Real Results Pioneers

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What lies ahead for SDHIs?

Making the right decisions with fungicide programmes is not just about maximising crop potential, but preserving the chemistry. *CPM* gathers experience from Europe and lessons learned from the Real Results trials to help inform plans for 2018.

By Tom Allen-Stevens

At some point in the early part of this season, every UK wheat grower looking for the best from their crops will make the decision: one SDHI application or two?

It's not just a simple matter of the most effective disease control, nor even best value for money, believes Dr Rosie Bryson, BASF team leader for arable fungicide development in Europe. Fungicide resistance has put another dimension on the issue, she says, making an informed choice absolutely critical if the effectiveness of SDHI chemistry is to be preserved.

"The difficulty is that there's currently not that much informed debate going on as to what we can expect in the future from SDHIs, as opposed to azoles," she notes.

There are a few fundamentals about fungicide resistance that are generally accepted, she says: SDHI chemistry is vulnerable, disease control would be a lot more difficult without it, poor practice will accelerate resistance, and action to slow its onset is required from the entire industry.

Reduction in sensitivity

"We're now finding quite a few septoria isolates with mutations that can confer a reduction in sensitivity to SDHIs. The key question is whether these will result in a gradual shift in sensitivity, as we've seen with azoles, or a more rapid breakdown, similar to QoIs (such as strobilurins)."

What's known about the binding sites of SDHIs compared with strobs — where they act on the septoria pathogen — suggests resistance isn't going to appear quickly. But the impact of the mutations on the field population, their frequency, selection pressure and fitness are still not well understood.

Rosie believes much can be learned from the experience with net blotch resistance to SDHIs in France and Germany. "The first mutation identified — B-H277Y — didn't have much impact on the efficacy of SDHIs. Over time, more mutations were found and, as an example, C-H134R had a greater impact — taking more SDHI to kill it," she explains.

The key question for Rosie Bryson is whether the SDHI mutations found will result in a gradual shift in sensitivity or a more rapid breakdown.

"So different mutations can have a different impact, and there's still a lot of the net blotch population that's still sensitive to SDHIs. There's always a risk that a serious mutation will come along, but it looks likely there's more of a shift in sensitivity , similar to the azoles."

So what's the situation with septoria? BASF monitors septoria sensitivity to its ▸

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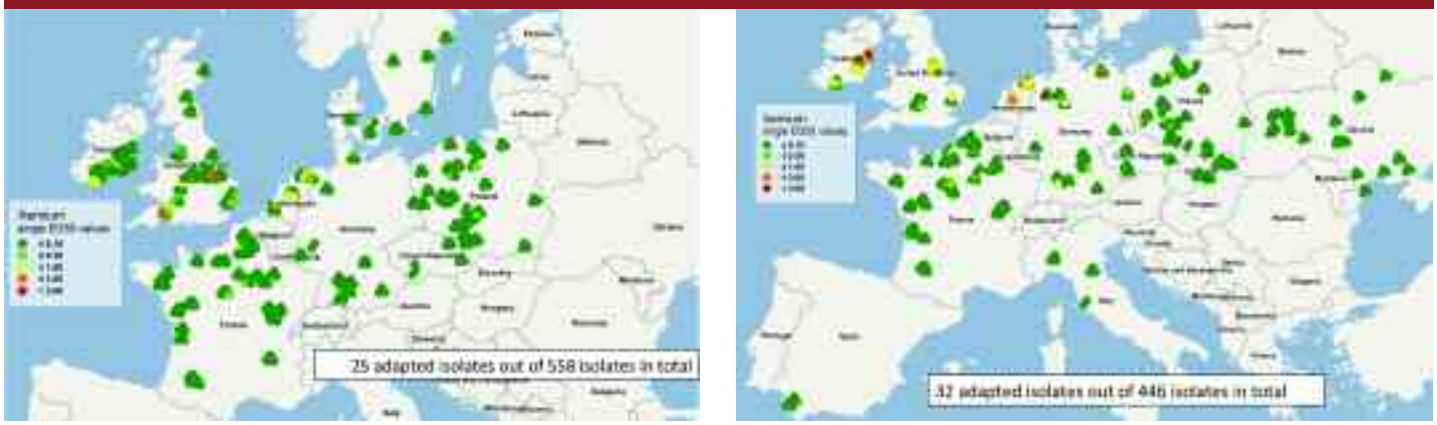
Septoria tritici sensitivity to Xemium in 2016 and 2017



Source: BASF routine monitoring

▸ Xemium fungicides (containing fluxapyroxad) across Europe, testing 558 isolates in 2016 and 446 in 2017 (see maps above). The aim is to keep a close eye on shifts in sensitivity and the individual mutations responsible.

"There was a slight increase in the number of adapted isolates found, although testing of the 2017 isolates isn't yet complete, so we don't yet know the full nature of these isolates," Rosie reports.

"What's alarming, though, is how septoria resistance varies across Europe. While less than 7% of the whole European population has an SDHI mutation, UK and Ireland varieties by nearly 3t/ha).

"But maintaining the right balance is the key — the SDHI needs the protection of an azole, and azoles need the SDHI. Both benefit from the use of multi-site chemistry, such as chlorothalonil. There should be at least a half dose of azole with your SDHI, otherwise it's probably better to leave the SDHI out altogether, if you believe the risk is that low," he stresses.

"But where a lower level of chemical applied is warranted, make sure you have a robust monitoring procedure in place — there are now more tools available with a greater level of sophistication that allow this — and be prepared to adapt programmes."

Real Results help with pesticide protection

Good, reliable, site-specific information on fungicide efficacy will be worth its weight in gold for UK growers looking for the best programme to keep their wheats protected, believes BASF's Ben Freer.

"Out of the 50 farms that took part in the Real Results trails in 2017 (see panel on p81), only nine results were statistically significant. Of these six showed a positive result for Adexar (epoxiconazole+ fluxapyroxad) and Librax (fluxapyroxad+ metconazole) against the farm's programme. In two, there was a negative result, but taken as a whole, the trials were largely inconclusive."

That's not to say there aren't some valuable pointers, however. "Many of the programmes trialled last year's new SDHI introductions against an Ad/Lib programme, so for many of the growers involved, the fact there wasn't a statistical difference between programmes has retained their confidence in the established chemistry.

"Also, all those who took part received a detailed analysis of their results, carried out by ADAS, using the Agronõmics approach to on-farm trials. Individually, that's given them a lot of information that I think we'll all be able to learn from and will help shape programmes for 2018."

For the Real Results trials themselves, one lesson learned is the importance of site selection. "Agronõmics is a very good way to measure comparative performance and analyse variability across an on-farm trial. But time and again, when assessing results, we had to reject those with a high LSD (least significance difference). In essence, you couldn't conclude from the data that a difference in yield was purely down to the fungicide applied," he explains.

Real Results coordinator for BASF Tim Short confirms the emphasis for the new season is to find consistent sites across its farmer network to put the chemistry to the test. "We're working with our 50 growers with the aim of getting as near as we can to 50 significant results. But across the network we have some really interesting individual results from the first year of trials — it's been fascinating discussing these with growers and learning how we can take fungicide programmes forward."

When it comes to pesticide stewardship, he believes the value of site-specific information will be crucial. "Farmers and agronomists want to do the right thing — they understand that it's important in the long term for the whole industry to follow a responsible approach. When it comes to best use of fungicide chemistry, the more data you have about how it performs locally, the better, which is why Real Results is so informative."

Ben notes there's also scope to look at varietal performance within the Real Results. "Those with a clean variety such as KWS Siskin or Graham, for instance, may find they have greater confidence to reduce the intensity of a fungicide programme, for instance. However, even last year, which was perceived by some as a low disease year, the clean varieties still responded positively to a two-SDHI programme by over 1t/ha (and "dirty"

The SDHI needs the protection of an azole, and azoles need the SDHI, says Ben Freer.

Looking for Real Results to bring marginal gains

Having just completed a Nuffield Farming Scholarship studying blackgrass, resistance issues are top of mind for Richard Hinchliffe, farming in E and S Yorks.

"The light bulb moment for me, when looking at how we can manage blackgrass better, was the realisation of how important good communication is. Every farmer can improve their approach to blackgrass control, but what we need is a better understanding and awareness of the various tools at our disposal.

"That becomes all the more important when it comes to fungicide resistance, because it's everyone's problem. There's no point in acting on your own — we have a massive collective responsibility to share what we're doing to preserve the value of the chemistry we have," he says.

With 560ha of arable cropping, based at Rawcliffe Bridge, near Goole, his Real Results trial last year was in a 6ha field of Grafton, on silty loam that rises to a more sandy soil type at one end. "I was never entirely happy with the site, and in the end, I think it was a limiting factor in terms of what we managed to learn from the trial."

The farm programme of epoxiconazole and Vertisan (penthiopyrad) at the T1 spray timing was followed with a T2 of Ascra (bixafen+ fluopyram+ prothioconazole). This was set against a BASF programme of Adexar followed by Librax. Chlorothalonil at T0 was included through the rest of the programme, with the entire trial getting prothioconazole at T3. "We didn't get yield monitor results, and weighed everything over the weighbridge, and there was a gnat's whisker between them," reports Richard.

The plan for 2018 is to site the trial on a larger, 15ha field with high clay content, direct drilled on 15 Oct with Belepi. "The soil type's challenging, but it's consistent across the site, so I'd hope we'd have a more interesting result — we learnt a lot last year about how we'll run the trial better this year."

Although he hasn't decided his fungicide programme yet, it will probably include two SDHIs, he says. "In recent years we've been lifting our wheat off the yield plateau, and I believe that's come through marginal gains we've been making through various changes in management practice. Use of SDHIs will be one of these. I'm hoping the Real Results trials will help inform us how to take their use forward."

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are hotspots, with around 20% and 50% respectively."

There's a caveat not to read too much into the headline numbers, however. "These adapted isolates have a raised ED50, making them harder to kill with SDHIs, and the majority will have an SDHI mutation. But they're not necessarily the ones that will have an impact on effectiveness of SDHIs."

The C-H152R mutation is a good example. It gives the pathogen a high degree of resistance to SDHIs. "The relatively good news is that it was found only at the end of the season (in 2015 and 2016 — data for 2017 not yet available) but not in the following spring. That suggests there's a fitness penalty and it won't dominate the population."

The 2016 analysis shows the majority of the adapted isolates have the C-T79N (31%) or the C-N86S (31%) mutation, which don't impact on SDHI performance as much. Unlike mutations that affect azole efficacy, it's rare to find more than one SDHI mutation in a single isolate of septoria. "Genetically we think SDHI mutations are similar to QoIs, but phenotypically, these appear to convey resistance in a similar way to azoles," she concludes.

"Septoria is a remarkable pathogen, but a bit like the Black Knight in Monty Python's Holy Grail, if it carries on adapting to the chemistry it's given in the field, this will have an impact on its ability to survive."

So what are the practical implications? Here, Rosie brings in azole efficacy. "The AHDB monitoring correctly maps their slide in performance, but they are more effective than the 20% headline figure, which is down to the way the trials are carried out using a one treatment approach on highly susceptible varieties."

The BASF-funded Eurowheat project, led by Aarhus University, that monitors efficacy of different azoles across Europe, shows azole mixtures still bring remarkably good performance, for example. "Are they still the backbone of fungicide programmes? Well the jury's out. But azoles are protecting the SDHIs as much as they are protected by the newer chemistry, and a good fungicide programme will need a balance. For every grower and every situation that balance will be different," she points out.

"Also, UK growers shouldn't beat themselves up over their approach. On average, they apply 1.3 more fungicide applications to wheat crops than those in Europe. This reflects the higher disease risk and also shows a good, broad range of chemistry is being used throughout the season to keep crops in a protectant situation — so keep up the good work," urges Rosie. ■

The Real Results Circle

BASF is partnering ADAS and AgSpace for the second year of the Real Results Circle. The initiative is focused on working with 50 farmers to conduct field-scale trials on their own farms using their own kit and management systems. The trials are all assessed using ADAS's Agronõmics tool, which, for the first time, brings statistical certainty to tramline, or field-wide treatment comparisons.

In this series, partnered with *CPM*, we will follow the journey, thinking and results from farmers involved in the programme. The features will also look at some in-depth related topics, such as SDHI performance and data capture and use.

We want farmers to share their knowledge and conduct on-farm trials. By coming together to face challenges as one, we can find out what really works and shape the future of UK agriculture.

To keep in touch with the progress of these growers and the trials, go to *www.basfrealresults.co.uk*

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