techtalk

Septoria management

A tougher problem than it was even a decade ago, *Septoria tritici* now demands a robust, preventative approach. This essential Tech Talk, powered by Syngenta, brings you up to speed with the challenge – including the role of varietal resistance and the importance of persistent fungicide protection.

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Staying ahead of septoria

Septoria management has become a balancing act between getting good levels of control while not pushing the pathogen population further towards resistance. *CPM* gets some expert guidance.

By Lucy de la Pasture

***Septoria tritici* is the biggest yield robber of wheat grown in the UK, capable of causing losses of 30-50% in some seasons. Even though varietal resistance has improved in recent years, it remains only partial, meaning a fungicide strategy is necessary in all wheat crops to protect yield.**

The problem with extensive fungicide use is that it can push the septoria pathogen population towards resistance and this may happen gradually or spectacularly, as happened with the QoI's (strobilurins).

The current challenge is to adopt strategies that help reduce selection pressure on the septoria pathogen and preserve the efficacy of existing chemistry, while maintaining septoria control in the field. ADAS principal research scientist Dr Jonathan Blake talks through how to achieve this in practice.

Why is septoria a challenge?

Septoria is endemic and occurs throughout the UK, though its development is favoured by the wetter conditions that usually occur in the west and south west regions of England. Plant breeders have been working hard to improve variety resistance to septoria, but even the most resistant varieties available just delay the epidemic rather than prevent infection from occurring.

Septoria is a disease that causes yield losses every year, with only exceptionally dry conditions able to halt an epidemic and reduce yield losses.

Only multi-site modes of action have maintained their efficacy against the septoria pathogen, with a history of resistance occurring in single-site fungicide groups — initially in the MBCs, then azoles and QoIs, and most recently the SDHIs. All were highly effective when they were first introduced and all selected for resistant strains of the pathogen, resulting in reduced levels of field performance, which is first seen as a loss in curative activity. This degradation of efficacy has occurred gradually in the azoles, but it was a different story

Jonathan Blake says good cultural practice should be the first line of defence against septoria.

for the QoIs where control failed over the course of three seasons. The loss in efficacy in SDHIs is still in progress, its rate of decline appears to lie somewhere between the two extremes.

How can its impact be minimised?

Good cultural control practices should be the first line in defence against septoria and ADAS, in partnership with NIAB and SRUC, have recently conducted research into the influence of agronomic factors on the disease.

The work shows the factors vary in their influence on a septoria epidemic, with varietal resistance the most influential. Delaying drilling date by a month also has a significant effect on septoria levels. By drilling a highly septoria-susceptible variety in October, the levels of infection were akin to a moderately-susceptible variety sown early. Similarly, the work shows sowing a resistant variety late offers a significant opportunity to reduce fungicide inputs.

Seed rate (crop density) has some effect but not in all cases, depending on the tillering capability of the crop. In low septoria pressure seasons then the affect of crop density on disease development is more apparent, probably because it isn't masked by other influencing factors.

Septoria in wheat 20 days after infection, as seen through the electron microscope.

What about resistance?

The results of independent monitoring of septoria isolates from the field and their genotyping by Rothamsted Research indicate a further shift in azole and SDHI efficacy. This is backed up by AHDB's fungicide performance trials which show azoles are now providing approx. 50% control of septoria in a protectant situation.

SDHIs (used alone in fungicide performance trials) provide approx. 70% control at full label rates, a decline from 90-100% control just 5-6 years ago. Dose response curves suggest a high dose is needed to achieve adequate control of septoria, however this may impact on selection for resistance so it's unclear whether rates should be increased or not. ADAS's Dr Neil Paveley is continuing work to find the answer to this difficult question.

What is clear is that the decrease in the efficacy of single site chemistry means alternative strategies need to be considered to help maintain control of septoria in the field. The reduction in curative activity means there's a possibility leaf two may be left more exposed to infection. In high pressure situations a multisite at GS37 may be advisable to protect leaf two.

A recent survey has highlighted that around 50% of T2 applications (GS39) don't contain a multisite, which is a poor strategy in terms of resistance management and the additional protection against septoria which they bring to the party.

Why is early management important?

Although most septoria infection spreads to upper leaves by rain-splash from the lower leaves, physical spread can occur without heavy rainfall, particularly when leaves 3 and 4 overlap the upper leaves as they emerge.

Septoria is in the process of evolving resistance to the azoles and most recently, the SDHIs.

T0 isn't a timing which gives any significant yield response to disease control. It's applied before the crop starts to extend, so provides no protection to the yield forming leaves of the crop. A T0 can be useful to keep a lid on septoria inoculum, particularly if the T1 timing on the most septoria susceptible varieties is compromised, so is often considered an insurance.

At T1, fungicide is targeted at the leaf three fully emerged timing, which generally coincides with GS32 of the crop. Leaf three only intercepts 5-10% of light but ▸

Integrated approach used to head off septoria menace

More vigilant crop monitoring, adoption of varieties with better resistance, tight spray intervals and a preventative fungicide programme fine-tuned to disease risk are the key strategies used by Heathcote farm manager, Andrew Robinson, to stay ahead of septoria.

The 1,150ha farm in Beds has 500ha in winter wheat — predominantly Group 1 and 2 varieties. The past couple of seasons have seen varieties with better *Septoria tritici* resistance as the first line of defence against the disease, as well as the adoption of newer SDHI chemistry.

This season, all four of the farm's main winter wheat varieties have resistance ratings of 6.4 or above.

"As fungicide chemistry has become less curative against septoria, it's become increasingly important for us to be more preventative," Andrew explains. "We don't have the silver bullets that we used to have, so we've become more vigilant.

"We walk crops more often, plus look at other factors. We'll ask: are we growing a resistant variety, have we got septoria present, and how does the weather look? All these affect our fungicide decisions. It's a risk-based approach."

With blackgrass not a major problem on the land, winter wheat isn't drilled particularly late: last autumn's drillings spanned from 23 Sept-10 Oct. However, a comprehensive four-spray fungicide programme, incorporating multiple modes of action, forms the backbone of in-season septoria prevention.

Kickstarting this, T0 has typically been a triazole/chlorothalonil mix, plus an early eyespot treatment for fields needing one; followed by an SDHI + triazole at T1, with the strobilurin /chlorothalonil treatment, Amistar Opti, added in high pressure situations.

For the main T2 timing, the SDHI-based fungicide Elatus Era has been the treatment of choice for the past two seasons, tank-mixed with Bravo (chlorothalonil), and followed by straight triazole or triazole/strobilurin on the ear.

"We've used Elatus Era since its launch. I saw data on its septoria control and prevention and it looked really good," Andrew explains.

By growing varieties with better septoria resistance, he's had the ability to be more flexible at the T0 timing, Andrew believes.

"When we didn't have the more resistant varieties, we'd have been more regimented. But as varieties have got better, we've tailored our inputs accordingly. We may be less robust at T0, but we'll always stay on the front foot against septoria. We also aim to keep spray intervals to less than three weeks. This can be difficult, so sometimes we'll include a T1.5 spray.

"We also alternate active ingredients and use mixtures for resistance management. As well as including chlorothalonil, we use a different SDHI at T1 and have no more than two prothioconazole applications in the programme.

Andrew Robinson is using varieties with better septoria resistance as his first line of defence, as well as employing newer SDHI-based chemistry.

Septoria management: top tips

- **Choose a resistant variety** – this helps delay the onset and severity of the epidemic.
- **Make use of multisite fungicides** – base programmes around multi-sites to protect existing chemistry and give added septoria protection.
- **Pay careful attention to timing** – apply T1 at 'leaf 3 emerged' to protect the emerging leaf 2.

Septoria disease cycle

Source: Syngenta

▸ protecting it from septoria infection reduces the spread of inoculum up the plant when the crop is extending, preventing disease from becoming established.

How does that translate into control?

Yield is dependent on light capture by the canopy so it's important to keep this green for as long as possible. Each five extra days of full light capture by a green canopy should be associated with 1.0t/ha of extra crop growth.

Leaf two is responsible for 20-25% of light capture and the uppermost leaf in the canopy, the flag leaf, intercepts 40-50% of solar energy and together with the ear, is the biggest contributor to yield, so keeping these green is critical.

Applying fungicides at the correct growth stage of the crop is increasingly vital to get the most out of fungicides, as their curative activity in the field is reducing as the result of shifts in the septoria pathogen population. Multisites are purely protectants and need to be applied ahead of infection to make use of their strong anti-sporulant activity.

Using fungicides with high levels of persistence in the leaf will help maintain protection and maximise late season light capture.

How does chemistry help?

Research at Syngenta's Jealotts Hill facility has been investigating the way fungicides move within the plant. It's important for a fungicide to remain on the leaf for long enough so the active can get into the plant, whilst also maintaining an effective preventative barrier. The fungicide then needs to reach the target site of susceptible pathogens and remain in the plant for as long as possible to maintain disease control.

The direction of flow within the plant is also important and, for a fungicide, acropetal flow (upward flow through the xylem) is desirable, meaning movement occurs throughout the leaf and potentially to new growth.

For Elatus Era (benzovindiflupyr+ prothioconazole), the movement of the solatenol (benzovindiflupyr) component within the plant is slow, so the active accumulates within the wax layer of leaves which subsequently provides a reservoir of fungicide. This reservoir of solatenol is maintained over a prolonged period due to its lipophilic nature, where it's slowly metered into the cells of the leaf, inhibiting spore germination, penetration and mycelial growth. Prothioconazole moves rather more rapidly and has a highly complementary profile alongside solatenol.

Although it's been shown to be slow moving, solatenol also has a slow rate of degradation and a high potency against septoria. Good stability, within both the plant and fungal cells, is a biokinetic property that then comes into play, ensuring sufficient active is available to take care of any latent infection in the plant and ensure longevity of disease control.

What's the bigger picture?

It's a time of change — both in the septoria population and the efficacy of the fungicides available to control disease. Adopting resistant management strategies has never been more important since preserving the efficacy of existing chemistry is essential to both prolong its life and maintain efficacy at a level that can help protect the new fungicide chemistry that's on its way.

One of these is a new azole and the other offers a new mode of action for cereals — Quinione inside Inhibitor (QiI). Both fungicides are reported to be highly effective against septoria, but good resistance management practices will need to be in place to ensure their longevity. ■

Resistance management guidance in wheat

Source: AHDB/FRAG-UK Fungicide Futures, Practical measures to combat fungicide resistance in pathogens of wheat, 2019.

Sponsor message

With difficulty curing it, there's no substitute for staying on the front foot against *Septoria tritici*. Newer varieties with improved resistance provide a timely foundation, with Graham providing top-rated septoria resistance among hard Group 4 winter wheats on the AHDB Recommended List and has among the highest treated yields in the wetter, septoria-prone west.

The inclusion of multi-site fungicides, such as Bravo, provides important added septoria prevention plus resistance management. And for flag leaf protection, the SDHI-based fungicide Elatus Era is an ideal fit.

Research during the development of Elatus Era showed its SDHI active ingredient to provide high potency against the target enzyme in the septoria fungus. It's also very stable on and inside the leaf, delivering long-lasting protection, and persists across the whole leaf better than some SDHIs. That's important because leaf axils are where moisture accumulates, and where septoria infection can cut off nutrient supply to the leaf.

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