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**No one right
answer for
cereal disease
control**



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**Volume 26 Number 1
February 2024**



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Editor's Pick

January can be a tough old month can't it — it seems to go on forever. The days are long, there's a lot of them, and there can often be a heavy weight of expectation for the year ahead. I guess it's wise to remember that as with everything in life, it's only temporary.

I sit here having gained another year on the clock and remind myself that despite the damp drizzly days, there remains a lot of joy in the ordinary. Of course I have goals and aspirations, but actually, if I take a step outside of my own head, there's a lot to be thankful for in the here and now.

So however you feel when you come to read this issue of *CPM*, whether that's good, bad or indifferent, remember that today is just one day. Don't feel guilty if you're not revolutionising the planet, you're still achieving through the small (yet significant) actions that you do.

February — it means back to business for the team here at the magazine starting with cereal disease control (page 8) and T0s (page 16). Due to production constraints, we spoke to experts at the end of January, at which point, it felt a little unkind to press them for their predictions with so many unknowns. However, hopefully there are some useful nuggets to take away.

I must admit, I find *CPM* surveys really insightful, with results from our latest one on biostimulant use on page 30. It's important to also say, they wouldn't be possible without individuals taking the time to share their thoughts, so a big thank you to anyone who took part.

We dive into two lesser known crops with haricot beans on page 52 and hemp on page 57. They won't be for everyone, but I find it fascinating to unpick the potential of niche crops such as these. Hemp also contributes to my sustainable fibres plight, a personal passion which I promise I won't allow to dominate the

pages of this magazine. Whereas let's face it, cheesy beans on toast is definitely a guilty pleasure.

Mike Abram meets French pioneer Frédéric Thomas during a BASE-UK trip on page 63 which makes for an inspiring read. Understanding alternative perspectives can often solidify our own position on a topic, which is why we aim to feature such content.

Melanie reports from Lamma on page 78 which I have to say, after visiting for one of the days, was much bigger than I expected. Having worked in ag-chem for a long time, I've never really had to go before, until now. It's really encouraging to see something do well, I hope the organisers are pleased with the result.

It's bitter sweet for me on page 89 where we pull together initial reactions on the loss of mancozeb. Having been very close to the active in a previous life, it's never nice to say goodbye (even if it's been coming for a while). Dates are still unconfirmed but we explore alternative options.

One of the pure joys of this job is getting to know people on an individual basis and what a delight it was to speak to Adrian Cunnington (page 92). I look at experts such as Adrian and think, well, if I ever know that much about a single topic, my time on earth will have been very well spent.

Just one favour to ask — we've extended our readers' survey. If you have time to answer a few questions about the future of *CPM*, it'd be greatly appreciated, just scan the QR code.

Speak soon,

Janine





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How British Sugar is seeking to make harvesting and delivery of the crop more efficient and transparent.

smith's soapbox

by Guy Smith



key rational of the assurance concept. It assures the customer that what they're buying is produced to high standards from farm to fork. Hence if the logo gets lost somewhere in the food chain, then the purpose is also lost.

Take oilseed rape, for example. UK crushers insist that if I want to sell my OSR to them I have to be Red Tractor assured. So, given these same crushers dominate the market I sell into, I duly go through the annual assurance check which, to be honest, isn't particularly burdensome.

Things like wood pigeons and cabbage stem flea beetle are an infinitely greater hinderance to OSR production

for me than a Red Tractor inspection. But, it's when my OSR leaves the farm and arrives at Tilbury that an overwhelming reality starts to hit home.

Once it's tipped, those same crushers, who seemed so fanatical about the requirement for assurance before the stuff arrived at their intake, suddenly seem to lose all interest to the point that Red Tractor assurance is dismissed with seeming contempt.

As my OSR disappears through the intake grill at the tip, so too its assured identity disappears like a rabbit down a rabbit hole never to be seen again. Once it's out of my hands, no attempt whatsoever is made to segregate it from non-assured imported canola, and thereby the chance to promote my assurance credentials to end consumers is gone.

This particularly hits home when, as a cafe owner, I buy four 20 litre drums of rapeseed oil for our kitchen friers every week.

As an OSR grower who owns a cafe, I'd welcome the chance to spread a provenance message to my customers that could be as wholesome and golden as the oil their chips are fried in, were it guaranteed to be from British farms.

At the cafe we proudly tell our customers that the bacon and the eggs on their breakfast plates are British and produced to high British farm standards as checked by traceable assurance. So why in heaven's name can't I say the same thing about the rapeseed oil that's used to fry those same bacon and eggs?

And let's be clear as to who's responsible — it's not the wholesalers who sell me the oil, it's the crushers who supply them. The unpalatable fact is that while the crushers are only

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

@essexpeasant

too ready to insist the farmer goes to the expense of jumping through the assurance hoops, they can't be bothered to return the compliment at their part of the chain because it's too much trouble to keep it separate from crop grown with no assurance. To add salt to the wound, the crushers know full well that imported OSR is grown with a long list of pesticides banned in the UK.

So, given the current review now being undertaken, if I had one plea to the powers at Red Tractor it would be to check that those processors who demand assurance from their grower suppliers make some attempt to apply those demands on themselves.

There's an important financial consideration here in that Red Tractor is financed by two streams — the growers and those who display the logo on their produce. The non-contributing flies in this otherwise happy ointment are those who pay nothing by wilfully breaking the assurance chain.

Red Tractor has the power to end this processor hypocrisy that makes a mockery of assurance. They should treat their farmer customers with respect and use this power.

No Red Tractor oil on troubled waters

From the perspective of a combinable crops business, a key weakness in Red Tractor assurance would seem to be how little of what leaves my farm ends up with a Red Tractor logo on it.

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Cereal disease control

No one right answer

Given the highly variable field conditions across the country, devising an effective spring fungicide programme may feel like an insurmountable feat. Although it's difficult to predict impending disease pressure with so many unknowns, *CPM* speaks to experts for their thoughts.

By Janine Adamson and Rob Jones

Yet more storms and wet weather, and as a result, unknowns-aplenty. At the time of writing (end of January), it could be viewed as almost unfair to ask industry experts to make predictions for cereal disease control this spring.

However, one theme holds strong among all — get out, walk the crops and evaluate. “There’s no one right answer this year,” says SRUC’s Professor Fiona Burnett. “It’s very much taking an individual on-farm view; look beyond disease scores and consider practical aspects in hope of buying some flexibility,” she says.

According to Fiona, there’s a ‘bigger than ever’ spread of crops. She says in Scotland,

whereas some growers have reasonable potential in the ground, others will have to take drastic action. But regardless of crop status, she stresses the importance of abiding by fungicide best practice.

“For early drilled crops, in reality, we’ve seen relatively few cold snaps to knock back disease but in Scotland, levels currently remain low — only traces of septoria and no yellow rust. This is of course a positive message.

“So with that in mind, I’d be avoiding marginal sprays at T0. There are major concerns around fungicide sensitivity so spraying at this timing should never be a blanket approach,” she says. “Of course if you do have early yellow rust, then absolutely treat the crop.”

Field travel

But being pragmatic, she also reminds that in a year like this, spray windows can be rare in Scotland. “If you’re in a risky disease area with historical problems, having something on a crop through a T0 spray isn’t a daft idea. That’s because of the risk of not being able to travel later on. If you do use a T0, go and check the crop after and be reactive.”

At the other end of the spectrum are those who’ve drilled winter wheat in January and may even be considering February planting. In this situation, Fiona says fungicide approach will be very different.

“Although septoria pressure will be low in these very late drilled crops, there’ll be the risk of yellow rust so aim for an ▶

“*Inoculum will always be lurking in the air and soil, but management can help to mitigate the effects.*”



Professor Fiona Burnett advises avoiding marginal sprays at T0 due to concerns around fungicide sensitivity.

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► all-encompassing T1 spray with the usual diversity to alleviate resistance issues. Look at an azole+ SDHI+ folpet mix, but all at lower doses in recognition of the lower yield potential," she says.

For NIAB's Dr Aoife O'Driscoll, she believes in most scenarios, variety choice should act as a T0. Her go-to chain of command is variety, plant health products, then consider multi-site and azole chemistry. "Most biostimulants and products used to improve plant health don't have a direct effect on spores of the target pathogen, but they do improve a plant's natural defence, an example being elicitors. T0 and T1 are the most effective timings for these products as it's when stress is likely to be at its highest.

"Inoculum will always be lurking in the air and soil, but management can help to mitigate the effects and increase resilience," she says.

Aoife also stresses the importance of wider management practices such as crop hygiene to prevent both disease and weed seed transmission, and to test home-saved seed.

Disease watch-outs

But for T0s in the South in particular, she says low risk crops of a resistant variety with minimal disease pressure shouldn't be sprayed unless yellow rust is present, in which case, opt for tebuconazole or a strobilurin. Her other watch-outs include mildew, and then take-all in second and third early-sown wheats.

Fiona also champions plant health products such as elicitors because of their role in fungicide resistance management strategies.

"SRUC trials have shown the potential of elicitors in being able to reduce the dose of fungicides, which is of course a real plus and offsets the additional investment. But equally, this is a benefit for resistance management because they're very low-risk in comparison



Dr Aoife O'Driscoll believes that in most scenarios, variety choice should act as a T0.

with conventional chemistry.

"Elicitors used in combination with fungicides in lower input programmes appears to yield the best results," she says.

According to Farmacy's David Howard, insight to help devise a route forward this spring could be available within farm records. "Don't forget to look back at yield maps during comparable years, for example, 2019. Field variation is remarkably similar year-on-year.

"Look at how those crops performed as a guide for what to expect, as with waterlogging comes a yield penalty.

Concentrate on the worthwhile areas and avoid over investing in high risk areas such as headlands," he says.

But more importantly, David believes it won't pay to make rash decisions right now. "How quickly will crops recover and come back is a question that we can't answer, nor do we know the extent of disease pressure as yet. I wouldn't be making restrictive decisions or it could become a self-fulfilling prophecy."

He agrees with the sentiment of regularly walking crops to assess damage and then later in the season, recovery. "I'd be looking at plant and tiller counts to understand just how affected you are and what you can target to improve. If there is a yield penalty as a result of

adverse conditions, it'll be imperative to match input spend to both yield potential and disease pressure.

"Judging fungicide timings will prove difficult but then there's the issue of PGRs — if we see rapid catch-up growth this can often be frothy and weak. And with poor rooting from the autumn, there'll be no lower structural support for those crops," explains David.

Strategic use of PGRs will divert energy away from apical growth and into rooting and tillering, he says. "But it's a case of when can you get on the land and what can you feasibly do. It's all a balance."

Aoife agrees with David that input versus output will be front of mind for many. "It'll certainly be beneficial to manage spend at this point given the seasonal challenges so far. Consider whether you'll really get your money back from a T0 spray," she says.

Farm Manager Philip Vickers says anything could happen yet but with smaller canopies comes less pressure. He also selects resistant varieties with solid disease profiles as part of the farm's strategy to reduce synthetic inputs.

During a recent 'do disease differently' webinar hosted by UPL, the topic of establishment method versus disease was raised. In response, Philip explained that

although he suspects direct drilling alone could increase susceptibility, wider management techniques would offset this pressure.

"If you're direct drilling as part of a regenerative approach, variables such as optimising nutrition and reintroducing livestock would likely reduce the threat of disease. So it's about the whole package and rethinking the system," he says.

From a barley perspective, SRUC's Neil Havis agrees that direct drilling inevitably increases the risk of trash-borne diseases. "We're seeing a lot more rhynchosporium in crops which are established this way. It can certainly have an impact," he says.

Fungicide performance

Looking ahead for later in the season, there's good news for Univoq (fenpicoxamid+ prothioconazole) fans. Independent trials organised by AHDB have shown that the product continues to perform against septoria and rusts.

The trials, which entered their 30th year, monitor the performance of different fungicides both as straights and as coformulations. With a unique site of action, Univoq has no cross resistance to any other chemistry used on farms today, says Corteva's Craig Chisholm.

"It's consistently proven its ability to



Don't forget to look back at yield maps during comparable years, for example, 2019, says David Howard.

control key diseases, most notably septoria. The 2023 AHDB fungicide trials back up what farmers have seen in the field for the past three seasons — Univoq and the Inatreq active provide robust control against key diseases and great yield returns."

Individual trial data isn't published, but the AHDB report says that, as in previous years, Univoq consistently demonstrated a superior yield return compared with the other fungicides trialled. ■

Not forgetting weed control

The success of spring post-em is heavily reliant on conditions around the time of application. In recognition of this fact, a tool is being developed to help optimise Atlantis Star (mesosulfuron+ iodosulfuron+ thien carbazono) applications.

The idea originated in Denmark as the Cossack Tool, which provides application guidance based on temperature. In the UK, experience suggests that sunshine on the day of application is also an important factor, so Bayer is currently testing a revised tool for launch in spring 2025.

For applications this season, there are several steps farmers and agronomists can take to optimise the efficacy of Atlantis Star, as demonstrated by Berkshire agronomist, Tony Bayliss. He says he was pleasantly surprised by the product's post-em efficacy on blackgrass last spring, but that the right conditions are essential for it to be worth applying. "It was a pattern of good control on several farms even where there is some metabolic resistance.

"When planning last year, I questioned why we're spending on mesosulfuron+ iodosulfuron products, but Atlantis Star took me by surprise.

The addition of thien carbazono seemed to make a difference — in some cases, 80% control and the remaining 20% remained stunted with small heads until harvest," he explains.

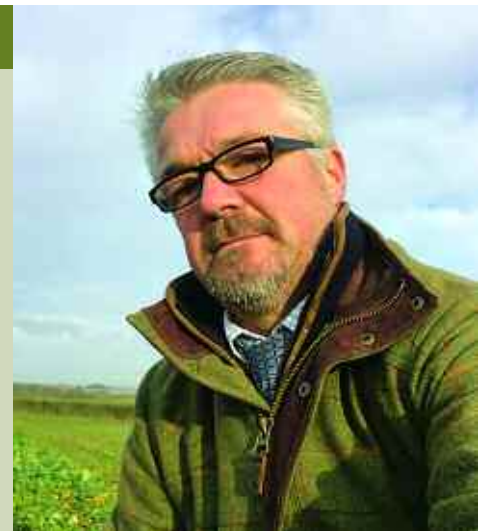
Tony encourages farmers to apply as early as possible and last spring, conditions were perfect at the start of February. "The earlier you apply, the better. We applied some as early as 1 February on a clear, sunny day. I'm a big believer in high UV levels so the plant can take in a large dose rapidly.

"And in February, weeds are still small which also helps. If you have back-to-back bright days, then I think the efficacy goes up again," he says.

However with early season applications comes potential compromises. Tony suggests being pragmatic and that the leaf doesn't have to be totally dry at the time of application provided it's sunny and drying.

Clear skies can also mean low night temperatures which may deter farmers. But Tony says unless there's a hard frost, he still recommends applying to take advantage of high UV.

"There are often days in February when it's sunny and reaches 8, 9 or 10°C. If the



When planning last year, Tony Bayliss questioned the spend on mesosulfuron+ iodosulfuron products, but Atlantis Star took him by surprise.

opportunity arises with this type of weather, get on and do it."

He also noticed improved broadleaf weed control where the post-em went on early, but urges growers to be mindful about following crops particularly oilseed rape.

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"In addition to producing higher yielding crops through better disease control, it sprayed well and there were no crop or equipment concerns."

Adrian Howell
Farm manager at Westacre Farms

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**Aoife O'Driscoll
Plant pathologist at NIAB**

iblon is a strong all-rounder. If you're looking for good eyespot control combined with *Septoria* and yellow rust control early in the season, then it fits that timing really well. If you choose to use it at the T2 timing instead you will still get the activity against *Septoria* with the added benefit of brown rust control too.

**Jonathan Blake
Technical director of crop protection at ADAS**

iblon is excellent on both yellow and brown rust and very good on *Septoria*. It is a more active SDHI on *Septoria* than existing standards, and the flexibility it will add to programmes will make it a valuable addition at either the T1 or T2 timing.

**Adrian Howell
Farm manager at Westacre Farms**

We've had iblon + prothioconazole in farm trials for two of the past three seasons and it has impressed with its excellent control of *Septoria* from the T1 application. In 2021 it outperformed the then farm standard of Revystar and in 2023 it outperformed the current farm standard of Myresa + Priaxor + Arizona. In addition to producing higher yielding crops through better disease control, it sprayed well and there were no crop or equipment concerns.

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TECHNOLOGY





Adapting disease management

Targeting T0

Establishment is a critical period of any season, but it's been a challenging time to get crops drilled, so what does this mean for T0 applications? *CPM* explores the diseases likely to be most problematic this spring and how to manage them.

By Melanie Jenkins

The main feeling in the industry is that this season's crops are a 'mixed bag' due in part to the autumn weather and the subsequent spread of drilling dates.

According to Syngenta's fungicide technical manager Joe Bagshaw, it's going to be a year of contrasts between decent crops that were planted early and those that are hit-and-miss due to being delayed. "There are some good crops out there but there'll also be quite a few headlands and areas that require re-drilling, so it'll be a case of adapting at field level — you might even want to re-drill your headlands with spring crops and this'll mean a mix of inputs which will be a challenge."

Jonathan Blake of ADAS says there were still crops going into the ground as of mid-January. "Because of this wide drilling window, we're really going to have to think about how to manage these late sowings. Generally, we're more familiar with

managing crops sown earlier than this, but those that go in late are a lot more susceptible to mildew and yellow rust, so plan this into your management.

Yellow rust control

He says it might seem as though a T0 is less important for late sown crops, but this is a dangerous presumption as yellow rust can be more prevalent on younger plants. "When the frosts dissipate into March and early April, the damp and mild conditions will be favourable to the disease.

Alongside late sown susceptible varieties, this could be the perfect storm for a yellow rust epidemic. So the primary reason for a T0 is to prevent this situation."

When approaching decisions around T0 applications, Joe reminds that it's about protection and providing a level of insurance early doors. "It can be a challenge to work out what you should and shouldn't do based on the unknown weather that's ahead of us.

"We're facing a difficult task due to crops being all over the place, so you have to prepare yourself to treat every crop differently and to work with your agronomist to make sure inputs are tailored to each field. In a year where many are likely to curtail inputs to save costs, it can be worth focusing on specific areas rather than blanket spraying," he suggests.

"For crops that were drilled in September, it started to rain about 6 October and then didn't stop until early January, meaning they're at a reasonable risk of septoria. Conversely those drilled later are at an increased

“We’re facing a difficult task due to crops being all over the place.”

risk from yellow rust infections."

Syngenta's forecasting model for overwinter survival of different pathogens indicated that as of early January, there was a lot of inoculum around, explains Joe. "Because it's been so warm and damp —



This season's winter wheat crops are a 'mixed bag' due in part to the autumn weather and the subsequent spread of drilling dates.

barring that cold spell early December and then mid-January — and if it remains so, then we could see a quick spread of disease, especially in early sown lush crops or those which are quite backwards and more susceptible to infection. In these instances, it's even more important to consider T0 protection."

Although last year was a low-pressure year for yellow rust, it's not to say this year won't be, says Joe. "If there's consistent mild weather without cold spells between now and the key timings, then we might see yellow and brown rust as well as mildews appearing — continual moisture in the crop will drive that sporulation. Although it wasn't an issue last year, it doesn't mean it's gone away."



According to Jonathan Blake, one of the reasons for a fungicide strategy failing can be down to going on too early with a T0.

And yellow rust can be devastating, highlights Jonathan. "I've known it to stunt a crop by affecting its development which can result in yield losses of 5-6t/ha. It can be the most damaging disease but it's also the most responsive to fungicides, meaning it's relatively easy to control."

Crop walking

In instances where there's risk from yellow rust, which can be quite variety dependent or if a variety goes in late, it's important to provide protection for crops, advises Joe. "The disease can come out of nowhere and if the inoculum has survived through the winter then it can cycle within 7-10 days and quickly become a big problem.

"So the main thing is, to ensure you're keeping an eye on crops by walking them a minimum of once a week when it comes to early spring."

One aspect to be aware of is the potential shift in yellow rust races which has meant an increase in the disease appearing in colder conditions, says Joe. "But we can usually expect to see a fast increase in the amount of rust when temperatures are between 12-15°C. And although some varieties have juvenile yellow rust resistance, others don't meaning it can appear early on, even where there's good adult resistance.

"So if you see it in the crop, get on top of it with Amistar (azoxystrobin) and tebuconazole because adult resistance might not kick in until GS39." Not only does this reduce inoculum, but it also provides a solid foundation in readiness for a robust T1, says Joe. "Elatus Era



Syngenta's forecasting model for overwinter survival of different pathogens indicated that as of early January, there was a lot of yellow rust inoculum around, explains Joe Bagshaw.

(benzovindiflupyr+ prothioconazole), provides strong yellow rust control and long-lasting protection against septoria."

Last year septoria was the predominant issue for growers, and with this disease there's always going to be enough inoculum in the crop to become a problem, he says. "If there's the right levels of humidity and rainfall between March and May then this could provide ideal conditions for the disease."

On a positive note, there's been no real change in how septoria reacts to the available chemistry, says Joe. "I'd still advise to get on protectively and to use mixed modes of action, but because its lifecycle is 14-28 days, it's evident between spray timings. ►

Building barley yield

For the most part, winter barley crops went into the ground well, says Joe Bagshaw. "If crops weren't hammered by pre-emergence herbicides then they appear to be in good condition, so just make sure you're nitrogen timings are correct for hybrid varieties or forward crops."

Joe advises growers to keep an eye out for brown rust — which cycles in 5-7 days as it can 'pop out of nowhere' depending on conditions. "Also be aware of mildew, depending on the variety, however I think we've moved away from the most of the more susceptible varieties now.

"Keep an eye on disease ratings and watch out for hybrids which can be rust prone. If you do see disease in the crop, keep on top of it. Kayak (cyprodinil) is an option you can use early in barley and potentially Amistar or Proline (prothioconazole) to help dry up rust

and keep mildew out.

"PGRs will also be important to try and manage the canopies of these crops this year. Applying Moddus at T0 will help with both rooting and tillering," he says.

As with wheat, Joe says to look after problematic areas in the fields, rather than the entire crop. "With the wet weather we've had leading into January, even rusts and mildews won't be particularly well established because if crops were under water, it would have just washed all the spores and fruiting bodies away. So again, we could have a mixed bag with winter barley."

Unlike wheat, which forms its yield late during the grain fill period, barley is more sink-limited, meaning its yield is formed earlier, explains Jonathan Blake. "So in the case of barley,



In barley, earlier fungicides could directly affect grains in the ear and tillering, improving both and helping to significantly aid yield up to 0.5t/ha where disease is present.

earlier fungicides could directly affect grains in the ear and tillering, improving both and helping to significantly aid yield up to 0.5t/ha where disease is present, meaning applying a T0 in February or early March can be really beneficial."

Adapting disease management



For crops which haven't gone into the ground until January, one approach to T0s could be to consider using products that are approved for use in both winter and spring crops.

▶ The main message is to apply some protection at T0, says Joe. "If there's a high septoria risk, then the advice is to use a multi-site product, for instance folpet, or even a sulphur, potentially I've seen recent data that suggests these are performing similarly against septoria, and there's also some activity against mildew with sulphur."

In addition, PGRs such as Moddus (trinexapac-ethyl) are going to be quite important for management, he adds.

As of early January, the inoculum levels of eyespot and take-all appeared quite high, he adds. "A lot of growers delay their drilling where they have second wheats, so you might think there's less risk of take-all. But possibly because of the weather we've had and the fact the disease quite likes wet conditions, it looks like there's a high risk. So if you have second cereals it might be one to watch out for.

"Amistar provides useful activity against take-all if you can apply it at T0 or T1. In a higher-risk situation it might be possible that growers have used Latitude (silthiofam), but an application of Amistar in the spring could be useful to slow down the pathogen in the soil."

For crops which haven't gone into the ground until January, one approach to T0s



An additional reason to apply a T0 is because it's impossible to know whether T1s will be applied in good time.

could be to consider using products that are approved for use in both winter and spring crops, advises Joe. "This could include using Amistar, Elatus Era or folpet, and would mean you don't have to change your plans if you've ended up drilling a spring rather than winter crop.

"But do keep in mind that in the HSE Chemical Regulation Division's (CRD) eyes, spring crops are considered to be any drilled after 31 January," he reminds.

Weather constraints

An additional reason to apply a T0 is because it's impossible to know whether T1s will be applied in good time, warns Joe. "Last year a lot of people struggled with the T1 timing, and there was a lot of septoria pressure early on. If you're having to delay your T1 then you're leaving the crop open to the disease, so if you can get something on early then you're potentially insuring yourself against the possibility of wet weather and delayed applications."

With newer chemistry coming to the fore, Joe imagines that growers may be inclined towards this. "But realistically, so long as your T0 and T1 timings cover leaves three and four, allowing for 3-4 week's protection, then even products perceived as weaker, when timed right, can still help produce equivalent yields to newer chemistry even if there's higher disease pressure."

Jonathan agrees that targeting T0s at the right time is important. "One of the reasons for a fungicide strategy failing can be down to going on too early with your T0. The aim is to use a T0 to protect crops ahead of a T1, but if a T0 is applied too early then there's opportunity for disease to come in between.

"It might be that the T0 can control rusts during March but sprays will generally only protect leaves which are emerged at the time of application. Any new leaves which emerge after won't be protected and this can potentially be where the yellow rust comes in, making it harder to control at T1."

He says for this reason, a T0 spray should be applied 3-4 weeks prior to a T1. "Trying to control yellow rust once it's established in a crop is very difficult and attempting to remove it is almost impossible — the fungus might calm down and slow but it'll rarely be entirely eradicated.

"Clearly some products have more activity than others on yellow rust, but there's good activity from strobilurins, while some azoles are more effective. In a curative situation, stronger chemistry such as the SDHI benzovindiflupyr comes into play. But keep in mind that timing is the priority," adds Jonathan. ■

Adapting disease management

Managing cereal diseases from one season to the next is rarely the same.

Disease pressures and grain prices fluctuate. And drilling dates, cropping areas and crop potential are at the mercy of the weather.

Indeed, this year sees a wide spectrum of winter wheat crops — from high potential early-drilled fields to lower potential late-drilled ones, and crops in the middle. Not to mention a potentially inflated area of spring barley.

All of which means adapting disease management on a field-by-field basis will be key. There isn't a 'one size fits all'.

Against this background, CPM has joined forces with Syngenta to help growers

negotiate the different scenarios through this series of articles.

At Syngenta our purpose is to bring plant potential to life.

With a range of proven fungicides — from Elatus Era with its outstanding rust capability and long-lasting protection against Septoria tritici in wheat and barley diseases, to the reassuring multi-site activity of folpet, and enduring treatments of Amistar and Kayak — we offer a flexible choice of cost-effective solutions.



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Recovery through NUE

Bioscience in Practice

Could improving nitrogen assimilation and carbon fixation be the key to helping autumn crops to bounce back from adversity? *CPM* investigates the potential of 2-oxoglutaramate technology.

By Janine Adamson

With much focus on spring cropping options and plan Bs, and perhaps in some cases plan Cs, for those with autumn cereal crops still standing, what can be done to give them a recovery boost?

Given the likelihood there will have been waterlogging at some point, Unium's Andrew Cromie says crop stress will be high whereas rooting capacity will be low. "The importance of rooting is widely recognised, not just for its role in water and nutrient uptake, but for tillering too.

"Unfortunately, poor rooting means reduced tillering and if you look at the relationship between tillering and yield, research has shown the two are intrinsically linked."

He says as a result, the priority should be to encourage crops to push out roots and scavenge for vital nutrients which will have been washed further away from the root zone during the inclement weather. "Applying calcium phosphite as soon as you can travel will help to encourage those roots down into the soil profile,"

recommends Andrew.

"Equally, crops will come out of dormancy and be hungry so providing adequate nutrition will be vital for survival and performance. However, when it comes to applied nutrition, and in particular large amounts of nitrogen, there can be a bottleneck within the plant's metabolism and pathways.

"This means the mission to promptly offset the stress of the autumn by topping up nutrition and boosting rooting, can be set back."

However, thanks to science, there's the potential to alleviate this bottleneck by improving the process and enhancing nutrient use efficiency through application of a natural plant metabolite — 2-oxoglutaramate (2-oxo).

Biomass and yield

2-oxo stimulates the plant to increase both nitrogen and CO₂ uptake, which results in improved biomass and yield, and creates a similar effect to that of elevated atmospheric CO₂ levels. It achieves this through exploiting the glutamine synthetase pathway. Simply put, it increases both carbon fixation and nitrogen assimilation.

Although it's widely understood that the growth and productivity of plants depends on a balanced distribution of carbon and nitrogen, recent findings reveal they also form a complex integrated network and are often dependent on each other.

To take this further, during research into 2-oxo, Dr Pat Unkefer discovered that this relationship could be improved through the addition of L-GPA (pidolic acid). Although it's

“It's important to consider the bigger picture – it's a cost effective addition that doesn't break the bank.”

been proven that 2-oxo is superior to L-PGA, thanks to a synergistic effect, the combination outperforms either separately.



When it comes to applied nutrition, in particular large amounts of nitrogen, there can be a bottleneck within the plant's metabolism, says Andrew Cromie.

Together, they're presented as Unium's Twoxo — a NUE signalling compound for use when the largest application of nitrogen is provided to a crop.

Andrew says that using the two components together seems to present as a short- and long-chain effect for improved crop NUE. "Once the problem of adequate rooting has been addressed, applying Twoxo at T1 timing in winter cereals is an effective way to make the most of what's

available to the plant."

With nitrogen being one of the largest input costs for Matt Fuller's milling wheat, he says he was keen to assess NUE.

"Achieving a good yield at milling quality is our main goal; we can't afford to not achieve the specification given what goes into it."

Matt, who manages the 1000ha Heathcote Farms in Bedfordshire has long explored the use of biostimulants and includes them in most tank mixes across

a range of combinable crops. To take his interest further he trialled a programme across the farm using Twoxo and Wholly K (potassium metabolite complex).

He says the driver was to understand where to place such biostimulants within a programme to achieve the best results. Equally, although a lot of biostimulants and trace elements are available on the market, he says independent data is lacking.

So, the comparison involved 32m-wide ▶

Twoxo Pro trials

Having achieved success with Twoxo at T1 timing, Andrew Cromie says Unium is now ramping the product up further by adding additional ingredients. This is demonstrated through Twoxo Pro — the classic Twoxo formulation plus essential trace element, molybdenum.

Where molybdenum contributes is in supporting chemical changes associated with nitrogen. It's the active centre of plant enzymes, acting as a cofactor, which is important for nitrogen fixation, nitrate reduction and nitrogen transportation in plants.

To put this into action, Twoxo Pro has been trialled by ProCam as part of a series of investigations into NUE and alternatives to bagged nitrogen.

At a winter wheat trial in Durham, three different nitrogen doses were explored. Two were reduced, where the second and third applications were cut by either 25 or 50%, compared with a 100% nitrogen programme involving three applications of 60kgN.

Trials manager, Becky Tunnicliffe, says where the nitrogen dose wasn't reduced, little benefit was seen from the application of Twoxo Pro. "We believe this was due to the crop having more than sufficient nitrogen, therefore, enhancing its metabolism and use efficiency didn't contribute to plant development," she comments.

Where the nitrogen dose was reduced, however, Becky says Twoxo Pro contributed substantially to the gap being bridged on both occasions, which was the objective of the trial.

"We can see that by improving the crop's metabolism, and making nitrogen use more efficient in the crop, less total nitrogen was required to achieve the same yield.

"Also, as the crop began to mature, the Twoxo Pro treated plots showed a significant improvement in green leaf area and the senescence of the canopy was delayed. This will have been a key driver in bridging that gap," she says.

To solidify the product's performance even further, grain analysis was conducted to calculate nitrogen offtake. Twoxo Pro enhanced this by around 23kg/ha in the scenario with an application of 150kgN.

Twoxo Pro was also trialled on conventional barley (KWS Tardis) at ProCam's Cawood site using a similar reduced nitrogen protocol. Although

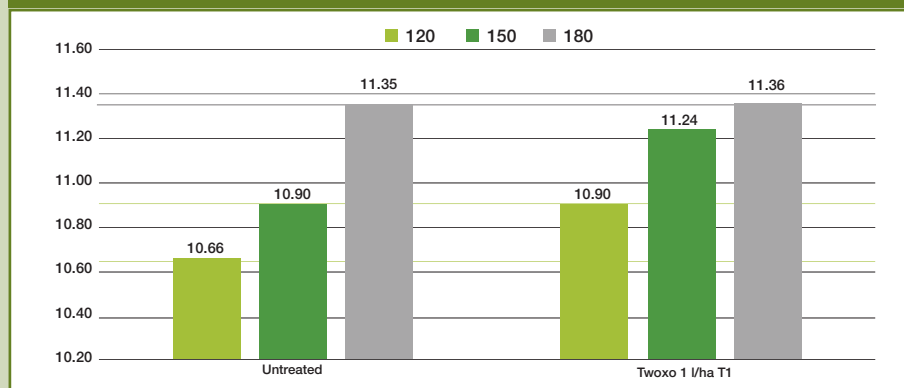


By improving the crop's metabolism and making nitrogen use more efficient in the crop, less total nitrogen was required, explains Becky Tunnicliffe.

notable, Becky says the benefit wasn't as dramatic, although the uplift from nitrogen applications overall was somewhat muted.

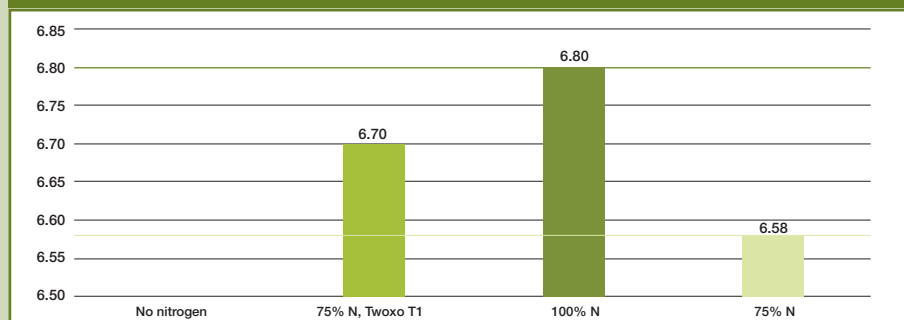
"Other factors capped the yield in this trial, but Twoxo Pro still aided the gap being bridged."

Twoxo Pro yield t/ha at three different N doses (kgN)



Source: ProCam, Durham 2023

Twoxo Pro yield t/ha in winter barley



Source: ProCam, Cawood, 2023



Twoxo Pro has been trialled by ProCam as part of a series of investigations into NUE and alternatives to bagged nitrogen.



Russell McKenzie has seen a 0.3-1t/ha yield response when Twoxo has been included in spring nutrition programmes.

► plots of Crusoe wheat across two fields, assessing the performance of untreated, Wholly K and Twoxo applied at T1. The results were then compared with the field average looking at both yield and protein levels.

Matt says for him, it's important to undertake trials using a reasonable field area rather than small plots which often aren't reflective of real-life farming. Results-wise, the outcome was mixed.

"In field one there was an uplift in both yield and protein levels when using Twoxo, but due to the season, field two went flat and yields were slightly lower than average. However, it looks promising, so we're going to continue the trial for at least another year to conduct a fair assessment," he says.

Nearly all of the farm's wheat is for milling, selecting between Crusoe and Illustrious from Group 1 varieties and Extase and Palladium from Group 2. With crop performance paramount, Matt is constantly fine-tuning.

"There's so much risk with nitrogen prices, assessing crop requirements and improving accuracy is vital. If Twoxo delivers on what it promises, subject to analysis, it could then be possible to reduce our nitrogen applications.

"Plus because it's a biological product, there shouldn't be a negative impact on soil health and the wider environment," he says.

Whereas Matt is relatively new to 2-oxo technology, Cambridgeshire farmer and independent consultant, Russell McKenzie, has been exploring the product for the past two seasons on his winter wheat crops. He was also involved in initial R&D trials before integrating Twoxo into the farm's nutrition programmes.

He says due to the product's nature and seasonal unpredictability, yield response can vary year-on-year. But, by understanding where best to use it, it can deliver meaningful results.

Cost effective

"We've seen 0.3-1t/ha yield response when we've included it in spring nutrition programmes," says Russell. "But, it's important to consider the bigger picture — it's a cost effective addition that doesn't break the bank. Boosting yield is great until it starts to impact margins, and then you have to question if it's worth it."

Russell supports the importance of developing a programme for biological products based on matching mode of action to the plant's specific requirements during its life cycle. "It's understanding the tools available and selecting from them in reaction to the season.

"You won't always require everything from the toolbox. What I like about Twoxo and the other products in the Unium range is when used in the correct scenarios, they really do deliver. In this case, not only have we seen a yield response, but it supports our overall goal of reducing synthetic nitrogen applications," he explains.

Unium's John Haywood says aside from yield benefits, enhanced nitrogen assimilation is critical in maintaining strong stem health which reduces the lodging risk associated with lush floppy growth.

"It also increases root production to scavenge for nutrients that are required with the increased nitrogen uptake, assimilating the free nitrogen in the plant into the useable amine form. It reduces any waste and excretion onto the leaf surface which can attract and feed insects or disease.

"Overall, once the crop is in luxury nitrogen supply, Twoxo is the critical factor to reach full potential," he concludes. ■



With nitrogen being one of the largest input costs for Matt Fuller's milling wheat, he says he was keen to assess NUE.

Optimised timings

With a suite of innovative biological products to choose from, Andrew Cromie says it's important to consider the optimum timings for Twoxo on a crop-by-crop basis.

"All timings coincide with rapid root and shoot growth when there's a high demand for nitrogen and a large supply from fertiliser applications which can lead to a bottleneck. There's also an increased demand for carbon to assimilate alongside that nitrogen," says Andrew.

Crop	Application timing
Winter wheat / winter barley	GS31
Oilseed rape	Stem extension
Potato	Tuber initiation / mid bulking
Maize	4 leaf
Sugar beet	6-8 leaf

Bioscience in practice

As the chemistry toolbox continues to shrink, an array of new biosolutions are coming to market, offering a range of benefits and complementary additions. Evaluating how effective they are and where they're best placed can be tricky, however.

This series of articles opens a window on the science behind these innovations. CPM has teamed up with Unium BioScience to explore the background, unravel the physiological processes and provide analysis on trial results. Above all, these articles give the grower an insider's view on some of the exciting

opportunities biosolutions offer in the field. This includes Twoxo.

Twoxo is an award winning nitrogen assimilation biostimulant developed by Dr Pat Unkefer as a result of more than 30 years of research. This breakthrough technology links and stimulates nitrogen-use efficiency.

Learn more by joining the Unium Bioscience technical group <https://www.uniumbioscience.com/unium-technical-group>





Zoning in on net zero

Crop nutrition

Managing crop nutrition is a nuanced subject at the best of times but add in net zero goals and it becomes a whole new ball game. *CPM* explores how crop nutrition can go hand-in-hand with environmental goals.

By Melanie Jenkins and Rob Jones

The impact of climate change on agriculture is an on-going concern for the industry, however, fine-tuning crop nutrition and how it's manufactured can make a difference and help the industry work towards net zero.

Farming has regularly had the finger pointed at it as a contributor to greenhouse gas emissions, highlighted Sir Peter Kendall at November's CropTec Show. Speaking in his capacity as a farmer, Sir Peter feels that the subject is an important one and is addressing it on his home farm having cut back on bagged fertiliser when prices skyrocketed in 2022. Instead, he's turned to using litter from

his own broiler chickens.

"The whole discussion on how we can fine-tune nutrition is really important, relevant and timely, not just for the profitability on farm but also for our carbon footprint moving forward."

Emissions

Inorganic fertiliser can often be seen as a major culprit in terms of GHG, but according to Yara's Mark Tucker, it's a coin of two faces. "Fertiliser is good in that it can double yields across the world but it's bad in the sense that this comes with emissions that stand out in a sustainability audit.

"As a company, Yara produces 20M tonnes or more of fertiliser every year and this has huge emissions and fossil fuel consumption associated with it, but we do have a net zero initiative which comes with a requirement to invest in how we achieve that within the business."

To achieve this, Yara is moving to fossil fuel-free fertilisers in the form of generating green hydrogen, which can be used to produce green ammonia. "This has kicked off in Oslo, Norway, and it'll be used in the UK for the first time in 2024 to grow wheat, barley and potato crops."

The green hydrogen is created in Norway through the use of hydro-electric power and in other regions will be produced using a combination of wind and solar power, explains Mark. "This is a huge win for sustainability, but it does come at a huge cost."

“The whole discussion on how we can fine-tune nutrition is really important, relevant and timely.”

With the increased use of different forms of hydrogen, he points out that the industry will have to get used to the terminology in the production of hydrogen, which includes grey, blue, green and even turquoise. ▶



A detailed soil test was conducted at Cobbs Farm before sowing cover crops to provide a baseline of core soil properties.

► “The second element in Yara’s journey to net zero is more about the recycling of nutrients. Another way we can bring nutrients back into farming and food production in the UK and Ireland is in the form of organic-based fertiliser which is created from waste food and green waste, or compost. This also reduces our reliance on fossil fuel-based fertiliser and helps to

both decarbonise production and reduce the overall carbon footprint.”

However, Mark says it’s not a simple task and flags that huge investment is required to achieve these more sustainable operations. “There’s a lot of money going into decarbonising industrial scale electrolysis and carbon capture. That cost will have to be shared across

the supply chain but we feel it’s a feasible achievement to reach net zero.”

At farm level, the Albanwise Farming partnership is taking actions to make the most of crop nutrition. According to chair Phil Jarvis, it’s been a team effort on farms across Yorkshire and Norfolk to manage the different soil types. “Nutrition on each soil comes from the individual manager on ►

CRF for productivity gains



Controlled Release Fertiliser technology could bring productivity and environmental benefits to UK growers, says Andrew Judd.

Controlled Release Fertiliser (CRF) technology, proven in independent trials and commercial crop production, could bring productivity and environmental benefits to UK growers, says ICL’s Andrew Judd.

“Applications of CRF have been shown to achieve a Nitrogen Utilisation Efficiency (NUE) of more than 90%, some 50% more than the UK average of around 60%.”

Other benefits include cutting ammonia volatilisation in half and reducing nutrient leaching by nearly 60%, compared with other fertiliser practices, he adds.

“CRFs are temperature-based and designed to release optimum daily quantities of nutrients to crops over a specific timescale. This ensures nutrient availability can be matched to the specific crop requirements more effectively, which leads to higher NUE and reduces nutrient losses.

“This more efficient use of nitrogen results in higher yields per tonne of fertiliser applied while also giving growers the option to reduce nitrogen inputs if they wish to, such as when farming in nitrate vulnerable zones (NVZs).”

He says another major advantage of CRFs is that they can reduce the number of fertiliser applications required through

the season. “This reduces farm traffic, labour costs and time, as well as helping to reduce potential soil compaction problems.”

The combination of reduced environmental impact and improved productivity means CRFs could play a key role in helping UK agriculture meet its future sustainability goals, he believes. “Whether it’s reducing ammonia emissions required by the UK’s Clean Air Strategy, addressing concerns over nutrients entering water courses, or reducing the carbon footprint of food production, CRF technology brings a range of benefits to growers and the wider food supply chain.”

Explaining in further detail, Andrew says CRFs work by covering granules with a semi-permeable coating that allows water to pass through to dissolve the nutrients contained within. “The process is temperature sensitive — as soil temperature rises, cracks develop in the coating, drawing in water to dissolve the nutrients inside.

“The water then carries these out into the soil for the plant roots to take up. When soil temperature decreases, nutrient release slows down. This process can last for many weeks with the release of nutrients specifically tailored to individual crop requirements,” he comments.

“Being low electrical conductivity (EC) products, CRFs can be safely used at planting or pre-planting and can be broadcasted or direct drilled,” says Andrew.

According to ICL agronomist Scott Garnett, trials carried out on CRF have been ‘pretty conclusive’ on the benefits of the approach. “ICL’s CRF technology has been rigorously tested on a range of crops with consistent results being seen.

“For a start, conventional nitrogen fertilisers average around 60% NUE, but in a recent UK winter wheat trial, we saw an NUE of 97% resulting from our CRF technology,” he says.

Another trial undertaken in Yorkshire showed the controlled release of nitrogen from CRF increased NUE by 82% and boosted seed potato yield by 10%, delivering an extra £736/ha compared with the grower’s standard AN-based practice.



According to Scott Garnett, conventional nitrogen fertilisers average around 60% NUE, but in a recent UK winter wheat trial Controlled Release Fertiliser technology produced NUE of 97%.

Andrew says CRF technology is offered through two ICL product ranges. “Agrocote is a 100% coated nitrogen fertiliser designed to provide crops with a continuous supply of nitrogen throughout the growth cycle. The longevity of the release can be tailored depending on the requirements of the crop.

“It contains 44% nitrogen and can be used either as a straight nitrogen fertiliser directly applied to crops, or blended with other nutrients. Agrocote is particularly effective in lighter soils where N is prone to losses from leaching, as well as areas where the use of nitrogen is restricted,” he explains.

Also available is Agromaster which combines Agrocote N with ICL PKPluS. “Agromaster effectively combines two ICL technologies to provide tailor-made NPK formulas for a range of applications. Agrocote provides the controlled release nitrogen and the PKPluS delivers the other key nutrients — phosphorus, potassium sulphur, magnesium, and calcium.

“The PKPluS gives an initial early release of these key nutrients which is then sustained alongside the controlled release of nitrogen from the Agrocote over the growing season,” concludes Andrew.

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Farming has regularly had the finger pointed at it as a contributor to greenhouse gas emissions, something which was highlighted by panellists at November's CropTec Show.

► each farm, but internal training has been really good for opening up the discussion on what's good for farming and for what crop nutrition looks like in the future."

Steps have already been taken within the partnership to push towards a more sustainable future and over the past 10 years it's increased the organic matter content of the fertiliser being used by 10% each year. "But we still can't get enough nutrition into crops by just using organic material," stresses Phil.

He points out that monitoring what's in soil to begin with can really help in the process. "Look at what tools are available so you can identify what crop nutrition you require and then plan for it to end up in the plant."

But driving change can be hard when there's already considerable risk in farming as it is, says Sir Peter. "So how do we drive this change and encourage farmers to change their thinking?"

Knowledge exchange

According to David Boulton, a Midlands-based agronomist at Indigro and AICC council director, the farming landscape is incredibly varied and includes people at different stages of the sustainability journey. "Because of this diversity in the industry there's potential for a knowledge exchange platform and I think peer-to-peer networking will become ever more important to demonstrate what does and doesn't work."



Yara is creating green hydrogen in Norway through the use of hydro-electric power and will be using a combination of wind and solar power in other regions.

“There has to be a perceived benefit to move towards a change, such as a cost benefit or yield improvement. However, I’d advise not going cold turkey initially but to implement gradual small step changes on farm. If you’re a conventional farm that cuts out insecticide, reduces fertiliser and minimised tillage and you ended up with a yield decrease of 25%, you wouldn’t necessarily know what variable had caused this outcome. But introducing gradual change will allow you to better understand what’s going on and what the impact is.”

David also suggests conducting an annual review to create a feedback loop. “Talk to your agronomist and to neighbouring farmers to see

what’s working on their farms. Also consider government incentives such as SFI as they come around.

“There are really good soil fertility building options such as herbal leys and the legume fallow mixture. These mean we can effectively rest soils in an otherwise heavily intensive arable rotation, allowing us to put fertility back into our soils in the form of soil mineral nitrogen and soil nitrogen supplies,” he explains.

According to Sir Peter, as BPS disappears, looking at SFI options could help build fertility and resilience in the farming system, as well as in farm businesses a whole. “Look at where the available support is and how it can bring a win-win to your rotation.” ■



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Cover crop assessment results summary

	Average of all five cover crops
Fresh weight	38t/ha
Nitrogen	189kg/ha
Carbon	1841kg/ha
C:N ratio	10
Phosphate	21kg/ha
Potassium	122kg/ha
Calcium	122kg/ha
Magnesium	6kg/ha
Sulphur	26kg/ha
Boron	124g/ha
Manganese	281g/ha
Zinc	161g/ha
Iron	2911g/ha
Copper	37g/ha
Molybdenum	5g/ha
<i>Source: Hutchinsons.</i>	

Nutrient building with cover crops

Trials at an Essex farm are shedding more light on the benefits that cover crops can bring to soil health, the environment, and nutrition in following cash crops.

The field-scale demonstration at Ben and Paula Twinn's JRT Farm, Cobbs Farm, near Pebmarsh, has been jointly organised by a agronomy firm Farmacy, and sponsors Essex and Suffolk Water, to quantify the impact of five multi-species cover crops grown in a 'real-world' situation.

"We've dabbled with cover crops for a couple of years, usually as a single species mix such as mustard or game cover, but there have been variable results," says Ben. "Slugs are a particular concern on our heavy land, as we've seen real problems with them in the past after a two-year leguminous mix.

"But despite that, we're keen to see how we can make cover crops work for us, especially with the funding now available through the Sustainable Farming Incentive (SFI), which is something we're looking at joining now that we're on the cusp of coming out of a Higher Level Stewardship scheme."

A 14ha field of predominantly heavy clay was chosen for the demonstration, which had previously been a winter wheat crop, and is due to go into Mulika spring wheat in 2024. Straw was baled ahead of a single pass with a Väderstad Carrier after harvest, then five Hutchinsons cover crop mixes — MaxiN, MaxiCover, MaxiRooter, MaxiGraze and MaxiSpectrum — were sown using the farm's 6m Einbock drill on 27 August 2023.

A detailed soil test was conducted before sowing to provide a baseline of core soil properties, against which any improvements could be measured. It also allowed Ben and Paula to assess the soil's 'biological signature' using a phospholipid fatty acid (PLFA) test and compare results with another field that has been in a clover mix for the past two years.

"The cover crops were sown later than is ideal, but that reflects the reality for many growers in a season like 2023 and is all part of the reason why it's important to test things in a 'real-world' situation," says Farmacy agronomist, Jim Woodward.

Cover crops took a while to get going in the hot, dry conditions experienced soon after drilling during early September, but once rain came, all mixes quickly put on large amounts of biomass, he says. Assessments show the average above ground biomass across all five mixes more than doubled in a month, increasing from 14.32t/ha on 18 October to 38.21t/ha by mid-November, with the MaxiRooter and

MaxiCover mixes leading the way.

"That's a great amount of growth that's delivering a lot of benefits both above and below ground. It's subjective, but already soil appears to be drier, easier to travel on, and slightly more friable where there's a diversity of cover crop roots in the ground. There's plenty of earthworm activity too.

"All the time there's green cover growing, plants are photosynthesising and pushing sugars into the soil to feed the biology, while capturing and storing carbon and preventing valuable nutrients from being lost from the soil.

"But on heavy land like this, we have to strike the right balance," adds Jim. "Building biomass is great, but we still have to let air in to help dry the surface out, and be able to manage that cover when it's time to drill the following crop."

Tissue analysis of samples collected during November offers an insight into the nutritional content of each cover crop mix. In terms of nitrogen, the highest level was in the MaxiN mix, which has been tailored to maximise nitrogen fixation with a high ratio of legumes. In total, MaxiN contained 291kgN/ha, however levels in other mixes ranged from 134-182kgN/ha.

"A proportion of that nitrogen would have been in the soil already, but if we weren't capturing it in the cover crop, then there's a risk that some of it would have been leached out of the soil into watercourses during wet weather," says Stephen Derbyshire from Essex and Suffolk Water.

The same applies to other nutrients, such as phosphate, which can also pose significant water quality concerns, he notes. "Keeping nutrients in the field is a win-win for both farmers and water companies."

For Ben and Jim, the big question is knowing what proportion of those nutrients will be available to the following spring wheat crop, and how quickly plants will be able to access those nutrients.

Much of this will depend on how and when the cover is terminated, the biological activity of the soil, and how effective it can break down and cycle nutrients, says Jim.

"Our Gold test shows the soil here has quite a high pH (7.3), which makes it more bacterially dominant. Having bacteria that are capable of solubilising inorganic phosphorus from insoluble compounds is important, but there has to be a balance with the levels of fungi, notably arbuscular mycorrhizal fungi, which help plants to take up nutrients."

Ben has been pleased by the levels of nutrients, particularly nitrogen in the cover crops, and hopes this may allow him to make some fertiliser savings in the following spring wheat. As



A field-scale demonstration at Cobbs Farm near Pebmarsh has looked to quantify the impact of five multi-species cover crops grown in a 'real-world' situation.



Jim Woodward and Stephen Derbyshire have both been involved with the cover crop trials to establish how they can benefit soils and prevent leaching.



One of the anecdotal benefits of planting cover crops has been the amount of earthworm activity.

part of the trial he plans to reduce nitrogen rates on part of the field by around 30kgN/ha from the standard 250kgN/ha to see if there's any difference in crop performance.

Jim will also monitor the establishment and growth of the spring wheat and conduct tissue analysis to identify any benefits from the nutrients released from the cover crop material.

"We know that generally, soils in the UK have been degrading in terms of organic matter, so we must stop that decline and build levels back up," he adds. "Growing cover crops is one of the few opportunities to do that."

Optimising phosphorus nutrition to

power up backward crops

Ensuring adequate supplies of readily available phosphorus will be key this spring to help maximise the potential of small, backward winter cereal crops.

Crops have been sitting in cold, waterlogged soils for months due to the prolonged wet weather that hit all areas of the UK last autumn.

Shoot and root development has suffered as a result, says **Chris Martin, head of soil health at Agrovista**. "This season in many wheat crops, it is very much a case of managing tiller numbers upwards rather than down, and ensuring they have an adequate root network to support that growth.

"Plenty of winter barley and oilseed rape crops also need nurturing. We need to supply the right nutrients in an easily accessible form when plants really need them."

Phosphorus is one of the most important nutrients in crop production due to its role in stimulating early plant growth and development.

Readily available source

"Soil indexes may suggest crops have adequate reserves of phosphate, but it can be quickly locked up on soils with chemical imbalances or unsuitable pH," says Chris. "Supplying a fresh, readily available phosphate source is key, as traditional soil-applied products such as TSP can be very inefficient, with as little as 10% being recovered by that season's crop."

Tests on more than 400 grain samples submitted by Agrovista customers last season revealed that just over 30% had a phosphorus content below the 0.32% guideline, despite receiving traditional phosphate applications.

Chris advises growers to consider applying Luxor and Calrite Extra this spring, just before the peak growth period, prior to or around T0 in cereals and before stem extension in OSR, to promote early growth.

Luxor delivers readily available foliar phosphorus, as well as humic and fulvic acids that stimulate soil biology to maximise nutrient availability. It also contains L-PGA (pidolic acid) to improve nitrogen assimilation within the plant.

Calrite Extra contains calcium phosphite, which 'tricks' the plant into reacting as if it were deficient in phosphorus, stimulating root and shoot growth. It also contains L-PGA.

Damaged roots

Unium's commercial manager Andrew Cromie says "Excessive rainfall in the establishment period of winter cereals is likely to have damaged root systems, reducing the plant's ability to produce tillers.

"Research shows roots suffer around twice as much as above-ground growth, skewing the root-to-shoot ratio. Correcting the problem early, using these products can lead to season-long benefits. A poor damaged root system from this winter will be much more susceptible to drought in the spring/summer."

Trials carried out last season by manufacturer Unium with Cambridgeshire grower Russell McKenzie used three winter wheat varieties on three different fields, comparing untreated plots, plots treated with 200kg/ha of DAP at the end of February and plots treated with 1 litre/ha of Luxor just before T0.

Combined approach

Applying a combination of both products in the field often produces the greatest effect as their moderate complementary, says Chris.

"In two years of our own trials, we've never seen a yield drop, and in the vast majority of cases we've seen a significant increase, in addition to typical savings of £70/ha over a traditional phosphate programme."



15 to 1 return

Yields averaged 11.36t/ha, 12.3t/ha and 12.49t/ha respectively, resulting in a margin over input cost of over £170/ha for the Luxor-treated crops, more than £92/ha ahead of those treated with DAP and producing a return on investment of nearly 15:1.

Calrite Extra has also produced impressive results. In 2018-2019, in 20 Unium trials it produced an

average yield response of 0.75t/ha in winter wheat. Overall, the product has delivered an 8% increase in wheat applied at 0.5 litres/ha at GS 25-30, and an 11% increase in oilseed rape applied at early stem extension at 0.75 litres/ha. This delivered a return on investment of £79/ha and £71/ha respectively over several years of trials.

“ Growers are a lot more open to using them and see them as a valuable part of the programme. ”

Building biostimulation

Biostimulant survey

With the landscape of agriculture changing vastly over recent years, *CPM* explores the place for biostimulants in a new era of farming.

By Charlotte Cunningham

When you think about biostimulants as being any substance, other than fertilisers, that can be applied to crops or seed to enhance growth, then they've been around for as long as some of our *CPM* readers...

But despite their long heritage and varying forms over that time, it's perhaps only more recently that their true benefits are being realised.

Dr Tom McCabe, lecturer at the University of Dublin, has a long history of research into biostimulants and has noticed a change in attitudes over that time.

"There's definitely been a sharp rise in interest in biostimulants over the past decade, specifically the last five years," he says. "There are a lot more products in the market which helps, but I also think there's a lot more space in the market due to less fungicide options, the increased price of fertiliser, and also the changing environmental pressures which has meant many have relooked at their strategy when it comes to conventional crop inputs."

Stuart Sutherland, technical manager at Interagro concurs and adds: "There has definitely been a shift in mentalities over the

past few years as a more regenerative approach has taken centre stage. With this putting a bigger emphasis on soil health, biostimulants naturally find themselves a place here too."

Traction continues

With this in mind, it comes as no surprise that in a recent survey carried out by *CPM* and Interagro, 69% of growers revealed they're already using them on farm, with a further 20% set to try them for the first time this year. Of those growers, 81% said they're applying them to winter cereals, 45% to spring cereals and others using them across an array of crops including legumes, fruit, vegetables and potatoes.

Among the growers already using them is Matt Fuller, arable and trials manager at Heathcote Farms, Bedfordshire.

Day-to-day, Matt is responsible for operations like drilling and spraying, and also does the in-house agronomy for the 1000ha of cropping — 500ha of which is milling wheat and the rest made up of winter barley, oilseed rape, winter beans, spring beans and spring peas.

Matt's views on biostimulants as part of the management plan are representative of more than half (52%) of growers who see them as being complementary to other inputs.

However, he also goes as far as saying they're a primary focus for him year-on-year.

"We've been using biostimulants for quite a while now and use them for a range of reasons," he explains. "We take the view that the use of biostimulants helps to keep the plant as healthy and stress-free as possible. In doing so, the hope is that it'll lead to crops which are better able to utilise inputs and nutrition, and also by being healthier, they should be able to fend off disease and other stress factors more easily."

In a bid to better understand the full

potential of biostimulants, Matt — like 27% of other growers in the survey — has conducted numerous trials on farm using different products, at different timings and under different conditions. "There are a lot of biostimulants coming into the market at the moment. With less chemistry available, there's a big gap in the market that these products are filling. However, there's not a lot of independent data out there and available, so by trialling them ourselves it helps us to make a more informed decision about what the best products are and where to place them and in what situations."

For Matt, these trials have included a mixture of small plot, tramline and half field-scale trials to ensure the results are representative of the claimed benefits of biostimulants. "Small plots are good, but they can hide the field effect, so by doing it over a larger area we tend to get a better representation."

Based on what he's found, Matt is now using biostimulants every year. "We're on quite heavy soils here and certainly on our winter cereals we'll do an application in the autumn to try and push rooting as much as ►



Success with using biostimulants all comes down to optimising the right product at the right time, says Stuart Sutherland.

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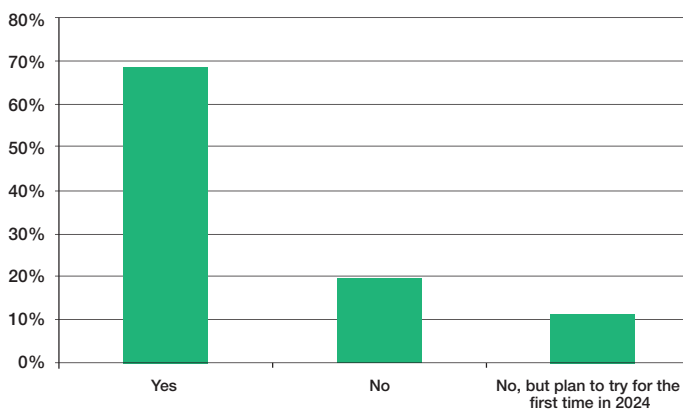
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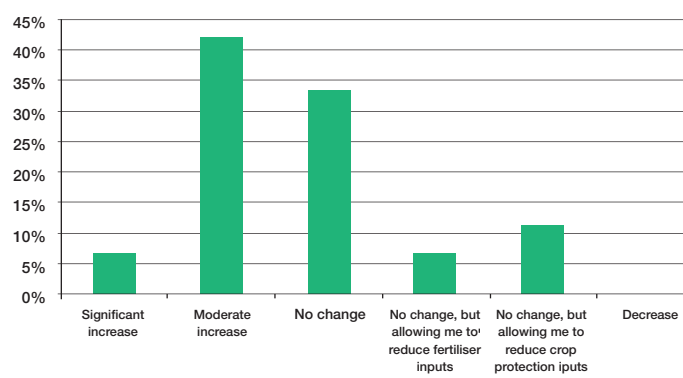


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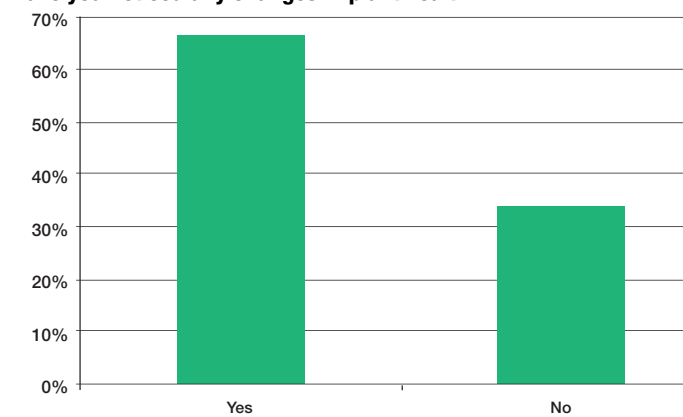
Are you currently using biostimulants on your farm?



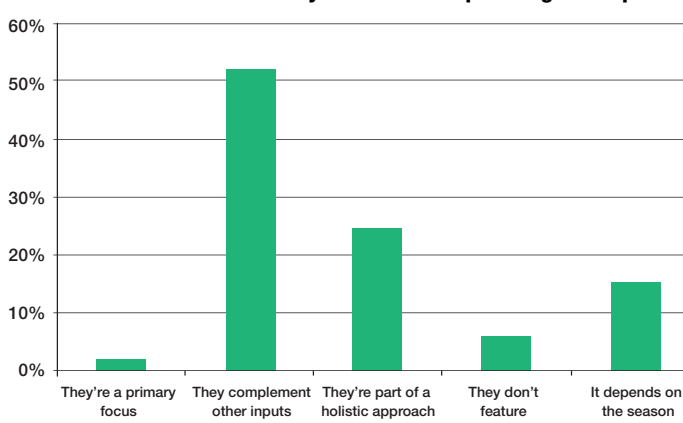
Have you observed noticeable improvements to crop yields since using biostimulants?



Have you noticed any changes in plant health?



How do biostimulants fit into your overall crop management plan?



► possible. We'll then do something similar in the early spring and then later on in that season — around fungicide timings — we'll use them again, but the specific product will vary depending on the crop, the conditions and forecast.

"One of the problems we've found is with beans — they can get really stressed out. Particularly during the flowering stage, we're tending to get extreme heat and you physically watch them shut down. So it's all about trying to mitigate that as much as possible and if crops have a big root zone and they're healthy because of biostimulants, then they're an incredibly valuable addition. In fact, in some years our spring cereals our biostimulant/nutrition spend has been higher than our fungicide spend, particularly if it's

been a dry year."

So what exactly are the benefits of biostimulants? Stuart says with the right product, there could be a multitude of advantages.

This sentiment was echoed within the survey, with 66% of growers stating that they've seen positive changes to plant health where biostimulants have been used, including better stress tolerance (49%), improved rooting (47%) and higher nutrient uptake and use efficiency (36%). "Better stress tolerance would be in my top reasons as far as the benefits of biostimulants," says Tom. "More tolerant plants are likely to be a result of better rooting too, so it's all linked. But just how much this can be improved will vary on the product."

Correct use has the potential

Picking a product

While 64% of growers said they don't have a specific preference when it comes to products, there are a range of options on the market and selecting the best tool for the job is going to align with success rates, says Stuart.

Matt adds that this is why he employs a range of products within his programme with one of them being Interagro's Bridgeway.

Bridgeway is an amino acid and peptide biostimulant designed to help nourish and protect crops by stimulating root and shoot growth, and by firing up the plant's natural defences, explains Stuart. "Feeding a crop Bridgeway early in the growing season has proven to be the ideal timing to build stronger more resourceful plants that are better able to capture water and nutrients and puts crops in the best position to cope/recover from a stress situation — something that might be really beneficial in what is proving to be a challenging season."

Interagro's biostimulant seed treatment, Newton, may also find favour with growers re-drilling

winter cropping area or thinking about how they can best prime spring seed. "Newton's unique in its action because of the signalling peptides which play a fundamental role in the regulation of growth and development and crucially, lead to faster seed germination and emergence," explains Stuart. "This year, getting crops up and away in the best health possible is going to be vital."

"Another benefit of Newton is that it's non-microbial, so the shelf life is long, and therefore you can leave it on seed without the worry of it decaying like a microbial seed treatment would do. The benefit of this is that it makes application more practical for growers."

"Similarly, Bridgeway also mixes really well — it's been on the market for six or seven years now and we've never had any issues. What's more, we've accumulated a huge wealth of data over this time which repeatedly proves the benefits of Bridgeway. It's all about using the right product at the right time when it comes to getting the best from biostimulants."

for yield increases too, with 42% of growers noting that they've seen a moderate increase on their own farms as a result of using biostimulants. However, 33% said they noticed no change at all, so why such a discrepancy?

"When we've tested biostimulants on a large field-scale, that's where we see the biggest difference, and if growers have been testing in small plots or tramlines, then that might be why improvements haven't been as widely noticed," explains Stuart. "But it's also about what situation and circumstances you apply biostimulants to and matching products with the expectation. They can help lift and improve yield in tricky situations, but it's not a silver bullet and that's really important to remember."

Tom adds that it's also important to take note of the inherent genetic yield potential of crops and take this into consideration when drawing conclusions on the impact of a biostimulant. "Particularly with cereals, they genetically can have a lot of resilience and a high yield potential which growers really have to keep sight of — you can often achieve this with a very good crop management programme, making it more difficult to see big differences with biostimulants. The challenge with biostimulants is that it often becomes very specific to the individual farm and even crop, so it's all a case of thinking about where they can fit within the programme to enhance performance."

"It's possible to get yield increases, but it can be difficult to achieve this consistently. But where you're likely to see the best results is in those more stressed seasons."

Improving quality with biostimulants is another claimed benefit, with 38% stating they've noted an uplift. "As we grow milling wheat, quality is really important, and we've seen more reliable quality results where biostimulants have been used," says Matt.

Stuart adds that a similar result,

and a positive influence on quality, has also been seen in Interagro's own trials.

As well as improvements to crops above the surface, there's evidence to show biostimulants can improve activity underground, too — specifically microbial activity and nutrient cycling — though 70% of growers said this isn't something they've noticed themselves on farm. "This is something that can be quite tricky to measure and get meaningful results, but we're actually going to be doing some glasshouse work this season," explains Stuart. "We know that we can show an improvement in root mass and root length, which ultimately means we're improving the rhizosphere. Within the rhizosphere and the root mass there's a huge uplift in microbial activity. But what we want to test is how much of an uplift in the quality of the microbial activity — so we'll be investigating that further this year."

Application techniques

In terms of application, the majority of growers (89%) revealed they make use of foliar sprays and a further 33% said they use seed treatments. The type of product will impact target growth stages and optimum timings, with 54% of growers noting that they aim for the vegetative stage.

"For us, it's not one position or application is best. We use everything from seed treatments and foliar applications just to target plants the best we can through the season," says Matt.

With the majority (70%) of those using a biostimulant already stating they believe biostimulants complement or enhance other inputs, Stuart adds that the success of this all comes down to optimising application timings.

"In cereals, for me T0 is a key timing," explains Stuart. "We've tested our own product Bridgeway quite a lot in field trials and what we tend to see is that you get a yield response at this timing as well as the ability for plants to fend off disease better

when overall crop health is improved. We've also seen evidence in a range of varieties that it reduces the incidence of disease — compared with when it wasn't used. So by getting it in the programme early on, the benefits could be vast.

"This reduction of the incidence of disease is further realised when followed up with a second or third spray. When you have a particularly high stress or high disease pressure year, this could prove really beneficial and could translate to a yield benefit at harvest."

One particular place Interagro trials have found biostimulants like Bridgeway and Zonda fit well is alongside an ethephon-based PGR in spring barley, explains Stuart. "We've seen that in several years' worth of trials, these biostimulants can safen the application. You still see the PGR effect, but it seems to add the ability to reduce brackling in barley. Reducing this means if you get a later harvest, your quality isn't going to be diminished, for example."

Of course, there's then the question of monitoring this to see if there's a return on investment. "If you're using a seed treatment like our product Newton, a really basic way of measuring the difference on farm is to do some early digs and look at the rooting," says Stuart.

"When you get to T0, it's not quite as easy to do this without damaging crops, but you can do things like look at Brix levels or send away leaf samples to see if you've improved nutrient uptake with a biostimulant."

Looking to the season ahead,



Matt Fuller believes the use of biostimulants helps keep his 1000ha of crops as healthy and resilient as possible.

with many growers still trying to recuperate from a washout autumn, how might biostimulants be beneficial?

Matt is planning to continue his usual approach of including them across the programme but says biostimulants could be an even bigger aid this season. "The main challenge for us at the moment is our wheat and barley crops have very poor, shallow rooting because of the winter we've just come through. They've not really pushed their roots further down into the soil profile."

"The concern with this is that if it suddenly turns dry, as we've seen in previous years, crops are going to get quite stressed and nutrient uptake will be depleted. This will then have a big knock-on effect on yield."

"Tiller retention is going to be vital this year, so if we can get early applications of biostimulants on it's going to give the crops the best chance of taking up as much nitrogen as possible when we get to that point." ■

Winner announcement

Congratulations to prize winner Matt Fuller who responded to the *CPM*/Interagro survey and provided insight on his biostimulant use. Matt won an iPhone worth £999.

Matt was chosen having completed the tie-breaker question, explaining that to

achieve the most from biostimulants, he recommends using a programme from sowing to harvest and to not just fit products in at any timing. He also said to look closely at the product dose.

To engage with future surveys, visit the *CPM* website and sign up to the newsletter.



Prioritising margin over yield

Applied innovation

In a year where cereal crops will be hungry thanks to suboptimal conditions, plus continued nervousness around conventional input prices and supply, interest in alternative products continues to rise. *CPM* learns how biostimulants can help when focusing on margin over yield.

By Janine Adamson

According to agronomist Alice Clews, it's time to focus on gross margins rather than yield alone. And to facilitate this switch in mindset, using all elements of the input armoury is required, particularly micronutrients and biostimulants.

Alice believes biostimulants will add significantly to the nutrient programmes being recommended on farms in the future. But rather than sit and wait for tomorrow, she's already applying this philosophy to support farmer James Warren at Tall Oaks Farm in Huby, North Yorkshire.

Whereas his medium loam soils are mostly free draining and support a cereal

rotation based on 100ha of first and second winter wheat, winter barley and oilseed rape, some of his lighter and sandy soils have presented a nutritional challenge.

Biostimulants

For this aspect of his rotation, he integrates spring barley, and stubble turnips for sheep grazing — both important elements. To overcome the nutritional conundrum, James believes biostimulants — more specifically Crop Rooter Plus — help to improve available levels of essential nutrients and trace elements including phosphorus, sulphur, manganese, copper and boron.

“The timing flexibility of biostimulants is key. Helping crops at different growth stages and situations such as when under stress or in drought conditions, is one of the ways to reach full crop potential,” says James.

So what constitutes Crop Rooter Plus? In answer, the foliar product is a concentrated NPK phosphite feed formulated with 19 plant-derived amino acids. For the plant, this results in promoted root development leading to enhanced growth.

James agrees that phosphite has helped his cereal crops to develop better root mass, which in turn has allowed improved scavenging for soil-held nutrients further away from the plant. “We started using biostimulants last year and have been encouraged by their performance. It was our Velcourt Advisory agronomist Alice who ▶

“ Helping crops at different growth stages and during situations such as stress or drought, is one of the ways to reach full crop potential. ”



Alice Clews believes biostimulants will add significantly to nutrient programmes being recommended on farms in the future.



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Alice Clews recommended Crop Rooter Plus to James Warren based on years of independent trial data.

► recommended Crop Rooter Plus based on a number of years of independent trial data.”

Alice says her interest lies in the impact biostimulants can have on crop performance, especially those grown on light and drought-prone soils, as well as those that have a proportion of nutrition supplied organically.

“Certainly on James’ farm, where some of the lighter land can be quite nutrient hungry, we’ve seen encouraging results

where Crop Rooter Plus has been applied. It now features in a wider range of nutritional regime recommendations I make,” she says.

For context, Tall Oaks Farm operates a mix of plough-based and minimum tillage cultivation techniques followed by a combination drill. All fields are rolled, particularly the lighter land, which according to James require consolidating to conserve moisture. Drilling starts in mid-September and ideally, all fields will have been rolled within 24 hours of drilling.

Spring nutrition involves winter wheat receiving 50kgN/ha at mid-late tillering, applied using an Amazone twin disc spreader. This is followed by a second application of 100kgN/ha at GS31 supplied as liquid digestate from a bioenergy plant. A third application of 50kgN/ha is applied in granular form at GS32-37.

Alice says soil testing is a key management tool to help assess nutritional requirements. “It has to be a routine operation on all farms,” she stresses. “Ideally taking place around February, when the soils start to warm up. Being consistent about the time that soil testing takes place is probably more important than the specific time at which you undertake it.

“Ensuring that macro-nutrition is correct is a fundamental building block of crop

production, however, we’re seeing responses to some biostimulants even when macro-nutrition is correct. As a result, biostimulants are featuring more routinely in nutrition strategies and being included in programmes on farms.”

Velcourt has been investigating the impact of micronutrients on crops, with particular interest in the role that phosphite has on nutrient uptake, says Alice. “Evidence shows that applications of Crop Rooter Plus are increasing crop yields, which is likely to be associated with more efficient nutrient recovery.

“Furthermore, evidence suggests that phosphite applications are beneficial alongside some fungicides to improve their uptake,” she says. “And this is one of the reasons why we’ve been so impressed with Crop Rooter Plus when applied at 1.0 l/ha at T0. We apply it at the same time as fungicides and the manganese foliar spray.”

Effective strategy

“A second application of Crop Rooter Plus at 1.0 l/ha is applied between mid-tillering and flag leaf, depending on the ground conditions for travelling. It’s difficult to predict when the crop is most likely to respond to applications, but trials have shown a total application of 2.0 l/ha split over 2-3 timings within the spring is an effective strategy,” explains Alice.

Last year, James’ yields were above average which meant the impact of the biostimulant was less obvious. However, he says visually, the difference in colour between treated and untreated fields was significant, particularly when the weather turned hot and the crop was stressed.

“The main difference in our nutrition regime last year was the earlier timing of the nitrogen and the inclusion of micronutrients,” he says. “It’s clear to me that early applied nitrogen is better than delaying it. If we can improve the rooting, and especially where there’s a good level of available nitrogen in the soil, then we may be able to reduce the amount of nitrogen applied going forward but have greater Nitrogen Use Efficiency (NUE).

“Last year this was definitely the case and going forward, biostimulants will play an increasingly critical role in our nutritional management programme,” says James.

Alice agrees that the key to using biostimulants is to understand the requirement of the crop, and that their use will vary depending on the weather and the season.

“Biostimulants should be applied at the

UK-centric approach

Ilex EnviroSciences’ Murray Smedley says the benefits of products manufactured in the UK, developed for the UK market, shouldn’t be overlooked. Not only does this add reassurance for growers, but it also helps with potential supply chain uncertainties.

“Crop Rooter Plus is wholly focused on the home market and unlike many products currently available, is manufactured here in the UK. That’s something which we’re very proud of as a business,” says Murray.

“Trial work is conducted on UK-relevant crops grown within UK soil types and conditions, simply put, it’s all about the UK.”

He also believes that having a robust, replicated trial set undertaken for at least four years, further adds to confidence in the product. “Our trials are independent and delivered by trusted providers such as ADAS and Velcourt. This is important when it comes to building the reputation of biostimulants as a product segment,” he says.

Equally, Murray stresses that when it comes to biostimulants, there shouldn’t be ‘disingenuous guarantees’. “It’s important to be



Murray Smedley stresses that when it comes to biostimulants, there shouldn’t be ‘disingenuous guarantees’.

clear on the outcomes and manage expectations. In ideal scenarios the benefits can be huge, but being realistic, conditions are very variable season by season,” he says.

“We shouldn’t claim huge yield benefits. Instead, it’s about focusing on the importance of crop health and addressing when a plant is deficient in something.”

right time. Trials show that there's frequently a benefit from using them, although this is usually less visible than the response seen from applying fungicides, for example," she says.

"This is why there's value in focusing on gross margins rather than yield alone, when relating it back to applied inputs; micronutrients and biostimulants are key components in this process.

"Of course they've only been taken more seriously in the last few years, mainly because rising nitrogen costs have left no option other than to consider alternatives."

To crunch the numbers, Velcourt trials on winter wheat have demonstrated an average margin over input cost (MOIC) benefit of £92/ha where Crop Rooter Plus has been applied, based on a price of £180/t. "Having the capacity to undertake our own trial work and make our own independent assessment of products is key to Velcourt's crop production philosophy," says technical director Nick Anderson.

"However, assessing biostimulants present their own specific challenges. Often we're trying to identify changes in yield or quality which are below the level of Least Significant Difference (LSD), which makes them hard to attribute to the application of the product, rather than to variation caused by different factors. In more than 40 trials over the last decade, this has always been the case."

When the company first looked at Ilex EnviroSciences' Crop Rooter Plus in 2019, Nick says they were surprised to observe something different. "In our first Crop Rooter Plus trial, six out of 12 treatments delivered a statistically significant increase in yield over the control, meaning that we could say with 95% statistical confidence that these yield increases were a result of the product's application," he explains.

Concerned that this could have been the consequence of a factor unique to either the site or season, Velcourt undertook a further five trials in subsequent seasons. "During the six trials, we are able to make 47 comparisons of Crop Rooter Plus applications with the untreated control, 41 of these resulted in a numerical increase in yield, two showed no change in yield, and four appeared to reduce the yield (by a maximum of 1.6%).

"An aggregated dataset of this nature, where the product has been looked at in three seasons on six different sites, provides a very high level of confidence in the response we have seen," explains Nick.

As growers enter spring with trepidation following a challenging autumn, what role

will Crop Rooter Plus play? Murray Smedley from Ilex EnviroSciences says scavenging for nutrients will be even more important than ever.

"Widespread waterlogging will mean nutrients will have been washed away and leached. Not only that, crops will potentially be quite backwards and hungry as a result," he says.

In addition, Murray believes it's the bioactive agents found in the product which 'helps a plant to help itself'. "It's all about combatting abiotic stresses which include anything from lack of sunlight to extreme temperatures."

Useful tool

Nick concurs that although some growers may want to avoid further investing in poorly performing crops, for those who prefer to optimise what they do have, biostimulation is a valuable tool at hand. "As growth starts again in the spring, applying early nutrition including biostimulants will help to drive root biomass and promote tillering," he says.

Already a convert, Flagleaf Farming's Jim Beeden says he believes biostimulants such as Crop Rooter Plus are 'here to stay'.

"The answers to disease control always used to be found in a can of pesticide, but with many key actives either being revoked or having lost potency, we've had to look elsewhere for solutions to make a crop more resilient to disease and better able to deal with stress pressure," he says.

For the past four seasons, he's used Crop Rooter Plus, and in the first year, he tested it against a range of other foliar nutrition and biostimulant products on the market.

Jim says he only saw a significant visual difference in crops where the Crop Rooter Plus had been applied, particularly with a larger root mass and healthier plants.

"We follow a simple programme based on two applications of 1.0 l/ha with ideally the first being applied in the autumn, but if the land won't travel, then waiting until the spring is fine.

"The first application should be applied ideally at mid-tillering which coincides with T0, T1 timings. We leave 4-6 weeks between each application," he explains.

Jim says as well as his own findings, he was impressed with the trial data from Velcourt. "Ilex is a company with numerous independent trials, so we're confident that including Crop Rooter Plus in with our existing portfolio of products will continue to have a positive impact on cost effective crop performance.



As growth starts again in the spring, applying early nutrition including biostimulants will help to drive root biomass and promote tillering, says Nick Anderson.

"Biostimulants have a role but they must be proven. I think the ban on some fungicides and herbicides has created a requirement for a different line of thinking and plant health is the key," says Jim.

Velcourt trials are now investigating the impact of Crop Rooter Plus on spring crops with promising results so far. "In 2023 we conducted six fully randomised and replicated trials for yield response in spring barley," says Nick.

"Impressively, we saw a positive response in five out of six of the sites, which adds confidence in the product's ability to deliver success in spring crops. Of course that'll be particularly relevant given autumn challenges and switches in rotations," he concludes. ■

Applied innovation

Ilex EnviroSciences is a British company which manufactures and supplies a range of concentrated foliar nutrients, biostimulants and seed treatments.

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





Spring establishment

Springing forward

Following what's been a miserable autumn season, the pressure is undoubtedly on to ensure spring crops successfully overcome potential weather extremes that come their way. *CPM* looks at some of the options on the table.

By Janine Adamson and Rob Jones

Conditions the past few months were far from ideal but rather than linger on the past, it's time to look forward to the spring, which by its nature, brings optimism. And although the weather can be just as unpredictable as the days grow longer, hope for a decent crop come harvest remains.

For those able to secure seed for spring cropping, there'll arguably be a little nervousness around the investment, especially if it's as a result of writing off what was sown in the autumn. But with less time to tiller and the ever present threat of drought, spring barley in particular requires additional attention to

help give it the best start possible.

For south Shropshire-based independent agronomist, Matt Jones, this means focusing on rooting. "Given the dry springs we can experience these days, rooting is my main objective," he says. "Without it, there's a high risk of stressing the crop which then leaves it more susceptible to disease."

Ticking boxes

With both straight arable and mixed farmers on his books, Matt aims to find cost-effective ways to support early crop establishment and emergence, which if possible, tick multiple boxes for the grower. For the past five years this has meant using Fielder's Kick-Off — a phosphite and biostimulant seed treatment.

"When you dig and assess the root structure of a spring barley plant treated with Kick-Off, you can clearly see the difference compared with an untreated plant. It offers a lot in one product, which is an important consideration in a season where every spend has to be scrutinised," he says.

Kick-Off contains phosphite, phosphate, manganese, potassium, zinc and sulphur, plus 19 plant-derived amino acids. As well as including it in his agronomic recommendations, Matt also uses the seed treatment at his home farm near

“There's no point planting valuable seed into ground where it has no chance to establish, as that's the profit gone.”

Bishop's Castle, where the majority of seed is home-saved.

"We disease test and on the whole don't require a single purpose dressing (SPD), so invest in Kick-Off instead across both autumn and spring-drilled crops. I'm a big believer in phosphite-based products for rooting, the difference is clearly visible when they're used," he adds.

Another grower who's remained faithful to Kick-Off is John Stonehouse from Scarborough. He's used the product for the past four years to support the arable side of his 146ha mixed farming enterprise.

"It does exactly what it says on the tin," he says. "The first time we used it was on a small area of spring barley which we ▶

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Healthier crops with better root structures can withstand stress better, which pays back in other ways, says John Stonehouse.

► had to drill late at the end of April. The land was high up and dried out, so we wanted to find a way to improve rooting.”

According to John, the results spoke for themselves — the spring barley treated with Kick-Off delivered 5t/ha compared with a basic manganese seed dressing that yielded 2.5t/ha. “Each year is different so the uplifts vary, but it isn’t always about yield. Healthier crops with better root structures can withstand stress better, which pays back in other ways,” he explains.

Reduced cultivations

One wider benefit, explains John, is a reduction in cultivations across the farm’s ploughed land due to the improved rooting breaking up compaction and improving soil structure. “Removing a pass of the power harrow saves fuel costs as well as time,” he says.

As a mixed farmer with farm-saved

seed, John confirms in terms of return on investment, the numbers add up. “It certainly performs across cereals and pulses but where I’d be intrigued to see it in action is on grass. We’re at the upper end of stocking density therefore are always looking for ways to maximise the performance of our grassland and permanent pasture.”

Fielder’s Robert Hawkin believes whether soils are in a good condition or suffering as in this season, Kick-Off has a role to play in boosting plant health and maximising yields. “The high phosphite-phosphate mix encourages deeper rooting and therefore supports crops to get up and away. This is in formulation with amino acids, which are widely recognised for their protein-building capacity which help plants to overcome different abiotic stresses,” says Robert.

“It also offers an excellent return on investment for growers, with our ►

Getting up and away

A recent X (Twitter) poll on spring intentions undertaken by Interagro in early January, revealed that just 20% of participants had drilled all of their winter crops, and a further 33% reported a rise in spring cropping plans as a result.

While a ‘repair and reboot’ approach will be required to rescue winter crops that have survived the past few months, building resilience in spring crops is going to be even more vital with a potentially volatile season ahead, says Interagro’s Stuart Sutherland. “The past few seasons have demonstrated just how unpredictable the weather can be, with some of the worst rainfall coinciding with when farmers are establishing crops.

“This season especially, winter cropping has borne the brunt of this, putting more pressure on spring cropping to compensate for some of the undoubtable losses.”

For Stuart, the key to priming spring crops and protecting yield potential lies in plant health, starting with the seed. “Stimulating it to thrive from day one should be a priority,” he comments. “By doing so, farmers are more likely to have self-sustaining plants with deeper, bigger root systems to help to survive through stress periods, as well as building plant biomass to optimise sunlight capture and subsequent growth later in the season.”

Biostimulant seed treatment, Newton, manages the balance of growth promoting hormones versus growth inhibiting hormones, to trigger faster germination while signaling

enhanced root and shoot growth and the defence systems of plants.

Resilient plants which are less dependent on inputs can be particularly beneficial in times of catchy weather, says Stuart. “Essentially, stronger plants buy you time. If the weather takes a turn for the worst ahead of a key spray timing, a more resilient plant is going to hold up better until you can get out with the sprayer.”

One grower looking to capitalise on this is Michael Kavanagh. Michael manages DGF & MAM Thompson Farms in Shropshire and says he’s been on a journey over the past nine years to grow high yielding, resilient crops which have little reliance on synthetic inputs.

Reflecting on autumn 2023, Michael says it was very much a tale of two halves. “Anything that was drilled mid to late September looks well but anything drilled later than that has really struggled due to the weather. We probably have around 40ha to redrill.”

Despite the lacklustre performance in some of the crops, Michael says he’s impressed with a biostimulant trial he’s been running on winter wheat. The split field trial has involved treating one half of a field with Newton and leaving the other half untreated.

He explains that although to the naked eye there doesn’t seem to be much difference between the two, the story underground is different. “I’ve dug up plants and the roots are a good inch longer on the Newton-treated wheat,” he comments.

As well as the crop benefits from using



Anything that allows plants to get up and out the ground quicker and in better health has to be a good thing, says Michael Kavanagh.

Newton, Michael says it’s also proved practical for home-saved seed. “It’s really easy for our seed cleaner to apply and then at drilling time it’s there ready to be sown. There’s always a massive time pressure during drilling, so having Newton already on the seed means I can crack on.”

Looking ahead, Michael has plans to try Newton on some of his spring crops for the first time. “I’m going to use it on some spring barley this year, and from what I’ve seen from Newton so far, it’s likely that it’s going to be something we use across the board from next year. Anything that allows plants to get up and out the ground quicker and in better health has to be a good thing,” he concludes.



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Spring establishment



Dick Neale says scrutinising soil conditions with a pragmatic eye will help to assess whether conditions are good enough to support a profitable spring crop.

► independent trials showing for every £1 spent on Kick-Off, the farmer sees on average £11 back in return.”

And for those with crops in the ground or who have already secured seed, partner product, Kick-On (P, Mn, Zn, S, N and K), can be applied as a foliar spray to young plants. “Kick-On enhances establishment and is ideal in troublesome conditions. It works by promoting healthy plant growth by aiding the plant’s natural defence systems and by stimulating meristem cell activity, especially in the plant roots,” explains Robert.

However, for Hutchinsons’ Dick Neale, scrutinising soil conditions with a pragmatic eye will help to assess whether conditions are good enough to support a profitable spring crop at all.

He says around 25-30% of winter crops

weren’t drilled and many growers were relying on filling the gap with spring cropping. But, with 300 national flood warnings in place come mid-January, the situation remains high risk.

Challenging times

“Soils across the country are wet, wet, wet. On top of this we’re not in a drying time, so there won’t be much opportunity for them to dry up before early spring,” says Dick. “Even where crops have been drilled, it’s been so wet, they may not survive through to harvest meaning establishing a crop this spring is going to be very different to last year.”

In comparison, February 2023 was dry and relatively warm with most seed drilled early doors into good seedbed conditions, which supported yield potential.

“This isn’t going to be the case in 2024 — the forecast is cold and cold wet soils aren’t conducive to getting on early to drill, so limit the potential of a spring crop even before it starts,” explains Dick.

“Also, spring cereals don’t have the same drilling flexibility we have with winter wheat. When planted late they end up resembling a forage crop that doesn’t finish. So this emphasises the importance of looking at soil conditions before investing in any crop and asking the question if it really has the potential to be profitable.”

His advice is to work closely with an agronomist to make assessments and be realistic about which fields, or even parts

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A visual difference can be seen between the root structures of spring barley treated with Kick-Off compared with untreated.

of fields, will drill early and well.

“Turning headlands are often the wettest parts of a field so it may be worth leaving these and focussing on the drier parts of the field. There’s no point planting valuable seed into ground where it has no chance to establish as that’s the profit gone.”

He says equally, there are longer-term impacts on the following winter crop to consider. “Travelling on soils that aren’t ready will leave them damaged — the spring crop will be late to harvest, more than likely full of weeds, all of which will carry over into the performance of the following winter crop.”

Dick suggests waiting and considering a summer cover crop in these wet areas to help dry out and recondition the soil in preparation for winter planting.

Nutrition priority

But where spring crops are drilled, he agrees that early nutrition will be key as most nutrients will have moved down the soil profile and out of the feeding zone. “Keep an eye on pH; calcium is pretty mobile so that has to be monitored. A seedbed with a pH of 6.5 at the start of the autumn could have dropped to pH 6 by the spring; it’d be worth starting to check fields now,” says Dick.

“Realistically, we’re looking at late March before spring drilled crops will be getting up and away and they’ll hit a period of fast growth, so it’s important that the plant has access to nutrients as required.”

If weather conditions support ground travel within the next few weeks, and seed is already in the shed, the message from ProCam is that it’s still not too late for some varieties of winter wheat.

Based on AHDB’s Recommended List vernalisation data, the safest RL 2024/25 varieties for drilling until the end of February are



Mike Thornton questions for those not used to growing a lot of spring crops. whether this year is the time to try.

RGT Skyfall, KWS Brium, RGT Bairstow and Swallow (Senova).

Head of crop production, Mike Thornton, says not only does wheat remain the most profitable option for many growers, but it may help to keep rotation planning on track. He also questions whether now is the right time to start experimenting.

“If you’re not used to growing a lot of spring cropping, is this really the year to try, given conditions are sub-optimal?” he questions. “Options such as linseed and spring oilseed rape might be considered for later drilling slots, but again, what are the impacts of those crops? Are they familiar, will they incur a late harvest and is there a local market?”

For those with spring cropping experience, Paul Gruber echoes Dick’s sentiment to assess land conditions on a field-by-field basis. “Experience tells us to not rush in with the drill if the ground is tender.

“Of course, this is contrary to research which says the earlier drilled spring crops perform better, but it’s worth bearing in mind that that’s only when they’re planted into favourable conditions. Don’t force it for the sake of a calendar date,” he concludes. ■

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Innovation insight

Stick or twist?

Data from Europe has revealed climatic changes could be affecting crop growth and limiting oilseed rape yields, leaving experts debating whether growers should stick or twist when it comes to drilling dates. CPM finds out more...

By Charlotte Cunningham

The past few years have been a rough old ride for oilseed rape — a crop which has kept itself firmly in the headlines due to ongoing challenges with the mighty mouth of the cabbage stem flea beetle and the limited options to protect both crops and growers.

But where there is challenge, there's often opportunity, and farmers have become resilient in their approaches to keep the valuable break crop in the rotation.

However, despite best efforts, growers were met with another challenge this autumn, with many experiencing the wettest since the washout of 2019. This is in tandem with monitoring data showing a

downward trend in yields over the past five years, undoubtedly leaving many scratching their heads about the best way to approach the crop.

The state of play for OSR, and how to tackle it in a changing climate, was the topic of discussion in a recent webinar hosted by LSPB.

Unrealised potential

"Looking at OSR during the past 30 years, there has been both evolution of the crop and — over more recent times — a struggle and decline in crop area," says Chris Guest, managing director at LSPB. "Despite that, genetic gain and yield potential has still continued to improve over this time."

Looking at this timeframe in more detail, developments have included the introduction of F1 hybrid types in the 90s, and a significant increase in market area — peaking at just shy of 750,000ha in 2012, he explains. "Obviously, the crop has had its fair share of challenges over this time too, with the neonicotinoid ban in 2014 and then further loss of chemistry to help growers protect crops from flea beetle damage."

The increasing frequency of extreme weather patterns at key timings has also been a major challenge, and the combination of these factors have undoubtedly impacted yields, notes Chris. "On farm, we've noticed a sort of flatlining

“The secret to high yields is to get more seeds per square metre from the plants.”



On farm OSR yields have dipped significantly over recent years, despite genetic improvements, says Chris Guest.

of on-farm yield, which goes against what we've seen in terms of the development and improvement of genetics in trials.

"So essentially, I think many growers have found themselves in the position that the genetic improvement is there, but they're not seeing that realisation into farm situations due to multiple external challenges.

"The problem with this is that with the total crop area down, we have a position where the UK becomes a net importer of rapeseed, having been a net exporter, and there's some challenges and questions on food security there."

So is there a solution to this? And how best can growers approach OSR in a changing climate?

Sowing dates

Chris says although there are no clear-cut answers as such, looking at crop management strategies — in particular, sowing dates — could help to put growers in a better position. "We've been doing a lot of work on later sowing recently, and also considering whether the increase of growers targeting that really early window is a reason for limited yields," explains Chris. "If we think about the on-farm situation,



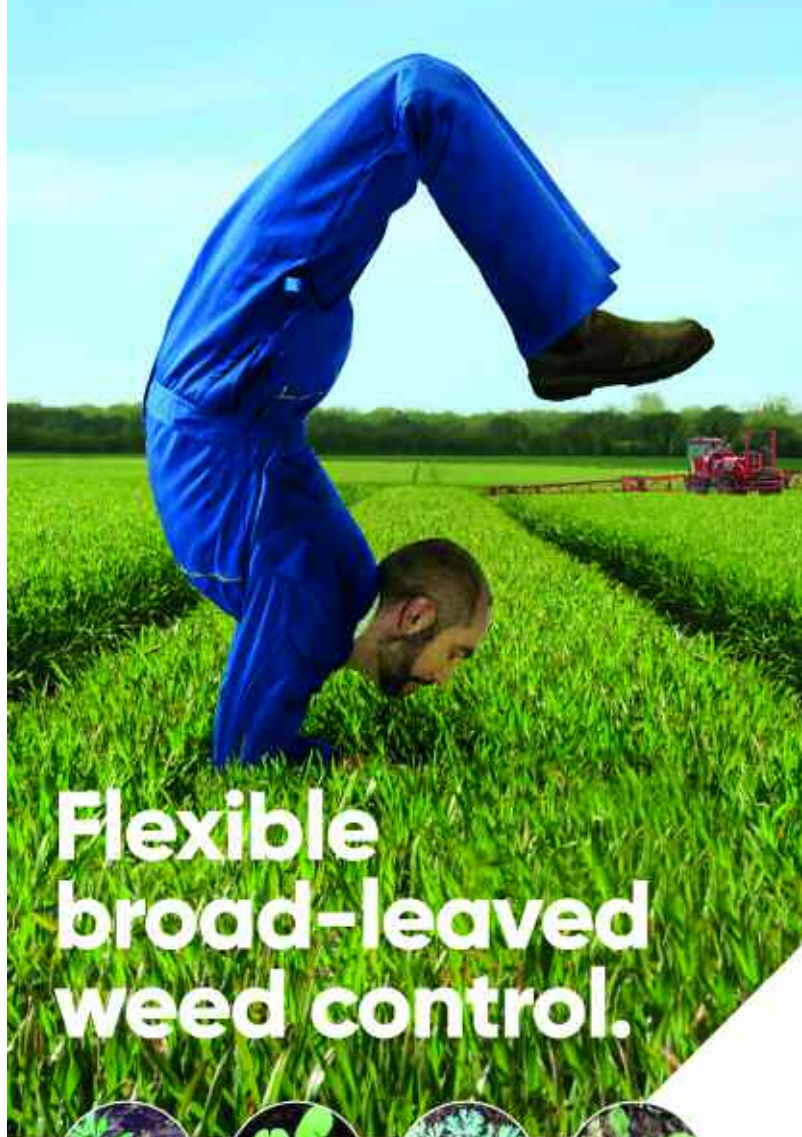
It's really important to understand the 'developmental rhythm' of the crop to better understand how yield is determined, says Ute Kropf.

most rape is now drilled in early August with some growers now even getting crops in at the end of July if they can, in a bid to get crops up and away to avoid the worst of any flea beetle damage.

"However, when we look at trials data, the average drilling date for crops tends to be around 30 August, so it could be that this contributes to the great disparity between performance in fields and performance in trials."

As such, turning to our European colleagues could provide some good evidence for altering the approach, says Chris.

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Based on European data, the 'ideal' drilling date for OSR in the East of England is around 18/19 September to ensure OSR plants are at the optimum growth stage by the end of the year.



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With warmer winters becoming the norm across Europe and the UK, experts believe OSR crop yields could be suffering as a result.

► Dr Ute Kropf from the University of Applied Sciences in Kiel, Germany has been working on the University's trial station since 2000, and during that time has collated some interesting data on sowing dates and crop performance, which could be applied to UK farms due to the climatic similarities.

Since 2008, Ute has been looking at OSR yields and says that up until 2014, yields were consistently around 5-6t/ha. Since then, they've dipped considerably. "In our experience, we believe that one of the main reasons for this is the difference in winter vegetation between the pre- and post-2014 periods," she explains.

This change in performance has led

Tapping into yield potential

Though changes in temperature is out of the hands of growers, Ute says there are a number of practical measures that can be taken to access as much yield potential as possible:

- Don't drill too early
- Using PGRs can help to slow down crop development if it's a particularly warm autumn/winter
- Apply nitrogen as early as possible; elongation begins much earlier as a result of climatic changes but the soil is too cold to mineralise any of the soil nitrogen in the late winter/early spring so applying to the crop can help to boost uptake
- Consider a PGR again in the spring which can help to shorten the upper third of the plant so that lower tillers/flowers get more light
- There is always going to be a compromise with optimum yield and crop development and likelihood of flea beetle damage; weigh up the risk carefully

Dr Kropf to look deeper into the causes of this difference in winter vegetation, and it all comes down to climatic changes.

The trials site at Lindenhof historically has experienced very cold winters, with temperatures plummeting to -15°C . At this temperature, OSR plants typically experience 2-3 months of dormancy. However, due to the rising temperatures since 2014, this dormancy period has been as short as 4-5 weeks — meaning crops keep growing for much longer during the autumn and winter and get going again much quicker in the spring, explains Ute.

So what does all of this mean for yield? "The secret to high yields is to get more seeds per square metre from the plants, and this is in part determined by the number of buds set in the spring," she explains.

Developmental rhythm

"Therefore, it's really important to understand the 'developmental rhythm' of the crop. Yield is determined early on in the crop's life cycle and with the back end of the year now tending to be warmer than usual, this yield is now being set in the winter rather than the spring."

Delving deeper into the development of the crop, it all comes down to the accumulated thermal temperature, she explains. "Each pair of leaves requires between $120-150^{\circ}\text{C}$ of thermal heat, plus 150°C for emergence, meaning about 600°C is required to get to the six-leaf stage."

At this point in the growth cycle, OSR moves into bud differentiation, which continues until the plants reach the beginning of stem elongation at around the 10-12-leaf stage. "When the total thermal temperature reaches around 1200°C , the plant reaches maximum bud density. After this point, the plant starts to reduce weak side tillers and flower buds to get enough food for stem elongation — which begins after this point — and growth in spring," explains Ute.

Applying the physiology to the data, during the traditional, colder winters, crops would have typically reached this stage at around mid-late March. However now, this is happening a whole two months earlier in January. "Some of the early sown rape can elongate as early as November/December," she adds.

The impact of this is that crops have a shorter differentiation period and begin stem elongation with maximum bud



To explore the relationship between sowing date and yield further, LSPB has trials in the ground at present with results expected this summer.

density having already been reached due to the higher temperatures. "What's more, buds are being formed in poorer conditions than they would be if they were forming in the spring, and all of this has a direct impact on yield."

As a result, the optimum sowing date at the trials site is now somewhere in the last week of August, she adds.

So what does this mean for farmers? Ute and her team have modelled the data seen at Lindenhof on average temperatures in Cambridge, to help UK growers to get a better understanding of how changes to sowing date could benefit yield.

Comparing the temperature data between the two locations, Ute says Cambridge has seen 230°C more thermal



Researchers have also found that TuYV varieties tend to start stem elongation earlier as they need less thermal time.



The University of Applied Sciences' trials site in Lindenhof, Germany has shown a correlation between warmer winters and diminished OSR yields.

time in the autumn/winter (September to December) and 200°C more in the later winter/early spring (January to March) during the past two years.

In terms of what this means for drilling date, based on the data this equates to an 'ideal' drilling date in Cambridge of around 18/19 September to ensure OSR plants are at the optimum growth stage by the end of the year — considerably later than the 'normal' OSR sowing date for a lot of growers, she notes.

Of course, it's not just a case of simply switching drilling dates. There are a number of risk factors to consider, including what later drilling means for potential flea beetle damage as well as the potential that a wet autumn could significantly impact drilling days. There are also important varietal considerations too, adds Chris.

While the reason why is unknown, something Ute has discovered is that TuYV varieties tend to start stem elongation earlier as they need less thermal time, so this is something worth noting and taking into consideration when selecting and managing varieties, says Chris. "We know in the UK there's a large percentage of varieties with TuYV resistance being grown.

So we're going to look more at what the influence of that genetic tool is in terms of giving crops even larger canopies into the winter."

LSPB has a number of trials in the ground this year, sown in both early and later slots, with results ready for further discussion this harvest.

"Our aim at the moment is to find out whether or not this really is a viable alternative option and not just a marketing story," says Chris. "But what we can say for now is that delaying sowing into September and utilising historic farm climatic data to enable this could be part of the strategy moving forward.

"This isn't the end story — we don't have the answers yet. But we're on a journey to find them," he concludes. ■

Innovation Insight

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AHDB Monitor Farms

Open collaboration

AHDB Monitor Farms is a nationwide network of like-minded growers with the common goal of improving their business through sharing performance information and best practice. CPM learns more about what's involved.

By Janine Adamson

Open-minded, ambitious and sociable — adjectives which could all easily be used to describe AHDB's latest monitor farmer, Jack Houghton. After all, they're on the job specification and prerequisites of the position. And in a sector where you only 'get out what you put in', he proved a prime candidate for the role.

Jack is the first West Midlands monitor farmer to be appointed post-pandemic and he's in his early thirties. He says because of this, his driver is to encourage more people to join the industry. "I'm often the youngest in the room. That has to change so that farming has a future.

"I'm not one for sitting around talking about new ideas — I want to get out and try them. If it goes wrong, it goes wrong, but you always learn something. And if I can share that learning, it's even more useful. That's why I'm excited to become a monitor farmer," he says.

Jack runs DW Burton Farms in Wolverhampton — just over 800ha of

owner-occupied land and farming agreements. His goals include stabilising the business by securing long-term tenancies and contract farming agreements, reducing inorganic inputs, and building soil organic matter.

But how does being a monitor farmer contribute towards those valiant ambitions? Dr Alex Ansell is AHDB's cereals & oilseeds knowledge exchange manager for the West Midlands and Wales, and will be supporting Jack during the next three years as he invites local farmers to join him for a series of knowledge exchange events.

Unique principles

Alex says the programme has unique principles. "It's a farmer-led, farmer-driven project with business efficiency and benchmarking at the heart of its activity. It takes place on commercial farms, providing a hands-on approach to personal and business development. This makes it attractive to other members of the farming community," she explains.

The monitor farming concept first originated in New Zealand, was adopted in Scotland in 2003 and rolled out across England, Northern Ireland and Wales in 2014.

How it works, is, a monitor farmer partners with their local AHDB knowledge exchange manager to host around five meetings each year. These farmer-led meetings provide the opportunity to find and share challenges and solutions, as well as spend time socialising with peers.

During the three-year programme every aspect of a farm business is scrutinised with the host farm serving as a case study — from soil management to machinery policy,

“ It takes place on commercial farms, providing a hands-on approach to personal and business development. ”

but with cost implications to the farm business always taking centre stage.

Alex says with a focus on making real developments in business management, improving productivity, competitiveness and environmental management, it's about embracing innovative ideas, all with the support of AHDB and industry experts. ▶



Jack Houghton will be supported by Alex Ansell during his tenure as AHDB monitor farmer.

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According to David Hunter, the creation of engaging and informative meetings takes time and relies on regular communication.

► “It takes a special mix of qualities to be a monitor farmer. Jack is keen to try out new arable farming methods in practical ways, and to share the results at his meetings to both inspire others and learn from discussions generated,” she says.

As for AHDB, Alex stresses that knowledge exchange is a mainstay of the levy board’s offer to growers. “The knowledge exchange team is a key part of the service AHDB provides, facilitating peer-to-peer learning, carrying out on-farm research and connecting growers with the best information and expertise.

“This is enabled by our network of Strategic Farms, Monitor Farms and Arable Business Groups. However, we are always eager for more farmers to be involved to continue the good work, which is why we’re undertaking a recruitment campaign for new Monitor Farms,” she comments.

At the other end of the spectrum is Newbury-based Rob Waterston who’s approaching the end of his tenure as a monitor farmer. He manages the Welford Park Estate — looking after 1072ha of mostly wheat, winter beans, oilseed rape and spring barley.

According to Rob, it was attending

What makes a great monitor farmer?

A monitor farmer should be:

- Willing to speak openly about their business, disclose information and share how they reach decisions
- Open-minded, interested in innovative ideas and happy to embrace change
- Ambitious – keen to set and achieve personal goals
- Sociable – enjoy meeting people and happy to host events

meetings with former Wantage Monitor Farm host Julian Gold that inspired him to take on the role. “I attended the meetings and always felt as though I took a lot from it — it’s important to visit different farms and share experiences.

“So I thought, why not? Admittedly I felt a little daunted as I knew it would push me, but that’s good because it’s easy to become complacent,” he says.

During his time as a monitor farmer, Rob has engaged in trials such as assessing the impact of cover cropping on soil biology, going fungicide free through optimising crop nutrition, and whether drilling a companion crop into spring oats can be a success.

Having hosted a variety of meetings, he says one of the most important things to consider when embarking on the role is the ability to be transparent.

New perspectives

“You have to be open and prepared to be challenged and questioned by others who are sometimes further on in their journey than you are. We’ve always acknowledged that our business isn’t perfect, and at times we’ve had difficult harvests, but being a Monitor Farm has proven a good way to scrutinise our ways of working,” explains Rob.

Equally, he believes choosing strong subject areas to attract audiences from both the local area and beyond is key to success.

“It’s about attracting the right sorts of people to visit the farm. AHDB provides support in sourcing quality speakers for the meetings which is valuable in terms of delivering a worthwhile event that keeps people engaged.”

Topics covered at Rob’s meetings include agri-environment and natural capital markets; cover cropping; labour and machinery review; and the recent soil secrets tour with Joel Williams.

Finally, Rob says having a strong handle of data is essential. “We’d long been part of a benchmarking group, so were familiar with gathering quality data and confident about sharing it with others. Having good sources, comprehensive monitoring and record-keeping all helps to support being a monitor farmer.

“That said, none of it’s a hardship. In reality, being a Monitor Farm is hosting a few meetings a year and as a result you have the pleasure of meeting people you wouldn’t usually meet. Be prepared to be scrutinised, be open, and enjoy the process,” he says.

Knowledge exchange manager, David Hunter, says Rob’s easy-going nature and ability to communicate have contributed to the success and popularity

of the Welford Estate as a host farm.

“The arrival of Covid mid-term resulted in a change from face-to-face meetings to webinars which was also accommodated with good grace. We’ve touched on openness as a requirement of the monitor farmer, and this, coupled with Rob’s honesty and willingness to bare all, has also been key to its success.”

David believes the relationship between the monitor farmer and knowledge exchange manager is also important. “The creation of engaging and informative meetings takes time and relies on regular communication. Rob’s timely responses to queries and keenness for visiting farmers to get value for their time at meetings have been a consistent theme at the venue.

“The Newbury Monitor Farm leaves a great legacy and will be difficult to replace. However, as the numbers of monitor farms past and present grows, the network of knowledge exchange strengthens to the benefit of all.”

AHDB is recruiting for Monitor Farms in the following areas — Lancashire or Cumbria; North Yorkshire, Durham or Northumberland; Warwickshire, Worcestershire or Herefordshire; Lincolnshire; Essex; Devon or Cornwall; Oxfordshire, Hampshire, Surrey, Sussex or Kent; Wales. ■

What does being a monitor farmer involve?

Supported by their AHDB knowledge exchange manager and industry experts, a monitor farmer:

- Sets up a steering group for the Monitor Farm
- Undertakes baseline assessments
- Submits figures to Farmbench
- Monitors benchmarked figures with their Arable Business Group (ABG)
- Hosts up to six meetings each year
- Brings specialist advice onto the farm, such as expert speakers and consultants
- Supplies updates on farm progress between meetings
- Sets up actions and follows them up to see real progress
- Adopts an evidence-based approach to change including carrying out co-ordinated on-farm trials
- Incorporates all aspects of the farm business including family aims, succession and diversification options
- Helps their steering group and ABG to continue meetings once the Monitor Farm has concluded
- Enjoys the social aspect



nature matters

by Martin Lines

Inputs and outputs: The future of fossil fuel-based fertilisers

Like many, we're coming out of winter with the already-planted crops in a very mixed condition — we don't have a single field with uniform establishment or condition of crops. The recent weather has certainly taken a toll on some of them and has left us with management problems to consider.

Some areas will have to be replaced entirely, and others will require a lot of help to achieve a profitable return. We usually have a rough nutrient management plan for the season ahead, selecting a representative range of fields to conduct some soil nitrogen testing which gives us a base level of nitrogen available in the soil. We then follow this up with tissue testing and handheld sap analysis.

The challenge we don't have this year, is working out the right amount to fertiliser to apply to the right areas of fields in order to meet our crop potential. With the new SFI standard coming later in the year, we'll have the opportunity to invest in more.

With the reduction in autumn planting and the increased cost of spring seed and inputs, the next few months' weather

will be critical to our crops if we're to achieve profitable yields. Now the BPS has been decoupled, focusing on fixed and variable production costs will be very important.

For some, delivering more environmental benefits and using herbal lays and legume fallow options will give a better return on investment, reducing variable costs and helping to build soil fertility at the same time. This will have to be kept under review as our farming systems change.

This time of change and adjustment is making some farmers and contractors refocus their businesses and what they produce. Food production and food security is important, but it's not the responsibility of farmers. What is our responsibility is maintaining as much profitability as possible now and for the long term.

The use of fossil fuel-based fertilisers and the negative effects these have on carbon footprints will become an increased focus in the years ahead. There is also a spotlight on urea fertiliser and its effect on air quality — not just where it's used, but also the drift in neighbouring towns and cities.

The government is taking a close look at urea fertiliser use. You might remember that Defra ran a consultation to reduce ammonia emissions from urea fertilisers? In response, an industry consortium proposed an alternative approach, to be delivered through the Red Tractor Farm Assurance scheme.

These new Red Tractor standards will require scheme members to restrict use of untreated urea from 15 January to the end of March each year, only using treated urea fertilisers after March to

reduce ammonia emissions. Alternatively, you can apply them in line with guidance from FACTS-trained advisers throughout the year.

The effectiveness of the scheme will be monitored with regulation being introduced if the scheme doesn't achieve the ammonia reductions required. When the scheme's restrictions are introduced, they'll be related to the use of ammonia inhibitors rather than a complete ban — it'll be the responsibility of all farmers to abide by the rules and only apply after March with the correct inhibitor.

If air quality doesn't improve, or farmers don't abide by the spreading restrictions of untreated urea, there's a real risk that Defra will put in place further restrictions.

To try to reduce our own impact, we've been using various biostimulants and other products as a replacement for some of our fossil fuel-based fertiliser. This has produced some interesting data and cost differences. It's only by trying things on our farms that we can see the benefits (or shortcomings) of these products.

If our industry is to reach the NFU's goal of net zero by 2040, we'll have to rapidly

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
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change the way we use fertiliser and other fossil fuel-based products. Speaking to and meeting many farmers across country, I'm always inspired by what many are doing — helping to increase biodiversity and improve soil health, reducing their carbon footprints and delivering climate mitigation solutions.

Many of these improvements are currently being funded by and will be funded by public and private finance in the years to come, giving us access to markets in the future and helping to work towards a sustainable future for farmers and farming.



Burning fossil fuels is a major source of greenhouse gas emissions especially for power, cement, steel, textile and fertiliser industries.

British beans on toast



Bean developments

A new variety of bean could soon be grown on British farms, one which could be suitable for baked beans, meaning potential new market opportunities for domestic growers. *CPM* explores this homegrown success story.

By Melanie Jenkins

It might be characteristically British, even dubbed an 'essential food' during World War Two, but the bean element of 'beans on toast' is actually imported.

The haricot (or navy) bean is native to the Americas and is part of the common bean family (*Phaseolus vulgaris*), but the commercial varieties aren't suitable for growing in the UK climate.

However, breeders at the University of Warwick have bred several new varieties of common bean that aren't just capable of being grown in the UK, but which

could also open up market opportunities for farmers.

The varieties, Capulet, Godiva and Olivia, are white, blonde and black, respectively, have been bred by Professor Eric Holub, project lead at the University of Warwick.

Versatility

"The objective was to breed a common bean variety for UK consumption and not for export. We wanted to demonstrate the different flavours and versatility of the common bean and to discover these initial varieties to break down barriers in UK cooking habits and thinking," says Prof Eric.

The history of Prof Eric's work started back in 2011, with material being used from the 1970s and 1980s. "This was research that had specifically looked at developing a navy bean for UK farming and the result was a variety called Edmund, which is a parent of Capulet."

Although Capulet was developed through a conventional breeding programme, technically it's different from a navy bean because it's derived through crossed hybridisation from the two origins of navy beans: Mesoamerica (Mexico) and

“ They then might look to cook products grown by UK farmers, creating a market for them. ”



Capulet is a new variety of common bean which could open up market opportunities for farmers.



Capulet is a cross of Edmund and an Andean variety, and was selected so that it could be domestically grown in the UK.

the Andes, he explains. “The varieties were conventionally bred — like with wheat — whereby two parents were chosen — Edmund and the other from the Andean gene pool, which would mean there was a lot of diversity in the offspring.”

Around 5000 F2 second generation plants were selected to be grown on the University of Warwick’s Innovation Campus in Stratford-upon-Avon’s Crop Centre, to determine their suitability to being grown in the UK, such as being tall enough for pod clearance from the ground to allow for conventional harvesting. “Although the varieties are still short, they’re taller than previous ones,” says Prof Eric.

“The plants had to have sturdy stems, and most importantly, had to fit the same growing season as North America. The three new varieties are best drilled in mid-May and ideally harvested in the first week of September, which is around two-three weeks earlier than in Canada and the US.”

Around four years ago, Agrii became involved with the project with the idea that domestically grown beans could help to reduce reliance on imports. This has resulted in both small-scale field trials and the first commercial crop of Capulet being grown, explains the firm’s Rebecca White. “We’re now at the stage where end-users are trialling the beans to see if they can be soaked, and if this is successful, then Agrii will be looking to multiply seed and expand to other growers.”

Although the idea of being able to

supply manufacturers with UK-grown beans to fulfil the domestic consumption demands of baked beans might seem like an outright win for sustainability, it’s one that isn’t feasible at scale. This is because around 2.5M cans of baked beans are purchased every day in the UK, meaning that a firm such as Heinz requires around 300t/day to meet this demand, says Prof Eric. “We can’t compete in this sense, but we can work in unison.”

With this in mind, the team from the University of Warwick and Agrii has been working with Princes — which supplies supermarket canned beans and also owns Branston — to explore the potential for Capulet as a canned bean.

Factory visit

In November 2023, the team alongside farmer Andy Ward, who grew the first commercial crop of Capulet, visited Princes’ factory in Spaling to test the first 10kg batch of the bean through the firm’s kitchen line. This involved soaking and baking Capulet in tomato sauce, which was the next step in promoting the variety. “I hope this will help to create more interest in people eating pulses, so it’s as much about cultural learning and engagement as anything.”

Rebecca anticipates that other producers will follow suit because Capulet offers an opportunity from a sustainability perspective. “Obviously there will be challenges with supply and physically growing them as we can’t expect farmers to stop producing fava beans or peas, but it could be a potential for a premium or niche market,” she says.

Although Capulet won’t replace imported beans, it has the potential to slot



Eric Holub visited Princes’ test kitchen in November where the first commercial crop of Capulet was cooked.



According to Rebecca White, the next stage is to determine whether end users can viably use Capulet before multiplying seed and expanding to more growers.

in the UK market in other ways. According to Prof Eric, samples of Capulet and Godiva have been donated to schools in Leicestershire to increase awareness. “We’re hoping this will get people cooking these beans and recognising their variety names. They then might look to cook products grown by UK farmers, creating a market for them.”

The university itself has created a start-up company specifically to work with growers. “Its main purpose is to create opportunities and start to introduce limited supplies in time for World Pulse Day (10 February). This involves a mix of Godiva and Capulet being sold in waste-free stores in Stratford and Coventry.”

This means that the demand for these varieties should expand in 2024 and Prof Eric hopes to see it scaled up over the next five years. “If there’s interest then farmers will grow these varieties. Agrii has scaled up seed production with the purpose of Capulet being canned with water. It’s early days at the moment and we’re still working on consumer development.”

While Capulet is well on its way to being on dinner tables, Olivia is about a year behind in terms of scale, says Prof Eric. “We’re anticipating a lot of interest from the zero-waste stores and we see Olivia as a replacement for the black bean, whereas Godiva can be an alternative to the kidney or pinto bean.

“We’re breeding beans for consumers, which can both be grown in back gardens and be scalable for on-farm production. We want to help to develop a good system ▶

► that serves public health with diversity and opens up new domestic markets.”

Agrii is now working to explore the consistency and financials of growing these varieties to explore their full potential, says Rebecca. “There’s still work to do to increase the yield, grow a consistent crop and liaise with end users to see how we can all work together.”

Proof is in the growing

Agrii has been trialling Capulet beans for the past four years with the aim to not only multiply the seedbank but to also explore the agronomics and best practice for growing the variety.

Initially, Agrii’s senior trials consultant Justin Burton, started out with 50-60kg of beans with the aim of multiplying them. “In the first year of production we actually fleeced the crop because we were really worried about bean seed fly and pigeons. They all grew nicely and we didn’t have any issues with pests, disease or nutrient deficiency, but we discovered the main issue which was at harvest.

“Capulet grows so low to the ground that a regular combine header just wasn’t going to cut it. It was a lovely looking crop that had podded up nicely with loads of beans on the plant, but when we took our small plot combine through it, we left about 40-50% of the seed on the ground.

“We tried adjusting the cutting angle, going through faster and slower, but everything we did, we couldn’t get better than 40% losses,” he explains. “So that first year demonstrated that we could grow them successfully in our climate,



Capulet grows so low to the ground that a regular combine header just wasn’t going to cut it.



Capulet has proved difficult to combine until the introduction of the MacDon FlexDraper header which is able to combine the crop with minimal losses.

but harvesting was going to be the major issue.”

Problem solving

However, fast forward to 2023 and Justin feels that the harvesting issue has almost been solved. “There’s been lots of trial work along the way and success eventually came from introducing the MacDon FlexDraper header which was a game changer. However, it highlighted another issue — we were getting most of the crop into the combine but because of the light fluffy nature of the ground, we were getting a lot of soil into the combine, which meant trying a different soil type.”

In the second year of trials, Justin coordinated both seed multiplication of Capulet and agronomic growing trials. “We wanted to work out the best way of growing the variety and how to maximise it. We had two trials sites, one at Deeping St Nicholas in Lincolnshire which was ideal for bean growing, and another in Suffolk to test the variety with hotter, dryer conditions, however the soil wasn’t ideal being clay.”

Two different drill dates, three different seed rates, row widths and inoculants were trialled. “Alongside this, we also conducted herbicide screenings which can be an issue with novel and niche crops because we’re pretty much limited to pre-emergence herbicides,” he notes.

By the third year, trials had moved away from the Suffolk site and more in-depth agronomy trials were carried out at Lincolnshire. “By this stage we’d determined a row-width and seed rate we were happy with but repeated these to get further data sets while looking more at drill date.”

Because of the struggles with combining Capulet, the fourth year of

trials moved to Andy Ward’s farm near Leadenham in Lincolnshire. Justin introduced starter fertiliser but admits this didn’t bring any results. However, one thing that did was companion cropping.

“What we wanted was to get Capulet growing taller and more upright, so using an Amazone Precea we planted the bean with black oats. In one row we put the black oats in the fertiliser hopper so they went next to the row alongside Capulet, and in another we recentred the drill so the row of black oats was in between the Capulet row.”

Justin says all through the season the Capulet looked fantastic; it was uniform and upright. “You don’t get expect to see such a good result, but from the off it was evident that the black oats were doing what we’d hoped.

“Admittedly they were sprayed off a little too late at GS37-39, after they’d done their job having produced a structure for the ►



Four years of trials have helped to determine ideal row-width and seed rate for drilling Capulet.

FOCUS NOW ON OVERWINTERED GRASS WEEDS

EXTREMELY CHALLENGING CONDITIONS FOR CROP ESTABLISHMENT IN THE AUTUMN LEFT SOME GROWERS WITH LESS THAN 20% OF THEIR CEREAL AREA TREATED WITH PRE- OR POST-EMERGENCE GRASS WEED HERBICIDES.



Georgina Young
Syngenta Grass Weed
Technical Manager

Coupled with that, successive periods of mild wet weather into the winter triggered repeated germination flushes of dormant grass weeds in wheat and barley fields.

Spring grass weed control strategies using AXIAL® Pro are now a priority to remove competition at the earliest opportunity and enable crops to grow away quickly.

Syngenta grass weed research with NIAB has proven the benefits of an early focus on grass weed removal, to target larger and more competitive overwintered wild oats, ryegrass and black-grass.

In addition to the greater impact on crop yields, these overwintered weeds have also been shown to produce higher numbers of viable seeds at harvest that will perpetuate grass weed populations, compared to later germinating grass weeds in the spring.

Delaying application to later in the spring, to allow more grass weeds to germinate, makes the successful control of the larger overwintered grass weeds harder and more expensive – requiring higher rates and even greater attention to detail to ensure applications hit the target.

Early removal of overwintered grass weeds with AXIAL® Pro, followed by a later application using an alternative non-ACCase mode of action to remove later spring germinating weeds provides a robust resistance management strategy in wheat.

With extreme wet weather this autumn and winter having depleted residual soil nutrients, early weed control can avoid further losses to grass weeds, enabling the crop to make full use of applied inputs.

BARLEY BENEFIT

AXIAL® Pro has long proven a popular option for grass weed control in barley crops. That will be especially valuable for the 2024 season, where spring barley is destined for fields where autumn drilling was impossible or crops have failed.

Spring barley offers an integrated opportunity for effective control of overwintered grass weeds before drilling. However, in-crop control of weeds also remains essential. Syngenta R&D has shown that if left uncontrolled in the relatively uncompetitive spring barley crops, grass weed populations will proliferate.

With rapid growth and development of spring barley crops, AXIAL® Pro has the flexibility for application right through to flag leaf sheath extending stage (GS41) to achieve the optimum treatment timing and hit the maximum number of emerged grass weeds. Where larger grass weeds are present, the application rate to use is 0.82 l/ha.

TOP TIPS

- ◆ Target grass weeds as soon as conditions permit
- ◆ Focus first on areas with larger overwintered weeds
- ◆ Early weed removal cuts seed return
- ◆ Use AXIAL® Pro first in any programme

 **Axial® Pro**

**Confidence
Season after season**



Capulet was planted with black oats in an effort to get the crop to grow taller and more upright.

► beans,” he says. “The MacDon header was again used to harvest the Capulet and this time there was no issue with the soil contaminating the sample and there were minimal losses, especially where we had the companion crop.”

According to Justin, the black oats hadn’t just helped the height of the crop, but with the added biomass the flow into the combine was much better, seeing an average of 0.5-0.75t/ha increase in yield in the companion cropped area. “I think the yield increase might have been even more had we been able to plant the crop sooner, but due to a few obstacles, we weren’t able to drill until 25 May. So this is certainly something I’m looking forward to trialling further.”

Justin plans to further expand on field-scale trials and feels there’s still some fine-tuning to do, with the hope that he can plant 8ha on Andy’s farm this year as well as a crop on another farm too. “This year we’re hoping to expand on the



Capulet should be planted when soil is a minimum of 12°C and there’s ample soil moisture for it to get away and start growing.

companion cropping work and get the drill date right.

“Ideally, Capulet wants to be on a medium-loamy soil and Andy’s soil isn’t quite what the variety wants, being a touch too heavy. I think this was reflected in the yields, but with the nature of the season, the soil probably took longer to heat up than the Deeping St Nicholas site.”

Drilling window

Agronomically, Justin has identified early May as an ideal time to drill the variety. “Aim for then but keep in mind soil temperature and moisture. Soil should be a minimum of 12°C and there has to be moisture there for it to get away and start growing. After this it’s fine if it dries out a bit but initially there has to be sufficient warmth and moisture.”

Site selection is key as Capulet is suited to medium-loamy free-draining soils with a neutral pH, he explains. “It also has to be on flat and stone-free land. Because the variety does require heat and sunlight hours, this means it’s limited to being grown in certain areas of the country.”

In terms of seedbed preparation, Justin advises producing a decent tilth. “It’s not one you’re going to be able to direct drill, and doesn’t like heavy or compacted soil. Drill it to about 5cm depth, depending on the moisture, and at 70-80seeds/m² with row widths of 45-50cm. “In trials we stuck at 30cm but with the Amazone Precea we moved to the wider rows and I feel this is the way to go.”

Weed control is the primary focus with Capulet as it has resistance to seed-borne diseases and fungi. Justin used Praxim (metobromuron) and Dual Gold (S-metolachlor) pre-emulsions in trials, but highlights that there’s also the option of Basagran (bentazone) as a post-em. “If you set the crop up right and have good management, then you should be fine in terms of weed burden.”

Bean seed fly could pose a threat to the crop, so Justin advises looking at cultural controls and time of drilling. “The main thing is to not cultivate anywhere near the time of drilling, so six weeks or more before you go in. You’ll also want a clean seedbed with no weeds and then the fine line between the drill date and bean seed fly activity. We’ve been lucky over the course of the trials and only ever lost as much as 10-20% in one year.”

Bruchid beetle could also potentially be an issue, especially if fava beans are being grown on the same farm, warns Professor Eric Holub. “We’re concerned about



Professor Eric Holub has been working on breeding a new variety of the common bean since 2011, using material from 1970s and 1980s.

bruchid beetle, but by planting in May this appears to be a good way to avoid the serious problems that have been experienced in fava beans. However, this might mean it could be helpful to freeze seed at harvest, to avoid carryover to the following year.”

The work from the trials at the Deeping St Nicholas and at Andy Ward’s farm has demonstrated the potential for Capulet to be grown in different soils. “I thought the soil in Lincolnshire would be heavier than is ideal for Capulet but it appears to work well, so we’re trying to expand in the area. The sandy soils in the Midlands are ideal so we’re working to form a grower cluster here, as well as in South Wales and potentially Cornwall.”

Currently, seed is sent to be cleaned in Lincolnshire and Cambridgeshire, but Prof Eric hopes that if the varieties take off, then further cleaning facilities might emerge.

Scaling up will be the next big challenge. “If Andy were to grow Capulet to his capacity of around 100t, this would likely take five years,” he says. “Optimistically, if Agrii and Andy keep producing for seed, we could have around 1000t of either one or all three varieties, being harvested for consumption by 2030.”

Justin has been involved with niche crops for around eight years and feels that Capulet has already been a real success story. “More times than not, niche crops fail and that’s just the nature of the beast we’re working with, so it’s really nice to have a success story with Capulet. We now know we can grow it so hopefully there’s a push for homegrown proteins and produce.” ■



“Hemp delivers four times the CO₂ sequestration compared with the same area of forestry.”

Industrial hemp

Growing high

With more than 10,000 applications from textiles to construction materials, plus offering a raft of environmental benefits, it's time to ask, why isn't the UK head over heels for hemp? CPM takes a dive into the world of Cannabis sativa.

By Janine Adamson

Let's be clear from the off — despite belonging to the same species, hemp and marijuana are two very different crops. Because where science doesn't differentiate between the two, the law does.

Legally, it's all down to tetrahydrocannabinol (THC) content — a psychoactive compound found in the cannabis plant. Hemp is simply cannabis that contains 0.3% or less THC content, so no highs involved.

Many moons ago, the UK championed this intriguing crop. In fact, King Henry VIII made hemp cultivation compulsory by law; farmers could even pay their taxes with hemp. But following the industrialisation of the agriculture and textile industries, it found itself out of favour. And now, despite retaining its countless benefits, it's become a regulatory hot potato.

“Cultivating industrial hemp constitutes a ‘special purpose’ under the Misuse of Drugs Act 1971 (MoDA), meaning it's permitted once a licence is obtained from the Home Office,” explains Savills’ Joe Lloyd.

Variety characteristics

“There's a wide range of varieties that can be grown and careful attention should be paid to their individual characteristics. Namely the variety should comply with the UK definition of industrial hemp — contain no more than 0.2% THC, and be on the ‘common catalogue’. The policy surrounding licensing perhaps isn't ideal, but is achievable.”

It's important to note that only the fibre/stalk and seed can be used under an industrial hemp licence and it's illegal to harvest, process, extract or transport the leaf and flower. But nonetheless, Joe believes industrial hemp offers numerous benefits for growers, as well as an opportunity for healthy returns.

“The industrial hemp licence is reasonably accessible, costing £580 for a new, three-year licence. And where the opportunity has really leapt forward in recent years is in consumer preferences — hemp addresses many consumer concerns such as reducing pesticide use or improving carbon sequestration. This is where industrial hemp differentiates itself when compared with other niche crops,” he says.

Inspecting the benefits more closely, firstly, there are quite literally thousands of

applications for industrial hemp meaning the market opportunities should be vast. Uses included bioplastics, construction materials, textiles, paper, panels for the automotive industry, food supplements, livestock bedding and biofuels.

Entrepreneur Steve Glover runs the British Hemp Co and UK Hemp in Wiltshire which includes a processing facility and licensed seed distribution arm. As well as producing hemp seed oil, protein powder, hulled seed and fibre, his processing facilities are available for other growers to access too.

Steve says although there are many applications for hemp, the starting point should be to identify an end use. “Depending on your chosen market, you ▶



Although there are many applications for hemp, the starting point should be to identify an end use, says Steve Glover.



According to Hugh Wrangham, although industrial hemp isn't a hard crop to grow, it can prove risky during early establishment.

► have to select either a fibre or seed variety, both of which must be certified and on the common catalogue. We believe the most economical entry point for hemp is to grow for solid fuel or biomass, it's a good business to be in.

"Conversely, growing a crop for seed fits into a conventional arable rotation really well due to its short lifecycle," he says. "Approved seed varieties such as Finola are short and stocky and can be

harvested using a standard farm combine; no specialist machinery is involved. Finola is well suited to the UK climate."

Worthwhile exercise

If opting to grow for seed, Steve advises a minimum of 10ha should be allocated to hemp to make the exercise worthwhile. But regardless, he says one of his business' aims is to help new growers to understand the crop, backed by knowledge gleaned from growing on 170ha and supplying products to 200 UK shops.

One grower who's producing hemp for seed is Hugh Wrangham from Northumberland. After successfully obtaining a licence, he sowed his first crop of hemp in 2021 in a bid to diversify the 600ha farm's rotation.

He agrees that although growing for fibre and textiles offers great potential, as a cereal farmer, it's easier to choose seed varieties, his preference being Finola. "It's definitely the simpler option until there are processing facilities for fibre applications," explains Hugh.

Now into his third season of growing hemp, alongside a rotation of winter wheat, winter barley, winter rye, oilseed rape and spring beans, he says he's pretty convinced by the benefits.

"Grown as a sustainable break crop, hemp delivers four times the CO₂ sequestration compared with the same area of forestry, and delivers an additional revenue stream through the sale of British-grown 'super-food' hemp seed products."

According to Hugh, although it's not a hard crop to grow, it can prove risky during early establishment. "Hemp prefers a warm soil temperature with a weed-free, uniform seedbed. Giving it a good start is really essential so we tend to run through with a sub-soiler prior to drilling to break up any compaction; it's then in with the Väderstad drill to plant into a shallow seedbed."

He says because the first month is slow, this is when the crop is most at risk. After that, rapid growth kicks in and there's little else to do until the seed ripens in September. "We use a Claas Lexion combine with a draper header and despite horror stories, it's actually easier to harvest than rye," explains Hugh.

With the decision to outsource production of hemp seed oil, Hugh wanted to install a seed dehulling production line. The solution lay in a McArthur Agriculture-supplied drier plus kit from the JK Machinery range.

Fabulous fashion

Think hemp fibre and textiles, and it's likely shapeless, beige garments spring to mind, similar to those worn at historical reenactments.

But according to Claire O'Sullivan of Contemporary Hempery in Eye, this couldn't be further from the truth. Together with business partner Kitty Wilson Brown, she's on a quest to quash preconceptions by delivering colourful and patterned hemp-based fabrics.

"Hemp fabric isn't a sack — that's completely wrong. It's refined and beautiful, not dissimilar to the finest of linens. Plus its production can be a simple reminder of artisan skills from the past, crafted by hand rather than machine," she says.

It's important to note that this is a field-to-fashion enterprise, with Claire and Kitty going 'all-in' to grow the crop themselves. Despite having no farming knowledge, they forged ahead.

After successfully obtaining a licence and finding land to rent, Claire says they had to quickly learn the ins and outs of growing hemp for fibre. "We're lucky in that David Wolfe from Wakelyns is very supportive of us growing hemp on his farm and the land is secluded,

can't be seen by the public, and is away from footpaths. These are integral aspects when securing a licence."

Seed was ordered through consultancy business Hempen Organic, which also provided agronomic advice to the duo. They then opted for two drilling dates — the end of May and the beginning of June — at the recommended density, which is higher for fibre varieties.

Claire says they were stunned by how quickly hemp grows. "We were recording an additional 25mm in height per day. The summer (2022) was so dry but the crop didn't care and we were amazed at the quality of the plants," she says.

With the crop being grown for fibre purposes, no fertilisers were used, however, the next conundrum was how to harvest it. "Because it was a small amount, we were able to instigate a community harvest day in August for cutting and retting, followed by a processing day where we used handmade tools.

"At the end, we had a box of golden fibre which we then required a mill to spin. With no suitable facilities in the UK, we hosted a community spinning day with 40 people. It's incredible how fine the hand-spun yarn is, it was



Claire O'Sullivan says hemp fabric is refined and beautiful, not dissimilar to the finest of linens.

quite a surprise to see how superbly soft it is."

Recognising this community-approach won't always be feasible, Claire and Kitty are now investigating ways to scale-up production including trialling the best way to produce the fibre. Claire says the final goal is to make luxurious UK-grown woven hemp fabric.

"We also want to help to drive the revival of growing hemp for fibre in East Anglia — it was a thriving industry for the area and only truly died out in the 1920s," she concludes.



Alex Bragg says there's a distinct lack of UK processing capacity and confusion surrounding end markets for hemp.

Post-harvest processing begins with the harvested hemp seed being dried to 8% moisture, then seed is graded using a JCM grading sieve cleaner.

Seed is then passed through a JK Machinery's JHI 05 Impact Dehuller to produce a mix of hemp hearts (dehulled seed), the empty hulls and whole hemp seeds. Remaining whole hemp seeds are collected and put back through the dehuller, says Hugh.

After passing through the sieve cleaner a final time, the remaining material goes over a JK Machinery JGC 03 Gravity Concentrator designed to separate material based on its specific gravity. Having completed this process the finished hemp hearts are then stored prior to sale.

"This year we've semi-automated our dehulling facility. This enables us to increase output and produce dehulled hemp hearts at a volume which allows us

to offer increasingly good value to our customers," says Hugh.

Savills' Alex Bragg says even with on-farm solutions such as this, there's a distinct lack of UK processing capacity and confusion surrounding end markets. "I think the reason why hemp has had a bad press in the past is some farmers have grown it without a specific end market in mind. Which goes against how they manage other crops in the rotation."

Achieving a premium

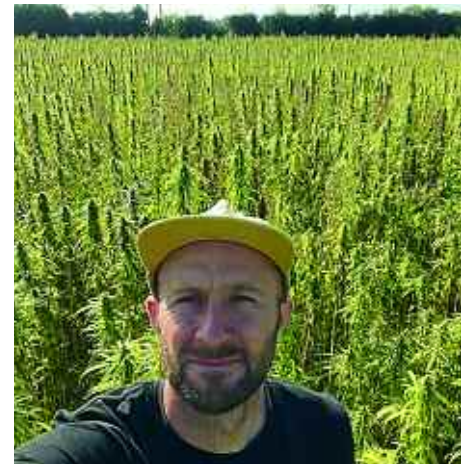
"Then, if you look at countries such as France, hemp is grown in large quantities for high-end commercial purposes such as car interior panels. This commands a premium and is something the UK could achieve if we secured a similar blue-chip end user with significant investment capabilities," he says.

"That, plus finding a way to legally utilise all parts of the crop (flower, leaf, stem and seed), and throwing carbon credits into the mix, could make industrial hemp a silver bullet for UK agriculture."

Tom Woodcock from Hempen Organic says there's a huge demand for organically-certified UK-grown hemp seed which isn't currently being met. "We have to work together to address the production barriers, which are mainly surrounding licensing, agronomic guidelines, and route to market.

"The problem with licensing is that a grower can only apply in January, and by the time the application has been processed, it can be too late to order seed for year one because it's currently imported from Europe," says Tom.

As for agronomics, he believes there's still much to learn, particularly regarding the crop's legacy effect within the rotation.



According to Tom Woodcock, there's still much to learn about hemp agronomy, particularly regarding the crop's legacy effect within the rotation.

"We believe this is due to hemp's long taproot which improves soil structure and water infiltration, and adds organic matter. Studies are taking place with Reading University to try and quantify these benefits."

Like Hugh, Tom stresses that the number one aspect to get right is establishment. "Sowing is so important — technique and timing. Hemp should be drilled at a very shallow depth (10-20mm) when temperatures reach around 14°C."

And although no conventional plant protection products are required meaning hemp seed can be produced organically, Tom says such varieties require feeding with nitrogen at a similar rate to an OSR crop. Altogether, he believes harvesting 1-1.5t/ha from a seed crop is a viable proposition, and should make hemp competitive when compared with other crops. ■

The house that hemp built

Cambridgeshire-based film director, Steve Barron, had no experience of agriculture when he set about growing a crop of industrial hemp six years ago. It was the result of wanting to give something back to the planet and contribute to carbon sequestration.

He says it soon became an 'investigative R&D mission', to see if it's possible to grow your own home and ultimately, disrupt societal norms surrounding the construction industry and its environmental credentials.

And so Margent Farm and Flat House were born. The three-bedroom construction, designed by architect Paloma Gormley, utilises

hempcrete (an insulation material made from hemp stems and lime) and is clad in a specially designed corrugated hemp fibre/bio-resin mix. It's powered by solar, wind and a biomass boiler.

Successfully built, Flat House is now Steve's home, whereas the farm continues to grow hemp but for seed purposes. Growing the crop has also proven to be a 'gateway' to wider arable farming and environmental stewardship.

"The hemp farm is around 21ha and we've also integrated winter wheat into the rotation, which is certified organic," explains Steve.

"I hope our story can be an inspiration to others."

Steve is now embarking on a joint-venture



Steve Barron set about an 'investigative R&D mission', to see if it's possible to grow a home through hemp production.

with bio-based building system developer, Hemspan, with the aim of elevating hemp house construction to the next level.



Navigating a changing world

SEAS conference

Farming finds itself at the centre of discussions in its role as both hero and villain as the UK plots its course to net zero. But can farming really save the planet? CPM reports from the South of England Agricultural Society conference, which asked that very question.

By Lucy de la Pasture

Reducing global greenhouse gas emissions has become a part of life in the 2020s as industries and populations seek to meet the global 2050 net zero target — with varying degrees of enthusiasm. Within that arena of change, farming is uniquely positioned as being a significant source of emissions, but also as a part of the solution with its potential to sequester more carbon.

But for farmers operating in a food system that's widely described as 'broken', it's become a confusing environment with changing policy goalposts, and an ever more demanding marketplace that's reluctant to reward farmers for their environmental efforts.

These issues were discussed at the South of England Agricultural Society conference, where Phil Jarvis, chair of Albanwise Farming and Environment and of the Voluntary Initiative, and organic farmer Sue Pritchard, chief executive of independent charity, the Food, Farming, and Countryside Commission, gave their views.

In a wide-ranging discussion, hosted by BBC Radio 4 journalist Charlotte Smith, the panellists were asked the question, can farming save the planet? The consensus was that there really isn't a choice, the alternative is pretty grim. As Sue put it: "The question is not can we, but how can we?"

Tipping points

"Across so many sectors, we're stepping into a future that we don't have a blueprint for," she commented. "We can see the effects around us now with more disruptive weather, but we are now seeing data coming through that might suggest we're going to be reaching tipping points sooner than we'd expected. We don't know what impact that's going to have."

With flooded fields and named storms charging cross the country one after the other during late autumn/early winter, farmers are certainly feeling on the frontline of climate change. But it's not just weather challenges farmers are facing, Phil highlighted.

"Market volatility, strategy and policy, the current global situation, and even social media — where everyone has an opinion — can all feel overwhelming at

“Farmers feel that they’re holding a great deal of the risk, and struggling to get a fair reward for the work they’re putting in.”



When it comes to farming in a more sustainable way, regenerative farming is often cited as the answer. Sue Pritchard reasoned that agroecology is a better term.

times. However, farmers are tasked to primarily produce food, but the future will require wider land management.”

Navigating the pressures of a changing world isn't easy. Phil recommended not to forget the fundamentals: “First and foremost, business planning is really important. You need to make the figures stack up, whichever way you farm, so that it's financially sustainable.

“Secondly, we already know the direction of change with things like the Sustainable Farming Incentive (SFI), but how can you grasp it so that you have win-wins? It maybe you can get paid for an SFI option that might help you, for example, by reducing your fertiliser bill.”

When it comes to farming in a more sustainable way, regenerative farming is often cited as the answer. Sue reasoned that agroecology is a better term.

“I'm somewhat agnostic about the word regenerative because it's not properly defined and, already, we're seeing all sorts of examples of greenwashing — supply businesses are using the term regenerative to mean utterly meaningless things.

“Agroecology is carefully defined and is about the whole system of food and farming, not just about on-farm practices, such as no-till, minimal use of artificial chemicals, keeping the soil covered and so on. It also encompasses topics we very rarely mention, such as the governance of food systems and farming.

“At the moment, farmers feel that they're holding a great deal of the risk, and are struggling to get a fair reward for the work they're putting in. And there are some players in the whole food system whose profits are increasing by big margins.

“Agroecology shines a light on those parts of the whole of the food system, and the farming system, that for many people are invisible. And it encourages sharp questions about whether it's organised in the fairest, most sustainable way for everybody.”

Phil believes that whatever a farmer may think about the concept, there are pillars of regenerative systems that may help them achieve the ultimate aim, which is keeping profit on the farm. For example, reducing cultivation will bring down machinery and fuel costs, overtime etc. Soil cover and living roots can reduce soil erosion. “So can you make them work for you?” he challenged.

The conversation about retaining profitability on the farm soon led into a conversation about who should be paying for this more sustainable direction of



Phil Jarvis highlighted the possible unintended consequences of government policy, where those at the forefront of developing sustainable practices aren't fairly rewarded due to lack of additionality.

travel, highlighting the discussions around Red and Green Tractor.

“All of the component parts needed to build more resilience in your farm has a cost. It can have an immediate cost, but it also has a consistent cost,” said Sue.

“We've got a dysfunctional marketplace,” added Phil. “In fact, what we do now and what we're expected to do in the future are not really being rewarded. Somewhere along the line, someone wants to take those credentials and put them on the front of their food but doesn't necessarily want to buy them from you.”

Language barrier

The language used around the SFI in mainstream and social media is something Sue believes isn't helpful. She made the point that when farming is talked about, a lot is made of the subsidies that farmers have received, but the reality is subsidies go to all sorts of other industries.

“You never hear that language used in any other sector. You don't hear about the subsidy paid to house builders and you don't hear about the subsidy paid to the energy companies, or the subsidy that fossil fuel companies are getting right now when they need to be investing so much more in renewables.

“So when government was investing in renewable energy and using devices like the feed-in-tariffs, that was considered to be an entirely appropriate economic incentive to help shift a whole sector from where it was to where it needs to be. That's the language we should be using about our sector. Not that farmers are getting subsidies, but government is investing and helping farming move to a sustainable and resilient footing.”

With figures just out that show low

initial uptake of the SFI, could it be that government doesn't have it right? “It's one thing having a policy and it's another getting a coherent implementation of it,” suggested Phil. “For those that signed up early, it was somewhat frustrating to learn the rules were being changed. But I still think it's a source of income that's worth pursuing if you have the patience to follow the scheme.”

Sue's concerns are about inequality. “Wales has already said that it's not going to be supporting organic farming anymore. So for those of us who have been doing really good work already, because it was important for us to do so, we don't have much additionality to add. In fact, we put in hedgerows and riparian corridors. I've got lots of woodland on my farm already, as well as unimproved species-rich grassland.

“The impact is greatest on upland farms, where we're already hearing ▶



The 'transition' process in agriculture has been underthought, believes Sue Pritchard. Not only are goal posts constantly changing, a wider conversation with society hasn't yet happened.



Agroecology is about the whole system of food and farming, not just about on-farm practices but also the governance of food systems and farming.

► stories of large land managers ending tenancies. We're seeing what some people might call a clearance from the uplands because those landowners can maximise their income by rewilding or natural capital solutions. And I think that that ought to really give us pause."

It's these unintended consequences that worry Phil too. "If you're a grassland farmer in certain parts of the country, or organic farmers where there aren't many options, government has been saying, 'you're already doing this'. But what they don't realise is that what these farmers were already doing is protecting the very asset they want protecting. If government isn't careful, it will drive them to either stop doing those practices or change to something more environmentally damaging where they think they can make more money."

So how can this process of change be better facilitated? Sue highlighted the 'change equation', explaining there are three components to any really effective change process.

"It asks what's the need for change, and if this version of the future is going to be better. And it helps identify the means and the methods to get to that new future. By working through this process, it highlights that the value of the actions required to make the changes have to be greater than the pain or the cost of change. And I don't think we've done this — government hasn't, and I don't think we've really talked through all of the elements of those components as a society."

Applying this reasoning, why do we need to change? "There are some folk in farming and in other sectors who are very happy with the way things are at the moment. Elements of the farming value

chain are profiting extremely well from the way things work right now. So they don't have a huge incentive to change unless we can create some other incentives to do so," said Sue.

"The reality is some farmers will invest in more regenerative practices on their farm, and others are already well sorted. Then there's those who say they'll farm intensively and take their chances in the marketplace — they're all doing what they think is best for their farm business."

Ensuring governance

And when it comes to the means and methods of transition, the tools are widespread, she said. "There are many different carbon calculators, for instance, and unregulated natural capital markets. Who's making sure the right guardrails are in place so that people aren't exploited by those who know their way around natural capital markets more effectively? There's lots of elements in this process that just are under-thought."

Phil doesn't believe government has a coherent plan about food, farming and the environment and that leadership is lacking. He was dismissive of the codesign process for SFI. "I think SFI has been consulted on and then government has written the rules."

So, would a strategy be helpful? "If you have a strategy on your farm, firstly you identify your aims and objectives. Then you work out how you're going to get there. Then you measure whether it's successful. That is a strategy as far as I can see. It's three sentences and not 154 pages," said an exasperated Phil.

But perhaps government-led strategy isn't the answer to the sort of change agriculture is facing, chipped in Sue. "The

reality is that some things lend themselves to strategy, things that are predictable, and that you can plan for, and that you will have control over.

"We're talking about something a bit more complicated because we're part of a global food system where we have little control over global commodity traders, global chemical companies, global food processors, such as Nestle, Unilever, PepsiCo. They have interests in the food system that are about maximising shareholder value, and they're operating in multiple political jurisdictions in countries all over the world to maximise value for themselves. So when we talk about strategising in the UK, we can't really do it without absolute cognisance of the complexity that we're operating in."

"But you can set frameworks in which people can make choices," she noted. In reality, the farming sector is so diverse, every farmer has to be able to establish their own strategy in the particular conditions and contexts that they're operating in, believes Sue. "It would be an absolute disaster if government tried to set a strategy because it's not within its gift to make it happen for the whole of the sector."

"Government needs to set the framework, or direction of travel, and put the policy levers in place, and the policy and business guardrails for people who are choosing that direction of travel."

Phil agreed. "There's a big enough marketplace, with enough produce coming from all over the world that we can't grow. But where we can grow produce, we should be supporting farmers to do just that."

How exactly that will happen, and 'how it might save the planet', is still very much a hot topic of debate. ■



The conversation inevitably turned to Red and Green Tractor Assurance schemes as the panel discussed who pays for the transition and fairness to farmers in the food value chain.



Meeting Frédéric Thomas

Ecosystem farming

French farmer, Frédéric Thomas, is a well-known pioneer of conservation agriculture, not just in his home country, but globally too. CPM joined a BASE-UK trip to see how he puts this into practice on his farm.

By Mike Abram

The group is stood together in a field of decent looking winter barley, especially when compared with many of the waterlogged fields seen while driving down to the Loire Valley since exiting the Channel Tunnel.

Direct drilled one month previously in mid-October, the barley roots are already reaching 20cm down into the soil profile. But directly facing everyone is a 5m round pit where no crop is growing. Other similar patches are visible across the field, with a larger area where most of the barley has been uprooted. The cause is wild boars.

“It’s a nightmare,” says Frédéric Thomas, whose 150ha farm lies between Blois and Orléans in the Loire Valley, around 100 miles south of Paris. “In a no-till system, the wild boars cause more weeds and damage to machinery

such as sprayers [because of uneven, pitted ground].”

In total, he estimates around one hectare of the 9ha field will have to be written off so far to add to the 25ha he’s stopped farming in recent years. He can claim compensation for the yield lost, but it doesn’t nearly compensate for the other issues being caused, he suggests.

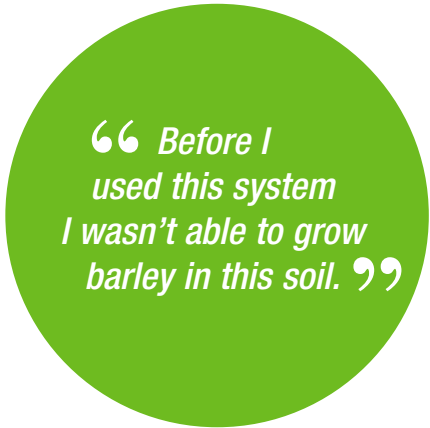
Compensation

“Last year we were compensated for 42t of maize even after using hunters and having electric fence on the farm. If I’d done nothing, it would have probably been 100t of maize on the ground.”

It’s not the only challenge he’s facing albeit perhaps the most difficult one to manage. Two other issues have shaped how he manages the farm — his time and the difficult soils.

Unusually, Frédéric doesn’t live on the farm, or even close to it; instead, he lives three and a half hours away. That plus other business interests, including editing a French conservation agriculture magazine, *TCS*, and worldwide calls for his consultancy on the topic, restrict him to working on the farm for three key months of the year — April, July and October.

His solution has been to build what he describes as an ecosystem of partners and collaborators that work together on both his and neighbouring farms. In total, he’s working with seven partner businesses of different sizes. All are separate enterprises, but together they



share machinery and advice.

Three partners use Frédéric’s farm for livestock grazing while a fourth has a compost business. He’s also working with a beekeeper. “We try to develop each other because you know that’ll help your ▶



Frédéric Thomas balances managing the farm with editing a French conservation agriculture magazine and consultancy work.



In a no-till system, wild boars cause more weeds and damage to machinery such as sprayers because of uneven, pitted ground.

► own business,” explains Frédéric.

The agronomic challenge provided by his difficult soils has been managed using conservation agriculture practices. A co-founder of BASE (Biodiversity, Agriculture, Soil and Environment) in France in 2000, Frédéric has been using a combination of zero tillage, cover cropping and compost amendments for 25 years on the farm to manage soils that consist of sand over clay and are prone to erosion.

“Water management is the challenge,” he says. Whereas maize is the main cash crop in his rotation, winter barley or triticale follow depending on soil type. Cover crops are used whenever possible while other crops such as oilseed rape, peas and beans are also grown.

A major change in recent years is greater integration of sheep into the rotation to graze cover crops. Frédéric doesn't own any himself, but through the collaborations with his partners he has access to nearly 400 sheep and some cattle.

“When sheep graze my farm I charge €0.15/ewe/day, which is around €60/year. It's very cheap [for the grazier]. If it's cows, it's €1/cow/day.”

One issue he's found by bringing sheep into the system is increasing Italian ryegrass populations. “The problem is, as you kill the cover crop and bring fertility, you don't have the cover [to compete with the Italian ryegrass],” he explains. “The Italian ryegrass likes the sheep manure and it's started to get out of hand.”

Because some of the Italian ryegrass is beginning to be resistant to glyphosate — INRAE tests suggest 88% resistance to 1080g a.s./ha of glyphosate on selected

seeds — it's meant a recent return to some shallow cultivation.

Resistant Italian ryegrass wasn't the sole reason for the return of a 4m-wide shallow cultivator, with uneven fields from wild boar damage also playing a part in his decision. “I was losing up to 15,000 seeds/ha of corn because the ground wasn't flat, and in 2022 with fertiliser costing a fortune combined with high commodity prices, it was looking like a year you couldn't afford to lose output.”

He was able to reduce his nitrogen requirements in maize to just 30kgN/ha, meaning he could use stock previously bought in 2020 and 2021. “We had a good even stand and the crop wasn't short of nitrogen, and we started to have better management of the Italian ryegrass.”

He's also using other crops in the rotation to help with that management. “One is to grow OSR, although it isn't easy to grow on the farm because of the wet, but now it's starting to be easier. It allows us to use propyzamide, which helps.”

Companion cropping

OSR is following winter barley in the rotation. He plants it with companions, including beans, peas, sunflowers, buckwheat and hairy vetch. “The idea is to keep the vetch because I only use Kerb (propyzamide) and the vetch probably won't be killed during the winter, so then I harvest both OSR and vetch together.”

When he's tried this previously the OSR flowers in April, while the vetch flowers later, which extends the flowering season with the pods on top of the OSR. As the soil isn't particularly suitable for OSR, he's not had any particular problems with lodging. “My expectation is, if I can get 1.5-2t/ha of OSR and 1t/ha of hairy vetch, I'd be very happy.”

With hairy vetch worth €2/kg, he says he can afford to pay for optical separation. After harvest he incorporates the residue with a tine roller and grazes sheep on the volunteers and regrowth from the middle of August.

Buckwheat and red clover is another option he's testing, with the buckwheat and subsequently red clover harvested for seed. “It's amazing how this kind of clover can overcome the Italian ryegrass and the good it's doing for the soil,” says Frédéric.

In the field grown last year, the yield of clover wasn't optimal at 200kg/ha because of weevils but the seed was worth €4/kg, plus an extra €150/ha of CAP payments for growing a legume, and €100 of carbon in his carbon programme. “It's not a bad

crop and the risk is very low.”

While Frédéric believes he's started to bring the Italian ryegrass back under control with the measures he's taken, he continues to experiment, this year running a cover crop trial on a field following beans and vetch.

Strips of various cover crops were planted in mid-July to assess their impact on Italian ryegrass populations including two varieties of a domesticated ryegrass, which he'll prevent from heading in the expectation they'll outcompete the weed population.

Other cover crop species in the trial include oats, forage rye, mustards, and a mix of Austrian fodder peas, beans and vetch. “If you get it right [with a dense cover] you can keep it very clean underneath,” says Frédéric.

One of his collaborators on the farm, José, has been grazing the trial with his sheep which prevents any of the species from heading. The plan is to follow the cover crop with maize, although Frédéric is also evaluating some of the covers as potential entry points into other crops. For example, the forage rye, he thinks, could be grazed over winter and then provide an entry into an early planted cereal.

Further up the field, as the group walks past the cover crop trial, is an example of a typical cover crop mix Frédéric uses. This part of the field is following winter barley and the cover crop was planted in early July.

The first species in the mix to emerge were sorghum, sunflowers, and radish, says Frédéric. “At the end of September, it was dry and the soil was out of nitrogen, so the vetch started to come and overgrow the cover crop. There are a few



The farm's soils consist of sand over clay which are prone to erosion and make water management challenging.

types of vetch in the mix, and there's still a lot — it's impressive."

In late October and early November, warmish temperatures encouraged mineralisation in the soil and the radish to regrow and flower. Finally, the mix also contains 3kg/ha of red clover, which he expects to provide a mulch into which to drill the following crop of maize and prevent Italian ryegrass from invading.

José is also mob grazing this area with sheep. "They're going to be here all winter; he's calculated the number and size of plots that 50 sheep will take to graze," explains Frédéric.

Compost, if the weather is favourable, will be applied before the maize is planted, which will be direct drilled with his modified Monosem planter if Italian ryegrass populations are under control and the ground is judged to be level enough, otherwise the cover crop will be shallow cultivated.

Maize yields on the farm have varied between 5.5t/ha grain in 2022 in a very dry summer to 8.5t/ha last autumn, rising to 9.5-10t/ha in the best fields under this system, says Frédéric. "My aim is to do 10t/ha dry. For this type of soil, that provides a much better return than any other crop."

His system allows him to plant maize earlier than otherwise would be possible on these soils, he adds. "One good trick we've learned is to measure the temperature of the soil at a depth of 15cm rather than 3cm. If you're at the right temperature at 15cm, even if it is too cold at the top you can start drilling."

Improved soil water management, which is essential for his soil type, is the key to being able to drill earlier, he says. "Conventional management gives around 35-40mm of rainwater holding capacity, which is about one week of corn growth in summer. In this system I'm around 150mm in the poorest soils up to 250mm, so you change the world. It means you have five



One issue incurred by bringing sheep into the system has been increasing Italian ryegrass populations.

to six weeks of water during the summer."

On his soil type there's the temptation to terminate cover crops early to save water, he says. "But the problem is not a lack of water, it's that your bucket is very shallow, so it's about increasing the size of the bucket [through growing cover crops longer] so you can refill it more easily".

Rotation management

"By planting maize earlier, I can try to have it flower by 1 July, which means it's finished by 15 August. I have the next month to dry it down in the field and harvest it in the right conditions and grow barley after.

"Before I used this system I wasn't able to grow barley in this soil. And by growing barley I get away from the early summer drought — barley is less hurt by June heat than wheat would be — and it's less sensitive to take-all. So I make better yields with barley and then I usually get sufficient moisture to start a nice cover crop to feed the sheep," he explains.

This year's cover crop has provided 7t/ha of dry matter, and around 30-35kgN/tonne because of the high vetch content. "That's between 200 and 250kg/ha of nitrogen in the cover crop biomass. Around 30% of that is likely to be available to the following maize crop, so 60-70kgN/ha."

Growing such a cover crop isn't just dependent on this year's conditions, but all the fertility that has been built up previously, he says. Measurements of his soil has shown it's high in mineral organic matter, which is relatively inaccessible to plants and 'quite high' in particulate organic matter.

"Particulate organic matter is the one that feeds the soil life that supply fertility. If you have a high C:N ratio it's good for soil life and you have a good flux of nitrogen. Analysis of three of my fields showed between 170 and 223kgN/ha of potentially mineralisable nitrogen compared with 60 for my neighbour's field, who is only five years into his cover crop journey.

"That explains the difference between cover crops. My cover crop doesn't grow because of the seed, but because of the previous cover crops I grew here.

"It means this soil can supply perhaps around 150kgN/ha, plus the 70kgN/ha in the cover crop. Add another 30kgN/ha at drilling to start the crop, you should be able to achieve 10t/ha of maize dry matter," he concludes. ■



Cover crops are an integral aspect of the farm's approach.

Mycorrhizae cover crop trials

Cover crop mixes with and without a mycorrhizal inoculant supplied by Lallemand Plant Care are being trialled at Frédéric Thomas's farm.

"We have 36m treated with the inoculant and 36m without. The idea is to see if we can develop mycorrhizal associations under the cover crop in order to get it on the maize crop afterwards," explains Frédéric.

"Two years ago we measured 0.6t/ha extra

yield in the maize with the mycorrhizae inoculant, and also about 0.2-0.3t/ha with the triticale that followed the maize.

"But what's most interesting was that it wasn't a clear difference in one strip versus another. There were some areas where you see nothing, some areas where you do, and it's the sum of winning and losing that makes the difference," he says.



The sustainability trilemma

REAP conference

How to grow more food while achieving net zero carbon emissions and increasing biodiversity – that was the challenge highlighted at Agri-TechE’s REAP conference at Newmarket Racecourse. CPM joined delegates to find out more.

By Will Charlton

The REAP conference always attracts prestigious industry leaders to speak. This year, senior figures from DEFRA, the NFU, farming organisations, food processors and retailers discussed the conference theme — adaptation through innovation.

The event is organised by Agri-TechE, which celebrates its tenth anniversary this year, and is a membership organisation that connects researchers, companies and farmers to facilitate the development and adoption of new agricultural technologies.

Undeniably, the agriculture industry of

2024 is almost unrecognisable from 2014. According to Dr Belinda Clarke of Agri-TechE, the explosion in ag tech had only just begun 10 years ago and subjects such as net zero or biodiversity were only starting to be widely discussed.

“Looking back to the first REAP, everyone was excited about drone technology. Since then, the conversation evolved to imaging technology and then to data.”

Extracting value

“Data seems to be an intractable challenge. We’re getting some actionable insights from what we have, but there’s far more data being generated than the value being extracted from it. That’s the thing we have to work on as an industry,” she stresses.

As part of its activities, Agri-TechE arranged a member delegation to visit Agritechnica in November. Belinda says she witnessed conversations about interoperability from the companies exhibiting there, although she’s yet to see much delivered.

“Interoperability and extracting insights from data remain the Holy Grail. The tools now available to us, like AI, machine learning and computer vision, mean that

“ We require more science to face the triple challenge of increasing food production, reducing greenhouse gas emissions and reversing the decline in biodiversity. ”



According to Dr Belinda Clarke, interoperability and extracting insights from data remain the Holy Grail.

I hope we're coming to an inflexion point in the industry where we won't struggle to manage data.

"I expect we won't still be having this conversation about data in the next ten years," she says.

REAP's keynote speaker was DEFRA's chief scientific advisor, Professor Gideon Henderson. To set the scene, he explained that the global population recently reached eight billion, with each person requiring 2,000 calories a day to survive.

"Historically, the increasing population has been fed by utilising more land for food production. However, since the 1960s, science has enabled us to produce more food from the land we grow it on.

"Nitrogen from the Haber-Bosch process and genetic improvements drove that decoupling. Now, we require more science to face the triple challenge of increasing food production, reducing greenhouse gas emissions and reversing the decline in biodiversity," he explains.

In the UK, 71% of land is farmed, which is an absolute constraint to how the challenge of food production in a changing world is faced, comments Gideon. He believes there are four things that require us to change how we use our land in the future, and three stem from the challenge of driving the UK to net zero by 2050.

"The government is targeting tree planting to reach 30,000ha a year," says Gideon. "Across several decades, that'll require 750,000ha of land across the UK, which will be a significant change but not revolutionary, when compared with the 3.25M hectares of woodland that already exists.

"Secondly, the degradation of peatland is destroying soils and releasing large amounts of carbon into the atmosphere. This'll require us to change how we farm lowland peat, either by rewetting or by growing new crops," he says.

Gideon then explained that the third policy area which will impact land use is the role of biomass or biofuel. At present, 12% of energy generation in the UK is from burning biomass and although most comes from overseas at the moment, it's possible to grow more of that in the UK. "These would be crops like miscanthus, willow, short rotation coppice or perennial crops," he says.

"There'll also be an increased requirement to create habitats — DEFRA has a specific target to create or restore half a million hectares. This, coupled with the carbon reduction targets, will mean approximately 2M hectares of land



Professor Gideon Henderson discussed government plans for land use changes and how technology can increase productivity.

changes use to focus on carbon reduction or biodiversity gain. It's a significant change to the way we farm and use our land."

Increasing productivity

It could be argued that a desire by the government and main opposition parties to maintain or increase food production seemingly runs at odds with the land-use changes outlined by Gideon. However, he believes the industry can increase productivity to meet both objectives and key to that will be new technologies.

For example, DEFRA funds the Genetic Improvement Networks (GINs). Their research helps to develop crop varieties with resistance to challenging pests and diseases such as orange wheat blossom midge (OWBM).

"We can take our increased understanding of genetics and use it to precision breed to make better crops quicker and more efficiently. We now have the Precision Breeding Act on the statute books to increase the rate of improved varieties for use in the UK and globally," says Gideon.

"Furthermore, there are 7,000 edible plant species, but humans only consume 400, with six being staples. We'll have to look at new crops, particularly on peatland, where there'll have to be a change in land use.

"Vertical and indoor farming are also areas where we can increase productivity without being bound by land constraints. This can be coupled with the use of aero- and hydroponics to eliminate the use of soil in food production."

To help support the industry in increasing productivity whilst repurposing the use of some agricultural land, Gideon says DEFRA is providing funding via several different pathways. The Farm Innovation

Programme has an industry-led R&D partnership fund which connects groups of farmers and businesses with researchers.

Whereas the Farming Futures R&D fund already provides funding for climate-smart farming, sustainable protein production, automation and robotics, and environmental reliance. In addition, this has plans for future funding calls on precision breeding and carbon.

Also speaking at the conference was David Exwood, vice president of the NFU. In response to Gideon, he says the ever-increasing production and consumption of food can't be taken for granted. "The land use framework is coming; Gideon shared some of the plans that'll be in it. But how will it be decided who does what with the land?"

"It will be almost impossible to have a top-down approach. Just leaving it to the market to decide doesn't seem to be right either. So, the industry will have an incredibly complex choice coming up," says David.

"Whatever the government decides, ►



As showcased by Dr Jim Bailey, PES Technologies is developing a pioneering system that 'smells' soil.



Agri-TechE's REAP conference has been running for 10 years.

▶ they'll have to pull levers to support food production. There are clear environmental targets but much less ambition for food production. Gideon talked about the progress that's been made on carbon reduction in other industries, but we know a lot of that improvement has been made by moving manufacturing abroad. We can't do the same with our food production as well."

That said, David acknowledges available technologies. "The Precision Breeding Bill gained broad political support and something similar is coming in Europe too, which is a sign of the challenge they face. I've been farming for 30 years and it's never been a more exciting time than now. I can pretty much farm my farm through my phone now; I couldn't do that five years ago," he says.

Fenland farmer, Tom Clarke, says the Fens makes up 4% of UK farmland area but produces 7% of its food. "If you repurpose that land, where will the food produced on it come from?" he asks.

"It'll have to be grown on less productive land, and Gideon said we have to increase productivity. It could also be grown abroad in countries where the environmental footprint may not be as verifiable.

"There's nowhere in the country where the problem of nature versus food production versus carbon emissions is more acute than the Fens. It's our productive agricultural land, wetlands are the most biodiverse environment that we have in the country, and the very fenland I farm emits carbon dioxide just because it's dry," explains Tom.

He says in other parts of the country, there's an easy solution to land use changes due to marginal land or having an obvious alternative use, whereas lowland peat is much more complicated.

Presenting something different, the start-up showcase is always the most

popular session at the REAP conference. Each year, six new companies are given the opportunity to share their technology with delegates. Past alumni include Yagro, Small Robot Company and Breedr.

This year, the spotlight was on PES Technologies, which has developed an in-field portable soil testing system to provide farmers and agronomists with GPS-tracked immediate results. They claim it'll provide biological, physical, macronutrient and pH results within minutes.

"When we began developing our system, we were told by NIAB that there were no good quality soil health tests that were also affordable, particularly for soil microbiology," says Dr Jim Bailey. "If we want to restore our soils, we have to be able to measure microbial biomass; 80% of new organic carbon sequestered in soil comes from the microbes."

Smelling soil

Jim explains that the sensors in the system 'smell' the soil by using electrical fingerprinting and machine learning in the cloud, with a high degree of accuracy. "The sensors plug into the device using a cassette, which will have enough to do more than 100 tests per cassette."

Soil samples can be taken in the same way as standard protocols with 5-15cm being the target depth. However, Jim says there are far fewer steps than present sampling techniques, such as packaging and posting the sample and then waiting for a lab to do the test.

The frequency of sampling is up to the farmer or agronomist and results will be aligned with the RB209 indices. However, he explains that soil biology is more complicated because there's no fixed reference for results.

According to Jim, PES Technologies is

developing an index for soil biology results, which will be ready for commercial launch later this year.

Also in the showcase was PlentySense, which has developed a sensor claiming to be the first device to continuously measure nitrogen in the soil. Born from a research project at the John Innes Centre (JIC) to screen different cultivars for nutrient use efficiency, the team realised it had applications beyond research.

Professor Tony Miller from the firm says the sensor delivers real-time in-soil nutrient data to aid decision-making. A solid-state probe, it measures nitrogen through the soil profile meaning it can provide information on overall availability and location.

"It measures soil water nitrate, which is the nitrate level dissolved in soil water. It's the most meaningful measurement because this is the form that's available for plant roots to take up and is a different measurement from what you get from soil core and potassium chloride extraction," he explains.

PlentySense has been collaborating with Agrii by trialling their sensors on their technology farms. "We sent the sensors to Revesby Estate in Lincolnshire, which is a technology farm. They're used to analysing Agrii trials investigating different nitrogen applications and nutrient use efficiency.

"The PlentySense sensor will allow more precise fertiliser applications by showing a farmer where the nitrogen is in their soil. This is important because globally, more than 50% of the nitrogen applied to crops is wasted. There are a number of measures that will improve this; better understanding the available nitrogen already in the soil is one," concludes Tony. ■

For more information about Agri-TechE or the REAP conference, visit www.agri-tech-e.co.uk



Although more than 50% of nitrogen applied to crops is wasted, there are a number of measures that can improve this, says Professor Tony Miller.



SFI know-how

Simplifying SFI

Tackling the new 2023 SFI in a systematic manner could help producers to achieve the most from the scheme. *CPM* explores a simplified approach and the impact it's having on one farm.

By Rob Jones

The new 2023 SFI rules remain complex and confusing in parts, but taking a step-by-step approach to their application could help growers to get the most out of them, believes farm business consultant, Paul Pickford.

"While 2024 has started with the promise of numerous new SFI options to be introduced during the summer, coupled to a mixed SFI/countryside stewardship scheme, there's much to gain from making a start with things as they currently stand.

"There's little doubt that DEFRA has succeeded in achieving one of their main objectives for the new SFI application service, which is to make it quicker and more straightforward for farmers. But it's still a daunting task for many," he says.

According to Paul, who is a consultant for Agrii, looking below the surface will reveal much more flexibility as to how to implement the rules and manage them, so it should prove a less demanding process to manage over the years.

"With 2027 being the last payment

under the old BPS scheme, it's important producers understand as much as possible about what SFI offers and how they can make it work as effectively. A good starting point for many applicants will be to break down the application process into distinct stages," explains Paul.

Easy wins

Where the biggest wins will be achieved depends very much on the size of individual farms, he points out. "With some of the stage one 'easy wins' being based on single payments regardless of area involved, smaller farms will benefit from these disproportionately relative to larger businesses.

"Where bigger enterprises might really win out, by contrast, is in stages two and three when they start making changes to farming and land management practices to leverage payments made per hectare of land involved," says Paul.

So what are the areas and business practices producers should act on first? Paul suggests that they're probably things which are already being done. "To net £6/ha (plus £97), all you have to do is test your soil organic matter and prepare a soil management plan on the nature of your soils and the risks they might be exposed to in the future.

"Most producers will be doing this to an extent anyway as part of the Red Tractor scheme and would have carried it out under cross compliance. Once you've done this, you also have access to a management payment of £20/ha for the first 50ha of your land," he explains.

Furthermore, Paul says assessment of hedgerows, size, width, height etc, will pay

“As BPS disappears, everyone is going to have to look to these and other opportunities to diversify their incomes.”

£5 for every 100m. "You can then cut them every year, as long as you cut them a little higher, or you can do this every second or third year for a further £13/100m. Many farmers do this every other year anyway, so the £18/100m on offer for this is a very definite easy win." ▶



Where the biggest wins will be achieved depends on the size of individual farms, says Paul Pickford.



Assessment of hedgerows such as size, width and height, pays £5 for every 100m.

▶ On the same theme is the single one-off payment of £1129 available under SFI for completing an Integrated Pest Management (IPM) plan, he points out.

“Again, many will be completing this as part of Red Tractor. It’s similar for the nutrient management plan and, whether under the NVZ rules or the farming rules for water, everybody should already have one of these and it’s worth £652 under SFI.

“Between management, IPM and nutrient management plans, there’s just under £2800 on offer within the scheme and that’s a good start,” says Paul.

He believes some elements which have been re-introduced from ELS, such as the arable field corners scheme, are worth thinking about. “Where farmers used to swing around and back in and do the whole field, ELS encouraged them to leave the corner and that’s now paying £590 for every hectare of land left in this way under the new SFI.”

On some farms, the buffer strips that were put in under ELS are still there and again these will attract payments, as will creating new ones, he adds. “On an arable field, you’ll get £451/ha for having a buffer strip, planting multi-species cover crops attracts a payment of £129/ha, plus a companion crop will pay you £55/ha. Crops that have no insecticide use will get another £45/ha.”

For those putting in new corners and buffer strips, land will be taken out of production and this is where things become a little more complicated and where stage two comes in, he explains.

“Ultimately, it’s about identifying the parts of the farm that aren’t profitable for cropping and could benefit more from being in SFI. If the average yield of a particular field is 10-11t/ha, then it’s obviously making some good money. But there’ll be parts of that field, whether it’s a boggy corner or a shady bit under a hedge, that might only be doing 5t/ha.

“Choosing to grow a pollinator mix, wildflowers or some winter bird food on that

particular piece of land could not only make a more positive contribution to the environment, it would make you more money,” suggests Paul.

“Those three options will all make a gross margin of somewhere just over £550/ha which could be considerably more than you would have earned by growing 5t/ha of wheat.”

In many cases, growers already know exactly where their least productive areas are but in some instances, Paul thinks this may require further investigation.

“The bad bits are obvious, but the more marginal areas will require a bit more work to identify. If an area has always produced 4-5t/ha that’s a given. But if it produces 7t/ha in most years and a bit more in some, that’s a harder call.”

Early intentions

“Being a three year scheme, unlike the old stewardship schemes which were five years, does mean that if you get something wrong it’s not the end of the world, but it’s far better to put the effort in to get the best out of it from the beginning,” he explains.

According to Paul, some of the benefits from looking at the finer detail may only be small, but it’s the aggregation of these improvements which makes all of the difference. “Take the case of headlands, for example. It could be that you’ve turned on two particular headlands for many years without really appreciating the implications of this.

“Looking at yield information from the last 3-5 years could tell you yields are down 15% in these areas, probably as a result of

compaction, and a quick calculation can reveal exactly what that is costing in monetary terms.

“It could be that a better result can be achieved through planting some wildflowers or pollen and nectar (IPM2 or AHL1) and using that as a turning headland. The last thing you want to be doing is replacing profitable cropping with game cover, for example, through a lack of imagination and information or simply time to evaluate the situation properly.”

Having pulled out of his SFI pilot on 214ha near Alcester in 2022, Warwickshire grower, Paul Wilson has just entered all 755ha of G.W. Wilson & Sons’ owned and tenanted arable land and small amount of permanent pasture into the 2023 SFI.

He says setting up the original pilot was time-consuming but not difficult and the arable soils standard, in particular, suited him well. “But in the end, we simply couldn’t justify taking out of production even the 5% of land required by the Introductory Arable Land Standard for the payment available.

“At the same time, the scheme wasn’t compatible with the attractive carbon payments opportunity we were also exploring. So, we had to pull out.”

Working with Paul Pickford, Paul Wilson now believes the greater flexibility of the new scheme and the fact it can be run in parallel with carbon credits makes it a much more attractive option. Adding all the Wilson’s 2023 SFI actions together, the team calculate that, after costs, they should be able to replace around 33% of their original Basic Payments Scheme income with their current plan.

G.W.Wilson & Son’s 2023 SFI Plan

SFI Action	Area
SAM 1: Soil management planning	All
SAM2: Multi-species winter cover crops	40ha
HRW1: Hedgerow recording	All
HRW2: Hedgerow management	All
HRW3: Hedgerow tree management	All
IPM1: Integrated pest management planning	All
IPM3: Companion cropping	120ha
IPM4: No insecticide use	378ha
NUM1: Nutrient management review	All
NUM3: Legume fallow (three year)	3.3ha
NUM3: Legume fallow (rotational)	40ha
AHL2: Winter bird food	5.3ha
AHL3: Grassy field corners and blocks	12ha
AHL4: Buffer strips	3.6ha
LIG1: Low input grassland	17ha



Paul Pickford and Paul Wilson admit there was some debate regarding the IPM4 no insecticide use action.

Furthermore, soil carbon benchmarking during the past season suggests they're likely to virtually double this through their annual carbon payments.

"The first thing we did in building our 2023 plan was to include all of the SFI actions we are already doing as a business and for Red Tractor, Farming Rules for Water and the like," explains Paul Wilson. "This gave us a good soil, IPM, nutrient and hedgerow management base for our scheme. It's involved some extra work in places such as assessing and measuring all our hedgerows, for instance.

"But this has been a very useful exercise in itself, enabling us to identify additional field corners and rough areas suitable for other SFI actions as well as understanding our field boundaries in more detail than ever before," he says.

Going through current practices, the two Pauls then identified specific areas for additional actions. Paul Wilson says having always grown just over 5ha of winter game cover, the farm had a good amount of buffer strips, and found a surprising area of field corners and inconvenient areas that would be better off down to grass than cropped.

"We also had a small, very difficult field that lent itself ideally to a three-year NUM3 legume fallow. Going for a reasonable area of multi-species winter cover (SAM2) we can rotate around ahead of our peas or spring barley makes perfect sense for us too.

"Cover cropping is something we've been doing anyway to improve our soils as well as protecting them, while providing some useful sheep grazing," he says.

Paul Wilson explains the new SFI rules allow him to continue the grazing and, while the cover is supposed to be maintained through December, January and February, he can destroy it up to six weeks ahead of sowing a following crop, so it shouldn't get in the way of barley drilling.

"We've been experimenting with companion cropping for a while to try to help

our oilseed rape to get away from flea beetle, so IPM3 was another logical element," says Paul Wilson.

Paul Pickford admits there was some debate around the IPM4 no insecticide use action. "Paul [Wilson] gave up spraying beans for bruchids years ago, has virtually given up doing so for CSFB and doesn't generally have serious problems with BYDV. But for flexibility and safety — just in case — we opted to commit only half the arable area."

Pragmatic approach

"After all, within the three-year SFI agreement we're able to increase the area to 100% or cut down by 50% in the following years. So, it's worth not over-committing to start with. The same applies to the rotational area of NUM3 legume fallow we've put into our plan. This fits in nicely as an extra break in place of beans or OSR, taking the pressure off OSR establishment in a difficult year and giving a great entry for milling wheat.

"It means a fair level of income foregone from this area, but it should deliver a decent gross margin of around £480/ha while giving Paul the flexibility to drill it in the spring having glyphosated-off an overwintered stubble or cover to help with blackgrass management," says Paul Pickford.

Even though it will only recover a third of their original BPS entitlement, Paul and Paul see the 2023 scheme as an opportunity to seize in the post-BPS world, with carbon payments increasingly important.

"It's early days yet, but our initial benchmarking with a sophisticated carbon certification system across 181ha of ground in very good condition here at Larkstoke Farm shows our regime is sequestering an average of 5.04t/ha of CO₂e annually," says Paul Wilson.

"Based on current carbon certificate rates, it would have earned us a payment of £130/ha — £104/ha paid in the following year with £26/ha held over for the future as a 'loyalty bonus'.

"While all our ground isn't capable of delivering such a good sequestration performance, we're conservatively budgeting for a return of over £60/ha (before bonus) from the 755ha we currently have in the scheme for payment in 2024, once all the auditing is completed on our 2023 season. This looks like matching the return we will get from SFI, putting us in a far better place overall."

Paul Pickford adds that with carbon credits already generating an average



Paul Wilson believes the greater flexibility of the new scheme and the fact it can be run in parallel with carbon credits makes it an attractive option.

annual payment of £55/ha for the UK farms involved, they are a particularly exciting opportunity. "It's an annual scheme, paying us for what we actually achieve each year through a well-validated process generating carbon credits that are only sold to food and fibre producers, so we aren't providing off-setting excuses for other industries.

"As BPS disappears, everyone is going to have to look to these and other opportunities to diversify their income alongside what government is prepared to pay for 'public goods'.

"In everything we do, though, I have no doubt that careful planning and the greatest possible flexibility will be the primary requirements — not least with the extent to which both our climate and markets are changing," he concludes. ■



Adding all of Paul Wilson's 2023 SFI actions together, it's been calculated that after costs, 33% of the original BPS income will be replaced thanks to the new plan.



not quite the *lastword* by Janine Adamson

No (wo)man is an island

You can be in a room full of people yet feel completely alone. It's true, isn't it? Loneliness comes in many shapes and sizes. Equally, here we find ourselves, in an industry which by its nature facilitates solitude, whether that's being a farmer, agronomist, trials officer or in my case, a magazine editor.

It's important to note that loneliness isn't just a symptom of an older generation, although it's acute within that demographic. Similar to grief, and perhaps in some ways connected, it can hit you out of nowhere and leave you stunned. No (wo)man is an island, after all.

Cards on the table, I've always struggled to make meaningful connections.

I believe that's because I place such emphasis on the meaningful part. So when I have been surrounded by people, either in a personal or professional environment, I've been desperately seeking a sense of belonging which sometimes just isn't there. Cue feeling very small and rather alone.

Some of my saddest times have been when I've tried to make myself fit into situations which just aren't 'me'. Forcing

friendships with people who don't have common interests or shared goals. I can even recall being 'friends' with someone who didn't like being outside and disliked dogs — ridiculous. You could say that's a result of being half country, half townie. Where do I belong?

On the flip side, some of my happiest moments have been discussing my favourite crop pest at great lengths (it's the potato cyst nematode by the way, seconded by the codling moth). Or explaining how the crashing waves of Scotland are realised through the rumbling motifs of Mendelssohn's The Hebrides Overture. I get highly invested in specifics, which can be quite handy working in journalism I guess.

In honesty, although admittedly unusual, I'm pretty content with the person that I am. So why am I so bothered about what other people think of me? The answer is, a desire for validation. I believe we can all be guilty of that at times; it's deep rooted in wanting to belong and be a part of something. And don't feel ashamed of that, it's completely natural, it's just how you manage those desires.

For me, it's learning to accept that I'm not everyone's cup of tea but hopefully I'm the occasional person's champagne (I like that one). I just have to find 'my people' — form a team of folk who champion me, and stick with them like glue. We all deserve a genuine circle who loudly celebrate our successes and show up for us when times are tough...and in my case, like dogs.

But in the meantime, how do

we cope with the loneliness in the moments between and while our select cheerleaders are otherwise busy? While we're crop walking on a rainy day, poking around with a spanner, or sat trying to figure out a stewardship application? I always joke — too old for Young Farmers but too young for U3A!

I've been told it's important to not force the matter and that new friends come in the most unexpected of places. But for many of you, the pool to source from will likely be quite small. A little like dating, finding the right 'one' while living in the middle of nowhere with nothing but a small army of cabbage stem flea beetle to muse to, is probably quite daunting.

Perhaps you're wondering why I'm discussing this so candidly with you all? The reason being, maybe this is the

only magazine or literature that you have the chance to read this month, so if what I'm saying resonates with one or two of you, I've done something useful with this space.

Making friends as adults is incredibly hard and people don't discuss it enough. People grow apart, lives move on and times are very busy. So if anyone has a magic formula, please let me know. But what I'm aware of is the gift of kindness and expressing how you feel. Tell someone when you recognise something good in them, when you appreciate them, when they inspire you. Bypass the negativity you sometimes see online.

Let's start a chain of meaningfulness and slowly build our connections. One or two might just stick and grow into something more.



A love of dogs is an essential characteristic of those in my close network (meet the new Adamson pup, Ted!).

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Focus on crop quality

“It’s a fairly regular occurrence that we see spoilage because there aren’t enough ducts or fans in sheds.”

On Farm Opinion

Prioritising crop quality in the grain store can provide a multitude of benefits and doesn’t have to be an expensive investment. CPM speaks to a farm manager who’s installed a new system to reduce labour and put crop quality first.

By Melanie Jenkins

The crop has come off the combine and safely gone into the shed, where it might be for mere days or even months. But, irrespective of time, if the wrong factors come into play and sheds aren’t ventilated correctly numerous issues could arise, highlighting just how important cooling can be.

According to AHDB, later sold grain can often achieve a premium price compared with when it’s sold at harvest, meaning grain can often be stored for months at a time. But this opens the door for

degrading quality which can then have a knock-on effect on the price crops can command.

Retaining value

If crops aren’t ventilated while being kept in grain stores they can be in danger of overheating, spoiling, rotting and getting bug infestations, says Rob Sweetlove of Evans and Pearce. “When your crop is valued at £150-£200/t you don’t want to be losing value from that, and when basic ventilation can be installed for £4-£5/t, it’s a no-brainer as it helps you to look after your crop.

“And this investment will last you 10-15 years or more. But in a lot of instances, I think money is allocated elsewhere as the investment is perceived as being less critical. However, it’s a fairly regular occurrence that we see spoilage because there aren’t enough ducts or fans in sheds to provide ventilation and this can often result in bug issues which is a false economy. Bugs won’t be active below 10°C and can’t survive in grain below 5°C — good ventilation can make all the difference.”

In a bid to prioritise ventilation, farm manager John Field has been instrumental in the installation of a Storecool system at Down Farm, F W Wallis and Son, near Rockbourn, Salisbury. The farm, consisting

of 400ha owned and a 200ha tenancy, is all arable including winter wheat, winter and spring barley, oilseed rape, peas, oats and spring linseed.

Across the two farms there’s a mix of drying floors and freestanding grain sheds and so John decided to install Evans and Pearce’s Storecool system to help utilise the sheds and reduce the labour of crop handling.



In a bid to prioritise ventilation, farm manager John Field has been instrumental in the installation of a Storecool system at Down Farm.

“Usually, we’d bring the grain in to dry and then it’s put into the freestanding sheds which works but it’s time consuming and labour intensive. We’ve also had some crops come into the sheds which have had to be cooled and the work involved wasn’t worth it for the short time they were cooled for.”

A further labour-intensive aspect came in the form of a fairly modern four-year-old 1000t grain store at Down Farm. “The shed was open fronted, so by the end of October we could no longer store grain in it, meaning anything in store had to be moved. We’ve now fronted the shed, but despite being modern it has no gable end fans, so we usually just leave the doors open.”

Investment

In 2021 the decision was taken to purchase eight Storecool pedestals and six PV250 fans from Evans and Pearce. These are rotationally moulded pedestals which draw air from eight apertures at the base of the unit. According to Rob, drawing air from the base helps improve the effectiveness with which they service their working area.

To install the system into the 30x20m shed, which is split into two bays of 10x30m, the Storecool units were placed in the centre of each bay and electrical sockets were installed to allow them to run. The farm also has a further two flat concrete floored sheds, and due to the versatility of the system it can be moved among these depending on where it’s required, says John.

“We only bought six fans with the intention of rotating them on the pedestals, but I think we actually require one fan per pedestal so that we can cool the grain at the optimal time and aren’t left stuck unable to move onto the next area. If we had a big fixed drying system there’s less versatility, but with these the ability to change their position is a lot more flexible and versatile,” he says.

Pedestals come in both mini and standard options with the former suitable for depths under 2.7m and the latter designed for 2.8-5.7m depths. The plastic bases allow for easier maneuverability and are stackable for storage, and small seeds won’t enter the duct so they don’t require filters for use with OSR. They’ve also been designed to be lower to the ground making it easier to fill around them, explains Rob.

The fans have a cast aluminium case construction and hard-pressed steel



Having to move grain between sheds can be a labour-intensive undertaking.

impellers to help improve air movement. Each fan has a tapered 150mm inlet spigot to increase airflow to the impeller and an integral round 150mm discharge

spigot as standard.

Rob advises installing one 1.1kW PV250 fan per 250t of grain which can be fitted with an optional temperature controller — ▶

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To reduce the labour of having to move grain, in 2021 the decision was taken to purchase eight Storecool pedestals and six PV250 fans from Evans and Pearce.

► Grain Fan Assist — which provides differential temperature control to supply air movement through the crop. “This monitors the temperature of the grain and the air so that when a set differential is met the fan will switch on. For example, it could be set so that if the grain is 18°C and the air falls below 14°C, the fan will switch on. Then when the differential is closed, the fan will switch off, meaning it’s only ever running when it’s drawing cool air through the grain.”

An on-screen display provides immediate and accurate temperature readings, something John has found beneficial. “With a manual probe you have to wait five minutes to get the actual temperature of the crop, so

from a crop management point of view, we can have a quick whiz around the shed to look at the eight displays and get good readings at all these areas which speeds things up. However, we do still have to take moisture readings by spearing the grain and taking samples.”

It cost £8800 for the Storecool components and fans, and a further £600 for the installation of electrics and extension cables, says John. “It works out pretty cost-effective even though the system can be pretty thirsty on electric, especially when we’re running eight in one shed, but we’ve found we’re not having to run it a lot of the time. We try to bring the crop temperature down by working with the



If crops aren’t ventilated while being kept in grain stores they can be in danger of overheating, spoiling, rotting and getting bug infestations.

cooler nighttime temperatures and then we can switch the system off. And previously we'd found we would get capping on the grain at the front of the big grain shed but this doesn't happen anymore."

Temperature management

John has also found that by using the system, crop moisture can be brought down anywhere from 0.5-1% depending on the weather conditions. "How quickly we can bring the temperature of the crop down does depend on what the temperature of it is when it goes into the shed. It was a struggle to reduce the temperature of the crop in 2022 because the harvest was hot and so were the nights. Because the fans can both blow air into the crop and suck air out of it, we were sucking the air out during this harvest as it worked better for the conditions."

Wheat was brought into the store at 26.6°C and 14.9% moisture, and after a month in the store this had been reduced to 18°C and 14.1%. "This was an unusually warm season," says Rob. "The drying of the crop is unusual with a pedestal system, but this was down to the warm, dry conditions experienced during this harvest."

Although it ended up being a longer more drawn-out process to lower the temperature, John says this was due to the conditions in 2022. "But in 2023, it was cooler at night so we were able to bring the temperature down a lot faster."

Although John feels it's hard to quantify the return on investment, he believes that the system has made a positive difference on the farm. "It's meant there's a bit more manual handling for the team member who's doing the grain store management but overall it's a positive as we're not getting the capping of the grain in the main store. It also means we can use this store to bring temperatures down, and



The next step at Down Farm is to install gable end fans into the large store to help improve airflow around the grain.

we used to have to make sure the crop moisture was right before bringing it in, but now we have that 1% leeway this is something we can address once the crop is in the shed."

All crops go to Frontier, Openfield and Robin Appel and John says the system has a positive knock-on effect when selling grain. "The merchants send someone to take samples and visually it looks good to them, giving confidence that the bulk of the grain will be well managed and looked after."

The next step is to install gable end fans into the large grain store, says John. "You can feel the humidity coming off the top of the grain when the fans are running so improving the airflow is paramount to getting the maximum out them. We're also going to purchase another two fans so we



The PV250 fan can be fitted with an optional temperature controller – Grain Fan Assist – which provides differential temperature control to supply air movement through the crop.

can have all the pedestals operating at once," he concludes. ■

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Breaking new ground

LAMMA

One way to brighten up the dreary month of January, as it turns out, is to be surrounded by endless amounts of shiny new machinery, something LAMMA 24 had in abundance. CPM reports on some of the latest launches and UK debuts from the show.

By Melanie Jenkins

Anyone who attended LAMMA on 16 or 17 January is likely to have observed just how popular the show was this year. With record numbers reported to have attended, even the vast halls of the NEC in Birmingham became crowded, much to the delight of the manufacturers and hosts alike.

And it's no surprise how many people piled in based on the number of machines making a UK debut and exhibitors returning after a few years of absence, including Massey Ferguson and JCB.

Massey Ferguson

Launched at Agritechnica in November, Massey Ferguson's 9S had its UK launch at LAMMA. The MF 9S tractor includes key features such as an updated six-cylinder, 8.4-litre AGCO Power engine, the Protec-U cab design, Dyna-VT transmission and tyre inflation system. Coming in six models with power from 285-425hp, controls have been enhanced with the new MF AutoTurn, AutoHeadland and ISOBUS Tractor Implement Management options.

Engine Power Management (EPM) boosts torque up to 1750Nm and generates up to 30hp of extra power at speeds above 15km/h for PTO and hydraulic applications on all models (except the MF 9S.425).

It features a 10% larger, 660-litre fuel tank as well as a 68-litre AdBlue tank. The engine is also designed to run on HVO fuel, to provide more sustainable operations.

JCB

Returning to LAMMA, JCB's stand was a dominating force, drawing in crowds with its versatile range of equipment, including its Fastrac, loaders and telehandlers.

New from the firm was the 542-100 AGRI Pro telehandler, with a 4.2t maximum lift capacity, 9.8m maximum lift height, a 173hp engine and a travel speed of 50km/h; and the 560-80 AGRI Pro, which has a 173hp engine, travel speeds of 40km/h, a maximum lift height of 7.9m and

a maximum lift capacity of 6t.

Both new machines come with JCB's AGRI Pro package, now available across the Loadall range, combining a 129kW (173hp) engine with the DualTech VT transmission, providing the 'best of both worlds' hydrostatic and powershift drive.

The all-new JCB Loadall 542-100 will complement JCB's current high-lift telehandler — the 536-95 — with a half-tonne, (or more than 16%) increase in maximum lift capacity of 4.2t.

Built with new chassis and boom designs enabling a number of performance and productivity enhancing features to be introduced, it will also lift heavier loads throughout the boom envelope and to the 9.8m maximum lift height.

In the highest-specification AGRI Pro form, the Loadall 542-100 will be significantly more powerful thanks to its 129kW (173hp) engine, and also faster, with JCB's unique 50kph DualTech VT transmission installed, designed to allow large farms and straw contractors to work more efficiently and more productively.

With its 129kW (173hp) JCB DieselMAX engine, the Loadall 560-80 AGRI Pro will become the most powerful and best equipped 6t capacity telehandler in the Loadall range.

The 560-80 is currently available to AGRI Super 97kW (130hp) specification with a four-speed JCB Powershift transmission and 160-litre/min hydraulics,

and in Agri Xtra form with 112kW (150hp) and JCB's unique DualTech-VT hydro/powershift transmission.

The new AGRI Pro version will have a 40km/h version of this transmission and 160-litre/min hydraulics — plus 15% more power and 15% more peak torque at 690Nm from the 4.8-litre JCB engine.

In addition, JCB's £100M project to produce hydrogen engines took centre stage at the show.

A team of 150 engineers is working on the pioneering initiative to develop hydrogen combustion engines — and more than 75 prototypes have already been manufactured at JCB's UK engine plant.

Visitors to the show saw the wraps come off the brand-new JCB hydrogen combustion engine — the company's zero-carbon emissions solution for agricultural and construction equipment.

Prototype JCB hydrogen engines are already powering Loadall telescopic handler and backhoe loader machines. JCB has also made a breakthrough in proving the wider appeal of hydrogen combustion technology by installing hydrogen engines into a 7.5t Mercedes truck and a Mercedes Sprinter van.



Launched at Agritechnica in November, Massey Ferguson's 9S tractor had its UK launch at LAMMA.

Bednar

Another first for LAMMA 2024 is the Bednar DIRECTO NO 6000. The drill is specifically designed for direct seeding of various crops into uncultivated soil, stubble fields, catch crops or heavy and rocky soils. Equipped with a 5000-litre

double chamber pressurised hopper, if combined with the optional Alfa drill 400 seeding unit, the drill can plant up to three types of seed in one pass. Fertiliser can also be applied during seeding with unique fertiliser discs.

Seeding coulters are set in two rows ▶

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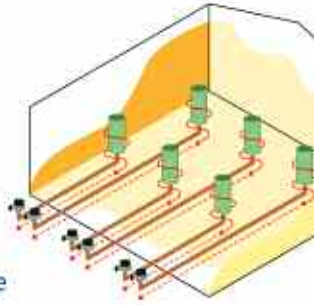
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Returning to LAMMA, JCB's stand was a dominating force, drawing in crowds with its versatile range of equipment, including its Fastrac, loaders and telehandlers.

▶ with an inter-row distance of 16.7cm, with a minimum sowing depth of 2cm and have a down pressure of 250kg each.

improved engine power and an 11% larger fuel tank.

Case IH

CPM first saw Case IH's new Quadtrac 715 AFS Connect in Austria last year, and it cut no less of an impressive figure at LAMMA where it made its UK debut. A dominant presence on the stand, the 715 is Case IH's most powerful production tractor, and is also the most powerful tracked tractor in the industry, featuring an upgraded cab, longer heavy-duty tracks and more fuel capacity.

The machine has a FPT Cursor 16 engine, which delivers up to 778hp at maximum power. Together with increased torque (+6%),

Ecorobotix

The Ara Ultra-High Precision Smart Sprayer by Ecorobotix brought its UHP-Spray-Technology and AI-driven Plant-by-Plant software to LAMMA for visitors to see. Unlike any sprayer most are likely to have seen before, the system, which looks like three rear-mounted ground-trailing boxes, is able to scan fields swiftly, targets specific crops or weeds and delivers a precise 6x6cm spray while minimising drift.

Initially focusing on herbicides in vegetable fields, it boasts boosted yields, aims to slash chemicals by up to 95% and reduces manual labour.



New Holland's new flagship combine the CR11, features a 775hp C16 engine, two 61cm rotors, a 20,000-litre grain tank and a 210litre/sec unload rate.

Ecorobotic, a Swiss B Corp wants to transform agriculture by minimising chemical usage and preserving biodiversity.

Grange Machinery

Grange Machinery returned to LAMMA with new updates to its Strip-Till Preparator, including a new 6m version. The machine has been designed for farmers wanting to accurately establish maize, oilseed rape and sugar beet. It has three independent rows of cultivated discs that are hydraulically adjusted while working with the firm's LD tine and point to help create the ideal cultivated row.

The updated machine had wider working widths and can now be specified with 0.45m, 0.5m, 0.75m or 0.8m row spacings, with either shear bolt or hydraulic auto reset leg protection. Other options include the application of granular or liquid fertiliser down the low disturbance tine.

Knight Farm Machinery

New from Knight was its 24 series self-propelled sprayers. Launched at LAMMA, the series includes four models with 3500-6000-litre capacities, 175-300hp six-cylinder Perkins engines and new

MAXimizer Pro circulation systems. In addition, these come with upgraded software for boom height, hillside correction, air suspension, steering, and diagnostics.

In addition, active rinse is now optional on all Knight sprayers. The company's Active Rinse system automates clean water management to eliminate spray solution where it's not required and actively cleans the plumbing when not in use. The technology ensures lines are always left clean when not spraying, minimising product leakage and waste, and the chance of cross contamination.

Models across the Knight's mounted, trailed and self-propelled sprayer ranges are also now available with MAXimizer PRO fluid control, which enables the sprayer's low volume plumbing to be primed before spraying begins for full circulation, automatic agitation and instant nozzle response/switching. The system also means clean water line purging is similarly instant.

Kubota

Kubota has expanded into the materials handling sector with the launch of its first compact telehandler. The KTH4815-2



Another first for LAMMA 2024 is the Bednar DIRECTO NO 6000 which has been specifically designed for direct seeding of various crops.

compact machine boasts an overall width of 1.6m and a height of below 2m, a maximum lift height of 4.8m and a maximum lift capacity of 1.5t, depending on the variant. Hose burst check-valves and a load-moment sensor with forward over-turn protection meeting EN15000 certification, are also part of the standard specification.

Four versions of the KTH4815-2 telehandler are available; two are canopy-equipped models with a curved front screen, and two use fully glazed ▶

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Valtra's new flagship sixth generation S Series - dubbed 'The Boss' by the firm - is its most powerful tractor, featuring an 8.1-litre AGCO Power engine.



Kubota has expanded into materials handling sector with the launch of its first compact telehandler, the KTH4815-2.

► cabs with a two-piece door — the glazed upper section can be secured in the open position. The entry-level KTH4815-2 is supplied without a 170kg rear counterweight and is shod on 10/75x15.3 narrow tyres, reducing both its cost and performance. A wider, 31/15.5-15 skid steer tyre option is available.

Merlo

Merlo showcased two new compact telehandlers at the show, including the Turbofarmer 30.7 and the 27.6.

The Turbofarmer 30.7 is specially designed to meet the demands of those working in confined spaces such as a traditional farm setting. Measuring at just 2m wide and 2.10m high, the TF30.7 can be lowered further still to 1.9m with the low cab option.

The TF27.6 has a lift capacity of 2.7 tonnes with a 6m reach and measures 2.2m tall and 1.9m wide. Equipped with a

new triggerless capacitive multifunction ergonomic joystick, these new models can also be fitted as option with Merlo's Adaptive Stability Control System (ASCS) which offers an in-cab LCD display with attachment recognition and weighing system.

New Holland

New Holland's new flagship combine, the CR11 made its UK debut at LAMMA having scooped several awards at Agritechnica 2023 where it was previewed. As the brand's highest capacity combine yet, the CR11 offers the top levels of productivity, at the lowest grain crackage as well as delivering greater throughputs, grain loss reduction, and more automation.

The CR11 features a 775hp C16 engine, two 61cm rotors, a 20,000-litre grain tank and a 210-litre/sec unload rate. The new Twin Clean cleaning shoe comes with two cleaning systems behind each other, with two upper sieves, two lower sieves, two clean grain augers and two sets of pressure sensors to measure cleaning shoe load.

Standen

Standen showcased a range of machinery, including its SR200 Planter as well as specialist machinery from Ferrari and MOM at the show.

The Standen SR200 planter, an easy to set-up, two row cup potato planter includes a new cup design that's capable of handling longer and larger seed.

The Standen planter offers a high work rate, achieving fast forward speeds of up to 10km/h. The updated in-cab touch screen controls operate the hydraulic space selector to give high levels of control over seed spacing and ensure accurate planting. The new stainless steel hood design with automatic hydraulic pressure adjustment is designed to form ideal ridges even at high forward speeds.

From Ferrari Growtech the firm's stand included the Futura Automatic Planter and the Remoweed Inter-row and plant hoe.

The Futura Planter can work with vegetables stored in trays of different sizes and materials and only requires one operator to feed the transplanter robots with trays. The machine can be adapted to the tray selected by the user so there's no requirement to use a specific tray to run FUTURA.

Ferrari Remoweed can remove weeds both between the rows and between the plants on the same row. The machine can scan and remove the weeds found

along the width of its frame while moving forward and this can be completed in one single pass, reducing labour costs and chemical usage.

New to the Standen Imports business was a MOM Strip Hawk Telescopic Strip-Till with liquid kit and separate unit. Strip Hawk Strip-Till concentrates the ploughing, weeding, fertilisation and harrowing operations in a single pass. The soil between the strips isn't worked and remains covered by crop residue helping to benefit soil structure.

Valtra

It turns out that Valtra has tapped into the magpie inside everyone judging by the plethora of shiny and colourful plumage on display at its LAMMA stand with the crowds craning for a better view.

But it's not just a bright exterior that the firm brought with it, also on display was its new flagship sixth generation S Series. Designed and made in Finland this machine has been dubbed 'The Boss' by the firm. Valtra's most powerful tractor, it's been designed for those demanding responsive torque, efficiency, reliability and low total cost of ownership. The new S Series comes with all the smart farming features for enhanced autonomy and increased profitability.

The S Series features an 8.1-litre AGCO Power engine and a continuously variable ML260 transmission, with the largest model, the S416 providing up to 420hp and 1750Nm of torque, while the S286 offers 280hp and 1250Nm of torque. ■



Both JCB and Kubota showcased their new hydrogen engines at this year's LAMMA as the industry continues to explore alternative fuels.



Ploughing min-till

Shallow approach

Typically regarded as deep working tools, ploughs can have a part to play in min-till, if specifically designed to operate shallowly. That's the message from two manufacturers when setting out the case for their implements to *CPM*.

By Martin Rickatson

Wide-working, shallow-operating, high-speed, and with a low power requirement — not words usually associated with a plough. Yet speak to the small number of companies who have developed specific shallow-working designs, and they'll point to a number of reasons why these are all characteristics of their implements and thus why they're suited to minimum tillage, particularly on thin soils.

Kverneland was a pioneer in the sector, introducing its Ecomat shallow plough in 2001 following development during the 1990s. Initial uptake, however, was steady rather than spectacular, says the company's plough specialist, Adam Burt.

"If you're growing combinable crops on shallow soils, ploughing down at 200-250mm/8-10in may be unnecessary if

the soil structure is good," he suggests.

"There are farmers on thin ground in particular who may be finding that min-till cultivators aren't burying weed seeds sufficiently, and who want to return to inversion but without the full depth of a traditional plough and its bodies," says Adam.

Speedy turnaround

In addition, he says shallow ploughing also suits some farms with vegetable crops in the rotation who want a quick turnaround after harvest. "Topping and mulching material ahead of an Ecomat pass can provide good incorporation of post-harvest vegetable matter into the top few inches where it can break down more rapidly.

"In many post-cereal cases, a depth of 125-150mm/5-6in is perfectly sufficient for inversion and burial of weed seeds. So for a number of years we worked on a plough and body design that would make this easy and initially launched the Ecomat as a six- to eight-furrow model designed for operating at 15-18cm/6-7in, with the tractor running in the furrow," he explains.

"But tyre technology was evolving rapidly at that time, and while we sold a handful of these in-furrow units, as tractors and tyres got bigger it was a struggle for the latter to fit into the furrow bottom."

In early 2023, the company addressed the issue with the launch of an on-land version of the Ecomat, making tyre size not just less of an issue, but also a distinct advantage in that the furrow bottom isn't compacted.

Operating on-land, compaction can be

“Increasing numbers of farmers who've been min-tilling for a while and are facing grassweed issues are considering the concept.”

managed by using tractors with much wider tyres using lower pressures than those typically used in-furrow. Like the ▶



Shallow ploughing can particularly suit thin soils and situations where other forms of min-till leave too much unburied residue, says Adam Burt.

Ploughing min-till



Nick Clark says initial UK interest in shallow ploughs came from the organic sector, but fuel costs and diminishing herbicide options means conventional growers are looking too.

► in-furrow version, it's a fully-mounted unit despite its eight- or ten-furrow configuration, made possible by the smaller, closer-spaced mouldboards with 65cm point-to-point clearance.

For on-road travel, Kverneland incorporates its Trailer Transport Solution, a design whereby the top link is detached for transport and the plough then pivots behind the headstock to allow the plough, supported at the rear by the depth/transport wheel, to be trailed and to track true behind the tractor.

"The principle remains the same," says Adam. "The design is a blend of plough and cultivator, turning over the soil surface without working as deeply as a traditional plough. With shallow bodies pulled at high speed — up to 10km/hr — the Ecomat inverts the top few cm of soil to provide effective mechanical weed control. The faster you travel, the better the results tend to be," he explains.

Because the bodies are smaller and shallow-working, Adam says there's less

pressure on the bodies and the Ecomat requires less power per furrow to pull than a traditional plough, with the sort of 250hp tractor common today on many mid-large arable units being sufficient for a 10-furrow model.

Requirements

"While that model weighs only 2400kg, tractor lift capacity has to be at least 7600kg because of the length of the plough — it uses the same 7m beam and frame as our 7f mounted LO reversible. That's well within the capabilities of most 250hp tractors, though.

"And with a lighter plough working at a shallower depth, it's possible to operate at around 10km/hr. Covering 4.1m in every pass, this means the 10-furrow model can turn over as much as 4ha/hr depending on factors such as field size and condition," says Adam.

"The latest version can work down to 18cm where required, but as shallowly as 6cm with similar standards of inversion. And shallow, high speed, low draft operation means high workrates per hour and per litre of diesel. Correctly adjusted for the conditions, it's possible to achieve 95% inversion at a depth of 9cm, achieving far better results than a one-pass cultivator."

Shallow ploughing works particularly well on thin and light soils, suggests Adam, and short plastic bodies make ideal fitments in such conditions, he says.

"They also contribute further to the low weight of the Ecomat in relation to the width it can cover with each pass. With furrow width mechanically adjustable from 30-50cm/12-20in, working widths from 3-5m are possible depending on the number of plough bodies and the furrow width selected."

The latest Ecomat updates have been

designed to improve the implement's ability to handle higher levels of trash, says Adam. Where point-to-point clearance was previously 55cm, this has been extended to 65cm to improve performance in trashy conditions.

"Underbeam clearance has been extended from 70cm to 80cm for the same reason. The bodies fitted remain unchanged though, being the short, twisted Ecomat type that ensures full inversion of the furrow slice with no requirement for skimmers. They can be supplied either in steel or, for sticky soils, plastic."

The company has also reintroduced an Ecomat model for in-furrow use. Available in six-, seven- and eight-furrow versions, like other Ecomat ploughs it's equipped with hydraulic vari-width, allowing furrow widths to be adjusted from 25-45cm/10-18in. Auto-reset leg protection is provided by six springs, with the option of an HD spring pack for tougher conditions. Further options include Kverneland's integral Packomat press and the TTS trailer transport solution.

"This isn't a big market yet, but Ecomat sales are increasing with the introduction of the on-land models," says Adam.

"But increasing numbers of farmers who've been min-tilling for a while and are facing grassweed issues are considering the concept — even among those who are not fans of ploughing. That's the key, though — the Ecomat is more a full-inversion shallow-working cultivator than a plough," he comments.

French farmers are particularly keen on the concept of shallow ploughs and domestic manufacturers such as Bugnot sell considerable numbers in the country. The firm's Rapid Lab is an on-land reversible available in 6- to 12-furrow versions, equipped with 13in/33.3cm bodies to provide working widths of 2.0-4.0m.

Former importer Ryetec, however, found fewer buyers in the UK and now focuses on non-inversion implements such as its Restorer low-disturbance subsoiler. Spanish firm Ovlac, though, has had more success since setting up its own UK operation in the early 2010s. While regular ploughs were its initial focus, Nick Clark, the firm's UK sales manager, says its shallow plough designs are attracting growing interest.

"While the number of units we've sold over the past two years is just into double figures, a growing number of farmers are requesting demonstrations. Ovlac has offered shallow ploughs since 2003, and ►



Kverneland recently reintroduced an in-furrow Ecomat model, complementing the on-land version shown in the article's lead photo.

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Ploughing min-till



Reducing ploughing depth directly correlates to reduced power requirement and fuel use, so that halving the first cuts the latter two by 50% apiece, points out Ovlac.



Ovlac's Eco Plus short bodies work at 8cm/3.5in to 25cm/10in, producing sufficient inversion to completely turn the soil and bury trash and weed seeds.

► has sold thousands of units across mainland Europe, working in a wide variety of circumstances and applications," he says.

While initial UK interest came from the organic sector with farmers seeking a rapid seedbed creation and weed

suppression tool, issues across crop production types concerning the cost of fuel, a diminishing armoury of weed control options and the growing emphasis on locking up carbon in the soil have all helped to develop interest in shallow ploughing, says Nick.



The shallow working depth of the plough promotes the development of cavities where air and water properly decompose the straw that's been mixed with the soil particles, claims Ovlac.

"That's led to a growing number of enquiries and requests for demonstrations. Many have come from vegetable growers, who require a clean seedbed ahead of precision drilling, and often have a lot of material to incorporate after harvest, but the weed control and soil benefits work well whatever the cropping."

Reaping benefits

Like Kverneland, Ovlac points to the fact that reduced working depth of 8cm/3.5in to 25cm/10in produces sufficient inversion to completely turn the soil and bury trash and weed seeds across large working widths, but at far higher workrates than a standard plough.

The firm's Mini-N is available in sizes of from 5 up to 9+2 furrows, working on-land and covering 1.92-4.22m in each pass at 38.3cm per furrow. Power requirements ranges from 85-105hp for the smallest models up to 190-220hp for the largest, which weigh 2.0-2.5t depending on specification. Point-to-point clearance is 66cm and underbeam clearance 70cm. Shearbolt models weigh from 1,200kg up to 2,195kg.

The Mini-N range incorporates three main frame designs — the N-5, N-7 and N-9 — each of which can be extended with one or two additional bolt-on bodies. The five-furrow frame is equipped with a 120 series headstock with 110mm diameter shaft, while the seven- and nine-furrow frames are fitted an oversized 150 series headstock with a solid 140mm diameter shaft.

Ovlac suggests the shallow working depth of the ploughs promotes the development of cavities where air and water properly decompose the straw that's been mixed with the soil particles, mineralizing the organic matter to increase natural soil fertility and structure, and therefore yield potential. The mouldboards' action breaks the soil capillarity, helping minimise moisture loss from the deeper soil profile, which is especially beneficial during dry periods, says the company.

Reducing ploughing depth directly correlates to reduced power requirement and fuel use, so that halving the first cuts the latter two by 50% apiece, points out Ovlac. It suggests this means that up to 40% more width can be covered in each pass than with a traditional plough behind the same size tractor, translating to the breadth of a comparable min-till cultivator, but benefiting from full inversion yet at a

typical cultivator forward speed.

Available with either shearbolt protection or hydraulic auto-reset, the latter allows trip pressure to be varied according to ground hardness, also helping to avoid bringing up stones from lower in the profile into the surface soil. As with all the firm's shallow ploughs, the Mini-N is fitted with Ovlac's Eco Plus body with 8mm mouldboards and forged shares.

Standard specification includes Ovlac's oscillating drawbar, designed to provide automatic self-alignment by allowing the plough to move freely by +10° to -10° around a central pivoting point in the cross shaft, thereby finding a natural balance between the side pressure exerted on the mouldboards and the landsides.

The company suggests this makes it far easier to ensure the tractor, working fully on-land, doesn't have to fight the plough forces to keep the implement straight — in essence the process is automated, making work easier on the operator.

Adaptable

First furrow width adjustment is mechanical or, optionally, hydraulic, and once set at the desired point according to the tractor width it can be varied any time to move the plough closer to or further away from the furrow wall where conditions such as hilly land require it.

The company also offers the Mini-S, a larger semi-mounted version of the Mini-N suited to tractors of 300hp-plus. Using the same format as a traditional on-land semi-mounted plough, it's available in 12- or 13-furrow versions, making it possible to cover up to 5m in each pass. Working at an average 8km/hr, this allows workrates of 3ha/hr, translating to 30-35ha in a typical working day, suggests Ovlac. It's offered with the same furrow protection option.

To ease turnover of the longer plough, the Mini S features an articulation at the front which folds in the front bodies. This reduces the turnover radius thereby reducing the load imposed on both the tractor linkage and the plough headstock when reversing the bodies, says Ovlac.

"There's growing interest in both types as farmers look at the advantages offered by shallow ploughing in inverting surface soil and mixing residue without burying it at depth," says Nick.

"With continued pressure both on herbicides and on fuel prices, I think we're likely to see more demand for shallow plough demonstrations over the coming year," he concludes. ■



Nick Clark says he anticipates demand will increase for shallow plough demonstrations during the next year.

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talkingtaties

by Andrew Wilson

What a winter, eh?

It seems a long time since the excellent BP2023 show at Harrogate in November and similarly superb CUPGRA conference in December.

Sugar beet is currently a chew on with low sugar content and high dirt tares. We still have a few spuds to lift, storage is an expensive challenge, actives keep dropping out of the armoury, weather extremes are hitting yields while cost and risk escalates. We have some flooded off winter cereals, low germination and unacceptably low vigour on some farm-saved spring barley seed, and for all forward grain prices are in the doldrums, spring seed prices are reaching for the stars!

So, what to do? New machinery price escalations are beyond ridiculous, interest rates keep climbing and risk versus reward seems to get ever further out of kilter. You could be forgiven for saying enough is enough, lets plant some bird food and put our feet up.

But is that wise? Why do the government keep putting SFI rates up? I doubt its sympathy for farmers mourning the loss of the BPS cheque. How much winter

bird food do we require and what will be the consequence of lots more birds? More mucky windscreens? Too many corvids? Yet more predators for the remaining cereal crops? More poachers?

The volatility during the past three years couldn't have been predicted and there's likely to be a General Election within the next three. Should we lay staff off? Sell kit? Go wall-to-wall SFI and become a park keeper? How will we spend our time that we used to spend farming? What happens in three years' time? What happens to potato land availability in the meantime?

I might be grey, grumpy, and cynical, but no one does owt for nowt; our data has never been so harvested. If governments and large corporations control the food and fuel supply, they control the people. Do we want that? Can the country afford not to feed its people? Of course it can't.

Smaller businesses are casualties to corporates on a daily basis and farmers are no different, be it non farming money out bidding for land, solar corporates planting plastic panels where food once grew, or the ever-increasing amount of land disappearing under concrete. It's not good.

The most maddening element to me is that of water management — practical logic seems to be harder to find the higher one climbs the power tree at the Environment Agency. The IDB's of the country generally do an excellent job of maintaining drainage channels but are let down badly by that organisation

that used to be called the National Rivers Authority.

You can't maintain the effectiveness of anything via neglect. Regular river maintenance retains capacity and reduces flooding — slow the flow in the hills and increase it as it gets nearer to the sea. I'm preaching to the converted, but it's really not complicated. If you don't remove the teabag from your pot on a morning, by the end of the week you'll either be thirsty or have a wet table!

The destruction to homes, businesses, wildlife, infrastructure, and food supply is becoming monumental — one can't help thinking about a recent television programme about an ivory tower at a corporation that runs a lot of little red vans...

The practical logic of winter-filled reservoirs for use in the summer to irrigate crops grown to feed people seems to be a long way down the agenda of the powers that be, despite the obvious secondary advantage of downstream flood reduction.

So what do I think? Bray on rewardless? Not exactly. Twenty two years ago wheat was £60/t. 2012 was the wettest year in a very long time, 2010 the coldest. The 1980's saw interest rates at least double those of today. The mid 90's were tremendously profitable.

Forever, farmers have adapted to whatever challenge arises; that won't change. There'll always be a seed time and a harvest, and we all have to eat. Short term politics is exactly that — nothing lasts very long because the target of those in power is always to stay in power first and

Andrew Wilson is a fourth-generation tenant of the Castle Howard Estate in North Yorkshire.

He has a strategic approach to direct drilling on his varied soil types and grows a wide variety of crops. He's passionate about the potato industry and having been utilising cover crops to reduce cultivation and chemical use since 2011, dipped his toe in the water of regenerative potatoes in 2021.

@SpudSlingsby

do what's right second.

We're now growing half the spuds we were at our peak in 2017 and are better off for it — physically, mentally and financially. Beet is getting more scrutiny after being a solid performer for 30 years, but it remains for now. We keep tweaking the combinables too. Livestock bring balance (and muck!).

Stewardship will also remain at Brickyard farm as it has for nearly thirty years — strategically placed and where practically useful, whatever trendy acronym it might be known as. A wise man offered his advice to me 25 years ago on a YFC farm walk: 'Do what you do best and do it better'. Another now departed gentleman told me as a teenager: 'Don't worry about what you can't control — and that's most things.' Good advice I reckon.

Dad would have said: 'It be right, crack on,' like he always did. So that's what we'll do, albeit with a few tweaks.

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“Without doubt, mancozeb will be missed.”

As one door prepares to close...

Mancozeb

After much uncertainty, the HSE finally announced last month that mancozeb doesn't meet approval criteria and therefore it proposes to withdraw it from use. *CPM* asks whether the industry is prepared for the impending loss and what can fill the gap.

By Janine Adamson

It's not been an over-night activity, in fact the Health & Safety Executive (HSE) first kicked off the review of mancozeb back in September 2021. However, it's finally been announced that the active poses a threat to human health, with operator exposure deemed at a level beyond safe.

This means that mancozeb is to be withdrawn at the end of the 2025 season, marking the conclusion of a multi-site fungicide which has helped to control potato late blight since its introduction more than 60 years ago.

At the time of writing, timelines for the sale and disposal of mancozeb-containing products were still to be announced by DEFRA, but based on documents published by the World Trade Organization (WTO), the body to which notification must be issued, the following dates appear likely:

- Active substance expiry to be extended to 30 April 2024
- Sale and supply of mancozeb-containing products to end on 31 October 2024

- Storage, disposal and use of mancozeb-containing products to end on 31 October 2025

The HSE's decision was made based on evidence for continuing the approval of mancozeb, including supporting data submitted by UPL and Indofil Industries.

Planning ahead

UPL's Geoff Hailstone says growers should plan their purchases and usage accordingly to avoid disruptions to planned blight programmes. He stresses that these are proposed timelines which can only be finalised at the end of the WTO consultation process, which should be by early spring.

"The WTO consultation process involves discussions with member countries and stakeholders, and their feedback could potentially influence the final decision on the withdrawal timelines," he says.

Assuming the proposed withdrawal timelines are ratified, Geoff shares that UPL plans to have Nautille DG (cymoxanil+ mancozeb) and Manzate 75 WG (mancozeb) available this year.

"We're planning our production for mancozeb based on it being approved for sale this season. The industry is coming off the back of a high-pressure year with increasing concerns regarding resistance pressure. With mancozeb being the only multi-site approved, it's used multiple times in a programme so it's difficult to ascertain what a typical season is," he says.

"I'd encourage growers and advisors to speak to their suppliers to let them know what they expect to require. This information greatly helps with production planning."

Indeed, the loss of mancozeb has several implications for crop protection

strategies, says Nick Winmill, Agrii's head of potato R&D.

"Without doubt, mancozeb will be missed. As the only fungicide with multi-site activity it's the best mix partner we have available, it's relatively inexpensive to incorporate in a programme, and provides incidental control of *Alternaria* species. The same can't be said of any of the alternatives," he says.

Since the EU called time on mancozeb in 2020, Agrii trials have been considering possible replacements. This was permitted because of a loophole when the regulatory authority changed at the end of the Brexit transition period, meaning mancozeb was given a temporary reprieve while the HSE's Chemicals Regulation Division (CRD) reviewed the data.

Nick says while none of the products trialled can be considered a like-for-like replacement, several have shown promise. "The principal observation is that programmes will have to be adapted, but ▶



Geoff Hailstone says growers should plan their purchases and usage accordingly to avoid disruptions to planned blight programmes.



Programmes will have to be adapted, but they're likely to be more complex and costly as a result, says Nick Winmill.

► they are also likely to be more complex and costly as a result," he warns.

Yorkshire farmer and *CPM* columnist,

Andrew Wilson, agrees on the usefulness of the active. "Personally, I think losing mancozeb is more serious than it perhaps first appears. Soley for late blight it's no longer a front-line product, but it's vital as the last remaining multi-site, a tremendously useful partner product, and instrumental in reducing *Alternaria* and rhizoctonia pressure," he says.

"Invariably risk and cost will both increase to the grower. Mancozeb has been around for a long time, one does wonder what's instigating these decisions and indeed, 'what's next?'"

Where *Alternaria* is a concern, growers can apply Narita (difenoconazole), Amistar (azoxystrobin), Signum (boscalid+ pyraclostrobin) or Caligula (fluopyram+ prothioconazole), although Nick says these products vary in the level of control.

Across continental Europe, isolates showing reduced sensitivity to fungicides belonging to the Quinone outside Inhibitor (QoI) mode of action group — namely pyraclostrobin and azoxystrobin — are widespread. In recent years, isolates with reduced sensitivity to some SDHI active substances, namely boscalid, have also been detected.

Nick says of the active substances considered in Agrii trials as a replacement for mancozeb against late blight, two have shown value. He advises that potassium phosphonates has shown good levels of control but is currently only available as a co-form with ametoctradin and is limited to three applications per crop.

"We've looked at two potassium phosphonates-containing products over several seasons. Only one has delivered the high-level protection expected and isn't currently authorised for use, but we're prepared to submit an application for emergency authorisation if other avenues fail," he says.

Health promoting products

The other product to have shown promise is Innocul8, a foliar fertiliser containing PREtec technology — a form of peptides derived from naturally occurring proteins that elicits a response against crop threats. Nick explains that trial data supports its place in a programme, but as a plant health promoter, it can't be considered as a replacement for mancozeb.

"Biological crop protection products and better nutrition will have a greater role to play in helping to reduce the damage caused by disease, but while these may serve to reduce the amount of fungicides required, they're not a replacement. Innocul8 is one example of how these products can be useful but they have to be seen as part of a wider IPM strategy which considers variety choice and better plant health," he says.

And while mancozeb remains available and is approved by processors or end-users, Nick stresses it makes sense to continue using it given its acknowledged value to crop protection programmes.

"We also have to be mindful of maintaining a balanced programme that considers the spread of resistant strains. It may be that the CAA-resistant strain 43_A1 has already spread to GB, but mancozeb has helped to keep it at bay. It would be premature to remove it from a programme while it remains authorised for use," he says.

Geoff agrees that developments on the continent ring alarm bells for the UK. He advises growers to continue to adhere to

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FRAC guidance — mix products with different modes of action in the same application and alternate mixes within the programme.

“Without mancozeb, products like Proxanil (cymoxanil+ propamocarb) would become even more important. The two actives have no reported resistance issues; they’re both from different chemistry groups

and are the only members of those groups.

“Cymoxanil is known to be one of the few actives with kickback activity and has a very low risk of developing resistance. Whereas propamocarb has strong anti-sporulant activity, good movement in the plant and is only active in the carbamate resistance group,” he concludes. ■

Mix partner conundrum

The loss of mancozeb will be a blow to the potato industry, not only for its ability to control both late and early blight, but also for its ability to protect the remaining single-site chemistry from resistance, says Syngenta’s Andy Cunningham.

“With the threat of new fungicide-resistant strains in Europe, mancozeb was one of the potential partners we’d advocate to mix with Revus (mandipropamid), and that will remain the case until mancozeb is eventually lost.”

Recognising the threat on the horizon, trials conducted in 2023 across the UK, Denmark and the Netherlands, explored mixing Revus with actives such as fluazinam, amisulbrom, cyazofamid, propamocarb and ametoctradin.

Furthermore, Andy says Syngenta is preparing to launch a new product in 2024 — Evagio Plus (mandipropamid+ amisulbrom). “This should be perfectly positioned to protect mandipropamid, the active ingredient in Revus, from the selection pressure of near and far future problematic blight strains.

“However, it’s important to recognise that these new problematic strains haven’t been found in mainland UK yet,” stresses Andy. “This is why the work conducted by the James Hutton Institute’s ‘Fight Against Blight’ programme is so important, to ensure the industry is aware as-and-when such issues arise.”



Andy Cunningham says with the threat of new fungicide-resistant strains in Europe, mancozeb was one of the potential partners to mix with Revus (mandipropamid).

Despite proactive trials taking place in anticipation of mancozeb’s demise, Andy thinks that the can has been kicked down the road for a while. “Everyone knew it was likely to happen, but I for one, naively always hoped that Brexit would work in our favour and that we wouldn’t lose it.

“However, varieties should and probably will be a major tool to keep blight at bay, with the caveat of resistant genes that makes some varieties less susceptible than others. Newer blight strains are becoming more aggressive and more virulent at overcoming R-genes, so for now, fungicides will inevitably be part of the IPM plan to control blight,” he concludes.

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Potato storage

Storage stalwart

Is there much more left to say on potato storage and life after CIPC? *CPM* speaks to recent industry award winner, Adrian Cunnington, to find out his thoughts on what could happen next.

By Janine Adamson

It's important to give credit where it's due, even if the recipient is a little coy about accepting the compliment. However, for those in the know, it'll come as no shock that Adrian Cunnington found his recent award presentation a little surprising.

He was bestowed the British Potato Industry Award — regarded as the *crème-de-la-crème* of accolades — acknowledgment of an outstanding contribution to the potato sector and a lifetime's achievement. Previous winners include Gordon Smillie, Ian Toth and David Firman.

According to Adrian, receiving such a commendation was much welcomed, but wholly unexpected. For one, he's an expert in the world of potato storage, a topic which he admits is rare to hit the mainstream headlines.

But one occasion in which it did attract wider attention was following the loss of

chlorpropham (CIPC) in 2020. Reflecting back, he says although there have been some unsteady moments within storage circles since, on the whole, great progress has been made.

"A lot of change took place in a short space of time but the main challenge was how to control potato sprouting in-store with a nearly new toolbox."

Change in approach

"Although maleic hydrazide wasn't new, it found itself under the spotlight — within months we went from around 20% of UK potatoes being treated with MH to 70%," he explains. "Whereas for other options such as the oils [spearmint and orange], it's taken around three years to understand their use, either alone or in combination for sprout control on processing crops. Really, we've been learning on the job."

For growers as well as industry experts, Adrian believes it's been a steady learning curve which can undoubtedly prove daunting. However, he says there was no choice but to find a way forward. "Sadly, there have been some casualties along the way, but on the whole it's a positive story."

With new options on the table including 1,4-Dimethylnaphthalene (DMN), Adrian says the 'big players' have since established clear preferences which could have an impact when it comes to switching contracts or end markets.

"McCain has aligned with ethylene which of all the options, is most unique in

“Short-term wobbles and changes in the landscape don't undermine the requirement for a year-round supply of potatoes.”

its management. This is because it appears to affect fry colour, so requires additional action during processing. ▶



Adrian Cunnington was recently presented with the British Potato Industry Award in recognition of his outstanding contribution to the sector.

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Following the loss of CIPC, the industry had to find means of controlling potato sprouting in-store with a nearly new toolbox.

► PepsiCo and Lamb Weston have opted for a combination of DMN and oils.

"Importantly, all processors seem to support the importance of MH in offering baseline residual control," he says.

And Adrian finds himself at the centre of such discussions mainly because he offers a wealth of experience on the topic — more than 30 years of dedication in fact. During this time he headed AHDB's Sutton Bridge Crop Storage Research centre, a facility which many mourned the loss of following its closure in 2021.

He's also been, and remains, involved in a wide range of industry activities from R&D to on-farm troubleshooting; he even authored the potato store manager's

guide. So, with that in mind, many would argue his voice should cut through when it comes to the future of potato storage.

"It might sound a little political, but a lot of time has been spent supporting growers and their stores yet it's apparent that margins during the past 5-10 years simply don't support investment in new facilities."

Rising costs

"Stores are ageing and past their sell-by-date which makes it difficult to achieve market quality at an affordable price. Running costs have escalated — new products cost £3-5/t more than CIPC. Storage costs in total are now £10-15/t more than in 2015," stresses Adrian, who now runs his own consultancy under the name Potato Storage Insight.

As stores degrade and become unfit for purpose, he believes rather than be replaced, they'll cease to exist all together. "To put it bluntly, the whole industry is in a depression and we have to get out of it to avoid even more growers abandoning potatoes.

"Then it becomes a food security issue. Short-term wobbles and changes in the landscape don't undermine the requirement for a year-round supply of potatoes," he says.

So, is there a solution? For Adrian, a start would be the provision of small capital grants which 'pump prime' and encourage investment in storage

infrastructure. Then, it comes down to demonstrating further support of those striving to fill the gap left behind by AHDB potatoes.

"We don't have the same core representation across the industry which we did have. Many individuals, companies and voluntary bodies, such as GB Potatoes, are coming together to address this which will hopefully solidify as time progresses."

Bringing it back to his core expertise, which is technical potato storage insight, Adrian believes there remains scope to progress.

"Technically, we have to keep working on more dormant varieties which can be stored at higher temperatures to reduce the electricity burden. Plus there's huge opportunity within novel storage management techniques and agri-tech.

"At the moment, the way stores are managed is quite naïve when you compare it with other areas of crop production; we don't always do things in the smartest of ways. Instead, energy and inputs have to be conserved for something that'll be effective," explains Adrian.

"A prime example is precision treatment — what an opportunity? But of course this cycles back to the issue of cash-flow and investment. The development and subsequent roll-out of such solutions comes at a cost and where will that come from?" he questions, to conclude. ■

CIPC Residues Monitoring Group

Adrian Cunnington has recently been named as the independent chair of the new CIPC Residues Monitoring Group (CRMG) — a cross-industry body which has been set up by the UK potato industry.

Its remit is to satisfy the data submission requirements of the Health & Safety Executive's Chemical Regulation Division (CRD), for measurement of CIPC residues in potatoes held in stores previously treated with the sprout suppressant.

This follows a decision made by the CRD to set a temporary Maximum Residue Level (tMRL) for CIPC of 0.35mg/kg from April 2024.

Adrian explains that this involves monitoring residues for the product, which is of course no longer in use in the UK. "It's vital that everyone in the industry ensures the data requested is provided so that potato stores previously treated with CIPC can continue to be used safely. If the data isn't supplied, all stores with a CIPC history are at risk of being taken out of use," he says.

CRMG has already been given pan-industry support from the following organisations who have offered to sit on the group: GB Potatoes, UK Potato Processors Association, Fresh Potato Suppliers Association, National Farmers Union, National Association of Agricultural Contractors (Postharvest Group), Certis Belchim B.V, UPL, CS Backhouse, Isle of Ely Produce, Potato Storage Insight and SA Consulting.

Now, CRMG is seeking support from growers and suppliers from all production sectors to provide residue data from compliance sampling for over 120 potato stores annually, to meet the CRD data requirement.

Growers or store managers willing to supply CIPC residue data from crops held in stores with a CIPC history (all data will be submitted anonymously), are asked to email adrian@potatostorageinsight.com or contact any CRMG group member or supply chain.

Adrian says the group will endeavour to act in the interests of the whole of the UK potato



If residue data isn't supplied, all stores with a CIPC history are at risk of being taken out of use, says Adrian Cunnington.

industry to ensure that the data submitted meets the quantitative and qualitative standards expected by CRD, with the aim of maintaining the new tMRL through its annual review process.

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Sugar beet

Sweet success

British Sugar has started a shake-up of how the sugar beet campaign is run through a new project – the Field-to-Factory Partnership. CPM learns how the company is seeking to make harvesting and delivery of the crop more efficient and transparent.

By Will Charlton

In many ways, the UK sugar beet industry is a success story to be celebrated. Whereas other crops have plateaued, sugar beet yields have increased by an average of 2% per year for the past 30 years.

British Sugar is also one of the most efficient processors in the world, using 99% of the crop it processes through co-products such as Trident animal feeds, LimeX and Topsoil.

As growers will be acutely aware, the sugar beet campaign is the period from September to March when the crop is harvested and delivered. It can be stressful for several reasons, not least the weather and the unique extendable nature of the

campaign. Plus, the weather this winter has underlined some of the challenges facing the industry.

To confront these difficulties, British Sugar established the Field-to-Factory Partnership in February 2022 with the objective of making the sugar beet campaign work for everyone.

The project team spent the first year canvassing the industry for their views through focus groups, surveys and interviews — it was the biggest consultation exercise ever held by British Sugar and took in perspectives from growers, hauliers and other stakeholders.

Stakeholder engagement

This winter's campaign marks the beginning of the Partnership's plan to improve some of the issues the research identified. "The first thing we did was to engage with sugar beet growers, hauliers and harvesting contractors," says Nick Morris, head of agriculture — supply chain at British Sugar. "This crystallised the areas our partners would most like to improve.

"Some of the most common issues are harvesting crops at the right time, communication between growers and hauliers about when their crop will be delivered, delays in collection, and opportunities for further yield increases through improved harvesting.

"Combined with British Sugar's objective of maintaining a continuous and efficient

“This is a critical time for the sugar beet industry and although we'd like everything right the first time, we'll have to continuously tweak to get things spot on.”



Nick Morris wants to see the five projects delivered and the opportunities realised, within five years.

beet supply into its four factories throughout the campaign, these are all the things the Field-to-Factory Partnership is now designed to solve.”

The project is divided into five initiatives, of which, the firm believes adaptable campaign planning has the potential to be the most revolutionary. It aims to devise a running order for the campaign by haulage group, considering the grower's preferences for harvest date by field and optimising the route to deliver maximum efficiency for the haulage and harvesting contractors.

Bulk logistics optimisation examines how to utilise the available lorry capacity most efficiently by maximising the opportunity for backloads of co-products from the factory to farmers.

By helping harvester operators improve their skills and encouraging an open dialogue between the contractor and farmer, the team hopes to steadily improve crop recovery from harvesting. This is crucial to improving sugar beet yields further.

Finally, British Sugar plans to improve its crop yield forecasting and communications. By doing this, it hopes to give growers access to more information about the campaign's progress so they can make more timely, better-informed decisions for their farms.

Nick says before they began, they examined the other sugar businesses that parent company ABF Sugar owns globally, as well as evaluating competitors in Europe to see if there's anything that could be adopted.

“Azucarera, our sister company in Spain, has recently adopted their version of an adaptable campaign plan for growers in northern Spain. We've seen the logic they used to calculate the running order of fields, although their aims for their plan are different to ours,” explains Nick.

“On the continent, most of the processors are farmer cooperatives. They have absolute control over the harvesting and haulage of the crops destined for their factories. Everything is well structured, but growers don't have a say in when their crops are delivered.

“We run a different system in the UK and growers must maintain control of their business decisions. That's why our adaptable campaign plan pilot, that's running this campaign, started by asking the growers for their intended following crop and ideal harvest date for all of their sugar beet fields.”

Since the sugar regime reform of the mid-2000s, sugar beet has benefitted from an increasingly professional pool of growers

and contractors. Nottinghamshire farmer and contractor Ed Plowright of JP Plowright & Son is typical of this change and has seen his sugar beet business grow over time.

Ed grows more than 30,000t of sugar beet for British Sugar's Newark factory. In addition to his crop, he contract harvests another 2000ha for growers across Nottinghamshire, Lincolnshire and Rutland. To do this, Ed runs nine-row and six-row Vervaet harvesters alongside two Vervaet self-propelled chasers.

“One of my biggest issues with the sugar beet campaign in the past has been that haulage groups heavily influence us as to the order of the fields we harvest,” says Ed. “This can mean a lot of road miles and makes our operation very inefficient.

“Because of this current system, I'm also not always a fan of just-in-time harvesting. If the weather changes, it can put a lot of pressure on us to harvest when conditions are not ideal. Otherwise, hauliers and the factory will be short of beet.”

Price hikes

“In the past few years, we've had to increase our harvesting price considerably. We've had no choice — the cost of spares, diesel, labour and machinery have all increased. The machinery financing cost has recently gone through the roof. If we can make our operation more efficient, it'll help to counter some of these increases,” he says.

Having communicated these concerns to his British Sugar account manager, Ed was asked if he would try a pilot version of the adaptable campaign plan for his harvesting customers. The farmers have submitted their preferred harvest date and the following crop for each sugar beet field as a starting point. The program calculating the adaptable campaign plan has given him a running order which maximises efficiency for his operation whilst being as close as possible to his customers' expectations.

“I've been harvesting most of my customers' fields long enough to know roughly when they'll need them harvested. This season's weather makes any plan difficult. At the moment, I'm going anywhere the conditions allow.

“In this situation, the adaptable campaign plan will be challenged, but you have to give these things a go and get behind them 100%. It'll be a lot easier in a more typical season,” adds Ed.

However, he's optimistic about more in-season harvester evaluations and opportunities for training from the harvester manufacturers. He operates one of his machines, and the other has another



Ed Plowright is trialling the adaptable campaign plan with his harvesting customers this season.

experienced driver, but he believes there are always chances to learn.

“The harvester testing is helpful, especially when I'm told the maximum potential root yield of the field I'm in at the time. It gets me thinking about what I can do to push the harvested yield as close as possible to that number,” explains Ed.

Someone who sees the other side of the campaign to Ed is Norfolk haulier and grower Jonny Wyatt of Pearn Wyatt & Son. Across the campaign, they deliver 450,000t into the Bury St Edmunds Wissington and Cantley factories, loading them with a conventional cleaner and loading shovel alongside a self-propelled (Maus) machine.

“My biggest frustration is the link between the farmer, harvesting contractor, and the haulier,” says Jonny. “There can be a lack of understanding of the haulage process and its associated risks. We just visited one customer where the loading site was under power lines; we had to make them move it before it was safe for us to transport.

“There was another recent example where the hedges weren't cut. The beet had to go through our Maus twice before getting a lorry close enough to load; all of these things lead to inefficiencies. The harvesting and ▶



According to Jonny Wyatt, the two words he uses for sugar beet are continuity and conversation.



Harvesting is a crucial area to improve sugar beet yields further because the losses can be considerable.



The sugar beet campaign relies on solid relationships between the British Sugar team, growers, harvesting contractors and hauliers.

▶ the haulage have to be brought together to make everyone's life better and more efficient.

"Despite this, sugar beet works well for our business. The factories are open 12 hours to take in beet, and our output is good as a result."

The pressure on hauliers is most acute in October and November as farmers push to harvest their sugar beet in time to sow winter wheat in the optimal window. In a typical year, British Sugar estimates that 60% of sugar beet is followed by winter wheat in the rotation.

Jonny says he can struggle to maintain

the haulier-farmer relationship when conditions are perfect for harvesting and drilling a following crop. He believes more pre-season conversations can help, although most farmers are busy with harvest in the months preceding the sugar beet campaign, and he has other businesses to run.

The adaptable campaign plan could be the ideal tool to alleviate this pressure and increase coordination between Jonny's haulage operation and the local contractors harvesting his customers' beet. However, like Ed, Jonny thinks the weather conditions of this current campaign would challenge any plan.

"In principle, it's the ideal solution, but it'll have to be able to deal with the disruption caused by bad weather. We find joining up A to B when conditions are unfavourable a real problem. I've just had a long road journey in my Maus to load fewer tonnes than I'd like because I'm chasing around to find some sugar beet that's been lifted."

Integral crop

"The two words I use for sugar beet are continuity and conversation; it's a massive part of how I run my business. I want to understand my customers from a haulier's point of view and for them to understand me. It makes life a lot easier for everyone," says Jonny.

"You require continuity to know all of the intricate parts of the job, like the gate codes or when the farm might be shooting. I also believe that the more you talk to each other, the easier life becomes. Keeping in conversation helps to develop our understanding and the relationship for the future," he adds.

Everything that goes well with the sugar beet campaign is more often than not a result of solid relationships between the British Sugar team, growers, harvesting contractors and hauliers than a system or



The factories are open for 12-hours each day to take in beet, which is commended by those involved.

process, agrees Nick. Rather than disrupt this, he intends the Field-to-Factory Partnership to create tools that they can use to build on those relationships.

"None of what we're trying to do is easy," says Nick. "If it were, it would have been done decades ago. This is a critical time for the sugar beet industry, and although we'd like to get everything right the first time, I know we'll have to continuously tweak and change to get things spot on. But by working collaboratively and continuing to listen, we should be able to accomplish what we want to do."

Nick would like to see the five initiatives that comprise the Field-to-Factory Partnership completed and their opportunities realised within three to five years.

"The outcome will be determined by how successful each initiative is. If growers, hauliers and harvesters don't feel it improves on what we already do, then we'll not continue the initiative. However, the shared ambition of continuous improvement to deliver cost and supply chain efficiency and increased satisfaction with the campaign should endure," concludes Nick.

Anyone wishing to be involved with the Field-to-Factory Partnership can contact British Sugar via their account manager who will provide further information. ■



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