



Agrii has the largest network of replicated trials in the UK, but how does the grower benefit? In the first of a new series, *CPM* visits its blackgrass site at Stow Longa and explores how the research is helping the industry get to grips with one of farming's biggest challenges.

By Tom Allen-Stevens

Plots pitched against a blackgrass burden

The differences in the level of blackgrass control in the plots at Agrii's extensive trials site at Stow Longa in Cambs have to be seen to be believed. You walk from a plot with barely a weed in sight to one that's completely festooned with blackgrass, and it's largely cultural control methods that have made the difference.

But by the time you've seen the 200th plot, you're confused as to what the answer is — should you plough or direct drill? Sow early or late? And which variety works best?

"We don't have all the answers.

What we're aiming to do is ask enough questions," says Colin Lloyd, Agrii's head of agronomy. He's been leading the tour of the plots and has just pointed out their 40th significant finding.

But he readily accepts that you'd come away from the site with more questions than answers to a bad blackgrass problem. "What it does give you is information, so you can sit down with your agronomist and plan the right strategy."

The 16ha trial site has built up information by the bucket load on some of the most difficult blackgrass in the UK since it started in 2000. But far from simply testing herbicide regimes, for the past eight years the focus has been on cultural control.

"It was more 'agronomy with a hunch', rather than pure science that got us started," recalls Colin Lloyd. "You look at one field with a certain population of blackgrass, then the field next door has exactly the same history, drilled and sprayed at the same time, yet the blackgrass population is different. Why?"

He points to the range of tools growers



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have at their disposal to control blackgrass (see figure on p54). “Traditionally, trials and evidence-backed agronomy advice have concentrated only on herbicides, that, if you had everything else right, could be doing as little as 5% of the job. Surely there’s a case for good, reliable information on how other control techniques interact, so that the agronomist is involved right from the start of the decision-making process?”

This was the start of variety competitiveness work at the site. There was already a certain amount of research evidence, as well as plenty of reports from agronomists in the field, that different cultivars had varying competitive abilities. “But at that time, I believe no one was carrying out properly replicated trials to investigate those traits and interrogate the performance of cultivars used commercially.”

Simple relationship

From the outset, it was clear that there was no simple relationship between how a cultivar grew and its ability to out-compete blackgrass. “One variety we looked at initially was Claire, because we thought its tillering and prostrate growth would work well. But we found more blackgrass in Claire than in other plots. So there was clearly more to it than just autumn growth,” maintains Colin Lloyd.

But they proved there was a measurable difference. “We compared Robigus, Hereward and Gladiator without herbicide at two seed rates — 175 and 350 seeds/m². Robigus was always a leafy doer, whereas Hereward is thin and Gladiator is somewhere in between.

“The difference ranged from 0% control in the 175 seeds/m² Hereward plot to 19%

less blackgrass with Robigus at the higher seed rate. These differences are highly significant and they’re consistent — that’s what I want to know as an agronomist.”

The consistency of the results ran through all of the ten varieties that were first tested in 2006. “The trials are fully replicated and repeated year on year to get reliable, robust results. Once we’ve had a variety through the trials for long enough to get consistent, reliable data, it’s switched out for other varieties. We currently have 32 winter wheat varieties in the plots.”

While most are on the HGCA Recommended List or are candidates, representing a good spread of those commercially grown, there’s also a French variety which is something of a wild card, says Colin Lloyd. “I wanted to test it because it moves quickly in the spring and there’s plenty of lush growth in ▶

From blackgrass burden to golden glow

The first blackgrass ‘trial’ at Stow Longa took place in 2000, recalls host farmer of the trial site Martin Whitlock. “There was a field that had horrendous blackgrass through half of it, so we just sprayed that half, and compared results with the untreated half. We ended up with horrendous blackgrass in the rest of the field, but at least we’d seen what the chemistry was doing.”

Colin Lloyd was the agronomist at Rookery Farm from 2000. The blackgrass was the biggest challenge across the heavy clay soils, with a burden of 1500 ears/m² if left untreated. So as well as advising on how to bring the farm’s 120ha of Group 1 milling wheat up to the correct spec for Warburtons, alongside the 40ha of oilseed rape, the decision was made to start what became an extensive trials site.

“The blackgrass work carried out here has always been very interesting,” comments Martin Whitlock. “The differences in yields across varieties have been incredible. But we’re restricted as to what varieties we can grow because of the Warburtons contract.”

Having moved away from Hereward, the farm

Rookery Farm struggles against a resistant blackgrass burden of 1500 ears/m²



now grows Solstice and Crusoe — varieties not necessarily noted for their competitive ability. But that’s not to say the information from the trials hasn’t come in useful, points out Colin Lloyd.

“The discussion we have is based around the knowledge that we’re in a vulnerable situation, so we have to build an agronomy programme that gives the crop every chance to compete.”

The regime starts with stale seedbeds — Martin Whitlock has a Claydon SR drill and uses a straw rake immediately after harvest to encourage the blackgrass seed to chit. “Getting a good kill with the stale seedbed is essential. We’re moving to a Claydon hybrid drill, aiming to move less soil, which will help ensure there’s not too much blackgrass that germinates in the crop.”

Drilling usually takes place in the first week of Oct — “not quite as late as Colin would like me to go to be ideal,” notes Martin Whitlock. “But we drill at 350 seeds/m² — establishment is very important, and if you don’t get the seed rate right, you don’t have a crop.”

An effective pre-em spray is essential. “If we don’t get a pre-em on, we’ll definitely go with a peri-em then see what’s doing. But Atlantis is quite fickle on this farm.”

In the spring, the emphasis is on getting the nitrogen and sulphur on, notes Colin Lloyd. “We need the crop to move early in the spring — it’s sitting there in cold soil and has to compete against the blackgrass.”

The first application goes on at the beginning of March, delivering 60kg SO₃/ha and 50kgN/ha. This is followed with 50kgN/ha towards the end of March, 70kgN/ha at the beginning of May and a



Growing a relatively uncompetitive milling wheat variety, Martin Whitlock relies on late drilling at high seed rates into stale seedbeds, and early spring N to reduce the blackgrass burden.

final 40kgN/ha at the end of May. “Our N Min results suggest we leave a bit of N behind, which probably helps the crop get going in early spring,” says Martin Whitlock.

The farm has won Warburtons prestigious Golden Loaf award twice in the past five years. In 2011, although the crop “struggled to get a good yield” at just 7.5t/ha, the specific weight averaged 81kg/hl, protein 13.7% and Hagberg 300.

It’s a result Martin Whitlock is loath to jeopardise by switching varieties, although there’s one milling type that’s shown very interesting results in the trials. “This year, I’m more interested in the cultivation trials, though — we’ve ploughed for the first time in ten years. In theory, any blackgrass seed we’ve brought up should be susceptible to Atlantis, so we’ve got this one chance to get our control strategy right, as I see it. We may now be looking more closely at how we introduce rotational ploughing.”



At Stow Longa, Colin Lloyd pioneered trials looking at cultivar competitiveness.

► the autumn. It's also early to mature."

The results are eye-catching — the blackgrass population in the plot falls to 50 ears/m² in this variety under a full herbicide regime, less than half the site average of 110 ears/m² (see chart on p56). "But the yield difference isn't significant, mainly because the variety wasn't treated at its optimum in the trials to get the best out of it. That's when you can put it into agronomy trials and learn more about it."

Yet it's not just varieties on their own that are under investigation. The trials look at how this competitive ability interacts with different herbicide regimes. "As an agronomist, I want to know how and when

to use each tool — I can't just consider varieties or agchem use on their own, but need to consider the whole package.

"So we've a full herbicide programme, including both pre and post-emergence treatments, and a compromised programme of just pre-em Liberator (diflufenican+ flufenacet)."

The site has RR resistance to pendimethalin and RRR enhanced metabolism resistance to Atlantis (mesosulfuron+ iodosulfuron) and the fops and dims. "There's probably more target site resistance than the current figures suggest, so it's a tricky site with high levels of blackgrass," he comments.

The trials are established in early Oct at 350 seeds/m² to replicate a typical farm's regime where bad blackgrass has led to delayed drilling. The results suggest that where growers are struggling with blackgrass, judging a variety's yield performance simply by looking at the RL would be far too simplistic, maintains Colin Lloyd.

"A yield difference between two similar varieties of 5%, according to the RL, widens to 20% in our trials with a robust herbicide regime, and 33% in a compromised weed control programme, for example."

The average yield difference between

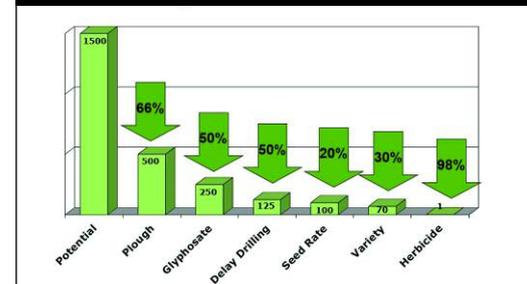
a compromised and full herbicide regime across all the varieties is 17%, he notes. But this ranges from 11.5% to 27.8% — a difference of 16.3% (see chart on p56). "So the way a variety interacts with a herbicide programme can have as much effect on yield loss from blackgrass as the herbicide regime itself."

Agronomic information

So how is the data being used? "It forms part of the information that Agrii agronomists have available to them when they discuss plans with growers — the data is pulled

By successfully combining a number of cultural control methods, there's less pressure on the herbicide.

Potential cumulative benefit of cultural control in blackgrass



together with other agronomic information from across the Agrii trials network into the so-called 'blue chart', that gives a much more rounded idea of a variety's performance than the RL."

The data also goes towards giving Agrii's seed business a more informed view of individual varieties. "The HGCA data is a good benchmark, but is it practically achievable on farm? What growers and

agronomists are aiming to do is protect that potential yield. Blackgrass has as much a role to play as disease.

"It's one of the reasons you'll see varieties perform very well commercially that aren't the best on the RL, or even don't even get on it. Growers have seen how they perform on farm and stick with them, and we often have the data that backs up why these varieties retain their popularity."

Now, with eight years of robust data on variety competitiveness, Colin Lloyd has noticed the wider industry is beginning to realise its value. "When we first started, I think breeders and agchem manufacturers thought the work was a bit superfluous. Now breeders put forward varieties each year they'd like to see go through the trials.

"They're getting better at noticing the traits, but there's still a long way to go. ▶

Cultivation regime – the next step?

The same evaluation that's been applied to varieties has now put cultivation regimes under scrutiny at the Stow Longa site. The work is in its third year, with a simple wheat/oilseed rape rotation overlaid across six cultivation regimes — ploughing, two direct drill (one of them drilled early), a 'continental' two-pass system, a shallow single-pass regime, and a deep non-inversion cultivation.

"The plots have been set out so that we've now got a three-year rotation of every combination of every regime, and these trials are replicated," explains Colin Lloyd. "So we can begin to draw

some really interesting conclusions, not just about how different regimes perform in one year, but how they can help control blackgrass across the rotation."

There's a vast amount of data, and very significant differences between the various regimes, he notes. "The plough definitely has its place, but needs to be used with care. But as with the variety work, you can't draw simple conclusions — this information is best used as the basis for an agronomist and grower to agree a strategy against blackgrass."

He's also noticed a keen interest from the



After three years of different cultivation regimes overlaid across the site, marked differences between the plots are now evident.

machinery trade in the trials. "These trials have shown manufacturers that their kit isn't just turning soil — it's an agronomy tool, too."

Agri-intelligence



Agrii's extensive national trials programme is designed to help UK growers maximise their crop production opportunities in a fast-changing world with the latest researched-based technologies and approaches provided through experienced local agronomists.

Overseen by an ORETO-accredited (Official Recognition of Efficacy Testing facilities and Organisations) trials team, four regional Technology Centres and a host of associated trials sites explore and develop integrated agronomy-led solutions in more than 50,000 replicated trial plots each year.

A linked network of 25 'iFarms' demonstrate these technologies and approaches in practice under commercial conditions while providing lively, interactive forums for agronomists and farmers to share experience and best practice.

With a multi-million pound investment from parent company, Origin Enterprises, Agrii's farm-based weather station network, agronomy information portal and precision agronomy services are all being developed alongside this research and demonstration programme in a uniquely joined-up approach to meeting future arable, vegetable and fruit production challenges.

► Relay is a good example — it should compete well as a Gladiator/Vector cross, both of which have a good growth habit. But it's actually relatively average."

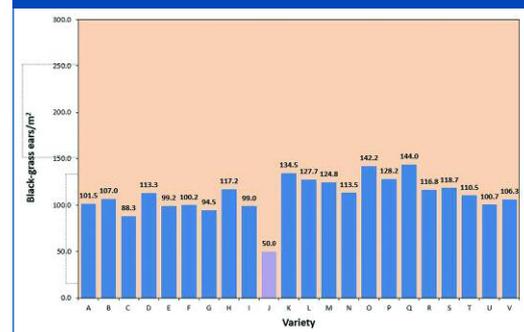
The Stow Longa site is also helping with some HGCA-funded work investigating the underlying traits that allow a variety to compete with blackgrass (see article on p58). Initial findings from container studies at Rothamsted Research are being tested in the field trials.

"There's a very exciting future for this work, but it's driven from what agronomists notice in the field," notes Colin Lloyd. "It's important the industry understands these traits, and one day marker-assisted breeding will no doubt help breeders introduce better competitiveness into new wheat lines."

So what does he think is the key trait? "Personally, I think it's down to how the variety moves in early spring. But every time I make a prediction on our trials, they've proved me wrong. Other people can take the science — we're looking at results instead. That's why it's important to me as an agronomist that we continue looking at new varieties as they come along, and carry on asking the questions." ■

With an untreated blackgrass population of at least 358 plants/m², control averaged 71%, but ranged from 60-86%.

Blackgrass infestations – robust herbicide regime



More competitive varieties showed a lower difference in yield between robust and compromised herbicide regimes.

Yield differences between robust and compromised herbicide regimes

