacy, which results in the final grassweed control level.

"Let's take cinmethylin, which sits in a more moderate position in regard to persistency, yet we know that it's highly effective against grassweeds. On the whole it's similar to flufenacet in terms of solubility and persistency, but it binds to soil much more strongly which reduces its mobility within the soil, keeping it in the weed root zone," highlights Stuart.

### **Unique MOA**

Re-focusing on why some herbicides perform better in drier conditions, Bayer's Chris Parsons points out that because aclonifen – which has a unique mode of action – performs differently to most other soil residual options, it could be perceived to be moisture independent.

### Gaseous vapour

Also standing out from the way in which most soil residual herbicides work, is tri-allate (as in Avadex Excel and Avadex Factor).

Once applied to the soil surface, the active ingredient becomes a heavy gaseous vapour which then fills the pore spaces in the soil, rather than being released into the soil pore water itself.

This characteristic allows tri-allate to remain below the soil surface, explains Gowan's Dr Will Smith. "Furthermore, the quantity of moisture required to 'activate' tri-allate to become its gaseous state is far lower than what's required for the equivalent process in most other residual herbicides.

"Combined with its extended halflife, this means the active can remain available until weeds begin to emerge for long-lasting control," he says.

Will acknowledges that Avadex shouldn't be used in isolation, instead offering an effective base to build programmes on. "It also helps to add robustness and resilience, particularly across changeable environments."

He adds that this is important while the industry lacks one single product which can provide sufficient control. "We have to utilise the diversity available which can support performance across a range of conditions.

"This includes the soil, which can be highly variable across a field with pH, organic matter content and even soil texture all contributing factors to the interaction of, and hence performance of, residual herbicides," concludes Will.



The quantity of moisture required to 'activate' tri-allate to become its gaseous state is far lower than what's required for the equivalent process in most other residual herbicides, says Gowan's Dr Will Smith.

### **Residual herbicides**



Bayer's Chris Parsons says because aclonifen performs differently to most other soil residual options, it could be perceived to be moisture independent.

"Rather than working within the root zone of a weed, aclonifen remains on the soil surface by clinging to the soil organic carbon. This means uptake is through weed shoots rather than roots," he explains.

However, this increases the importance of precise application. "Soil coverage has to be right - whether that's through using the correct nozzles and water volumes or only spraying in optimum environmental conditions. Cloddy seedbeds also don't suit actives like aclonifen or diflufenican.

"But with the right coverage, aclonifen creates a layer on the soil surface which the weed seed then comes into contact with as it emerges. As long as the weed germinates, the product has activity," continues Chris.

"Alconifen also has the added bonus of persistency in the autumn, meaning it captures the protracted germination of weeds such as ryegrass. For those who've opted for earlier drilling, this is an added benefit," he suggests.

With so much to consider, this all makes for a complex picture, says Stuart. "It's very difficult to attribute a single thing to why residual herbicides may or may not work in certain conditions. Furthermore, let's not forget the role of UV light breakdown which again won't help certain products to perform in drier situations, which is often when there's more sunlight.

"The main rule of thumb for all soil residual chemistry, is that they prefer a level of moisture to work at their best. There's obviously a sweet spot - avoiding

the deluge we had last autumn - but herbicides will be more effective when there is moisture because this is when grassweeds are actively growing.

"When weeds are growing, they're sucking up the moisture from the soil pore water, which is where the chemistry for most of the residual options should eventually be providing there's enough solubility," he explains.

### Pre-em timina

According to Stuart, as well as ensuring good seedbed conditions, timing is also a critical part of the weed control puzzle. "You want to make sure you hit blackgrass in its pre-emergence phase because killing it before it gets out the ground is the best thing to do and when residual products are at their most efficacious.

"This means using a holding spray and waiting to use your best chemistry until the blackgrass emerges, could be a risky strategy, particularly if the weather turns." he stresses.

According to Chris, there could be value in devising a grassweed programme which features actives with different physicochemical properties. "Having diversity of chemistry within the programme is a good way to mitigate the risk of poor efficacy from extreme weather, whether that's within the season or across the wider cropping rotation.

"It's also important to recognise products which form the backbone of grassweed control, such as flufenacet. Although there are doubts about its future, it's still available and continues to do much of the leg work," he concludes. ■

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66 It's probably more of a problem than blackgrass now in terms of its difficulty as a weed because it continues to flush. 99

### Pushing Performance

With ryegrass becoming an increasing problem on arable farms, *CPM* learns how one farmer is using a multitude of tools to tackle resistant species.

By Charlotte Cunningham

#### Although blackgrass has dominated grassweed conversations during recent years, the tides are slowly turning and now it appears that for some growers, ryegrass is causing more of a stir.

Among those growers is William Hazell, who inherited a ryegrass problem when he took on a 360ha farm in Oxfordshire four years ago. "When we arrived on farm, there was an area which had been in a Countryside Stewardship agreement, but when I took it on the timings were wrong to put in an application to continue with it, so we decided to crop it instead."

Following suit with what the previous tenant had done, William decided to top what was already there and direct drill a cereal crop – which is when the weed challenge was unveiled. "Every coulter where the drill had gone along just flushed with ryegrass."

### **Tackling resistant ryegrass**

To tackle this, William went in heavy with contact herbicides. However, after minimal effect on the weeds, suspicions were raised that there could be a resistance issue at play – so he worked closely with his Agrii agronomist, Peter Carr, to get a better handle of the status on farm. "Having tried a few different herbicides and not seen any results, we came to the conclusion that it was likely to be resistant," explains Peter. "Further testing confirmed that the ryegrass was indeed RRR resistant – the contact herbicides weren't even yellowing the ryegrass."

### **Protracted germination**

While this can be incredibly challenging for the individual farm, Peter says it's becoming more and more commonplace across the UK. "Ryegrass is probably more of a problem than blackgrass now in terms of its difficulty as a weed because it continues to flush. With blackgrass, with the right cultural control, once you've shut the door on that initial germination, it's just bad luck to get subsequent flushes if you've stacked the herbicide correctly and crop competition takes over in the spring. But ryegrass quite prolifically keeps going; it's also more competitive."

This discovery led to an overhaul of the farm management, deploying every cultural control in the toolbox. "This included everything from stale seedbeds, very competitive varieties and delaying drilling right until the third week of October," continues Peter. "Luckily, the medium-bodied soils on farm allow this.

"We've also looked at the rotation and have now introduced some forage maize, which hadn't been grown on the farm before. The thinking behind this was that the crop would bring in a new active ingredient, as well as a later-drilled spring crop to allow more flushes prior to drilling."



Agrii agronomist Peter Carr says ryegrass is probably more of a problem than blackgrass now in terms of its difficulty as a weed because it continues to flush.

### **Pushing Performance**

### **Testing for resistance**

The only way to get a handle on any potential resistance issues is to test and confirm exactly what is present on farm. But when is the best time to test?

According to ADAS, if there has been a gradual decline in weed control, this may indicate herbicide resistance. "You may also notice that one weed type seems increasingly hard to control while others remain wellcontrolled," explains ADAS' Katy Hebditch. "Herbicide resistant weeds tend to occur in species-specific patches, so healthy weed patches may be found beside dead weeds of the same species. A more uniform failure

### **Resistance ratings**

RRR – Resistance confirmed, highly likely to reduce herbicide performance
 RR – Resistance confirmed, probably

reducing herbicide performance

■ **R?** – Early indications that resistance may be developing, possibly reducing herbicide performance

**S** – Susceptible

Cultivation-wise, while the plough has been used to 'hit the reset button', William sticks predominantly to minimumtillage to avoid disturbing the soils. "We want to get to a point where we're completely direct drilling, but we require the ground to be in best shape first in order to make sure it's a success.

"We generally bale the straw behind the combine and the cultivator follows the last straw trailer out of the field. It's then left to flush for a minimum of six weeks."

In terms of chemistry, the approach has been based on big stacks of residual herbicides and mixing different modes of action, explains Peter. "We're using a mixture of cinmethylin, aclonifen, pendimethalin, diflufenican, metribuzin, picolinafen and flufenacet, and typically spread these across pre-emergence and peri-emergence applications, as well as a top up in the late winter – end of January/early February time – to control the spring flush."

To avoid further resistance issues, a traffic light system is in place, with a reduced programme applied to the 'green' cleaner fields. "The red fields get the full treatment as we're really trying to give them the best chance."

With so much riding on the residual

across the whole field, across multiple species, would tend to point more towards application issues. However, if herbicide failure becomes a recurring pattern, it's important to then test for resistance.

"Ideally, fields should be tested every three years to coincide with a typical three-year rotation. Understanding the resistance profile of the grass weed population in the field will help to optimise control measures."

There are, of course, certain risk factors which could increase the likelihood of a resistance issue, says Katy. These include; repetitive application of herbicides with the same mode of action, particularly high risk groups such as the ALS inhibitors (HRAC Group 2), multiple herbicide applications during the same growing season, a lack of nonchemical management, a lack of crop rotation and reduced or less effective dose rates of herbicide applied.

ADAS provides both standard and bespoke grassweed herbicide testing for blackgrass, ryegrass, wild oats and brome – with a standard test costing £240 and giving results to three herbicide actives. "Your results will

programme, William says he has leant on the benefits of a specialist activator adjuvant to keep chemistry where it's required and further assist with the ryegrass battle.

### **Maximising coverage**

Backrow Max by Interagro, is specifically designed to push the performance of residual herbicides, particularly under suboptimal weather conditions. "It does this in a number of ways," says Stuart Sutherland, technical manager at Interagro. "Firstly, it reduces drift to maximise coverage which is achieved by the product's ability to reduce the



Fields should be tested every three years to coincide with a typical rotation, says ADAS' Katy Hebditch.

come with a guidance document which will explain what tests were done and our interpretation of the results. For grass weeds, we will also calculate a resistance rating for your sample/s using the UK resistance-rating 'R' rating system.

"We know that ryegrass is becoming an increasing challenge on arable farms. In 2023 it was the first time we received as many ryegrass as blackgrass samples in our testing programme, so acting as soon as you have suspicions can really help nip any issues in the bud at a potentially much less severe stage."

number of droplets to below 100 microns, as these are the ones prone to drift.

"It also reduces the number of very coarse droplets prone to bounce, creating a more optimal droplet size for pre-emergence application and even distribution across the soil target. This improvement in coverage maximises the number of weeds coming into contact with the herbicide at germination, leading to an increase in the number of weeds controlled."

As well as this, Backrow Max helps retain chemistry in that all-important kill zone, he continues. "Adding it to the mix enables herbicide and moisture retention

### **Ryegrass resistance stats**

- An increasing threat throughout the UK
- Resistance first found in 1990
- More than 475 cases confirmed, across 33 counties
- Non-target site resistance most common
- Target site resistance to 'fops', 'dims' and 'dens' occurs, but less commonly than in blackgrass
- Target site resistance to ALS inhibitors (confirmed in 2012)
- 2019 survey of resistance status suggested resistance is continuing to increase
- 2021 survey found evidence of increasing control issues, with problematic hotspots widespread across the UK

Source: AHDB

### **Pushing Performance**



By deploying a range of techniques, Oxfordshire farmer William Hazell has improved the ryegrass burden on farm.

in the top 5cm of the soil to be maximised. This can increase the longevity of weed control by up to eight weeks - boosting herbicide performance in a dry spell or when conditions turn wet. By retaining more of the herbicide in the top 5cm of the soil for longer, away from the root zone of the crop, Backrow Max also has benefits from a crop safety perspective too and helps to prevent the leaching of the herbicides and subsequent crop protection inputs to groundwater. All residual herbicides move in soil, the trick is to keep them concentrated in that weed germination zone for as long as possible to control weed flushes."

Peter says it's an integral part of the programme now. "I deploy a data-driven approach to agronomy, and everything in that programme – including the Backrow Max – has proven its place and value."

William adds: "I think it does an amazing job. The amount of time the chemistry seems to keep working when we've included it is phenomenal really – I'm talking about still seeing effects during Christmas time. I'm not a scientist, but it really seems to aid the longevity and effectiveness of our programme."

### **Retention data**

Looking at just some of the wealth of data behind Backrow Max, Peter specifically points out a trial undertaken at the Institute of Soil Science and Plant Cultivation in Wroclaw, which proved that the retention of Luximo (cinmethylin) is enhanced in wet conditions when paired with Backrow Max.

Soil cores were taken from an arable field in Wroclaw and treated with Luximo

### Institute of Soil Science and Plant Cultivation study, 2023

Treatment	Herbicide residues (mg)		
	0-5cm soil layer	5-10cm soil layer	10-20cm soil layer
Luximo	0.103ª	0.019 <sup>b</sup>	0.003
Luximo+ Backrow Max	0.110 <sup>b</sup>	0.015ª	ND
LSD <sub>0.05</sub>	0.0036	0.0021	-

ND - no residues detected (<0.001mg/kg)

a,b - values marked with the same letter don't differ statistically



The farm has a severe RRR-resistant ryegrass issue, illustrated here in a crop of wheat.

alone and Luximo with Backrow Max, before simulating a heavy rain event and comparing the differences. The results (see table) showed that Luximo is retained well in the weed zone, but it can be further enhanced with Backrow Max, giving you more bang for your buck. "We know Luximo is one of the products which works on William's ryegrass, so by adding Backrow Max to the mix we're able to push that performance just a little bit further," says Peter.

### 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. and war on ryegrass have not been in vain, and now they're achieving some fairly good levels of control, he adds. This year, William says they'll continue

Looking forward, the duo's efforts

to experiment with all the controls available to improve both the control of ryegrass populations and fine-tune the best strategy possible. "We've made a significant improvement to control – we're not there yet, but we're definitely on the right track," he concludes. ■

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66 This year we're telling all of our clients to just be patient. 99

### **Fit for the Future**

In a year where the general trends are pointing towards earlier drilling, experts say there are many benefits of the later slot which shouldn't be overlooked. *CPM* finds out more.

By Charlotte Cunningham

There's an old adage in agriculture which says you shouldn't farm for the previous year. While this makes sense on paper, the scars of the washout 2023 drilling campaign run deep for many and as such, have made plans for decidedly earlier drilling this year.

Of course, this is in stark contrast to the general shift in direction during the past few years, with many seeking those later sown advantages – namely, weed control – and these are benefits which shouldn't be forgotten despite the challenges of last season, says KWS' Olivia Bacon.

"Late-drilled winter wheat has a lot going for it from both agronomic and economic viewpoints, and the development of varieties that can produce almost all of their genetic yield potential when drilled as late as February makes the case very compelling."

Although growers are no doubt eager to get seed in the ground to avoid the

same fate as last season, Ceres Rural's Beth Ashley stresses the importance of them holding their nerve. "This year we're telling all of our clients to just be patient, but understandably after last autumn, many have been keen to get going so they're not in the same situation again."

One of the biggest benefits of delayed drilling is grassweed control – particularly blackgrass, says Beth. "Stats indicate that 70% of blackgrass populations emerge mid-September to mid-October. From the 20 October onwards this reduces to 30%, so if you can delay drilling – particularly in high weed pressure areas or a second wheat situation – then it will hugely help with overall control."

### **Minimising BYDV risk**

There are also disease control advantages, she continues. "Especially barley yellow dwarf virus (BYDV), there's a reduced risk the further into October you drill, as it takes much longer for the 170-degree days to be reached."

Septoria can also be mitigated by drilling later, she adds. "With earlier drilled wheat there's a higher septoria risk in the spring which will then also increase costs during this period due to fungicide requirements."

But should Mother Nature be unkind once again this autumn, how late is too late? Olivia advises that if growers haven't managed to drill prior to Christmas, it may be more economically viable to switch to spring wheat varieties. "But the ongoing shortage of wheat will continue to keep domestic prices firm, whereas an oversupply of spring barley could easily reduce prices and make it very much a buyers' market.

"With wheat, producers can load the dice even more in their favour by growing a 'dynamic' variety which, as well as producing high yields, will allow them to take advantage of added value markets which again are likely to be under-supplied."

To get the best from later drilled crops, there are a few key management considerations to take on board, says



Stats indicate that 70% of blackgrass populations emerge mid-September to mid-October and from the 20 October onwards this reduces to 30%, explains Ceres Rural's Beth Ashley.

### **Fit for the Future**



Late-drilled winter wheat has a lot going for it from both agronomic and economic viewpoints, says KWS' Olivia Bacon.

Beth. "Seedbed conditions are so important especially for herbicide efficacy. Residual herbicides require moisture and with the rainfall in September largely being quite sporadic and localised, it'll be vital to ensure there's enough moisture prior to drilling.

"Structurally, ensuring a nice fine seedbed also helps. On heavier soils, blackgrass prefers the wetter areas, so consider drilling those last."

Olivia adds: "Late drilled wheat can recover amazingly well but the seedbed quality still has to be fairly decent. Nothing lacks competition against blackgrass more than late, slow thin wheat."

Beth says something she's advising her



Dawsum maintains its yield regardless of drilling slot, averaging 106% when drilled early, 103% in the mainstream window and 103% when late sown.

clients is to operate a traffic light system when it comes to scheduling drilling. "Fields that are cleaner – green fields – are ones which should be drilled first, and then the red, worst affected fields are drilled last.

"When you delay drilling even further in the worst impacted fields you are able to create better stale seedbeds, encourage a chit and then spray it off, which will significantly impact control levels."

Once drilled, it's important to note that germination in particularly cold and wet soils will be slower and behind normal sowings with regard to tiller numbers and size, says Olivia. "We really have to kick these plants on as early as conditions allow, to get nutrition into the crop for more tillers to be formed and the existing ones to be strengthened. Fertiliser type and timing are critical to make sure availability is there early in the spring.

"Septoria should be less of an issue as the disease has less time to develop but growers should keep an eye out for any early rusts or mildew developing," she points out.

But regardless of whether you choose to drill early or late, it's vital to consider the key agronomic characteristics required for a variety to be suitable for either slot, notes Olivia. "Understanding the best wheat varieties for your preferred drilling window will help you to maximise your potential." Looking at the offerings from KWS that

### Learnings from Stow Longa

With Agrii's Rotations trial site at Stow Longa now in its tenth year, John Miles says it continues to deliver helpful learning opportunities for best practice – particularly with regard to weed control. "Last year we had quite high levels of blackgrass – 300 heads/m2 in the worst-case scenarios and down to 50-0 in the best areas," he explains.

"At Stow Longa we know that typically 100 ears of blackgrass equals 1t/ha yield loss – so controlling the weeds as best we can is really important."

In terms of how this is done, delaying drilling – and creating space for stale seedbeds – is vital. "Wheat is a very expensive crop to grow in a good year, but if you allow poor weed control to reduce yield then it becomes a very expensive loss-making crop very quickly.

"The key drivers of the continued success of the ploughed area are weed control and consistent crop establishment," explains John. "The ground is ploughed and pressed after harvest and left. The next thing that goes through is a drill – which is more than likely a very low disturbance disc drill.

"What we're doing in that situation is making our seedbed, leaving it to green up and then literally slotting some seed into it."

According to John, in autumn 2023 there were problems with the continual ploughing. "It didn't plough very nicely and wasn't very level – so we had to put a power harrow through and in some of the winter wheat blocks you could see more blackgrass where there had been an extra pass.

"The minute you disturb the soil, you get another flush, so if you can, set the field up early and then go in – with minimal disturbance – to try and stitch the seed in," he says. Careful management and leaving that ground to green up as much as possible prior to drilling is going to be even more important this year with high blackgrass dormancy predicted, he warns. "If there are high levels of blackgrass dormancy, good seedbeds are going to be vital because we'll be asking a lot from herbicides. We're not likely to get a huge flush prior to drilling – but we will get some. We are currently five weeks from cultivation to signs of blackgrass emergence. Stow lessons suggest six weeks is the minimum gap from cultivation to drilling.

"That said, we have to recognise that there's likely to be a knee-jerk reaction to last year and growers will want to get on earlier than usual. However, Stow has definitely taught us to start our preparations early and not fiddle around with the ground prior to drilling to achieve the best possible control."

### **Fit for the Future**



Lessons from Stow Longa have highlighted the importance of delaying drilling – and creating space for stale seedbeds – is vital, says Agrii's John Miles.



Group 4 Cranium has been around for several years, and it's really found favour as a late sown specialist variety.

do particularly well in that later slot, Olivia says KWS Cranium continues to excel. "Group 4 Cranium has been around for several years, and it's really found favour as a late sown specialist variety."

This comes largely down to its yield when later sown (after 1 November) which tops the charts at 104%. This is in addition to a robust disease package and a vigorous plant type. This vigour is particularly beneficial for those who direct drill, she adds.

"In trials which compare conventionally drilled and direct drilled wheat, Cranium showed the least amount of difference in yield – so that's another little niche which may be attractive to growers looking to minimise their all-round risk."

### **Flexibility**

For those looking for something with ultimate flexibility when it comes to drilling date, KWS Dawsum is likely to tick a lot of boxes, she continues. "Dawsum maintains its yield regardless of drilling slot, averaging 106% when drilled early, 103% in the mainstream window and 103% when late sown.

"Like Cranium, Dawsum also boasts a strong disease package and high untreated yields – alongside excellent grain quality and high specific weight – rightly earning it the nickname 'Awesome Dawsum'."

In Suffolk, Dawsum's performance in its inaugural year on farm has more than impressed Michael Craske of H. H. Craske and Son – so much so that the family have increased its sowing area by a third, a total of 100ha, this autumn.

"This was our first season with Dawsum; the previous year we didn't even consider

it," he explains. "On reflection, that was a mistake as its strong agronomic performance, high specific weight and yield make it an excellent choice."

The variety was drilled as a first wheat following beans at the end of September through an 8m Vaderstad Rapid drill pulled by a Caterpillar 845, on land which had been min-tilled using discs and a Kongskilde Vibro Flex heavy duty stubble cultivator, recalls Michael.

"It was also drilled as a second wheat at two different timings, into ploughed land during mid-October and at the end of November on land that was ploughed and then immediately followed with a 4m KRM combination drill."

Tracking the journey of Dawsum on farm throughout the season, Michael says he was impressed from the get-go with the variety standing up well against disease. "The cold, wet weather during the season meant septoria was an issue across all varieties. However, the disease pressure on Dawsum was less than for some others because of its excellent yellow rust and brown rust resistance.

"The variety tillered strongly and covered the ground well, helping to suppress grassweeds. In early spring it seemed to hold back slightly then developed well, but without becoming too lush."

Despite an incredibly challenging year – one which saw 120mm of rain in a month – Dawsum delivered at harvest, too, says Michael. "We combined our 120ha of oilseed rape at the end of July and started the winter wheats on 5 August. Dawsum was harvested in mid-August.

"Most of it was grown as a first wheat and yielded 9t/ha, but even in the second wheat

slot it averaged 8.5t/ha with a specific weight of 79kg/hl. Overall, yields were slightly down on our long-term average but amazing considering the challenging weather for so much of the season." ■

### Fit for the Future

In this series of articles, *CPM* has teamed up for the seventh year with KWS to explore how the cereals market may evolve, and profile growers set to deliver ongoing profitability. The aim is to focus on the unique factors affecting variety performance, to optimise this and maximise return on investment.

It highlights the value plant genetics can now play in variety selection as many factors are heavily influenced and even fixed by variety choice.

KWS is a leading breeder of cereals, oilseeds, sugar beet and maize. As a familyowned business, it's truly independent and entirely focussed on promoting success through the continual improvement of varieties with higher yields, strong disease and pest resistance, and excellent grain quality. KWS is as committed to your future just as much as you are.



66 With careful management, you can achieve some really great results. 99

### Grazing arable crops Flocks of benefits

The reversion back to more traditional methods of farming during recent years has seen livestock find favour on arable farms again. *CPM* speaks to one grower who's ahead of the curve.

By Charlotte Cunningham

Farming 1200ha on the edge of Exmoor, the Speed family are located in prime sheep territory. But for Andrew Speed, the 1500-head flock are more than just a commodity, and in fact, have become a core part of the integrated management strategy for the farm's arable enterprise.

Briddicott Farm is a tenanted holding, operating as a mixed beef, sheep and arable farm, across a landscape which ranges from sea level right up to 1200ft moorland – farmed by Andrew, his wife Tracey, and their son, Robert.

Looking at the enterprises individually, the sheep flock is made up of predominantly Polled Dorset-cross breeding ewes, crossed back to either Polled Dorset or Charolais. Rather uniquely, the ewes lamb every eight months – three times over the span of two years – in January, September and finally the following May.

"We keep lambing to a four-week period using teaser rams to keep

everything tight," explains Andrew. "They have to be efficient."

The flock sits alongside a 195-head suckler herd, which graze the heathland in the summer months. Whereas arablewise, the rotation typically includes winter wheat, winter barley, oilseed rape, spring oats and spring beans, as well as some maize and lucerne for feed.

"We started grazing our crops about 25 years ago but it went out of fashion. We weren't growing as much cereals and we started milking the sheep, so it sort of fell by the wayside," explains Andrew.

### **Livestock revival**

However, following a difficult time with a crop of OSR, Andrew made the decision to venture back into grazing five years ago – working alongside his ProCam agronomist, Emma Dennis, to ensure the management was optimum for both the crops and the flock.

"It was about January time and we realised we had a bad problem with cabbage stem flea beetle," says Andrew. "It was a lovely crop, but it was absolutely plastered in them.

"I asked Emma what our options were, and decided we'd try putting the sheep in. We grazed it right down to nothing and it bounced back and produced 5t/ha that year – that was a lightbulb moment for us which proved just how valuable grazing is in an arable system.

"We've been grazing the OSR ever since and had some really good results – our disease levels drop to zero after it's been grazed off, for example. It also encourages tillering and better canopy height. We now graze the wheat and barley too."

Emma adds: "By complete removal of the foliage, we eradicated the stem larvae growth stage – with hope we'd have less pressure on the crop as it progressed through the season. We found that not only did we improve CSFB levels, but managing the crop canopy also helped with preventing lodging.

"We've seen the likes of ADAS carry out trials on defoliation, which have often resulted in a yield penalty. The advantage with grazing is that you get the benefit of the nutrient cycling too via the manure, which feeds into the crop."

As well as the reduction in disease burden – and subsequent lower input bill – Andrew reports yield potential and quality benefits where crops have been grazed. "The two main yield-



Getting grazing right is very much an art as much as a science, says ProCam's Emma Dennis.

### **Grazing arable crops**



Somerset farmer, Andrew Speed, (pictured here with son Robert) has seen great results from using sheep to graze down his cereals and OSR crops.

limiting factors in cereals are disease pressure and the risk of lodging, but grazing addresses both of those things via management of the canopy.

"Quality wise, we mainly try to grow milling wheats and by grazing them, we've found it really boosts the quality – increasing protein content by at least 1%. We've split the fields to trial it, and you can visibly always see a line in the field between the crops which have been grazed and those which haven't. The grazed crops are always the ones that go off and make milling specification, too."

### **Balancing act**

While Andrew has seen great success, he says ensuring the grazing of the crops is right requires careful management – and this is where he's leant on the support of Emma. "Getting grazing right is very much an art as much as a science," she says. "There's a balance between having to graze it enough, but also to ensure that soil structural damage



Despite being hit early on with cabbage stem flea beetle, Andrew's OSR made a full recovery after grazing the crop.

doesn't occur or trampling of the crop."

Emma says key factors to pay attention to are the number of stock and the relevant field size, the growth stage of the crop and the timing of putting the sheep on. "Something we now ensure is that sheep don't go on until the collar diameter – the top of the root – is at least 10mm. In my mind, this ensures there's enough root reserve to come back to life after it's been grazed.

"It's also only advisable in wellestablished crops to ensure they don't become compromised by the sheep."

Andrew adds that grazing crops tight enough is also fundamental to success. "Our target is to get the sheep in and out of a field within seven days to ensure they're not grazing the regrowth. That said, making sure they've grazed it down enough is also just as important.

"Light grazing does more harm than good and means the sheep aren't eating the leaves at the bottom which is the reservoir for disease. You have to get



Following success in OSR, Andrew is now grazing his winter wheats, which he believes has boosted quality.

all those bottom leaves either eaten or trampled in to see results. So many people try it, but only graze it lightly, which is why they don't see a response."

Emma says it's about being brave. "You have to keep them on to quite an extreme point of grazing, but also take them off in a timely manner which is why I say it's an art as much as a science.

"However, by being consistent with this, we've found that sheep are now grazing more evenly, which is helping overall production. The sheep have now become more accustomed to the grazing and as a result, are creating a lot less issues with the soils."

What's more, being able to move the sheep into clean, fresh grazing has benefits for livestock health – namely, reducing the risk of worm burdens and other pasture-related diseases, she adds. "We're lucky in the South West that our fields are quite small which makes the management of grazing arable crops much easier, as fields don't necessarily have to be sub-divided and we can move the animals around quite quickly."

This year, wheat was drilled in mid-September – earlier than usual – and will be grazed in November. OSR will be pre-Christmas and the remaining cereals post-Christmas, although this may move to December too depending on canopy height, suggests Andrew.

"We've proven it works, and it's something we'll continue to do – it's been a real lightbulb moment for making the two enterprises work together. With careful management, you can achieve some really great results," he concludes. ■

### Wholecrop

protect and enhance the environment, and adapt to ever changing demands from market and supply chains."

At its new, unsubsidised sites, Future Biogas plans to pay growers a fixed premium above the crop price for the adoption of sustainable farming practices for the duration of a feedstock agreement. "This will assist growers in their transition to more environmentally-sensitive farming and away from reliance on government subsidies," suggests Angela.

She adds that maize remains very popular as a feedstock for AD and is a viable break crop in arable rotations which provides shelter from the volatility of

commodity markets. "A lot of our farmers are looking to reduce their exposure to commodity markets to 50% or less and maize can really help.

"With nitrogen being one of the biggest emission factors on farm, being able to use digestate helps growers to reduce their reliance on artificial inputs, helping to lower their

emissions. There are also some good SFI options which can be stacked along with the crop payment including no insecticide (CIPM4) and winter cover following maize (SOH4)," adds Angela.

Rory Hannam, KWS UK technical manager for hybrid crops, says wholecrop cereals are a viable alternative option to maize and can provide significant agronomic,



Even if the UK expands at the lowest projected growth rate for the world as a whole, that'd mean an additional 500 AD plants in the country by 2030, says ADBA's Chris Huhne.

# The whole approach

### Wholecrop

While grain crops remain the backbone of UK arable production, wholecrop cereals can play a key role in rotations with rising demand underpinning a range of new marketing opportunities. *CPM* takes a look at the options.

> By Rob Jones and Janine Adamson

Statistics suggest that renewable gas could heat up to 15M homes in the UK each year by 2050, with energy crops providing around two thirds of the demand, according to Britain's largest gas distribution network, Cadent.

Furthermore, this rapid growth in biogas interest offers significant opportunities for UK farmers and growers, as well as promising major environmental gains for the country, it believes.

The global growth trajectory for the sector is between 8% and 22% a year, says Anaerobic Digestion and Bioresources Association (ADBA) chairman, Chris Huhne. "Which when translated into the UK situation, produces some startling figures.

"Even if we expand in the UK at the lowest projected growth rate of the International Energy Authority (IEA) for the world as a whole, that'd mean an additional 500 AD plants in the country by 2030," he points out.

"If we grow at the higher rate, we'd be looking at an extra 2000. But at the end of 2023, the UK had around 723 plants, so this is a substantive projected increase. Even on the lowest IEA predictions, the industry would overtake the nuclear sector in producing energy during the 2030s," explains Chris.

### Food vs fuel

Angela Battle, feedstock director for Future Biogas, believes food and energy production can exist comfortably side by side. "Biomethane produced via AD is a scalable solution to gas decarbonisation and growing crops for it can help farms to achieve a neutral or even negative carbon footprint, while also allowing for the adoption of wider cropping rotations.

"Gaps between energy and food crops can be filled with cover crops capable of holding plant nutrients, water and helping to build soil organic matter. Therefore, introducing AD and sustainable farming practices into an arable production system provides multiple opportunities to help build soil organic carbon and restore the soil-carbon sink potential for future generations," she continues.

According to Angela, growing bioenergy crops provides significant diversification opportunities for growers too, supporting them to make long-term changes. "The growth in AD not only provides an opportunity for change, it also supports the essential transition required to safeguard food production,

**66** Given hybrid rye's benefits, it's no surprise the UK area has increased. 99

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### Wholecrop



Future Biogas' Angela Battle believes food and energy production can exist comfortably side by side.

environmental and economic benefits.

"Most arable growers are aware of the benefits of growing maize in the rotation – there was a significant increase in the maize area in 2024 as growers struggled to get autumn cereals in and spring seed was in short supply.

"There's a growing market for grain maize, but a lot was grown as wholecrop and while some of this was traded from arable farm to dairy producer as animal feed this last year, the vast majority found its way into AD," he points out.

"Wholecrop maize has become pretty much the staple energy crop for AD in the UK, but there are good alternatives including hybrid rye and hybrid barley that, depending on individual farm circumstances, can fit into the rotation well and offer significant benefits beyond production."

Rory believes it's unlikely that farmers will grow a wholecrop cereal as a speculative crop. "You're either going to have identified a particular management or agronomic requirement for growing it, or, there's a sound economic proposition such as an AD plant nearby with significant demand.

"Equally, you're probably not going to grow wheat as a wholecrop when demand is so high for grain and if prices are strong. While it might be a fallback in a difficult blackgrass year, planning to grow wheat as wholecrop with all the upfront investment required isn't a sound strategy," he stresses.

But when it comes to wholecrop rye, there are solid reasons for growing it from an agronomic point of view, he says.

"Given hybrid rye's benefits, it's no surprise the UK area has increased from 25,000-35,000ha annually just four years ago, to around just under 50,000ha today. Approximately 50% of this is used for biomass to produce feedstock for AD plants.

"It's one of the most drought-tolerant crops available and is typically well suited to lighter, drier, drought-prone soils, particularly in areas of low rainfall, as well as being suited to heavier land with many farming businesses in that situation now considering the crop.

"In fact, some of the highest wholecrop yields tend to come from regions with higher rainfall and heavier soils," he notes.

Rory adds that growing rye for

wholecrop can be a useful option for grassweed management within an arable rotation given the crop's quick spring vigour, tall plant height and the fact it's usually harvested in June before blackgrass seed sets, helping to minimise weed seed return.

"Depending on the timing of harvest, this might also allow for a second energy crop to be grown such as energy beet or maize, or provide an early entry for oilseed rape. Another option might be to put in a cover crop which provides soil cover during winter, before a following spring crop.

"Another positive for the early harvest is that it tends to be drier in June helping to minimise potential compaction and soil erosion which can result from harvesting maize later in the autumn."

#### Watch-outs

While there are benefits to including wholecrop rye in the rotation, it's important to highlight a couple of 'watch outs', he says. "Whole-cropping rye removes potassium from the soil as the potassium isn't bled back into the profile as it would with a crop left to mature for grain harvest.

"Depending on the soil indices, potassium fertiliser may then have to be applied to bring the numbers back up to an appropriate level as to not have a negative effect on the following crop. Also, in some scenarios, the regrowth of cut rye can cause an allelopathic effect which may lead to issues in establishing the next crop," comments Rory.

Rye fits well with energy beet or maize in the rotation and can be utilised in biogas

### Variety selection

Variety choice is important for hybrid barley and a series of UK-based field trials suggest new KWS variety, Inys, offers promise, says the firm's Kate Cobbold.

"There's a definite yield advantage for Inys over the leading hybrids currently available in the UK with good yield stability plus thicker plant stands and deeper rooting – exactly what we were hoping to see.

"UK trials also indicate that lnys has a much more vigorous growth habit in the early stages of development with up to 40% greater ground cover," she adds.

Hybridisation is an equally important part of the equation when selecting rye varieties for wholecrop and biogas production, Rory Hannam adds.

"Currently in the UK, our varieties are

classed as dual purpose, in that they can be grown for grain or wholecrop. The ear contributes to roughly 50% of the final wholecrop yield, so by producing varieties with more grains per ear, we've been successful in improving yield since we hybridised the portfolio.

"Standout rye varieties include KWS Igor, KWS Serafino and KWS Tayo. In trials with Agrii, all three produced outstanding wholecrop yields with Igor and Serafino topping 50t/ha at 34% DM.

"Our breeders are also developing biomass-only varieties which will be particularly suited to wholecrop markets. This in an exciting development that growers and end users should look out for during the next few years," he concludes.



Trials indicate KWS Inys hybrid barley has a vigorous growth habit in its early stages of development with up to 40% greater ground cover.



KWS' Rory Hannam believes it's unlikely farmers will grow a wholecrop cereal as a speculative crop.

plants to balance the high productivity of energy beet or maize substrates – providing an alternative nutrient source for the bacteria and stabilising gas output, he adds.

"Used alongside maize, rye has a synergistic effect by improving the gas yield, as it increases the length of time for the maize to produce methane in the digester.

"By mixing 25% hybrid rye with 75% maize, plant managers can increase gas output by nearly 15% more than from maize used alone. However, combined gas yield declines when the proportion of rye used rises above this level."

### **Top gas yields**

Rory says harvesting when the crop is at 30-35% dry matter produces the best gas yields and reduces costs compared with rye produced for grain. "Depending on the season, you may be able to save on using a late-season PGR and a T3 fungicide application."

Apart from that, growing hybrid rye as wholecrop is very similar as growing for grain, he notes. "Rye has a lower nitrogen requirement compared with other cereal species, with the total nitrogen requirement ranging from 100 to 150kgN/ha.

"This is usually split across two timings, with 40-50kg applied during tillering in late February/early March and the rest once stem extension has started a month or so later."

In terms of disease threats, Rory highlights brown rust as the main concern for UK rye crops, whereas mildew can reduce yield if left untreated. "In general, most rye crops being grown for wholecrop may only require two fungicide applications. A T3 will only be financially viable in a high brown rust year as the crop is harvested at the milky ripe stage and not taken for grain," he says.

According to KWS UK hybrid crops product manager, Kate Cobbold, hybrid barley grown as wholecrop offers a similar opportunity to rye. "Hybrids generally have greater vigour than conventionally-bred varieties and this results in the highest biomass which then provides the best gas yields.

"If weed control is a higher priority, hybrid barley offers some specific advantages over hybrid rye. As farmers increasingly battle with blackgrass, hybrid barley can help reduce grassweed pressure considerably."

This is because hybrid barley has a bigger root system than conventional barley, so can compete with grassweeds below ground, she says. "It gets going very early in the spring which allows it to better compete with grassweeds above ground.

"While both hybrid rye and barley are competitive in the early stages, as hybrid rye grows, it develops a more open canopy so isn't as good as hybrid barley at suppressing grassweeds in spring.

"Hybrid barley is much better in this respect with more compact tillering and a dense crop canopy. Equally, because hybrid rye is better suited to earlier drilling than



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Hybrids generally have greater vigour than conventionally-bred varieties which results in high biomass and therefore the best gas yields, says KWS' Kate Cobbold.

hybrid barley, it potentially gives less time to create a stale seed bed for weed control."

Kate says the other advantage of hybrid barley is that if market conditions change and the value of grain barley becomes more attractive, there could be more opportunities for marketing barley than rye. "Demand for rye for use in feed for pigs and poultry is growing and there's a much healthier grain market than a few years ago, but barley is established in demand and has a much greater infrastructure built around it," she concludes. ■

### Making more of mustard

Understanding which regenerative agriculture practices can be applied to growing mustard is the aim of a 4-year research project funded by Unilever to support production of Colman's Mustard.

The work, which is led by PhD student Charlotte Robb at Rothamsted Research, is collaborating with the English Mustard Growers (EMG) group to evaluate actions such as intercropping and wildflower margins.

The goal is to improve pest management, facilitate a reduction in insecticide use while increasing biodiversity, says Charlotte. "We want to understand which specific tools can support growers to utilise the benefits of regenerative agriculture."

For the work, commercial field-scale experiments will be supplemented by controlled field plot trials at the Rothamsted Research farm and in controlledenvironment field simulators.

But in the first instance, it's ascertaining where growers are in terms of sustainable practice, says project supervisor, Dr Sam Cook. "Hopefully we can optimise the techniques already being used while potentially encouraging the adoption of further actions.

"It's about comparing approaches and outcomes



PhD student Charlotte Robb is investigating which regenerative agriculture practices can be applied to growing mustard.

and identifying potential areas for gains," she explains.

As such, the first part of the work involves surveying the EMG group to establish a benchmark. Once this has been conducted, the practical side of the research can begin.

In terms of project outputs, it's hoped a quick and easy biomonitoring approach can be developed. "Working with the growers, this will be co-designed so that they themselves can assess the impact of selected regenerative agriculture practices," concludes Charlotte.

The project is being cosupervised by Dr Alice Mauchline from the University of Reading.

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### Hutchinsons' SFI day

Ensuring SFI actions are used appropriately to not only meet the requirements of the scheme, but deliver tangible gains for individual farming businesses too, was the theme of a recent open day. *CPM* joined the discussion hosted by Hutchinsons.

By Janine Adamson

Since its launch in 2022, growing numbers of farmers are engaging with SFI (Sustainable Farming Incentive), and during this time, knowledge surrounding the scheme's role within wider production systems has developed apace.

As such, the picture is becoming clearer regarding when, where and how to use each of the various SFI actions, as well as their impact on cropping rotations.

To help demonstrate this knowledge in action, Hutchinsons invited growers to an open day at its environmental trial site at Warboys in Cambridgeshire, hosted by 180ha family farm, P F England & Son.

At the first stop on the site tour was regional technical support manager, Alice

### **Beyond hedges and edges**

Cannon, who discussed the benefits of different cover crop species. "We want to understand which species to use and why we're using them, to make sure we achieve the farming benefits rather than just a payment," she said.

The first example Alice provided was phacelia, which she explained is fantastic for pollinators when it comes into flower. "Having dug with a spade, you'll see that this land – which is high in magnesium and likes to stick together – is tight, but the phacelia is starting to crumble the soil surface (top 5-8cm)."

### **Species diversity**

"Phacelia is also a good component for SFI because you require a herb in a lot of the spring and summer cover crop options for the 2024 offer. Diversity is key and being a herb, it ticks that box for both farm rotations and environmental benefits," she said.

Moving to gold of pleasure (known as camelina or false flax), Alice highlighted that it's one of her favourite cover crop species due to its effective deep taproot and web of side roots. "As a result it holds sandy soils together while breaking up clay or high-magnesium soils, improving friability."

She warned that although it's great as a cover crop, using gold of pleasure or linseed as a cereal companion crop might not work due to its sensitivity to residual herbicides. As such, more learning is required before this is advocated, with peas or beans more suited in this position, she noted. Alice then raised issues associated with mustard, which although is cheap and similar to barley and oats, requires careful management. "Mustard goes into stem extension very early and is a tall crop that has a high lignin content in the stem making the biomass a challenge when it comes to machinery following the cover crop.

"The biomass has a high carbon-tonitrogen (C:N) ratio which temporarily locks up the available nitrogen in the soil which is used by the biology to break down the biomass. If not managed correctly, this can lead to a yield loss of



Regional technical support manager, Alice Cannon, said it's important to understand which cover crop species to use and why, to make sure wider farming benefits are achieved rather than just an SFI payment.

### **Hutchinsons' SFI day**



Soils services specialist, Jade Prince, suggested that when looking at soil analysis, quantifying active carbon will indicate how much organic matter is being broken down by biological activity.

30-50%, according to our trials work." She added that while cover crop biomass above ground is great for pollinators, it's important to learn how to manage such species properly to reduce the impact on subsequent commercial crops. "Ultimately don't use great quantities of them, and use them in a wider blend," she said.

A success story for Alice has been buckwheat, which she said she used to hate. "It turns out it's just learning how to manage it." Among the benefits, she listed it's a valid companion crop for oilseed rape, has a long flowering period for pollinators and forages for phosphorus very well.

"When we look at soil with the spade, buckwheat has made the soil so friable because it's well establishing – drill from July into August. September-drilled buckwheat has limited benefits due to slower/smaller growth as a result of cooler weather conditions."

She also sees value in vetch, which being a legume is nitrogen fixing. "Again, you're looking at an August drilling date – as with most of these options they want to be in earlier rather than later."

To round up, she stressed that although these options have been presented as individual straights, the key is diversity. "According to SFI, an overwinter cover crop only requires two species, but to achieve the aims of the action as well as greater farm, soil and environmental benefits, we should strive to include more.

"Ideally, you should have winter covers established in August, with moisture, for the best success. Also, the heavier the soil, the more diversity becomes key to the success." Of the seed mixes which Hutchinsons' recommends, Alice said although none of them contain cereals, they do feature at least eight different species of cover crop.

Soils services specialist, Jade Prince, reminded attendees that the three pillars of soil health are related to chemical, physical and biological properties. "Without those three in place, we're severely risking the functionality of a soil," she said.

To expand, Jade explained the importance of in-depth soil analysis, in particular, understanding soil pH. "By measuring buffer pH we can identify the pH that a soil naturally wants to sit at, if a field was left alone without intervention. By knowing that figure, we can understand whether management practices are moving the pH away from where the soil wants to be."

### **Soil organisms**

"This is important because if that's the case, the soil pH may fluctuate, which can have a negative impact on soil organisms which we know like stability," she explained.

Jade also questioned the role of organic matter. "What is it we're actually looking for? It all depends on soil texture – clay loves to hold onto organic matter whereas sand burns it. When we're looking at soil analysis, as well as organic matter we want to quantify active carbon – so how much organic matter is being broken down by biological activity.

"By knowing this we can find out whether we have biological activity present in the soil which is a good indication of functionality, the key to cycling nutrients," she explained.

To demonstrate the importance of comprehensive soil analysis, soils services specialist, Nick Chichester-Miles, took to a soil pit to explain how the calcium-tomagnesium ratio has an impact on soil structure. If incorrectly balanced, high calcium levels will push soil particles away whereas if magnesium is dominant it'll draw the particles together.

He explained that the easiest way to re-balance the high-magnesium soils found at Warboys is to apply gypsum (calcium sulphate), because sulphate binds to the magnesium so it becomes leachable and can move through the soil profile.

"Here we have heavy blocky clay; gypsum was applied after ploughing and we can see it's having an effect on the soil surface for more friability which allows better water infiltration and cover crop rooting. In the coming years we'll see those roots travel even further down the soil profile as the gypsum moves through.

"Not only does this help the cover crops to do their job beyond the first 6" (15cm), but with better soil structure we have an improved environment for soil biology," he explained.



To demonstrate the importance of comprehensive soil analysis, Nick Chichester-Miles took to a soil pit to explain how the calcium-to-magnesium ratio has an impact on soil structure.

### **Hutchinsons' SFI day**



According to technical manager Dick Neale, although cereal crop roots create friable and stable soils, direct drilling into the stubble will be tough and challenging.

To address the wider implications of whole-field SFI options, technical manager Dick Neale discussed how different species behave below ground, and therefore the subsequent management challenges which can occur after. To begin, he highlighted the impact of a long-term legume fallow.

"Although in the first couple of years we see improved soil structure, beyond this it seems to have the opposite effect and we observe a level of slumping. This could be because we're flushing the soil with too much nitrogen which has skewed the soil biology."

Dick also raised the pros and cons of drilling into winter wheat stubble. "Although we see very friable and stable soils which are held together by the cereal root systems, direct drilling into that will be tough and challenging. I'd imagine it'd be the same for grasstype cover crop species too.

"Because broadleaf plants don't hold soils together in the same way, we may want to use them in conjunction with a cereal, but we have to be able to farm the land too and question whether it can be done successfully."

Dick explained that problems arise due to a cereal crop's root mass which can behave like a 'springy mattress' – with the seed slot gradually relaxing and re-opening post-drilling. "A solution could be to roll a few days after drilling, to close the soil back up again.

"But really, when choosing a cover

crop or fallow, don't go for one or two species. Do the job properly rather than just taking the money – consider how long it'll be there, what weed problems might be exaggerated and whether it suits your cultivation strategy," he stressed.

### Winter bird food

Continuing on the site tour, environmental services specialist, Hannah Joy, pointed out that the winter bird food SFI action (CAHL2) is now being used more frequently for whole-field areas, rather than just corners or poor performing zones. "Stacked with supplementary winter feeding (AHW) it's proving very financially appealing, it's just being careful how we manage this action to ensure you meet the aims."

Among the management challenges includes weed control – particularly

for two-year options – given herbicide options are very limited, she warned. Therefore maximising cultural control methods and ensuring optimum site selection are both paramount.

"Having had trials on this site for four years with some form of winter bird food or bumblebird mix, the weed pressure is now much higher than when we started. If you have areas where you have no plans to return to cropping in the foreseeable, these types of SFI options will be ok.

"But for more temporary scenarios, at a whole-field scale with an element of rotation, the longer that's down, the greater the weed burden will be. Traditionally, poorer areas were selected for these actions, but we're seeing a considerable increase in them being used rotationally," she concluded. ■



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66 Studies show an integrated approach of applying composts and manures with synthetic nitrogen is a good strategy for building organic matter. 99

# Carbon cycle Balancing matters

How does carbon cycling help to build soil organic matter and what role does nitrogen play during the process? *CPM* explores the topic. *By Rob Jones* 

The role of nitrogen fertiliser in increasing yield and profitability is widely acknowledged. However, a predominant focus on the nutrient's cycle and utilisation may have led to neglecting the importance of preserving soil organic matter reserves.

As researchers further their understanding of soil function and how organic matter is created, will it become easier to balance the two more effectively?

To begin, higher organic matter soils typically have better pore structure leading to increased water holding capacity and reduced nutrient leaching, while providing greater resilience. This doesn't necessarily lead to higher crop yields, especially once soil organic carbon exceeds 2%. Building organic matter starts with photosynthesis, explains Joel Williams, a soil health educator and consultant from Integrated Soils. "Plants take in carbon dioxide, turn it into sugar and that becomes the building blocks of their bodies. It's how they grow biomass both above and below ground."

### Particulate organic matter

When plants die, that biomass is broken down to form organic matter with the roots making a greater contribution, partly through their location in the soil. Microbes use external digestive enzymes to break down plant litter from the highly complex, high lignin-containing carbon compounds into smaller and smaller pieces, explains Joel.

"This is known as particulate organic matter – plant material such as crop residues, dead cover crops and roots in various states of decay – the fraction of carbon that's continually decomposed and cycled."

But this isn't the only type of organic matter. Relatively recent research, driven by the increasing interest in soil organic carbon's role in potentially mitigating climate change, has uncovered that as much as 50% of organic matter is derived from microbial dead bodies rather than it being virtually all decaying plant material.

When the microbial digestion process creates small enough carbon compounds to be ingested by microbes, explains Joel, the carbon becomes of microbial origin and is used to grow microbial biomass. Higher carbon-to-nitrogen



Building organic matter starts with photosynthesis, explains soil health educator and Integrated Soils consultant, Joel Williams.
#### **Benefits of molasses**

Liquid carbon-based fertilisers based on sugar cane molasses, such as L-CBF Boost from QLF Agronomy, help to prime the carbon cycle in the soil, according to the firm's US-based vicepresident of agronomy, Tim Chitwood.

The molasses acts as a carbon source that provides energy to microbes and helps them to cycle nutrients, he continues. "We're mimicking what Mother Nature wants to do, and that's cycle carbon."

When combined with other management practices such as a more diverse rotation, growing cover crops and reduced tillage, using L-CBF Boost amplifies the effect of making soils more biologically inhabitable, he says.

There are three main times to use a molasses-based product, suggests QLF Agronomy's UK national sales director, David Maxwell. "First, applying it with a starter fertiliser increases microbial loading and helps with rooting and resilience. It'll also help to increase root biomass, allowing the crop to unlock and make more from any residual or newly applied fertiliser," he explains.

"If you're direct drilling, leaving a larger root network will also add to your organic matter over time."

L-CBF Boost, however, is most commonly used in the early spring with fertiliser applications. "That's about improving nutrient use efficiency by spiking the bacteria to consume applied nitrogen and move it from the leaky nitrogen cycle to the more stable carbon cycle," adds David.

The product can also be used with foliar nitrogen applications, which can potentially help to reduce the total nitrogen applied. "Foliar applications are 3-4 times more efficient, and by using them, you reduce the amount of salts (from the urea) you're applying to the soil, producing more of an environment that's better for microbial activity," he concludes.



According to QLF Agronomy's David Maxwell, there are three main times to use a molasses-based product, the first being to apply it with a starter fertiliser.



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#### **Carbon cycle**

 (C:N) ratio litter such as from cereals, takes longer than low C:N legume cover crops, for example, to reach that point.

Plants also release as much as 30% of the carbon they make during photosynthesis through their roots as exudates. These exudates are also carbon compounds with a lower molecular weight, which can be efficiently ingested by microbial soil life directly without the inclusion of external digestive enzymes.

"When the microbes die, the microbial necromass (a large, dynamic and persistent component of soil organic carbon) has an affinity to stick to soil particles, particularly silts and clays, to form more stable organic matter. This is known as mineral-associated organic matter," says Joel.

Clay soils form more of this type of organic matter than sandy soils, as carbon has more mineral surfaces to bind with in clay soils. However, because there's a finite number of mineral surfaces to adhere to, this type of organic matter will eventually plateau.

In contrast, particulate organic matter doesn't appear to saturate – such as a peat bog where plants grow and die year after year, highlights Joel. "You can build lots of this organic matter but



Adding legumes, whether in the rotation, as companion crops or in cover crop mixes, helps to prevent nitrogen mining from soil organic matter.

#### Do N inputs burn or build SOM?

There has been plenty of discussion, and perhaps a little controversy, regarding whether nitrogen inputs burn or build soil organic matter. Joel Williams says that's with good reason, as research suggests the answer appears to be both.

"It's context-dependent, so there's no easy answer," he says. "The evidence from research papers is mixed with plenty showing nitrogen inputs help increase soil organic matter, while others show the reverse."

Nitrogen can stimulate the breakdown of soil organic matter, where nitrogenenriched microbes require carbon to maintain the carbon-to-nitrogen (C:N) ratio of their bodies, which they find within organic matter.

Where nitrogen is found to increase soil organic matter, it's typically linked to building plant biomass – so the soil receives greater residue inputs to convert into soil organic matter. But too much carbon can result in microbes mining nitrogen from soil organic matter.

The picture is further complicated

by research which suggests increased nitrogen fertilisation generally increases above-ground biomass production but not necessarily root biomass. That can be good for boosting yields and indeed most varietal selection has been bred for that type of trait, adds Joel.

However, it's the root biomass and exudates that are more important for building soil organic matter. "This points towards nitrogen fertiliser not being so good for roots," he says.

Joe highlights that one research study suggests applying insufficient nitrogen results in limited biomass production, including root growth. But as nitrogen increases, biomass production is optimised, but only up to a point. "If there's surplus nitrogen, it begins to have a negative effect specifically on root biomass," he comments.

"And it's the roots that build soil organic matter, so the nuance in this discussion is how nitrogen affects that below-ground carbon allocation. The simple answer is, it's another reason to optimise your nitrogen applications." once that environment is disturbed, it's very prone to being lost because it's not chemically attached to soil particles."

In contrast, mineral association is one of two key mechanisms to stabilise carbon inputs coming into the soil, he says.

"Whereas the second is a physical process, where carbon is trapped within soil aggregates. When soil aggregates – soil particles that are clumped together partly through the glue-like substance released by microbes – any carbon inside gets physically trapped and protected. This can be either particulate organic matter or mineral-associated organic matter."

Practically understanding how the two types are formed can help with management strategies. For example, avoiding tillage means soil aggregates aren't broken up, helping slow down the particulate organic matter carbon cycling.

Whereas maintaining living roots as much as possible through growing cover crops will pump more exudates into the soil, which can be converted more readily into mineral-associated organic matter, continues Joel.

Adding legumes, whether in the rotation, as companion crops or in

#### **Carbon cycle**

possible through applying carbon-based inputs such as composts and manures. "There are plenty of studies that show an integrated approach of applying these with synthetic nitrogen is a good strategy for building organic matter," says Joel.

Carbon-based inputs also have a role in helping to optimise nitrogen fertiliser additions. Options such as humic and fulvic acids, and to a lesser extent molasses, act as a carbon sponge binding to nutrients, making nitrogen less likely to leach and helping to optimise inputs (see box).

Where molasses has the advantage over organic acids, is by providing a highly digestible, highly available carbon carbohydrate form of energy to stimulate soil biology, suggests Joel. "In the soil generally, carbon is more limiting, so when we apply some carbon it stimulates their growth."

It also stimulates soil biology to effectively eat nitrogen fertiliser to balance the C:N ratio within their bodies to grow, he adds. "That incorporates the nutrients from that fertiliser into their cells, and it's a way to stabilise the nutrient and help prevent it leaching, creating a slowrelease fertiliser," he concludes.■

#### **Strategic focus**

Building soil organic matter in his mostly clay/ loam soils is a key part of Will Oliver's strategy for Osbaston House Farm. "We're always thinking about soil organic matter," he says.

The 600ha farm makes good use of organic manures from a 200,000-bird broiler unit with litter and digestate applied in spring on wheat, and sewage sludge before grain maize.

Grain maize trash also adds organic matter to soils within the rotation with reduced tillage and direct drilling used when appropriate to avoid soil disturbance. "We've done a lot of mole ploughing this year with the aim of improving drainage. Hopefully that'll help to improve soil health in the long term."

Cover cropping and catch cropping are utilised in a rotation that features winter wheat and winter beans, as well as the grain maize. Will is also making use of L-CBF Boost, having first trialled it on a few tramlines in a maize crop a few seasons ago.

Applied in a mix with the pre-emergence herbicide, pendimethalin, he could see to the line where L-CBF Boost had been used. "I think it's helping to feed the soil biology and hopefully get more out of the organic



Building soil organic matter at Osbaston House Farm is a key part of Will Oliver's management strategy.

manures we're using," he explains.

After also seeing a small yield increase in the grain maize, he trialled it in wheat, again applied with a pre-emergence herbicide. "We didn't see much difference at emergence, but there was a yield benefit of around 0.2 t/ha in our tramline trials."

While he believes it's a little early to say whether L-CBF Boost has directly contributed, the combined effect of his management changes is leading to improved organic matter levels in his soils. "We want more resilient soils so they can cope with these freak weather events we seem to be getting," concludes Will.

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### Sound of the underground

#### **Soil ecoacoustics**

Could recording the sound of biodiversity below ground be used by farmers as an indicator of soil health status? *CPM* investigates an Innovate UK-funded project which aims to apply the principles of ecoacoustics to what's happening at a topsoil level.

By Janine Adamson

Similar to the creatures which populate above ground habitats, those found below the surface also exhibit their own behavioural traits and as a consequence, emit a breadth of unique sounds as they move through the soil and go about their business.

Now, with a little help from sound technology, it's possible to record that underground hubbub to help farmers understand whether their soils are a biological hotbed or deathly silent.

This approach is known as ecoacoustics – an emerging science which investigates natural and anthropogenic sounds and their relationship with the environment. While ecoacoustics has historically been used to listen for bats and birds and other above-ground wildlife, as the technology developed and became cheaper, Baker Consultants, and other like-minded researchers around the world, saw the potential to take the science below ground and apply the same methods to the soil.

As such, soil ecoacoustics was born, says consultancy director, Gavin Ward. "Having undertaken explorative work ourselves to establish a methodology, we knew we had the basis of an initial concept for how to measure and analyse the sounds within the soil.

"However, we wanted to take this further to develop a conclusive proof of concept, which resulted in a successful Defra grant application through Innovate UK for £250,000 of project funding," he continues.

"This involves a two year study working alongside the University of Warwick Crop Centre, where we develop a system to try to monitor the absence or relative activity of soil fauna, including earthworms, within agricultural topsoils."

#### **Field and lab trials**

The work began in April 2023 and already, progress has been quick, highlights Gavin. Baker Consultants, led by director of ecoacoustics Dr Carlos Abrahams, has been undertaking a range of UK-wide field trials, while the University of Warwick has been conducting controlled laboratory tests.

For both trial environments, it's involved recording and then assessing the sub-surface soundscape using a range of Acoustic Complexity Indices (ACI) – which measure how complex the soundscape in an environment is, in this case, within the soil.

Gavin says progress with this has been promising with the ability to characterise typical soundscapes through recordings taken from a large number of arable and dairy pasture sample sites. Next, the team is hoping to start looking for the unique tell-tale sounds from a range of target species, from both pest and beneficial groups, he adds.

This data will lead to the development of a detailed library of acoustic signatures for certain species, alongside a robust database of soundscapes which future recordings can be benchmarked against.

66 The theory is,

a healthy soil is a

noisy soil. 99

"The theory is, a healthy soil is a noisy soil and by analysing the changes and differences in the soil

> soundscapes, we're hoping to understand and monitor the hidden functional biodiversity within the topsoil," explains Gavin.

"You may wonder what an earthworm sounds like; although this does vary depending on its movements, we mostly hear it as

a crunching noise as it contracts and expands within the soil. Other descriptions include popping, slurping or rasping.

"We've also recorded beetle larvae who, similar to a grasshopper, rub an appendage on the side of their body to create some very surprising sounds indeed. We're unsure exactly why they're making this noise – is it for hunting, attracting a mate or deterring predators? But now we know it's happening, we can investigate that further," he says.

Other unusual noises recorded during the project so far include a field vole squeaking as it travels through its tunnel, and an ants'



By analysing the changes and differences in soil soundscapes, Baker Consultants is hoping to understand and monitor the hidden functional biodiversity within the topsoil, says the firm's Gavin Ward.

#### **Soil ecoacoustics**



The project also involves finalising a protype for the technology which produces the recordings in the first place, which is similar to a hand-held bat detector.

nest, which sounds similar to rain on a tent.

As well as the sound library, the project also involves finalising a protype for the technology which produces the recordings in the first place. Based on a patent-pending device, the aim was to develop an accessible and affordable tool, emphasises Gavin.

"Similar to a hand-held bat detector, the unit is run on batteries and an SD card with a 6-10" (15-25cm) long soil probe and an in-built GPS chip. From a userperspective, you push the probe into the ground, hit the button on the hand-held unit, step away and wait for a couple of minutes while it makes the recording.

"The probes can only listen to a radius up to 1m, depending on the soil conditions, so it's recommended that multiple recordings are taken from each field and then averaged to give an overall score, as the soil invertebrates communities can be very patchy in each field on any given day," he says.

#### **Advanced analysis**

Although the technology is relatively simple, it's the analysis which does the heavy lifting, suggests Gavin. "Advanced analysis allows us to rapidly evaluate the samples and produce a report, including how it compares against our reference database.

"As we're now nearing the end of the research stage, the next step is to start offering a commercial service – we're hoping that the probe and first year of analysis will be available for less than £1000. After that, it would simply be a case of a low monthly subscription and any replacement probes, as and when required."

Gavin believes soil ecoacoustics could be an easy and rapid way to supplement the intelligence gathered from traditional soil pits. But overall, he sees it as a simple way for growers and agronomists to benchmark soil health on farm.

"Recording the soundscape before and after an intervention or cultivation, would help land managers understand its impact on the topsoil fauna. Equally, the technology could also be used to compare different fields with different soil types to help understand their biological status.

"As people submit their sound samples for analysis, this will then allow us to gain more insights from the database – training the system to be even smarter, fine-tuning it and improving the benchmarking so it can also account for different factors such as soil type etc," he says. As part of its work so far, Baker Consultants has partnered with Wildfarmed to compare the soundscapes of conventional and regenerative soils. It's also been working with the dairy sector through a relationship with First Milk.

"We envisage various different uses for this technology, but essentially, it's a means of measurement. In the future, as emphasis continues to be placed on environmental schemes, it could even be used to monitor the biodiversity gains or soil improvements that result from SFI actions," suggests Gavin.

He adds that so far, the technology has been well received. "We began with earthworms as our 'poster boy' and everyone understands that they're a solid indicator of soil health – the more worms, the better the soils.

"Equally, we knew the demand was there for a more efficient system to measure earthworm communities, however our system has also provided a gateway for other species-groups too."

According to Gavin, one goal is to enable farmers to identify the presence of soil-dwelling insect pests. "Because invertebrates all have their own specific sound cues, it might be possible to assign these to certain pest species such as symphilids.

"This intelligence could then be used prior to taking out the lease on some new land, for example, so that farmers could enter into an agreement with greater knowledge of the pests they're about to inherit," he says. "We're also hoping to start looking for the sound signatures of beneficial insect species soon too." ■

#### From lab to field

As a partner in the soil ecoacoustics project, the University of Warwick Crop Centre has been collecting sound recordings from the laboratory right through to the field.

Soil scientist, Dr Jacqueline Stroud, says work began by introducing different species of earthworm to model soils sourced from reallife farms. "We recorded hundreds of hours of worm sounds and this took place in a highly controlled environment; Baker Consultants use this information to feed its database."

Then, collaborating with Rothamsted Research, the principles were applied to the field where data was collected during a 6-month period – for both fallow grass and wheat – to identify longer-term trends.

"By moving from a highly controlled

environment through to a real-life scenario we're able to provide a robust dataset to train the algorithms involved," she adds.

According to Jacqueline, ecoacoustics is an opportunity to learn more about soils – a topic which much remains unknown. "Rather than using sight, soil-borne organisms communicate through vibration. As such, soil ecoacoustics taps into this communication system and works alongside it, capturing data through their ways, rather than ours.

"It also allows us to capture the interactions between invertebrates – enabling us to learn so much. Soils are a sophisticated system which we know so little about; it's exciting to contribute towards creating a baseline for future monitoring techniques," she concludes.



According to the University of Warwick's Dr Jacqueline Stroud, ecoacoustics is an opportunity to learn more about soils – a topic which much remains unknown.

**66** There's a realisation that autumn-applied sulphur plays an important part in helping to capture residual and mineralised nitrogen in the soil. **99** 

#### Sulphur management

Following wash-out conditions during the past year, early-season sulphur applications could do much to boost crop establishment this autumn and create the foundation for optimising nitrogen utilisation next spring. *CPM* finds out why sulphur management deserves more attention. *By Rob Jones* 

Sulphur deficiency is becoming an increasingly widespread issue in modern crop production even in areas previously considered to have sufficient levels of the nutrient. That was the message shared by Professor Jorgen Eriksen of the Department of Agroecology at Aarhus University, Denmark, recently.

Across Europe and in other countries, a combination of reduced atmospheric levels of sulphur, increasingly wet conditions and poor availability of the nutrient in most organic sources of fertiliser,

## The forgotten nutrient

is becoming a real concern, he told delegates at the International Fertiliser Society Conference in Cambridge.

"Sulphur is often called the forgotten nutrient, yet it's one of the most important in terms of optimising plant health, making sure nitrogen is used by plants as effectively as possible, and ensuring the best yields and quality.

"With reduced emissions from industry and power generation, there's now no more than a few kg/ha of sulphur available from the atmosphere and any sulphate present in the soil is vulnerable to leaching in much the same way nitrates are," he says.

"Due to increasingly wetter conditions during the winter and spring – frequently seen as a result of climate change – there's virtually no carry over of sulphate from one year to the next in many areas."

#### **All-time low**

ICL Growing Solutions' Scott Garnett says the past 12 months of weather in the UK have more than proven the point. "Many agronomists are saying soil sulphur levels are at an all-time low in many parts of the country and urgent action is required to address the problem. It's been an issue for many years now, but the last season has put it into even sharper focus.

"Sulphur is used in the production of several amino acids required for protein and oil synthesis, as well as



Agronomists are reporting soil sulphur levels are at an all-time low in many parts of the country and urgent action is required, says ICL Growing Solutions' Scott Garnett.



According to Professor Jorgen Eriksen, organic sources offer the potential to supply 10% of the sulphur crops require, but no more.

being essential in chlorophyll formation, nitrogen stabilisation and nodule development in legumes. Furthermore, sulphur deficiency can reduce oil content in oilseeds and affect baking quality in wheat," he adds.

"Independent analyses by Lancrop Laboratories reveals a steadily increasing proportion of soils deficient in sulphur during recent years with up to 97% of UK soils now classed as 'low' or 'critically low' for sulphur deposits."

While the problem is particularly marked this year, addressing the issue requires long-term planning, careful evaluation of available sulphur sources and timing of applications, he says. "Crops have a season-long requirement for sulphur, so it makes sense to apply more than one treatment each year, but you have to be careful about the form of sulphur applied.

"Traditional thinking has positioned sulphur as a spring application but the latest agronomic approach moves away from this. There's a growing realisation that sulphur applied in the autumn plays an important part in helping the plant to capture any residual and mineralised nitrogen in the soil as winter crops are sown."

In ICL fertiliser trials, an

autumn application of phosphate, potassium and sulphur with calcium and magnesium has been shown to boost early root mass, leading to increased biomass in the spring to ensure the crop grows away strongly, he points out.

"An autumn application of around 100kg/ha of the naturally occurring mineral polysulphate (48% SO<sub>3</sub>, 14% K<sub>2</sub>O, 6% MgO and 17% CaO), for example, has resulted in a 41% increase in take up of phosphate and a 28% increase in nitrogen take up.

"This has been shown to increase root biomass by 30-40% and as just one extra centimetre of root on each plant touches an extra 130t of soil over a hectare, this is highly significant," he stresses.

"The larger root mass increases the plant's ability to access more soil-bound nutrients and water leading to a stronger, healthier plant going into the winter. And the more contact with soil moisture, the better protection crops will also have against drought stress, plus the larger root structure also helps reduce soil compaction and increases organic matter."

#### **Organic sources**

Jorgen suggests that while growers are being encouraged to make greater use of organic sources of fertiliser, in reality, they contain very little plant available sulphur so timely and appropriate supplementation is essential.

"Animal manure isn't a great source of sulphur as a huge part of it is in the organic form which isn't immediately available to the plant. The other problem is that we usually have to store manure for a long time due to legislation around nitrogen, with storage times of many months and often up to a year resulting," he says.

"During that time plantavailable sulphate will turn into either the organic form or sulphide, which is extremely volatile and is basically the smell of manure, but neither of these are readily available to the plant. "When you apply fresh



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#### **NPZ UK - Breeding Quality**

#### Sulphur management

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Origin Fertilisers' Peter Scott believes more people are turning to polysulphate which doesn't contain any nitrogen, because it gives greater agronomic flexibility.

manure, there's some content of plantavailable sulphur, but the longer it's stored the less of this there is and the more of the unavailable organic forms there are."

Digestate from biogas production performs a little better in terms of sulphur availability, he points out. "When organic manures are used in digesters, plant availability of nitrogen in the resulting digestate increases compared with the raw manure or slurry.

"But this isn't the case with sulphur. The result of the decomposition process produces volatile forms that become emissions and when the methane goes to the grid, these have to be collected in filters."

#### **Immobilisation**

Furthermore, Jorgen says the solid material leaving the digester isn't only very low in sulphur, it also creates immobilisation of sulphur in the soil. "It doesn't contribute to plant availability, it actually fixes some of the sulphate that was otherwise available.

"All-in-all, I'd say organic sources offer the potential to supply 10% of the sulphur crops require, but no more. Growers relying on manures and slurries for their sulphur will soon run into deficiencies, so supplementation is essential."

According to Origin Fertilisers' technical director Peter Scott, growers should consider sulphur supplementation as part of a wider picture. "Despite its fundamental importance, we still don't give sufficient attention to sulphur nutrition in terms of how much, when and in what form.

"Ammonium sulphate (AS), for example, is the main sulphur source in the UK and is widely available as a 'straight' and also within nitrogen sulphur (NS) compounds and nitrogen, phosphate, potassium and sulphur (NPKS) blends," he says.

Peter adds that more people are turning to polysulphate which doesn't contain any nitrogen, meaning sulphur strategies can be planned separately from nitrogen which gives greater agronomic flexibility.

"Polysulphate is a multi-nutrient fertiliser providing potash as well as calcium and magnesium in water-soluble forms which is important. A lot of Ca and Mg products on the market aren't watersoluble and have limited agronomic effectiveness; polysulphate also has no acidifying effect in the soil."

Scott agrees, adding that growers are increasingly thinking about the environmental implications of their fertiliser decisions. "The food industry as a whole is focused on sustainability and we're seeing growing interest not just from farmers, but also key multiple retailers, keen to understand how they can reduce the carbon footprint of the products they sell.

"Polysulphate is a low carbon British product with minimal processing and transport required, which has all contributed to a recent reduction in its carbon footprint of 90% and a CO2e of just 0.0029kg per kg of product.

"Autumn applications can be carried out from early October to before Christmas either as a straight or in a blend as part of a grower's autumn fertiliser programme and it can be broadcast using conventional fertiliser spreaders or direct-drilled with the seed.

"These applications can then be topped up with another 100kg/ha in the spring or as appropriate following soil testing," he concludes. ■

#### **Phosphate Power launch**

British farmers can now benefit from a new decision-making tool which has been designed to help optimise phosphorus use efficiency in crops.

Phosphate Power, developed by Unium Bioscience, is a free online tool which aims to assess the phosphorus biological availability in soils with just a postcode entry.

A critical nutrient during germination and establishment, phosphorus availability can often be limited by various soil and environmental factors, says Unium Bioscience's John Haywood.

But by utilising Phosphate Power – which uses the phosphorus index – farmers can better understand whether soils are biologically optimised to offer what the crop requires. If not, the service provides advice and information to help overcome any transient deficiency.

"Phosphate Power is both simple and practical," states John. "It links environmental conditions such as soil moisture, temperature, and soil texture to provide growers with precise, location-specific guidance."

The tool offers tailored recommendations depending on the phosphorus levels in the soil. If phosphorus availability is limited, it gives advice on appropriate action, such as the application of seed treatments, foliar phosphorus products, or biostimulants, which encourage root growth to enhance phosphorus absorption from the soil.

One of the key advantages of Phosphate Power is its ability to help farmers during the critical early stages of crop development, ensuring plants have the necessary nutrients for optimal growth, adds John. By leveraging environmental data, it aims to maximise efficiency, leading to healthier crops, improved yields, and reduced input costs.

"By integrating this tool into farming practices, growers can expect to optimise crop phosphorus uptake and enhance their overall production efficiency."

![](_page_43_Picture_29.jpeg)

A key advantage of Phosphate Power is it helps farmers during the critical early stages of crop development, ensuring plants have the necessary nutrients for growth, says Unium Bioscience's John Haywood.

Phosphate Power will be available to growers nationwide by visiting www.uniumbioscience. com/phosphate-calculator/. Once a postcode has been inputted, users will receive a detailed analysis of the phosphorus content in their soils.

**66** Around 5% of all fires on farm are caused by rodents chewing through wires and machinery. 99

#### **Pest control**

**Unlike Roland Rat, Mickey Mouse or Jiminy Cricket,** most rodents and insects are an unwelcome sight in grain stores, leading to a multitude of issues including grain being rejected. CPM investigates what can be done to achieve control over these pesky pests.

By Melanie Jenkins

Each growing season, crops can face a number of pests within the field and while the move away from insecticides has heralded a focus on more integrated approaches, pest control doesn't stop at the combine, with the grain store providing a veritable feast for a whole host of rodents and critters.

Not only are there primary feeders to contend with, there are also secondary feeders, mould feeders and scavengers, says Pelsis' John Stewart. "It's almost a small ecosystem when you start looking at it in any real detail. It's hard to quantify the value

# **Guarding grain**

of the losses sustained this way because not a lot of research has been done, but it can cost some farmers quite a lot."

Rodents are one of the biggest threats to grain once it's in store, warns John. "These are a primary consumer of grains but their droppings, urine and hairs are further contaminants. It's also estimated that around 5% of all fires on farm are caused by rodents chewing through wires and machinery."

#### Winter warning

Rodents are likely to become more of an issue as temperatures fall and conditions outside become harsher, he adds.

Other primary pests associated with stored grain include insects such as the saw-toothed grain beetle, rust-red grain beetle, grain weevil, foreign grain beetle, the flour mite, cosmopolitan food mite, lesser grain borer and rice weevil. "As primary pests, these can attack the actual seed to obtain access to the germ," says John.

"Grain doesn't have to be milled for them to attack it and once they have, this can result in raised temperatures within the grain and an increase in relative humidity, which is a farmer's worst enemy because it promotes mould and mycotoxins, leading to grain being discarded."

Insects can become an issue incredibly quickly, according to AHDB's Kristina Grenz. "Grain borers and weevils can spread rapidly and cause very serious issues that

can result in further pest problems which are detailed in AHDB's grain storage guide."

Secondary feeders, which include the brown house moth, white-shouldered house moth, hairy fungus beetle, white-marked spider beetle, mould beetle, plaster beetle, flower beetle and booklice, don't directly attack grain but can feed on it once it's been damaged by primary feeders, explains John. "The insect carcasses can also result in the grain being downgraded or rejected - it's a constant war with nature."

It's also advisable to be aware of the

![](_page_44_Picture_17.jpeg)

Primarily, rodents are one of the biggest threats to grain once it's in store, says Pelsis' John Stewart.

#### **Pest control**

issues birds can cause, adds Kristina. "These aren't necessarily directly damaging the grain, and may be feeding off the insects and mites, but their excrement can result in issues such as salmonella in the grain."

In terms of the effects of grain store pests on farmers' businesses, these can be both the physical loss via consumption and a reduction in quality and tainting, as well as potential mould growth and the loss of nutritional value where the wheat germ has been consumed by larvae, highlights John.

"And all the effort put into establishing, growing and harvesting a crop only for it to be damaged during storage means a lot of time has been wasted."

Other factors to consider are the effects further down the food chain, risks to health and safety and the environment, plus the cost of pest control to treat infestations and prevent further issues, he adds.

Kristina also warns that issues with grain as a result of pest damage or contamination can mar a farmer's reputation with their grain buyer. "It can all have a cascading effect that ultimately results in cumulative costs to the farmer."

The first and foremost advice to manage grain store pests is to prevent them in the first place, says Frontier's Dr Paul Fogg. "Our advice always starts pre-harvest because once grain is in store, if there are issues, it's ten times harder and more expensive to do anything about them."

#### **Regular inspections**

It's important to make grain stores as inhospitable to pests as possible, says John. "This means understanding the biology, requirements and capabilities of these pests and having regular inspections to plug or fix any gaps or holes in the fabrication. Mice, for example, can fit through a gap 6mm in diameter, that's the size of a biro pen, so you have to be working to an intricate level of detail.

"Using 5mm galvanised weld mesh and concrete, placing sheet metal across gaps and blocking up around pipework are all steps that can be taken to prevent access to the building," he advises. "Also consider putting a steel band 30cm up the outside of the shed to prevent rodents climbing above this. Once they have access, rodents tend to harbour in wall cavities and emerge at

![](_page_45_Picture_10.jpeg)

night to feed." John also suggests removing redundant machinery, pallets, or other harbourage

from the sides of stores to limit where rodents can nest nearby. "Ideally, buildings should be surrounded by concrete so that it's easy to clean spillages, but the next best option if concrete is too expensive is to use geotextile and place stones 1m out from the building to prevent burrowing.

"It's also worth increasing external lighting as this will discourage rodents from running under lit areas because of the increased risk of them being predated by creatures such as owls."

Further steps to take include having a thorough staff clean-up and reporting policy, removing free-standing water and improving drainage, as well as not opening the shed door. "Ensure that if your staff see rodents, they report it immediately so they can be dealt with right away because the longer there's an infestation, the more damage there'll be.

"Rats and mice can proliferate at a fast rate, and while rats take longer to sexually mature and have fewer offspring than mice, both have a gestation period of 21 days, meaning infestation growth can be exponential," he warns. "But these pests don't tend to coincide because rats are more aggressive and will kill mice." Whereas many farmers will be familiar that the best way to reduce the chances of insect infestations prior to grain storage, is to clean the shed thoroughly, says John. "Remove any material and sanitise the entire shed with a biocide to kill fungus growth. Remember to start at height and work your way down to the ground, but be aware that some issues are airborne, so using airlines isn't advised."

Paul concurs, adding that it's essential to implement good hygiene and fumigation around two months prior to anything going into the shed. "It's also vital to dry and cool grain as quickly as possible before placing it in long-term storage – ideally grain should be at 5-6°C and then it's a case of constant monitoring."

But if pests do become an issue while grain is in store, it's vital to achieve control as soon as possible. There are a number of physical traps available to deal with rodents, including smart-enabled options which have remote sensors that can trigger alerts to phones or via email, says John. "These can even be set up to trigger technicians or be focused on certain areas around the building."

#### **Termination**

Other traps kill rodents outright – some such as the Quadro box can kill four from one base station, while others use electrocution or gas to kill up to 20 animals, explains John. "Be aware that rats exhibit a behaviour called neophobia, which

#### **Pest control**

means they are wary and averse to new objects and so it can take them 7-14 days before they'll explore something new."

Pheromone or baited traps are a further option, but live rodents may have to be dealt with after they're caught, says Paul. "You also require the correct training to use the right products in these, to avoid catching non-target species."

It's also important to ensure that any products used in baited traps don't contain allergens that could contaminate the grain and cause issues further down the food chain, warns Kristina. "Take a holistic approach and consider where your grain will be used and how any products could impact that."

For those opting to employ chemical controls, it's important to avoid the risks of secondary poisoning, warns John. "If a rodent consumes an anti-coagulant and it's then eaten by a raptor, this will poison the raptor. So it's really important to first undertake a risk assessment and then collect rodent carcasses.

"Another issue with these is that after rodents have consumed them, they can die on the grain resulting in further contamination issues. It's also difficult to use anti-coagulants once there's grain in the store because there's too much food competition for the anti-coagulants to be appealing.

"Issues are likely to be worse on livestock farms – especially pig farms – and this might mean that alternative control methods are required to avoid cross-contamination of pest control products with livestock," he adds.

![](_page_46_Picture_7.jpeg)

It's important to ensure any products used in baited traps don't contain allergens that could contaminate grain and cause issues further down the food chain, warns AHDB's Kristina Grenz.

But one of the most effective tools for dealing with rodents comes in the form of man's best friend. "Terriers are very useful to help manage rodent infestations and they're unlikely to have negative impacts," says John.

Although there are a whole range of insect and mite pests, the options for controlling these are limited, explains Paul. "Pyrethroid insecticides can be used but be aware that they are only applied to the surface of the grain. To achieve control beyond this you're likely going to have to employ specialist help which is expensive."

Kristina suggests using residual insecticides or add-mixtures to the grain. "But be aware that these aren't instant solutions and at lower temperatures the residuals take longer to work."

It's also worth considering whether the use of an insecticide could impact the Sustainable Farming Incentive, she adds. "As far as we're aware, growers are able to use insecticides in store, but the guidance isn't clear. The government webpage states, 'You mustn't apply any plant protection products, including seed dressings, containing insecticide on land entered into this action'. This implies that farmers can apply to the grain store as this isn't the 'land' they're entering into SFI."

#### **Thorough fumigation**

When it comes to tackling insect or mite infestations, fumigation is the only thorough solution, says John. "You can attempt control by managing the temperature and relative humidity of the storage environment, but be aware that each insect has its own preference."

And, fumigation must be undertaken by an accredited firm and only works in the right scenario, warns Kristina. "Before you resort to any chemical solution, ensure you're using CRD-approved products and that these are applied at the appropriate dose rate to avoid resistance developing. Also check that what you're using is suitable for your end

![](_page_46_Picture_16.jpeg)

According to Frontier's Dr Paul Fogg, the best approach to tackling pests is to always start pre-harvest because once grain is in store, if there are issues, it's ten times harder and more expensive to do anything about them.

market – you don't want to apply something and find out afterwards that it prohibits your grain from being sold as originally intended."

There are exams farmers can take which permit them to buy rodenticides and anticoagulant products, and educate them on the most effective proofing materials, says John. "Buying the correct products in the first place can save you both time and money. But if you choose to bring in a pest controller, they'll survey your site, identifying any proofing work that's required, what mitigating action can be taken, and implement mechanical or chemical control."

Whatever approach farmers take, it's important to keep a thorough record of the actions taken, both preventative and reactive, adds John. "Create a thorough risk assessment, have a lockable pesticide store and demonstrate what actions have been taken and that they've been done safely and effectively."

#### Glue board ban

As of 31 July 2024, a ban on glue board traps was introduced meaning it's now against the law to use them to catch rodents, unless the user has a licence. While some farmers might have employed this tool in the past, Pelsis' John Stewart doesn't believe the ban is of particular concern because the level of dust in grain stores often made the traps inefficient.

"There were also concerns regarding the traps catching non-target species, even barn owls on some occasions. It's more important to target ingress issues rather than just dealing with the present pests, and there are far better alternatives than glue boards which are a last resort."

# naturenatters

*Nature has answers if government provides the budget* 

It's that time of year when farming businesses are committing new investments and hope into next year's harvest. Rotational plans have been made, inputs been bought and crops have been planted in the hope of a good yield in 2025.

While individual crops will hopefully give a good annual return on investment, other things we're doing offer longterm benefits – using a diverse rotation, improving soil health year-on-year, and investing in machinery and technology that can reduce our costs over time. We farmers are always thinking and planning ahead, whether for the weather next season or the health of the farm in 20 years.

Often, the benefits of these longer-term investments aren't seen by the generation making them which can make it tricky to prioritise them. This is especially true for hedges, trees and infrastructure, where the advantages are few at first but consistently increase over time as the beneficial insects return and growing foliage cover provides essential windbreaks.

Even in years where little or no profit is available – perhaps due to extreme weather causing damage to yields – investments are still required. This is why careful planning and nurturing nature's free support systems are so crucial to our businesses' future resilience.

It shouldn't just be us farmers making long-term investments for a productive and stable future. To create the impactful change we require, all actors in the system must move together. Supply chains should address their vulnerability to factors outside their control such as climate events, and on fairness to the producers of the goods they rely upon. Our government must also invest public money to help us to bolster the resilience of our damaged ecosystems. changing weather patterns, and long-term nutrition supply.

Our new government has been making it very clear that they feel they have little funds available for agriculture and tough decisions will have to be made on where spending is prioritised. We'll have to wait until the end of October to see which rumours are true and how they've allocated the budget.

Having been to four party conferences this year and spoken to new MPs in all parties, it's clear many have little understanding of farming, our long-term nutritional security risk and the impacts that are already being felt from climate change and the loss of nature. They don't understand the direct effects these have on farmers' financial viability to manage a landscape and produce the services and food we require.

While some MPs may have heard the simple messages being promoted around 'No Farmers, No Food' and the concerns regarding food security, they have little understanding of what that means regarding actual action. Catchy headlines and slogans get short-term attention in the news and

![](_page_47_Picture_11.jpeg)

Having been to four party conferences this year and spoken to new MPs in all parties, it's clear many have little understanding of farming.

on social media, but don't deliver long-term solutions and the investment needed.

Encouraging politicians to think ahead for future generations and not just the next election can be difficult; the investment government has made into agriculture hasn't increased for years. Therefore with inflation, returns have steadily declined. While £3Bn sounds like a lot of money to spend on farming in the UK, if you look at the money being spent in other areas of government, that £3Bn is stretched very thinly indeed.

There's much evidence to show that the budget has to at least double to achieve the outcomes of the government's legally binding targets.

We'll have to wait and see if the government rows back on its commitments in the years ahead. If we as farmers, fail to deliver as an industry, it'll be because the investment hasn't been made. I'm hopeful that core budgets will be maintained, especially those contributing to the outcomes government is focusing on.

For some of us, we may have to refocus on what's being asked of us by the public and new government and the range of products they want from the landscape – be that human food crops, animal feed, fibre, energy and more – to stabilise our own futures.

The government often says, 'food security is national security.' But to achieve that security, investment is required now and in the long term. Crop production will always be vital, but the blend and the value put on other outcomes from our landscape that society wants to invest in, will become increasingly important and it's up to us to be ready. ■

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.

66 The past 12 months in particular have marked a step change for machinery sales and purchases. 99

## Profitable machines

With industry projections indicating a downturn in machinery spend, *CPM* finds out how growers can be savvier with both existing and new purchases. *By Charlotte Cunningham* 

On the surface, shiny new kit, decked out in all the latest technology, can offer growers the opportunity to enhance profitability of their operations via greater efficiencies.

However, with changes to the structure of UK farms putting a tight band around margins, for some businesses they may find just as great a return by looking at what's already inside the shed. This is according to Harry Henderson, formerly of AHDB and now technical manager at BASIS, who says the past 12 months in particular have marked a step change for machinery sales and purchases.

"Up until this year, machinery spend has been quite buoyant," he says. "Order books have been pretty full, seed drill manufacturers have even been able to put prices up. However this year, there has been quite a marked reduction globally in demand for farm machinery – especially in the UK.

So what's driving this? "Despite years of warnings, I think SFI, ELMs and all of those other changes since Brexit have caught up with a lot of growers and hit home," says Harry. "Couple this with global events impacting input prices and wet

# Savvy spending

autumns reducing yield, it's no wonder that machinery spend has been reined in.

"Major global manufacturers have made reductions too, and there have been a number of redundancies within the industry."

This is amid a backdrop of rising machinery prices. Looking at the figures in more detail, the 2025 55th edition of the Nix Farm Management Pocketbook highlights that in 2023, machinery costs and tractor prices rose by 2% and 3% respectively – with a 180-220hp tractor now estimated to cost between £127,094 and £167,825.

#### **Re-evaluation**

The impact of this has been a shift in attitudes towards machinery replacement policies, he says. "I think many farmers are now taking a look in the shed and evaluating what they've got and considering how what is already there can be made more profitable."

In terms of looking after existing kit, good maintenance is key to extend the lifespan and profitability of the machine, advises Harry. "Poor maintenance is unfortunately all too common. A classic example is when you see a combine parked up in the middle of winter and can smell that mousey-smell around it because it hasn't been cleaned and the mice have got into it. That can be fatal to a combine and replacing a wiring loom can cost tens of thousands of pounds. It's absolutely imperative that combines - and all machinery - are cleaned before storing. It might take time at the end of a busy harvest, but failure to do so can really sting you in the long-term."

When new purchases are required, Harry says it's vital to budget in detail before signing on the dotted line. "If you're worried that it might be too expensive to repair, then it's worth considering if you're buying too expensive of a machine anyway and can't really justify the maintenance costs.

"Something else to keep in mind is that machinery costs will probably continue to go up, so when you make a new purchase, ensure you factor in the cost of the eventual replacement which will probably be quite a lot more. This may lead you to consider if a contractor is a better option."

Graham Redman, author of the Nix Farm Management Pocketbook and partner at The Andersons Centre, concurs. "The most important starting point is calculating what the investment is going to generate you – is it going to add to your bottom line? Is it going to make you more profitable? Or is it just replacing something you think you require because you've had one before?

![](_page_48_Picture_18.jpeg)

This year, there has been quite a marked reduction globally in demand for farm machinery – especially in the UK, says BASIS' Harry Henderson.

#### **Profitable machines**

![](_page_49_Picture_1.jpeg)

Somerset farmer Charles Quick is launching a self-designed retrofitted system this autumn which will enable RTK autosteering on any tractor.

"Can you repair your existing machine or keep it going for just one more season? That might save you a lot of money and you can then replace it the following year," he suggests.

"Consider how much any purchase is going to be used. If it's something that's likely to be used every day, then it's a different acquisition and calculation compared with kit which you might only use three times a year."

Graham adds that it's important to look at the specification in detail too and be realistic about the requirements of the farm – rather than just including upgrades because they come at a good price.

In light of this change in mindset, Harry says there's a huge space in the market for technology which can be added to transform the existing capabilities of machinery. "It's a very good idea. Something like RTK easily adds 10% productivity to the tractor –

#### Box 3 – key features

![](_page_49_Picture_8.jpeg)

'Box 3' – marketed by Charles' business, CSEQ Technologies – is a streamline system comprising the control box, hydraulic valves, antenna and a Windows tablet which comes preloaded with the software.

• Canbus capable – meaning easy 'plugand-go' installation on steer-ready tractors

• Hydraulic proportional valve, safety valve and wheel angle sensor included for non-Canbus tractors

• 4 x 12v section outputs enabling easy control of sprayers, drills and spreaders

- Workswitch input to allow control
- mapping from the implement's positionExternal inertial measurement
- unit (IMU) for easy installation

compared with a manual-steered machine – so it's a bit of a no-brainer, particularly if you can put it on an older machine."

#### **Entrepreneurial spirit**

In a bid to add value to existing machinery, an entrepreneurial Somerset farmer has designed and developed exactly that – a retrofitted system which is claimed to enable RTK autosteering on any tractor.

With a 140ha arable and fruit farm near Taunton, Charles Quick says that while there was a requirement for autosteer on farm, the hectarage couldn't justify purchasing new machinery just for that

![](_page_49_Picture_20.jpeg)

The software that powers the kit is AgOpenGPS – a global network of GPS guidance software built by farmers.

 2 x Power over Ethernet (PoE) ethernet ports for future expansion
Pre-configured Windows tablet and full wiring loom included
Integrated 4G modem with dual SIM slots enabling the receiving of RTK corrections across multiple

 networks and avoids dead-spots
L1/L2 RTK receiver across four constellations - GPS, Galileo, GLONASS and BeiDou which delivers accuracy down to 2cm.

feature alone. So he set about designing his own technology – drawing on the learnings from his degree in agriculture and computer science – which would allow him to turn his pre-existing tractors into precision kit. "It was surprisingly easy," he laughs.

#### So how exactly does it work?

'Box 3' – marketed by Charles' business, CSEQ Technologies – is a streamline system comprising the control box, hydraulic valves, antenna and a Windows tablet which comes pre-loaded with the software. "I started designing it back in 2018 and at that point it was just a bunch of wires in a cab. From that, I developed protypes and tested them out on local farms, slowly building up to what we have today."

If your tractor is steer-ready, Box 3 today is pretty much a case of 'plugand-go' into a diagnostic connector and away you go, he explains.

With a hydraulic system, if your tractor isn't steer-ready, then it's a slightly more complex process – though Charles says it's still something that a farmer with a small workshop could fit themselves in a few hours. "From the hydraulic side of things, you're given a suitable valve, which you tee into the steering lines. In terms of electronics, a micro-controller controls the steering valve and reads various inputs from the tractor, such as steering angle."

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#### **Profitable machines**

A linked tablet PC takes the GPS information from the RTK receiver, maps it all out and that generates a target steering angle which is sent to the microcontroller and in turn, controls the valve to move the wheels at the desired angle. Accuracy is estimated at about 2cm.

While the system is able to be used across the majority of tractors, Charles says the only limitations are those which don't have power-steering. "Anything from the 1960s onwards essentially."

The software that powers the kit is AgOpenGPS – a free and open-source piece of software built by farmers. Charles has also set up a supporting RTK correction network. "The Qnet RTK network is made up of base stations, spaced such that each one covers approximately a 30km radius," explains Charles. "If you are in a new service area for us, along with the purchase of a Box 3 you will be offered a free base station if you are willing and able to support it with a wired internet connection, electricity – approximately 5W – and a clear view of the sky."

At present, the service area is predominantly focused on the South West, though Charles says he hopes to expand this area as the product is launched. "In return for hosting a base station, you will receive one free RTK signal for use with your Box 3, or any other GPS receiver supporting NTRIP. All our base stations are crossreferenced against the Ordnance Survey, ensuring accuracy with 'ground truth'."

#### **Seamless accuracy**

"You can also seamlessly switch between

![](_page_51_Picture_7.jpeg)

The system has been in development since 2018, designed initially as a cost-saving alternative to buying a new tractor on Charles' farm.

base stations while retaining centimetrelevel accuracy. Each base station connects to our central server, which then sends your receiver the nearest available correction signal. This allows for roaming across our entire service area, and resilience in case of an outage at one base station."

While typically access to a NTRIP signal would cost over £500, however, by setting up his own network, Charles has been able to bring this cost down to £120 a year. "If you would like to use our RTK without buying a Box 3 system, we will send you base station with a free signal, but you must also purchase at least one RTK subscription alongside – or convince your neighbour to buy one," he laughs.

RTK signals are strictly for use on one machine at a time, meaning multiple boxes users will require multiple signals.

Access to the software – and any updates or future functionality – is

![](_page_51_Picture_13.jpeg)

For those tractors which are steer-ready installing the new Box 3 system is simply a case of 'plug-and-go'.

completely free and will remain free, says Charles. Growers will purely have to pay the one-off charge for the kit. Cost-wise, the kit comes in just shy of  $\pounds 3,000 - \pounds 2,950 -$  which Charles believes offers a much more attractive return on investment than a new tractor. "It gives options to smaller farmers, particularly, that we wouldn't get otherwise. Enhancing the productivity of an existing tractor – which is probably already paid off – can be a really cost-effective technique to make machines more profitable."

The first kits are expected to be available to purchase from November this year, and growers can register an expression of interest on the website now. ■

#### **Calculating costs**

To help growers get a better handle on their machinery costs, Harry recommends using AHDB's costing calculator. "When we think about costs, it's all about looking at how we can enhance productivity, preserve yield, and extend the life of the kit as much as possible."

The online tool can calculate the cost of machinery on a per hectare or per hour basis and can also be used to be used to compare the costs of owning equipment with the cost of hiring it or getting in a contractor. Different machinery systems can also be compared, and repair costs can be calculated for budgeting purposes.

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![](_page_51_Picture_22.jpeg)

![](_page_52_Picture_0.jpeg)

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![](_page_52_Picture_4.jpeg)

66 We're conscious that anything we do will cause compaction. 99

#### Tra<u>ctors</u>

From minimised compaction to the ability to travel on wet ground earlier than their tyre counterparts, tracked tractors offer their own benefits. But as they're usually fitted to only the most powerful machines, do they have a place on farm? *CPM* explores.

By Melanie Jenkins

Tracked tractors aren't a common sight on UK farms and some might not see the benefits of running such large machines. But for those requiring north of 600hp or looking for marginal gains in efficiency, fuel use and output, there are only a small number of tractors available to buyers.

For David Rowe, tracks have had a place on his arable and potato operation since 1999, and having used them for 25 years, he says he wouldn't be without them.

FW Rowe and Sons is based in south east Staffordshire but operates across Leicestershire, Warwickshire and Derbyshire. "We have about 1700ha of combinable crops, 57ha of potatoes and do some contracting work as well," explains David.

"We still have around 324ha of oilseed rape, 445ha of winter barley and

810ha of winter wheat, and although we did grow a little spring barley and spring wheat this year, we usually aim to only grow winter crops and have everything established in the autumn."

Runn

He says his soils are incredibly varied and range from heavy clay to light sandy land. "We sometimes have all of these types in one field, which makes it very difficult to roll out operations meaning we have to be flexible in what we do," adds David.

#### **Cultivations**

Tillage is mostly without full inversion, but David explains they do still move a fair amount of the soil. "We use a Sumo Quatro and a Väderstad Topdown for primary cultivations and then either a Väderstad Rexius Twin Press or something like a Pöttinger Terradisc after. We then use a Väderstad NZ Aggressive before we drill.

"We've maintained carrying out more cultivations to support better establishment across fields. We do venture into direct drilling when we can, but found it worked in some parts of fields and not in others. We don't want to roll out different approaches across the farm and find in some places it's compromised establishment, especially when establishment is everything.

ing on track

"If crops establish well in the autumn, then from this point until harvest the process is pretty straightforward, meaning we can afford to apply sufficient inputs to hopefully get a good crop at the end."

David's first tracked machine was a John Deere 8400T, whereas he now has a 9RX 640 articulated quad track, an 11-year-old 9560T twin tracked machine and two 8RXs on four tracks which are front steered. The latter undertake a lot of drilling and top work, while the former two carry out most cultivation work.

Prior to 1999, the tractors had been run on dual wheels which required a lot of rubber on the ground. "We tried moving to singles but with wider tyres, however these never seemed to have any grip when on machines with more than 300-350hp, and the tractors would struggle to put

![](_page_53_Picture_17.jpeg)

One of the key differences when FW Rowe and Sons switched to tracks was how the tractors were suddenly more capable of pulling everything while causing less compaction.

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![](_page_54_Picture_3.jpeg)

V-FLEXA is BKT's response for field and road transport with very heavy loads avoiding soil compaction.

![](_page_54_Picture_5.jpeg)

![](_page_54_Picture_6.jpeg)

![](_page_54_Picture_7.jpeg)

![](_page_54_Picture_9.jpeg)

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![](_page_54_Picture_11.jpeg)

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energy into the ground through the tyres.

"We know tyres have moved on since then but we're still sceptical about how well they work with higher horsepower tractors and how kind they can be to the soil. But with tracks we can put the power down and have a minimised footprint."

And while some might consider tracks to be more troublesome when it comes to road transport, David says machines all fold to 3m and can be moved fairly easily between the areas of his land which are more scattered. "However, we do run the machines slower than others might with tyres to preserve track life."

David's previous 9RX was purchased in 2016 and when he sold it, the machine went with its original tracks on, demonstrating that careful management can avoid heavy wearing. "It's not often we have to change a set of tracks because we've been conscious of looking after them right, but this does mean travelling at 30km/h rather than 40km/h or below on roads to keep the temperature of the tracks down."

One of the key differences David noticed when he switched to tracks was how the tractors were suddenly more capable of pulling everything he wanted them to. "We were able to travel across the ground a lot easier and there was a lot less compaction.

"We're conscious that anything we do will cause compaction. so our combine also runs on tracks and our trailers are on wide tyres.

"We don't operate a full controlled traffic farming (CTF) system but combines, spring tines, drills and rollers can adopt CTF at 13.3m."

Harvest 2023 saw fairly wet ground conditions but David highlights that the tracked machines didn't create further compaction because of their even weight distribution.

Additionally with the larger tractors, tracks negated the necessity to add, remove or change ballast weights every time a different piece of equipment was

![](_page_55_Picture_10.jpeg)

Tracks have negated the necessity to add, remove or change ballast weights every time a different piece of equipment is used at FW Rowe and Sons.

being used. "When we put big kit onto smaller tractors, we'd have to add weight and then when we wanted to do lighter work, we'd be taking them back off.

"But with the large tracked machines, these can undertake both in land or on top work without adding weight, meaning we aren't having to spend as much time setting up for different jobs."

David admits that a degree of consciousness is necessary with tracks to ensure the machines are kept on top of firm land and not run in furrows which they're not best suited to. "We avoid running this to maintain track life because running them through 60cm of mud, sludge and water has an impact."

#### Loyal to JD

John Deere machines have had a place on the farm for a long time, with the latest tractors set up to be integrated with one another to optimise guidance equipment. "The tractors have performed well for us and the residual value is very good. We were the first farm in the UK to have the new 9RX demonstration in 2015 – maybe even in Europe - because we wanted John Deere to produce a tractor similar to the Case Quadtrac and when it did we jumped on it."

Before this we ran a 9620 with H-Traks from 2007 to 2016, and before purchasing

![](_page_55_Picture_18.jpeg)

Care is taken at FW Rowe and Sons to ensure the tracked machines are kept on top of firm land and not run in furrows which they're not best suited to.

the two 8RXs we had two 8345RT machines on twin tracks. "The only criticism of the twin tracks was that they scuffed the headlands a little, so moving to the 8RX was the natural progression.

"We purchased a wheeled 8R 370 last year to have more flexibility in wetter conditions and for more power on our bed tiller when planting potatoes. We originally felt that we wanted another RX machine but the 370 is mostly used on our 6m combination drill meaning it's not as critical to have it on tracks all the time," he explains.

"But the difference between how the RX and the 370 pulls is really noticeable. We have to put weights onto the 370 and let the tyres down and it still can't pull anything like how the tracked machine can, it just runs out of grip.

"In the spring of 2024, we had a 12m Horsch Avatar direct drill on demonstration which we originally pulled with the 370R, there was noticeable soil disturbance behind the wheels, so we changed to the 8RX and we were surprised at how little soil disturbance there was."

Tracked machines are also an established tool at J D Mee and Son. After owning a Fendt 943 MT for five years, Olly Mee upgraded to the larger Fendt 1162 MT following an increase in farmed hectarage and the requirement to cover fields with greater efficiency while reducing operating costs.

The farm has a long history of owning twin-track crawlers, previously Challenger models and now Fendt, with the latest tractor arriving in July 2024. Olly says the new machine has impressed during the first 350 hours, with the biggest advantage being the fuel saving thanks to the Vario transmission and Fendt's TMS technology.

"The 1162 MT has averaged about 65 I/ hour pulling our 5m Keeble cultivator at 11kph, which has already produced a saving on the previous machine and significant

![](_page_55_Picture_28.jpeg)

![](_page_56_Picture_1.jpeg)

Olly Mee observes that although his new Fendt 1162 MT is wider than his previous tractor, the design means the weight is spread well.

reduction from the Challengers we've owned in the past, that averaged about 110 l/hour.

"The 943 MT would pull this cultivator using 90 l/hour and at a slower speed of 8kp/h, so we're covering the ground quicker and using less fuel to do so. The efficiency of the operation has improved considerably."

The 770ha farm based in Tillingham, Essex, is run by Olly, his dad Chris, and uncle Nick. It's flanked by the River Crouch and River Blackwater on each side, with land running to the North Sea coast. Most of the

![](_page_56_Picture_6.jpeg)

The Fendt 1162 MT covers 600 hours per year with one of its main jobs pulling a 5m Keeble Progressive cultivator at J D Mee and Son.

land is heavy clay and requires moving each year via cultivating or rotational ploughing.

Twin-track machines have always been preferred by the farm as the main power source for this work and although the 1162 MT is wider than his previous tractor, Olly says the design means the weight is spread well.

"The tracks offer a longer footprint and they're set wider than the previous crawler, so although it's heavier and has significantly more power, the overall impact on the ground is similar. It also doesn't seem to rock as the much as the smaller model and feels sturdier in comparison – it has an extra track idle wheel on the Smartride suspension which makes a difference." The 1162 MT covers 600 hours per year with its main job pulling a 5m Keeble Progressive cultivator alongside drilling using an 8m Väderstad Rapid. When deciding what to replace the 943 MT with after it had reached 5000 hours, Olly chose the 1162 MT for several reasons.

"I liked that it had the MAN engine and I wanted to go down this route for reliability. We demo-ed a twin-tracked John Deere, and a Case Quadtrac which I'd had experience with before I worked at home. I like the differential option on these but the largest model we could get the stepless transmission in was 540hp, so only 100hp more than our old model.

"The larger engine in our new crawler allows us to achieve greater fuel savings that we couldn't have achieved in

![](_page_56_Picture_14.jpeg)

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![](_page_56_Picture_22.jpeg)

another machine. It'll operate at 1400rpm when pulling the Keeble cultivator, with all the subsoiler legs at 36cm deep, J-tines, discs and a packer working. The bigger 1320-litre fuel tank allows us to go for longer between fill ups."

The farm grows wheat, winter barley, winter beans, peas and lucerne and has two other Fendt tractors – an 828 and a 724 – that all run Trimble guidance from the farm's own RTK base station. With three operators and additional staff at harvest, keeping the same cab interfaces and brands help when switching between machines.

"I really like the Fendts as they're easily customisable and we can save operator profiles that can be loaded as soon as you get into the cab. This also helps as we only learn one system and can get the best out of it.

"Once we're set up, it's just one button at the start and end of each run. As we are owner operators, running Fendt tractors offers us a good mix of comfort, low cost of ownership and ease of use," adds Olly.

He says the 1162 MT has excellent visibility and doesn't feel like a 618hp tractor from the seat. "From the outside the exhaust looks huge, but it's been designed to fit behind the cab's pillar, so you don't notice it."

Another benefit is that the GPS domes and controllers are built into the roof which means they're less likely to be stolen as it isn't as quick to unplug.

Part of the reason for investing in the Fendt 1162 MT was the relationship and support the farm receives from local dealer, Crawfords. "The support is exemplary. Back up to any farm is immensely important so having trust in a dealer to support us when required is the peace of mind we require.

"If anything goes wrong, Crawfords are out to sort it. This allows us to

![](_page_57_Picture_9.jpeg)

One of the key benefits of using the Case IH Quadtrac 540 has been improved weight distribution, says Matthew Addison.

fix costs during a five-year period and I think the service contract is very reasonable for what it covers. I wouldn't be without them," says Olly.

#### **Minimising compaction**

For arable farm manager Matthew Addison, tracks are the solution to minimising soil compaction. The Sir Richard Sutton estate Matthew manages is situated in Lincolnshire, covering 3200ha, with 2355ha cropped. "We've a mixture of soils on this estate, including free draining chalk on the Wolds and heavy clay situated near the Humber bank, which requires careful management."

The estate operates a six-year rotation growing feed and milling wheat, winter barley for feed, spring barley for malting and usually grows oilseed rape – none has been drilling this year – as well as spring beans, vining peas and sugar beet.

"The estate has operated tracked machinery for many years," says Matthew. "We've tried high horsepower wheeled machinery in the past but due to the topography of the Wolds we struggle with putting the power down compared with tracked machinery."

The estate runs two primary tracked machines: a Case IH Quadtrac and a John Deere 8RX 410, with a third supporting tracked Caterpillar in the background to assist with secondary cultivations. "A couple of years ago we made the decision to go to a managed wheelings system because a jump straight to a Controlled Traffic System would be initially quite costly," explains Matthew.

The Quadtrac is used to pull a 12m Horsch Sprinter, a 7m Simba SL700 and a 12m Väderstad Carrier which joined the

![](_page_57_Picture_19.jpeg)

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and services to help farmers globally farm profitably and sustainably.

![](_page_57_Picture_23.jpeg)

#### For more information visit: www.fieldbee.com

#### Packing the power

John Deere recently announced a power expansion at the top end of its tractor range, with three new 9RX models introduced. The 9RX 640, 710 and 830 sit above the three existing models (490, 540, 590) and have had a significant makeover inside and out.

According to John Deere's Michael Mueller, the tractor will fit into operations covering more than 2000ha, particularly those working heavy soils or which have to travel in difficult conditions. "As well as the step up in power, comfort and ease of maintenance have been fundamental to the design of these three models," he says.

Under the hood is the JDX18 engine which has no AdBlue requirement and can deliver

fleet last year to aid with trash management. "Because we've now also embarked on a more min-till approach we've found residue management to be an issue."

One of the key benefits of using tracked tractors has been improved weight distribution, says Matthew. "The machines can weigh up to 24t which can be very damaging to soil structure if not properly 913hp and up to 4234Nm of torque.

The e21 PowerShift gearbox is engineered to harness the high power and torque. Its purely mechanical drive keeps power losses low and the 21 gears feature close spacing so operators can set the right speed for the work they're doing.

Operators will notice the design of the new cab which has 15% more floor space and 20% more glass, offering greater visibility to the field ahead or the rear hitch. Carplay and Android Auto, 65 of seat swivel and a G5 Plus display come as standard, as well as suspension borrowed from the 8RX.

A 9RX 830 configured to suit a typical UK or Irish farm has a list price of around £917,000.

distributed. To try and minimise compaction we've retrofitted a tyre inflation kit to our 12m drill allowing us to drop the tyre pressure on the seed cart, while all combine wheelings are lifted with a low disturbance subsoiler."

Aside from reduced compaction with tracks, the Quadtrac has proven its worth through its track life. "It's only on its second set of tracks within its 6200

![](_page_58_Picture_13.jpeg)

John Deere recently announced a power expansion at the top end of its tractor range, with three new 9RX models introduced.

hours of use, which we feel is costeffective when compared with wheels."

According to Matthew, the estate will always stick with tracks on its primary machines. "Utilising high horsepower machinery with better traction helps to optimise efficiency and so will always have a place in our system on the Lincolnshire estate."

#### Here's an idea 🖗 A cultivator drill so advanced it avoids any overlapping

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![](_page_58_Picture_21.jpeg)

The individual row shut-off distributor head can also easily work with any symmetrical or asymmetrical tramline systems.

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![](_page_58_Picture_25.jpeg)

![](_page_58_Picture_26.jpeg)

![](_page_58_Picture_27.jpeg)

66 The workload grew steadily but the old forager seemed to take it in its stride. 99

#### Foragers

A 50-year legacy is certainly something to write home about, and as Claas' Jaguar celebrates this particular milestone, *CPM* speaks to one farmer who's been loyal to this machine for almost three decades.

By Melanie Jenkins

#### Claas first launched the Jaguar 60SF selfpropelled forage harvester 50 years ago, and since then the machine has become world renowned with more than 45,000 units manufactured.

The Jaguar's journey to success began in the 1970s, with the increasing cultivation of maize and a move away from trailed foragers. Claas entered the market in 1973 with the 120hp Jaguar 60SF, which drew on key components from the trailed Jaguar 60. By 2001, the Jaguar 900 series boasted 600hp while now the current top-of-therange Jaguar 980 produces 925hp.

As Claas celebrates 50 years since it first launched the Jaguar 60SF,

one farmer looks back on his longstanding experience with the brand.

Around 28 years ago, Brian Dawe took the plunge into silage making on his Hampshire farm. Starting out with a nine-year-old Jaguar 690SL, he chopped more than 200ha of grass and a further 200ha of maize in his first season. While it might sound a modest amount by today's standards, at the time it was considered quite an achievement with a second-hand 300hp machine, he says.

#### **Building business**

"The workload grew steadily but the old forager seemed to take it in its stride," continues Brian. "However, with three seasons under our belt I felt we'd proved the business was sound and could justify a change of machine.

"I looked around at other colours but it was pretty clear the Jaguar was still the machine to have so I put my name down for a brand new Jaguar 820. That coincided with another local contractor retiring and suddenly we were looking at chopping 690ha of maize."

Brian says although it felt like a long season, they proved it was possible – it just meant some long nights in the seat. "The biggest difference with the switch from the Jaguar 690 to the 820 was the move from a longitudinally mounted V8 to a transverse V6. This change did away with the 90° gearbox which had a huge impact on efficiency.

**Chopping champs** 

"We immediately saw a 20% increase in output even though the engine had only an extra 20hp – the simpler driveline was just sucking less power," he explains.

"From an operator's point of view it was the cab that really made the difference – it was so much quieter and

![](_page_59_Picture_16.jpeg)

Around 28 years ago Brian Dawe took the plunge into silage making on his Hampshire farm, starting out with a nine-year-old Claas Jaguar 690SL.

#### **Foragers**

#### **New Holland UltraFeed**

New Holland has introduced a renewed version of its grass pick-up, the UltraFeed, on its refreshed FR forage harvester range for 2024. Presented in 3.0m, 3.5m and 4.0m working widths, the pick-up is designed to enhance crop flow to allow each FR forage harvester model to handle the largest crop volumes and exploit the full capacity of the chopping cylinder and engine.

"We've used our experience in all kinds of swathed crops to design this new grass pickup," says New Holland's Henrik Aaskov Hansen. "Our engineers' aim was to perfect the crop flow, with an even, direct feed to the forage harvester, for greater throughput and more productivity."

A new auger design with a belt driven, heavy-

simple things like the positioning and action of the hydrostat lever meant you weren't leant over all day and aching the next. And having all of the functions grouped on the stick rather than a series of levers and pedals meant you were able to respond that much quicker."

With four years' work under its belt, the 820 was replaced by another of the same which did a similar stint. It was at this point that an opportunity arose that would see the forager's working window stretched by some margin.

"In the early 2000s, I was approached by United Oilseeds to see if I'd have the capacity to pick up their morphine poppies," says Brian. "With poppy harvest generally taking place through August – typically a quieter time for grass harvesting in Hampshire – I could see an opportunity to extend our acreage without piling up more work at busy times.

"While it was initially very manageable, the demand for the crop grew massively and pretty quickly we were looking at clearing 1010-1215ha within a couple of weeks. Having a bigger machine was never really an option as invariably we'd have to be in two places at once, so we went all out and bought a second 830."

Some of the steep rolling ground on the farm would see the Jaguars scrabbling, so Brian's next machines were ordered with 4WD. "With increasingly challenging weather throughout the season becoming the norm – whether in grass or maize – it's cheap insurance knowing we won't get stuck and we'd never not have 4WD now. It also means we're not wearing out tyres unnecessarily on some of the flinty ground that Hampshire is famous for." duty driveline matches the capacity and reduced maintenance requirements while minimising risk of crop wrapping. Other advantages include reduced maintenance, longer service life and greater operator comfort during long days, from the even crop flow when chopping, he explains.

A single large roller windguard provides swath pre-compression for even feeding in light crops and helping avoid bulldozing in dense swaths. It opens up to 160cm for easy access to the header if necessary. A seethrough mesh provides a clear view of crop flow into the header, and LEDs illuminate the auger and feed rolls in low light conditions.

Upgraded hardware on the new cam-track pick-up reel eases replacement tine installation,

![](_page_60_Picture_13.jpeg)

New Holland has introduced a renewed version of its grass pick-up, the UltraFeed, on its refreshed FR forage harvester range for 2024.

cutting replacement time to just 90 seconds. A more compact reel gearbox provides a 25% increase in reel speed where required, matching the pick-up's higher capacity.

![](_page_60_Picture_16.jpeg)

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#### Foragers

►

A move in poppy growing and processing to other parts of the world saw the United Oilseeds workload diminish to the point when in 2016, only a single forager was required. "By then an 840 was the smallest model in the range which was capable of comfortably managing our grass and maize single-handedly."

It also had a trick hidden up its sleeve, notes Brian. "If the metal detector kicked in it'd stop the transmission dead. It's a brilliant feature, but during the first season striking out in maize one of our trailer drivers was a bit close to the back of the new machine, the forager stopped all of a sudden and he carried on. It cost us the rear corner panel but has repeatedly saved us swallowing anything nasty – I wouldn't be without it now."

Several years after purchasing the first 840, Brian invested in a second. "With its new joystick, armrest controls and touchscreen, the 2019 machine was

![](_page_61_Picture_4.jpeg)

The latest machine to join the Brian Dawe's line-up is a Jaguar 840, which is equipped with GPS autosteering and Quantimeter yield recording.

#### Fendt Katana

Fendt launched the Katana 850 in 2022 with the first machines arriving to the UK for the 2023 season. The latest model features a revised crop flow, reversible fan with variable fan blade pitch technology, and a new 12-row header.

The 850 has an in-line six-cylinder engine which provides 847hp and has been engineered to optimise torque characteristics while reducing maintenance costs. This is partly achieved through Eco Mode, a fuel-saving system which maintains the running speed of the chopping cylinder at a reduced engine speed, explains Fendt's Ed Dennett.

"The Katana also features a seven-step engine speed control to further reduce fuel consumption. Operators can choose between 1600rpm and 1900rpm in 50rpm increments. Four different torque curves are stored in the machine, each optimally designed for the selected engine speed."

![](_page_61_Picture_11.jpeg)

The latest Fendt Katana 850 model features a revised crop flow, reversible fan with variable fan blade pitch technology, and a new 12-row header.

Like the smaller Katana 650, the 850 can be specified with a reversible fan to enable the pitch adjustment of the individual fan blades for efficient cooling, he says. "This is managed automatically and any residual fan power is fed into the rest of the machine. The reversing function on the fan also cleans the cooling package of debris and fine dust."

In 2023, a new generation of pro maize headers from Kemper was made available to lower cob and harvest losses, improve performance and optimise crop flow.

Chop quality and length are handled by six pre-compression rollers on the feed intake which ensure optimum forage pre-compression. Metal and stone detectors on the first pre-compression rollers prevent damage to the chopping cylinder. In the rear area of the feed intake, the crop volume is recorded via a sensor allowing this data to be available for yield monitoring and documentation.

The Katana features a revised discharge chute that blows the crop into the trailer to minimise losses. The loading height of up to 6.20m also enables accurate crop transfer, even with large trailers, adds Ed.

Fendt also offers an optional silage additive system which is fully integrated into the vehicle and has a tank capacity of 215 litres. "For those looking to manage forage quality on the move there's also an optional NIR sensor which analyses the dry matter content of the crop," he concludes.

#### Foragers

#### **Krone updates**

Krone has introduced a number of new tools to its foragers including a sharpening stone. This sharpens the blades on the chopping drum and stands out for a longer maintenance interval, high operator comfort and less abrasion. The new sharpener carries out 2200 grinding cycles without requiring manual readjustment.

Additionally a new dual-purpose NIR Control sensor, which helps to measure and record nutrient levels in grass, maize and whole crop silage as these crops are being harvested, has been introduced.

The firm's new EasyLoad auto-filling system fills trailers automatically by controlling the spout. The technology behind it consists of a system of cameras that mount on the spout and a software that detects the trailer contours and controls the spout accordingly. At the same time, the software also detects the current fill level so the spout continues filling all the way up to the trailer's capacity

The final addition to its forager range, the XtraPower assistance system is unique and according to Krone, a world-first innovation. This feature

![](_page_62_Picture_6.jpeg)

Krone has introduced a number of new tools to its foragers including a sharpening stone, a new dual-purpose NIR Control sensor and the EasyLoad auto-filling system.

is designed to bring maximum flexibility and extra engine power into the machine depending on requirements and local harvest conditions. After the purchased machine is registered, the extra power is immediately enabled at mykrone.green and ready for retrieval whenever necessary.

another step on again. It was so much more driver-friendly with electronically selected gears and the ability to sharpen up and adjust the shear-bar from the cab."

#### **GPS** steering

The latest machine to join the lineup is a 2023-plate 840, which is equipped with GPS auto-steering and Quantimeter yield recording. "Going to GPS steering has made life that little bit easier, especially when we're chopping maize that's been sown with a cereal drill," acknowledges Brian.

"I don't have to concentrate so hard meaning I'm less tired coming off the forager. It also links well with yield mapping – I can now email customers maps to show them how their crops have performed and which areas could do with a bit of help."

In time, Brian says he can see yield mapping becoming a useful tool in moving to a charging system that's fairer on both the farmer and contractor. "By recording exactly what tonnage of crop has gone through the machine we can give growers a precise picture of what's in the clamp and bill accordingly. That way they only pay for what they're getting, and if they choose to prioritise high quality multi-cut grass, they're not getting penalised. Likewise, we're paid fairly for every tonne we've processed.

"Even though the very first Jaguar I bought was nine years old, it was a solid, reliable machine. And every one we've had since then – nine in total – has proved to be the same. We've tried other makes during this time, but nothing matches a Claas." ■ <text>

KRM SM-P tine drills feature the heavy duty SM coulters with their narrow carbide tip which are ideally suited to direct drilling or sowing into mintill seedbeds. The ISObus controlled electric metering system is fed from the pressurised hopper for accurate sowing rates from 4-400kg/ha. Available in working widths up to 8m and with wide spaced options available suitable for mechanical weeding.

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![](_page_62_Picture_18.jpeg)

Pantero 7004

66 I've enjoyed being part of this family and it's been a real highlight to see how the business has progressed. 99

MAZONE

What separates a job from a career? While a job pays the bills, careers are built over years, with learning and craftsmanship poured into them. As Amazone's Simon Brown retires, CPM finds out what's shaped his time with the firm.

By Melanie Jenkins

When thinking about the leaders of large companies, chances are for anyone on the outside they're an unknown figure, yet many in the agricultural community will have had a very different experience with Amazone's recently retired managing director, Simon Brown.

A recognisable individual, many will testify that Simon makes time for anyone who wishes to speak to him, willing to share his wealth of knowledge and experience. But after an impressive 40 years with the firm, Simon has (almost) set aside his toolkit to enjoy a well-earned (part-time) retirement with his family, while keeping an oar in the water by continuing to work a day a week for Amazone.

"I've had a lot of different roles within the firm - there's no aspect of the company I've not tried or been involved

# On farm opinion A career well crafted

with - and this has eventually lead to becoming managing director," he says.

So what paved Simon's way into a job as a field service engineer and then up to managing director of one of the bestknown implement manufacturers? It was a chance encounter with the farm manager of British Steel's local farm at a cricket dinner aged 13, which saw Simon take his first foray into agriculture. "He asked what I was doing the next morning and invited me to come milking - that's how it all started. From then on I was hooked and spent every hour I could farming."

#### **Degree switch**

After enrolling to study agriculture at Harper Adams University, Simon took his pre-college year out to milk cows at a different farm, but when this didn't quite work out as he'd hoped, it almost resulted in him looking at careers elsewhere.

"It made me realise I didn't have sufficient interest in livestock farming and I even wondered if there was a career in agriculture as a non-farmer. Luckily Harper had launched a course in agricultural engineering and I realised this was just my cup of tea so I switched to this."

After completing his course, Simon joined East Anglian Ford dealers, Dalgety Eastern Engineers, but shortly after saw a job for a service engineer advertised in Farmers Weekly. He took a punt and it turned out to be Amazone in its earliest form in the UK.

"I started in October 1982 and was part of a team of just three UK employees.

We didn't have an office, instead working out of my boss' garage with spare parts located on a farm in Wiltshire."

Prior to this, Amazone's UK presence had first been facilitated by Curtis and Padwick which imported Amazone and Claas machines, followed by Taskers of Andover which was part of the John Brown Engineering group. When Taskers looked to leave agricultural machinery, Amazone took on its UK stock in 1983 and launched Amazone Ltd.

Before that launch in Britain, Simon

![](_page_63_Picture_19.jpeg)

After working for Amazone for 40 years, having undertaken almost every job possible in the company, Simon Brown has retired.

#### **On farm opinion**

worked for part of a year in Germany, embracing the opportunity to learn the language and immersing himself in the kit Amazone produced. "I loved living in Germany and would have liked to have spent more time there, but it wasn't easy because of having a family back home."

On his return to the England, Simon looked after field service and parts while Amazone Ltd. took over a disused World War II air hangar near Hungerford called Cuckoo Copse. He then dropped the parts aspect of his role, focusing solely on service as the business grew at a fast rate.

"We grew in number and turnover dramatically during the early years and by 1990, when I'd effectively completed seven years of 'spannering', a sales opportunity arose covering Yorkshire down to the Thames."

Although this meant a move from Hungerford to Grantham, Simon took the chance and it paid off – he still lives there now. "It was a lucky move because at the time we were looking for a service depot and the firm ended up buying land just south of Doncaster in Harworth. So the move meant I ended up with a doorstep office. Latterly, after the purchase of nearby Orchard Farm, I supervised the build and commissioning of their stateof-the art training, research and product support facility which has plenty of space for outside demonstrations."

Simon reminisces about how in those early days his 'working day' used to end – he'd return home and then have to ring everyone who'd left messages either on his answer phone or with his wife during the day. "The working day didn't stop when you arrived home, and in some

![](_page_64_Picture_6.jpeg)

Launched at Stoneleigh in April 1983, the ZA-U 1001 was the machine that put Amazone firmly on the map.

ways mobile phones changed all of that."

#### **Night school**

In 2002, Simon moved from sales back into service to become the service manager, working from the Doncaster depot. "This is when I decided to attend night school to achieve my O-Level, AS and A2 in German. Because I was dealing with the factories more, it was both useful and more respectful to converse in the native tongue of the teams I was contacting so regularly. It was invaluable to learn because I still help with the German marketing side of things now."

Around the same time, the original managing director of Amazone's British subsidiary retired and his shares in the business were bought out by Amazone, meaning the firm

![](_page_64_Picture_12.jpeg)

Amazone is already pushing automation through its partnership with Agxeed with the technology potentially able to appeal to different areas of agriculture.

then owned the branch entirely. "The UK was Amazone's first exploration into having its own business outside of Germany, and this has now become a fairly common model in the multiple countries where there are subsidiaries."

At this stage, the firm was importing Krone machinery and dabbling with Strautmann kit and Elho bale wrappers. "We wanted to be able to supply the dealer with a full line of arable, grassland and livestock equipment – and this worked to a degree, but by 2008 Krone split away and we went in our own direction, which coincided with dramatic developments in the product line-up such as the move into producing passive soil tillage kit, broadacre drills and selfpropelled sprayers," explains Simon.

These developments resulted in the firm supporting both a separate service manager and product manager, so Simon took on the role of brand manager which he did solely until 2018 when he also became managing director. "The business wasn't large enough to support two individual roles, so I did both, but now these have separated."

The ethos at Amazone's heart has been one of looking after its employees and taking a personal approach to getting to know its team members and their families. "It was like this when Heinrich Dreyer first founded the firm and it's still the same now, four generations later. We're down-to-earth grafters and like people who follow that trend, meaning staff retention is good.

"I've enjoyed being part of this family and it's been a real highlight to see how the business has progressed. When I joined Amazone, it turned over

#### **On farm opinion**

€80M, and last year this was €804M. while in the UK it's gone from taking £300,000 in the first year to well over £30M last year, so there's been a fairly incremental increase in the business."

Beyond this, he feels privileged to have seen numerous developments to both kit and technology. "Some of the advancements I've witnessed are already long in the tooth such as GPS and variable rate spreading, which were first introduced in the 1990s. But every year technology achieves more and the capabilities of the kit increases - it's fascinating to see what it can do and how well farming takes this all on board."

#### **Embracing change**

Simon recounts one instance at a farm in Norfolk where a 20m pneumatic boom spreader was being introduced. "It was the first computer controlled, basic forward speed-related spread rate machine, back in the days of AmaTron I. The tractor driver stepped out of the cab, said it was beyond anything he'd be able to cope with and left. The farm manager and I looked at one another and didn't know what to say. But this is the only time I've ever come across a driver who wasn't keen to embrace new technology."

At the other end of the spectrum, he recalls a one-man-band farmer in Barnsley who looked after 202ha by himself until he passed away, aged 93. "He ran John Deere and Amazone machines and did all of the work himself. Up until the day he died, a few years ago now, he was running the newest technology with a high-tech sprayer, mapping on his spreader and drill and a combine that could do everything."

Of all the new machines Simon has

![](_page_65_Picture_7.jpeg)

Amazone's Simon Brown steps down as managing director in 2024, passing the baton to Matt Smith.

![](_page_65_Picture_9.jpeg)

Spreading technology has advanced significantly in the past 40 years, with machines now able to adjust for wind speed and direction, modify spread at headlands and utilise spread pattern radar.

seen developed, he's most impressed by how spreaders have advanced. When he first joined the firm, the 24m spreader was just being introduced. "While I was working in Germany, I helped to build the first prototype ZA-U 1001 and brought that to market. To see how spreading has developed in that time and to understand what it can do now is incredible.

"We've gone from the days of just having twin disc spreaders to being able to adjust for wind speed and direction, modify spread at headlands, utilise spread pattern checking radar and can work up to 54m tramlines. And this technology is available in machines that cost £30,000-£40,000 when your fertiliser bill could be £1M. Working in tangent with GPS this technology is what'll drive efficiencies and help justify the continued use of fertiliser on crops."

He feels that the role GPS has played - and will continue to play for the industry - can't be understated. "It's revolutionised farming, whether you're running an Amazone machine, a combine or a baler. Whereas the plough originated 5000 years ago, seed drills in the 1800s and spraying in the 1950s, none of these processes have altered that much from the foundational principle, but how we control these systems and handle the inputs and resources at our disposal has."

And just as some aspects of technology are similar now to how they've been decades past, so too are the experiences of farmers. "Amazone's founder Heinrich, kept a diary most days that detailed issues experienced by agriculture. This ran from the late 1800s to the 1920s and recorded the price of things such as pork and milk, the weather and how many machines the company was making. And the issues faced then were aspects such as hail and flooding, so nothing much has actually changed in the cyclical fortunes of farming.

"The challenges experienced come and go, then come back around. We have good and bad years and every 10 years in the past 40 of my career there's been a downturn, but things then improve again. These hiccups have helped to shape farming to a degree, driving efficiency, machinery developments and purchases," he observes.

Simon believes that it's Amazone's philosophy of investing during these tougher times that's helped the firm to prepare for when better periods come back around. "Money is spent on R&D and production rationalisation investment which can be anything from new robotic welding systems, to sheds and factories.

"Constantly investing money back into the business has meant we don't have to lay people off and then, when money is flowing back in again, we already have machines that are right and ready for this."

So far as future challenges go, Simon views the next great frontier as automation. Already being pushed forward by firms such as Amazone, he sees the various levels of sophistication of the technology appealing in different areas of agriculture, and even envisions that it could stem the depletion of medium sized farms and see a return to smaller scale management.

But without doubt, he feels that yield will remain the greatest driver in how the industry progresses. "If we're to feed more people with less, then improving yield is the only way to do so. We can't lose sight of the fact that we have to feed the world and this is going to be a huge challenge.

"But I don't think there's any business that operates on such a personal level as farming does, where the crossindustry contact ranges so widely and such close friendships from all walks of life are formed. It's made for a great career and if I won the lottery tomorrow, I'd go out and buy a farm."

![](_page_65_Picture_22.jpeg)

![](_page_66_Picture_0.jpeg)

#### From dust to clart

Firstly a few positives - for one, our late-drilled spring cereals were just about worth sowing; not anything like as good as the earlier planted crops, but I didn't expect they would be. However, the rent is to pay and I don't like to see bare fields.

Grain N in Laureate barley was 1.42% which was as much a low record as last year's 2.07 high, meaning it made the grade to fill the spec I sold it forward at, for a price comfortably above the current market.

Yield varied from a poor 3.3t/ ha to a better 5.1t/ha, mostly dictated by soil type and drilling date. Spring oats varied from 4.6t/ha to 6.3t/ha with a better than expected hl weight, so again met the spec and were sold forward at decent money for milling. The straw from both crops is a welcome bolster for our pigs this winter.

Invariably, things haven't all gone well. The spring beans are still to harvest as I write this on 30 September and the rain continues to pour down. Wheat vields look better if I work them out on the harvested rather than sown area, varying from a poor 4.7t/ha on heavy

wet land to a more acceptable 8.7t/ha on light land after potatoes. Not a disaster as an average for this year, but pretty poor all the same.

Our autumn cereals are just about all sown via a variety of methods. Wheat on the 6.5ha of fallowed land has been direct drilled into an oat and bean cover crop that was strip-till established, whereas wheat after oats and second wheat has been strip-tilled after an initial light cultivation, and all rolled down before the rain. Most of the winter barley land was ploughed, pressed and drilled in a more conventional fashion, mostly to control sterile brome and volunteer wheat.

At this point we're vet to harvest any potatoes, but most are now flailed and sprayed with carfentrazone, or will be in the next week. We've held off a good week longer than we might have done to squeeze every last kilo of yield from what are lacklustre crops in the main.

Some dry matters have been very high with evidence of internal defects from stress - the recent rain seems to have improved matters in this regard at least, and will now give crops a gentler ride over the harvester.

Potato varieties have surprised me this time indeterminate varieties have died off early whereas determinate ones have surprisingly held on for a usual length of time. Tubers are down in number but up in size for most crops, and at this point I estimate yield to average around 20% below contract

levels - the worst will be a lot worse than that from my digs.

It remains to be seen whether sprout control in store will be an issue following a hot summer and less than ideal conditions for applying maleic hydrazide - crops are going to take some watching in store this winter.

Potato stores are always easier to manage when they're full rather than part filled be that managing sprout control, cold pockets of air, hot spots, energy efficiency or condensation. Our youngest store is now 32-years-old and the oldest 44-years-old, but it's a long time since potato profitability alone was sufficiently prolific to justify building a new one. I'm not sure at age 47 that I have enough years ahead of me to justify building one even if the numbers looked a bit better.

Potato growers are a resilient bunch, but 2024 has once again proved to be a mettle tester - I feel that change is coming but it has to get a wriggle on. Our product is vastly undervalued by our markets and the risks of growing potatoes are way higher than even potential rewards if everything goes right.

Jam tomorrow doesn't pay the bills of today. We have to make enough money on a regular basis to reinvest or backward is the inevitable trajectory. At one time, small growers were absorbed by larger operators, but increasingly scale isn't any guarantee of a fruitful future, in fact, the

opposite can be the case. I halved my potato area

by Andrew Wilson

seven years ago with no regrets and we were by no means a large operator back then. I love being a part of the potato industry but eternal optimism is no longer sufficient to tolerate ever increasing costs. weather volatility. reducing tools, financial, physical and mental pressure, let alone ever greater data harvesting for ever less value.

In some respects I must sound like a broken record - it's not that long ago I mooted the possibility of NoSpudSlingsby. The market responded with what was at the time a meaningful price increase, but it hasn't kept pace. We don't want flowery details and lots of hoop jumping; we want a realistic price which allows us to make a decent return. It's really no more complicated than that.

Here's hoping that Mother Nature has had her fun and lets us get our crops harvested before winter properly sets in.

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

@SpudSlingsby

The weed harrow Thulit Shows true greatness.

#### 

New!

66 We can have a good go at making a dent in the carbon footprint number, even if we can't ultimately get there. 99

## Potato Days event Net zero potatoes

Sustainability was the key discussion point at the new Potato Days UK event held at Dyson Farming in Lincolnshire. *CPM* joined delegates to find out more. *By Mike Abram* 

Sustainability – whether debating the question of if net zero is possible, or indeed necessary, within potatoes, or looking for ways of reducing inputs to grow the crop in a more environmentally-friendly way – was the key theme at the new Potato Days UK event hosted recently.

Held at Dyson Farming headquarters on the Nocton Estate and run by Agritechnica organiser DLG, the two-day event was opened by Mark Willcox, agronomy director at Branston. He began by kicking off a panel session which debated whether net zero is possible in potatoes.

"We can have a good go at making

a dent in the [carbon footprint] number, even if we can't ultimately get there," he suggested, with optimism.

Mark explained that UK agriculture's percentage of the country's carbon emissions is increasing due to other industries making progress in reducing their footprints, while agriculture remains flat.

"Our 50M tonnes of emissions now represent about 12% of UK PLC," he said. "It's fair to say we haven't really applied ourselves to the challenge yet, but with retailers thinking about commitments and brands considering what they can claim, that might be the compelling reason for getting the numbers moving."

#### **Big buckets**

Modelling suggests around 100,000t of carbon dioxide equivalent emissions are wrapped up in a 350,000t end-to-end potato supply chain, with growing and storing potatoes accounting for between a quarter and a third of emissions. Transport and haulage of potatoes and packaging are the other 'big buckets' when it comes to emissions, added Mark.

Perhaps unsurprisingly, fertiliser, especially nitrogen, accounts for the largest chunk of emissions associated with growing and storing, while cold storage accounts for 18% and farm fuels next on the list.

According to Mark, Branston has already taken steps to reduce its scopeone and -two emissions by doubling its solar capability to provide around 30% of its total energy, and by deducing that finished goods don't have to be chilled

![](_page_67_Picture_14.jpeg)

Branston's Mark Willcox said UK agriculture's percentage of the country's carbon emissions is increasing due to other industries making progress in reducing their footprints, while agriculture remains flat.

#### **Potato Days event**

for seven or eight months of the year. Whereas previously, they were chilled all year round, he said. "Which has saved a lot more fuel than you'd think."

The firm also has a target for a double-digit reduction in mpg for fuel use, which it's achieving through minor modifications to vehicles and measuring trailer and driver performance.

Mark said investment is also helping. For example, a new mashed potato facility has been installed with an ammonia refrigerant system with zero global warming potential. Then, other plans include using renewable energy guarantees of origin (REGO) sourced electricity, exploring ground source heat pumps as an alternative to heating the last remaining factory which uses fossil fuels, and alternative fuels for trucks.

"Out of our 70 trucks, one of them is electric – I'm not sure about it – while a stepping stone to hydrogen might be biomethane. That could be an option, so we're trialling one of those too," said Mark.

He added that an onsite anaerobic digestion plant could potentially supply biomethane if the gas was scrubbed.

#### **Collaborative project**

On the farming side, progress had been accelerated through involvement in a 3.5-year Innovate UK-funded project with B-Hive, the University of Lincoln, Crop Systems and two potato growers, he said, with six potential mechanisms for reducing emissions identified.

These include low nitrogen varieties, which studies have shown capable of achieving the same marketable yield but using 50% less applied nitrogen. "We now have to work out whether they cook properly and eat consistently," said Mark.

The second mechanism is using low carbon fertiliser – Branston has been undertaking a six-year trial with a product from CCm Technologies which could cut emissions by 70%, with others also being tested.

Alongside using alternative fuels in tractors, Branston is also measuring the release of greenhouse gases after every type of cultivation on different soil types to understand the impact of cultivations, added Mark.

Whereas a fourth part of the mix could be using in-crop removals which capture carbon dioxide such as applying basalt rock to soils ahead of potatoes or other crops. Another example of potential in-crop removal is photocatalytic foliar applications which react with sunlight and

![](_page_68_Picture_12.jpeg)

To open the new Potato Days UK event, a panel session debated whether net zero is possible in potatoes. Photo: Mike Abram.

convert passing nitrous oxide molecules into harmless nitrogen and oxygen gases.

Reducing the energy required for long-term potato storage by more than 50% is another target the project is investigating, comparing a low energy store with an existing one. "Around 30% would be achieved by new innovation, with the remaining 20% from solar panels which should be standard on stores if affordable," suggested Mark. Finally, opportunities through the Precision Breeding Act to develop varieties which cut waste, for example, by reducing bruising, could prove a quick way to reduce carbon footprints, he said.

These potential changes and innovations are behind Mark's optimism regarding whether net zero could be possible. "Currently, a potato crop emits about 82kgCO<sub>2</sub>e/t packed, and just using low carbon fertiliser will reduce that by 30kgCO<sub>2</sub>e/t, new fuels another 4.5t and if the low energy cold store works, which we will know in around eight months' time, 7.5tCO<sub>2</sub>e/t.

#### **Project developing cost-effective regen potatoes**

A three-year Innovate UK-funded research programme is aiming to develop cost-effective low input farming methods for the potato sector.

Led by Dyson Farming Research, Transformative Reduced Inputs Potatoes (TRIP) is an integrated research programme investigating innovative plant nutrition approaches, reduced and no-tillage methods, low input potato varieties and developing new integrated pest management methods.

All aspects of the project were demonstrated in trials plots at the Potato Days UK event, with Emerald Research focusing on its OptiYield soil analysis, combined with foliar nutrition to reduce fertiliser inputs from 180kgN/ ha to just 30kgN/ha. It's also investigating the potential for reducing pesticidal seed treatments with microbial and biostimulants. Further plots showcased new breeding lines selected by Bangor University for late blight resistance and other low input requirements using conventional breeding methods, while Dyson Farming Research plots investigated the potential for potato production with minimal cultivation by growing the crop under a mulch.

That's the project's most extreme example, said Dyson Farming Research's Christine Jones. "We're also looking at removing different cultivation operations. It's probably a more practical way of reducing cultivations."

Nitrous oxide emissions from the soil are being measured by a prototype free-standing device that can be easily set up and used in the field. Developed by Light Science Technologies it gives the project the ability to compare low input and conventional treatments for greenhouse gas emissions.

#### **Potato Days event**

![](_page_69_Picture_1.jpeg)

According to Dyson Farming's Dan Cross, understanding who values reaching net zero is crucial.

"That takes us halfway without doing anything like banning destoning, only using hydrogen-powered tractors, going organic or using very low nitrogen rates – a recipe for low yields and growers bailing out of potatoes.

"Whereas the project has identified practical steps that will get us halfway there. It'll cost a premium, albeit relatively small though," he noted.

During the following debate, Dan Cross, managing director of Dyson Farming, stressed that understanding who values reaching net zero is crucial. "Are we trying to achieve targets driven by supermarkets or the government, or is there a genuine belief in the population that net zero potatoes or food is beneficial?

"At what point are you willing to pay

a premium of 10-20%? In the shortterm at least, there's a cost to making transitions even when making the logical, sensible ones Mark is suggesting."

Crop-based targets are potentially meaningless in comparison with wholefarm calculations and could create future risks for the industry, he added, suggesting they could be used to drive down production of root crops in the UK if targets weren't achieved.

"The likelihood of our national diet changing significantly to not consume root crops is pretty slim, which would mean we'd just offshore some carbon emissions. So I slightly disagree with Mark's optimism. We have to be hopeful and positive and take action, but also be realistic in what we suggest is possible," he concluded. ■

#### Haute cout-ulm

Destroying potato haulm at the end of the season has become significantly more challenging following the ban of various desiccants such as diquat. But start-up company, Fibe, is hoping to make use of the haulm by turning it into a sustainable textile fibre for the fashion industry.

Fashion is the second most polluting industry in the world after oil and gas, explained David Prior Hope, chief technology officer of Fibe. "This is somewhat due to cotton – a crop which is grown on a land area equivalent to Germany globally each year, using hundreds of trillions of litres of water."

Growing consumer awareness is starting to see increased demand for sustainable fashion, with major brands investing and making targets, added David. "By 2030, it's expected that 88% of textile fibres will be from sustainable materials."

Despite the growing demand for eco cotton alternatives, replacements which meet the same quality often fall short in scalability, affordability or sustainability, he said. "To address this, we have to look for readily available feedstocks at mass scale."

As such, David and his three co-founders, all former Imperial College students, considered agricultural co-products. "Crops that have a co-product have a much lower carbon footprint compared with conventional textile crops," he explained. "And they're more affordable than crops grown solely for textiles."

Potatoes and its haulm stood out, he said. "As well as being the third most important staple food crop in the world, potatoes are local everywhere and with perennial challenges and constraints, there's an appetite for sustainability and innovation."

With around 300,000t of potato haulm discarded or destroyed annually in the UK, and around 150M tonnes globally, Fibe considers it to be the largest untapped agricultural coproduct in the world. Furthermore, it's one which has been considered a nuisance by growers in the face of the diquat ban, points out David.

"With our patent-pending technology we can convert this 150M tonne opportunity into 70% of the world's natural clothing demand. It'll enable growers to not only produce a staple food, but also a feedstock for cottonlike fibres with no additional land, using 99% less water and producing 82% less CO<sub>2</sub>e."

Fibe is in the early stages of developing its technology, having passed a key technical milestone of creating the world's first yarn made from potato stem fibre, highlighted David. But many challenges remain, not least how to harvest the haulm without damaging tubers or creating unnecessary hassle for the grower.

"Up until now we've harvested by hand, but with a goal of being able to harvest the equivalent of up to 100% of the UK's potato haulm by 2030, we've partnered with Grimme to develop a prototype method of automating harvesting as part of an Innovate UK project," said David.

He added that the process should fit in with current haulm destruction practices, with trials this season providing a proof of concept for the machine.

Fibe is also working with NIAB to investigate how agronomic practices such as plant spacing, nitrogen and varietal determinacy,

![](_page_69_Picture_24.jpeg)

Crops that have a co-product have a much lower carbon footprint compared with conventional textile crops, explained Fibe's David Prior Hope. Photo: Mike Abram.

affect canopy growth and structure and in turn the fibre from the potato stem.

"Potato haulm from across the country has given suitable fibres but there are variations in cost and quality," said David.

Next steps involve setting up a pilot production facility, ideally close to a grower group already using growing practices which are optimal for fibre production as well as for tubers, he continued. "We have a clear roadmap for scaling up and hope to see the first clothes made from this fibre in the coming years," concluded David.

## Stand out from the crowd

![](_page_70_Picture_1.jpeg)

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).

![](_page_70_Picture_3.jpeg)

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HOOPOE

66 I don't think we'll get to a position where Conviso varieties dominate the RL, but they're useful in many different ways. 99

## Sugar beet varieties

With the lifting of current season sugar beet crops well underway, variety performance is under scrutiny as growers make decisions on what to sow this spring. *CPM* speaks to those in the know.

By Martin Rickatson

While the way any crop looks through the growing season can have a strong correlation with yield, it's only once it's through the harvester that final judgements can be made on how a variety has performed overall.

As sugar beet lifting gets fully into its stride, growers committed to the crop and considering options for next season have not only current variety choice performance to bear in mind, but also the yield promise, disease resistance scores and other traits of alternatives on the Recommended List, including this year's additions.

It's a decision making process made perhaps more challenging by the expansion of an RL which for 2025 comprises 22 varieties, thanks to six additions. But

## **Compare and contrast**

given the breadth of challenges faced by beet growers, that's a number which is well justified, believes Mike May, former chairman of the sugar beet RL committee, with involvement dating back to the 1980s.

"There was some concern back when we had 18 RL varieties that there were too many, but I think that as breeders develop and include traits to meet various beet-growing challenges, we may well go beyond 22.

"Beyond the stalwarts, life on the RL for a variety is 3-5 years, and the varieties we test are whittled down to around 15 by the last year of Variety List trials, with some withdrawn by their breeders and others rejected in our trials process.

"Most are fairly similar on sugar content and adjusted yield, and there's more to variety performance than yield alone, so growers have to decide on their priority characteristics and assess the variety options that meet them," he says.

According to Mike, the principle of variety inclusion on the RL has always been based on yield, but when he first became involved, more trials were undertaken as costs were lower and fewer varieties were coming forward.

"Now, there are more traits to assess and while that's good, it does make things more complicated. A variety that's not quite there on yield but offers another highly-desirable trait such as a particular disease resistance may well make it onto the RL as a result."

All RL trial plots are treated exactly the same, using the standard treatments of the farmers hosting the trials, he explains.

"For consistency, this has to include conventional herbicide treatments on Conviso types, which makes distinct Conviso variety comparison difficult. The breeders therefore prove ALS tolerance before we accept a Conviso variety into RL trials.

"Relative yield performance will obviously depend on what a variety is being compared with. If that comparison

![](_page_71_Picture_18.jpeg)

Now there are more traits to assess, a variety that's not quite there on yield but offers another highly-desirable trait may well make it onto the RL, explains Mike May.
### **Sugar beet varieties**

is against conventional crops being treated with robust herbicides, crop damage can result, particularly if the weather isn't ideal, and in such a case Conviso types would commonly outyield conventionals," says Mike.

"But in most situations where growers are careful with herbicide choice and application, there would likely be a smaller difference. So we do rely on close dialogue with breeders to ensure we get that full Conviso data from them and from other trials."

### **Resistance management**

The development of further Conviso varieties will be a considerable help to the weed control challenges faced by some growers, he suggests. "But it's essential to consider that the herbicide used to control weeds in a Conviso crop is an ALS type, so care is required to guard against resistance development across a rotation.

"The benefit of the weed control chemistry used traditionally in conventional varieties is that most have a different mode of action to herbicides used in other crops in the rotation.

"Therefore, I don't think we'll get to a position where Conviso varieties dominate the RL, but they are useful in many different ways, particularly for weed beet and for growers who face considerable time pressures in spring. If we're to benefit long-term from Conviso technology, good stewardship – including bolter removal – is essential," he stresses.

Farm and field circumstances will naturally have a significant bearing on the breadth of variety choice a grower has, suggests Mike.

"If you have land with beet cyst nematode your choice is immediately narrowed to tolerant types, for example, but thanks to the breeders those options are available and yield well."

With the RL trials being based on standard field circumstances, disease ratings can be based only on the disease pressure seen across the five trials sites, he adds.

"But the breeders place considerable focus here. In addition to rust and mildew resistance, cercospora incidence is growing in the UK, but as it's been a major issue on the continent for some time, we'll benefit from the tolerant varieties coming through from European breeders. The first of those, Chyma KWS, is on the 2025 list."

Before varieties can be sold or considered for the RL, the Animal and Plant Health Agency (APHA) assesses



The 2025 sugar beet Recommended List includes the first cercospora-tolerant variety, Chyma KWS, which incorporates CR+ genetics.

those put forward by breeders for varietal listing, in a process which has superseded the former National List procedure.

Data from these trials is submitted and used by the RL committee; harvesting of both sets of trials starts in early September with the VL trials completed by mid-October and the RL by the end of November. This is to ensure data can be processed before the year-end in time for assessment ahead of the following season's RL trials, allowing breeders sufficient time to prepare seed supplies.

The RL system has traditionally been based on genetic performance but as it evolves, the RL varieties growers purchase will be ever closer to what's been tested in the RL, says Mike. "For example, in 2021 we changed to seed pelleted with the grower's chosen pelleting. For 2025, trial varieties drilled will receive an advanced treatment, as most commercially-drilled beet seed does."

With three withdrawals and six additions, the 2025 RL offers a choice of 22 varieties. They include the first cercospora-tolerant variety, Chyma KWS, which incorporates CR+ genetics. Unsuited to early sowing and with lower than average rust and powdery mildew scores, it has an adjusted tonnage yield performance compared with controls of 101.0% at 16.9% sugar.

From the same breeder, Josephina KWS has a yield rating of 99.5% adjusted tonnes but at 17.3% sugar, offers the highest content on the RL. It also produced the fewest bolters in early sown bolter trials.

Although it produced a lower establishment population than the other varieties, ST Tweed from Strube produced 98.2% adjusted tonnes at 17.0% sugar. The same breeder's ST Trent produced 97.7% adjusted tonnes at 17.2%, the second highest sugar yield on the list. Meanwhile, Magpie from SesVanderHave produced 97.7% adjusted tonnes at 17.1% sugar.

The final addition is the ALS-tolerant Smart Uma KWS. Its yield in the RL trials (treated with non-ALS herbicides) was 95.3% adjusted tonnes at 17.1% sugar, with the RL committee acknowledging that ALS-tolerant varieties are likely to produce higher yields when used with their partner ALS herbicides than with conventional products.

Beyond specific trait requirements, growers should first split their variety choices into those which can and can't be drilled before mid-March, depending on how early they wish to lift their first beet and have ground clear for following crops, suggests Georgina Barratt, BBRO applied crop scientist.

"If something isn't working well for you, identify the reasons and look for varieties with traits and performances that address them," she says.

#### **Bolter risk**

Those marked with a red cross will produce high bolter numbers if sown too soon and are unsuited to drilling early, explains Georgina. "These include BTS 1915, which has become the market stalwart, joining the RL in 2020. It yields well at 102.2% and 16.9% sugar, forms a tall canopy with long petioles, and its foliage has good rust resistance, but is slightly less repellent of powdery mildew.

"Look at disease scores and relate them to the pressures typically faced in your own fields, considering where your



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"Bear in mind that some high yielding varieties score quite low on certain diseases. If you plan to lift some of your crop later, strong scores and a canopy that stands well post-Christmas – soil fertility may also have an impact here – are especially important to support fungicide programmes."

Conversely, varieties offering higher sugar content suit planned early lifting or drought-prone land, helping to optimise adjusted tonnage returns, adds Georgina. Although data for 'new' diseases like cercospora is still being developed.

"However, growers with cercospora concerns can use the BBRO cercospora monitoring platform and link this with variety performance on-farm. The introduction of Chyma KWS offers a new option if you grow beet in high humidity situations where wet canopies can develop and risk of cercospora development is therefore higher, with three or four fungicide applications necessary."

In terms of other disease traits, Maruscha KWS offers beet mild yellowing virus resistance, and there's some evidence that it performs slightly better under beet yellows virus, she points out.

"Elsewhere, the development of beet cyst nematode-tolerant varieties has been really exciting. A strong trait often has to be balanced against lower yields, but that's not the case with three of the four BCN varieties on the RL, underlining breeders' efforts to combine the traits we want with the yields required.

"If you have fields with an identified BCN issue, these varieties offer an answer. As these new traits come into the market, there's an obvious small amount of yield lag, but we're now at the point where many are yielding just as well as any of the non-specialist trait varieties."

Georgina adds that despite now being the longest-serving variety on the RL, Daphna from KWS, offers BCN tolerance with an adjusted yield of 101.3 and a sugar content of 16.9% – a welcome combination. "Its rust score is slightly lower than average but its powdery mildew score is slightly higher, while its foliage tends to be a little shorter, with a more prostrate growth habit.

"Another BCN-tolerant variety with exactly the same adjusted yield performance, Harryetta KWS, has lower rust resistance but a similar mildew rating. Katjana KWS is similar to Harryetta with a very slightly lower – but still above average – powdery mildew score," lists Georgina.



If something isn't working well on farm, identify the reasons and look for varieties with traits and performances that address them, says BBRO's Georgina Barratt.

### **Increasing parity**

In similar fashion to the way in which the varieties offering a combination of good yield performance and disease resistance have become established, varieties with traits like cercospora and BYMV resistance should soon come alongside fully competitive yields, she believes.

"In terms of other disease challenges, for growers aware they have the more aggressive strain of rhizomania on-farm, Osprey offers a management option as the only AYPR variety on the RL, but it yields well at 97.6t/ha adjusted.

"If seeking a weed management aid on problem land, the three Conviso Smart varieties – Smart Uma and Smart Vesnica from KWS plus BTS Smart 9485 from Betaseed – yield similarly on the RL, but bear in mind that for trial purposes this data comes from use of a conventional herbicide programme, not the Conviso One programme that would be used in practice."

Georgina stresses that Conviso Smart varieties shouldn't be drilled early and bolter control must be thorough. "This is valuable technology which requires good stewardship.

"As with any varieties possessing certain traits, those traits alone won't solve a problem and have to be part of integrated management. But trying a new variety alongside ones which have performed well will also maintain genetic diversity and allow you to benefit from breeding progress," she concludes.

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