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The good, the bad and the ugly

Lampport trials

The Agrovista trial site at Lampport in Northamptonshire has matured into a hive of information and reveals how changes in rotational management affect blackgrass populations, crop yields and soil health. CPM visits the trials and finds out its latest triumphs and pitfalls.

By Lucy de la Pasture

One of the burning questions for growers who’ve resorted to spring cropping because of severe blackgrass infestations is when to bring autumn cereals back into the rotation. Agrovista’s trial site at Lampport in Northamptonshire has been looking at this question for a decade now and has had as many failures as success stories — and that’s what makes it a valuable mine of information.

Agrovista technical manager Mark Hemmant believes Lampport provides a valuable insight into what may happen when tweaks are made to a rotation with a heavy blackgrass infestation — in the early days head counts of 2000/m² were the norm at the heavy land site.

“The rotation had been a close one with winter wheat/oilseed rape in a min-till cultivation system. Blackgrass control relied on residuals and control was only around 40% in the first year of the systems trial. We had to find other ways to grow crops so looked at alternatives.”

Rotational strips

The message from blackgrass researchers was that rotational ploughing — to plough down resistant seed and then leave it buried for nature to do its thing — and spring cropping was the answer. What wasn’t clear was how to implement those strategies on a heavy land site such as Lampport, explains Mark.

Not to be put off by the challenge, the Lampport site has now been planted in different rotational strips (systems) for the past eight years. Initially the land was ploughed as per the scientific advice and from that point the management of the strips has diverged, with different systems in place to assess alternative strategies.

“We wanted to find out which were the best cultural control measures so that we had less reliance on chemistry to control blackgrass. Where the site has really come into its own is in the information we’ve been able to glean since we began to look at soil health while doing good cultural controls. We’re also incorporating elements of

regenerative agriculture in the trials and have a system where we’ve used no chemistry bar a late fungicide for rust control,” he says.

“Unlike science, which looks at one thing at a time, we’re looking at interactions at Lampport and this is where the really valuable learning lies. The site has turned into much more than just looking at managing blackgrass.” ▶



Mark Hemmant says it’s fascinating to unravel the interactions between lots of different factors rather than look at things in a binary fashion.



The good - a bumper looking first wheat crop which has followed a hybrid version of AB15.



The ugly - A combination of a dry autumn, August establishment and a hefty blackgrass population spelled disaster for the AB15 strip at Lampport.

► The initial concept behind the work at Lampport has been to get blackgrass to germinate in the autumn by disturbing the soil and then 'trapping it' in an open cover crop, which is then destroyed before Christmas. A spring crop is then established behind it using a disc drill for minimal soil disturbance. Using this system at Lampport has consistently produced spring crops with very low levels of blackgrass compared with systems where no cover crop has been used.

Niall Atkinson, Agrovista's farming systems research and development adviser, recalls the first time he visited Lampport. "It frightened the life out of me. I had to forget everything I've learned over a lifetime in farming and begin to question everything."

He explains that one of the alternative 'systems' being looked at is AB15 — a two year legume fallow which is often touted as helping growers manage blackgrass infestations. At Lampport the opposite has been true — blackgrass has thrived in the AB15 strips at the site.

"It pays £522/ha to put land into the scheme, which looks attractive as a headline figure. Seed will cost around £75-90/ha but

that's if you only have to sow once," he says.

And therein lies the problem for heavy land farmers — the rules state that AB15 has to be established by the end of August which is a far from ideal time when it comes to cultural control for blackgrass. The problem experienced at Lampport was that very few legumes established in the dry August so blackgrass soon outcompeted them and smothered the legumes out, explains Niall.

Successive mowing

Under the rules for AB15, successive mowing is allowed, but that hasn't been enough to significantly reduce seed return he explains. "When you mow blackgrass, the plant goes on to produce another seed head but closer to the ground. As the season progresses, the heads are produced on shorter and shorter stems so the mower can struggle to pick them up — it just becomes progressively harder to mow."

And what's it done for soil health? Very little, according to Niall. "Blackgrass is shallow rooting and doesn't help soil structure and create better porosity in the soil like other plant roots can. Together with the mowing AB15 has been an environmental disaster on this site."

Mark adds that people who have had success with AB15 have had far lower levels of blackgrass and the legumes have been better able to establish and do their job. He recommends that before going down this route to think about the starting point. "We had four years of spring cereals and had got on top of the blackgrass in this system strip. It then went back into autumn sown wheat for two years before the legume fallow and the blackgrass population was too high for AB15."

Moving on to another strip, Niall looks rather proudly on a promising looking first winter wheat, with only a few scattered blackgrass heads to be seen above the crop. Could it be that the team has discovered a way to bring winter wheat back into the rotation without sacrificing blackgrass control?

The answer is yes and ironically the route back to a first wheat has been paved by a tweaked version of AB15.

"A cover crop of phacelia and black oats was established in autumn 2018 with the aim of trapping autumn-germinating blackgrass. It was desiccated in late December/early January — often a second application of glyphosate is necessary to pick up any



Niall Atkinson believes two good first wheats in a six-year rotation is possibly a realistic aim once blackgrass has become 'manageable'.

blackgrass that was shielded at the time of the first spray or blackgrass that's newly emerged. AB15 was then established in springtime using a disced direct drill to avoid disturbing the soil, which would have encouraged more blackgrass to germinate," explains Niall.

The result was great in terms of soil health and there was no need for successive mowing through the spring/summer months, he adds.

The AB15 was left in situ for 18 months before being destroyed in autumn 2020. "We went straight in with a Weaving GD disc drill to plant winter wheat in mid-October, minimising any soil movement so as not to encourage blackgrass to germinate."

Under the Countryside Stewardship scheme such a hybrid scheme wouldn't be allowed but the new Sustainable Farming Incentive could accommodate it — the crunch being that the schemes run on a calendar year so the chance to get an autumn crop in would be delayed another year, highlights Niall.

He believes that it's possible to develop a system to get back to growing a September sown first wheat in the rotation without throwing away all the hard yards earned in getting blackgrass under control. But his view is that less is more — so two good first wheats in a six-year rotation is possibly a realistic aim once blackgrass has become 'manageable'.

Mark adds that a first wheat offers the highest gross margin potential so if it can be brought back into the rotation, then it should. But it's not easy — using the hybrid AB15 system has been the first time growing a first wheat in the rotation has been demonstrated at Lampport without compromising blackgrass control, he says.

Another concept being challenged at Lampport is whether rotational ploughing can (or should) be used as a re-set when



Chris Martin explains how the physical properties of the soil affect the way that it behaves and how it should, or shouldn't, be worked.

blackgrass begins to get the upper hand. An ideal opportunity arose at Lamport where winter wheat had been reintroduced into one of the systems. After three years of autumn cropping the blackgrass became so extensive that the wheat wasn't even harvested.

So the system strip was split, with one half destined to have 2-3 stale seedbeds and then be ploughed over. The other half was established with an autumn cover of black oats and phacelia before going into spring oats.

"The problem came when it rained incessantly that autumn/winter (2019) so we couldn't get in with the plough. Blackgrass was growing after the stale seedbed cultivations and was acting like a sponge, with zero water infiltration — it just stayed wet," explains Niall.

By spring 2020, ploughing was still out of the question, so a summer cover crop was planted. Where the spring oats had been



Measuring soil health has given a real insight into how the different rotational/cultivation systems being trialled at Lamport have an impact on the soil.

established, it yielded 8t/ha, and was able to return to winter wheat in 2020.

"It was on the limit when drilling last autumn as it was also another wet one here, so the wheelings are showing but there's very little blackgrass. After harvest it will go back into a cover crop followed by a spring crop — we know we still have a very large amount of blackgrass seed in the seedbank. A second winter wheat isn't an option at Lamport as blackgrass just explodes and yields around 5-6t/ha."

The key learnings from the site so far are that even after several seasons of spring cropping, the seedbank is still able to produce an enormous amount of blackgrass if the rotation isn't carefully managed. "This proves we're not on top of the seed in the seedbank", explains Mark.

Cover crops

"We've tried establishing a cover crop in the autumn by direct drilling but have ended up with more blackgrass by spring. We've consistently confirmed that some soil movement is necessary to get a flush of blackgrass to trap in the cover crop."

Niall notes that in just one of the plots where the Weaving drill was used there's more blackgrass in a narrow line that marks an overlap — probably because the outer angled disc causes a little bit of soil movement. "It shows how important soil movement can be, but a tine drill would have been even worse," he points out.

Chris Martin, head of soil health at Agrovista, points out that where there are no autumn cover crops in the systems, then these are full of blackgrass and this is reflected in the soil health measurements. And it's these metrics which have given the biggest insight into the different systems being trialled at Lamport.

"The physical properties of the soil tell you how the soil will behave. At Lamport we have a high Ca:Mg ratio so the soil will flocculate. But it also has a high silt content (above 50%) so as the soil opens up, it also runs together and becomes tight. It's like a vertical river — the silt runs down as the soil flocculates and creates a dam which we see as a layer of compaction — where there's blackgrass this is shallow at about 5cm (the rooting depth of the blackgrass)," says Chris.

"While it's important to use some metal in the rotation to allow air back into the soil, cultivating too deep can de-nature the soil — allowing the silt to run deeper, which means dragging deep steel through the ground at Lamport does nothing to alleviate deep compaction.

"On Lamport soils, it's clearly the biopores

and plant roots which improve soil structure. Since air is needed to get the biology to work, and allow this natural re-structuring process to occur, subtle, shallow cultivations based on a low disturbance tine would be the best option from a soil health point of view."

Chris says that if direct drilling, then the best compromise would be to establish the cover crop with a tine drill but for a cash crop it's better to use a disc drill to minimise soil movement in a blackgrass situation.

"If you have an imbalanced soil like we do at Lamport, and you want to practice direct drilling, then you probably need to have two drills to manage soil health and blackgrass — a tine based and a disc based," he comments.

Another new but noteworthy system is where spring wheat has been planted with a companion crop of berseem clover and sweet alysium — no herbicides were applied. The nutrient management was also adjusted, with 100kgN/ha being replaced with controlled-release foliar nitrogen, so there would be less free nitrogen in the soil during spring and a step closer to reducing carbon emissions.

The regenerative system has also received a comprehensive biostimulants programme, beginning with Tiros, an endophyte seed treatment that fixes nitrogen and solubilises phosphates, and Boost to feed the soil biology and increase nutrient use efficiency. Phosphorus liberator has been applied to make use of the pool of P locked up in the soil and the programme completed with an application of amino acids, Klorofil and T6P, applied at the main fungicide timings.

Mark highlights that the change in nutrient management has translated into very little disease or blackgrass in the plots — with just a fungicide for rusts in early July applied. The crops look really well so the proof of the pudding will be in the eating when the yields, economics and soil health have been assessed. ■



The bad - where cover crops aren't used to 'trap' blackgrass in the autumn, levels of blackgrass are always much higher.