In this issue...

Net Zero hero  page 82  
Making carbon capture pay

Inter-row hoes  page 70

Weed spring clean  page 40  
Dealing with the autumn aftermath

Winter beet conference  page 85
Go Liquid

The benefits of liquid fertilisers

Available with a wide range of sulphur ratios

- Fast-Acting
- Uniform Application
- Improved crop response
- Convenience
- Accurate application - even in bad weather
- Apply right up to the field margin
- Using Diflubenzuron Liquid N means full application in one pass

Call 01526 396 000  Visit www.omex.co.uk

@OMEXCompanies  OMEXCompanies
**Opinion**

4 **Talking Tilth** - A word from the editor.
6 **Smith’s Soapbox** - Views and opinions from an Essex peasant......
60 **Tech Respect** - CPM’s machinery editor surveys the search for UK Ag’s next step.
91 **Last Word** - A view from the field from CPM’s technical editor.

**Technical**

8 **Disease control - The late show**
Predicting the onset of septoria has always been a challenge.

12 **Crop Doctor - Lessons learned from late septoria surge**
How observed disease levels shaped up and what these mean for this year.

16 **Tech Talk - A thinly veiled threat**
Lurking unseen in barley crops, ramularia shows its spots late in the season.

19 **Pushing Performance - Prevention’s better than cure**
Kantor can give fungicide mixes containing folpet a performance boost.

22 **Partners in performance - Season’s options put on trial**
Beds grower Russell McKenzie has taken on-farm trials a step further.

26 **Stem-based disease survey - At the stem of the problem**
The stem-based complex can be most difficult to identify.

30 **OSR agronomy - When farming meets science**
Farmer-led groups are exploring innovative ways to boost OSR productivity.

34 **Theory to Field - The road to resistance?**
An AHDB project set out to discover the current status of fungicide OSR.

37 **Research Briefing - Feed the hidden hunger**
Getting micronutrients into a crop that’s too small to take it up.

40 **Weed control - Mind the gap**
Knowing the weaknesses of spring herbicides is important.

46 **Research Briefing - Confidence comes from a quick diagnosis**
It’s a world first and spun out of a UK blackgrass research project.

52 **Research Briefing - Fine-tuning wild oat control**
Wild oat control can sometimes be a hit and miss affair.

56 **Insiders View - Small but mighty**
KWS Parkin looks set to bring something new to the hard Group 4 portfolio.

**Machinery**

62 **Drills - Licence to drill**
Drill technology has increased rapidly over recent years.

66 **Trailers - Trail away...**
Growers can now tow more safely and efficiently than ever before.

70 **Inter-row hoes - Dance of the inter-row hoes**
Mechanical weeding options are enjoying a surge in interest.

74 **On Farm Opinion - The Sky’s no limit**
A grower in Cambs is farming with the environment in mind.

78 **Machinery Masterclass - Prepare to surrender control**
Smart technology on the latest combines brings a marked step-up in performance.

**Innovation**

82 **Climate Change Champions - The low carbon community**
The Faccombe Estate in Hants turns Net Zero into a commercial opportunity.

**Roots**

85 **BeetTech20 - Traits gain importance**
Sugar beet variety traits were in the limelight at BBRO’s technical meetings.

90 **Soils - Less is more for cultivations**
Preparing land for potato planting will be tricky given the wet winter.
Is 8p per metre enough?

I’ve been invited by the Rural Payments Agency to renew my Countryside Stewardship (CS) agreement, and I’m seriously wondering whether it’s worth the hassle.

The email dropped into my inbox in mid Feb, about a week after the window opened for farmers to apply for CS agreements that will start on 1 Jan 2021. I was one of only a few hundred farmers to take up the first of the agreements when they started to replace the Entry-Level Stewardship scheme in 2016.

So we have a choice: extend by one year, start a new agreement or exit CS altogether. I have until 20 March to make up my mind — just a month, which is a bit rich, seeing as it took RPA two years to make my first payment under the agreement.

And this largely explains my reservations about the whole thing. Neither the RPA nor Natural England have covered themselves in glory with how they’ve managed CS for the past five years. Applying for the scheme in the first place took me into bureaucratic purgatory as we wrestled with the apparent location of a medieval village. This was marked on the RPA’s MAGIC map, although Heaven knows why as that’s the only record there is that such a thing exists, while there’s oodles of documentary evidence of one on my neighbour’s land that MAGIC hasn’t marked up.

The reason this mysterious village was important is that I couldn’t locate a CS option over it — a legume-rich sward, it seems, would ruin this archaeological treasure, while NE were quite happy for me not to include any options over it at all and continue to rip it every year with plough and subsoiler.

The absurdity is that I had actually applied for the option in the field next door to one marked up on the MAGIC map. But trying to convince NE they’d made this clerical error resulted in logic overload, and it was only after months of emails and phone calls they finally accepted the area of GS4 could go ahead.

Then there were the inspections — I’ve had two. Both of these were entirely painful, not because of the inspectors themselves, who seem a very pragmatic bunch, but because of the system they wrestle with. The findings of my first inspection, that took place nearly four years ago, still haven’t been adopted correctly, and I’m still waiting for the outcome of the report on the second, that took place last year. I often wonder whether the grey partridge we’ve successfully encouraged are really that bothered one of my patches of wild bird cover is actually 0.39ha, rather than the 0.4ha I’d measured it to be.

But the real slap in the face is the amount paid for some of the options. Take BE3, hedgerow management, for instance. You provide a hedgerow, care and tend for it, encourage a profusion of berries, nurture it to expand (to more than 2m tall and 1.5m wide), gap it up to ensure its fullness, cut it no more than once every three years so that it captures all that carbon, waiver the expense of the shadow it casts across your high-yielding wheat.

How much are you paid? £8 per 100m. That is derisory, RPA. If that’s all Society thinks of our hedgerows, that make up the very fabric of our green and pleasant land, no wonder so many farmers thrash them with a flail every year to the withered stubs that all too often blight the arable landscape.

Then there’s GS2, permanent grassland with very low inputs. This is the opportunity for most farmers (apart from those applying for Higher Tier CS) to restore the species-rich meadows our fathers and grandfathers were told to rip up to grow more food. This is Society’s opportunity to encourage a new generation of enlightened land managers, who push their grassland, not for every last protein-rich kg of dry matter, but for the wildflowers and butterflies it could contain.

How much are you paid? £95 per ha — doesn’t even cover half the rent. No wonder so many farmers who sit on such potential gems of the English countryside are enticed by the raft of new woodland grants on offer. They cover their pasture instead with tens of thousands of plastic tubes containing saplings which will one day grow up to shade out any hope of wildflower wonder as a virtual monoculture of timber takes over and locks up the land forever.

The crowning triumph is that misguided, half-informed politicians of every persuasion think such practice will save us from climate change. But instead it results in examples of wildlife tragedy, such as the small plot of species-rich meadow in Cumbria recently lathered in plastic tubes and saplings. This was at the behest of an over-bearing multi-national food business keen to brandish some environmental credentials to drown out suggestions its sugar-rich confectionary is turning the western world obese.

With the new Environmental Land Management contracts, the Government has the opportunity to change all this. It had better think carefully about how to do so and how to invest wisely to incentivise the right outcomes. For me, my Basic Payment starts to come down next year. If Society truly values the environmental assets I look after on its behalf, it had better start putting its money where its mouth is.

Tom Allen-Stevens has a 170ha arable farm in Oxon, on which villages appear, as if by MAGIC.
tom@cpm-magazine.co.uk	@tomallenstevens
When others won’t

NITRAM WILL


Find out how Nitram Will help your farm.
www.cffertilisers.co.uk
I’ve been trying to reassure myself that we made good progress with the drilling programme last autumn. The truth of the matter is I talked myself into thinking 2020 would be a golden year for spring cropping.

So now we have nearly half the farm undrilled and waiting for a benign spring to appear on the weather horizon. But as one storm after another trundles off the Atlantic, the chances of a peck of dust in March becomes more remote. Hopefully what results will be a decent turnout so the farmer voice gets a hearing while we don’t overstep the mark in terms of what is seen as reasonable protest.

The last mass rally in London was in 1970 when the NFU were negotiating the price review talks. Press reports suggest it was a good-natured affair. I enclose a photo.

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.

The F word

review talks. Press reports suggest it was a good-natured affair. I enclose a photo. I particularly like the placards that read ‘Cash or else’ and ‘Unless we have the cash you starve’. Now that’s what I call plain speaking.

The last NFU rally 30 years ago put on the streets of London some plain speaking on the cash crisis farmers were facing. What will the farmer’s voice be saying about food standards at the Westminster rally, set for 25 March?
Discover the perfect balance.

Pixxaro® EC offers outstanding broad-leaved weed control in winter and spring cereals.

Combining the remarkable Arylex™ active and fluroxypyr, it delivers irrespective of the weather or weed growth patterns. And there are no major following crop restrictions.

If you want a herbicide that delivers the perfect balance of fast, flexible and cost-effective control, you’ve found it.

Always keep your cereals in great shape, talk to your advisor or find out more at corteva.co.uk
Predicting the onset of septoria has always been a challenge because it’s invisible during its latent phase. But a changing climate is possibly making fungicide decision-making even more difficult, CPM discovers.

By Lucy de la Pasture

Last year proved to be another season of unusual weather. March turned out to be the fifth wettest on record, yet April was one of the driest. In the lead up to spring there’d been below average rainfall for most areas but when rain arrived in May and June, septoria pressure rocketed and many growers were caught unawares.

That acceleration in septoria was recorded at the Bayer trials site at Callow in Herefordshire, where the company, with the help of Fera, is using some of the latest technology to register septoria DNA levels in the three leaves that contribute to yield in winter wheat.

“The aim has been to detect the disease within the leaf during its latent phase — when symptoms aren’t visible — and look at the impact of variety resistance and drilling dates on the build-up of disease,” explains Bayer’s Jennie Watson.

First assessments were made on leaf two in Elation (AHDB Recommended List rating 4.3 for *Septoria tritici*), LG Motown (5.4) and LG Sundance (7.9), just ahead of T2 sprays on May 24. These revealed only untreated Elation carrying perceptible infection — this being under 10pp/µl. When further assessments were made just 10 days later, septoria DNA had soared and untreated Elation came in at over 250pp/µl, with Motown a little further behind at 70pp/µl.

Driving the jump in inoculum was a series of rain events, says Jennie. “The Callow site lies in the shadow of the Brecon Beacons and usually gets its fair share of rainfall in most seasons, but after the dry start to the year there were some significant downpours — with over 10mm of rain falling on both May 10 and 12.”

**Septoria severity**

Jennie says it highlights just how quickly rain events can change septoria severity. “In the early spring, growers know their variety susceptibility and drilling dates, but when fungicide programme choices are being taken it’s impossible to predict the weather to come.”

A few weeks earlier, the talk was of the lack of disease and trimming T1 rates, she points out. For Jennie, appropriate fungicide use is vital, which means good stewardship practices and adjusting rates to match disease severity.

“But growers must ensure product and dose are enough to give protection. No one could have predicted the rain from mid-May through to early June. After a mild winter we had strong crop biomass and septoria in the base of crops, but April dried it out.

“Our work shows if you have background septoria, it only needs rain events to kick it off. Over the past four years our spikes in the DNA have all come after repeated rain events,” she says.

Something similar was observed in 2017, this time at a Bayer-sponsored ADAS trial at Kingsbridge, Devon. In some areas spring rainfall had been just 10% of the quarterly average and Kingsbridge was little different. Again, May rain changed everything. Leaf two assessments revealed low levels of the disease but by June it had soared, with untreated samples taken three weeks post GS39 revealing levels between 6000–10,000pp/µl.

The speed of acceleration in the levels of latent septoria in 2017 and 2019 caught both Fera and Bayer experts by surprise, says Jennie. “You have green leaves and feel happy that you’re in a protective position then, out of nowhere, septoria symptoms appear on the leaf. The truth is that the disease was established in the plant in its latent phase and was beyond the stage where a fungicide can provide protection at the time of application.”

That’s a good reason to pay close DNA testing last year has highlighted just how quickly septoria inoculum can build while in the latent phase, says Jennie Watson.
REVYSTAR® XE.
A NEW LEVEL
OF EFFICIENCY.

THE REVOLUTION IS HERE

Farming is about to change. A new cereal fungicide, Revystar® XE, has been specifically designed to help improve farm efficiency. A broader spraying window means greater versatility, making it easier to plan and manage your farm. Whilst lower water volumes help save time and resources. To allow simplified decision-making and planning – gain the revolution.

bascareresults.co.uk/revolution

NEW FUNGICIDE
REVYSTAR XE
IS NOW AVAILABLE

CARE
SIMPLICITY
CONFIDENCE

BASF
We create chemistry.

Revystar® XE and Revystar are registered Trade Marks of BASF. Revystar® XE contains Revystar® and temurat. Revystar® contains metconazole and tebuconazole. Always read the label and product information before use. For further product information including warning phrases and symbols, you can refer to cigcems.basf.co.uk.
Disease control

Bill Clark explains the length of the latent period is dependent on thermal time.

...attention to application timing, says Jennie. “When spores land or penetrate the leaf, they’re still sensitive to fungicides and applications at this time will protect leaf tissues. But once hyphae grow within the leaf, then even the most potent fungicides have little activity.”

Research has shown that septoria spores begin to germinate within 12 hours of landing on a leaf, and penetration occurs just 12 hours later. But it’s when the disease starts spreading within the leaf that is the crucial part and why growers may get caught unawares.

NIAB’s Bill Clark says that leaves may still look green, but the next generation of spores is in production. “It’s thermal time that dictates how quickly we see symptoms on leaves. Typically the disease needs 220°C day degrees for symptoms to show, but how quickly this happens depends on thermal time. In warmer conditions symptoms could express themselves as quickly as 14 days, but it could be as long as 28 days in cooler conditions. During this time the fungus mycelia are spreading through the leaf leading to spores forming inside pycnidia.”

VARIETAL RESISTANCE

The Bayer work also assessed the value of varietal resistance, a key aim of the initiative. Bill notes that a number of factors affect the latent period. “VARIETAL RESISTANCE certainly is one of them, so the more resistant varieties tend to have longer latent periods, but we know very little about the mechanisms behind this.”

In 2017 it was found that after the T2 application some KWS Trinity (RL 5.3) samples had DNA concentrations 20 times higher than KWS Siskin (6.8). Last season assessments on leaf two taken on June 4 showed that in Elation, septoria DNA levels were three times that of Motown and significantly above Sundance. According to Jennie the key benefit of

CROPPED POINTS

With an upturn in late-drilled winter wheat and more septoria resistant varieties in the ground this season, some will be questioning the need for expensive fungicide chemistry this spring. But ADAS cereal disease expert Jonathan Blake believes that value for money and risk management should be factored into fungicide choices made during the 2019 season.

Speaking at the recent Association of Independent Crop Consultants (AICC) annual technical conference near Towcester, Jonathan provided an update on the AHDB fungicide performance trials, including recently approved and pipeline products.

He said there’d been a clear fall in the performance of the SDH co-formulations since 2017, with some differences between the products starting to emerge. In these trials a full label rate of Elistus Era (bicyflavinflupyr + prothioconazole) showed similar efficacy to 1.0 Vha of chlorothalonil in 2019, falling some way behind the likes of Ascar Xpro, which was the best of the older SDHs.

Corteva’s Oil fungicide active, Inatreq (fenicoxamid), which will be sold in mixture with azole prothioconazole when it eventually gains approval, and BASF’s new azole-SDHI formulation Revystar (methienthifluconazole + fluxapyroxad), were clearly in front for septoria control, explained Jonathan.

ADAS-inoculated, early sown trials using dirty variety Santiago put Inatreq under severe pressure in 2019 and the product performed very well. Revystar also offers similar activity on septoria to Opus (epoxiconazole) when it was first introduced in the 1990s.

With both likely to be priced at a premium, Jonathan said that some growers may be loath to spend the money on this new chemistry at T2 in late-sown crops, perhaps opting to go with Librax (fluxapyroxad+ epoxiconazole) or Ascar at the flag leaf timing. But he also pointed out that both new products are more active against septoria at half label rate than older alternatives at full rate, so this should be factored into fungicide plans.

“What really matters is how much it will cost to get similar efficacy from these new products. There’s a fair chance with the older chemistries that what you expect to get, and what you actually get, will be quite different because we’re seeing changes in the performance of SDHs.”

With the newer product less likely to see a divergence in performance from the efficacy seen in trials, Jonathan added they could still be an option at T2 in late-drilled situations to manage risk.

“It will come down to price and how much value for money and risk management should be factored into fungicide choices made during the 2019 season.”

Jonathan also touched on some older, but equally important chemistry which will be a hot topic of discussion this season as growers use up the last of their chlorothalonil.

He said multisite fungicide alternatives such as mancozeb and folpet will still have an important role in the future, particularly in protecting other chemistry from resistance and both offer activity in septoria.

In particular, folpet performed admirably under high pressure in 2019 and best results with the active are seen when used in a tank mix at T2.

“Over three years of trials we have also seen that folpet works particularly well with Inatreq,” he noted.

Leaf five showing higher levels of septoria on early versus later-drilled Graham.

Jonathan Blake tells AICC members that the new fungicides are performing ahead of the rest, with some SDHs showing a drop-off in performance last year.

With the newer product less likely to see a divergence in performance from the efficacy seen in trials, Jonathan added they could still be an option at T2 in late-drilled situations to manage risk.

“It will come down to price and how much value for money and risk management should be factored into fungicide choices made during the 2019 season.”

Jonathan also touched on some older, but equally important chemistry which will be a hot topic of discussion this season as growers use up the last of their chlorothalonil.

He said multisite fungicide alternatives such as mancozeb and folpet will still have an important role in the future, particularly in protecting other chemistry from resistance and both offer activity in septoria.

In particular, folpet performed admirably under high pressure in 2019 and best results with the active are seen when used in a tank mix at T2.

“Over three years of trials we have also seen that folpet works particularly well with Inatreq,” he noted.
David Lines points out that even a septoria-resistant variety like KWS Extase will still get septoria, especially if it’s early drilled. Being able to track septoria inoculum in its latent phase would enable agronomists to time fungicides better and recommend appropriate rates to give the best control of septoria.

Disease control at 8.1, has a large variation in yield response across trials sites. “Extase has a much wider range than other septoria resistant varieties, such as Graham (6.8), Siskin (6.8), Theodore (8.2) or Sundance (7.9) when it comes to response to fungicides. So under favourable conditions, it will still get septoria, in spite of its relatively high resistance.”

Illustrating the point, David describes one farm last season where Extase had been planted in Sept and just romped away in the spring. “At T1 the crop had quite high levels of septoria and needed a robust T1. The levels of disease reflected its early growth and high biomass production, but the varietal resistance kicked in later and we were able to pull back a bit on the rate of Ascra XPro (prothioconazole+ bixafen+ fluopyram) at T2.

The research reinforced David’s point and highlighted the benefits of later drilling. Just before the T2 fungicide timing, leaf two samples were taken from KWS Trinity, drilled on 22 Sept 2017, and 10 days later showed huge differences in DNA measurements.

In 2019 comparisons between Callow plots drilled on Oct 8 and those at Hinton Waldrist, Oxon drilled on Oct 27 also revealed big differences. “The weather played a part, as Callow did get higher rainfall, but all six trial varieties carried more septoria at the Callow site than those at Hinton Waldrist,” notes Jennie. “With some varieties, we recorded a ten-fold increase in infection on leaves two and three between the two sites.”

This season Bayer will be extending its DNA assessments by testing more regularly throughout the season. Eventually such technology will make its way into commercial farming, which Jennie welcomes. “Couple DNA testing with weather and spore trapping technology and you’re getting a very accurate picture of the disease threat. It means knowing more than whether you’re in a protective or curative position. Rates can be adjusted more accurately to reflect variety, drilling date and weather patterns.”

David agrees that a rapid test for latent septoria would help aid decision-making in the field. “At the moment fungicide decisions are based on variety information, which is known; the levels of disease within the field, which doesn’t account for latent septoria; and future weather patterns, which is a best guess.

“Knowing the level of latent infection would inform and justify both the product choice and rate at which to use it. The importance of this is highlighted by the Bayer SpotCheck work in OSR, where light leaf spot has consistently been confirmed by DNA testing samples where no symptoms were identified in the field,” he says.

There’s also a resistance management angle to selecting the appropriate effective dose of fungicide, adds Jennie. “A product like Ascra has dose versatility as it can be used at rates from 1.0-1.5 l/ha. If excessive fungicide use is avoided it not only helps protect chemistry but farm margins too,” she concludes.
It was a late season in terms of disease which really kicked off with the wet start to June.

Following two visits across UK trials sites with Bayer’s Crop Doctors last season, CPM finds out how observed disease levels shaped up and what these mean for this year’s programmes.

By Rob Jones

When the Crop Doctor team took to the skies during March and April last season, disease levels didn’t give any serious concern. Septoria was largely restricted to the base of plants and yellow rust and eyespot were found at varying levels but nothing to cause alarm, according to specialists assessing the trial plots at four locations across the UK.

But it became a season that proved how quickly the disease threat can change, especially septoria. So with assessments and harvest data now received from the four sites, how did the varieties across the UK fare?

Long Sutton, Lincs

Showers around the middle of May started things moving at the fenland site, hosted at GH Hoyles and Son, and this was then aggravated by downpours in early June — 202mm of rain fell in four days at Long Sutton.

The weather washed the potential out of crops says a despondent David Hoyles. “We still had plenty of stems and grains at harvest but specific weights were low — between 71-73kg/hl. Our yields were 15% down on our five-year average. It looked so promising before the rain.”

Septoria just ‘exploded’ notes Bayer’s Darren Adkins, which was unsurprising given the weather. But just as much of a concern was lodging — a focal point at the Bayer Long Sutton Field Day in July.

Lodging damage was observed in every untreated fungicide plot, despite all receiving a robust three-way PGR programme, he reports. Some treated plots were also affected but not to the same degree.

Darren believes treated plots benefitted from eyespot control. “Prothioconazole has good eyespot activity and plots treated with Aviator (prothioconazole + bixafen) and/or Ascra (prothioconazole + bixafen + fluopyram) benefited accordingly. Eyespot isn’t a severe yield robber on its own but if it contributes to lodging then the losses soon stack up.”

Callow, Herefordshire

With Herefordshire typically getting close to 150mm more rainfall than Lincs it’s a surprise that Callow avoided the worst of May and June’s downpours. Yet the advance in disease pressure following rainfall events is illustrated here through Bayer research into septoria’s latent phase through measuring DNA levels in leaves.

The research has shown how quickly disease levels climbed with the rain events in May, despite the dry conditions earlier in the season (for details, see article on p8).

ADAS researcher Dr Jonathan Blake says the influence of a dry spell on septoria depends on timing. “Dry weather early in the season has less influence on septoria severity as it does later in the season. Rain splash is the most likely cause of spreading the disease up the canopy but it can continue to cycle with early morning dew.”

Given the late season pressure you’d think it was T2 sprays that underpinned 2019

With the disease widely reported last season, SRUC’s Prof Fiona Burnett believes it was encouraged by another season of mild winter and spring weather resulting in early crop growth. But she also feels management practices are a factor. “Best practice is a two-year break. But rotations are still dominated by cereal crops so it’s rare.”
Korvetto® is the NEW wide-spectrum, spring applied herbicide for use in winter oilseed rape.

Not only is it highly effective on a range of problem broad-leaved weeds, it provides outstanding control of key weeds such as Cleavers, Mayweeds and Thistles. Containing Arylex® active, it works hard even in cool and warm spring conditions too.

To clean up your broad-leaved weeds this spring, talk to your advisor or find out more at corteva.co.uk
Crop Doctors Jonathan Blake and Fiona Burnett combed the plots and found low levels of septoria early on, especially on susceptible varieties.

- disease control but Jennie thinks last season highlighted the importance of the T1 as much. “Despite low levels of Septoria early on, by the time we were approaching GS43 you could see differences in the upper canopy in our T1 trial plots. There was enough disease in the base of plants to spread up into the canopy with conducive conditions following.”

The talk last spring was of reducing T1 rates and/or switching away from primary septoria actives. Bayer’s Jennie Watson believes that where growers have sown a resilient variety late, there is flexibility at the T1, but sees this as dose rather than switching actives. “Key fungicide timings have to be based on effective septoria actives and the evidence from last season is that prothioconazole, bixafen and fluopyram are clearly still effective,” she notes.

AICC agronomist David Lines feels the T1 application is now on a par with the T2. The loss of curative options means sprays aren’t providing the clean-up they once were. “If leaf 2 becomes infected, septoria has a platform to move up the plant. The T1 is a barrier protecting the upper canopy.”

His typical spend last season was £90/ha, including varieties like Siskin, Graham and Zyatt. He’d rather spend an additional £20/ha and get extra 1-2 t/ha in yield. The spend on Extase wasn’t much less although he feels there is more scope to omit a T0.

**Great Tew, Oxon**

T0 sprays were in focus when the Crop Doctor team visited Great Tew Estate. Manager Colin Woodward part treated two fields at the T0 timing. With dry weather dominating, differences in the fields of Gravity and Sundance were hard to find at the time.

Drawing definitive conclusions remains, as the dry weather continued and robust T1 sprays followed. But some of the dirtier varieties did carry more septoria later in the season, especially Gravity. “If you’ve got dry weather around GS29 then it is possible to spend less on a T0 with more resilient varieties,” he says.

Whether Colin will do the same this year remains to be seen. That decision probably depends on how yellow rust comes through the winter, he says.

What will remain is a robust T1, however. Despite the drier spring, SDHs were used at both T1 and T2, and it’s a decision he doesn’t regret. “It was a late season in terms of disease which really kicked off with the wet start to June. Some of the untreated plots in the fungicide trials I host here quickly succumbed.”

Estate winter wheats averaged 10.7t/ha — a yield Colin is happy with. This is in part due to lodging defence. With the weather, some crops did go over on the run-up to harvest but it wasn’t as bad as he feared. He also feels a robust fungicide programme added to that of an equally robust PGR strategy.

Despite the arrival of new fungicides, he’s also planning to ‘beef up’ cultural measures, starting with variety choice. Last season saw Gleam, Gravity, Sundance, Skyfall, Elicit and Skyscraper sown at Great Tew. But with Colin looking to bolster disease, pests and blackgrass management, Gravity and Skyscraper have been joined by Extase and Firefly.

“It’s their disease profiles that appeal, but also their development — they’ll perform well in a later drilling slot,” notes Colin.

The surprise here may be Gravity, which has a septoria rating of 4.8 on the AHDB Recommended List, but with blackgrass now found on every field he needs varieties that can compete, which is where Skyfall, Elicit and Gleam fall short, he says. “They’re all a little tiller shy and that really stood out last season with the dry spring. Gravity does need a robust disease control programme but its tilling capacity compensated for the conditions. With the septoria resilience of Extase and Firefly we can plan for Gravity being a priority if need be.”

**Cawood, Yorks**

Protective best practice is the message from Cawood. The site is prone to septoria and yellow rust, and as with the other sites, after a dry spring May rain kicked disease into life, septoria stripping untreated susceptible varieties of green leaf area.

What surprised site manager Sean MacGill was the yield response from the site. Take out highly susceptible varieties like Reflection, which he feels skew the figures,
If you have dry weather around GS29 then Colin Woodward feels it’s possible to spend less on a T0 with more resilient varieties.

and you’re still left with mean yield responses of over 2.0t/ha. Another surprise was the response to more resilient varieties. “Even Extase delivered economic responses to our four-spray fungicide programme,” he notes.

He feels yellow rust control contributed to site results and the disease was more easily found than in previous seasons. But an increase in yellow rust pressure doesn’t overly concern him. “Whether it’s a shift in the disease or the mild winter I’m not sure but good fungicide programmes held up. Our standard programme starts with a multisite plus tebuconazole at T0 and anazole plus SDHI mix at T1. Those are key timings to control yellow rust.”

Application timing was also a factor. He accepts that maintaining a protective position is easier when treating plots to the realities of commercial farming, something he sees as more important than ever with the loss of CTL. “With any season you are likely to see a period of intense pressure. If that coincides where programme protection is compromised, disease is bound to establish. Kind weather allowed us to hit T1 and T2 application timings and that clearly helped when septoria pressure rose late on.”

Maintaining a protective position will be more challenging with CTL going but he feels it will still be possible — what’s needed is a shift in emphasis. Fungicides have never been a ‘silver bullet’, he says, and for any active to work as designed application timing is key. When azoles had strong curative activity they still worked better as protectants, he points out.

“The fungicide armoury is still strong but we have to minimise the pressure on products. This means an integrated approach to optimise target leaf protection. It calls for improved disease diagnosis via technology like SporeSentry, accurate sprayer set-up and nozzle choice plus using rotation, variety choice, cultivation and drilling date to limit disease establishment,” concludes Sean.

Eyespot isn’t a severe yield robber on its own but if it contributes to lodging then the losses soon stack up.

Prone to septoria and yellow rust, the Cawood site brought mean yield responses of over 2.0t/ha.

If you have dry weather around GS29 then Colin Woodward feels it’s possible to spend less on a T0 with more resilient varieties.
For both azoles and SDHIs to lose efficacy against ramularia at the same time is unprecedented, notes Neil Havis.

Lurking unseen in barley crops, ramularia has developed resistance to most chemistry and shows its spots only late in the season. CPM explores how to keep a lid on infections.

By Tom Allen-Stevens

Ramularia in barley

With mounting resistance to single-site chemistries making the control of ramularia in barley increasingly difficult to achieve, Adama is working with CPM to highlight the importance of including a multi-site fungicide in spring spray programmes – not only to ensure crops are adequately protected, but also to prolong the effective lifetime of at-risk products.

Ramularia was only acknowledged as a disease in barley in 1998. But in the relatively short space of time since, it’s passed from being a minor disease to a major one, and there are probably more unanswered questions raised about it than there are solutions.

For Dr Neil Havis of SRUC, one of the major challenges ramularia poses is its unprecedented ability to mutate and evolve resistance to major fungicides — a good understanding of the pathogen is therefore vital. With chlorothalonil (CTL) falling out of the picture this spring, Adama’s David Roberts believes a planned, programmed approach to its control is the best way forward.

What is ramularia?

Caused by the pathogen Ramularia collo-cygni, the disease affects both winter and spring barley but lives within the host and usually shows no visible symptoms until after flowering — it’ll only appear earlier if the crop is stressed or on senescing leaves.

It can be a notoriously difficult disease to identify correctly, and growers are advised to use the ‘5Rs’ to identify symptoms (see picture on p17). Lesions are typically found on the top three leaves later in the season, with the majority on leaf two. Abiotic stress can easily be misidentified as ramularia if the 5Rs aren’t closely followed. It can also be readily confused with net blotch, although ramularia doesn’t run up the veins, so monitoring how the disease develops will often reveal which it is.

Infection can be carried into the crop on the seed, and the fungus moves asymptptomatically in the crop through the growing season. The huge diversity of the pathogen population suggests a high level of sexual recombination takes place late in the growing season, giving diversity levels similar to septoria in wheat. What’s more, the fungus mutates readily under ultra-violet radiation, and this ability to adapt and evolve is believed to be the cause of the high level of resistance ramularia has to key fungicides.

Warm, wet conditions encourage the disease to spread and the symptoms are thought to be produced by a toxin the fungus produces within the leaf, rubellin D, which is light activated. So under certain light conditions — prolonged, intensive sunlight being ideal — this toxin causes oxidative stress, leading to plant cell damage resulting in typical leaf symptoms. A plant already under stress will exacerbate these symptoms, so water-logged, or drought-stressed crops, those with nutrient deficiencies or suffering other diseases are likely to be most affected by ramularia.
How important is it?
Once believed to be a disease found only in the north of Britain and perhaps in the West, ramularia is now widespread across the UK. In terms of damage, however, as it’s a disease that shows itself late in the season, a high infestation rarely takes more than 10-15% of yield. The real yield robber in barley remains rhynchosporium, that’ll knock up to 50% off yield potential if allowed to develop unchecked. But it’s not just yield — ramularia stresses a barley crop causing thin grains, resulting in rejections if destined for a quality malting market.

Why is it a problem?
Ramularia’s ability to mutate and evolve resistance to fungicide chemistry makes it a problem. This was first picked up in Germany in 2015.

In 2017, conditions across the UK were particularly conducive to the disease. This coincided with the widespread breakdown of efficacy of azoles and SDHIs — for both major groups to go down at the same time is unprecedented. This combination of prevalence and resistance put ramularia to the top of the agenda as a pathogen in barley crops.

While most single-site chemistry is all but ineffective against ramularia, multi-sites provide protectant activity against the disease, which include CTL and folpet. Independent trials have always shown CTL to be the most effective fungicide, but its loss of approval on 20 May this year will take it out of most control programmes at the traditional T2 timing for winter barley and almost certainly for spring-sown crops.

The new triazole Revysol (mefentrifluconazole) has been shown to have good efficacy. But as a single-site fungicide it cannot be relied on for long term control and should be partnered with a multi-site to slow down the development of resistance.

Multi-sites remain the cornerstone of barley disease control
Like many agronomists, Suffolk-based Laura Buckingham has been caught off-guard by ramularia. “It’s one of those diseases we’ve largely ignored, and we haven’t been very good at identifying it,” she admits.

“In the past, a half decent fungicide programme has kept a lid on the disease, but with resistance building, it’s now far more of a priority.”

An AICC member, Laura looks after around 400ha of arable crops in Suffolk in addition to her role as arable manager at Fram Farmers. It was a crop of KWS Orwell that made her rethink the significance of the disease. “I noticed an infection in the canopy post-flowering and thought at first it was net blotch. This struck me as odd as the crop had received a good fungicide programme.”

About 10-15% of the leaf was infected, with worst symptoms showing on leaf two. Closer inspection confirmed it was ramularia, and although she knew she’d “missed the boat” on treating it, it was important to keep the level of infection monitored. “It’s worth knowing for crops that may be used for seed or heading to quality markets,” she notes.

Laura’s strategy to manage ramularia is firstly to keep the crop healthy and then to include a multi-site fungicide at both spray timings. “Winter barley always responds well to trickle feeding throughout the season, and that helps hold back ramularia as the crop is less stressed,” she says. “We’ve all learnt the lessons of not including a multi-site fungicide. It’s important to get spray timings right, too.”

Her standard programme on winter barley is to apply 0.6 l/ha of Siltra at T1, dropping this back to 0.4 l/ha at T2, depending on overall disease pressure. On spring crops, the rate at T1 is shaved to 0.5 l/ha. Until now, she’s tank-mixed CTL at 1 l/ha at both timings, but has been exploring other options. “There’s been a question mark over CTL’s continued approval for use for quite some time and it’s important to know where to go,” she notes.

So she’s been monitoring the performance of folpet used in AICC trials and has used it as part of the programmes she’s advised, often switching folpet in at one of the spray timings.

“The multi-site should really be considered the cornerstone of spray programmes — you start with it and then build the rest of the tank-mix around it depending on the disease priorities. It’s crucial to keep timings correct, and with ramularia particularly important to keep the crop stress-free. But with CTL falling away, I’m as confident as I can be in folpet, and it will remain an essential element of the tank-mix to protect other actives,” notes Laura.

How can its impact be minimised?
Varieties do differ in their response to ramularia, and these are significant until crops reach around GS80. After that, differences are less clear. But breeders have not been selecting for resistance to ramularia, so no variety on the current AHDB Recommended List can be classed as either weak or strong.

What’s more, there are no RL scores for the disease — previous attempts to score varieties at RL trial sites have been abandoned as it’s hard to agree a standard protocol. While this is under review, it effectively means growers cannot rely on varietal resistance, and that’s a serious concern.

Laura Buckingham admits ramularia is a disease she’s largely ignored in the past, but with resistance building, it’s now far more of a priority.
**Ramularia in barley: top tips**

- **Keep the crop healthy** – Plan establishment and management so that the barley is free of stress.
- **Keep it in a protected state** – use multi-site chemistry to help prevent disease and prolong life of single-site actives.
- **Use a programmed approach** – Using folpet at both T1 and T2 spray timings offers best on-going results.

> omission from the toolbox.

Healthy crops, even if infected, are far less likely to suffer symptoms of ramularia than those under stress — the health of the crop has a greater influence than with other diseases. This increases the importance of ensuring good soil conditions at planting and the right balance of available nutrients throughout the season.

There’s potential for elicitors to build plant defences. These are products formulated in a way to trick a plant into thinking it’s under attack from disease. Trials into these products are underway at SRUC, and initial results indicate they can allow a fungicide rate to be halved for the same level of control.

Biologials and biostimulants may offer similar benefits, and again trials are underway.

One of the challenges of ramularia, however, is that symptoms will not be seen until after GS70, by which time it’s too late to treat a crop. There will be other disease priorities at key fungicide timings, so the only way to manage the disease is to plan overall management carefully to keep the crop healthy and to keep it well protected through the use of multi-site chemistry.

### How can it be controlled without CTL?

According to industry market data, the area of barley treated with multi-site chemistry to control ramularia more than doubled between 2017 and 2019. With widespread resistance to single-site chemistry, CTL has proven the most effective treatment to control ramularia, but cannot be used on crops after 20 May this year. Alternative choices are limited, although folpet is approved for use in barley.

Folpet offers good protection to a range of cereal diseases and, as a multi-site fungicide, has no known resistances or insensitivities. Independent trials carried out at Oak Park in Ireland indicate a programmed approach, with folpet used at both the T1 and T2 spray timing gives the best results (see chart right).

Work carried out by Silsoe Spray Applications Unit has investigated whether the uptake of some modern fungicides is impeded when tank-mixed with multi-site chemistry. While this found that there was a notable effect with CTL on some chemistry, no such antagonism existed where folpet was used.

Folpet has also been found to help protect azole chemistry and prolong its effective life. ADAS has carried out modelling work on septoria to assess the relative efficacy of repeated use of epoxiconazole with and without folpet, with results showing the multi-site doubled the effective life of the triazole. This work has since been repeated using prothioconazole with the SDHI fluxapyroxad and produced similar results. While no specific trials have been undertaken with ramularia, the pathogen behaves in a very similar way to septoria.

### What strategy works best?

While many growers will use up existing stocks of CTL this year to protect crops from ramularia, it’s unlikely this option will be available at T2, which is where Arizona, containing folpet, can be used at the recommended rate of 1.0 l/ha. Folpet can also be safely sequenced with CTL.

The most effective strategy against ramularia is to keep crops healthy and in a protective state. Folpet offers the best on-going option to ensure this, and also helps prolong the life of other chemistry. A typical programme offering best results across a range of barley diseases would see Arizona applied at 1.0 l/ha at both the T1 and T2 timings tank-mixed with an SDHI/azole such as Siltra Xpro (bixafen+ prothioconazole).

### How the multi-sites compare on ramularia

<table>
<thead>
<tr>
<th>% ramularia infection</th>
<th>Leaf 1</th>
<th>Leaf 2</th>
<th>Leaf 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>40</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Siltra 0.5 + CTL 1.0</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Siltra 1.0</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Siltra 0.5 + Arizona 1.0</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Siltra 0.5 + Arizona 1.0 + CTL 0.75</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Source: Teagasc, 2019, Carlow, Ireland; cv Pixel; T1 – GS32 (8 April, 2019), T2 – GS39-49 (7 May, 2019), assessed 10 June, 2019; LSD – F=0.001, L1=6.183, L2=10.3, L3 =17.02; Arizona contains folpet, Siltra – bixafen+ prothioconazole*

### Sponsor message

Arizona is a unique multi-site protectant fungicide containing straight folpet at 500g/l. In addition to providing activity against ryhchosporium in barley, it also provides useful protection against ramularia and has the added benefit of not interfering with the activity of partner azoles or SDHIs. A well-timed T1 spray (typically GS30-32 in winter barley or GS25-30 in spring barley) is key to protecting the crop at tillering/stem extension and should be followed by a subsequent treatment at T2 (typically GS39-49) to provide continued protection. Arizona can also be used at T3 (GS49-59) but growers must be aware that a maximum total dose of 3.0 l/ha is allowed.

For more information, or to subscribe to Adama’s disease management hub, go to [www.adama.com/uk](http://www.adama.com/uk)
Optimising the coverage on the leaf can play an essential role in increasing biological efficacy, says Stuart Sutherland.

Over the past few seasons chlorothalonil has underpinned cereal fungicide programmes — providing good protectant activity at a reasonable price, with the added benefit of its multisite mode of action to help protect the single-site actives it’s mixed with. From May 20 this year all that will change as CTL takes its final bow, leaving folpet or mancozeb as the only multisite alternatives.

Folpet has an extensive trials history of good efficacy on a range of diseases, according to Adama, including septoria in wheat and rhynchosporium in barley. Interagro suggests fungicide mixes may be enhanced by the addition of Kantor, based on the results of 49 trials (over seven years) which have recorded an average yield boost of 0.27t/ha with a range of fungicide partners, including folpet.

This spring will pose some specific challenges where the properties of Kantor may come in useful, believes Interagro technical manager, Stuart Sutherland. One of these is ensuring the active ingredients applied are able to do their job, he says.

Potential barriers
“Challenging application conditions can often stand in the way of active ingredients reaching their target site on or inside leaves. Potential barriers start in the spray tank, and this spring we can expect some larger and potentially more complex mixtures given the lack of autumn spray days and increased spring workload on farm.

“Tank-mixing offers flexibility, saves time and may increase pesticide effectiveness, but physical or chemical incompatibility can cause downtime, damage to the crop and reduce chemical effectiveness,” explains Stuart.

“Kantor is ideal in these situations — it’s a self-micro-emulsifying compatibility aid, which enables tank-mix components to dissolve in the spray tank and remain thermodynamically stable over time. This reduces antagonism between products, improving crop safety and increases the bioavailability of active ingredients.”

With an early start to weed control expected in some fields to get on top of over-wintered weeds, all of these things are crucial when tank-mixing in cold conditions, at low water volumes or where prothioconazole and CTL are going in the tank, he adds.

Last season illustrated the importance of a good protective fungicide programme in early season to keep inoculum low in the crop, highlights Interagro’s Sarah Ferrie.

“After a couple of relatively low disease years, 2019 saw the return of wetter weather in May and June. This put cereal crops under considerable septoria pressure where fungicide programmes had been scaled back earlier in the season — on the premise that the early spring was very dry and disease would never come in.

“Firefighting later and relying on the limited curative activity of SDHIs and azoles was too late for some, leading to high disease pressure at the critical yield-building phase,” she recalls.

“Prevention’s better than cure”

Filling the shoes left by chlorothalonil is a big ask, but new work has shown the multi-tasking adjuvant, Kantor, can give fungicide mixes containing folpet a performance boost. CPM investigates.

By Lucy de la Pasture
“Where a protectant multisite fungicide had been used early to keep inoculum low, the benefit was all too clear to see. Replicated trials in wheat and barley also demonstrated additional benefits where Kantor was added.”

After the very wet winter some varieties of wheat have significant septoria on their lower leaves coming into spring and in these crops there’s particular value in keeping inoculum low and protecting the vital yield-building leaves as they emerge. And the most effective way to control disease is to prevent infection establishing in the first place.

“Alongside the selection of varieties with more durable disease resistance from the outset, multisite fungicides form the foundation of any disease control programme and help prevent septoria from establishing. This means ensuring each newly emerged leaf from T0 is protected before septoria spores land on the leaf and germinate.

“The combination of reduced performance from SDHIs and azole chemistries with the weather extremes we’re routinely experiencing, means this spring we can’t be complacent and rely on a curative approach to disease control,” says Sarah.

“Despite the exciting new launch of BASF’s Revystar XE (mefentrifluconazole + fluxapyroxad), a fungicide that’s promising to reset the clock on curative activity, we shouldn’t underestimate the importance of stewarding and preserving fungicide performance by continuing the use of other modes of action to limit selection pressure, and keeping disease at bay early in the programme.”

The protectant activity of CTL had become a key component of fungicide programmes, particularly since the shift in efficacy of SDHIs. Adama believes folpet can take on the main multisite mantle and fill the boots of CTL.

“Folpet acts on multiple bio-chemical pathways within a pathogen and is therefore less susceptible to disease resistance,” explains Melanie Wardle, fungicide product manager for Adama. “It remains unaffected by sensitivity shifts and continues to provide good levels of efficacy.

“Modelling work carried out by ADAS in 2019 also shows that the inclusion of folpet as a mixture partner significantly prolongs the effective life of prothioconazole and doubles the life expectancy of the SDHI fluxapyroxad.

“As a multisite, folpet works on the leaf surface by inhibiting spore germination, it impedes cell division and reduces energy production in the mitochondria of the pathogen. It’s therefore recognised by the Fungicides Resistance Action Group (FRAG) as a valuable tool for managing resistance and for its ability to protect and prolong the lifespan of medium to high resistance risk fungicides — like SDHIs,” she explains.

And this is where Kantor’s adjuvant properties can help achieve good protection by enhancing fungicide coverage on cereal leaves and improving uptake of fungicide, explains Stuart.

“Keeping disease out of the crop not only relies on fungicides with good potency and persistence, it also relies on good coverage to ensure the whole crop is fully protected. The addition of Kantor can ensure fungicide coverage is optimised,” he says.

So how does it do this? The answer lies in understanding why coverage is particularly important for protectant fungicides such as folpet.

**Optimal distribution**

“As protectant fungicides have no mobility, they offer zero protection to the parts of the leaf not covered by spray droplets. Optimal distribution across the whole leaf is crucial to avoid exposure to infection and they must be applied before spores germinate,” explains Stuart.

Challenging application conditions can stand in the way of active ingredients reaching their target site, which may be either on or inside leaf targets, he adds.

“If you think about the canopy structure of a wheat or barley plant, it’s not an easy target to coat. The spreading and retention of fungicide is critical to distribute it across the leaf surface, but water (95% of the spray solution) beads on waxy surfaces and is prevented from spreading out due to high surface tension.

“This not only leads to poor coverage across the leaf surface, particularly on hairy leaves, but it’s also a challenge with ear sprays — where spikelets can suspend spray droplets above the surface, preventing the contact critical for an effective fungicide application at T3.”

The adjuvant properties of Kantor can help achieve better spray distribution, says Stuart. “By fully optimising the coverage on leaf or ear surfaces, it can play an essential role in increasing biological efficacy, he claims.

“While in-can adjuvancy can help, it’s often insufficient as the rate of adjuvant in the formulation is fixed by the fungicide rate per hectare. Tank-mixed adjuvants can be adjusted to fit the water volume being used, reducing surface tension sufficiently for optimum spreading and

---

**Kantor recommendations**

- Add Kantor at 0.15% of the total spray volume.
- Add to the spray tank first.
- Compatible with all crop protection products.
- Can be used throughout the programme to optimise fungicide performance.
- Kantor is approved for use in cereals up to GS52 and beyond with all azole and morpholine fungicides, up to the growth stage cut off of the fungicide.
coverage to occur.”

Where growers do find themselves in a curative situation, fast penetration of an appropriate fungicide through leaf cuticles and into leaf tissue will be crucial so it gets working as quickly as possible, points out Stuart.

“The leaf cuticle, on the upper and underneath sides of the leaf is the biggest barrier to the entry to water soluble compounds. Most fungicides have a low water solubility and are able to penetrate leaf cuticles by simple diffusion through the waxy components of the cuticle, which make up the most part.

“Kantor can speed up entry by increasing fluidity of waxes in the cuticle — in essence, it’s like doubling the lanes on a motorway increases the flow of traffic. In curative situations where speed of entry is key, Kantor is particularly useful,” he comments.

Interagro and Adama have been assessing the performance of Kantor with folpet in fungicide trials.

In 2019, trials looking at the benefits of adding Kantor to Aviator (bixafen+prothioconazole) plus Arizona (folpet) at T1, followed by Elatus Era (benzovindiflupyr+prothioconazole) at T2. The results showed significant improvement in septoria control on leaves one and two (+20%) when Kantor was added.

“This also translated into a yield benefit of 0.19t/ha. In winter barley (variety Cassia), the addition of Kantor to Proline (prothioconazole) plus Arizona added 0.59t/ha and surpassed control achieved by Proline plus Bravo (chlorothalonil),” says Sarah.

Adama’s Andy Bailey concurs that because folpet is a contact/protectant fungicide, ensuring good leaf coverage is an important part of application.

“In the trials conducted by Interagro in 2019, there’s evidence to show that the addition of Kantor can add to the overall septoria control of folpet, translating through to a positive effect on yield. Maintaining label rate of folpet at 1.5 l/ha at T1 and T2 is important not only for the best disease control but also resistance management,” he says.

Melanie suggests T1 is the priority timing for folpet inclusion in wheat. “Additional sprays up to the maximum 3.0 l/ha total dose can be applied at T0 or T2, depending on the season, and will aid green leaf retention and increase the potential for improved yields. “Folpet also offers the additional advantage of not interfering with the curative kickback activity of azoles; an important factor where active rust is present because it’s important to maximise the speed of activity and the curative effect of the azole in order to combat infections effectively.”

In barley she recommends a well-timed T1 spray (typically GS 30-32 in winter barley or GS 25-30 in spring barley) to protect the crop at tillering. This should be followed by a subsequent treatment at T2 (typically GS 39-49) to provide continued protection.

“Folpet is also flexible enough to be used at T0 (GS 25-30) and T3 (GS 49-59) where a three-spray programme is adopted in some winter barley crops, taking care not to exceed the total dose allowed in a year,” says Melanie.

While the addition of an adjuvant may seem a belt and braces approach, the sums do add up, adds Sarah. “Kantor can more than pay for itself, having produced an average yield response worth £41/ha across all trials, and it’s particularly beneficial in sub-optimal conditions,” she concludes.

**Effect of Kantor on septoria control**

![Effect of Kantor on septoria control](image)


**Yield in barley**

![Yield in barley](image)

Fife - winter barley, cultivar Cassia. All Treatments applied T1 and T2 and disease was low disease, with untreated < 2% rhynchosporium. Source: Scottish Agronomy 2019.

Pushing performance

At the heart of good crop production lies careful use of chemistry to protect the plant and maintain performance, right through the season. But optimising the efficacy of plant protection products can be challenging, while increasingly restrictive regulations limit just how far you can go.

This series of articles explores the science behind the use of adjuvant and biostimulant tools to help power both chemistry and crop performance, as well as increase understanding of why they’re needed and what they do. We’re setting out to empower growers and drive crops to reach their full potential.

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

Kantor is a unique activator adjuvant based on the active alkoxylated triglyceride, offering improved weed and disease control in a wide range of crops. Kantor is the only adjuvant with corrective action at every step of the application process, delivering greater freedom for plant protection products to perform to their potential. Kantor improves tank-mix compatibility, buffers spray water to pH6, reduces drift, improves coverage and improves the speed of uptake.
It’s about gathering knowledge and storing it – the value of the data you get is second to none.

Bedfordshire grower Russell McKenzie has taken on-farm tramline trials a step further, looking beyond fungicides for solutions that work. CPM visits as he plans his approach for this season.

By Tom Allen-Stevens

Trials results
That’s an element he brought into his trials last season, and this year, he’s planning something similar. Joining him to discuss plans is Bayer commercial technical manager Ben Giles. He’s armed with results from the company’s trial sites across the UK, and from Hinton Waldrist in Oxon and Callow in Herefordshire in particular.

“There’s only so much you can learn from a 12x3m trial plot,” he says. “The beauty of what Russell does is he takes that over a 12x18m area, which is much closer to a real-farm situation.”

The 2020 trial field has only just been drilled — delayed until early Feb as a result of the weather — with 10 varieties in the ground. “We’d have liked to have got more in, but conditions weren’t good enough across the field to complete the plots,” reports Russell.

Three breeders have each put forward varieties, so in the ground are KWS Firefly, Kerrin and Kinetic; LG Spotlight, Skyscraper, Sundance and Crusoe; and RGT Saki, Gravity, and Lantern.

“This is a little bit of unchartered territory with late drilling of winter cereals for us and although there are the published latest safe sowing dates, there isn’t a large amount of trials or data from planting in Feb.” It’ll be a chance to explore vernalisation, and how to make late-sown varieties perform, he says. “So it could be an interesting trial and an opportunity to find out what we can achieve on farm and what the parameters are. We learnt a lot from last year’s trial and that provided information we could take forward. That’s what we’re hoping to repeat.”

Last year, yellow rust dominated the plots early on, Russell recalls. “RGT Wasabi was affected, but it was the most bizarre thing — adult resistance kicked in and it pulled through. Gravity fell off a cliff towards the end as septoria came in, but Firefly held up well. It had a wobble, but came through, although it didn’t yield quite as well as it looked.”

Last year, 11 winter wheat varieties were drilled with seven different disease control programmes (plus an untreated control).
Advance to harvest early

KWS PARKIN

- A unique type, unlike any variety on the current Recommended List
- Earlier maturity than any Recommended variety
- Shorter and stiffer strawed than any wheat on the 2020/21 RL

KWS UK LTD, 56 Church Street, Thirsk, N Yorks, HG9 6NS
Tel: +44 (0) 1845 202202 / Fax: +44 (0) 1845 202245 / Email: info@kws-uk.com
www.kws-uk.com
Keep it simple.

Ben confirms that Firefly was “towards the top end” in fungicide-treated trials at Hinton and Callow. Untreated yield results put Sy Insistor and Theodore as the top performers respectively. “Extase did well at Callow, Skyscraper and Kinetic at Hinton while Sundance and Saki performed at both,” he adds.

Russell picks out Skyscraper and Spotlight. “They were frothy and growthy, which is useful against blackgrass. Spotlight stood better of the two, while we had concerns for Sundance’s standing ability. Crusoe is still performing well.”

Ben agrees. “The issue with Crusoe is brown rust, but that’s relatively easy to control if you’re prepared for it.”

On the treatment side, three of Russell’s plots last year had an SDHI at both T1 and T2 timings — Adexar (fluxapyroxad+ epoxiconazole) and Librax (fluxapyroxad+ metconazole); Aviator and Ascra; Aviator and Elatus Era (benzovindiflupyr+ prothioconazole). Chlorothalonil (CTL) and Epic (epoxiconazole) at T1 followed by a T2 of Comet (pyraclostrobin), Epic and CTL.

“This was on average 0.2t/ha behind on yield, but it was a reflection of the season — if we’d had rain early on, we would more than likely have seen the SDHI programmes performing a lot better,” notes Russell.

But the best performing programme was one that reacted to the season. “With this, we decided not to apply SDHIs at either T1 or T2, as the level of disease didn’t warrant the investment, so followed the non-SDHI treatment. But we then put Librax on at T3,” says Russell.

Unusual programmes

More interesting, perhaps, were the more unusual programmes. A non-SDHI treatment saw Amistar Opti (azoxystrobin+ CTL) and Epic (epoxiconazole) at T1 followed by a T2 of Comet (pyraclostrobin), Epic and CTL.

“However, with stronger septoria varieties coming good as a result of the season, that’s worth way more than any trials information,” says Ben. He has some pointers for those looking to give it a go:

**Choose your site carefully.** Aim for a field or area within it that has a consistent soil type, with uniform yield performance. There should be no drainage or nutrient-deficiency issues, keep your trial areas off the headland, and put them next to each other so you have a comparison line.

**Keep it simple.** Testing too many variables is unlikely to give you a conclusive result. Keep it to just one or two criteria, such as T1 and T2 fungicides, or the effect of a biosimulant programme.

**Try to replicate.** Two or three sets of tramlines reduce errors and make a result more statistically robust.

**Monitor results throughout season.** Take measurements, ensuring they’re representative, of plant and ear counts, NDVI scans if possible, photos, and try taking samples with a SPAD meter.

**Take care when combining.** Keep the header within the individual plots and measure as June turned progressively wetter. This came out top by over 1t/ha,” he reports.

Ben notes it’s a programme that only came good as a result of the season. “However, with stronger septoria varieties helping to give better protection at the beginning of the year, shifting the SDHIs to T2 and T3 could be an option to consider. But you won’t know if it was the correct

**Do your own trials and Judge For Yourself**

Russell is one of around 50 growers who have taken part in Bayer’s Judge For Yourself programme, where Ascra and Aviator are pitched in split-field or tramline trials against the on-farm standard fungicide programme.

“Whenever we’ve done Judge For Yourself, Ascra has always given us the better result, by around 0.2t/ha,” he says.

The trials themselves are branching out, says Ben. As well as providing fungicides to compare on farm, Bayer has helped with taking NDVI images of crops, using drone technology, providing additional specialist advice and bringing farmers together regularly to discuss results.

“It’s this interaction that’s a really important part of the programme, and often the stimulus for how it evolves.”

One new aspect introduced, for example, has been to try out Aviator’s approval for use in oilseed rape. “When applied mid-flowering, growers have found it brings a yield response as much as 0.4t/ha greater than Filan (boscalid) and Amistar (azoxystrobin).”

But you don’t have to be part of Judge For Yourself to carry out on-farm trials. “If you can prove something works for you on your own farm, that’s worth way more than any trials information,” says Ben.

He has some pointers for those looking to give it a go:

- **Locate your on-farm trial in a crop on a uniform piece of land and keep it simple, testing just one or two variables.**

- **Choose your site carefully.** Aim for a field or area within it that has a consistent soil type, with uniform yield performance. There should be no drainage or nutrient-deficiency issues, keep your trial areas off the headland, and put them next to each other so you have a comparison line.

- **Keep it simple.** Testing too many variables is unlikely to give you a conclusive result. Keep it to just one or two criteria, such as T1 and T2 fungicides, or the effect of a biosimulant programme.

- **Try to replicate.** Two or three sets of tramlines reduce errors and make a result more statistically robust.

- **Monitor results throughout season.** Take measurements, ensuring they’re representative, of plant and ear counts, NDVI scans if possible, photos, and try taking samples with a SPAD meter.

- **Take care when combining.** Keep the header within the individual plots and measure yields over a weighbridge. A grain analysis is also useful.

- **Keep an open mind.** Let the results speak for themselves — a null result can be as informative as one that shows a positive benefit.

Russell notes that on-farm trials help address criticisms about false claims directed at manufacturers that he feels are misplaced. “They do a lot of R&D and if they make a claim for a product, they do so with good reason. But I don’t do trials to prove them wrong, I do so to find out for myself how the products work and how best to use them. Unless you’re going organic, it’s a route I’d advise to anyone.”

Something you’ve proven works for you on your own farm is worth way more than any trials information, says Ben Giles.
Partners in Performance is the result of a long-standing collaboration between Bayer and a group of progressive growers. It started in 2011 with the launch of Aviator Xpro when growers were invited to trial Aviator on their farm. In these split-field trials, Bayer took a back seat with the only demands being the field area for fungicide comparison and crop yield verified over a weighbridge or via combine yield monitor –– everything else was down to the farmer.

Over time, this has developed into a club. Each year, the farmers meet to discuss results, listen to guest speakers and debate winter wheat management issues.

Partners in Performance aims to bring farmers and specialists together to develop solutions to improve crop performance and investment return.
Of all winter wheat diseases, the stem-based complex is probably one of the hardest to identify.

Stem-based browning could be just that, or it could be eyespot. And if it is, then is it sharp or true eyespot?

Add in mildew and fusarium to the mixture and you have quite a range of disease threats.

In short it isn’t easy, and even some of the best plant pathologists have been perplexed at times — especially as these diseases often strike when plants are still small, making observation difficult.

Stem-based diseases include foot rot, microdochium and mildew, but according to a recent survey carried out by CPM and Bayer, it’s eyespot (true) and fusarium that sit at the top of the list when it comes to the biggest threats on farm, with 77% and 58% of growers stating it as their main stem-based threat to winter wheat crops, respectively.

But just how much of an issue are they?

“Yield reductions average about 5%, but in severe infections, losses can be as high as 30%,” explains Kerry Maguire, fungicide development manager at Bayer. “These losses are due to impeded nutrient flow to the roots and water and nitrogen to the leaves later in the season. This leads to stunting, poor root systems with associated low drought tolerance, and whitehead formation. This can be further compounded by crop lodging, as basal lesions cause stem breakage.”

Quite challenging

The difficulty in identifying these stem-based diseases appears to be one of the biggest reasons for failing to mitigate against them, with 61% of growers stating that identifying stem-based diseases can be tricky in some situations, and a further 19% noting the identification process as quite challenging.

“Defined symptoms don’t always emerge until the period after optimum control.”

However, what typically separates stem-based browning from the disease complex is the penetration of leaves and stems, adds Patrick. “Stem-based browning only affects one side of a leaf whereas disease will penetrate leaf or stem surface. This is particularly true of eyespot and fusaria.”

Perhaps rather interestingly, 39% of growers said they didn’t know whether or not the stem-based complex is increasing in frequency, adding further weight to the argument that they really are difficult diseases to comprehend, adds Kerry. “They can be very patchy — some areas can be affected and others won’t. Likewise, you’ll only ever come across them in some years.

“From our own trials last year, we were quite surprised at just how much eyespot was left in the field after harvest. In my opinion, if you really want to get a handle on your disease levels, then it’s worth looking at the crop both in the early season and after harvest. If you can see disease in the stubble, you’re likely to have a problem the following year.”

Fiona Burnett, professor of applied plant pathology at SRUC agrees that it can be hard to know whether stem-based diseases are on the rise in winter wheat, however, their presence in other crops could shine a light on the severity of the issue. “Typically, the UK grows a lot of ‘white rotations’ and we’re actually seeing stem-based problems appear in winter and spring barley now too.

“Basically, that means it’s becoming problematic in more than just wheat, which could indicate that the issue is spreading.”

Technical Stem-based disease survey

The stem-based complex can be most difficult to identify, with a number of issues raised in a recent CPM/Bayer survey. In a bid to bring growers answers, CPM has delved deep into the symptoms, situations and solutions for these yield-robbing diseases.

By Charlotte Cunningham
Stem-based disease survey

How often do stem-base diseases threaten winter wheat crops on your farm?

- Always
- Every season
- Most seasons
- Infrequently
- I don’t know

What are your most common stem-based threats?

- Eyespot
- Sharp eyespot
- Foot rot
- Fusarium
- Microdochium
- Mildew
- I don’t know

Fiona also raises an interesting point about chemical usage and how perhaps growers are unintentionally masking some of the underlying issues. “I think one of the reasons there’s such uncertainty as to whether the stem-based complex is increasing in frequency and severity could be due to the increased usage of SDHIs at T1. It may be that some growers are managing eyespot, even if they’re not directly targeting it.”

With the disease causing issues to stem integrity and strength, crop lodging is often a tell-tale sign that something isn’t quite right — even if there are no obvious signs of disease.

Crop lodging was widely reported last spring, and the survey revealed that 38% of growers experienced lodging — but field area was small and the damage was negligible — while 14% said lodging varied from field to field, with the hardest hit crops suffering quite significant yield losses.

In contrast, 34% said they didn’t really have a problem.

Good understanding

“Lodging is caused by so many different things, such as heavy rain late in the season,” explains Kerry. “It’s hard to tell exactly what the cause is unless you’ve got a good understanding of your nutrient and disease levels.”

Fiona agrees and adds: “If you’ve grown a crop with a good strong stem and applied PGR effectively, then of course, eyespot or a mixture of diseases could be a factor. But there are also so many other things that need to be considered.”

What’s more, for those growers who did have lodging issues, the majority (60%) said this occurred despite applying PGR, creating some confusion. “A lot of the lodging I saw last year was high up in the crop, so this could be down to sub-optimal PGR timings, rather than just a disease issue,” adds Kerry.

To be proactive and to try to drill down into exactly what the reason behind crop lodging could be, Fiona advises getting out into the field and examining the stem base for any clues.

“Often, people are disappointed in yields, but overlook the role crop lodging can play — in particular, discounting any kind of influence diseases such as eyespot and fusarium could have played.”

“If the crop has lodged, it’s important to find out why, so looking at the stem base for any clues is essential, says Fiona Burnett.

Spotting eyespot

The survey presented growers with two pictures and asked them to identify which was true eyespot.

An impressive 80% answered correctly, but for the other 20% that weren’t sure, what is the best way to identify an incidence of true eyespot?

“Don’t be afraid to get out in the field and pull up young crops or stubble to look for eyespot,” says Kerry. “A tip from me is to use your fingernail to rub the surface of the plant. If you can rub off the black dot, then you’ve probably got eyespot.

“Due to the sheer tenacity of the pathogen to infect the stem, identifying and targeting it at this early stage is key.”

80% of growers managed to correctly identify true eyespot (left)

To spray, or not to spray

When it comes to PGR timings, 45% of growers said they targeted the T0 and T1 slots, while 21% stretched this to include T2.

And for fusarium specifically, the majority of growers (38%) said they always look to achieve some suppression at GS32/T1 or GS39/T2 and back up with a robust T3 spray, while 28% said early fusarium pressure is an indication of a heightened fusarium/mycotoxin risk, so they would treat with the most effective active at GS65/T3.

But what’s the best approach?

“This season could be particularly interesting,” says Patrick. “In previous seasons we’ve typically needed four fungicide sprays to control a range of diseases from GS30 onwards. But possibly not this spring.”

He adds that a T0 may not be required, should early season septoria or yellow rust pressure be light. “Prothioconazole is the best azole against the stem-based complex but others used at GS30 have some activity, and it’s an opportunity to apply a specific mildewicide if needed. Stem-based pressure might have been masked by fungicide use in the past.”

If the crop has lodged, it’s important to find out why, so looking at the stem base for any signs of disease is essential, says Fiona Burnett.
New Pacifica Plus is a post-emergence herbicide ideal for spring 2020 conditions where any grass-weeds, including black-grass, brome or rye-grass, are present amongst broad-leaved weeds.

Small steps today, big rewards tomorrow

Discover more at
cropsience.bayer.co.uk/pacificaplus

PACIFICA®
PLUS

For mixed grass and broad-leaved weed control
in your winter wheat this spring

Which best describes your approach to controlling eyespot?

- I actively consider risk factors and attempt to minimise them pre-sowing
- I use AHDB pre-sowing and spring risk assessments to determine risk, and treat accordingly
- I assess symptoms in the spring and spray if necessary
- I don’t consider eyespot usually as I know my fungicide programme will take care of it
- I don’t treat for eyespot as it is not damaging
- I don’t know

How challenging is it to identify stem-based diseases?

- Extremely difficult
- Quite challenging
- Can be tricky in some situations
- Relatively straightforward
- I don’t know

> signs of disease is essential. Of course, as we know, it can be difficult to identify, but it can help with deciding whether low yields due to lodging are potentially a result of disease, or whether it’s more of a management issue.

“Where you think it could be a disease issue, my advice is to take the whole basket of risk into account, as quick field examinations can miss vital things. It’s all about building an awareness of risk.”

With chemical efficacy and availability a difficult area for arable growers across the board, recent years have seen a shift in attitude — looking at the bigger picture around a problem, rather than just heading to the chemical store.

This theory is also important when it comes to tackling stem-based diseases, says Fiona. The survey revealed 46% of growers actively consider varietal risk to stem-based diseases when it comes to selecting a variety to grow. “Front-loading your risk management is so important for disease control, so opting for varieties with more robust protection will help to give you an extra edge before the seed is even in the ground,” notes Fiona.

However, despite growers’ desire to select these more robust varieties, they aren’t always easily available, she adds. “If we look at septoria for example, varietal resistance is getting much better, but with eyespot, we’re not seeing that improvement as much, which provides a bit of conflict for growers.

“If you can’t have everything in one variety, the advice from me is to select something that satisfies your main risk. Hopefully we’ll see varieties with improved eyespot resistance going forward.”

Front-loading risk was a consistent theme throughout the survey, with 37% of growers stating they actively consider risk factors (when it comes to controlling eyespot) and attempt to minimise them pre-sowing. In contrast, 47% said they take
Congratulations to our winner Keith Norman from Lincs who responded to the CPM/Bayer survey on stem-based diseases and has won the fabulous prize of a set of Sonos Smart Speakers.

Keith responded to the survey and completed the tie-breaker question on the smartest way to avoid problems with stem-based diseases. His answer, “a holistic approach — using varietal selection, risk factor analysis, field examination, appropriate fungicide intervention and PGR usage to minimise stem penetration,” impressed the judges due to his awareness that it’s not a one-size-fits-all answer when it comes to stem-based diseases, as well as the broad range of factors he utilises to minimise risk.

The aim of the survey was to explore the complexities of stem-based diseases. To take part in the next survey, make sure we have the correct details for you by emailing angus@cpm-magazine.co.uk.

Thinking about risk before the seed is in the ground allows growers to reconsider variety choice, restructure the rotational position of crops or even move the sowing date, she adds. “Manipulating sowing dates can be difficult but you can drill in the order of risk.”

However, being prepared before sowing doesn’t mean you can, or should, take your eye off the ball in the spring, adds Fiona. “The two timings aren’t independent of each other. My advice would be to combine the two approaches — do what you can pre-drilling, then reassess the symptoms again in the spring.”

### Eyespot assessment — what’s your risk?

Back in 2004, Fiona worked alongside AHDB to create a risk assessment method to identify eyespot within winter wheat crops. While it’s now somewhat dated, it remains a useful tool for growers to determine their eyespot risk.

The aim of the project was to develop a risk algorithm allowing growers to accurately determine the need for eyespot treatment in their wheat crop. This was then turned into a scoring-system, with growers able to calculate their risk based on this.

“Base your treatment on your previous experience of the disease, and on the risk assessment which is shown below. Wetter sites with a high preponderance of cereals in the rotation are at greater risk,” says Fiona.

The four key stages of calculating risk include:

1. Work out the pre-sowing score — taking into consideration region, soil type, previous cropping, tillage and sowing date.
2. Assess eyespot disease in the spring — at GS31-32, as the % of stems showing visible eyespot symptoms on plants collected at random.
3. Determine final eyespot risk — adding together pre-sowing score and eyespot incidence at GS31-32 to give you a low/medium/high risk assessment.
4. Take action based on the final eyespot risk — Low risk = no action; medium risk = treatment may be justified where eyespot has been a recurring problem, leading to consistent yield reduction; high risk = Treatment may be justified even in fields where eyespot has rarely been known to cause yield damage.

### Winner announcement

Congratulations to our winner Keith Norman from Lincs who responded to the CPM/Bayer survey on stem-based diseases and has won the fabulous prize of a set of Sonos Smart Speakers.

Keith responded to the survey and completed the tie-breaker question on the smartest way to avoid problems with stem-based diseases. His answer, “a holistic approach — using varietal selection, risk factor analysis, field examination, appropriate fungicide intervention and PGR usage to minimise stem penetration,” impressed the judges due to his awareness that it’s not a one-size-fits-all answer when it comes to stem-based diseases, as well as the broad range of factors he utilises to minimise risk.

The aim of the survey was to explore the complexities of stem-based diseases. To take part in the next survey, make sure we have the correct details for you by emailing angus@cpm-magazine.co.uk.

Thinking about risk before the seed is in the ground allows growers to reconsider variety choice, restructure the rotational position of crops or even move the sowing date, she adds. “Manipulating sowing dates can be difficult but you can drill in the order of risk.”

However, being prepared before sowing doesn’t mean you can, or should, take your eye off the ball in the spring, adds Fiona. “The two timings aren’t independent of each other. My advice would be to combine the two approaches — do what you can pre-drilling, then reassess the symptoms again in the spring.”
When farming meets science

Farmer-led groups, co-ordinated by scientists, are exploring innovative ways to boost OSR productivity and combat cabbage stem flea beetle. CPM reviews some results.

By Tom Allen-Stevens

It may seem a little like cutting off your nose to spite your face, but early trials work conducted by a group of farmers suggests cutting or grazing oilseed rape can significantly reduce damage from cabbage stem flea beetle (CSFB) larvae. The snag is that the first year of trials have also resulted in an average yield penalty of 14% from the winter defoliation.

A second year of trials is now underway aiming to explore this practice further and shed more light on how timing in particular could have an influence. It’s carried out through Innovative Farmers, a network that supports farmers who want to carry out on-farm trials. Launched in 2015, this brings groups of farmers together who work directly with a researcher to design field labs – on-farm trials that can be set up quickly and are designed to be practical. The group decides on the topic and the researcher helps design a trial.

The CSFB control field lab has brought eight farmers together under the stewardship of Dr Sacha White of ADAS.

“Damage from CSFB larvae has increased rapidly in recent years. It’s brought significant crop losses to growers, particularly those in the Eastern Counties,” he says. Monitoring shows average populations from 2003-2012 were just 0.09 larvae per plant, but by 2017 this had shot up to 8.2 per plant, with some plants assessed in March bowing under a burden of more than 80 larvae.

Limited options

“Growers now have limited control options with no neonicotinoid seed dressings and resistance to pyrethroids becoming a growing problem,” he says. The larvae overwinter in OSR leaf petioles before moving into the stems as they mature in early spring, he explains. That’s where the damage occurs, and the more larvae per plant, the more it suffers.

So the theory behind the trials is that if you can remove the leaves before the larvae move into the stem, you’ll save the plant which can grow up again in spring. Previous trials, stretching right back to 1992, have proven OSR’s remarkable ability to bounce back from winter defoliation, and can even result in a canopy benefit and higher yield.

“AHDB-funded trials were carried out in 2016/17 to assess the effect winter defoliation would have on larval burden,” continues Sacha. In a randomised, replicated plot trial, a lawn mower was used to defoliate a WOSR crop in either December, January or March.

“We found that the later you leave the defoliation, the lower the number of larvae found. Importantly, there were no significant differences in yield between the treatments,” he reports (see chart on p32).

So that was the basis of the field lab (see panel on p32). The first-year results show that, on average, defoliation reduced the number of larvae by 39%, with grazing and topping leading to a 51% and 25% drop respectively. But the results from the group showed that defoliation resulted in yield losses, with an average reduction of 14.2%.

“The yield results from year one of the research were disappointing,” notes Sacha. “But we believe this is down to timing as the crops didn’t have time to recover, rather than being down to the method itself. It could also be in part due to the weather as the mild winter conditions last year may not have killed off larvae and poor spring conditions may have limited crop recovery.

“This year, many early sown crops have survived adult flea beetle feeding but are likely to have high larval loads and so defoliation may be ideal for these crops.”

The yield results were disappointing, but Sacha White believes this is down to timing and weather.
THE CARYX EFFECT

1. REDUCES LODGING
2. INCREASES LIGHT PENETRATION
3. IMPROVES ROOTING

TO MAXIMISE OSR YIELDS

FOR MORE INFORMATION, VISIT AGRICENTRE.BASF.CO.UK/CARYX
Chris Eglington aims for big, strong plants with thick stems to limit the damage from CSFB larvae.

With farmers dealing with devastation caused by this pest and no effective control available, it’s crucial that we explore the factors that can impact on potential solutions and that the research takes place on real farms with real farmers."

So the second year of field-lab trials are now underway, with funding from AHDB and BASF. The aim is to test the timing theory in real farm settings, as well as assessing any variation in results down to weather. For the first time, this field lab will also investigate the size of the larvae, thought to have an important impact on yield loss.

One farmer who’s followed it from the start and is now taking part in the second year of field labs is mid-Norfolk grower Chris Eglington. “My interest started about five years ago when I had some trials with Syngenta on Toprex (difenaconazole+ paclobutrazol),” he recalls.

“As part of the trials, they took some CSFB larval counts. I didn’t think there’d be any, but was staggered when they found up to ten in one leaf.”

With 400ha at Letton, soil type for SS Eglington and Son ranges from sandy loam to heavy clay loam. An all combinable crops rotation has pushed OSR out to just once every eight years, interspersed with winter wheat and barley and peas as the other break crop.

“We’ve been growing Barbados for the past six years, but have moved to Dariot this year,” says Chris. The crop’s established with a 7-row Kverneland Monopill precision drill in a one-pass combo trailed behind a subsoiler. “We plant just

Lessons learned from farmer-led field lab

The first year field lab, funded by AHDB and Syngenta, brought in data from eleven other sites across Herts and Sussex, along with the Norfolk trial. Grazing appeared slightly more effective at reducing larval numbers than topping (51% compared with 25% — see chart right).

This was probably due to the greater severity of defoliation that occurred from grazing, notes Sacha. “Also larvae may be ingested by sheep rather than surviving in topped debris, from which they could re-invade the plants.” The level of larval Infestation in the stems, although low overall, was actually almost double in the defoliated areas compared with untouched crop.

Yield reductions were reported from all sites, ranging from 11% to 50%. Only three sites had data suitable for robust yield comparisons (see chart right), which showed an average reduction of 14%. “Defoliation is likely to reduce the number of adult CSFB emerging from the crop, however, and may, in turn, reduce CSFB pressure in following OSR crops,” he suggests.

There were also practical difficulties — preventing overgrazing by sheep was found to be hard while multiple wheelings occurred when topping, which didn’t do the crop any good, given ground conditions in winter months.

The yield results came as a disappointment to the growers involved, too, who gathered in October to discuss results. “We have a lot to learn about the severity of grazing, finding the ideal stocking rate and timing,” noted one. Topping was felt to leave stems exposed to recolonization.

The weather during spring last year, with dry conditions followed by a relatively cool May, was also considered unsuitable for good regrowth. “We just couldn’t regenerate the biomass, but then the plant’s ability to do so may have been compromised by the larval burden anyway.”

For those interested in defoliating crops to reduce CSFB, Sacha has the following advice:

- Target crops that have experienced significant adult CSFB pressure
- Target early drilled, non-backward crops in good soil as these tend to have higher larval populations and are likely to be more robust
- Defoliate early, ideally before Jan, to ensure the crop recovers
- Manage pigeon pressure, choosing a crop away from woodland.
24 seeds/m² and typically achieve a plant count of 14/m². More important than anything is that we double roll to get good seed-to-soil contact, and that helps establishment.

Drilling usually takes place around 20 Aug, but this autumn his 25ha field was drilled on 11 Aug. “We wanted to get the crop up and going before the adult beetles came in. We’re aiming for big, strong plants with thick stems and I believe that helps limit the damage from the larvae.”

Last year, as part of the field lab, Chris decided to try grazing, and duly fenced off a 1ha plot of his field between two tramlines. “We have sheep on the farm under an arrangement with a local shepherd, that puts a flock of 400-1800 ewes in our fields throughout the year. They mainly graze our 100ha of pasture that’s in Higher Level Stewardship.

“We put 110 ewes on the OSR from 1-9 Jan. The aim was that they’d take out the leaves, but they took the middle of the plant too, and in retrospect I think they grazed it too hard.”

The crop began to regrow in Feb and a larval count revealed the petioles from the grazed area contained about half the burden of the ungrazed (see chart on p32). Flowering was delayed by around ten days, lasting three days less, and a pollen beetle assessment on 20 April found pest pressure to be higher in the grazed area, however. The grazed plants responded by producing multiple stems and the seed yield at harvest was significantly lower — 3.25t/ha compared with 4.15t/ha.

Whole crop ‘grab’ samples Chris submitted before harvest to ADAS were analysed by ADAS Agronomics (right). The grazed area didn’t need an autumn dressing as the larvae were below the threshold. The sheep took the charlock out, and this included crop that was infested with charlock. “The sheep took the charlock out, but again I think they grazed the crop too hard, and with the wetter weather, the field looked like the Somme by the time we took them out,” says Chris.

Although he’s yet to see how the crop will recover, Chris’ gut feeling is that yield potential has yet again been compromised.

**Cross-drilling trial brings valuable knowledge exchange**

Finding the optimal plant population may be key to maximising OSR yields, according to results from a grower-led trial conducted by three farmers who cross-drilled an area of their crops.

The trials were carried out as part of a programme co-ordinated by ADAS and funded by EIP-Agri, the EC’s innovation partnership. The cross-drilling group was one of five farmer innovation groups (FIGs) who carried out a total of 48 trials in 2018 and 2019 to test their own questions, which were often prompted by results they had achieved from YEN (Yield Enhancement Network).

Two of the three trials provided a positive yield response where the growers with 50cm row widths had cross-drilled a plot within their crop. At the third site in Cheshire, a yield reduction was probably down to the relatively narrow (12.5cm) row width and high seed rate, concludes Dr Sarah Kendall of ADAS, who co-ordinated the trial.

“This trial wasn’t about the commercial viability of cross-drilling, but more to explore how spatial set-up affects yield,” she notes.

N Yorks grower Richard Wainwright was one of the growers who took part in the trial. “Visually the difference was dramatic, but if you give the plant the space it needs, you still have to feed it right so it reaches its potential,” he maintains.

But what he learnt most from the trial was the benefits of working with scientists. “You can’t underestimate how rewarding it is carrying out a trial and having a scientist on your farm.”

Following the project, there are plans to use the farmer-led trial model to help stimulate agri-innovation as part of a number of measures due to be introduced through the Agriculture Bill aimed at driving up productivity.

“The most exciting thing about these trials is the potential to use the results to inform the science,” says Prof Roger Sylvester-Bradley of ADAS. “Great ideas are just as likely to come from farmers as from a scientist, and learning together is so much more effective than learning in isolation.”

<table>
<thead>
<tr>
<th>Convert Yield (t/ha)</th>
<th>X-drilled Yield adv (t/ha)</th>
<th>Yield diff for 95% confidence</th>
<th>Seed rate (l/m³)</th>
<th>Row width (cm)</th>
<th>X-drilled Plant pop (l/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Yorks</td>
<td>4.63</td>
<td>1.1 ±0.12</td>
<td>0.24</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Lincoln</td>
<td>3.40</td>
<td>0.22 ±0.12</td>
<td>0.23</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Cheshire</td>
<td>4.61</td>
<td>-0.98 ±0.37</td>
<td>0.72</td>
<td>83</td>
<td>12.5</td>
</tr>
</tbody>
</table>

**Erratum**

In the Feb issue on p38, we referred to a new urease inhibitor containing both NBPT and NPPT. The correct brand name for this is Limus, not 2-NPT as stated. **CPM would like to apologise for any confusion caused.**
The road to resistance?

With questions raised over fungicide resistance in OSR and the best course of preventative action, an AHDB project set out to discover the current status quo and look at the best tactics to protect fungicide efficacy in the field. CPM investigates.

By Lucy de la Pasture

While resistance management strategies have become a core part of fungicide programmes in cereal crops, oilseed rape has been somewhat lagging behind. A research project, funded by AHDB and partnered by industry, has been evaluating the risk of resistance developing in the main OSR diseases and looking at the best way to manage this risk in a cost-effective way.

Catherine Harries, who manages cereal and oilseeds disease research at AHDB, says there’s a very real threat of fungicide resistance developing in OSR diseases.

“Azole-insensitive strains of Pyrenopeziza brassicae, which causes light leaf spot (LLS), are already present in the UK. In Europe resistance to SDHIs has been reported in Sclerotinia sclerotiorum (sclerotinia) and further afield in Australia, azole insensitivity has been found in Leptosphaeria maculans (phoma stem canker). Such strains are likely to occur here eventually,” she says.

Catherine says the aim of the project has been to pre-empt the development of fungicide resistance and put in place cost-effective strategies to help maintain the efficacy of fungicides.

Single-site chemistry

“In OSR there’s a dependence on single-site modes of action which aren’t generally applied in mixture with fungicides from other groups. From our experience in cereal crops, we already know this isn’t a good resistance management strategy.”

Charged with managing the project is plant pathologist Dr Faye Ritchie, based at ADAS Boxworth in Cambridgeshire. She explains when the project started in 2016, growers were having to very much rely onazole chemistry to control both phoma and LLS in the autumn. The situation became worse following the loss of Refinzar (penthiopyrad+ picoxystrobin) in 2018, which had provided an autumn alternative to azole chemistry in the form of an SDHI and strobilurin (QoI) co-form.

“The first stage of the project was to look at the risk of fungicide resistance developing in the pathogens causing LLS, phoma stem canker, sclerotinia and alternaria (Alternaria brassicae/brassicicola). We did this using a published peer-reviewed model to predict how long it was likely to take for resistance to occur for all the modes of action and active ingredients available to control OSR diseases,” explains Faye.

“The results showed the risk of resistance developing is very similar across all modes of action. The different pathogens showed more variation, with sclerotinia having the lowest risk of developing resistance and alternaria the highest, though very closely followed by LLS and phoma.”

Having established the risk of fungicide resistance developing, Faye explains that LLS was the main concern. “We know the mutations that cause azole insensitivity are already present in the UK pathogen population. In 2015 the LLS epidemic was very difficult to control in OSR crops, with multiple fungicide applications being commonplace as growers struggled to...”
control it and we needed to understand why,” she says.

LLS is a polycyclic disease which makes it difficult to control because the pathogen is always present in the crop at different stages of its lifecycle. “Looking at historic data, LLS control from fungicides ranges from 40-85% in AHDB’s fungicide performance trials, with the best efficacy coming from an autumn fungicide followed by a further application in the spring,” highlights Faye.

During the three years of the project, samples of LLS were sent from field trials to Rothamsted Research to test for the presence and identity of mutations associated with decreased sensitivity to azoles and to assess their prevalence in the population.

Researchers at Rothamsted had previously identified two alterations in the LLS CYP51 protein, the target site inazole chemistry, known to be associated with decreased azole sensitivity — G460S and S508T. They reported the mutation resulting in G460S to be dominant and present in 70-90% of the population in 2017-18, which was substantially higher than in earlier testing in 2011 where it was only found in approximately 20% of isolates, explains Faye.

In addition, the majority of strains are now also able to overexpress CYP51 after exposure to azoles due to the presence of different DNA inserts in the promoter region of the encoding target gene.

“The unexpectedly high levels of CYP51 promoter inserts in combination with G460S in the population at the start of the season made it very difficult to compare resistance management strategies by testing for selection, and analysis is ongoing to determine the conclusions we can draw from the work.”

Still effective

In spite of the high proportion of the LLS pathogen carrying this mutation, azoles are still effective in controlling the disease in the field. “Even though we found this mutation to be widespread in all eight trials, there was no difference in the performance of azoles and non-azoles between sites.”

This has been further backed up by the AHDB fungicide performance trials, she highlights, where no further shifts in azole performance have been detected. That begs the question, why is this?

Faye explains that the significant decline in azole performance against septoria in wheat has been mainly associated with the accumulation of multiple mutations in the CYP51 encoding gene of the septoria pathogen.

“In lab studies at Rothamsted, researchers at Rothamsted, if the two known LLS mutations occur together in the CYP51 protein then azole sensitivity can be up to 35 times less in yeast transformants. But it’s thought that both mutations can’t evolve together in nature due to fitness costs, which may be why azole

control it and we needed to understand why,” she says.

LLS is a polycyclic disease which makes it difficult to control because the pathogen is always present in the crop at different stages of its lifecycle. “Looking at historic data, LLS control from fungicides ranges from 40-85% in AHDB’s fungicide performance trials, with the best efficacy coming from an autumn fungicide followed by a further application in the spring,” highlights Faye.

During the three years of the project, samples of LLS were sent from field trials to Rothamsted Research to test for the presence and identity of mutations associated with decreased sensitivity to azoles and to assess their prevalence in the population.

Researchers at Rothamsted had previously identified two alterations in the LLS CYP51 protein, the target site inazole chemistry, known to be associated with decreased azole sensitivity — G460S and S508T. They reported the mutation resulting in G460S to be dominant and present in 70-90% of the population in 2017-18, which was substantially higher than in earlier testing in 2011 where it was only found in approximately 20% of isolates, explains Faye.

In addition, the majority of strains are now also able to overexpress CYP51 after exposure to azoles due to the presence of different DNA inserts in the promoter region of the encoding target gene.

“The unexpectedly high levels of CYP51 promoter inserts in combination with G460S in the population at the start of the season made it very difficult to compare resistance management strategies by testing for selection, and analysis is ongoing to determine the conclusions we can draw from the work.”

Still effective

In spite of the high proportion of the LLS pathogen carrying this mutation, azoles are still effective in controlling the disease in the field. “Even though we found this mutation to be widespread in all eight trials, there was no difference in the performance of azoles and non-azoles between sites.”

This has been further backed up by the AHDB fungicide performance trials, she highlights, where no further shifts in azole performance have been detected. That begs the question, why is this?

Faye explains that the significant decline in azole performance against septoria in wheat has been mainly associated with the accumulation of multiple mutations in the CYP51 encoding gene of the septoria pathogen.

“In lab studies at Rothamsted, researchers at Rothamsted, if the two known LLS mutations occur together in the CYP51 protein then azole sensitivity can be up to 35 times less in yeast transformants. But it’s thought that both mutations can’t evolve together in nature due to fitness costs, which may be why azole
In recent seasons finding an active ingredient that wasn’t an azole to use in the autumn has been nigh on impossible, but two new products gained approval in 2019, adding co-forms containing additional modes of action for phoma and LLS spot control.

Aviator Xpro (bixafen + prothioconazole) has been approved for control of light leaf spot, phoma stem canker and sclerotinia. Independent assessment in AHDB’s fungicide performance trials show it tracks the performance of straight prothioconazole very closely for LLS control, though in terms of yield the trials show an advantage over prothioconazole alone.

Angle (azoxystobin + difenoconazole) has an approval for phoma stem canker reduction and sclerotinia control (moderate), though in the fungicide performance trials also showed control of LLS.

Faye highlights that when using co-forms as part of a resistance management strategy it’s useful to know the relative strengths of its active ingredients on the different diseases. “For example, if one part is strong on a disease and the other has no activity against the same disease, then relying on this co-formulation as a mixture isn’t a good resistance management strategy.”

**Low disease pressure**

Faye points out the field trials took place during three low pressure disease years. “According to the Defra oilseed rape disease survey statistics, in 2016-2018 only 12-15% of OSR crops were affected by LLS. This compares with 23-44% in the period 2008-2016,” she explains.

“We found that, where the same fungicide programmes were compared across three years and eight sites, gross margins were not significantly different from where no fungicides had been applied,” she says.

“A yield response of 0.17-0.27t/ha was necessary to cover the cost of fungicides and associated yield responses achieved in trials just covered the cost, despite low disease pressure. From the industry sponsored trials, a range of different fungicide products/alternation and tank mixture strategies were tested.

“It was found that mixtures were generally the most expensive strategy, followed by alternation with the azole-only strategies coming out as being the least expensive. The conclusion from this is that having access to good information on the efficacy of products, at a range of doses, will be key to putting together a cost-effective resistance management fungicide programme.”

“Resistance management strategies don’t have to be more expensive than azole-only fungicide programmes, and by implementing them it will make sure that the efficacy of active ingredients is preserved for longer,” she concludes.

---

**A start to seeing the bigger picture**

While fungicide resistance management strategies have been well developed in cereals, in other crops it’s an area where research has been lacking, says BASF’s Clare Tucker.

“In oilseed rape, there’s been a real dependence on azoles, particularly early in the programme, but also a lack of research into how fungicide use may affect the development of resistance in pathogens. The LLS pathogen is present in the crop practically from the get-go and phoma infects in early autumn, so these pathogens are exposed to fungicides over a long period of time. In comparison, fungicide applications only start in the spring for cereals.

“Getting a feel for what’s going on in the OSR pathogen population will help make informed decisions and identify where more work needs to be done. That’s what makes this project so valuable — it’s good fundamental science that’s been a long time coming,” she says.

Even though the economics of applying resistance management to fungicide strategies didn’t always fall the right side of positive in this trial series, Clare points out that fungicides have to be applied in a preventative manner when there’s no way of knowing how the disease will develop over the season.

“Because OSR is also a very elastic crop, yield is not just determined by good disease control. It’s very different to wheat, where there’s a very direct relationship between levels of foliar disease and yield. In OSR, there’s a much more complex relationship with factors such as cultivar interactions, canopy size and canopy duration all influencing yield. It’s a jigsaw that needs to be put together to optimise yield by focusing inputs on a more individual crop basis,” she says.

Clare believes the project provides a good platform for further research to look a bit more closely at how this puzzle comes together. “As a manufacturer, we strongly support the agronomy work ADAS carry out looking at the components of yield and the outcomes of this project will help build on this important agronomy work.”
Feed the hidden hunger

Technical Research Briefing

The benefits of applying micronutrients through foliar applications are well established, but what about when the crop is too small to take it up? CPM assesses the value of a micronutrient coating applied to granular fertiliser.

By Tom Allen-Stevens

Chances are, if you have crops in the ground, they’re getting a bit hungry. And that won’t just be for nitrogen and other major nutrients — there are around seven micronutrients considered essential for healthy crops, and attention to these are unlikely even to get a look-in until you get the sprayer out.

“The agricultural supply industry has created a dichotomy around crop nutrition whereby macro-nutrients are delivered in solid and liquid fertilisers and micronutrients are generally supplied as foliars within the crop protection programme,” notes technical director at Origin Fertilisers Peter Scott.

“This dichotomous approach makes proper, integrated nutrient management planning difficult.”

Right balance

R&D development manager at Agrii Jim Carswell has similar concerns. “Relying solely on foliar applications to give a crop what it requires simply isn’t good enough,” he says. “The crop needs the right balance to get established and to get up and away. All too often the approach to nutrition centres around a philosophy of addressing nutrient deficiencies through curative treatments, by which time the crop’s yield potential has already been compromised.”

A better approach is to bridge what’s referred to as ‘the hunger gap’ or a crop’s ‘hidden hunger’, he suggests. This is the period between establishment and when foliar feeds can be applied during which plants will be searching for nutrients, but won’t necessarily show deficiency symptoms if they can’t find them. “To optimise field performance the crop needs access to all the essential nutrients throughout the season,” Jim points out.

The issue is particularly acute this year, he notes. “There are some very sorry-looking crops, and soil samples are indicating low levels of N in the soil. My advice would be to get an NPK fertiliser on as soon as possible. But the crop needs access to micronutrients to assimilate macro-nutrients during growth. Crops established late that haven’t tillered won’t have a sufficient root system to find these, and they won’t have enough leaf for an early foliar application either.”

Jim says there’s a similar issue with spring crops, but this can be addressed at the time of drilling. “You have to get the plant going from day one, so it must be able to access the nutrients to do so. This is further compounded by the likelihood that conditions will turn too cold, too wet or too dry at establishment and put the seedlings under stress.”

Early P is the essential element here, but he believes you can’t rely on soil reserves to supply this, and even freshly applied TSP needs a helping hand. “We know that P helps rooting, but it effectively doesn’t move in the soil, so the nutrient needs to be close to the seed to feed it and thereby stimulate the roots to develop. P also needs nutritional interaction.

Jim Carswell feels that addressing nutrient deficiencies purely through curative treatments compromises a crop’s yield potential.
The effect of starter fertiliser on oilseed rape

The effect of starter fertiliser and foliar Mn on spring barley

What are Wolf Trax DDP innovative nutrients?

The technology behind the nutritional coatings was originally patented by Canadian firm Wolf Trax in 2004. The products first came to Europe in 2009, and then to the UK a couple of years later. The product line was bought for US$85M (£65M) in 2014 by Kansas-based multibillion-dollar concern Compass Minerals.

"Traditionally micronutrients are available as minerals or chelates," explains Michael Lassen, European sales manager for Compass’ plant nutrition lines. “But take-up by the plant and lock-up by the soil always cause problems, so Wolf Trax DDP are formulated with adjuvants, pH adjusters, sticking and wetting agents to aid nutrient take-up."

The key challenge comes in the early part of the year when the soil is too cold. That’s why Wolf Trax developed a way to make micronutrients available to emerging and young seedlings.

The nutrients are formulated into a dry dispersible powder (DDP) that attaches itself to the individual granular fertiliser. This can be applied combination-drilled with the seed, or spread soon after drilling or to a young crop in early spring as growth starts.

Using the fertiliser as a carrier means very low rates of micronutrients can be effectively blanket-applied to the soil. "Fertiliser granules for most blended compounds and nitrogen prills would be just 2-3cm apart. But if you were to apply granular micronutrients the application points would be at least 50cm apart," he notes.

This puts the right amount of micronutrients within easy reach of young roots, he maintains, and the formulation is optimised for root uptake with minimal lock-up. "Dual-Action availability means each DDP nutrient is formulated with at least two forms of the mineral, providing immediate nutrient uptake by the plants, as well as continuous feeding over time," he adds.

So why not apply it to the seed? "We have formulations especially suited to seed coatings," explains Michael. "The limitation there is the amount you can apply to the seed — it doesn’t take you all the way to that first foliar spray."

"Coated to the first fertiliser dressing, however, the minute the crop begins to take up N, P and K as growth gets underway, it’ll access all the micronutrients it needs. This closes the gap until they can be supplied through foliar feeds."

The coating itself is typically applied at just 1-3kg/t. “Our EvenCoat technology thoroughly coats each and every granule of N, P, K or S in a fertiliser blend. Once applied, the DDP nutrient won’t come off during transport or handling, isn’t affected by rainfall or humidity and doesn’t require operators to wear PPE,” adds Michael.

In the UK, it’s applied at Origin’s blending sites, explains Peter Scott. “We have special technology and equipment to apply the DDP micronutrient. We use the umbrella brand name Micro-Match to cover any blended compound fertiliser grade that has Wolf Trax applied to it as this fits in with our Nutri-Match concept of prescription nutrients matched specifically to crop and soil need."

Over 12,000 different products are currently supplied from its plants across Great Britain and Ireland, he says. “There’s an infinite range of prescription compounds formulated to match the specific soil and crop nutrient requirements identified by broad-spectrum soil analyses.”

Alongside N, P and K

Nutri-Match blends, Origin Fertilisers can apply Wolf Trax nutrients either individually or in any combination up to 1% weight by weight (10kg/t) for cereals, oilseed rape, grass, potatoes, maize, root crops and vegetables.

Michael Lassen says the key challenge comes in the early part of the year when the soil is too cold.

Micro-Match nutrients available

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron</td>
<td>18.5%</td>
</tr>
<tr>
<td>Calcium</td>
<td>27%</td>
</tr>
<tr>
<td>Copper</td>
<td>57.5%</td>
</tr>
<tr>
<td>Iron</td>
<td>47%</td>
</tr>
<tr>
<td>Magnesium</td>
<td>35%</td>
</tr>
<tr>
<td>Manganese</td>
<td>33%</td>
</tr>
<tr>
<td>Zinc</td>
<td>62%</td>
</tr>
</tbody>
</table>
Research Briefing

The effect of starter fertiliser and fertiliser coating on winter wheat

A trial carried out by NDSM (now Euroflins) in 2016 in Yorks, aimed to evaluate response of spring barley to soil and foliar micronutrients. Soil analysis showed the level of Mn was very deficient, slightly deficient in Cu and optimal for Zn, but its cation exchange capacity (CEC) was low, indicating the sandy loam has low potential to hold nutrients.

NPK fertiliser with and without Wolf Trax DDP coatings were applied to the seedbed. In five of the seven treatments, foliar Mn was applied at GS13 and GS30. The greatest benefits from the Wolf Trax treatments came where the level of the nutrient in the soil was lowest, with the highest return on investment coming from soil and foliar-applied Mn.

The highest grain yield was achieved from soil-applied Mn, Cu and Zn together, followed by foliar Mn, indicating there may have been a synergistic yield benefit from the combination of soil-applied micronutrients.

Effect on spring barley yield of Wolf Trax DDP coatings and foliar manganese

A trial carried out by NDSM (now Euroflins) in 2016 in Yorks, aimed to evaluate response of spring barley to soil and foliar micronutrients. Soil analysis showed the level of Mn was very deficient, slightly deficient in Cu and optimal for Zn, but its cation exchange capacity (CEC) was low, indicating the sandy loam has low potential to hold nutrients.

NPK fertiliser with and without Wolf Trax DDP coatings were applied to the seedbed. In five of the seven treatments, foliar Mn was applied at GS13 and GS30. The greatest benefits from the Wolf Trax treatments came where the level of the nutrient in the soil was lowest, with the highest return on investment coming from soil and foliar-applied Mn.

The highest grain yield was achieved from soil-applied Mn, Cu and Zn together, followed by foliar Mn, indicating there may have been a synergistic yield benefit from the combination of soil-applied micronutrients.

Research Briefing

To help growers get the best out of technology used in the field, manufacturers continue to invest in R&D at every level, from the lab to extensive field trials. CPM Research Briefings provide not only the findings of recent research, but also an insight into the technology, to ensure a full understanding of how to optimise its use.

CPM would like to thank Origin Fertilisers for sponsoring this Research Briefing and for providing privileged access to staff and material used to help bring it together.

Origin Fertilisers is a national manufacturer and distributor of crop nutrition products with 12 production sites throughout the UK. Key to Origin’s strategy is its continuous programme of innovation and unique product developments aimed at improving nutrient efficiency and farmer returns on fertiliser. Improving soil health through matching crop requirements to a prescription fertiliser blended with up to 14 nutrients has increased the Nutri-Match range to over 12,000 grades.
Competitive over-wintered weeds, like cleavers, may need to be taken out early.

Knowing the weaknesses of spring herbicides is as important as knowing their strengths in order to plug the gaps and avoid any nasty surprises. CPM gets some tips from boots on the ground.

By Lucy de la Pasture

Spring 2020 looks like being anything but a normal season, with a big drop in autumn planting, late drilling and little or no residual herbicides applied. Kieran Walsh, agronomist for Velcourt Advisory Services, reckons just 62% of the planned winter wheat area is in the ground on his patch in the Cotswolds and surrounding counties. Winter barley figures are even more depressed, with just 35% of the crop planted.

“Around 85% of the wheat received a pre-emergence residual herbicide and where it was applied, we had no crop damage. Getting an even seed depth was tricky last autumn so we were very careful not to go spraying residuals if any rain was forecast in the days following application,” he says.

Once the wet weather became entrenched in late autumn, all chances of stacking residual for blackgrass control went out of the window and Kieran confirms none of his crops received a peri-emergence herbicide.

In spite of the lack of residual herbicide applied, it’s broadleaf weeds that are looking to be the most pressing problem to tackle this spring, says Kieran, particularly where no pre-em was applied.

Extra flush

“Drilling was 2-4 weeks later than normal so we had an extra flush of blackgrass out of the way before planting the crop, which may account for the lower than expected levels in crops. The moist soils have also meant the pre-ems worked well last autumn,” he explains.

Many of the broadleaf weeds that are present this spring are usually taken care of with residuals in the autumn, so the spectrum of weeds for spring control is much broader than is generally the case.

“I’m seeing plenty of chickweed, poppy, groundsel, ivy-leaved speedwell, shepherd’s purse and cleavers in crops. Where no pre-em went on at all, the broadleaf weeds are taking over in places.”

The very competitive nature of some of these species, combined with the fact crops are slow-growing, means Kieran will go in as soon as possible to tackle broadleaf weeds where no residual has been applied.

For early control he favours one of the Arylex Active-containing herbicides (halaxifen-methyl) because of their broad spectrum and activity in cool conditions. He accepts he’ll have to come back in with a post-emergence herbicide for blackgrass control in some fields and may also have some late-spring germinating broadleaf weeds to clear up.

When it comes to tackling the blackgrass, Kieran says he’s not keen on putting down any residual now because the crops are shallow rooted and not very growthy. That means they don’t need any added stress and by hitting blackgrass hard in early spring, more harm may be done than good, he believes.

Kieran’s keen not to rely on post-em chemistry in the spring to clean up blackgrass survivors. Instead he’s been looking at cultural control using an...
Hit them early.
Hit them hard.

Brome  Rye grass  Wild oats  Broad-leaved weeds

Broadway® Star gives excellent control of brome species, ryegrass and wild oats in wheat.
It is also effective against a wide range of broad-leaved weeds. Apply for cost-effective and proven control.

Hit your problem hard. Talk to your advisor or find out more at corteva.co.uk

Discover more at corteva.co.uk
Technical Hotline: 0800 689 8899 E-mail: ukhotline@corteva.com

USE PLANT PROTECTION PRODUCTS SAFELY. Always read the label and product information before use. For further information including warning phrases and symbols refer to label.

Corteva Agriscience, CPC2 Capital Park, Futtsu, Cambridge CB21 5XF. Tel: 01462 657272.
® Trademarks of DuPont, Dow AgroSciences or Pioneer and their affiliated companies or their respective owners.
Broadway® Star contains florasulam and pyroxasulam. *Label approval for the control of a range of broad-leaved weeds in spring wheat.
Weed control

Chris Bean emphasises that it’s as important to be mindful of the weaknesses of specific actives as well as their strengths.

> inter-row hoe with one of his growers. Last year it was used to good effect to remove blackgrass without having to resort to a post-em herbicide in the spring.

“Hoeing during March can be really effective if the weather conditions are right. It removes blackgrass and broadleaf weeds between the rows and then we can go back in later to take out any remaining competitive weeds, such as cleavers.

“You can stack residuals and still get an unacceptable level of blackgrass in crops, and control using post-em herbicides really isn’t very good, so cultural measures have a useful role to play.” (for more on inter-row hoes, see article on p70).

Where broadleaf weed control isn’t a desperate measure, Kieran will look at all the herbicide options in the toolkit and believes it’ll be a complicated spring, with agronomy decisions very much tailored on a field-by-field basis because of the huge variations in planting dates and growth.

“Every field has a unique set of problems this spring which will require an individual approach. Overall, the herbicide spend for many growers will be less than normal but with much more reliance on post-ems.

“Where these are for grassweed control, eg Pacifica Plus (mesosulfuron-methyl+ iodosulfuron-methyl+ amidosulfuron), Atlantis or Springtime, or Zypar, plus Broadway Star to control wild oats and a wide range of broadleaf weeds, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

“Crops established with shallow disc cultivations before drilling in early spring could transplant large, over-wintered weeds into crop rows, which will readily re-establish. These larger weeds will be much harder to control as they are unaffected by any residual herbicides used, so a contact product will be required.

“Fluctuating temperatures in early spring means SU chemistry may struggle to achieve good control of some weed species, especially larger poppy plants and those exhibiting ALS resistance.

“That’s where Zypar, which contains Arylex Active, can prove very useful. Zypar works well at low and fluctuating temperatures giving good control of poppy, including ALS-resistant populations. It’s also robust on cleavers, cranesbill, chickweed, mayweed, fat hen, fumitory and charlock. In spring cereals Zypar can be applied from 1 Feb to 30 June, up to and including GS45 of the crop.”

Where a mix of broadleaf weeds and grassweeds need controlling in spring cereals, growers could use Arylex-based products, Pixarro or Zypar, plus Broadway Star to control wild oats and a wide range of broadleaf weeds.

In late-sown winter cereals, Pixarro at 0.375 l/ha plus Broadway Star can be used to control both grassweeds and broadleaf weeds from 1 Feb to GS23.

“Tank-mixing with plant growth regulators, fertilisers and trace elements will help reduce the number of sprays applied to crops in the busy spring period. This will be especially helpful with the expected increase in spring drilling work.

“In Scotland, Broadway Star is likely to be the contact herbicide of choice on either winter or spring cereals, due to its effective control of ryegrass, brome, oats, and range of broadleaf weeds,” he adds.

Spring cereals switch demands herbicide strategy rethink

Farmers abandoning winter cereals after the wet autumn and switching to spring wheat and barley are advised that close attention to broadleaf weed control can help prevent significantly reduced yields.

Alister McRobbie, cereal herbicide product manager at Corteva Agriscience, notes that for many arable farms, fieldwork taking place over the next few weeks will have more of a focus on spring cropping than it has done for many years.

“The very wet autumn and winter has led many growers to abandon the remainder of their winter cereal drilling and opt for spring-sown crops instead. We saw about 900,000ha of spring barley planted in 2013 but we could see as much as one million go in the ground this year if the switch is as profound as some predict.

“Where spring cereals aren’t the norm, different weed control strategies are required. Broadleaf weed species are more likely to pose a threat to yield and a problem at harvest than grassweeds.”

Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

Farmers abandoning winter cereals after the wet autumn and switching to spring wheat and barley are advised that close attention to broadleaf weed control can help prevent significantly reduced yields.

“Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

“Where spring cereals aren’t the norm, different weed control strategies are required. Broadleaf weed species are more likely to pose a threat to yield and a problem at harvest than grassweeds.”

Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

Farmers abandoning winter cereals after the wet autumn and switching to spring wheat and barley are advised that close attention to broadleaf weed control can help prevent significantly reduced yields.

“Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

“Where spring cereals aren’t the norm, different weed control strategies are required. Broadleaf weed species are more likely to pose a threat to yield and a problem at harvest than grassweeds.”

Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.

Farmers abandoning winter cereals after the wet autumn and switching to spring wheat and barley are advised that close attention to broadleaf weed control can help prevent significantly reduced yields.

“Where annual meadowgrass is a problem, farmers often use triad and tested residual herbicides. But these won’t control all the key broadleaf weeds and a number of important species, such as cleavers, cranesbill, poppy, fat hen, black bindweed and fumitory will come through a residual application, says Alistair. He advises a follow-up with a contact herbicide, depending on the weed species present.
ALLY® MAX SX®

“If you want the best, you have to choose the best”

1. Unique SX® formulation
2. Faster, safer washout
3. Broad spectrum weed control

ALLY® MAX SX®
Herbicide
- Broadest tank mix compatibilities supported with the widest range of approved ALS tank mixes and sequences
- Consistent quality, reliability and traceability
they struggle on and are better controlled by the new halauxifen-containing products. In many situations both types of chemistry have a part to play — their activity is very complementary.”

Chris looks after the agronomy on farms in Kent and South Essex, some with potatoes or vegetable crops in the rotation.

**Volunteer beans**

“Changing rotations in recent years has seen an increase in the pulse area. In spring 2019 I found Zypar (halauxifen-methyl+ florasulam) was highly effective for control of volunteer beans.

“Other weeds that often need control in spring are the polygonums — especially redshank, knotgrass and black bindweed — but these are a big gap in the Arylex armoury. Polygonums tend to emerge as pendimethalin, prosulfocarb and DFF run out of steam and where winter frosts have broken the residual layer on our soils.

“An SU-containing tribenuron or thifensulfuron will pick these up and, for a number of years, I have used Ratio (thifensulfuron-methyl+ tribenuron-methyl) to control them,” he says.

Fumitory is a weed that thrives on the Kentish chalk downland soils and it is only partially controlled by residuals. It was a major reason Chris edged towards using Pixarro (halauxifen-methyl+ fluroxypyr), which has good activity on the weed.

Where polygonums and other SU weeds, such as volunteer oiled rape, are present as well as fumitory then he’d mix the two chemistries to get the best of both worlds.

Mayweed is another weed that can be a problem and it’s also a relative weakness of the Arylex products, he points out. “It’s a weed that can be well controlled by autumn residuals, but it can come back in the early spring, especially following a wet winter.”

“Volunteer OSR needs to be nailed at every opportunity because of close rotations and its link with high erucic acid in rapeseed. It’s not very well controlled by Pixarro but OSR is a speciality of SUs, particularly metsulfuron, thifensulfuron and tribenuron-containing products,” he adds.

For other weeds some florasulam in the mix can be the best option, according to Chris. “We have a lot of poppy on our high pH soils which appear to be resistant to SUs. In this circumstance florasulam is very effective and when there’s a mixed...
populations of brome can be tackled using Broadway Star (pyroxsulam+ florasulam) is a useful option.”

Groundsel is another weed which is on the increase because it comes through the widely used autumn residuals, pendimethalin and prosulfocarb. Florasulam again is very effective, he adds.

Changes to rotations and particularly tillage regimes are changing the weed spectrum on farms, believes Chris, with direct drilling, in particular, providing new weed challenges.

“Weed control is a constantly changing picture. We’re starting to see weeds in arable fields where there’s been no soil disturbance that used to be a problem in perennial fruit crops, such as fleabane and rosebay willow herb. Both are well controlled by metsulfuron-methyl products. “Umbellifers are a problem in places, with bur chervil a major issue in some parts of Kent and in the West. In other areas hemlock is more of a problem and this needs a multi-targeted approach with SUs, but it’s not a one year hit and needs working at,” he says.

Fortunately hemlock still isn’t that common but where it does occur, it’s a real problem — not just because of its competitive effect but because it’s poisonous, so straw can’t be used for livestock. In response to reports of increasing incidences in arable crops, FMC conducted some field trials in Gloucestershire in 2019 to look specifically at hemlock control.

Hemlock trial
“The trial looked at full rates of Jubilee (metsulfuron-methyl), Ally Max (metsulfuron-methyl+ tribenuron) and Harmony M (thifensulfuron-methyl+ metsulfuron-methyl), as well as Harmony M with the addition of either Fortune adjuvant, 0.5 l/ha fluroxypyr or 1.0 l/ha CMPP,” explains FMC’s Adam Espir.

The application was made in April 2019 to an open crop of winter wheat, in warm conditions when the hemlock plants were 20cm tall, possibly bigger than ideal, he explains.

“The results showed Harmony M gave the best performance of the SUs with 90% control, assessed six weeks after application. This was boosted by 5% where the adjuvant was added, and 8% where fluroxypyr or CMPP were tank mixed.”

Understanding the gaps in different herbicides’ weed spectrum is as important as understanding their strengths and underpins good weed control strategies, highlights Chris.

“Arylex is a highly effective and very good active but it’s important to remember what’s not controlled and therefore what it needs mixing with. It’s tempting to switch to something new and sexier, but you could find you end up with a weed problem that you didn’t know you had because you’d previously been happily controlling it with an SU.

“SUs are still very much centre stage. It’s what you build around them that’s important and knowing how best to use them,” he says.
Confidence comes from a quick diagnosis

It’s a world first and spun out of one of the biggest weed research projects the UK has seen. CPM assesses a ‘pregnancy-test style’ kit for diagnosing blackgrass resistance.

By Tom Allen-Stevens

It’s long been said there’s no quick fix for resistant blackgrass, arguably one of UK Farming’s biggest problems and recently estimated to cost the UK £0.4bn and 0.8M tonnes of wheat every year. But now there’s a quick scientific measurement for it, and it’s as easy and as cheap to carry out as a pregnancy test.

BRed (Blackgrass Resistance Diagnostic) is a lateral-flow device that will give you important information about how resistant your blackgrass is in just 10 mins. The kit costs £40+VAT, which includes enough devices and mixing solution for five separate tests. What’s more, there are 400 kits that are now being made available for free, and CPM readers are encouraged to apply (see panel on p51).

The new test, launched at Cereals 2018, is a world first, and one of the outcomes of the Blackgrass Resistance Initiative (BGRI), a £2.8M BBSRC and AHDB-funded project that completed two years ago (see panel on p50). Developing an in-field diagnostic test was one of the core aims of the project, and it’s been validated and refined as the project progressed.

“We now have a high degree of understanding of the molecular mechanisms underpinning the evolution of metabolic herbicide resistance (MHR) and how we can counteract it,” notes Prof Robert Edwards of Newcastle University, who’s led that element of the project. “That’s helped us develop this diagnostic test.”

Range of genes

The breakthrough came right at the start of the project in 2014 when researchers pinpointed a protein that was linked to MHR called glutathione transferase, AmGSTF1. Unlike target site resistance, MHR is caused by a complex set of genes being activated following repeated herbicide exposure over time (see panel on p48). Changes in gene expression that lead to herbicide resistance are selected for and this results in the increased production of AmGSTF1. The more of this protein released, the better the plant becomes at overcoming the herbicide.

“It’s the same type of protein associated with multiple drug resistance in humans,” notes Robert. “Having identified it as a functional biomarker of resistance, we could develop antibodies that would detect how much protein a plant has and therefore how resistant it is.”

This quantitative assay forms the basis of the lateral-flow device, with the kit developed by commercial partner Mologic. “These diagnostic kits are used throughout human healthcare, most commonly in pregnancy tests. But this was the first time it had ever been used to gauge herbicide resistance in plants.”

But how reliable was it, and would it work in the field? “We needed to be sure the kit would deliver scientifically valid diagnostics when used by people with...”

Robert Edwards and his team now have a high degree of understanding of metabolic herbicide resistance.
Securing the best spring cereal start

Well-entrenched weeds in ground destined for spring cereals make first class early management vital for the best crop performance and least weed seed return this season.

Prioritise Pre-Planting Weed Control
Established weeds must be eliminated ahead of drilling to safeguard spring cereal performance and rotational weed control.

Use the Most Active Glyphosate Formulations
Modern formulations optimised to work under challenging conditions are essential for the best low temperature glyphosate uptake and activity.

Take Enough Time and Care in Spraying
Putting as much attention to detail into glyphosate rates and spraying practice as any pre-em application will pay dividends.

Drill by Conditions not Calendar Date
Seedbeds that are fine and warm enough for the best establishment and residual weed control are well worth waiting for.

Consider Pre-Emergence Glyphosate
An approved glyphosate in the pre-em mix can be very valuable in dealing with any emerged weeds in the seedbed.

PERFORMANCE WARNING
Lower levels of performance can be expected from the most popular (APE) replacements for traditional (ETA) glyphosate formulations now withdrawn from UK use.

Recommended Early Spring Glyphosate Rates

<table>
<thead>
<tr>
<th>Weed Type</th>
<th>Rate (g/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seedling grassweeds</td>
<td>540</td>
</tr>
<tr>
<td>Well-tillered grassweeds</td>
<td>720</td>
</tr>
<tr>
<td>Established broad-leaved weeds</td>
<td>720</td>
</tr>
<tr>
<td>Tough over-wintered broad-leaved weeds*</td>
<td>1090</td>
</tr>
<tr>
<td>Tough perennials</td>
<td>1440</td>
</tr>
</tbody>
</table>

STEWARDSHIP
To minimise the risk of resistance development it is important to spray ahead of weed stem extension and appreciate that no amount of adjuvant will make-up for insufficient glyphosate.
The types of resistance

Target site resistance (TSR). Mutations in the proteins targeted by particular chemicals can make weeds less sensitive to them. This form of resistance is relatively well understood and plants are either resistant or susceptible to individual herbicides. It can be countered by the rotational use of herbicides with differing modes of action.

Metabolic or multiple herbicide resistance (MHR). Weeds become more tolerant of a broad range of herbicides, irrespective of their chemistry or mode of action. Generally, this is due to the weed being better able to detoxify crop protection agents, and is characterised by a more gradual shift towards total resistance. MHR is also termed non-target site resistance (NTSR). As MHR is poorly understood, the BGRI focused on it.

Population dynamics

There were 64 farms from Oxon to Yorks where blackgrass populations had been mapped, with samples taken each year in another part of the project aimed at understanding population dynamics, headed by Rothamsted Research.

“MHR is a very complicated beast to work with,” notes Rothamsted’s Richard Hull. “But we now understand a lot more about how it develops in the field.”

The monitoring confirmed MHR as the most common form of resistance. What’s more the plants develop cross-resistance to other herbicides and modes of action. “We found that, while populations will vary significantly in density across a field, previous work has shown the level of resistance will be pretty uniform, although this can differ from one field to another,” he says.

Research from the project indicates that the rate at which MHR increases is related to the total amount of herbicide used. “There’s no risk-free herbicide — most of them have the potential to raise the level of MHR, although the rate depends on the active used. It’s also a numbers game — the more plants you expose to herbicides, the more likely you will drive resistance.”

That’s not to say herbicides can’t continue to deliver effective control even

A blackgrass approach underpinned by science

For Wiltshire-based agronomist with Pearce Seeds, Sam Pociecha, the BReD kit provides confidence to give the right advice and confirmation that what he’s seeing in the field is resistance.

“Many of the efficacy problems associated with blackgrass herbicides are down to application or timing, particularly with Atlantis (mesosulfuron+ iodosulfuron),” he notes.

Having read about it first in CPM, Sam saw the BReD kit demonstrated at a Pearce open day in 2018 and decided to try it on a few farms with suspected resistance issues. “In one case it’s confirmed where pendimethalin has caused a high level of resistance, but in another, where resistance to Atlantis was suspected, that turned out not to be the case.”

Sam’s used around 20 kits to date, and notes the results require a degree of interpretation. “It won’t give an indication of target site resistance, and you may have both. But TSR is relatively easy to spot in the field, especially if you can rule MHR in or out.

“It’s especially useful where you find a low level of resistance appearing — that’s the opportunity to highlight and make management changes before a blackgrass problem gets out of hand. It can tell you whether it’s worth applying Avadex (triallate) or taking the field out of winter cropping altogether.”

He also encouraged Pearce Seeds to invest in a cube to give a digital read-out of herbicide resistance. “This is useful for benchmarking — the data is available for known populations, such as Peldon, so you can gauge the relative resistance level. You also get an accurate idea of resistance shifts.”

For this reason, he samples at the same time of year. “You can do the test in Feb or March but it takes a little longer for the band to show. I test in June, when plants are bigger to sample and may have grown through a treatment program, which allow a proper assessment of the program. It’s also the time of year I have more time.”

Sam believes the BReD test will become an increasingly important part of the IPM toolbox. “There’s far more to providing a good agronomy service than just recommending products. This adds science into the frame of blackgrass assessments, and helps in terms of justifying any herbicide applications you make. You have confidence in it because there’s a robust level of science that’s gone into developing the kit.”
GOWAN CONTACTS

Dominic Lamb
UK and Ireland
Business Manager
07504 052323

Kuldip Mudhar
UK and Ireland
Development Manager
07532 607338

Barrie Hunt
UK and Ireland
Technical Manager
07306 166356

Helping to control grass-weeds since 1961!

- Full effective grass-weed dose for all cereal drilling dates – spring and autumn
- Cornerstone of any black-grass control programme
- Programmed approach for control of wild oats, bromes, rye-grass and a range of broad-leaved weeds
- Flexible application timing in spring barley – pre or post drilling

Need a contractor?
To find a contractor in your area check the website: www.Aavadex.co.uk or scan the QR code with your phone to view the contractor list
This Research Briefing article forms part of the delivery of knowledge exchange from a public and grower-funded research project. CPM would like to thank Newcastle University for its support and in providing privileged access to staff and others involved in helping put it together.

The Blackgrass Resistance Initiative (BGRI) ran from April 2014 to March 2018. Delivered across five work packages, it examined the evolution and management of herbicide resistance in blackgrass focusing on multiple herbicide resistance (MHR), from genes to agro-ecosystems. Led by Newcastle University, scientific partners included Rothamsted Research, Zoological Society of London and Universities of Sheffield, Reading, Edinburgh and York. Its total cost was £2.8M, funded mostly by BBSRC with £280,000 funded by AHBD.

While population densities can change, depending on management, it’s predicted the levels of resistance always get worse year-on-year.”

So Richard feels that the BReD kits are most useful as an early warning. “Farmers in Worcestershire, Herefordshire, Wales, the north of England and the South West are beginning to find blackgrass in crops. The last thing you want in these areas is for blackgrass to get out of hand. So these are the populations that should be tested and monitored, with management practice altered accordingly.”

Robert notes that the evolution of resistance is a constant process. “It’s like living with a long-term illness. You’ll never cure it and it can become a serious problem really quickly. The best way to manage it is to understand it and learn how to keep it under control.”

He also recommends using the BReD kits when taking on new land. “If you plough a field, it’s also worth testing both before and after, to assess the level of resistance in the population you bring up. But test 12 months apart to ensure both populations are tested at the same time of year.”

The BGRI project has allowed Richard Hull and other researchers understand more about how blackgrass resistance develops in the field.
Newcastle University have 400 kits they are offering for free to growers and agronomists. CPM readers in particular are encouraged to apply. “We want to gather information on how farmers are using it, so in return we’ll ask you to complete a brief questionnaire,” says research associate Dr Nawaporn Onkokesung.

The kits are very easy to use and come completely self-contained, but there’s a process to preparing samples that must be followed to gather accurate results, she notes. “You can use it at any growth stage, as long as there is green material. But it’s best to test at the same time of year so that you can get comparative results — temperature and size of plant can affect the result.”

One plant per device should be tested, using a leaf tip cut into 3cm strips. These are placed in a small bottle with buffer solution added and shaken vigorously with ball bearings for exactly 30secs. Three drops of the extract are applied to the aperture of the device and it takes around 15 mins for the red line to show. The stronger the band, the more resistant the blackgrass plant.

“One while this will give you a reliable indication, you can purchase a reusable cube for £350 from Mologic that clips onto the device and gives you a numerical read-out. This is useful for comparative analysis,” says Nawaporn.

The assay has been specifically prepared for blackgrass but can be used to assess levels of resistance in other grassweeds, she notes. “It will give you an indication if there is MHR in wild oats, ryegrass and bromes as it’s the same protein the kit detects. But it will need a different quantitative assay to assess accurately the level of resistance. “We’re keen to know the demand from farmers in a kit for other grassweeds, so would like to hear from growers who would find it useful.” The kits are not suitable for assessing resistance to glyphosate, however, adds Nawaporn.

Those interested in receiving a free kit should email their postal address to nawaporn.onkokesung@newcastle.ac.uk Put “BReD trial by” in the subject field, specifying the intended sampling date, allowing two weeks for fulfilment. One free kit per applicant.
Wild oat control can sometimes be a hit and miss affair. *CPM* reviews new work by Syngenta which demonstrates how seasonal factors can influence control and how to mitigate these.

*By Lucy de la Pasture*

When one of its co-formulants was recently banned under EU regulations, spring grassweed herbicide Axial (pinoxaden) was reinvented by its manufacturer, preventing its active ingredient from becoming another casualty on the long list of plant protection products that have lost their approval for use in recent years.

Syngenta took the opportunity to optimise the formulation to include a built-in adjuvant system, launching Axial Pro last year. The first grower experience with the new product was in a spring that was in many ways difficult for grassweed control, explains the company’s field technical manager, Georgina Wood.

“In 2019 the spring was very dry, so grassweeds weren’t always growing well at the time of Axial Pro application. In a few instances the control of wild oats and ryegrass achieved by growers wasn’t as expected, so we set up a series of studies to look at its performance under different stress conditions and compared this with the original Axial formulation plus Adigor (methylated rapeseed oil) as a wetter and with fenoxaprop-p-ethyl.

A glasshouse pot study was established at Jealott’s Hill with the aim of confirming that Axial Pro is as effective as Axial plus Adigor; whether dry conditions affect efficacy and if these are then followed by wet conditions, will there be regrowth of wild oats?

**Growth bounce-back**

Regrowth of wild oats after treatment is a problem that some growers experienced last spring, says Georgina. “Bounce-back sometimes occurred and in a field trial last year at Honington in Warwickshire, we found this was the case when sub-optimal rates of Axial Pro were applied.”

The trial took place in a crop of JB Diego winter wheat, which had an untreated over-wintered wild oat population of 180 heads/m². Axial Pro was applied on 26 April at 0.4 l/ha, 0.6 l/ha and 0.82 l/ha, at GS30 of the weed.

“Initial control was best where the 0.82 l/ha rate was used, the advisory rate for full control of winter wild oats at this growth stage. The plots were reassessed on 3 July, after the rain in June, and approaching 40% regrowth had occurred at the 0.4 l/ha rate and about 20% regrowth at the 0.6 l/ha rate compared with no regrowth at the full recommended rate,” explains Georgina.

The pot trials also sought to answer whether there’s a benefit to adding adjuvant to Axial Pro in sub-optimal (dry growing conditions) and whether it will move into a shielded tiller more quickly than fenoxaprop-p-ethyl, she explains. “The idea of this pot study was to replicate application of Axial Pro in sub-optimal conditions to improve our understanding of how field conditions will affect performance, so that growers are able to get the best control possible,” she says.

Under standard growing conditions, the results showed no benefit from the addition of Adigor to Axial Pro, which performed equally as well as its predecessor, Axial plus Adigor, in terms of control. But where there was a distinct difference between the two formulations was their speed of activity, explains Georgina.

“The effects of Axial Pro could be seen much sooner after application than for Axial (plus Adigor). At 13 days after application, stunting was assessed at 30% in the Axial Pro pots compared with 11% for Axial. By 17 days after treatment this had increased to 60% and 48.3% respectively,” she explains.

To account for the variation in speed of kill between the two formulations, a phosphorimaging study was carried out at Jealott’s Hill. This clearly showed the differences in movement into the leaf between the two formulations, says Georgina.

“The phosphorimaging shows the Axial Pro formulation gets the active ingredient into the plant more quickly and acts faster as a result of its in-built adjuvant system, which is better than Adigor,” she explains.

So why is the adjuvant system so important? Fast uptake and translocation
RANCONA® i-MIX

MICRO-EMULSION FUNGICIDE SEED TREATMENT CONTAINS 20g/L IPCONAZOLE + 50g/L IMAZALIL

SEED TREATMENT

i-DEAL FOR SPRING AND AUTUMN USE

- Protects against seed and soil-borne diseases in wheat and barley
- Combines two active ingredients for enhanced protection
- Reduces ergot germination
- Low active substance rate per tonne of seed
- Unique micro-emulsion formulation for low dust and a safer working environment

www.upl-ltd.com/uk

UPL Europe Ltd, The Engine Rooms, 1st Floor, Birchwood Park, Warrington, Cheshire WA3 6YN
T: +44 (0) 1925 819999  E: info.uk@upl-ltd.com
**Effect of graminicides under standard conditions**

Application to wild oats at GS37. Source: Syngenta glasshouse pot trial, 2019.

Phosphorimaging studies show the new formulation, Axial Pro, has better movement in the leaf 72 hours after application. Source: Syngenta Jealotts Hill, 2019.

- are important for a systemic herbicide to work well, she explains.

"Firstly, it must reach the weed and retain well on the leaf surface and pass through the waxy cuticle. Once through the cuticle, it then has to translocate in the phloem to reach its target site. For pinoxaden, an ACCase inhibitor from the phenylpyrazolin (DEN) group of chemistry, this is the growing point of the weed where it inhibits meristemic activity."

Under dry conditions the speed of kill was slower in all the pot study treatments but again, the Axial Pro formulation outperforms the other treatments — all of which performed much better than fenoxaprop-p-ethyl which struggled under the adverse conditions.

**Slight reduction**

When the dry conditions were followed by wet, the results confirmed the observations seen in the Warwickshire field trial — with a slight reduction in overall control.

The last element of the study mimicked shielding of weed tillers by the crop, to assess if sub-optimal spray coverage on tillers would affect overall control of the weed. This was done in the pot trial by covering individual tillers so that it did not directly receive any of the graminicide spray.

“The results showed that even if you don’t hit a tiller directly with Axial Pro, it will still kill it because of its improved movement into the phloem in the plant. In this experiment, the shaded tiller in the fenoxaprop-p-ethyl pots continued to grow and produce a panicle, as this active is less well translocated," comments Georgina.

The results of the pot study have helped reinforce Syngenta advice to control weeds as early as possible to limit crop competition, to ensure weeds are actively growing at the time of application to get the best efficacy and to adapt product rates and application techniques according to the target.

Georgina says it’s also

**Axial Pro best-use advice**

<table>
<thead>
<tr>
<th>Grassweed</th>
<th>Growth stage</th>
<th>Rate Axial Pro</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wild oat</td>
<td>&lt;GS29</td>
<td>0.4 l/ha + Adigor 0.5% or another MSO</td>
<td>Ensure weed is actively growing; drought stress will reduce effectiveness</td>
</tr>
<tr>
<td></td>
<td>&gt;GS29</td>
<td>0.6 l/ha</td>
<td>Min rate for SU or Arylex mixes</td>
</tr>
<tr>
<td>Overwintered (&lt;GS30)</td>
<td>0.82 l/ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ryegrass</td>
<td>&lt;GS22</td>
<td>0.6 l/ha</td>
<td>Required for SU or Arylex mixes</td>
</tr>
<tr>
<td></td>
<td>&gt;GS22</td>
<td>0.82 l/ha</td>
<td></td>
</tr>
<tr>
<td>Blackgrass (barley only)</td>
<td>1.1 l/ha</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Nozzle selection important at different crop growth stages**

While the Axial Pro formulators may have cracked getting the active ingredient quickly into the plant, uptake can only happen if the spray is adequately delivered to the target weed. Successful control is very much in the hands of sprayer operators to make the necessary adjustments to pressure and droplet size to hit small weeds most effectively.

One myth Georgina is keen to dispel is that increasing operating pressure will push sprays down to small weeds at the base of a crop. “All this will do is create a finer droplet that’s more easily intercepted and retained in the crop canopy. It’s bigger droplets at lower pressure that are needed because they have the momentum to reach the target,” she explains.

Application research carried out by Syngenta has shown an operating pressure of 1.5 to 2.5 bar can be the optimum for both the Syngenta 3D and Amistar nozzles used for spring grassweed control. Georgina points out that the nozzle type should change according to the growth stage of the crop for best results, it’s not a case of one nozzle for all timings.

When crops are still small (<GS30) and early emerged grassweeds are exposed, she advocates the Syngenta 3D nozzle as the best option to target sprays, providing application conditions are good.

“As crops get larger, through the stem elongation stages, grassweeds are more shaded under the canopy. At this timing, the angled Amistar 03 or 05 nozzle would be a better option to get more droplets down to reach the target.”

In trials, 90% drift reduction nozzles (applying 200 l/ha) have also given good results — which could help with spring application opportunities, she adds.

“Axial Pro can be applied in water volumes of 100 l/ha, but higher volumes improve the chances of hitting the target in dense crops.”
Wild oats were overwintered and at GS30 at application, 0.82 l/ha Axial Pro is the advised rate for full control. Source: Syngenta field trial at Honington, Warwickshire in 2019.

Research Briefing

To help growers get the best out of technology used in the field, manufacturers continue to invest in R&D at every level, from the lab to extensive field trials. CPM Research Briefings provide not only the findings of recent research, but also an insight into the technology, to ensure a full understanding of how to optimise its use.

CPM would like to thank Syngenta for sponsoring this Research Briefing and for providing privileged access to staff and material used to help bring it together.

Driven by growers’ demands to be ever more efficient and the need to make better use of resources, Syngenta is at the forefront of developing practical and proven solutions for farmers and agronomists. Continued investment and research into smart innovations in products, improving formulations, understanding grass weeds and how to best apply products to get the best weed management will further improve the precision and performance of future decisions.

Identifying wild oat species

Knowing the species of wild oats present in fields can help refine herbicide strategies, suggests ADAS weed biologist, Lynn Tatnell.

“There are two species of wild oats present in the UK — the common or spring wild oat (Avena fatua) and the winter wild oat (Avena sterilis), which is the less common of the two,” she says.

Emergence patterns and winter hardiness differ between the two species, so correct identification can help determine the best herbicide timing. The common oat mostly germinates in the spring (Mar-April) but can also germinate during the autumn (mostly Sept-Oct). The winter wild oat germinates in the autumn and continues throughout the winter (Oct-Mar) as it’s more cold-tolerant than the common oat and is also more challenging to control.

Differeniating the species during vegetative growth stages is impossible and Lynn suggests the best time is at seed shedding, when the species behave in a clearly different way.

“A. fatua sheds single seeds so its seeds have one tail (awn) visible, whereas the winter oat sheds seeds in pairs, so two tails are present,” she explains.

Identification is also possible at panicle emergence by the presence (A. fatua) or absence (in A. sterilis) of an awn on the middle seed in a spikelet which has three seeds.

Both species can occur in the same field but in distinct patches. “It’s always important to map grass weeds but particularly with wild oats, which are very easy to map because they occur in patches and are very obvious above the crop. These can then be monitored year on year to see if there are any changes in the patches,” suggests Lynn.
Small but mighty

Falling short of making it onto the 2020/21 Recommended List, KWS’ latest wheat offering may be discounted by some as a viable option. But with strong agronomics, this small, but mighty, variety looks set to bring something new to the hard Group 4 portfolio.

By Charlotte Cunningham

The AHDB Recommended List has long been something of an agricultural bible for growers when it comes to selecting varieties for the upcoming season.

While of course, it’s an incredibly important source of information, the strict criteria means not every variety makes the cut.

However, this isn’t to say those varieties that fall short aren’t worthy in their own right.

Such is the case for KWS’ latest offering, KWS Parkin — a new hard Group 4 wheat, claimed to be the shortest, stiffest variety on the market, which narrowly missed out on recommendation this year.

Drawing traits from its Reflection x Costello parentage, the aim of KWS Parkin was to create something that gleaned the good agronomics of Reflection, but with the added bonus of yellow rust resistance, explains breeder, Mark Dodds. “Reflection has some good attributes — nice grain and fairly short in height. Costello, on the other hand, has always sat at the lower end of the yield spectrum, but it does have yellow rust resistance.

“By crossing the two, we’ve been able to capture those good, strong traits from Reflection and give growers that little bit extra with the rust resistance.”

In terms of its stand-out feature, for KWS Parkin, it’s all about its height — or lack of…

At 78.6cm, it’s an impressive 15cm shorter than the tallest variety on the RL.

Increased biomass

While taller varieties often bring the reward of increased biomass, this often comes with a penalty of flatter crops, particularly in a catchy season, says John Miles, product development manager at KWS.

He believes that there’s a gap in the market for this kind of variety and KWS Parkin looks to trump the rest with regards to its shortness and stiffness.

“With many growers now looking to drill later in the season, I feel that the attribute of varieties with good stem stiffness is something that’s being lost a little on the RL.

“Of course, this is not necessarily a bad thing — if the majority are drilling later — but for those looking to target the early window they have just a small number of varieties to choose from that are agronomically safe.

“Cast your mind back 15 years or so, if we think of the RL at this time and what varieties were finding favour on farm, products such as Equinox, Cordiale, and Grafton may jump to mind. But what did all these popular types have in common?

“They were all short and stiff types that enabled PGR applications to be simplified, and introduced flexibility into spray windows, allowing them to be safely widened to when workloads or weather conditions permitted.

“Fast forward to today and looking at the RL reveals a very different story. Realistically, I’d say there are only about four or five other options when it comes to really stiff varieties.”

This characteristic goes hand-in-hand with KWS Parkin’s early maturity, he adds. “On a larger farm, or in certain locations, having a variety that is early maturing is incredibly valuable as it allows you to get the harvest going.”

The official score for ripening comes in at -1 day (compared with Skyfall) for KWS Parkin was to create something that gleaned the good agronomics of Reflection, but with the added bonus of yellow rust resistance, says Mark Dodds.
Parkin, and John believes growers are now willing to trade slightly on yield because early maturity is just so valuable. “Harvest yield will always come from the longest grain-fill period, which of course naturally pushes you towards later maturing types, so to have something that yields at Parkin’s level and boasts early maturity is quite unique.”

The variety also looks good in terms of its disease package, adds Will Compson, UK country manager at KWS. “KWS Parkin has a combination of disease resistances to help spread the sprayer workload.

“A score of 9 for yellow rust will help to relieve the workload at T0, while its untreated yield score of 81% of controls is better than the average for feed varieties which should serve to give confidence that KWS Parkin will be an easy-to-manage variety with a high output.”

At the other end of the spectrum, KWS Parkin does receive a score of 4 for eyespot, meaning there is the potential of susceptibility. The advice from KWS is that in second or continuous cereal positions — or in high pressure first wheat situations — an effective eyespot fungicide herbicide should be used at T0 and T1.

As a hard Group 4, the end market will predominantly be for feed, but what kind of grower might KWS Parkin be best suited to?

“KWS Parkin is a great choice for growers that are looking for something different,” explains Kirsty Richards, KWS’ knowledge transfer manager.

For growers looking for something to compare it with, the variety is most similar to the OSR in until late Sept, which is much too late.”

After being recommended the variety by both his agronomist and seed merchant, Robert says he was instantly attracted to the early maturity and the fact it’s suited specifically to northern growers. This year, the estate is trialling an 18ha plot to test its potential, and so far, things are looking promising. “We managed to drill it in early Sept and so far it looks very good.”

Though traditionally Skyfall growers, if KWS Parkin continues to perform, it could become the main wheat next year, adds Robert. “At the moment, it’s looking well ahead of our Skyfall — there’s a very noticeable difference. We’ve only just put a token amount of fertiliser on — about 100kg/ha — so not done much to it at all, but as it looks now, I’m expecting it to out-perform Skyfall.

“I’ve always been a Skyfall man, but I think we may have found our new main crop.”

Though specifically suited to Northern areas of the country, the variety is also proving to be a good performer down in Bedfordshire at Woburn Farms.

With KWS Parkin very much looking to be a variety that’s utilised for a specific purpose, two growers are trialling it this year to see if it really does do what it says on the tin.

Robert Childerhouse has been the estate manager of Mulgrave Estates, North Yorks for the past three years. Hailing originally from the south, Robert says he noticed a distinctly later harvest on the north Yorks coast, which was causing havoc with the following autumn drilling window. “Harvest is so much later up here which means we have a very narrow turn-around period for getting OSR in the ground or drilling autumn crops.

“Last year, the harvest was so late and we were so far behind that we didn’t manage to get the OSR in until late Sept, which is much too late.”

With a need to get harvest done earlier, Mulgrave Estate is trialling an 18ha plot to test its potential, and so far, things are looking promising.

Though specifically suited to Northern areas of the country, the variety is also proving to be a good performer down in Bedfordshire at Woburn Farms.

The search for solutions

One of the key points about KWS Parkin is that while it’s suited to all regions of the UK,
Based on the RL figures, yield could be seen as one of KWS Parkin’s weaker areas, with a treated yield of 102% and untreated sitting at an average of 81%.

However, it’s still performed well, explains Mark. “The RL is quite difficult to get onto and a variety isn’t often considered unless it meets a specific UK yield target. However, when you look at the specific situations that this variety is suited to, it does really well.

“For example when you just look at the yield from heavy land sites, KWS Parkin has a very competitive yield of 103% with a lower lodging risk than some of the other varieties that might appear to have a slightly higher yield in this slot.”

John agrees: “In early sown trials data, KWS Parkin proved to be one of the highest yielding varieties. It’s all about using the right tool for the right job.”

Though it was ultimately its yield that caused KWS Parkin to be left off the RL, Kirsty reckons it’s not all just about quantity when it comes to variety choice. “Of course, yield is king, but in the recent AHDB Look Ahead survey, it showed that farmers are looking at attributes other than yield.

“Though it’s not such a common thing to grow “off-list” when it comes to wheat and barley, I don’t think it should deter growers.

“Of course, not being recommended isn’t ideal, and we would always be aiming to get our varieties onto the RL, but we will be supporting it fully as a good choice for specific situations.”

Insiders View

Based on the RL figures, yield could be seen as one of KWS Parkin’s weaker areas, with a treated yield of 102% and untreated sitting at an average of 81%.

However, it’s still performed well, explains Mark. “The RL is quite difficult to get onto and a variety isn’t often considered unless it meets a specific UK yield target. However, when you look at the specific situations that this variety is suited to, it does really well.

“For example when you just look at the yield from heavy land sites, KWS Parkin has a very competitive yield of 103% with a lower lodging risk than some of the other varieties that might appear to have a slightly higher yield in this slot.”

John agrees: “In early sown trials data, KWS Parkin proved to be one of the highest yielding varieties. It’s all about using the right tool for the right job.”

Though it was ultimately its yield that caused KWS Parkin to be left off the RL, Kirsty reckons it’s not all just about quantity when it comes to variety choice. “Of course, yield is king, but in the recent AHDB Look Ahead survey, it showed that farmers are looking at attributes other than yield.

“Though it’s not such a common thing to grow “off-list” when it comes to wheat and barley, I don’t think it should deter growers.

“The RL is great as it stops mediocre varieties getting onto the list, but obviously there’s the question as to whether it’s flexible enough.”

However, according to AHDB, there are a whole host of things that go into recommending a variety, not just yield. “Although yield is an important characteristic when making a recommendation, it is not the only feature looked for in the RL,” explains Dr Paul Gosling who manages the RL at AHDB.

“We measure a wide range of quality and agronomic features and lower-yielding varieties can be recommended, provided they have a positive balance of features compared with current varieties — with some traits, such as septoria tritici resistance, rated higher than yield.

“Varieties that fail to make the list may have strengths that fit well in certain circumstances and so suit some growers. Our advice is to use the RL as a foundation for varietal choice but to use local agronomic/market knowledge to cement any final decision.”

Outstanding field performance!

Multi-use silage or biogas – wide drilling window...

AUTENS
FAO 170
• Top DM yield in its class; good standing power and very high starch.

KEOPS KWS
FAO 230/220
• KEOPS offers a wide drilling and harvest window.
• For silage or AD.
in a catchy harvest.”

Frontier’s Jim Knight says there’s definitely an appetite for a short and stiff variety from a seed merchant’s point of view. “Parkin is the first in a little while that has these features and will be an important option particularly in the north, not only where straw strength is important but also where an early harvest has a high value.”

With that said, growers and the wider market should be careful not to pigeon hole it solely just as a northern variety, he adds. “More exposed and fertile sites will appreciate KWS Parkin too, no doubt.”

While Tom doesn’t see its yield as an issue, one area to watch for is septoria resistance, which is slightly lower on the spectrum with a score of 5.5. “However, this is a very similar score to the likes of Skyfall, which has still been hugely successful. If growers are aware of it and keep an eye on the crop, it shouldn’t be too much of an issue.”

While in general, KWS Parkin has a fairly decent disease profile, it’s important to note that it doesn’t benefit from orange wheat blossom midge resistance, adds Jim. “It’s not necessarily an issue, but it’s certainly something to be aware of as growers are increasingly looking for OWBM resistance.

The advice from me is that if you do select KWS Parkin, make sure you’re matching it with a variety that does have midge resistance to make things easier in a high pressure year.”

All in all, Tom says KWS Parkin is a good all-rounder and adds something completely new to the arable toolbox. “It doesn’t feel like just another variety. With its short, stiff straw, early maturity, good yield, and fairly good disease package I think it’s going to be a really good, specific-choice variety.”
I often find myself wondering, what are we doing today that in 50, 25 or even 10 years’ time people will look back on and wonder why on earth we did things like that?

I was reminded of this a few months ago when I had a car accident. Thankfully, it wasn’t my fault and there were no injuries, bar a few bumps and bruises for me.

My insurance company was brilliant and a hire car arrived promptly the next day. Though it took me a few days to get back behind the wheel, when I did, I was faced with a whole different — and unexpected — kind of panic.

As I went to pull off of our driveway, I realised that unlike my vehicle, this replacement driveway, I realised that unlike I did, I was faced with a whole different — and unexpected — kind of panic.

It was this exact sentiment that came to mind when I saw Kubota unveil its concept tractor — the ‘X’ tractor — in Japan to commemorate its 130th anniversary.

Sporting a futuristic design and looking like something that spawned from a Hollywood film set, this concept design is equipped with artificial intelligence and electrification technology — as well as being completely autonomous.

At first glance, I laughed and absent-mindedly thought, it’ll never catch on — as did many on social media — and couldn’t see how it would or could replace our traditional-type machinery on a wide scale.

Would I realistically see these Transformer-esque tractors autonomously buzzing around the little back lanes of Warwickshire in the years to come? I doubted it...

While the physical look might not be everyone’s cup of tea, on further reading I realised the technology and thought process behind this concept-tractor actually address some very real problems.

For example, in Japan, while an increasing number of farmers retire due to aging, the average scale of farming continues to grow as a result of the contracting out of farm operations and the accumulation of farmland for efficient management, according to Kubota. In order to address the challenges which farmers are facing such as labour shortages and low operating efficiency, it’s urgently necessary to introduce smart farming — hence this autonomous creation.

It was at that moment, I realised that just because it can’t or won’t be done in the future and in fact, could be a very feasible solution to a lot of the problems the industry faces at present.

To put it into another perspective, think back to the old-school plough.

Heavy, pulled by a horse and incredibly slow. While the farmer at the time probably thought nothing more of it — that’s how it was done, as simple as that — can you imagine now being able to show him that the industry has replaced his horse with high-horsepower, and we have imminent access to vehicles with the capability to run electrically or even autonomously?

Or perhaps think about drone technology as another example. When I first started my career, drones were in the picture, but not really in a commercial or practically feasible capacity.

Yet, just a few years on and they’re something that are talked about daily and seem to be firmly cementing their place in day-to-day practice. Now, we have the ability to walk crops without even setting foot in a field thanks to these high-flying gadgets — could we really have predicted that 20 years ago?

So while at first glance, it’s easy to shrug off new and perhaps bizarre concepts, it’s striking just how much has changed in as little as a lifetime, and how day to day tasks — like reversing in a car — have been made easier or more efficient through technology.

For me, it’s this mindset that will help us all embrace the innovation coming forward to revolutionise farming in the years to come.

Kubota’s ‘X’ concept-tractor was recently unveiled in Japan to commemorate the firm’s 130th anniversary.
MAKING IT EASY

4 + 44 monthly payments @ 0%
Offer available on all new ARION 400, while stocks last. Offer ends 31 March 2020.
For business users only. Terms and conditions apply.*

CLAAS have made it easy to own a new 4 cylinder tractor, now available with TELEMATICS, GPS steering and ISOBUS as optional extras. Each new ARION 400 is also delivered with 3 years /1,500 hours Warranty (Terms and Conditions apply).

EASY technology, EASY back-up, EASY finance – it’s an EASY decision.

Call your local CLAAS dealer today,
claas.co.uk

*Finance for business purposes only. Subject to acceptance and affordability checks. Applicant must be 18 or over. Promotion valid until 31.03.20 or while stocks last. Available on new equipment only. The interest free offer is subject to a maximum to finance of 50% (based on RRP). The finance product offered under this promotion is Hire Purchase. First payment, full VAT and a documentation fee of £125 are all due on signing. An option-to-purchase fee of £75 (plus VAT) will be collected with the final payment. You will own the machine when all payments have been made. Alternative finance options are available. Terms and Conditions apply. Images are for illustrative purposes only. Finance provided by CLAAS Financial Services Limited, Northern Cross, Basing View, Basingstoke, RG21 4HL. Registered in England No: 0854271.
There’s something of an awkwardness in broaching the subject of investing in a new drill after a pretty much non-existent autumn sowing window.

But doing so could provide a hefty return on investment — as well as providing benefits to soils and subsequent crops.

CPM rounds up some of the most recent developments to make their way onto the market.

By Charlotte Cunningham

Horsch

Horsch’s Maestro drill has recently received an update with the introduction of the new CV and RV models.

Available in 8-row, 12-row and a new 9-row version, the Maestro CV now uses a central hopper for seed and fertiliser — known as Main Tank Supply — or a large fertiliser hopper and individual seed tanks as with the previous Maestro CC.

This new central hopper has a capacity of 3000 litres for fertiliser and 800 litres for seed. If the fertiliser-only central tank is used, the capacity is 3000 litres with 70 litres of seed per row hopper, says the firm.

The Maestro RV model is an 8-row mounted unit with one seed tank per row. Fertiliser supply is carried out via a front-mounted pressurised hopper, such as the Horsch Partner 2000 FT.

Both the CV and RV are equipped with a completely new vacuum metering device, aptly named AirVac, which works with a scraper that doesn’t need to be adjusted — requiring only the correct metering disc and in turn reducing seed handling considerably, claims the firm.

According to Horsch, this increases the range of the standard single grains that can be handled (maize, sugar beet, sunflower, soya and rape) with further varieties, such as beans and peas, possible in the future. The metering unit is still driven electrically to use technologies like Horsch’s SectionControl and VariableRate for every individual row.

The seed body has also been revised for higher stability and a high hydraulic coulter pressure. It’s connected to the main frame with a new clamping profile that makes it easy to alter the number of rows from 12 to eight — a key requirement for customers, notes the manufacturer.

Kongskilde

Despite Kongskilde’s merger with New Holland, the firm’s Vibro Seeder is still sporting its original colours, having yet to be updated to a blue livery.

The Kongskilde Vibro Seeder combines a spring-tine cultivator with a pneumatic seed drill and is ideally suited for minimum tillage seeding in unploughed conditions and even works on wet ground, says the firm.

Key advantages of the drill include strong...
The Kongskilde Vibro Seeder combines a spring tine cultivator with a pneumatic seed drill. Row-by-row seed rate variation is now possible in electrically driven models within Kuhn's Maxima 3 precision drill range.

So how does it work?

Seeding tubes are fitted behind Kongskilde heavy duty cultivator tines and the seeder itself can be specified with a front or rear seed hopper.

Seed is distributed pneumatically to seed coulters mounted at the rear while metering is done with a proven Kongskilde Vario K gearbox.

In terms of working widths, the Vibro Seeder is available in 4m, 5m and 6m models and each has a row spacing of 150mm.

Kuhn

Row-by-row seed rate variation is now possible in electrically driven models within Kuhn's Maxima 3 precision drill range — which the firm claims will give growers new levels of seeding capability.

Available on machines from 6 to 12 rows — and with row spacings from 37.5cm up to 80cm — electric drive

Soils are any farmer’s greatest asset and yet many are unwittingly destroying their structure and productivity.

“Save tine, save money.”

No other drill has our patented leading tine. Because it needs fewer passes, it saves you both time and money — less fuel, fewer wearing parts — yet delivers great yields year after year.

And because it doesn’t damage soil structure, it benefits the environment too.

For a more in-depth look at the Claydon system go to: www.clayondrill.com Telephone: +44 (0) 1440 820 327
Reach for the Sky

Recently introduced at LAMMA, Sky Agriculture has added a host of updates to its EasyDrill and MaxiDrill ranges.

At the top-end of options, the ‘E Drive Premium’ feature has been added which is set to provide electronic shut off for each individual outlet — as well as offering left and right control.

The thinking behind this is that, as a result, the drill can be set to seed with any number of row configurations by simply hitting a button.

According to Sky, this ability to shut off individual rows means that whatever the width of the sprayer or spreader it no longer needs to be a multiple of the drill width — simply enter the sprayer/spreader width into the control box and the tramlines will be calculated and set automatically. “From now on the customer can change sprayer/spreader width without having to renew the drill — an extremely valuable function for contractors providing drilling services for customers with a range of different tramline regimes,” says Opico’s Sky Drill specialist, Joe Redman.

More modest additions include a brand new electronics package with blockage sensing, ISOBUS control as well as a second “Pro-Hopper” allowing four products to be individually metered and distributed at once, says the firm.

With grain and fertiliser main tanks as standard and the possibility of adding one or two smaller Pro-Hoppers, the range of possible applications the machine can be employed for is dramatically extended, says Opico.

In practical terms, this means the operator can now place seed, fertiliser, companion crops and plant protection products accurately in one pass. For example, oilseed rape can be sown with fertiliser, alongside a companion crop of beans and phacelia to reduce insect predation and insecticide usage.

As with the previous generations of Sky drills, 20 Series machines have two outlets, the first being the disc coulter and the second a placement tube with 3 different positions to allow depth to be varied.

One Pro-Hopper places its product into the air flow for the disc coulter whilst the second delivers its metered product into the second airflow for the tube outlet. The double air circuit means the user can manage the air flow of each distribution circuit to suit the type and quantity of product that’s metered.

Sky has delivered what our customers have been asking for,” adds Joe. “With sustainability and the environmental agenda at the forefront of most farming minds the control update and option of a fourth hopper and metering unit delivers a multitude of options for farmers to reduce their input costs and more accurately target where products are placed.”

Share the love

The tail end of last year saw UK manufacturer, Claydon, launch its new ‘Love Your Soil’ campaign, as well as the new Hybrid T6c trailed direct strip seeding drill.

The campaign aims to highlight the need for farmers to take better care of their soils, as well as touching on how the long-standing Claydon Opti-Till system can help achieve this.

“The Claydon family’s 400ha arable farm in the East of England is one of very few in the UK to achieve a five-star rating for the condition and health of its soils,” says the firm’s export manager, Simon Revell. “We know about soils and how to get the best from them in the most eco-friendly, sustainable way, and will be highlighting that to visitors.

“Soils are any farmer’s greatest asset and yet many are unwittingly destroying their structure and productivity through the incorrect use of conventional full cultivations and min-till techniques.”

To complement its existing tools, Claydon’s new 6m Hybrid T6c compact trailed drill is claimed to tick the box for those farmers who require a highly versatile and manoeuvrable 6m trailed drill.

Weighing in at over 20% lighter than Claydon’s MaxiDrill ranges.

Recently introduced at LAMMA, Sky Agriculture has added a host of updates to its EasyDrill and MaxiDrill ranges.

The ‘E Drive Premium’ feature has been added to Sky’s drills which is set to provide electronic shut off for each individual outlet.

Providing a hopper capacity of 3500 litres — double that of Claydon’s 6m mounted drill — the T6c weighs approximately 7900kg unladen, compared with 9000kg for the T6.

The hopper can be used for seed only or divided 60:40 between seed and fertiliser for combination drilling — a technique which gets crops off to a fast start and is popular with farmers and contractors throughout Europe and Scandinavia.

Versatility appears to be at the core of Claydon’s latest launch, with the T6c able to sow directly into stubble, in min-till situations or on ploughed/cultivated land. “This enables one drill to handle any crop establishment situation and minimises capital investment,” notes Simon.
A key benefit of John Deere’s 750A is the extremely low soil disturbance created at the point of drilling.

A variable rate map.

Work carried out by Kuhn in the development of the technology has shown that varying the seed rate in response to soil conditions can lead to seed savings of 2-3% when used in conjunction with section control (automated row shut-off).

In addition to seed savings, variable seed rate can also optimise plant populations according to available water and soil nutrients, with this resulting in an overall potential yield gain of 5-8%, says the firm.

Looking to crop suitability, Maxima 3 precision drills can be used for drilling maize, sunflower, beetroot, sugar beet, peas, beans, onions and other crops where row spacings from 37.5cm to 80cm are used.

Both mechanical and electric versions of the Maxima 3 range also benefit from an improved seed selection and ejection system which enables accurate seed placement at working speeds of up to 10km/h.

Accuracy has also been enhanced by a new seeding unit parallelogram which is reinforced in key areas, including at critical hinges and linkages, for added stability, robustness and longevity, says Kuhn.

John Deere

Seen for the first time in public at the 2018 Tillage-Live event, John Deere’s ProSeries opener for the 750A All-Till drill is the main focus for the firm at the moment on the drilling front.

Available for retrofitting to existing machines, this replaces the 90 Series opener that’s been a feature of the drill since its introduction in the mid-1990s.

The new opener is designed to provide even less soil disturbance, more consistent seeding depth, better seed to soil contact and improved slot closure, and features only one grease point for minimal annual maintenance, says the firm.

According to the manufacturer, a key benefit of the 750A is the extremely low soil disturbance created at the point of drilling, which fits well with cultural methods for controlling grass weeds, particularly blackgrass.

The ProSeries opener further reduces soil movement by utilising a narrower seed boot that fits tighter to the disc, creating less soil throw and providing 40% more consistent seeding depth, according to the firm. Wear life is increased, as the seed boot is hidden more behind the opener disc and subjected to less soil contact.

The flexible press wheel is both narrower and larger in diameter, so it fits in the seed trench better, and now features a double-row bearing for twice the service life.

This redesign helps to improve seed to soil contact and keeps each seed at a consistent depth, for more even crop emergence and potentially higher yields, says Deere. Better emergence is also provided by a more aggressive serrated closing wheel, which has improved the closing function by 50%. ■
Growers look set to benefit from an additional 40% capacity with the latest trailer launch from British manufacturer, Ktwo.

According to the firm, the new Roadeo Compact and Push trailer is unique in its design because it doesn’t tip to empty its load. Instead, it compacts and pushes its contents out which ultimately results in a reduction in costs thanks to the trailer’s ability to increase the volume each trailer load can take by up to 40%, says the firm.

According to Ktwo, at the core of the trailer’s design is increased safety and reliability.

The chassis and running gear have been developed to provide maximum stability with high quality on-and-off road handling characteristics as demanded by today’s high-speed tractors, it says.

As well as this, the new trailer is fitted with high specification axles and brakes to ensure that it can stop safely in all conditions.

“Our Roadeo Compact and Push Trailers are already being used by farmers and contractors in the UK and worldwide,” says Robbie Polson, Ktwo sales director. “We regularly get praise for their time and cost saving benefits to farming. The increased capacity and emptying speeds reduce fleet running costs dramatically.”

It’s Ktwo’s belief that the traditional tipping trailer is likely to be replaced by the safer and cost-saving pusher design in the future.

If there’s one bit of kit you’re always likely to find on-farm, it’s got to be a trailer — and more often than not, not just the one.

While they’re usually long-lasting investments, there’s new trailer technology on the market that looks to make life just that little bit easier for growers.

Ktwo
Growers look set to benefit from an additional 40% capacity with the latest trailer launch from British manufacturer, Ktwo.

According to the firm, the new Roadeo Compact and Push trailer is unique in its design because it doesn’t tip to empty its load.

For those looking for something a bit smaller and perhaps more budget-friendly, SlurryKat has recently expanded its Panterra range with the introduction of a completely new range of trailers, designed to offer growers an alternative specification trailer, while still maintaining build quality and reliability.

According to the firm, the Panterra range allows the end user to enjoy high quality components without having to opt for the higher specification engineering features.

The Panterra drop side general purpose trailer range consists of four models — 8t, 10t, 12t and 14t — all of which come as standard with tandem axles, hydraulic brakes and a full LED lighting package.

Other features include a single tipping cylinder, which is carried across from the company’s premium trailer range and offers a fast and efficient tipping cycle.

Growers look set to benefit from an additional 40% capacity with the latest trailer launch from British manufacturer, Ktwo.
It's Fendt.
Because we understand agriculture.

FendtONE
FendtONE. The seamless connection of office and machine.
To find out more contact your local Fendt Dealer.
According to the Health and Safety Executive, the most common cause of serious and fatal injuries in agriculture involve moving and overturning vehicles — with trailers that are unfit for purpose one of the biggest culprits.

In a bid to improve trailer safety, Jane Gurney has been leading the Tilly Pass scheme, which is now available via an app.

For those that haven’t come across the Tilly initiative, it was founded by Jane following her son’s death in 2014, after his tractor and trailer crashed into a bridge. The trailer was later found to be poorly maintained, as well as having faulty brakes.

The scheme itself calls for trailers to be put through an 18-point inspection, carried out on the individuals’ farm, by an authorised mechanic, and was designed with help from the HSE.

Upon completion of the test, a Tilly certificate is fixed to the tailgate of your trailer which also includes a unique Tilly Pass number.

After making a difference with the original scheme, the brains behind Tilly Pass has gone one step further with a free trailer safety towing app — aptly named Head to Tow — which gives quick and easy access to manufacturers daily, monthly checks and was unveiled at LAMMA in January this year.

“It’s important to remember that Head to Tow is an aid to towing safely, and shouldn’t be substituted by an annual trailer inspection,” says Jane. “However, with the app, safety checks can be carried out on a more regular basis.

“These checks can range from drivers carrying out start-up safety checks before using the vehicle, to regular preventative maintenance inspections carried out based on time or mileage.

“By using the Head to Tow App farmers will be able to select their specific trailer and access these safety checks directly via the manufacturer’s link.”

Some of the manufacturers already linked with the scheme include Bailey Trailers, Harry West, Larrington Trailers, Broughan Engineering, Richard Western, Stewart Trailers, Ktwo and Warwick Trailers.

With legislation in place meaning that employers have a legal obligation to ensure work equipment is maintained to an efficient state, in efficient working order and in good repair, Jane hopes the new app will help to facilitate this. “By making this important information so readily available both employers and employees can more accurately identify problems which may happen while the vehicle is in use and carry out appropriate checks while developing a proper system of maintenance.”
ernative colour paint.

According to SlurryKat, a common complaint with this type of trailer is that the user has to leave the cab and manually open the tail door, however, this issue has been resolved within the firm’s new launch with the introduction of a hydraulic latch rear door which it believes saves both time and effort for the operator.

The drop side trailers are also available in a heavy duty version for more arduous applications if required.

Stewart Trailers

Scottish manufacturer, Stewart Trailers, debuted its first trailer fitted with a Central Tyre Inflation system at LAMMA recently.

“The use of flotation tyres is commonplace but they’re often not used to their best advantage because the trailers have to travel on the road and in the field, meaning the tyres are not operated at optimum field pressure,” says the firm.

“It’s not practical to inflate and deflate the tyres, so they are generally run at a pressure that suits both environments. The development of a Central Tyre Inflation System means that the operator can quickly and easily adjust the trailer tyre pressures to suit the environment the trailer is working in.”

So how does it work?

“If the system is fitted to a two axle trailer, the trailer is fitted with four air tanks which enables rapid inflation of the system,” explains the firm. “Three axle trailers are fitted with an on board compressor to provide the air and the system is operated via an in cab interface.” According to Stewart Trailers, the tyres can be inflated from field pressure to usable road pressure within 45 secs and the operator can start to inflate the tyres while still in the field so that when they reach the road, the tyres are already up to the necessary pressure.

A particularly neat feature of this system is that if the operator forgets to inflate the tyres when leaving the field, an in-built safety system sounds an alarm and the system automatically starts to inflate the tyres when the trailer reaches a pre-set road speed.

“The benefits of using the tyres at optimum pressure are reduced soil compaction and tracking in the field, reduced fuel consumption in the field and on the road, and reduced wear and tear on the tyres as a result of being utilised at their optimum pressure both on the road and in the field.”

Scottish manufacturer, Stewart Trailers, debuted its first trailer fitted with a Central Tyre Inflation system at LAMMA recently.

If the Central Tyre Inflation system is fitted to a two axle trailer, the trailer is fitted with four air tanks which enables rapid inflation of the system.

UNLEASH YOUR TRACTOR’S POWER WITH TORQUEMAX

Engineered to undertake all demands of the field and road with ease.

- Low soil compaction
- High traction
- Superior grip

Also, launching in IF (Increased Flexion) Technology

To know more, visit www.ceatspecialty.com
Distributed in the UK by
For further inquiries, call 01387 951114
or email us at cstdv@ceat.com / sales@nordictyres.com
In order to use an inter-row hoe effectively, you’ve got to have wider rows, says Dick Neale.

The future of glyphosate is one that hangs on tenterhooks at the moment, with constant debate over whether or not growers will continue to have access to the crop protection product — and if they will, for how long.

“Undoubtedly, it’s easier to knock out weeds in a min-till or no-till system, but how this is structured will make all the difference when it comes to using mechanical weed control.”

While inter-row hoes provide a physical kill, and can be very effective, Dick believes the biggest issue for growers adopting this approach will be row width. “In order to use an inter-row hoe effectively, you’ve got to have wider rows, which means less competition for weeds earlier on.”

Another challenge to overcome will be the fact that that inter-row kit doesn’t react with in-row weeds, he adds. “This includes weeds that are causing some of the biggest problems, such as blackgrass. The issue is that even if you’re able to remove some of the competition, the plants left produce more seeds which in turn just exacerbates the issue.

“So at the moment, for something like blackgrass, I don’t see mechanical control as an ultimately-viable, long-term solution.”

For broadleaf weeds, however, there should be less of an issue as there are still a wide range of chemical options available, adds Dick.

Going forward, the transition from chemical to mechanical weeding can be made smoother by taking on board lessons from the organic sector. “What traditional systems can learn from organic growers is the importance of getting technique right and selecting the right bit of kit for the job. But it’s important to keep...”
in mind that machinery alone won’t replace glyphosate, and herbicides will have to be used in tandem,” he notes.

When it comes to investing in kit, it’s important to do your research thoroughly, explains Dick. “Go with manufacturers who have put thought and consideration into the geometry of the tine. This is incredibly important because if the tine drags, rather than cutting weeds off, it can encourage them to grow more severely.”

With more hoes likely to come onto the market over the coming years as a result of the increased pressure on glyphosate, the advice from Dick is to go with a manufacturer that has long-standing experience and understanding of this type of kit. “I’d advise growers to be really critical about the design of the hoe and the experience of the people — or firm — that have created it.”

But before you even consider splashing the cash on a shiny new hoe, significant changes to your current farming system may be required, he warns. “It’s not just as simple as going out and buying a new hoe. If you’re running row widths of 16-18cms this won’t allow enough flexibility to get the hoe down. If you’re already operating with a wide drill, then of course, this transition might be easier. But if not, it can be a huge investment, so it’s important to think carefully and wisely about the implications and whether or not you’re structured correctly before you invest.”

As Dick says, investing in the right kind of hoe can make or break the system, but...
Garford Farm Machinery also has a nifty solution to mechanical weed control in the form of its Robocrop InRow weeder. So how does it work?

Robocrop InRow uses a digital video camera to capture images of the crop ahead of the tool-bar. These images are analysed to find the positions of the individual plants as they pass beneath the tool.

This information is then utilised for lateral steering of the hoe and individual synchronisation of the InRow weeder discs. The Robocrop computer works to constantly adjust the rotational speed of the discs to suit the variability of plant spacing.

Row following is maintained accurately to within 10mm of average position of detected plant foliage, via steered soil-engaging disc wheels. The working depth of the InRow weeder disc is controlled via the parallel linkage wheel unit.

The system uses a special shaped disc rotating about an axis and set to cultivate at a shallow depth (typically 10 to 20mm) within the crop row.

The crescent-shaped disc profile is designed to arc around the plants and then cut in between the plants as it rotates around the axis. Rotation of the disc is synchronised with forward movement and the plant positional information from the imaging camera.

The disc is coupled directly to a hydraulic motor which is driven via a proportional hydraulic valve controlled by the Robocrop computer.

Claydon’s TerraBlade inter-row hoe
Claydon recently launched its three-section TerraBlade inter-row hoe at LAMMA which has been designed to eliminate weeds or companion crops growing between the rows in any strip seeding system.

Launched in response to customer demand, the new three-section 6m/20-tine and 8m/26-tine versions have been designed to operate effectively in even the heaviest soils, says Claydon.

Both incorporate Claydon’s unique contour-following TerraBlade tines which can be infinitely adjusted to suit any row width, enabling them to be used in any band-sowing system, the pressure on the blades being adjustable to suit variations in soil types and conditions, according to the manufacturer.

Carried on the tractor’s front linkage and steered manually, they incorporate a heavy-duty box section steel frame comprising a fixed centre section and two vertically folding wings.

The largest 8m model requires a minimum 80hp tractor, has an optimum working speed of 6km/h and provides an average work output of 4ha per hour. Weighing 720kg, it has a maximum width of 8.15m, but folds to 2.78m wide and 3.73m high for transport.

“The TerraBlade provides a valuable additional weapon in the agricultural industry’s weed control armoury,” says Jeff Claydon. “We developed it for farmers who need an effective, reliable, low cost, mechanical method of removing weeds from their crops. This is becoming increasingly important, for several reasons. In recent years numerous agrochemicals,
including herbicides, have been lost to more stringent legislation, some of those which remain are becoming more costly and less effective, while an increasing number of farms are turning to organic production where such products cannot be used.

Ideal for use in band-sown crops because the unseeded strip between the rows can be mechanically hoed, the TerraBlade is designed for use in all types of strip-seeded crops. Its thin, sharp blades work at up to 30mm deep, effectively eliminating weeds from that area reliably, safely and without chemicals, greatly reducing the overall weed burden.

By keeping the unseeded rows clear of weeds during the early stages of crop growth, competition for nutrients, light, air and water is reduced, allowing the young crop to grow away strong and healthy, adds the firm. “The TerraBlade therefore has the potential to improve yields, drastically lower the potential for carry-over of weed seeds into the following crop and reduce the risk of more resistant weed types developing.”

**Horsch’s Hybrid Farming System**

Combining the best practices of organic farming and conventional farming, Horsch claims its new Hybrid Farming System provides a solution to weed control without glyphosate.

At the core, are four new products which were launched at last year’s Agritechnica — the Transformer VF hoeing tool, Finer LT cutting tillage tool, Cura ST harrow and Cultro TC knife roller.

The new Transformer VF (VariableFrame) is the basis of a new Horsch’s hoeing tool line. The fully integrated lateral sliding frame enables the Transformer VF to be extremely flexible with parallelogram-guided tools.

Available in 6m to 12m working widths, the Transformer VF benefits from ISOBUS compatibility and can be combined with many camera systems, says Horsch.

The 6m and 8m models are folded in three sections while 9m to 12m models are folded in five, and all models have a transport width of 3m and height of 4m.

The clearance below the frame is an impressive 660mm, which is particularly useful in row crops like maize and sugar beet, the firm adds.

The Transformer VF can cover row spacings from 25cm to 90cm and adjustment is simple and fast, with working depth adjusted easily without any tools, while the units can be hydraulically operated for particularly hard soils.

The hydraulic system is also used when individual rows are lifted via section control. Covering discs for the hoeing tools are available as an option to protect crops in the early stage and an additional attachment space can be used for finger rolls or other tools that work in the row.

**Opico/Hatzenbichler’s inter-row cultivators**

At the end of last year, Opico launched a complete range of inter-row cultivators by Austrian firm, Hatzenbichler.

Although the manufacturer has been building inter-row cultivators for 65 years, it says it’s only recently that precision guidance technology has made them a realistic option for mainstream arable production.

“We’ve traditionally sold most of our comb harrows to organic producers wanting to control weeds in broad-acre combinable crops and to vegetable producers looking to reduce herbicide usage,” explains Opico managing director James Woolway.

“However over recent years, with cost pressures and herbicide resistance developing, more and more conventional growers are showing an interest.

“Technology has moved on too — camera guidance on steerable hoes means it’s now possible to cover decent acres in a working day. While this has initially seen biggest take-up with those growing row crops such as beet, vegetables and maize, we’re now getting enquiries from cereal growers looking at moving to wider row spacings specifically to provide them with the opportunity to integrate some sort of mechanical weed control in their system.”

The new range of inter-row cultivators have working widths stretching from 3m right up to 18m in a bid to provide something for everyone, adds Opico.

The principle for all versions remains the same. Tines mounted on parallelograms with individual depth wheels run between the crop rows, cultivating the soil surface and slicing through weed roots leaving unwanted plants to die on the surface.

There is a choice of points and of tines which need to be matched to the job in hand — A-shares mounted on S-tines for deeper work or duckfoot shares and L-blades mounted on the specially designed Hatzenbichler Vibro-tine. On top of that there is a whole raft of additional options including plastic finger wheels that flick out weeds in the crop row and crop protectors that shield delicate plants from soil throw.

Camera-controlled row guidance is provided by a special headstock which has an integrated hydraulic ram to provide up to 250mm of side-shift in either direction. Oil is sent to either left or right by the camera controller, ensuring the tines run as close to the crop rows as possible without hooking out plants.

More and more conventional growers are showing an interest in hoes, according to Opico.
The Sky’s no limit

“...This drill just does things you don’t think a drill can do.”

Farming with the environment in mind is set to become an even greater area of focus for farmers in the coming years. CPM visits a farm in Cambs to find out how investing in a new drill has helped boost both crop productivity and environmental protection.

By Charlotte Cunningham

As Tom Martin walks out across a field on a bright, but chilly, February morning in Peterborough, you’d be forgiven for thinking he must be one of the lucky ones with light, sandy soil that’s escaped the peril of the persistent rain over the past few months.

Noticing an unexpected lack of sticky mud on our boots, Tom laughs: “We’re actually very heavy clay here. We did some testing which showed we’ve got about 70ft of clay — and that wasn’t even reaching the bottom.”

As a self-proclaimed ‘conservation farmer’, Tom credits this ability to walk out on what should be very sodden ground, to the work he and his father George have put in to regenerating the land over the past 15 years. “This winter has been a good one to test everything we’ve been working towards,” he says. “Like many others, it’s been horrendously wet here and we’ve had several times our usual rainfall.

Water gets away

“Under our previous system, I don’t think I would’ve been able to walk across this field, but the water just seems to get away that bit better.”

So what’s changed?

“About 15 years ago, my father dispensed with the plough, and went to a minimum tillage system with a set of discs,” explains Tom. “He made great strides and improvements with this change, but since I’ve been back on the farm, I’ve been really looking at what the future holds for us, and one thing I’ve been really forensic about is our costs.”

Tom made the decision to target and reduce tillage in a bid to keep a lid on costs, and he believes investing in a Sky Agriculture EasyDrill has helped him do just that.

“For a number of years, I’d been looking into ways to change what we were doing,” he says. “On our heavy soils, I knew weight would be an important factor, so I automatically discounted one particular drill that was ultimately 2t heavier than the EasyDrill.

“I went out to Agritechnica, not specifically looking for a drill, but very much in the mindset that it would be something we’d look to purchase over the next couple of years. But I really liked what I saw in the EasyDrill.”

As Tom Martin first came across the EasyDrill at Agritechnica a few years ago.
The hardened disc which opens the soil runs at just 3.5° to the direction of travel.

Drilling into the Peterborough sunset with the EasyDrill.

After months of research, Tom eventually purchased a 6m Sky EasyDrill, which is now two years old and has taken reducing cultivations one step further by implementing a no-till system.

The drill itself comprises three hoppers — two main ones and a mini-hopper at the front — and has the ability to drill multiple products at two different depths in the seeding row thanks to the dual distribution system.

The hardened disc which opens the soil runs at just 3.5° to the direction of travel which means less soil disturbance, less...
Every time you want to do something with this drill, it’s like a Frenchman has already thought about it and made it a little bit easier for you, says Tom Martin.

| On Farm Opinion |

The drill itself comprises three hoppers — two main ones and a mini-hopper at the front.

► power requirement and less weed and volunteer emergence, according to Sky. Running alongside the disc and keeping it clean is the carbide tipped monobloc skim coulter. The carbide face on the skim coulter ensures minimal wear while it cleans the disc and the seed slot in front of the seed tube. The height of the skirt coulter in relation to the disc can be altered as the disc wears. Behind each disc coulter is an angled metal press wheel which itself works in tandem with the one next-door. These press the soil sideways and downwards closing the seed slot and covering the seed.

“We use it a lot for applying fertiliser with OSR or a companion crop. Or, for drilling wheat with a phosphate fertiliser,” explains Tom. But with so many other options on the market, what is it that makes this particular bit of kit so great?

“I always say to people that every time you want to do something with this drill, it’s like a Frenchman has already thought about it and made it a little bit easier for you,” laughs Tom. The drill is easy to use and has impressed with its ability to perform in a number of situations, he says. “It’s sold as a no-till drill, but it really is wonderfully versatile.

Immaculate field

“A couple of instances spring to mind. One was a friend pointing out that he thought I was going to drill a certain field when in fact, I already had. The field was immaculate with no soil pulled up and no smearing, so it looked like it hadn’t been touched with any piece of machinery, let alone a drill.”

“Another occasion was where we decided to sow a winter barley crop into a patch of spring barley volunteers. It was a pretty dense covering — top of the boot kind of height — and my uncle said he didn’t think it would work, but it came up beautifully. This drill just does things you don’t think a drill can do.”

If money was no object, Tom says he’d love to add coulter sensors to his drill, which don’t come as standard, but are available as an optional extra. “These sense any kind of blockage and when you’re doing contract work and carrying out operations for other people this is really critical to ensure you’re not leaving anything in their fields.”

For those growers toying with investing, Tom points out that it’s important to remember that though it’s incredibly versatile, it is a disc drill, so there are some conditions that won’t allow it to operate to its full potential. “My other point would be

Jack of all trades

According to Opico — the UK distributors of Sky Agriculture drills — the EasyDrill is one of very few direct drills that can truly be advocated as a direct, a min-fill, a grassland and a cover crop drill.

“One of the reasons for the EasyDrill’s success is its versatility,” says Joe Redman, Sky Drill product specialist at Opico. “It’s proven time after time to work into multiple seedbeds — whether that’s into ploughed pressed ground, stubble or even into cover crops, this drill can do it all.”

According to Joe, this versatility is credited to the drill’s weight transfer system. “On each wing, there’s a hydraulic cylinder, and this allows users to manage where the weight of the machine sits — with an allowance of up to 250kg per disc. “That weight can be placed over the front rubber wheels — if growers want to drill into cultivated ground — or it can be put over the discs, to give good penetration in hard conditions.”

If operators are looking to achieve good slot closure and soil to seed contact, the weight can be distributed back over the rear closing wheels, he adds.

Furthermore on well consolidated ploughing it can also be used in conventional systems. “Its low disturbance disc coulter and press wheel not only ensure minimal weed seed germination, they also keep hp requirement to a minimum,” says Joe. “A 6m EasyDrill typically takes 200hp to pull which reduces fuel consumption, tractor weight and therefore damage to the soil structure when drilling in damp conditions.”

Operator’s outlook

Despite how great the EasyDrill has proven to be to Tom, it’s actually main operator, Joe Porteous, who gets to push this drill to its limits.

“Two weeks before Tom bought it, we had another similar drill out on demo. I thought that was good, but then when the EasyDrill arrived it was an absolute game-changer and just made everything ten times easier,” he says.

According to Joe, it’s both the simplicity and the usability that’s made the EasyDrill such a hit for him. “Once you’re used to the controls, it’s so easy to use. It’s incredibly user-friendly and every detail and function has been thought about.”

He’s also noted a significant difference within crop establishment too. “We’ve been placing DAP fertiliser at the same time as the seed and it’s made a huge difference. So much so, that we did a few trials where we turned the fertiliser hopper off, and you could clearly see a contrast in the crops.”

Thanks to the three hoppers, Joe says his workload has been dramatically reduced. “It means I can do three jobs at once which cuts down my own workload and reduces the farm’s labour cost. It really is a great bit of kit.”
to keep in mind that the parts are made in France. If you live near a dealer and are used to having parts delivered the next morning, this may not always be the case with the EasyDrill."

While the firm is based in France, Opico are the UK distributor and do keep an array of parts in stock to make the replacement process as smooth as possible for growers, he adds.

**Teething problems**

While most new bits of kit experience teething problems, this proved not to be the case for Tom. “For us, the early days were more just about learning what the drill did and how to use it, so we just needed some assistance there.

“But the beauty of Sky is that they’re a small enough company still to get direct support. Opico’s Sky Drill specialist, Joe Redman, is utterly remarkable and was on hand for whenever I had a question.”

With the recent unveiling of the Agriculture Bill, it’s evident that farmers are going to have to up their game when it comes to environmental care. But with this particular farm already looking to be ahead of the game, what’s next for Tom? “I like to think we’re relatively progressive, but I don’t think any farmer would admit to being ahead of the game,” he laughs.

“Our focus for the coming years is on trying to consolidate what the future may bring, as well as maintaining a diversified income stream and working hard to protect the environment by being as efficient as possible.

“Going forward, things are going to be tighter and the top performing businesses will be the ones who survive. For us, that’s where we’re aiming, and hoping, to get to.”

---

**Farm facts**

Village Farm, Haddon, Peterborough

- **Crops:** Wheat, barley, oats, beans and OSR.
- **Mainline tractors:** 2x John Deere tractors (150hp and 195hp)
- **Cultivations:** 36m Knight trailed sprayer, John Deere combine.
- **Soil type:** Very heavy clay
- **Staff:** Tom, father George and operator, Joe Porteious.

---

Placing DAP fertiliser at the same time as the seed has made a huge difference in terms of crop establishment, says operator Joe Porteious.
Prepare to surrender control

This machine makes decisions so much faster than you can and just eats up the acres.

Machinery Masterclass

Smart technology on the latest New Holland rotary combines brings a marked step-up in harvest performance. CPM heads to the company’s training facility in Basildon, Essex, to receive a Masterclass in what it can do.

By Tom Allen-Stevens

One of the biggest considerations facing many arable businesses when buying a combine harvester is who’s going to operate it?

The machine may represent the largest capital outlay the farm makes, and process nearly all its throughput. A combine’s level of performance can therefore mean the difference between profit and loss, so this is not a job to be trusted to anyone but the most skilled operator, and that’s an increasingly rare individual.

Nigel Honeyman of New Holland, however, believes the skill required now exists within the machine itself. “The operator represents one of the limiting factors of a modern combine,” he says.

“Even some of the most skilled drivers won’t push a machine enough to release the enhanced performance of our CR Revelation range of rotary combines, for example (see panel on p79). It’s why we’ve worked hard to develop the range so that it’s as easy and intuitive as possible to operate. And we now have a system that replicates how the best operator would handle its capabilities.”

Innovation Award

He’s talking about IntelliSense (see panel on p80) which was introduced at Agritechnica in 2017, winning a silver Innovation Award. This is a proactive and automatic combine setting system, geared towards maintaining maximum throughput while keeping losses and damaged grain to a minimum. It constantly gathers information from sensors around the machine and every 20 secs will make adjustments from an estimated 280M possible settings combinations to keep it at peak performance.

IntelliSense has now been rolled out as an option across New Holland’s CR (Twin Rotor) range, and successfully completed its first commercial season last year on a number of harvesters operating across the UK, says Nigel. “We were worried at first that some operators would abuse it — push the system beyond its limits — but quite the opposite appears to be the case.

“Farmers have been genuinely surprised at how hard a combine using IntelliSense will push itself, with some reports of throughput doubling. We’ve found that customers looking to step up harvester capacity can achieve this through buying an equivalent-rated machine to the one they have and equipping it with IntelliSense.”

That’s because the system reacts faster than an operator to a change in the crop or condition, he explains. “A combine runs at peak efficiency when you give it a full
First introduced 45 years ago, New Holland’s Twin Rotor technology has been through a number of iterations, the latest of which have led to a claimed increase in harvesting productivity of up to 25% in the last five years.

New 20mm higher crop covers and an increased beater speed step up threshing efficiency of the 17” (43cm) rotor on the smaller CR models. The rotor also has an adjustable beater grate, which can be opened to provide as much as 0.26m$^2$ additional separation surface (a 75% increase). The improvements deliver a 10% increase in these models’ capacity.

The 22” (56cm) rotor on the four larger models also benefits from the increase in beater speed, adding an extra 5% capacity increase. The top-end CR9.90 and CR10.90 have a new high-capacity grain elevator delivering to a 14,500-litre grain tank which increases the combine’s grain transport volume by 10%.

Standard across the range is Twin Pitch, which was introduced with the Stage IV engine in 2011. These rotors feature 75mm rasp bars spaced out in such a way that they can deliver a performance increase of around 10%, especially in damp conditions. The 22” models now come with Twin Pitch Plus, which further increases capacity.

The Deep Cut Dynamic Feed Roll comes as standard across the range and puts a 45cm diameter transverse beater roller in front of the Twin Rotors and has the effect of speeding up the crop.

Throughput. IntelliSense is designed to maintain that.”

This level of artificial intelligence (AI) is relatively new in combine technology, although New Holland’s been making steady progress towards it since IntelliCruise was introduced in 2007. “It’s only recently we’ve had processors powerful enough to manage the volume of data required to make decisions. AI can also get stuck in a logic loop. This is where algorithms correct and counter-correct and can’t find a happy medium that solves an issue.”

In combines, the problem comes with setting the fan speed, and it’s a quandary many operators will be familiar with, notes Nigel. “Most operators are terrified of setting the fan speed too high and blowing grain over the back. But equally, set it too low and the sample doesn’t

### Features that step up productivity

First introduced 45 years ago, New Holland’s Twin Rotor technology has been through a number of iterations, the latest of which have led to a claimed increase in harvesting productivity of up to 25% in the last five years.

New 20mm higher crop covers and an increased beater speed step up threshing efficiency of the 17” (43cm) rotor on the smaller CR models. The rotor also has an adjustable beater grate, which can be opened to provide as much as 0.26m$^2$ additional separation surface (a 75% increase). The improvements deliver a 10% increase in these models’ capacity.

The 22” (56cm) rotor on the four larger models also benefits from the increase in beater speed, adding an extra 5% capacity increase. The top-end CR9.90 and CR10.90 have a new high-capacity grain elevator delivering to a 14,500-litre grain tank which increases the combine’s grain transport volume by 10%.

Standard across the range is Twin Pitch, which was introduced with the Stage IV engine in 2011. These rotors feature 75mm rasp bars spaced out in such a way that they can deliver a performance increase of around 10%, especially in damp conditions. The 22” models now come with Twin Pitch Plus, which further increases capacity.

The Deep Cut Dynamic Feed Roll comes as standard across the range and puts a 45cm diameter transverse beater roller in front of the Twin Rotors and has the effect of speeding up the crop.

### New Holland CR Revelation range

<table>
<thead>
<tr>
<th>Model</th>
<th>Rotors</th>
<th>Max Power (kW/hp)</th>
<th>Grain tank (litres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 10.90</td>
<td>22”</td>
<td>515/700</td>
<td>14,500</td>
</tr>
<tr>
<td>CR 9.90</td>
<td>22”</td>
<td>441/600</td>
<td>14,500</td>
</tr>
<tr>
<td>CR 8.80</td>
<td>22”</td>
<td>441/600</td>
<td>12,500</td>
</tr>
<tr>
<td>CR 8.90</td>
<td>22”</td>
<td>400/544</td>
<td>12,500</td>
</tr>
<tr>
<td>CR 8.80</td>
<td>17”</td>
<td>380/517</td>
<td>12,500</td>
</tr>
<tr>
<td>CR 7.90</td>
<td>17”</td>
<td>338/460</td>
<td>11,500</td>
</tr>
<tr>
<td>CR 7.80</td>
<td>17”</td>
<td>305/415</td>
<td>10,500</td>
</tr>
</tbody>
</table>

The range complies with Stage V emissions standards.

---

**Fast, accurate and efficient drilling**

**ESPRO**

A 3m version of the ESPRO is also available

KUHN’s 6m ESPRO minimum tillage drill combines speed, accuracy and efficiency, having the capability of working accurately at 17km/hr behind a 200hp tractor. This new machine combines innovative design and the new CROSSFLEX seed bar with established technology such as the SEEDFLEX double disc coulter system.

---

Throughput. IntelliSense is designed to maintain that.”

This level of artificial intelligence (AI) is relatively new in combine technology, although New Holland’s been making steady progress towards it since IntelliCruise was introduced in 2007. “It’s only recently we’ve had processors powerful enough to manage the volume of data required to make decisions. AI can also get stuck in a logic loop. This is where algorithms correct and counter-correct and can’t find a happy medium that solves an issue.”

In combines, the problem comes with setting the fan speed, and it’s a quandary many operators will be familiar with, notes Nigel. “Most operators are terrified of setting the fan speed too high and blowing grain over the back. But equally, set it too low and the sample doesn’t

### Features that step up productivity

First introduced 45 years ago, New Holland’s Twin Rotor technology has been through a number of iterations, the latest of which have led to a claimed increase in harvesting productivity of up to 25% in the last five years.

New 20mm higher crop covers and an increased beater speed step up threshing efficiency of the 17” (43cm) rotor on the smaller CR models. The rotor also has an adjustable beater grate, which can be opened to provide as much as 0.26m$^2$ additional separation surface (a 75% increase). The improvements deliver a 10% increase in these models’ capacity.

The 22” (56cm) rotor on the four larger models also benefits from the increase in beater speed, adding an extra 5% capacity increase. The top-end CR9.90 and CR10.90 have a new high-capacity grain elevator delivering to a 14,500-litre grain tank which increases the combine’s grain transport volume by 10%.

Standard across the range is Twin Pitch, which was introduced with the Stage IV engine in 2011. These rotors feature 75mm rasp bars spaced out in such a way that they can deliver a performance increase of around 10%, especially in damp conditions. The 22” models now come with Twin Pitch Plus, which further increases capacity.

The Deep Cut Dynamic Feed Roll comes as standard across the range and puts a 45cm diameter transverse beater roller in front of the Twin Rotors and has the effect of speeding up the crop.

### New Holland CR Revelation range

<table>
<thead>
<tr>
<th>Model</th>
<th>Rotors</th>
<th>Max Power (kW/hp)</th>
<th>Grain tank (litres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 10.90</td>
<td>22”</td>
<td>515/700</td>
<td>14,500</td>
</tr>
<tr>
<td>CR 9.90</td>
<td>22”</td>
<td>441/600</td>
<td>14,500</td>
</tr>
<tr>
<td>CR 8.80</td>
<td>22”</td>
<td>441/600</td>
<td>12,500</td>
</tr>
<tr>
<td>CR 8.90</td>
<td>22”</td>
<td>400/544</td>
<td>12,500</td>
</tr>
<tr>
<td>CR 8.80</td>
<td>17”</td>
<td>380/517</td>
<td>12,500</td>
</tr>
<tr>
<td>CR 7.90</td>
<td>17”</td>
<td>338/460</td>
<td>11,500</td>
</tr>
<tr>
<td>CR 7.80</td>
<td>17”</td>
<td>305/415</td>
<td>10,500</td>
</tr>
</tbody>
</table>

The range complies with Stage V emissions standards.
Productivity pushed with a demonstration Revelation

A 12-hour spell in a demonstration CR8.90 last harvest was quite literally something of a revelation for Rob Mair, the main combine operator for W Mair and Sons based near Sleaford in Lincs. 

“I thought I was pretty good at pushing the performance of a combine until I set the IntelliSense going on this new machine. It went like the clappers and didn’t grunt or flinch once as it moved through the crop, even when it came across thicker, slightly green patches.”

Last harvest was his third as the main combine driver for the business that currently puts 525ha/yr of combinable crops through a 2013 Claas Lexion 740 with a 7.6m header. “We’re looking for a new combine for 2020 harvest, so had a couple on demonstration. Our Lexion’s a good machine, but the technology’s moved on and we want a step-up in capacity — the main limitation is our dryer, so the aim is a machine with an improved throughput that will harvest more crop when it’s dry.”

It took just five minutes to get accustomed to the IntelliView terminal, notes Rob. “I set up the GPS and IntelliCruise, selecting 8km/h maximum ground speed. It’s a powerful terminal and you get a lot more information on that big screen than the small one I’m used to — there’s clearly a lot you can access through it. But I also liked the console lay-out with its manual switches and one-flick functionality.”

He then put the 9m header into the crop of Skyfall winter wheat. “We got the combine at 5:00 in the evening and ran it through until 2:00am, and I was staggered just how much it did at the full 8km/h. I’d set it to — it peaked at 80t/hr and was absolutely flying through the crop. I wouldn’t have gone more than about 6km/h at night, but then this machine makes decisions so much faster than you can and just eats up the acres. What’s more, the lighting kit lit up the field like a collapsed sun — the visibility was superb.”

With a third of the farm on fenland, a third on sand and the rest heavy clay, the harvested area was on the lighter land. “We had the chopper going as we need to incorporate the straw on that land. Admittedly it was a 10.5t/ha crop, and quite short and thin, but the straw just turned to dust and the rest heavy clay, the harvested area was on the lighter land. “We had the chopper going as we need to incorporate the straw on that land. Admittedly it was a 10.5t/ha crop, and quite short and thin, but the straw just turned to dust and the rest heavy clay, the harvested area was on the lighter land. “We had the chopper going as we need to incorporate the straw on that land. Admittedly it was a 10.5t/ha crop, and quite short and thin, but the straw just turned to dust out the back — really well distributed. I even tried putting the header to the floor and it nibbled it up than grain (MOG).”

The new 

Keeping command of automation

The new IntelliView IV monitor sits at the heart of the control console and its 26.4cm (10.4”) display gives access to machine functions, as well as displaying essential parameters.

With IntelliSense, the operator can choose from four strategies: limited loss (the one most skilled operators would follow), best grain quality, maximum capacity, or fixed throughput. These operating modes can be further refined to meet specific harvesting conditions, and once activated the system will remain on and continue to learn throughout the season.

Sensors on the cleaning shoe provide measurements of the load, and based on this data the combine adapts Twin Rotor speed and vane angle, fan speed and the opening of pre-sieve, upper and lower sieve to automatically deliver the desired result.

IntelliSense also gathers information from the Grain Cam system, which takes real-time images of the crop as it passes through the clean grain elevator and analyses these to produce a reading detailing grain quality. This includes the percentage of cracked grain and material other than grain (MOG).

These features now take over control of the IntelliCruise crop-feeding system, which automatically matches the forward speed to crop load. This now features automated ground speed functions with a choice of three harvesting strategies:

• Maximum Capacity increases the combine’s groundspeed to reach maximum engine load or maximum ground speed.

• Fixed Throughput strategy varies ground speed to maintain a pre-set load on the combine, so that productivity remains constant in varying yields.

• Limited Loss varies ground speed to maintain a set flow, but if losses become excessive, throughput is reduced to limit them.

The new EVO NIR on-board sensor joins the standard yield and moisture sensors and provides additional information on grain protein. Available as an option from partner supplier Dinamica Generale, monitored parameters include moisture, protein, fat, starch, neutral detergent fibre (NDF) and acid detergent fibre (ADF).

All of this information can be stored, downloaded and analysed with MyPLMConnect Telematics, New Holland’s precision farming software. This connects the combine to the mobile phone network, keeping the office in touch with the field during harvest. The entry-level Essential package offers the most frequently used features while Professional allows full machine monitoring and control. For those who prefer not to opt for MyPLMConnect, data can be transferred from the IntelliView IV terminal via a USB port.

When Rob Mair set the IntelliSense going on the demo combine it went like the clappers.

without any heavy patches of residue.”

Among other aspects Rob liked were the cab and the tracks. “It was as smooth as you like going across the tramlines, with no bounce on the header. You couldn’t see where the tracks had been, either. And the cab’s a lot quieter than I’m used to — it’s a nice place to be,” remarks Rob.

“Looking around the machine, it seems a lot simpler than the Claas, that’s lathered in belts and chains by comparison. I also noticed there’s no toolbox. But then, the smart technology’s got to be the way to go, so maybe these days you don’t need one,” he comments.

The Grain Cam takes real-time images of the crop as it passes through the clean grain elevator.
Technology is advancing fast, and the capabilities of equipment found on farm far outstrip what was available just five years ago. For growers who embrace the change, the potential to cut cost, refine production systems and boost output is immense. But how can you make an informed choice about whether an innovation will deliver the refinements you seek if you’ve not operated it before?

This is where Machinery Masterclass comes in. In this article, sponsored by New Holland, CPM has worked with the manufacturer to get a true user experience and an insight into the technology advances it has introduced. We hope this will bring you a ‘try before you buy’ feel for specific features found on this item of machinery and help you remain at the forefront of progression in crop production.

The breakthrough was the addition of a pressure sensor above and below the sieve. It can be difficult for sensors to know whether that’s down to a heavy crop, incorrect sieve opening or wrong fan speed.

The breakthrough for IntelliSense was the addition of a pressure sensor above and below the sieve. “Too much pressure below the sieve and the system knows to step up the fan speed. Too little and it cranks it down or closes up the sieve.”

Another smart addition is the Grain Cam that uses multi-spectral light to detect cracked grain, informing the system whether the concave needs opening or rotors should reduce speed.

But while IntelliSense may take control, the operator’s still in command, Nigel points out. “The key to the system is its adjustability — whether you want maximum throughput or limited losses, and how much damaged grain you’re prepared to tolerate. The operator sets the parameters, depending on the priorities, and IntelliSense does the hard slog of delivering.”

The changes in technology go hand-in-hand with design improvements that have brought a step-up in harvest productivity of up to 25% over the past five years, adds Nigel.

“We’re also now extending the standard warranty for the CR and CX ranges. It covers engine, driveline and after-treatment system for three years or 1200 engine hours. Our wide range of extended warranties and maintenance contracts make it easy for customers to calculate total cost of ownership.”

Also included is specific training for combine operators. “The beauty of IntelliSense is that now they don’t need years of experience before they can achieve the best performance and uptime from the machine,” he concludes.

IntelliSense is a proactive and automatic combine setting system, geared towards maintaining maximum throughput while keeping losses to a minimum.

IntelliSense is that now they don’t need years of experience before they can achieve the best performance and uptime from the machine,” he concludes.
Every step the Faccombe Estate in Hants takes towards Net Zero carbon emissions is turned into a commercial opportunity. CPM visits to explore the inspiration behind the changes.

By Tom Allen-Stevens

Al Brooks looks on at the 400hp Wood Terminator 10XL as it munches its way effortlessly through 75cm diameter trunks of diseased ash, and you get the sense there’s rarely a moment of his working day he doesn’t enjoy.

The seasoned woodchip that flies from the spout of this wood-chopping beast is sourced from areas of the 1720ha Faccombe Estate in Hants beset by ash dieback and now being sensitively felled and replanted. Very little of the brushwood and branches escape the jaws of the Wood Terminator and up to 300t/day can be processed for use through the estate’s wood-pelleting plant. This supplies fuel to the estate’s properties — the village of Faccombe which opened its own pub and guesthouse two years ago.

“We have long term plans to upgrade to a community heating system for the majority of cottages in the village, and for the dryer in the grain store,” says Al, who took up the role as Faccombe’s estate director four years ago.

“We draw water from our own borehole and have a wind turbine that powers parts of the estate. If we’re not already at Net Zero, that’s exactly where we want to be.”

High flint content

The estate lies 330m above sea-level on rolling chalk soils with a high flint content and a few clay caps. It’s ring-fenced with 546ha of woodland (see panel opposite), but this isn’t the sum total of its carbon capture. Al’s been introducing changes across the rest of the land that he feels boost both the productivity and sustainability of the farming side of the business. Most of the farmland is given over to combinable crops, of which 100ha is rotated with grassland.

The reforms started with the sheep.

Al says, “Every enterprise on the estate has to dovetail with the rest so you get the optimum benefits for the resource outlay you give them,” he says. “The sheep enterprise was losing money, however, so needed to change.”

The estate’s native lambing flock was previously reared under a traditional system, which put it out on pasture for the majority of the year, then into the sheds for lambing. So the flock’s been sold, replaced with 1500 ewe lambs purchased in October which are grazed outdoors for ten months and then sold in July as breeding stock.

“It’s meant a sizeable reduction in labour and machinery costs and released the sheds for alternative uses,” notes Al. “We quartered the loss on the enterprise in the first year, and we’re now on track to make a profit. But it’s the benefit it brings the arable side I value most.”

He’s introduced stubble turnips as a cover crop within the rotation and these are grazed by the lambs. “Having ruminant livestock may be a high carbon-equivalent output, but I feel this is more than offset by what’s captured by the cover crops. The lambs turn these into dung, applied directly to the soil which improves its fertility, reducing our requirement for bagged fertiliser and raising arable productivity. What’s more, there’s been a significant reduction in lameness as a result of the more extensive nature of the enterprise” he adds.

It’s this focus on the estate’s soils that drives Al’s ambitions to raise productivity sustainably. “We benefit from our chalk, but the high flint content and our height above sea level make this land very drought-prone. So soil structure and organic matter (SOM) content are absolutely critical.”

The Wood Terminator 10XL munches its way effortlessly through 75cm diameter trunks of diseased ash.
Innovative ideas
New ventures and changes implemented across the estate not only reduce net emissions, but harness a real commercial opportunity. A determination to drive up productivity goes hand-in-hand with a resolve to do so sustainably, with a willingness to try something new to get there. Carbon footprinting software tracks progress.

Productivity push
Enterprises across the estate dovetail, aiming for them all to perform at optimum output for minimal resource. Targeting value-added markets and driving root growth down into drought-prone soils is helping achieve this.

As with the woodland, however, he’s turned this drive for soil improvement into a commercial, bio-based opportunity. Rather than incorporating the straw, 2000t/yr are sold as a renewable fuel source. “We’re a fair few miles away from the power stations we supply at Sleaford and Ely, but a back-haulage deal on straw for mushroom compost makes it all worthwhile. It also brings us 1000t/yr of valuable material to build SOM which is far better than straw itself, that I don’t rate as a soil improver — it takes up available N and attracts slugs.”

Last year’s average wheat yield was 10.1t/ha, and Al admits they’re not always barn-busting, but it’s at the high end of what soils in the area achieve. “We also aim to add value to everything we grow.”

Cultivation care
Tillage has been reduced as part of a measured, on-going journey, aided through cover crops and sheep-grazing. Organic matter has been raised through selling off straw and replacing with biosolids, compost and manure. Diseased woodland is being sensitively replanted.

Bio-based boldness
Timber is sold into construction or turned into pellets as a renewable fuel source for biomass boilers. The estate is moving towards its own, home-sourced community heating system and is already supplied electricity through a wind turbine and solar panels. Straw is sold to power stations as a renewable fuel source.

Closing the circle for a sustainable community
Faccombe’s woodland lies at the heart of an estate with true Net Zero ambitions. Half of this is planted with softwood, felled strategically and replanted, following the UK Forestry Standard — 21,500 new saplings were put in last year with another 10,000 due to be established this year.

The best of the timber is sold for log cabins and other construction uses, ensuring long term sequestration of the carbon captured, notes Al. “One thing I noticed when I started here four years ago however was the amount of usable forestry material that was going to waste. We now aim to utilise nearly all of the smaller branches and brushwood, as well as the usable timber itself.”

This includes making best use of the diseased and dying ash trees — 70% of the non-softwood area is predominantly ash. “We’re ensuring the areas we have to fell are sensitively replanted with species that will secure the long-term value of this woodland.”

But he’s also turned Nature’s loss into a commercial opportunity for the estate, and one that ticks the environmental box, too. Identifying an expanding market for wood pellets, most of which are currently imported, Al tracked down a supplier of the plant required to produce a higher quality, dust-free product.”

Installed two years ago, the plant currently produces about 2500t/yr of pellets. About 360t/yr is used on the estate itself — aside from the manor house, there are 35 properties in Faccombe village, all owned by the estate, as well the new pub and guesthouse and a few commercial units. These are gradually being converted to biomass heating, which has already displaced 65,000 litres/yr of heating oil.

Electricity is fed to the community from the estate’s 500KW wind turbine that sits high on a hill, while barn rooves are clad in solar panels, putting another 250KW into the local network, with surplus peak output sold to the grid.

“We’re looking to upgrade the turbine to a 750KW version that would take us even further towards self-contained, by setting up a smart microgrid,” notes Al.

The estate has its own borehole that supplies the village with water, but it’s not just the human residents who are looked after in this virtuous community. Wildlife enhancement is not only an integral part of the estate but essential for its thriving shoot enterprise. There’s 150ha of habitat for wild birds as well as beneficial insects. The farm is also part of the ASSIST project (Achieving Sustainable Agricultural Systems), an £11M public-funded project aimed at increasing the efficiency of food production while enhancing farming’s environmental delivery and providing an invaluable carbon sink.

“The project has shown us how we can enhance benefits and cut our use of inputs, which helps towards our carbon savings,” explains Al.

And he’s relatively well informed where this is concerned — the estate uses carbon footprinting software to assess its progress towards net zero. But this is far from a refined way to tell where they stand, Al maintains. “We know the carbon cost of our individual enterprises, but it doesn’t take account of how these dovetail together. We need something that’s intuitive and user friendly and will tell us the net carbon footprint across the estate, and I reckon we’re pretty close to Net Zero already.”

All the wheat is sold for milling, apart from what’s fed to the pheasants for the estate’s shoot enterprise. In recent years, this has involved a focus on high-protein wheats, sold at a premium price over milling. “We were growing KWS Montana, but have switched this year to Mv Frederica,” he says.

The variety has similar bread-making quality to German E-grade wheats, so has the potential to displace imports. But how does Al get the protein into the ear without compromising yield on soils prone to drought?

Again, his focus lies beneath the soil surface. “Getting roots down quickly is important.”
Innovation lies at the root of climate care

The solutions that will help farming deliver Net Zero may quite literally be unearthed by exploring the very root of the issue, believes Interagro’s Emma Ralph.

“Every farm will start the journey to Net Zero from a different place, but achieving this in reality will require the whole ag industry to work together. For Al, his focus with his crops has been to drive energy into their roots and stimulate growth beneath the soil surface,” she notes.

“It’s where our interests lie, too. We see our role in finding solutions that will help growers capitalise on the opportunities they have to capture carbon as well as to help cut the carbon cost of current practices. Biostimulants are valuable tools both in enhancing crop performance, and thereby capturing carbon, and in increasing crop resilience. Adjuvants play a crucial role in improving productivity and optimising the performance of plant protection products.”

These are the innovations that help enable farmers to continue to produce the high quality food that’s required for a growing population, alongside a backdrop of regulatory and sustainability underpin everything we do.”

Climate Change Champions

UK Farming has set itself the challenging target of Net Zero emissions by 2040. Although led by the NFU, it will take the entire industry, working together in a partnership approach, to meet this ambitious goal.

But there are individual growers, who have already started on this journey. They have the ideas, the progressive outlook and the determination to shape positive change. CPM has teamed up with leading agricultural suppliers who have a credible Net Zero aspiration to identify these individuals and bring them into the top-level discussion about how farming can position itself as the solution to climate change. CPM readers will get the chance later this year to decide who will be awarded the accolade of Climate Change Champion 2020.

CPM would like to thank our sponsors:

“A significant area looked horrendous, and as a last resort, we thought we’d offer it a little TLC in the form of 2 l/ha of Bridgegway.” Al explains.

“It was a transformation. The plants took on an altogether different colour, becoming much greener. The smaller plants which had been looking particularly stressed, put out a more fibrous root system and the crop went from strength to strength. We repeated the application in Nov and one field in this area turned out to be the highest yielding of our OSR crop, at 5.1 t/ha, against a farm average of 4.8 t/ha.”

Cost savings on the machinery side have brought carbon savings, a move to Fendt mainline tractors bringing between 15-20% lower fuel costs alone. Cultivations themselves have been reduced, but the farm’s some way from zero till, says Al.

“There was a heavy reliance on the plough four years ago and we’ve moved to min-till, based on a 4.7 m Horsch Terrano going down to about 150 mm.

“But the soils are light and don’t self-structure well. I’m not sure a move to direct drilling would suit us, given the compaction from the sheep in the rotation although we do practise it on a neighbouring farm where we have a contracting arrangement. We’re always looking to earn and improve, however.”

Assistant manager James Higginbotham has high hopes for the 6m Grange toolbar the farm had on demonstration that goes in front of the Väderstad drill to make a one-pass system for OSR establishment.

“Along with our HEAR variety, height above sea-level and use of biostimulants, we’re finding we’re keeping ourselves clear of damage from cabbage stem flea beetle. We’re now looking at how we can use the toolbar in the cereals,” he says.

“But every cultivation is a resource pass unless it was truly required for a productive crop.”

Al notes the estate’s in a transitional phase with its soils. “If we move too fast, they’ll end up in an anaerobic state, which would be even worse from an emissions point of view. It’s an evolution that’s needed, not a revolution — if we make knee-jerk reactions to ill-founded ambitions, we’ll get it wrong,” he says.

“At the end of the day a significant output from the estate is the high quality food it produces. I’d say we have a low carbon cost comparatively in how we produce this — financial and environmental sustainability underpin everything we do.”

James Higginbotham (left) and Al Brooks have been exploring the use of biostimulants in encouraging root growth of their HEAR oilseed rape.
Sugar beet variety traits were in the limelight at BBRO’s technical meetings last month, with a focus on how these may assist growers as the crop comes under new challenges brought on by a changing climate. CPM reports.

By Lucy de la Pasture

There’s a lot of discussion about mitigating the effects of climate change but very little on how crop production may be influenced over the next few decades. Prof Steve Dorling, a meteorologist at University of East Anglia (UEA), opened the meeting by giving an insight on the changes in weather patterns.

He began by explaining the UK climate can be very variable. “Sometimes there’s not enough water and at others, there’s way too much water. This year it’s too much.”

Rainfall for the autumn (Sept-Nov) last year amounted to 170% of the 30-year average in East/North East regions, with winter rainfall still be calculated it’s likely to add up to a very wet six months. That’s in line with the most recent climate change predictions, with drier and warmer springs and hotter summers expected to follow wetter and warmer autumns and winters.

“Since 1950 the temperatures across Europe are rapidly changing, with the past decade becoming noticeably warmer (according to weather data). In the UK this translates to an increase in the average growing degree days — from 1472 in the period 1961-1990 to 1695 from 2009-2018. In 2018 this rose to 1807.”

Up-to-date data

Steve pointed out that this increase in growing degree days demonstrates the need for up-to-date data on crop production because the climate that crops are now growing in has changed from 30 years ago.

“Over the past decade April has become drier, warmer and sunnier. It’s a change of 10% compared with the 30-year period as a whole. Growing conditions are changing.”

New, more accurate climate models suggest that by 2061-2080, the winter will be warmer by 1.9-3.3°C and summer by 3.6-5°C, assuming continued high emissions. Rainfall has a wider margin, with winter being 16-42% wetter and summer 16-46% drier.

Focusing on the sugar beet drilling window, he used historic data to illustrate how the drilling window moves from season to season because of our variation in the weather from year to year.

“On Apr 1, the 20-year data shows a wide range of soil temperatures at 10cm from 2.5-12.5°C. That’s our UK climate and it influences the variation we see in drilling date from season to season.”

For growers to make their crops more resilient to these changes in climate, Steve said they need more reliable information to base decision-making on. Part of his work at UEA is to develop an accurate 28-day weather forecast by county, so that growers can make better informed decisions about when it’s right to start planting their beet.

Not too far into the future, the forecast weather from ‘weatherquest’ will be...

Steve Dorling highlighted the climate that crops are now growing in has changed from 30 years ago.
available in conjunction with the catchment mapping carried out by the Centre for Ecology and Hydrology, and this will provide an high-resolution map of soil conditions in the field to give growers an even bigger picture, he explained.

One of the implications of a changing climate will be on the growth of the sugar beet crop, said BBRO’s Dr Simon Bowen. He’s been conducting a review of scientific literature to establish just what the predicted changes may mean to plant growth in the UK.

“Higher spring temperatures will mean earlier drilling and faster, earlier canopy establishment. Warmer growing season temperatures and elevated carbon dioxide levels means that there’s likely to be increased biomass production and water use efficiency, with later growth extending the growing season,” he said.

On the other hand there’s likely to be more periods of drought and an increase in some pests and diseases, with a rise in ozone levels also having a negative effect on crop growth, he pointed out.

“On balance, we believe the yield-increasing effects will be in the region of 5-25%, with the yield-decreasing effects negating about 10% of this — giving an overall net gain of 5-15% in yield.”

Soil resilience
Simon went on to say it was crucial to continue to build soil resilience, particularly by increasing soil organic matter content, and to further develop and utilise variety traits. He highlighted bolting resistance as a trait not to overlook when drilling in an early window (before mid-March).

“Drilling earlier has been considered to be one way of protecting the crop from virus yellows infection. The aim is to get the crop to 12-true leaves, when mature plant resistance kicks in. If you adopt this approach it’s key to select the right variety to avoid bolting,” he commented.

Simon highlighted the big seasonal effect on the number of bolters, with 2016 and 2019 having higher numbers than in other recent seasons. “It highlights the need for a good forecast for the period after drilling, remembering that cold temperatures can affect plants before they emerge.”

The bolter effect can be significant for yield, with just one bolter/m² reducing yield by 11%, but also because of weed beet — with each bolter capable of producing 1500 viable seeds, he added.

One of the pests predicted to rise in a warmer climate is beet cyst nematode (BCN) and BBRO believe it’s present on a much wider scale than originally thought. BBRO’s head of science, Prof Mark Stevens explained that BCN would produce more generations in a season with an increase in temperature and growers would feel that impact much earlier in the season.

BBRO are looking at the effect of BCN-tolerant and BCN partially-resistant sugar beet varieties on the populations of the pest, so that better use can be made of varietal traits to manage the effects and multiplication of the nematodes.

In a straw poll of delegates at the Lincolnshire meeting, 42% of growers didn’t know if they had BCN in their sugar beet fields; 26% were aware they had the pest and 20% were aware and grew a BCN-tolerant variety. This seemed to indicate better use could be made of the BCN varietal trait and more soil testing to identify fields with the pest is advisable.

Varieties with good resistance
Mark Stevens said managing hygiene was going to be business critical when it comes to virus yellows.
Nematode nemesis.

Vydate® effectively controls potato cyst nematodes.

Without doubt, Vydate® is the tried, trusted and proven nematicide, ensuring PCN and FLN are kept at bay.

Protecting your precious potato crop and ensuring yields are optimised has never been more important.

So, don’t plant doubt. Talk to your advisor or find out more at corteva.co.uk.
Having just navigated the first season without neonicotinoid seed treatments in 25 years, the incidence of aphids and virus yellows in 2019 is a signpost of things to come.

**Early warning**

“2018-2019 was a mild winter and enabled aphids to over-winter. The virus yellows forecast produced in March last year was for 22-54% of the sugar beet crop to be at risk of infection. We caught a record number of *M. persicae* (39,243) in the yellow water pan trapping programme, which is intended to provide an early warning of aphid migration and trigger regular field inspection of crops to look for green wingless aphids,” he explained.

“We tested 10,000 of the aphids we caught for virus yellows and 0.4% were found to be carrying it. I believe we had a legacy effect from the neonics in 2019 and the likelihood is that the further away we get from their last use, the more virus levels will increase.”

Insecticide usage for aphid control by growers corresponded fairly closely to a poll taken in the room. 16% of the crop didn’t need an insecticide; 38% received Biscaya (thiacloprid) followed by Teppeki (flonicamid); 20% received a single application of Biscaya and a 21% a single application of Teppeki. Only a small percentage, 3%, received the full-monty of two Biscaya applications and one Teppeki, according to British Sugar statistics.

“Insecticide usage for aphid control by growers corresponded fairly closely to a poll taken in the room. 16% of the crop didn’t need an insecticide; 38% received Biscaya (thiacloprid) followed by Teppeki (flonicamid); 20% received a single application of Biscaya and a 21% a single application of Teppeki. Only a small percentage, 3%, received the full-monty of two Biscaya applications and one Teppeki,” he explained.

“55% of fields had virus yellows last year but only 1.8% of the crop was affected. We got away with it, even though we’d caught record numbers of aphids,” commented Mark.

Putting those figures into context, he explained that in 2018 only 18% of fields had virus yellows and 0.4% the sugar beet crop was affected. “So already there’s a step-change in virus yellows. My real worry is that as we go into 2020, we’ll have more sources of virus infection which has the potential to increase the pressure on the crop about to go into the ground. Managing hygiene is going to be business critical,” he said.

The options for aphid control in 2020 currently stand at the one and only insecticide with full label approval, Teppeki. “This was the situation this time last year, but we managed to gain an emergency use approval for two applications of Biscaya. We’re working hard to gain further insecticide options through emergency applications for this season.

“We need to think and box-clever to manage virus yellows. That means thinking about how we can use predators in the field, and last year there was some interesting work where growers introduced beneficials into the sugar beet crop — which isn’t something that’s often done in an arable environment.”

Plant breeders may also have an important role to play when it comes to controlling virus yellows and Mark highlighted that it’s not an easy thing to find plant resistance genes to all three viruses that cause virus yellows in beet. Dr Alistair Wright has been assessing virus levels and yield effects on coded varieties, with the inclusion of current RL varieties as a comparison. He says there are some promising developments from plant breeders in the pipeline which are showing varying degrees of resilience to the two main viruses in the virus yellows complex, BYV and BMYV.

---

**Virus Yellows in the ‘Goliath’ trial**

The Goliath trial is investigating the impact of virus yellows across a number of existing and coded varieties, with positive signs breeders are finding some resistance genes.

*Source: BBRO*
Revolutionary PCN control and yield protection

Controlling PCN populations is your first key step to ensure high-quality potato yields.

Velum Prime is a revolutionary nematicide that will support your fight to sustainably manage PCN and protect yields. A liquid formulation, it is applied in-furrow to offer improved ease of use and has significantly lower dose rates than traditional granules.

Bayer: changing the face of potato agronomy.

To discover more about Velum Prime’s effective protection, please visit crops.crops.bayer.co.uk/velumprime
Less is more for cultivations

Preparation land for potato planting will be tricky in many areas given the wet winter. *CPM* gets some timely advice and considers how soil resilience can be improved.

By Paul Spackman

With the spring planting period approaching, many growers, especially those in areas worst affected by heavy winter rainfall, may well be wondering how land can be prepared in time.

This year more than ever, patience will be vital when it comes to spring cultivations, says Lincolnshire-based Hutchinsons agronomist, Will Sharpe.

“Working any soil when it is too wet is likely to create problems, notably compaction, that will restrict crop growth and could take years to rectify.”

He says that despite the scenes of waterlogged and flooded fields over winter, soils in many areas are comparatively dry deeper in the profile (15-30cm), with problems more linked to the surface layer.

“We’ve seen a lot of surface capping in the top 2.5-5cm, which has stopped water infiltrating properly, but dig down to 15-30cm and soil is comparatively dry.”

He therefore cautions against going straight in with the subsoiler at 35-40cm deep to relieve surface waterlogging, as this is likely to create a slot down which water will quickly run, only to pool in a layer at the bottom of the working depth.

Subsoiling is generally more effective in late summer or autumn when soils are dry enough to get the sub-surface shattering effect machines are designed for, he adds.

“You’re better off using a shallower hook or pigtail line cultivator to break the capped layer and allow water to infiltrate through the profile naturally. This should give more even soil moisture, which will be available to the growing crop, rather than roots having to penetrate through layers of wet and dry soil.”

Regular inspections are vital to assess soil condition, especially as potatoes are very sensitive to compaction.

### Compacted layers

Fibrous potato roots will easily follow old root or worm channels down through the profile, but they cannot penetrate compacted layers, such as plough pans, which tend to force roots to grow horizontally towards the sides of the ridge. We’ve got to keep roots growing vertically not horizontally.”

Although most potato root growth is concentrated in the top 30cm of soil, research has found maximum rooting depth can extend from 60-140cm, potentially giving crops access to a much bigger reserve of water and nutrients.

While potatoes inevitably require more soil disturbance than other arable crops, Will and fellow Farmacy agronomist Alice Cannon say there’s a shift towards shallower tillage to help improve natural structuring, water holding capacity, nutrient cycling and soil resilience.

“Deep cultivations to 30cm or more are de-structuring soils within this layer, yet good natural structure is often found below this depth, created by old root channels and deep-burrowing (Anecic) earthworms that have gone undisturbed.”

Will supports AHDB recommendations to reduce ploughing depth to 23cm rather than 30cm and says growers should do the “minimum possible cultivation to achieve adequate planting conditions”.

This may mean shallower ploughing with narrower furrow widths and higher forward speeds to achieve good inversion and a level finish, followed by one pass with a Baselier rotary hook line cultivator, or power harrow, before bed-forming and planting, he notes.

“It’s worth ensuring there’s enough tillage without large clods to cover and seal the ridge effectively and reduce the risk of herbicide damage or greening, but equally don’t over-cultivate to a very fine, fluffy seedbed. This is more prone to slumping or capping and won’t be as resilient to heavy rain, as some areas saw last June which washed 5-7.5cm of soil off the ridge.”

He advises growers to wait for soil temperatures to reach at least 10°C before planting to ensure seed tubers emerge quickly. “Also consider adding a phosphate-based starter fertiliser, such as diammonium phosphate, Primary-P or P-Focus to boost establishment and root development.”

The mild, wet winter has increased slug pressure, with more activity than normal in the upper layers of the soil profile, adds Will.

Growers should monitor risk with field trapping and be prepared to treat where necessary. This can be done by placing ferric phosphate pellets in the ridge or applying them pre-bed forming and then incorporating.

“Reduced cultivation intensity should be integrated with other management practices, such as rotational cover cropping and organic matter additions, for best effect,” she says.

Will supports AHDB recommendations to reduce ploughing depth to 23cm rather than 30cm and says growers should do the “minimum possible cultivation to achieve adequate planting conditions”. This may mean shallower ploughing with narrower furrow widths and higher forward speeds to achieve good inversion and a level finish, followed by one pass with a Baselier rotary hook line cultivator, or power harrow, before bed-forming and planting, he notes.

“Working any soil when it is too wet is likely to create problems, notably compaction, that will restrict crop growth and could take years to rectify.”

He therefore cautions against going straight in with a shallower hook or pigtail line cultivator to break the capped layer and allow water to infiltrate through the profile naturally. This should give more even soil moisture, which will be available to the growing crop, rather than roots having to penetrate through layers of wet and dry soil."

Regular inspections are vital to assess soil condition, especially as potatoes are very sensitive to compaction.

### Compacted layers

Fibrous potato roots will easily follow old root or worm channels down through the profile, but they cannot penetrate compacted layers, such as plough pans, which tend to force roots to grow horizontally towards the sides of the ridge. We’ve got to keep roots growing vertically not horizontally.”

Although most potato root growth is concentrated in the top 30cm of soil, research has found maximum rooting depth can extend from 60-140cm, potentially giving crops access to a much bigger reserve of water and nutrients.

While potatoes inevitably require more soil disturbance than other arable crops, Will and fellow Farmacy agronomist Alice Cannon say there’s a shift towards shallower tillage to help improve natural structuring, water holding capacity, nutrient cycling and soil resilience.

“Deep cultivations to 30cm or more are de-structuring soils within this layer, yet good natural structure is often found below this depth, created by old root channels and deep-burrowing (Anecic) earthworms that have gone undisturbed.”

Will Sharpe cautions against going straight in with the subsoiler at depth to try and relieve surface waterlogging.
Briefly hopes were raised in late Jan/early Feb when there was a dry spell and field work resumed — things were looking up again. But thanks to Ciara and Dennis, a stormy Feb effectively put pay to the last chances of getting further autumn cereals in the ground, making 2020 a 41-year low for winter wheat area.

For those who did manage to get drilled before the storms, which in the West brought double the average monthly rainfall in the space of a week, their newly planted crops haven’t had the kindest of starts. You also have to wonder where the nitrogen has ended up that went on some fields before the weather broke again.

Here in Herefordshire, we’ve already had the equivalent of our annual rainfall since Sept and it’s far from being a unique position. It’s been a grim old winter.

According to the climate change experts this may be the shape of things to come, with warmer and wetter winters the new normal. If that’s the case, then rotations will certainly have to change over time but as a one-off, the washout this winter may just have done us a favour — there’s always a silver lining to a bad situation, you just have to find it.

So where is the positive in seeing the planned acreage of your highest earning cereal crop go down the proverbial swanny? First and foremost it’s provides a chance to re-evaluate and reset the rotation. Taking the leap to predominantly spring cropping would have been a tough one on paper. But with Nature forcing her hand, it may just prove to be an unlikely godsend for some, providing an unexpected opportunity to get on top of blackgrass.

The forced change of plan may also provide a chance to repair soil which has been under water or become compacted and slumped over the winter. Putting in a cover or catch crop instead of a spring crop would also help put things back on track for autumn 2020, where there’s a risk of late entry for autumn crops without making an adjustment this spring.

Undoubtedly every farm business is in a different position when it comes to cash flow requirements and this will influence planting plans. But assessing the state of the soil and rotation on future profitability is something to factor in — the effects of planting in poor conditions will be felt for seasons to come, so there’s perhaps a fine line to walk when taking the longer-term view with some fields this spring. It’s going to be one of those times where a spade is your best friend and will help to assess the best course of action for the next few weeks ahead.

Ciara and Dennis may have wreaked havoc, but they’ve also highlighted some areas where management changes could be made for the better. The resulting run-off from the deluges has certainly spurred some lively debate about farming practices amongst the Twitter community.

Agriculture is blessed to have many innovators and progressive thinkers who are passionate about doing the right thing for the soil, our most precious resource. Some growers progressing fast up the ‘slope of enlightenment’ sometimes seem frustrated at those they believe lag behind, yet rarely are things so black and white. There can’t be a grower in the land who’s happy to see the topsoil flowing off the field and down the road.

Once at field capacity water has a bit of a habit of running downhill or through an easy route, so while the ability of the soil to act as a sponge is a result of land management — the rainfall these storms deposited were an unfair test. Some ‘uncontrollables’, like depth of topsoil, aspect and underlying strata all come into play. The events we’ve all just endured have been exceptional and even the most absorbent saturated sponge leaks water.

The strength of our industry lies in its diversity, yet it has great cohesion as a community. It’s a fertile thinking-ground where farmer-to-farmer learning has a massive role to play. No other industry works like this. So in imparting views and opinions on other growers’ farming practices, a degree of empathy and a recognition that little steps are often the safest way to walk into uncertain territory, would go a long way towards effecting change for the better.

Based in Ludlow, Shrops, Lucy de la Pasture has worked as an agronomist, while among the Twitterati, she’s @Lucy_delap.
lucy@cpm-magazine.co.uk

The standing water in some fields means the soil will need a bit of TLC to repair.