> *In the past I've depended on an answer in a can, but these days that's the option of last resort.*

Drill stays in the shed in the 'new normal'

Technical
Weed control

Few growers with blackgrass would be foolhardy enough to drill wheat this month, say experts. *CPM* visits a grower in Suffolk to find delayed drilling is just one of a number of strategies used to keep grassweeds at bay.

By Tom Allen-Stevens

Edward Vipond leads the way through the maize headland — a towering crop of over 6ft tall — which eventually breaks to reveal a 6.5ha stunning crop of sunflowers. The heads hang heavy on stout stems, and almost every floret is occupied by a bumble bee, seemingly entranced in a nectar-induced torpor.

"This could be a wish crop, in that I could be saying 'I wish I'd never grown it'," he says. "But apart from the cost of the seed, a light pre-emergence herbicide and 30kgN/ha, it hasn't cost a penny to grow, so I won't need much yield for it to become a viable new break crop."

The field was established after the winter oilseed rape crop failed on the Breckland blow-away sand, part of the 1500ha Troston Farms that Edward manages near Bury St Edmunds, owned by the Claas family. The land is spread over a 24-mile radius, and at the other end of the spectrum takes in heavy clay. While the OSR area has dropped from 180ha to just 50ha, there's now a range of break crops that slot among the Group 1 to 4 wheats, such as sugar beet and spring beans, while forage maize and rye feed an anaerobic digester.

The rotation is a vital tool for Edward in his battle against blackgrass. It's a struggle in which he generally feels he maintains the upper hand, but that's not to say there aren't mistakes he's keen to learn from.

Blackgrass solution

"We had thumping OSR crops that were full of flea beetle larvae, and what we harvested yielded just 3.5t/ha on average. The question is what to move into. I'd like to grow more spring beans, but it's not the solution for blackgrass."

We've just come from what he calls his "failure field" — a crop of spring beans on heavy land in which a fair few patches of bad blackgrass are clearly evident.

"We knew there was a high blackgrass seed burden, so it went into rye several years back, cut for the AD plant before the seed shed. I thought the propyzamide in the following OSR crop would mop up any blackgrass that emerged, but the seed burden was obviously so vast, it came through and affected the winter wheat that followed," he explains.

"Some of this we sprayed off with glyphosate, and now, in the spring beans, you can see to a line what we didn't spray out. Now I know what I know I'll be more ruthless when spraying patches of blackgrass." But he admits this is tricky — he sprayed just 2ha of a 27ha field, which yielded 9.5t/ha against a farm average of 9t/ha.

Patch-spraying is just one of a number of measures Edward aims to implement against his blackgrass. "In the past I've depended on an answer in a can, but these days that's the option of last resort."

Cultivations are working well, he claims — the strategy revolves around min till, aiming to keep the seed in the germination zone, with the plough used strategically to bury a bad burden and keep it buried.

A crucial change has been to drill wheat around a month later than previously, in mid Oct, even on the heavy land. "You have to look at the seedbed. If we've had a decent flush, and conditions are good, we'll drill. ▸

Blackgrass emerged into the spring beans in this "failure field" in areas that weren't sprayed out in the previous wheat crop.

Starscaping way to a new MoA

MoA Technology, a crop protection discovery company spun out from Oxford University's Plant Sciences department, has secured £6.3m of funding to develop a novel way to discover resistance-busting modes of action in herbicides.

"We've developed a completely new discovery platform that takes a unique approach to identifying a potential new mode of action," says company chairman Hadyn Parry.

Traditionally scientists look for chemicals that will block or disrupt the fine balance of biochemical processes within a weed. Hadyn claims MoA have turned this thinking on its head. "When a herbicide kills a plant, we can detect a very subtle change that denotes its mode of action," he explains.

"So what we look for in our screening is this signature. But because we're after a new mode of action, it's not the familiar signatures we're after, but those we haven't seen."

Hadyn calls this starscaping, and MoA has developed Galaxy, which is an in-vivo high-throughput screening platform the company uses to explore this unknown world. "We can test tens of thousands of compounds per month, which we believe is unprecedented. We use artificial intelligence (AI) to analyse the results."

When a signature of interest has been found, MoA Target uses an in-vivo plant-based genomic process to identify the precise target protein associated with the new mode of action. MoA Select then validates the mode of action.

"We've had very promising results so far. What's more, with our system we can test natural compounds in a way that's never been done before."

This could bring about a whole new array of bioherbicides, he suggests. "The potential in areas such as allelo-chemistry is huge — we know that there are plants that have suppressant activity on their neighbours, but know very little about the process or the compounds involved. Traditionally it's been very expensive to fully explore these complex systems."

MoA is also looking at non-selective chemistry. "Farming worldwide is increasingly dependant on glyphosate — resistance is on the rise and it's high time there was a new mode of action that replaced it. There's a high probability the way we're working will develop one."

But don't throw out the Roundup yet — with the new funding, Hadyn reckons it'll be a matter of months before they've targeted some novel modes of action, but it will then take the best part of a decade to develop these and bring them to market.

MoA can test tens of thousands of compounds per month and uses artificial intelligence to analyse the results.

"We're a completely independent company but in time we will be looking for partners to help bring on new discoveries."

Moa Technology was formed in 2018 to develop the research of co-founders Prof Liam Dolan, a Sherardian professor of botany at the Oxford University's Department of Plant Sciences and Dr Clement Champion, previously a research fellow at the university.

▸ If not, I'm happy to leave it until spring, if necessary. Bonfire night tends to be my cut-off — don't let the Guy catch you.

"I also pay close attention to seed rates to ensure good crop competition — we used to sow at 150 seeds/m² in Sept, but now the rate starts at 325 seeds/m² in mid Oct, going up by 25 seeds/m² each week.

"Once drilled, we'll start off with a really ruthless pre-emergence herbicide. Many fields get a peri-emergence dressing of Avadex (triallate), then post-emergence we'll follow up with Atlantis (mesosulfuron+ iodosulfuron) and a flufenacet top-up with some diflufenican (DFF)."

Delay, delay, delay

This strategy, of pushing everything later and bringing in a range of cultural control methods to take the pressure off the chemistry, is what BASF calls the "new normal".

"Feedback we've had from growers we've seen on the blackgrass battle bus that's toured events around the UK this summer suggests growers know what to do and are implementing a range of controls," says BASF herbicide campaign manager Ali Richards.

"We're very excited about Luximo, our new mode of action against blackgrass (see panel right), but we see Crystal (flufenacet+ pendimethalin) and future R&D as very much the final of ten stops on the blackgrass control journey."

Tramline trials carried out by the company in Norfolk last autumn have emphasised the value of late drilling and a robust pre-em herbide, reports technical manager Stuart Kevis. Four treatments were applied:

A. Drilled 28 Sept with full pre-em programme (Crystal + Avadex Factor + DFF + prosulfocarb) and post-em (Atlantis+ ethofumesate+ flufenacet+ DFF)
B. Drilled 13 Oct with full pre-em and post-em
C. Drilled 13 Oct with light pre-em (Avadex Factor) and post-em
D. Drilled 13 Oct with full pre-em only (no post-em)

"By far the worst was the early drilled treatment, A. Treatment B was the best but very expensive. Treatment C didn't deliver an adequate level of control, but D was the most cost effective," he says.

"It shows that that the pre-em treatment in that mid Oct slot works best, and if you let blackgrass slip through, you'll never claw back control."

It's a consistent message, supported by many trials and a substantial amount of independent research, confirms grassweed expert Dr Stephen Moss. "Delay drilling by a month and on average 30% less blackgrass ▸

Trials have a go with Luximo

A robust range of cultural control approaches, tailored to the severity of the blackgrass problem, will be needed to keep the pressure off the chemistry once BASF's new herbicide Luximo is launched. The active has been in the UK since 2012 and has been through around 100 trials on selected farms over the past two years, reports herbicide marketing manager Phillippa Overson.

"There's always the worry that it won't perform as glasshouse trials suggest it should, or won't do as well in UK conditions. What the trials have shown is a consistency of performance that's absolutely in line with what we were hoping for."

The new molecule has a brand new mode of action that hasn't yet been given its HRAC group and controls a broad range of grasses, including difficult-to-control blackgrass and ryegrass in winter cereals.

"The trials are helping us define its strengths and best practice," continues Phillippa. "It's definitely a pre-em herbicide, suitable in mixtures and sequences, but must be used as part of an integrated weed management strategy." Currently going through approval, Luximo is due for launch in 2021.

Ed Vipond delays drilling and uses his rotation and seed rates to keep a grip on blackgrass.

▸ will emerge in your crop. What's more the blackgrass plants that do appear will also be less competitive and produce less seed. Most importantly, you'll get on average 25-30% extra control from the residual herbicide at the later drilling date because of cooler and moister conditions," he says.

Although the rule of thumb is 15 Oct — considered the ideal drilling date 50 years ago, Stephen notes — he advises growers to gauge the correct date by seedbed condition, expected weed pressure, drill type and capacity. "Don't drill until you've taken out a decent flush of grasses in a stale seedbed. Some can drill later than others depending on drill and soil type."

It's one of the cornerstones of the 5 for 5 approach to beating blackgrass — adopt at least five strategies, only one which may be herbicides, for five years and you will get your blackgrass under control, says Stephen. "Having a competitive crop is also important and growers tend to overestimate their average emergence. Raising the seed rate by 10% will have little effect — you want to have a bigger shift if you want your crop to have a real competitive advantage.

On cultivations, he sounds a note of caution for those leaving stubbles untouched. "The theory is fine — blackgrass will chit from the surface or be predated. But we don't have the research to quantify the effect with any degree of precision, so it can be an unknown. The important thing is that the seedbed must be in the best state to maximise pre-em herbicide efficacy, so work back from there," he concludes.

Know the facts on Centurion Max

Growers planning to use the graminicide clethodim to help control grassweeds in oilseed rape have been reminded to adhere to stewardship guidelines.

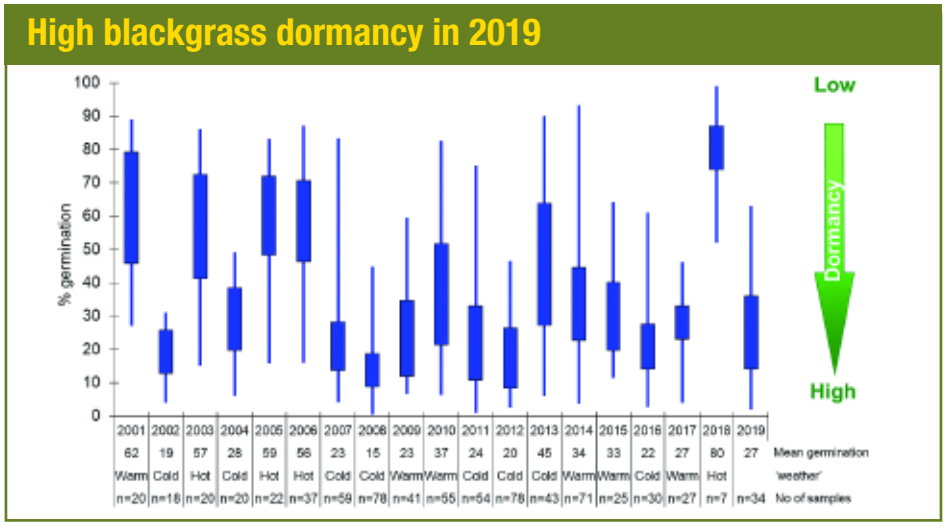
"The clethodim oilseed rape stewardship scheme has evolved over the past few years, after originally being created to minimise the risk of phytotoxicity at stem elongation," says technical specialist at UPL, Rob Adamson.

A recent trial carried out on Centurion Max by the company has reinforced the guidelines which state:

- Do not apply after the cut-off date of 15 Oct or when the mean temperature falls below 7°C.
- Do not tank-mix with any other product, including vadjuvants, although water conditioner can be used and an insecticide for flea beetle control is permitted.
- Do not spray the crop for 10 days before the application and 14 days after, although nutritional products and insecticides are permitted after seven days.

For best grassweed control, Rob recommends starting with a post-em graminicide such as quizalofop-P-tefuryl to reduce competition from cereal volunteers. "Allow the blackgrass to reach the three-leaf stage, which is when clethodim is most effective. Follow up with an alternative mode of action, such as propyzamide or carbetamide."

High blackgrass dormancy in 2019



The highest dormancy for several years is set to make blackgrass control difficult, as germination of freshly shed seed in stale seedbeds will be relatively slow even where soils are moist, says ADAS. Significant amounts of rainfall during maturation in the North and West would increase dormancy further, compared with the higher temperatures in the South. Ploughing is advised for high populations, while high seed rates will increase crop competition.

Richard Hull of Rothamsted Research echoes Stephen's advice. He ran the AHDB-funded research trials that quantified the beneficial effect of delayed drilling, first reported in *CPM* in May 2013. "The trials results are just as valid and relevant now, and we would expect the same level of benefits if they were repeated."

He reckons growers should bear three things in mind as autumn progresses:

- Know your population – make sure you know its resistance status and severity, map areas and patches and be aware of where the seed lies in the soil profile.

Ali Richards is excited about Luximo, BASF's new mode of action against blackgrass.

- Know your soils – assess which fields can be drilled later, which fields to prioritise and apply appropriate cultivations.
- Know your limits – it's a question of balancing the risk to achieve as low a population as possible and a successful crop establishment. How late will you drill into winter and are you prepared to wait until spring?

While blackgrass is the sole focus for many growers, ryegrass and bromes are an increasing threat, notes Richard. "Most of what you'd do for blackgrass does a good job on other species. Be vigilant for Italian ryegrass, while if you have brome, identifywhich type as the best control strategy can differ." ■