

Your new tank-mix partner?

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Technical Fit for the future

As chlorothalonil drops out of the picture, genetics may be stepping in to take its place on septoria control.

CPM assesses what the transition means for growers.

By Tom Allen-Stevens

If you're looking for chemistry to replace chlorothalonil and have been drawn into this article by its headline, prepare to be disappointed. Well, perhaps half disappointed, depending on how broad your expectations are.

CTL is being withdrawn from use and after 20 May this year, you'll no longer be able to apply it. That's set to put a hole in fungicide programmes just as septoria in particular is getting tougher to control — CTL is the multisite fungicide widely viewed as the best current tank-mix partner, both to protect newer, more effective single-site chemistry and keep a lid on resistant strains of the disease developing. And just to clarify, there's no new chemical multisite that's about to replace it.

So how do you put together a septoria control strategy that's fit for the future?

“We're going through a transition period,” says John Miles of KWS. “Chemistry can no longer be relied on solely to do the job, and increasingly genetics are stepping up to the plate. There's now a wheat variety that's a unique type with unique qualities, and that makes it fit for the future.”

Stand-out qualities

John's talking about KWS Extase. New to the AHDB Recommended List last year, it leads the Group 2 wheat varieties, and its first commercial crop, harvested last year, has received the thumbs-up from both the farmer who grew it and the mill where it was processed (see panel on p25). Its stand-out qualities, though, are an untreated yield of 95% of treated controls and an exceptional 8.1 score for *Septoria tritici*.

That's all very well, but does it mark a transition — a point where growers can confidently switch tools from the chemistry to the genetics for septoria control? It's a point breeders have been aiming for, explains senior researcher at KWS Nick Bird. He's been leading the company's quest in the UK for genetic septoria resistance for the past five years, following 15 years at John Innes Centre studying the wheat genome and the plant's response mechanisms to the pathogen.

“There are a number of ways a wheat

variety can put up its own defences, but septoria is very good at adapting,” he says. “Unlike other pathogens, it undergoes sexual cycles in UK conditions, so can evolve within the crop and within a season. It's this that makes it such a tough one to tackle.”

Scientists studying the huge wheat genome have gradually narrowed down the specific regions responsible for fighting septoria. This work has accelerated since



John Miles believes KWS Extase has unique qualities, making it fit for the future as growers make a transition from chemistry to genetics on disease control.

the wheat genome was mapped and published recently and culminated two years ago with the discovery of the precise location of Stb6 (Septoria tritici blotch) — a major gene found to confer resistance. “Unfortunately, Stb6 is now only effective against a very small proportion of the UK septoria population although other major resistances have since been identified,” continues Nick.

“So while major genes are useful, what we aim to do in plant breeding is accompany these with a whole host of genes known to confer partial resistance. Identifying these, their individual role and how they interplay is much harder, but the right combination offers effective, resilient control.”

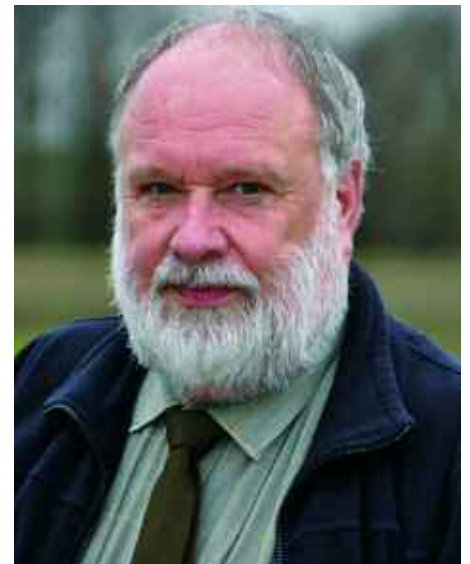
New tools to help include genetic markers, a bit like DNA fingerprints used in forensics, that can show if a particular cross has a specific gene of interest. There’s also genomic selection. “This relies

on tying varietal phenotypes — a trait the breeder observes — to its genotype, or genetic make-up,” he explains.

Advancing fast

“This is an area that’s advancing fast and we now have a level of predictability for septoria resistance of around 60-70%. But the genetics is really just playing catch-up with the breeder’s eye — the best resistance is still identified in the field or gathered from a breeder’s network around the world and introduced into their lines.”

And that’s how KWS Extase came to prominence. “Extase comes from our French breeding programme, located in a part of the country that has some of the worst septoria in Europe. Its major gene resistance comes from Boisseau, a variety that’s been commercially available for 10 years and is still really clean, indicating the gene is holding up well,” notes Nick. ▶



Bob Simons sees genetics and chemistry working together in a partnership approach, with no reliance on either.

On-farm trial puts genetic resistance in the picture

If wheat genetics are going to replace what growers are losing with CTL, KWS Extase is the variety best placed to do so, believes Andrew Robinson of Heathcote Farms, based at Herne Manor Farm near Toddington, Beds. He grew the first commercial crop last year.

“It was spotlessly clean — the cleanest variety I’ve seen — although you still get a decent return from what you invest in it,” he comments. Andrew grew a 7.5ha trial field of Extase last year on Hanslope series heavy clay, farmed within a total of 1150ha. Just under half of this is usually grown to winter wheat, all premium milling varieties, with the Extase grown under contract with Heygates.

“It performed very well under our usual farm-standard fungicide regime, yielding 12.31t/ha with a Hagberg of 347, specific weight of 79.7kg/hl and 13.62% protein. But there’s clearly potential to save on inputs too,” he reports.

Andrew routinely carries out on-farm trials, so within the field he tried two alternative low-input fungicide regimes — one without CTL and the other with fungicide costs shaved as low as he dared. All other inputs were the same (see table on p26). “Trace elements were applied according to tissue analyses,” he notes.

“I could tell it was a different variety when it emerged — we’d put it in a heavy bit of dirt and expected large losses. But, oh my God, in the spring it flew out of the blocks. It’s a very vigorous variety, and drilled at the end of Sept, early Oct, I’d say no more than 350 seeds/m² is about right — around 25 seeds/m² less than you’d want for KWS Siskin.”

So what’s he learned from the fungicide trials? “In a spring like last year, you could cut the TO

spray, but I’d put a little more on at T1 than we did in the low input regime. Otherwise, the low input would be my default on Extase.”

At harvest there was some green straw and just a little lodging. “The thickness of the crop was down to us — we’d simply underestimated how vigorous it is and sown too thickly. We maybe cut the crop earlier than we should — this was mainly to do with a period of forecast rain we wanted to avoid. Extase ripens early, but not as early as Cordiale or Gallant, in my view. But the crop threshed really well, producing a lovely sample.”

Sold to Heygates, the company has four sites in Northants, Norfolk and Herts. “Our plans are to continue to support KWS Extase going forward,” says senior grain buyer George Mason.

“Since issuing the buy-back contracts almost a year ago, we’ve been pleased with the response from growers who have made commitments going forward. Obviously if a grower has fallen foul of the recent weather and been unable to plant for harvest 2020, then we’ll have to accept there’s little they or we can do to correct the issue. We’d hope though that their appetite for the variety would continue and that their intention would be to plant for harvest 2021.”

He encourages farmers to grow it as a milling variety. “There are ample opportunities to make a quality premium even at a low protein. Our contracts are for either full spec 13% with fallbacks down to 12% or min 11.5% protein with fallbacks to 11%.”

With little of his 2020 wheat drilled, Andrew is lining Extase up for a fair share of his 2021 wheat area. “You can have confidence in the variety to save on inputs, especially for far-flung fields, but



A variety that flew out of the blocks in spring, Andrew Robinson believes there’s potential with KWS Extase to save on inputs, too.

you can’t just drill it and leave it. It’s best put in a healthy situation, with inputs carefully planned. I find if I invest in a variety, I get more than my money back, and that’s certainly true of Extase.”



George Mason is offering buy-back contracts for Extase and hopes that growers’ appetite for the variety continues towards harvest 2021.

Heathcote Farms' recipe for KWS Extase, 2019

Date	Product	Rate (/ha)	Price (/ha)
	Seed		£77.44
26 Sept	KWS Extase	161kg	
	Herbicides		£114.87
	Insecticides		£4.33
	Fertiliser		£158.91
19 Feb	Nuram 35+S	230 litres	
19 March	Nuram 35+S	250 litres	
02 April	Nuram 35+S	240 litres	
	Fungicides – standard		£102.79
28 March	T0 – Cherokee	1 litre	
13 April	T1 – Aviator + Opus Team	1 + 0.65 litres	
06 May	T1.5 – Amistar Opti	0.75 litres	
21 May	T2 – Elatus Era	0.8 litres	
16 June	T3 – Firefly	1 litre	
	Fungicides – No CTL		£68.31
13 April	T1 – Firefly	1.25 litres	
21 May	T2 – Elatus Era	0.8 litres	
16 June	T3 – azoxystrobin + tebuconazole	0.6 + 0.3 litres	
	Fungicides – low input		£47.07
13 April	T1 – Proline	0.4 litres	
21 May	T2 – Aviator	1 litre	
16 June	T3 – tebuconazole	0.3 litres	
	Growth regulators		£15.38
28 March	T0 – CCC + Tempo	1 + 0.15 litres	
13 April	T1 – CCC + Tempo	1 + 0.15 litres	
21 May	T2 – Terpal	0.5 litres	
	Trace elements		£38.94
04 Nov	Post em – manganese + zinc	2 + 0.25 litres	
25 Feb	Pre T0 – manganese + boron	3 + 0.25 litres	
28 March	T0 – copper + zinc + boron	0.25 + 0.5 + 0.5 litres	
13 April	T1 – magnesium	4 litres	
06 May	T1.5 – molybdenum + boron + manganese + copper	0.25 + 0.5 + 3 + 0.25 litres	
21 May	T2 – magnesium + zinc	4 + 0.5 litres	
16 June	T3 – potash + magnesium	2 + 4 litres	
	Biostimulants		£23.54
28 March	T0 – Phorce	0.5 litres	
13 April	T1 – Calibra Carbo	0.5 litres	
06 May	T1.5 – Bridgeway	0.75 litres	
21 May	T2 – Bridgeway	0.75 litres	
Standard	TOTAL VARIABLE COSTS		£536.20
4 Aug	Harvest	12.31t	£2031.15*
	GROSS MARGIN		£1494.95
No CTL	TOTAL VARIABLE COSTS		£501.72
4 Aug	Harvest	11.56t	£1907.40*
	GROSS MARGIN		£1405.68
Low input	TOTAL VARIABLE COSTS		£480.48
4 Aug	Harvest	11.65t	£1922.25*
	GROSS MARGIN		£1441.77

Nuram 35+S – 35% N, 7% S03; CTL – chlorothalonil; Cherokee – CTL + cyproconazole + propiconazole; Aviator – bixafen + prothioconazole; Opus Team – epoxiconazole + fenpropimorph; Amistar Opti – azoxystrobin + CTL; Elatus Era – benzovindiflupyr + prothioconazole; Firefly – fluoxastrobin + prothioconazole; Proline – prothioconazole; CCC – chlormequat; Tempo – trinexapac-ethyl; Terpal – mepiquat chloride + 2-chloroethylphosphonic acid; Phorce – 5% N, 25% P₂O₅, 5% K₂O, amino acids; Calibra Carbo – 2% N, 1.8% P₂O₅, 1.2% K₂O, amino acids, seaweed; Bridgeway – 5% N, 17.5% C, amino acids; *based on ex-farm price of £165/t

► “Solehio, Extase's other parent, brings in a set of good background resistance that complements Boisseau's partial resistance.”

Strength of the package

John Miles believes it's not just Extase's septoria resistance that'll appeal. “It's the strength of the package. What's unique about the variety is that it breaks the linkage between the good disease resistance on offer, and poor grain quality and agronomic performance that's often the trade-off. Extase is a different proposition — it has a treated yield of 101% of controls, stands as stiff as a house and has good grain characteristics, with both Hagberg and specific weight among the highest on the RL.”

John suggests it's worth thinking differently about the mix and match of growth habits and disease resistance in varieties drilled. “For those who adopt a scheduling mindset across the rotation, the aim would be to have sequential leaf layer emergence across the area just in front of the sprayer. Decreasing curative activity of available chemistry makes this more imperative.

“KWS Extase is vigorous, so drilled end of Sept it will stay in front of everything drilled after it. With high output drill systems Extase will keep in front of all wheats, which is why it will be an important asset for the future.”

Specifically on fungicide, RL figures

Fit for the future

In this series of articles, *CPM* has teamed up for the third year with KWS to explore how the wheat market may evolve, and profile growers set to deliver ongoing profitability.

The aim is to focus on the unique factors affecting variety performance, to optimise this and maximise return on investment. It highlights the value plant genetics can now play in variety selection as many factors are heavily influenced and even fixed by variety choice.

KWS is a leading breeder of cereals, oilseeds, sugar beet and maize. As a family-owned business, it is truly independent and entirely focussed on promoting success through the continual improvement of varieties with higher yields, strong disease and pest resistance, and excellent grain quality. We're committed to your future just as much as you are.





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suggest a lower response — 0.7t/ha, while most wheats give an extra 1.5-2t/ha. “You can make savings, but be mindful that, just as chemistry should be protected, so too should the genetics. We recommend a spray programme, tailored to situation and season, that has at least two modes of action in each tank-mix at the two main spray timings,” adds John.

It’s advice echoed by Bob Simons, an independent agronomist who works closely with KWS. “KWS Extase could be your best tank-mix partner after CTL has gone. But the important word here is ‘partner’,” he says.

“We’ve run into trouble with some of the chemistry, and options are increasingly limited, but we’re not ready for the end of the chemical era yet. I see genetics and chemistry working together, with no reliance on either — it’s a partnership approach.”

Fungicide response

So what does that mean in practice? Bob points to the fungicide response figures, noting there’s not a lot of evidence Extase will benefit from a “heavy duty” spray programme. “But you’ll want to apply something half decent at the T2 timing.”

The variety probably wouldn’t need a T0 spray, unless there is a lot of seedling yellow rust about. “Most varieties, even those like Extase with a resistance rating of 9, are susceptible as young plants, so

it makes sense to clear it out. Just a cheap triazole would do, if needed. At T1, a modest triazole with a cheap SDHI, such as Tracker (boscalid+ epoxiconazole) would manage most situations,” he suggests.

“T2 is where you’d focus your spend, and it’s worth applying a modern SDHI/azole mix that provides some persistence to cover brown rust. Your T3 would be season and situation-dependent, as well as whether you’re heading for a quality market. You’d time it to provide the best protection against fusarium.”

Bob feels Extase could prove to be a popular variety. “It has the disease resistance without the yield penalty. There’s good quality with an early harvest, it’s tall but has decent standing power — I see no reason why it shouldn’t take Skyfall’s crown, although I wouldn’t be confident it would make a good second wheat.

“But if you grow Extase, treat it differently, to make the most of its attributes. Plan at the time you drill, taking account of its earlier scheduling and the lower inputs you’re likely to apply.”

Nick is keen to stress that the potential for low inputs should not be translated into a wheat that’s not looked after. “If the genetics are abused, that resistance won’t last as long as it needs to. Once we identify a promising source of resistance it still takes 8-10 years to bring it to market. Breeding for resistance takes time,” he notes.

“Having said that, there’s some really interesting pre-breeding material coming through from the public-funded Designing Future Wheats programme. Various projects are reintroducing genes and diverse traits lost long ago from UK wheat lines through selective breeding. The wheat-breeding community is working together to identify the most promising sources, focusing on disease resistance, and this offers the best prospect for future genetics growers can have confidence in.” ■

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