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East Edition Crop Focus

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Profit from good disease
control in 2015

Timing matters

Time-lapse photos show
value of protection

Septoria

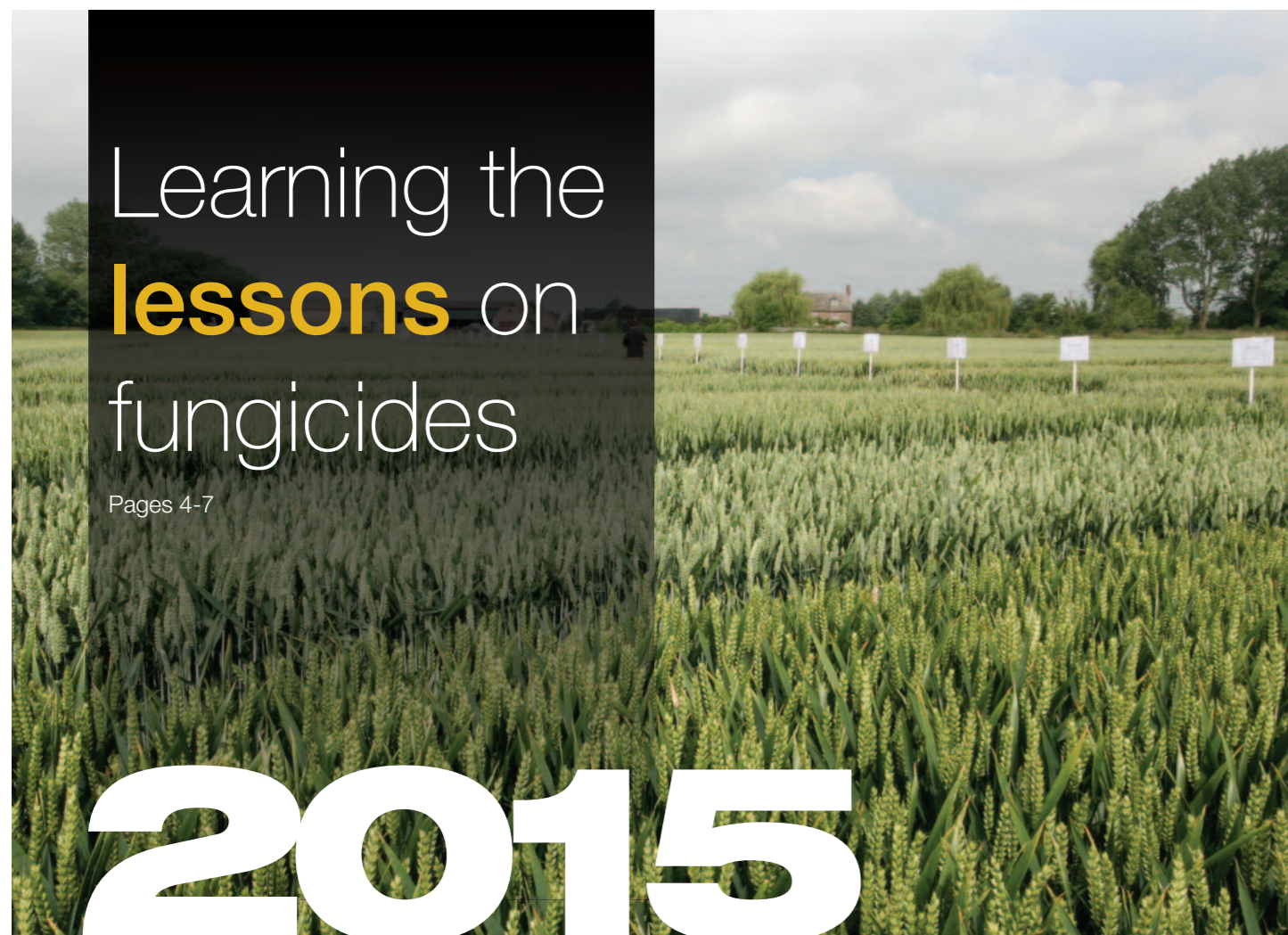
the cultural solution

Bayer Field Days:

The results



Bayer CropScience



Timing matters

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Barley in focus

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High disease pressure brought fungicide programme effectiveness and timing into sharp focus in 2014, not least because growers faced the highest *Septoria* levels since the DEFRA winter wheat disease survey began. It makes the 2014 growing season one to remember for more than just the easy harvest.

The survey, which is conducted across 300 commercial crops in July, provides a snapshot of what has taken place and gives a very useful overall picture on disease incidence, explains Dr Judith Turner, plant pathologist at FERA.

“The 2014 results confirm what many people suspected with *Septoria*,” she says. “All areas were affected by the disease, with no regional variation being seen. That’s very unusual.”

“*Septoria* was found in 100% of crops, making it the worst year since 1970, when the survey started.”

To put this into context, a low disease year would result in just 50% of crops being infected, she points out. “That shows what growers were up against and what fungicides had to do.”

A comparison with 2012, which was another bad *Septoria* year, shows that the disease pressure wasn’t as high then. “Disease was very evident in wheat crops in 2012, but it was due to the lack of spraying opportunities caused by the incessant rain, not because of unduly high disease pressure.”

***Septoria* was found in 100% of crops, making it the worst year since 1970, when the survey started**

The 2014 results show that *Septoria* levels were at 5.9% on the flag leaf and 11.5% on leaf two, she notes.

The importance of the forecast

“*Septoria* is largely weather driven,” explains Dr Turner. “That means one bad year won’t necessarily be followed by another – a cold, frosty winter followed by a dry spring will have a huge effect on reducing the threat. Last year, of course, we had a very mild winter.”

Indeed, analysis done at FERA for Bayer CropScience has shown that there’s no relationship between *Septoria* levels in successive years, she stresses. “That’s very different to diseases such as light leaf spot, which has a very significant relationship from one bad year to the next.”

This means that growers should not worry about 2015, based on what happened in 2014. “The weather will drive any epidemic,” notes Dr Turner.

spray,” he stresses. “And by robust rates of SDHIs, I mean three quarter doses of products such as Aviator.”

The average spend on fungicides in 2014 was high, he accepts, but the return on investment was even greater. “Yield responses of over 4t/ha were not unusual, especially where both diseases were present.”

Even today’s grain prices mean that growers will get a good return on their investment, he notes. “It’s not what people want to hear, but the optimum fungicide requirement of a wheat crop is only slightly affected by the wheat price.”

“Wheat at £200/t and at nearer £100/t should only have a slightly altered fungicide programme. Perhaps spending £15-20/ha less.”

The average spend on fungicides in 2014 was high, but the return on investment was even greater. Yield responses of over 4t/ha were not unusual

Product differences weren’t obvious at T2, providing the timing was right, he says. “The two market leading SDHI/triazole formulations, Aviator and Adexar, both performed very well (see chart below) and in line with our expectations. The key with both of them is to keep rates high under high disease pressure.”

Whichever product growers opted to use, they should have used at least three quarters rates. “You can’t afford to get it wrong at the T2 timing – if this spray is poor your yield is lost.”

Looking forward to the 2015 season, Mr Clark believes yellow rust is here to stay. “The more aggressive Warrior races now



Santiago: Untreated

dominate the UK population so we can expect the disease to be around next year.

“Furthermore, the UK wheat area is still dominated by rust-susceptible varieties.”

This means that if there’s another mild winter, early intervention will again be important. “If you haven’t used a seed treatment, you will need to take action at T0.”

Mr Clark adds that loss of efficacy in the triazoles against *Septoria* should continue to be a consideration in disease control programmes. “The SDHIs will be very important, especially at T2. But if we have a wet spring, then they may also be needed at T1. That’s a decision that can be taken nearer the time.”

Accurate growth stage recognition is essential, particularly when leaf three is being targeted, he advises. “It’s so easy to get it wrong, which then makes the whole programme difficult.”

His final word is on cost. “Remember that the wheat price shouldn’t dictate your fungicide programme. Trim it back a bit, by all means, but don’t make drastic changes.”



Bill Clark, commercial technical director at NIAB TAG, recalls that it was a two disease year for many growers, with both yellow rust and *Septoria* causing difficulties.

“Even in areas which don’t usually get them, both diseases were severe,” he says.

He believes that yellow rust will continue to be an issue for growers, given that there are at least four different types of the Warrior race and a high number of susceptible varieties being grown.

“Don’t forget that some resistant varieties are susceptible at the seedling stage, which helps to build up inoculum levels through the autumn and winter if it’s mild.”

But *Septoria* was the more difficult to control this year, he says, for a number of reasons – both simple and complicated. “Unfortunately, people are still getting their growth stages wrong and spraying at GS31 rather than GS32. All too often, this causes them to leave too long a gap between T1 and T2, allowing the disease to get onto leaf two and three.”

The use of chlorothalonil at both T0 and T1 is beneficial to protect against *Septoria*, he continues. “If it was missed, *Septoria* control was more difficult. And where disease pressure was high, straight triazoles, even with chlorothalonil, weren’t good enough.”

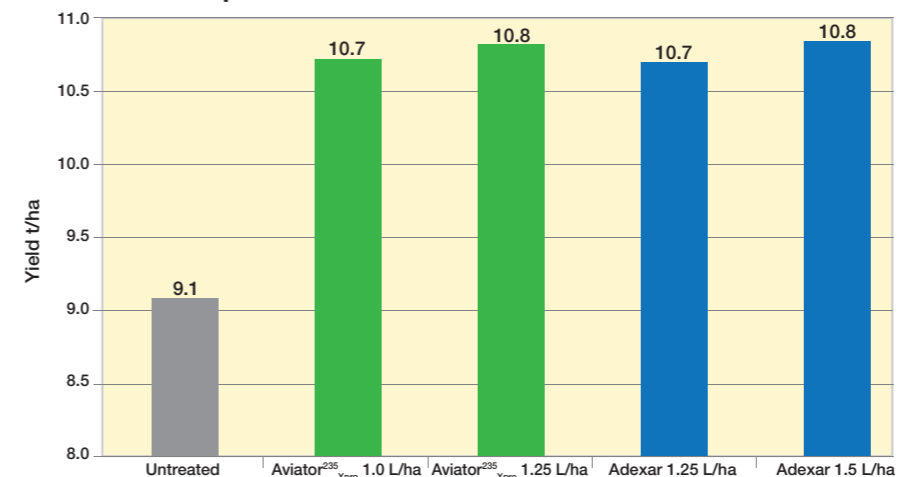
Eradicant control

In addition, T2 sprays were very important, points out Mr Clark. “It was only the SDHI/triazole mixtures which gave good enough eradicant control of *Septoria*. High rates of triazoles aren’t enough in high pressure situations.”

So the best fungicide programmes in 2014 were those that had early intervention on yellow rust, the inclusion of chlorothalonil for *Septoria* and used robust rates of SDHI mixtures at the flag leaf stage, he summarises.

“By early action on yellow rust, I mean seed treatments or an autumn/pre T0

Yield comparison between Aviator and Adexar



Source: Mean of 15 trials: (AICC, ADAS, SRUC, NIABTAG, BCS) (Leaves 1 & 2)

Key Messages

- Huge return on investment from fungicides in 2014
- Wheat price has little impact on optimum programme costs
- Disease well controlled where timings good
- Protectant programmes need to be used
- Concentrate on identifying final leaf 3 emerging correctly

Continued...

The Bayer View

Andrew Flind
Development Manager
Combinable Fungicides

Andrew Flind of Bayer CropScience says it was no surprise that *Septoria* was bad in 2014. "We had a warm, wet winter and there had been plenty of early drilling of susceptible varieties. Crops were under pressure right from the start, so that fungicides had a lot of work do."

The Grower View

Simon Beddows
Coppid Farming Enterprises, Oxfordshire

Last season posed significant challenges for wheat fungicide strategies. Oxfordshire grower Simon Beddows believes it highlights the need for a flexible preventative approach

However, very good trials results shows that the chemistry stood up well to the challenge, with no performance issues being identified, he adds. "The very high disease pressure meant that there was some disease evident on upper leaf layers in commercial crops. This was exacerbated where growers were under pressure to get on and spray, and went a little too early."

In some cases, that caused them to miss the T1 target, leaf three. "Where there are very large areas to spray, it can take up to 10 days to get round. Poorly timed T1s were a feature of 2014 and that's where problems can arise."

A well-timed standard T0, T1, T2 and T3 programme was sufficient in 2014, even though some growers added in a T1.5 spray, he continues.

"The impact of the T0 spray was very clear in 2014. Any delays after that caused problems with disease control, as re-infection was constant."

Mr Flind stresses that results are always better from protectant sprays. "The spray window has narrowed because of the reducing curative ability of triazoles. In a

year like 2014, if you're too late or too early with spray timings, the task becomes more difficult."

Getting the T1 spray timing right means applying it as soon as leaf three has fully emerged, he advises. "The T0 needs to be three weeks before that."

Aviator was mostly used at T2 in 2014, he reports. "There was some applied at T1, but the flag leaf timing is where you'll get the most benefit in terms of protecting yield potential and that seems to have been recognised."

As *Septoria* pressure rises, so do the yield benefits, says Mr Flind. That could easily be seen in last year's trials. Over the past six years, the average yield response from Aviator over azole + strobilurin +/- CTL was 0.4t/ha. Last year it was 0.75t/ha. Where *Septoria* infection levels reached 60% or over in untreated plots the yield response was 1.3t/ha last season.

Even if disease pressure is lower, Aviator still pays as, alongside its excellent *Septoria* and rust control, it also drives yield through improving overall crop health. "At flag leaf these include better nitrogen utilisation,

increased chlorophyll levels for more efficient photosynthesis during grain fill, and better water use efficiency to help reduce drought stress in dry seasons," says Mr Flind.

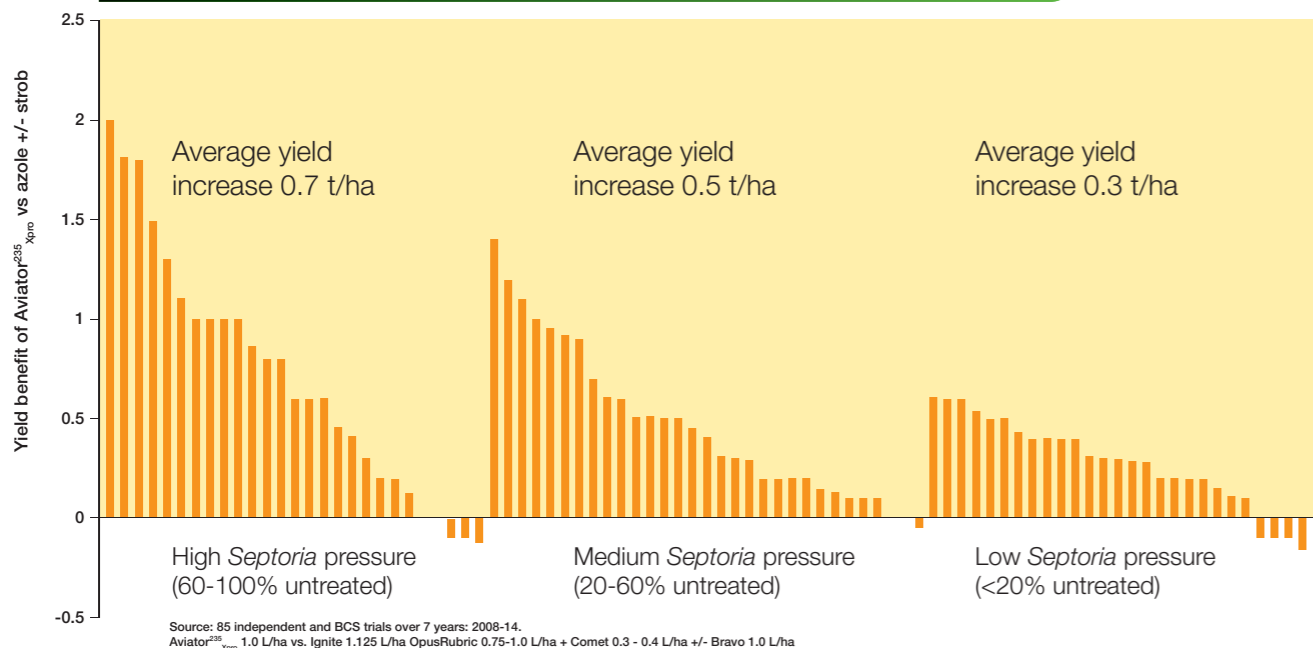
While the yield benefits in lower disease years are less, at an average of 0.3t/ha over the traditional strob + azole +/- CTL approach, which is still a £36/ha benefit at £120/t for a £5/ha investment, says Mr Flind.

"It's time to move on from the triazole/strobilurin/chlorothalonil mixes now. There's clear evidence of the value of the SDHIs at this timing."

Against other SDHI fungicides at T2, Aviator and Adexar have clearly separated from other competitors, such as Seguris and Vertisan.

In 2014, across 15 independent and Bayer trials, the yields from 1.0 L/ha Aviator and 1.25 L/ha Adexar were equivalent, and at the higher rates of 1.25 L/ha Aviator and 1.5 L/ha Adexar. "But with Aviator a little cheaper than Adexar, it gives a greater return on investment for the grower."

Wheat: Aviator T2 yield uplifts over strob+azole +/- CTL are dependent on disease levels (7 year dataset)



The 2013/14 season clearly highlighted the unpredictability of UK growing conditions and need for a robust but flexible fungicide strategy.

Dry weather early on meant disease pressure was low running up to the T0 spray, but mild, wet conditions later saw *Septoria* take off and spray days were at a premium around the crucial T1 and T2 timings, says Mr Beddows, who manages 800ha of arable at Dunsden Green near Reading, with a good proportion of his land over gravel.

Some 320ha of mainly milling wheat is grown in rotation with feed barley, oilseed rape, spring beans, spring oats and forage maize. Wheat varieties for 2014/15 include Crusoe, Solstice and Skyfall after Gallant and Invicta were dropped last autumn.

"The biggest issue last year was the unusual weather and rapid crop growth. We could have probably got away without using a T0 at all, but it went on as an insurance policy as you never know what will happen.

"By the time we got to T1, leaf three was well out and as growth accelerated the gap to T2 was longer than it should have been which let disease build. In hindsight, we should have gone with a T1.5 of chlorothalonil and it is something we'll consider this year."

Nevertheless, the 1.0 L/ha of Aviator applied across 100ha of Invicta at T2 last year did a "good job under a lot of *Septoria* pressure" and crops yielded well. Other varieties received 1.25 L/ha of Adexar, which also worked well, he says.

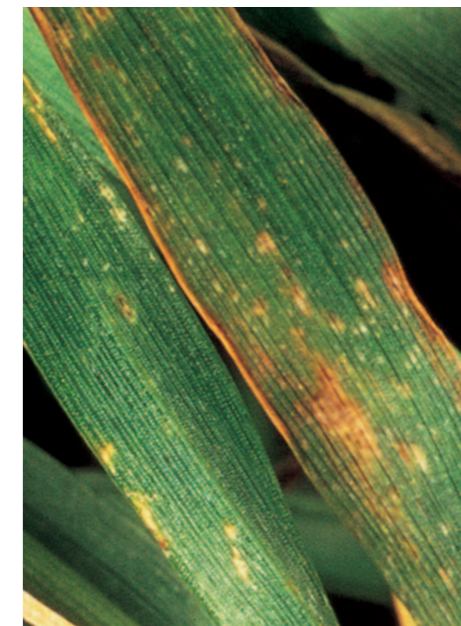
This season's fungicide strategy will broadly follow last year's, with exact products and rates varying depending on variety and disease pressure. In 2013/14, the T0 consisted of 1.0 L/ha Bravo or 1.0 L/ha Cherokee plus growth regulator, while T1 was 1.0 L/ha Bravo + 1.25 L/ha Firefly. 1.0 L/ha Aviator or 1.25 L/ha Adexar was applied at T2 and 1.0 L/ha Prostaro or 0.75 L/ha Firefly at T3.

It's about having a plan and being flexible according to the weather, disease pressure and variety.

Much of the farm is drought-prone so preserving green leaf area is a major priority for Mr Beddows, who believes the crop physiology effects of SDHIs are a key strength alongside superior disease control over triazoles.

While SDHI chemistry was only used at T2 last year, it could appear at T1 too if conditions dictate this spring and he also plans to trial SDHIs at T3 to maximise green leaf retention.

"It's about having a plan and being flexible according to the weather, disease pressure and variety. Hopefully we will be able to make some fungicide cost savings on the Crusoe and Skyfall this year due to their higher disease ratings."



Fungicide Programmes

Variety	T0	Rate	T1	Rate	T2	Rate	T3	Rate
Invicta	Bravo	1.0 L/ha	Tracker + Bravo	1.5 L/ha + 1.0 L/ha	Aviator ²⁵ _{xpro}	1.0 L/ha	Firefly ⁵⁵	0.75 L/ha
Solstice + Crusoe	Cherokee	1.0 L/ha	Firefly ⁵⁵ + Bravo	1.0 L/ha + 1.0 L/ha	Adexar	1.25 L/ha	Prostaro	1.0 L/ha

Is it really necessary to switch to

SDHI fungicides at T1?

T1 sprays don't have to contain an SDHI fungicide to give the best performance on *Septoria*, Bayer CropScience trials have shown, even in a season where disease pressure was high.



In most situations, a well-timed T1 spray based on Proline + chlorothalonil timed to protect the fully emerged leaf three will give all the protection that a winter wheat crop needs at that stage of the growing season, where a T0 has been applied, says Andrew Flind of Bayer CropScience.

"What we've seen over the past few years, in trials, is that there's little difference in disease control if an SDHI/triazole product is used instead of Proline at T1, where a T0 has been applied," he says.

"Providing the right rate is applied and the timing to hit leaf three is correct, a Proline + chlorothalonil mix will give excellent results."

For the best outcome, he recommends that cereal growers use a minimum of three quarters rate at T1. "That means Proline at 0.55 L/ha and chlorothalonil at 1.0 L/ha, following an effective T0. The message that rates need to be kept up remains the same this year, ahead of the new season."

In addition, accurate spray timing is essential with this approach, he stresses. "There is a case for an SDHI in more

curative situations, such as where spray timings have been delayed and/or there's high disease pressure, or where T0 has been missed," he acknowledges.

No need for two SDHIs

Bayer trials conducted in 2014 comparing T1 sprays showed 84% control of *Septoria* from a well-timed Proline + chlorothalonil spray. That went up very slightly, to 86.5% with Aviator, but remained at 84% when a Vertisan + Proline mix was used.

"The SDHIs were no better in these protectant situations," he says. "Even in a high pressure year, it's still possible to get very good results from Proline + chlorothalonil. So providing everything is going according to plan, there's no need to use two SDHIs in a winter wheat disease control programme."

Yield responses from the T1 spray were up to 2t/ha this year, continues Mr Flind. "There is an argument for using an SDHI at T1 for insurance, but that tends to be where growers struggle to get round all of their crops with the sprayer in a tight timescale.

"But there's also a counter argument that keeping the best chemistry for the timing that protects the leaf layers driving yield is a good way of reducing the risk of resistance developing, so safeguarding the chemistry for longer."

The role of chlorothalonil at T1 has been another focus of Bayer trials, so that the company can gain a better understanding of the situations in which antagonism between active ingredients and chlorothalonil can occur.

"There's always been an issue with chlorothalonil and triazoles in a curative situation, which everyone in the industry has been aware of for a while," explains Mr Flind. "So it was important to look at how chlorothalonil might affect the performance of Aviator, by using three different rates and investigating both protectant and curative situations."

Use CTL as a protectant

Following ADAS work, it was established that there is a small disease control and yield benefit from adding 0.75-1.0 L/ha of chlorothalonil to 1.0 L/ha of Aviator, providing it is being used in a protectant situation, he says.

"Chlorothalonil has a useful effect in protecting a leaf three once it has just fully emerged, which contributes significantly to yield," explains Mr Flind.

These findings confirm that where growers are keen to follow their T0 spray with Aviator at the T1 timing, it is fine to include chlorothalonil, says Mr Flind. "But it is important that a T0 spray was used to help make sure the T1 is being applied in a protectant situation."

However, where there's been a delay and there is a need for curative control on leaf three, or disease pressure is very high, he recommends leaving chlorothalonil out of the tank, as it can compromise disease control. "That's especially important if rust is already present in the crop."

By applying Proline + CTL followed by Aviator, rather than a new SDHI at T1 and T2, you can potentially trim up to £15/ha from programme costs and still achieve the best possible yields

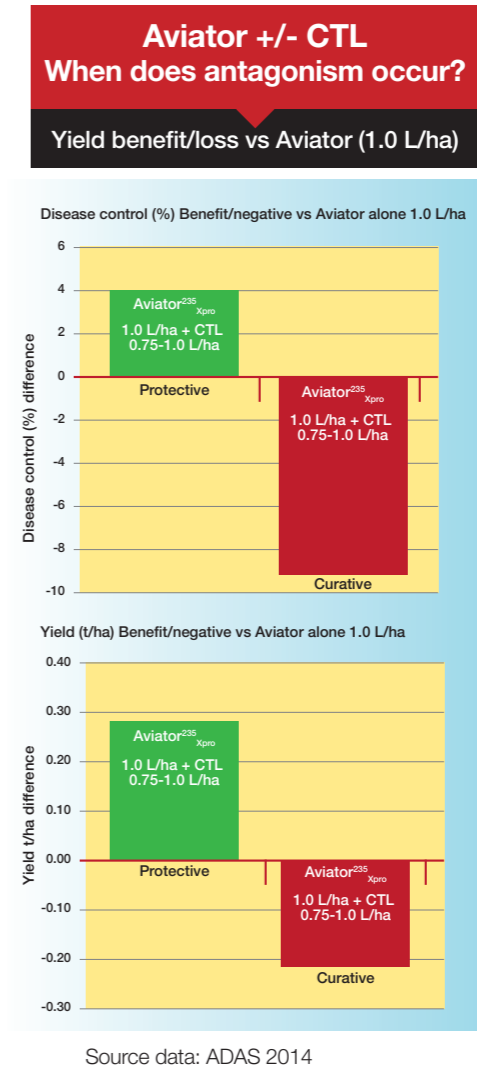
The best returns from using Aviator come from a T2 application, however, stresses Tim Nicholson, Bayer CropScience's commercial technical manager for the South West. "The flag leaf and leaf two contribute most to yield and are therefore the most important leaves to protect with the best chemistry. It is also the timing where you get most improved crop health benefits from applying Aviator."

And with wheat prices under pressure this year, it also makes sense to use the most cost-effective programmes, he says. "By applying Proline + CTL followed by Aviator, rather than a new SDHI at T1 and T2, you can potentially trim up to £15/ha from programme costs and still achieve the best possible yields, as was shown in our demonstration trials last season.

"Across 200ha of wheat on a farm, that saving is the equivalent of the cost of a 27t lorry load of wheat."

Bayer won't be supporting the use of chlorothalonil at T2 with Aviator, adds Mr Flind. "While there should be no infection on the flag leaf when the T2 is being applied, leaf two often has latent disease infection already present, and with that leaf contributing around 25% to yields, it is not a good idea to potentially compromise disease control on that leaf."

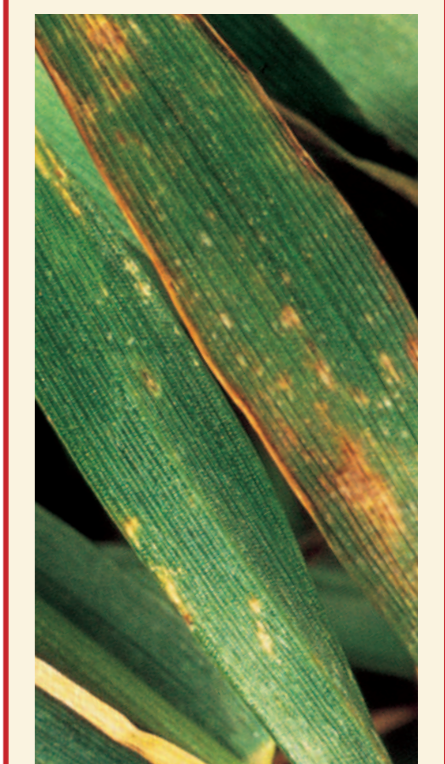
"Our trials have confirmed disease control can be adversely affected by adding CTL to Aviator at T2, due to the curative situation on leaf two so it's better to stack chlorothalonil early in the programme and get its protectant benefits then."



- ### Key Messages
- Proline + CTL as good as SDHI at T1 in protectant situations
 - Proline + CTL cheaper, as effective and helps protect SDHI chemistry
 - Switch to SDHI at T1 in high disease pressure / curative situations
 - Add CTL to Aviator at T1 only when using in protectant situations
 - Don't add CTL to Aviator at T1 in curative situations or when active rust present

Prothioconazole brings more than just *Septoria* control at T1

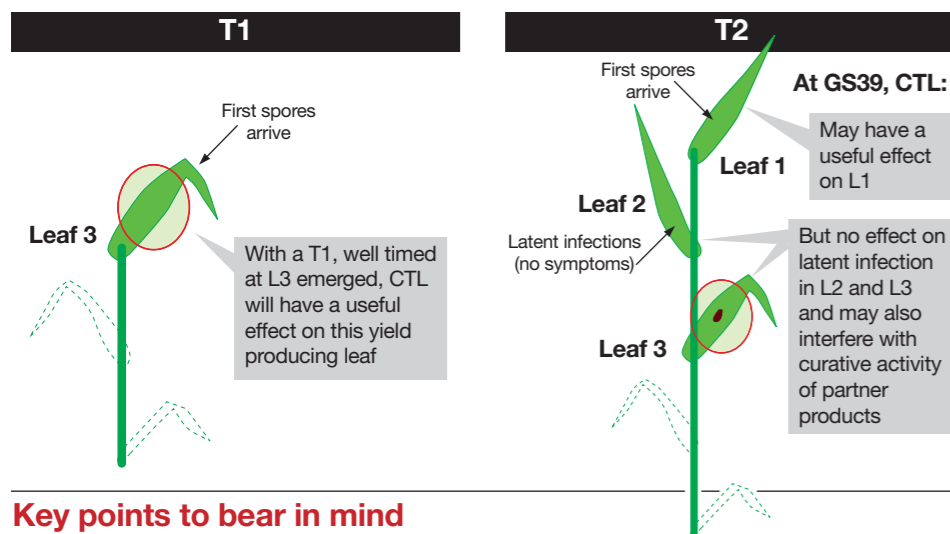
A key advantage for Proline at T1 is its all-round strength on the key diseases at that timing, says Bayer CropScience's Tim Nicholson. "By using Proline at 0.55 L/ha, you not only get effective *Septoria* control, but it also widens the spectrum to include eyespots and *Fusarium* foot rots, yellow rust and some mildew activity."



Proline is also useful for beginning a *Fusarium* inoculum management programme ahead of the main control timing of T3. Research carried out by Harper Adams University College and FERA over a number of years has shown the benefit of using prothioconazole at T1 in reducing *Fusarium* build-up, and ultimately levels of mycotoxins in grain.

The active also has useful activity against mildew, which could mean not needing to apply a specialist mildewicide unless there is active mildew in the crop, and is strong against yellow rust, when applied as a protectant, in particular. "If there is active yellow rust at application, it makes sense to add a strobilurin to help knock down the yellow rust quickly."

Why CTL may have a place at T1 but not T2



Key points to bear in mind

- The ear and top 3 leaves contribute 98% to total yield and are the key focus
- CTL is purely protectant and needs applying before spores land on the leaf



Cultural controls

are not just for black-grass

Cultural controls are becoming an accepted part of black-grass control, but how many growers consider their value when it comes to combating disease?

Harvest 2014 clearly illustrates the value of fungicides in protecting yields. Despite intense disease pressure during the season in many areas, commercial crops performed exceptionally well, producing a record UK average of 8.6t/ha according to the NFU harvest survey released in early October.



However, the difficult season also highlighted the value of cultural controls, such as more resistant varieties and delayed drilling, to safeguard yields and reduce the pressure on fungicides to maintain their efficacy.

Had these techniques been widely adopted commercially, how much better might things have been?

Clare Bend, Agrii's Head of Strategic Communications, can provide some clues. The R&D team at Agrii compared the performance of four varieties drilled at two different drilling dates at the firm's AgriiFocus site in Wiltshire last season. Each of the varieties at the two drilling dates were treated with one of three different fungicide programmes or left untreated.

As with most of the country, the site was subjected to intense disease pressure, particularly from *Septoria tritici*, and the impact of delaying drilling in these circumstances was graphically illustrated, with the untreated plots from the later drilling date yielding 2t/ha more than the untreated early drilled. "The importance of variety choice was further highlighted by the later drilled untreated Crusoe yielding only 0.3t/ha less than the fully treated early drilled KWS Santiago," Mrs Bend points out.

Only where both good genetic disease resistance and a full fungicide programme

were used was it possible to maintain yields across the two drilling dates, she says. "It shows that the combination of genetics and chemistry were able to cope in what was an extreme season.

"However, where the genetic disease resistance package was weaker, for example in KWS Santiago, the early drilled plots still suffered a yield penalty of nearly 2t/ha even when the best fungicide programmes were applied as the disease could not be effectively managed.

Bayer CropScience trials at Callow in Herefordshire backed those results, says Gareth Bubb, a commercial technical manager for the firm. In the variety trial, varieties rated a seven for *Septoria* resistance yielded 16.09t/ha compared with 15.13t/ha for those with a *Septoria* rating of four.

KWS Santiago and Solstice were also sown at two different drilling dates, just 10 days apart on the 20 and 30 September. "Those 10 days made a massive difference. KWS Santiago gave an extra 1t/ha of treated yield when drilled at the later date, while Solstice gave almost 2t/ha more.

Septoria ratings are based on October sowings, and this trial reinforced the observation that for each week you drill before October a variety's rating falls by 0.5 t/ha."



Integrated approach

A more integrated approach using both genetics and chemistry is needed to combat disease, *Septoria tritici* in particular, says well known wheat breeder Bill Angus, of Angus Wheat Consultants Ltd.

"Key fungicides are under a huge amount of pressure because we are growing so many susceptible varieties and drilling earlier. Unless we start thinking about raising standards on the Recommended List we face a losing battle."

Septoria tritici is the key battleground, he adds. "Yellow rust is very visible and a very emotive disease, but we have good seed treatments and foliar fungicides that allow us to control lower-rated varieties, unless the genetic resistance breaks down completely, which is often predictable.

"*Septoria* tends to lurk low in the crop early in the season, so is easily overlooked. Once it gains a foothold, you are stuck in a high input/high risk regime for the season. We did get big yields this year, but at what cost? This can only get worse as azole efficacy comes under more pressure."

A lack of genetic diversity is not helping, says Mr Angus. Over the past 30 years there has been little incentive to change, due to the success of azoles and other chemistry, he adds. "Some breeders have been operating a spray-it-and-weigh-it philosophy for too long."

Change is in the air, he believes. "We need to produce high yielding, highly resistant varieties. Long term we need to broaden the genetic base, for example introducing

resistance from wild relatives of wheat, to introduce robust, polygenic resistance.

"The best way is to put promising material in the ground and assess it, but this is very expensive. New technologies such as gene chipping will allow breeders to assess millions of combinations in the lab and grow only the most promising."

Breeding programmes

In the shorter term, some breeders are achieving significant success by tapping into breeding programmes beyond the UK. Skyfall, Relay and particularly Cougar, all from the RAGT stable, are showing good resistance to *Septoria tritici* as well as the rusts, as are Revelation and Crusoe from Limagrain.

The importance of variety choice was further highlighted by the later drilled untreated Crusoe yielding only 0.3t/ha less than the fully treated early drilled KWS Santiago

"But there are still only a handful available," says Mr Angus. "We should perhaps be looking more to the Continent to build on this."

More thought also needs to be given to positioning varieties within the rotation, as some varieties pre-dispose a following wheat

crop to disease, notably eyespot, he believes.

"Growers need to use genetics strategically. For example, consider the effect of growing variety A followed by C, or B followed by C. If A produces 11t/ha and C only 7, they would be better off growing B at 10.5t/ha if C then yields 9."

Robigus derivatives should be avoided as the first of two successive wheats, whereas those with Xi19 in their background tend to perform better in that slot, says Mr Angus. "Very few growers check wheat pedigrees, but they should.

"Variety choice is an incredibly important decision, especially with the pressure chemistry is now under. Once the seed is planted you can't change it – it pays to get it right first time."

Key Messages

- Cultural controls are not only for black-grass
- Using cultural controls to help protect fungicides from resistance development
- Delayed drilling of susceptible varieties increased yields
- Varieties with higher *Septoria* resistance yielded more than susceptible varieties regardless of yield potential in the high *Septoria* season of 2014
- Huge return on investment from fungicides in 2014



Bayer FieldDays

Extremely high disease pressure, particularly from *Septoria tritici* and to a lesser extent yellow and brown rust, made for a testing environment for both varieties and fungicides at the Bayer Field Days sites around the country.

And the results highlighted that a combination of both varietal resistance and effective fungicides were more than capable of producing wheat crops with very high yields, even when tested to the limit.

At each site the performance of 30 wheat varieties was tested, both untreated and after treatment by each of three four-spray programmes that reflected commercial practice.

Assessing the results by Recommended List ratings for *Septoria tritici* highlighted the important role genetic resistance played last season. Wheats rated a four for *Septoria* on the new HGCA Recommended List produced an average untreated yield of 8.46t/ha. For those with a rating of 5, that increased to 9.09t/ha, and then to 9.83t/ha for varieties with a six. Cougar, the only variety with a seven on the RL, yielded an incredible 11.29t/ha untreated across the four sites.

These figures show the value of varietal resistance to *Septoria* in untreated crops, and the inherent benefit growers can get from choosing varieties with better disease resistance. But it was also interesting that the same pattern also emerged when

analysing the results of the treated varieties.

Again, those rated a 4 – Gallant and KWS Santiago – yielded the least on average across the four sites, at 13.82t/ha, while the fives averaged 13.92t/ha. Varieties with a six achieved 14.29t/ha while Cougar, the seven, yielded 14.57t/ha.

The average yield response across all varieties and all treatments was 4.66t/ha over the untreated. At a wheat price of £127/t that equates to an extra £492 /ha in margin over the cost of the fungicide programme.

Those results showed that to some extent, at least, varietal resistance was a driver in the performance of varieties last season, says Gareth Bubb, a commercial technical manager for Bayer CropScience. "What was interesting is that some of the higher yielding varieties, which had lower disease ratings could not live up to their Recommended List yield rating under this

disease pressure, even when treated with a well-timed four-spray programme, whereas inherently lower yielding varieties with more resistance, such as Cougar out-yielded them."

But the results also highlighted the value of fungicides. The average yield response across all varieties and all treatments was 4.66t/ha over the untreated. At a wheat price of £127/t that equates to an extra £492 /ha in margin over the cost of the fungicide programme.

The standard Bayer programme of Proline + Bravo at T1 followed by Aviator at T2, started and finished by a standard Folicur + chlorothalonil at T0 and three-quarter dose prothioconazole at T3, achieved the best yield responses, producing just under 0.4t/ha more than the same programme with Adexar substituted for the Aviator.

The results were consistent across sites, says Mr Bubb. "Of the 30 varieties in the trials, the Aviator programmes produced the highest yield in 27. And with Aviator also being less expensive than Adexar, this programme also produced the best return on investment for growers."

Adding a second SDHI at T1 did not produce any additional yield indicating that where programmes are well-timed, as these were, and intervals between treatments kept to no more than three weeks, then the extra expense of a second SDHI was not required.

East Field Days: Results

At the Long Sutton site in Lincolnshire, yellow rust came in early on susceptible varieties, especially KWS Kielder and Solstice, although surprisingly less so on KWS Santiago. But after the rains came in spring, *Septoria* came in strongly across most varieties and took over as the main disease. Late in the season brown rust and *Fusarium* were also present, again on the most susceptible varieties, such as Crusoe for brown rust and Gallant for *Fusarium*.

Varietal performance followed the HGCA Recommended List ranking to some extent at this site, with Evolution, Britannia, KWS Lili, Skyfall and Reflection achieving the highest yields.

Not surprisingly with such high disease pressure, the average yield response to fungicides was 4.58t/ha – giving a huge return on investment of nearly £500/ha after fungicide costs, based

on a wheat price of £127/t.

At the Hinton Waldrist site in Oxfordshire, KWS Santiago came out on top in the treated plots, with KWS Kielder and Evolution also performing well.

This was because the disease pressure was lower than at other sites, as shown by an average yield response to fungicides of just under 3t/ha, says Ben Giles, who oversees the site for Bayer. "It sits in a little bit of a rain shadow, and while *Septoria* pressure was still quite high, the level of disease was much more easily controlled than at other sites, especially Callow in the west.

"That was highlighted by the relative performance of the more disease susceptible feed wheat varieties, such as KWS Santiago and KWS Kielder, being much better than at all our other sites."

Top Performing Varieties

Long Sutton, Lincolnshire

Variety	Treated yield (t/ha) *
Evolution	14.08
Britannia	13.71
KWS Lili	13.68
Skyfall	13.56
Reflection	13.46

*Average of three treated programmes

Top Performing Varieties

Oxford

Variety	Treated yield (t/ha) *
KWS Santiago	17.72
Panacea	16.94
Evolution	15.58
KWS Kielder	15.50
Cougar	15.37

*Average of three treated programmes

Fungicide treatments: T0 – 31 March: Folicur (0.4 L/ha) + Bravo (1.0 L/ha)
 T1 – 24 April: Proline²³⁵ (0.55 L/ha) + Bravo (1.0 L/ha) or Aviator²³⁵_{xpro} (1.0 L/ha)
 T2 – 19 May: Aviator²³⁵_{xpro} (1.0 L/ha) or Adexar (1.25 L/ha)
 T3 – 11 June: Proline²³⁵ (0.55 L/ha)

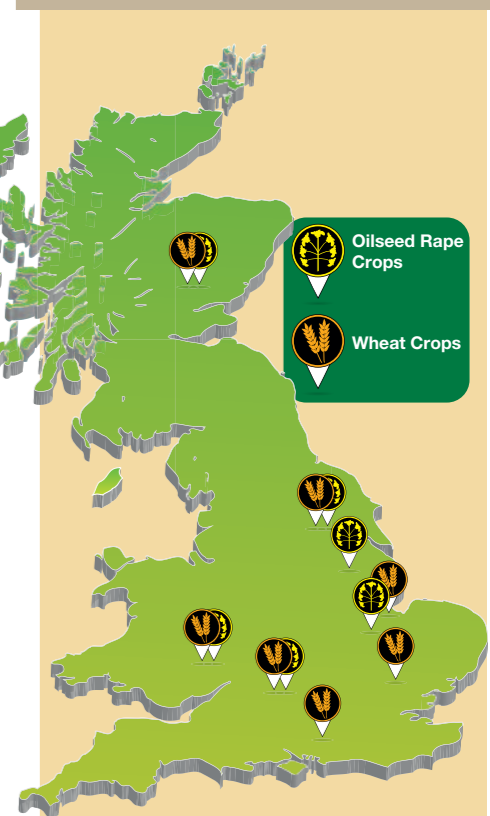
Average yields across all sites

RL <i>Septoria</i> rating	Untreated Yield	Treated Yield
4	8.46	13.82
5	9.09	13.92
6	9.83	14.29
7	11.29	14.57

All open days are registered by BASIS & NRoSO

If you would like to visit one of our field days please visit our [#BayerFieldDays](https://www.bayercropscience.co.uk/bayerfielddays) webpage at www.bayercropscience.co.uk/bayerfielddays, contact Bayer Assist on **0845 6092266** or **01223 226644** or look out for an invite in your inbox or post in the months before the event.

Bayer FieldDays 2015



Oilseed rape

Thorney Dyke, Peterborough
26 March (pm) & 27 March (am)

Wickenby, Lincoln
30 March (pm) & 31 March (am)

Hinton Waldrist, Oxford
9 April (pm) & 10 April (am)

Callow, Herefordshire
14 April (pm) & 15 April (am)

Cawood, Yorkshire
16 April (pm) & 17 April (am)

Coupar Angus, Perth
21 April (pm) & 22 April (am)

Wheat

Chishill, Cambridgeshire and RAGT Hinxton site - 16 June

Cawood, Yorkshire - 18 June

Hinton Waldrist, Oxford
- 22 June (pm), 23 June (am)

Callow, Herefordshire - 25 June

Petersfield, Hampshire - 30 June

Long Sutton, Lincs - 2 July

Coupar Angus, Perth - 9 July

Predicting a *Fusarium* season

Dr Phil Jennings of FERA has pieced together live monitoring data and weather records with isolate and mycotoxin analysis for the past seven years and compared them with what actually happened each season to help understand the risk factors which lead to the colonisation and infection of FEB pathogens and the production of mycotoxins.

The starting point is the autumn where warm dry conditions allow *Fusariums* and *Microdochiums* to establish in the crop debris and stem base respectively, providing a source of inoculum for the season ahead.

That initial risk can be reduced depending on the winter, says Dr Jennings. "A particularly wet winter reduces the risk from *Microdochiums* and *Fusarium graminearum* as these species don't like lots of standing water."

Inoculum build-up

A good example of this was in 2000 when autumn flooding continued through the winter leading to hardly any *Microdochium* being found in summer 2001. A similar situation occurred in winter 2013 following high levels in 2012 and inoculum was again reduced, he says.

A warm dry April and May allows inoculum to build and then in late spring it's all about moisture, especially when it comes to the maturation of *F. graminearum perithecia*. "If May is totally dry *F. graminearum* perithecia cannot mature and ascospores are not released."

Finally the weather at flowering is important, with warm wet weather giving the best chance for infection. "If all these factors are satisfied in one year, we get pretty hefty disease," says Dr Jennings.

It is the correlation between all these factors plus the weather post flowering and around harvest that dictates the species favoured and the level of mycotoxins produced. Comparisons of

recent years illustrate the differences in FEB and mycotoxin levels.

The clearest comparison is 2007 and 2008, says Dr Jennings. The spring conditions were similar leading to comparable levels of *F. graminearum* infection, but the mycotoxin levels were very different.

That's because deoxynivalenol (DON), the toxin that is produced when the fungus infects the ear, increases in concentration as the ear is subjected to repeated wetting and drying during latter grain fill and ripening. The more rainfall post infection from GS80 onwards the more DON will accumulate in the grain resulting in higher contamination levels. And this is what happened in 2008 with above average rainfall in July and August compared with 2007.

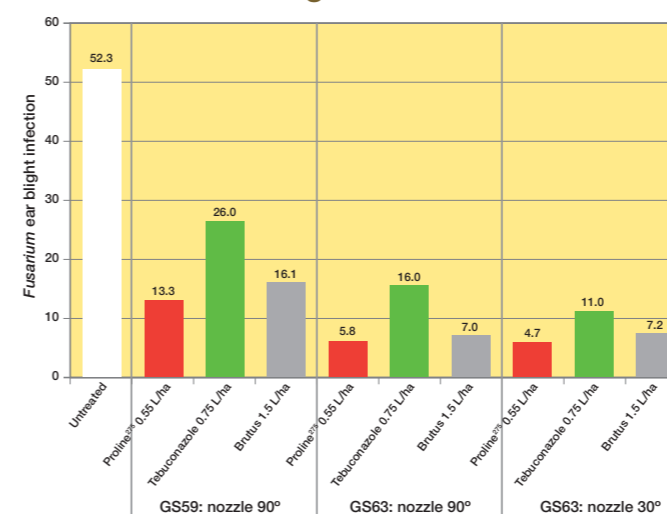
The higher than average August and September rainfall delayed harvest in 2008 leading to saprophytic growth of *Fusarium culmorum* and *F. graminearum* on the grain resulting in zearalenone (ZON) production and the highest ever percentage of samples exceeding the EU limit. In contrast harvest 2007 was not wet or delayed and ZON levels were low.

The 2010 and 2011 seasons highlight that similar conditions throughout the growing season with lower than average rainfall in June resulted in similar low ear infection and low toxin production in both years.

A comparison of the highest mycotoxin year, 2008, and the highest FEB symptom year, 2012, might have led to projected mycotoxins in 2012 being much higher than 2008, says Dr Jennings. Spring conditions favoured development of *F. graminearum*, while the cool extended flowering period in 2012 gave multiple infection opportunities leading to very high FEB infection. But unlike 2008 where DON and ZON especially was very high, a wet July and August caused exceedances in DON but the harvest, although it was late was not delayed and therefore ZON exceedances were not as high as those seen in 2008.

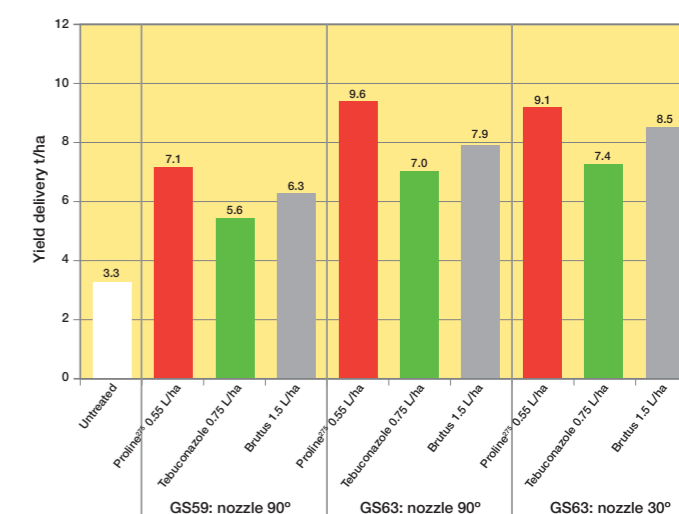
Fusarium ear blight (FEB) severity is increasing, but is it possible to predict whether a season will be low or high risk?

Fusarium ear blight infection



Mean of 2 inoculated trials (FERA and Harper Adams). AVG untreated stats; yield 3.3 t/ha, TGW 33.1 HLW 59.1, *Fusarium* infection 52.3%. Forward angles were used at one site and backward angles at the other. No difference was observed between spray angle.

Yield delivery t/ha



Mean of 2 inoculated trials (FERA and Harper Adams). AVG untreated stats; yield 3.3 t/ha, TGW 33.1 HLW 59.1, *Fusarium* infection 52.3%. Forward angles were used at one site and backward angles at the other. No difference was observed between spray angle.

When to control

Understanding these seasonal risk factors is very important especially when relating to fungicide choice and timing to control FEB.

Although T3 is the most responsive timing to control FEB, studies at Harper Adams University identified that where prothioconazole is used in the programme at T1 and/or at T2 it delivers a secondary benefit to foliar disease control with an additional 20-40% final control of DON at each timing, says HAU's Professor Simon Edwards.

T1 and T2 products shouldn't be chosen with *Fusarium* control in mind, rather as an additional benefit if the product choice fits within the foliar programme. T3 should be the main focus.

"And for T3 the optimum time of application is at mid flowering, GS63-65 when the flowers are open and the anthers are extended in the main canopy."

The difficulty with achieving this is that the optimum timing is not static and is weather dependent, explains Prof Edwards. He encourages growers to go on earlier from GS59 onwards if wet weather is forecast or hold off until GS65 if the forecast is dry. "But this is our worst time of year to predict rainfall because of localised thunderstorms," he adds.

T3 *Fusarium* control is primarily protectant, with +/- 3 days activity and control is dependent on timing the application relative to an infection event. In a wet year when multiple infection events take place control will be lower than if just one infection event occurs. In this instance 80-90% control is achievable depending on infection pressure, he says.

Inoculated trials carried out by FERA and HAU last season highlighted that the optimum timing is early to mid-flower, ideally prior to an infection event. *Fusarium* control, reduction in mycotoxins, yield and grain quality were all better when Proline at 0.55 L/ha was applied at GS63 rather than the earlier timing (see charts above).

The trials also compared Proline with Brutus and Folicur at each timing, and confirmed Proline as being the most effective product, while a further test of angling the nozzle forward at 30 degrees at GS63 showed a small advantage over crops treated with nozzles pointing straight down.



Key Messages

- Conditions in lead up to spray timing can be used to help predict risk
- Weather post-flowering and at harvest helps dictate species and mycotoxin levels
- GS63 key timing for application
- Proline (0.55 L/ha) gives best control of *Fusarium*, *Microdochium* and reductions in mycotoxins

Practical advice

Independent agronomist Steve Cook routinely treats Group 1, 2 and some high Hagberg 3 and 4 wheats for FEB to protect premiums. And that means planning the T3 programme well in advance so that product is on farm before the weather forecast around flowering is known, he says.

"T3 will always be a prothioconazole base because it controls the mycotoxin *Fusariums* and *Microdochium nivale*." Mr Cook plans for about half rate and then tops up with tebuconazole to deliver a full rate of *Fusarium* actives. He also uses Amistar Opti where he is looking for brown rust and extra *Septoria* protection.

"Timing is critical as there is very little kickback, just a day or so. As soon as the first anthers are out we are telling farmers to go if there is wet forecast. If it is dry we can wait a bit and get better protection." The risks from not getting the spray on are high. "Growers that didn't get the timing right in 2012 might have lost a third of the ear which just shrivelled so there is a yield loss factor and specific weight as well. It's not just about mycotoxins."

And losing specific weight means losing premium, he says. "The extra spend between a standard and *Fusarium* T3 costs £10-15/ha yet we are protecting a premium that is potentially £20/t @ 9-10t/ha. So it is cost effective."

That extra fungicide application will give growers additional yield worth two or three times the value in most years anyway from late infections of rust and *Septoria* and green leaf area retention, he adds.

Leaf three Eradicant
Curative Fungicide
Control Flag leaf
Protectant SDHI
T APRIL
T MARCH
T MAY
Effective PTZ
Timing GS32
Weeks GS39
6-8-9
Septoria
Good timing
is all you need



Wheat fungicide spray timings are coming under scrutiny as the unpredictable climate and increasingly difficult to control diseases make their presence felt.

Keeping leaves disease free for as long as possible is vital to protecting yield, says Dr Jonathan Blake, principal research scientist at ADAS. So last season when some growers struggled to control *Septoria* on leaf two in particular, it opened discussions about whether an extra spray that specifically targeted that leaf might be required.

However, control of *Septoria*, even in high pressure situations, was achieved by many wheat growers thanks to their efforts early in the season, Dr Blake says.

"Where T0s and T1s were correctly timed, the disease was well-controlled. But the T1 spray had to be robust."

Some of the difficulties encountered in the field were to do with timing, he points out. "Last year, we had an early spring, so crops were thought to be reaching the T1 timing earlier than usual."

But those crops needed to be carefully checked for whether final leaf three was emerging, as that is the critical timing for T1 sprays. Earlier sprays risk spraying before leaf three has emerged and then leaving too long a gap before T2, because an earlier spring doesn't mean the flag leaf will emerge much sooner, explains Dr Blake.

"Through the spring, crops become increasingly dependent on day length rather than temperature for reaching growth stages. In 'early' seasons there is naturally a longer gap between leaf three and flag leaf emergence, as above average temperatures cause leaf three to emerge early, but then the influence of day length slows the emergence of leaf two and the flag. The T1 to T2 gap then gets even longer if T1s are applied before leaf three emerges. In such situations this could be stretched to four to five weeks.

"Ideally growers should be aiming to have a gap of not much more than three weeks to keep *Septoria* out."

Correctly identifying when final leaf three is perhaps the trickiest and most crucial decision within a fungicide programme, admits Ben Giles, Bayer's commercial technical manager in the West.

"The best way to get it right is through careful dissection of the main stems of at least three plants in a field. It is fiddly and requires a steady hand, but it is the only way to be sure that you are getting the T1 timing correct.

"With eradicant activity from azole fungicides declining, making sure sprays are applied protectantly and that intervals are not stretched is the key to getting good disease control."

Early T0 sprays can sometimes put pressure on going too early with a T1, he adds. "The T0 spray is an important treatment, as it

helps keep inoculum down and acts as a buffer against any T1 delays.

"But any sprays applied before the last week of March should be viewed as an additional treatment, rather than a T0. That way the T0 application won't be applied more than four weeks before the T1.

"The idea is to keep the gap between fungicides down to three to four weeks."

If the gap between T1 and T2 is going to be more than three weeks, then a T1.5 may be required. This is likely to only be in seasons where growth slows down around late April, as in 2012, or perhaps where conditions are ideal for yellow rust to cycle quickly, Dr Blake says.

"If it is deemed necessary, a strobilurin at half rate would do a good job on rust, and use chlorothalonil for *Septoria*. Don't be tempted to increase the number of azole fungicides being used – this is just likely to hasten resistance development."

Key Messages

- Traditional timings provide good control if timed correctly
- Early T1s can cause problems
- Dissect plants to check for final leaf three emerged
- If T1.5 required, don't use an azole fungicide

Picture perfect Disease Control

Time-lapse cameras are providing a striking insight into disease development in wheat and are set to help growers improve their spray planning in the coming season, thanks to a new initiative from Bayer CropScience.

The ravaging effect that *Septoria tritici* can have on an unprotected winter wheat crop and the effectiveness of a well-planned robust fungicide programme in controlling it are graphically illustrated in a new video from Bayer CropScience.

The short film compresses a three-month timespan into just 90 seconds, juxtaposing footage of untreated and treated plots of Santiago from first node detectable (GS31) to just before harvest.

It was shot at Bayer's Callow (Herefordshire) and Oxford Field Days sites, which were subjected to very high *Septoria* pressure last season. The result is a fascinating insight into the association between crop and disease development and spray timing, says Bayer combinable fungicides product manager Will Charlton.

"The viewer can clearly see how *Septoria* climbs an untreated plant, showing the relationship between rain events, growth stages and new infection, latent periods when disease is present but unseen, and how the disease can explode onto an unprotected flag leaf when conditions are right.

"It also shows how a well-executed fungicide programme can keep *Septoria* lower down in the crop for longer. The result is two very contrasting sets of images on the screen."

The dramatic footage will be uploaded onto Bayer's website as a benchmark of *Septoria*

spread and control. It will be part of a new interactive area that will also track the current season's crop growth and disease development as it happens, says Mr Charlton.

help broaden the debate, he adds.

The relationship between leaf emergence and the key spray timings is one key message he hopes the new mini-website will achieve. "The videos will highlight the key growth stages and which fungicides were applied. Any problems with the programme, such as delays, will be highlighted and the results will be visible for all to see."

The programme will also incorporate yellow rust, says Mr Charlton. "Next spring we will install cameras at our trials site at Chishill, Cambridgeshire, which is prone to the disease.

"Yellow rust often creates a lot of noise in the press and elsewhere, and this can sometimes lead to the key T1

and T2 timings being compromised. We aim to show that sticking to these key timings will usually control yellow rust, or, where it doesn't, that an appropriate treatment should be an addition to the planned programme."

Given the high percentage of wheats with a poor *Septoria* rating in the ground, the mild outlook and the amount of inoculum stemming from last season's outbreak, Mr Charlton believes there will be plenty to observe in the straightforward treated-versus-untreated plots this coming spring.

"We could well be in for another serious *Septoria* year, some more dramatic footage – and hopefully plenty of discussion."



Hereford: treated



Hereford: untreated

The site will provide an updated image of the crop every 10 minutes, so viewers will be able to see a virtually live scenario whenever they log on. "Our trials managers will comment on what they are seeing, and what they expect as a result, as well as detailing spraying decisions and timings," he explains.

"The current footage will also have a time-lapse facility so that the results of decisions taken can be reviewed in seconds.

"People really will be able to see fungicide programmes in action, and we hope this will provide the basis for some useful dialogue as the season progresses." Key updates will also be relayed via Twitter to

Check www.bayercropscience.co.uk/timelapse from mid-March for live pictures of 2015 crops



Finding the right combination in

barley

Disease pressure in barley was higher in 2014 than for many years, and it highlighted the need to use a prothioconazole-base to achieve the best disease control.

Net blotch and mildew caused early concern in winter barley in 2014, says Dr Fiona Burnett of SRUC, but *Rhynchosporium* was also showing up in places, often at severe levels.

"Just as it was with wheat diseases, 2014 was a high pressure season," she recalls. "That means it was also a responsive year for fungicides, providing they were applied at the right time."

As the season developed, the wetter areas in the west increasingly suffered from *Rhynchosporium*, while there was more net blotch and brown rust found in crops in the drier parts of the east, she notes.

"The regional differences seen in disease levels were also related to previous cropping," says Dr Burnett. "Where barley had been grown before, there was more of an issue with *Rhynchosporium*."

Although spring barley varieties tend to carry better mildew resistance, there's always a risk that the spring crop will pick up any other disease that's already established in the winter crop, she continues.

"So any early problems in winter barley tend to transfer onto the newly sown crop. And that's what happened in 2014."

The mild, wet winter experienced last year provided favourable conditions for disease development, with events to date suggesting that the same scenario will be repeated this year, points out Dr Burnett.

"So far, it's almost a replay. We're seeing net blotch and mildew already, following another relatively mild autumn and winter."

Crops had disease, but they also had potential. So growers were prepared to spray and to use the stronger fungicide product

Without a sustained period of cold temperatures, there is likely to be high disease pressure again this year, she predicts. "Fortunately, growers can use the lessons from last year to help them cope with the disease threat."

Those lessons included making good use of T0 and T1 sprays, she says. "It was apparent early on that disease was around,

so the early treatments were essential. There was plenty of warning of what was to come."

More T0s were applied to winter barley, followed by robust T1s, she confirms. "Crops had disease, but they also had potential. So growers were prepared to spray and to use the stronger fungicide products."

Omitting a T1 spray on spring barley proved to be a mistake. "It meant that the T2 treatment then had to be eradicator, putting yield at risk."

The greater choice of chemistry for use on barley is good news, stresses Dr Burnett. "There are more products to choose from and most offer good performance against disease. So there are plenty of options."

But within the different chemistry groups, there are some stronger candidates, she says. "We know that prothioconazole is the strongest azole on barley, and that is also reflected in the performance of co-formulations containing prothioconazole, such as Siltra."

"These continue to perform very well, as was confirmed by the latest HGCA-funded fungicide performance trials results."

SDHIs all offered good efficacy in the fungicide performance trials, with Imtrex being at the top end of the straight SDHIs for disease control in 2014, while Zulu was at the other end. "It still has a place but would need to be balanced by its partner – as they all should."

The disease is there and the conditions are conducive to its development. So pay attention to early sprays, both T0s and T1s, and see what disease gets transferred to spring barley

"Adexar is available for barley now, but its epoxiconazole content makes it a less well-balanced barley product."

Strobilurins can also be used and have given good results against *Rhynchosporium*, she notes, while chlorothalonil has a role in providing a more protectant T1 spray.

"Chlorothalonil can also be used at T2 for *Ramularia* control," points out Dr Burnett. "If the warnings indicate that there's a high risk of *Ramularia*, it can be added into the mix. There's less evidence of its interference with the efficacy of other products in barley."

Looking ahead to 2015, she highlights that the warning signs are already present. "The disease is there and the conditions are conducive to its development. So pay attention to early sprays, both T0s and T1s, and see what disease gets transferred to spring barley."

Again, the T1 spray will be important for spring barley crops. "There's always a temptation to omit it, but it wouldn't be sensible this year."

Key Messages

- Use prothioconazole as foundation for barley disease control
- Make good use of T0 and T1 sprays in programmes
- Use different modes of action to help reduce risk of net blotch resistance spreading
- Siltra / Fandango programme strong against net blotch and *Rhynchosporium*



Grower Focus

Mark Ireland

Both winter and spring barley are grown for malting in a four year rotation with sugar beet at Irelands' Farms Ltd, near Sleaford in Lincolnshire.

Last year's results from over 600ha of barley were very pleasing, says Mark Ireland, who points out that the propensity of the Lincolnshire heath land to dry out means that he has to keep a close eye on crop expenditure.

"We don't want to spend too much," he says. "We're aiming for a winter barley yield of 6.8t/ha and a spring barley yield of between 6.0 and 6.8t/ha, depending on its place in the rotation, so we have to make sensible decisions about inputs."

Having a NIAB TAG trial site on the farm has been very helpful in pinpointing where responses to inputs are highest, he admits. "It gives us an opportunity to see how agronomy programmes perform at this site and, in particular, any differences between fungicides. It allows us to make informed choices."

As a result, two years ago he took the decision to switch to Siltra, which is always used at T1 and often at T2. "The T1 is the more important of these timings, so it's where we put the most firepower. The winter barley will get 0.5 L/ha at T1, with 0.4 L/ha going on the spring barley."

A decision about the T2 spray is then

taken nearer the time, so that the weather and growing conditions are taken into account. "If we have a very dry season, our T2 plans will change accordingly," says Mr Ireland. "Otherwise, we will apply Siltra again, but at the slightly lower rate of 0.4 L/ha on the winter barley and 0.25-0.4 L/ha on the spring crop."

The T1 is the more important of these timings, so it's where we put the most firepower. The winter barley will get 0.5 L/ha at T1, with 0.4 L/ha going on the spring barley

He makes infrequent use of a T0 on winter barley. "If mildew is present early in the season, then we might spray. But it only happens once every five or six years."

If winter conditions remain mild, he foresees that his 2015 barley fungicide use will be very similar to that of 2014. "It won't be far off what we did last year. Our product choice is unlikely to change, but the amount we apply might do."



Net blotch resistance

Net blotch spores with less sensitivity to SDHI fungicides were first picked up in Northern Germany in 2012, and spread to other parts of Europe, including the UK in 2013.

"It's a worrying development as it is the first case of SDHI resistance to a disease to be found in an arable crop in the UK," says Andrew Flind, Bayer CropScience's cereals fungicides development manager.

"But equally growers should be reassured that so far it has not resulted in any performance failures in the field.

"It is a warning, however, to continue to employ suitable strategies to minimise the risk of resistance developing and spreading in all diseases, not least *Septoria* in wheat," he says.

In barley, it is positive that there are a range of other actives that will help control net blotch when used in an effective programme, including prothioconazole and strobilurins, such as fluoxastrobin or trifloxystrobin.

Programmes making use of all three should provide very effective control of net blotch and other barley diseases, Mr Flind suggests.

"But it is important that you don't leave any one partner exposed to controlling a single disease. For example, if you use a weaker azole, such as epoxiconazole, against net blotch, you will leave the SDHI component more exposed to potential strains of the disease that are less sensitive to SDHIs."

Fungicide Performance 2014

Net blotch was one of the most common diseases found in winter barley in 2014, although *Rhynchosporium* was also present.

"The wet, mild conditions that we experienced were just right for net blotch," says Mr Flind. "Of course, those are the same factors which also suit *Rhynchosporium*."

Siltra followed by Fandango programme performed extremely well where net blotch was the main threat, says Mr Flind.

1 Hybrid barley net blotch trials

That was shown in two independent trials where net blotch in untreated Hyvido winter barley plots averaged around 10%. In those trials two sprays of Bontima yielded almost 1.0t/ha less than two sprays of Fandango, with the Siltra followed by Fandango, giving a further 0.3t/ha (see chart 1). "That equates to around £75/ha more return from Fandango and over £100/ha more from Siltra over the Bontima programme, as well as providing a better net blotch anti-resistance strategy."

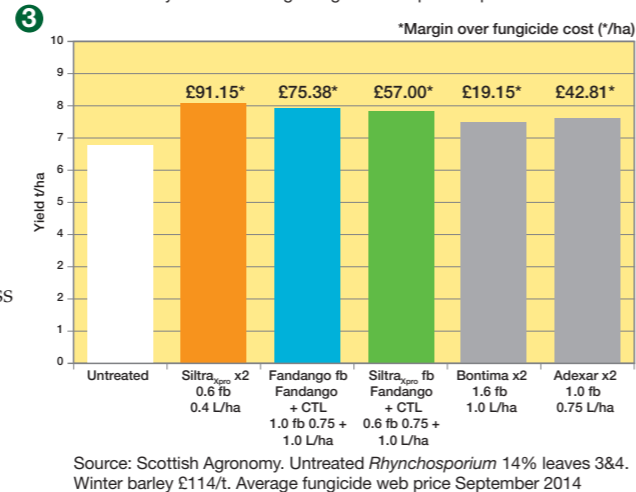
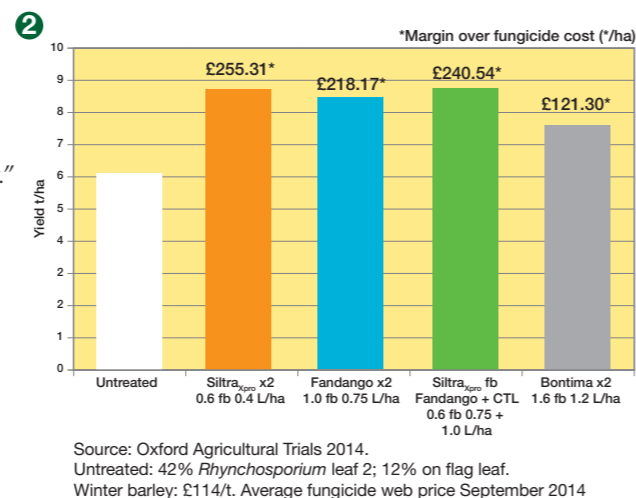
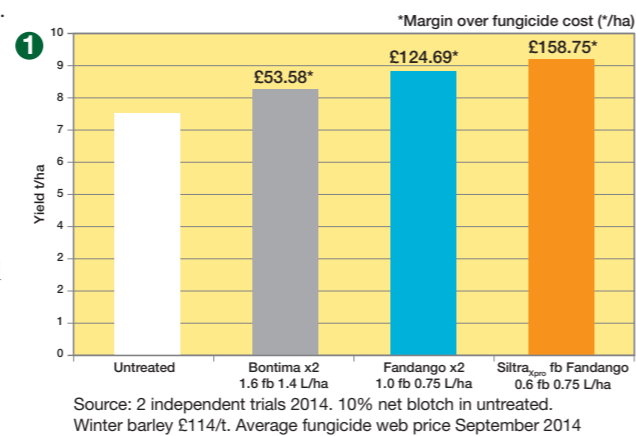
2 Winter barley *Rhynchosporium* trial

The Siltra / Fandango programme is also strong against *Rhynchosporium*, says Mr Flind. That was illustrated in a trial conducted by OAT, which had high levels of *Rhynchosporium* infection. In that trial two sprays of Siltra yielded the most at 8.79t/ha, but the Siltra followed by Fandango plus chlorothalonil treatment was only 0.1t/ha less, and two sprays of Fandango 0.25t/ha behind.

In contrast, a two spray programme containing Bontima yielded over 1t/ha less than Siltra, which translates into an extra £130/ha income.

3 Scottish Agronomy winter barley trial

A second trial in Scotland carried out by Scottish Agronomy showed a similar pattern, with two sprays of Siltra giving the highest yield at 8.1t/ha with Siltra followed by Fandango at 7.84t/ha. Again the two spray programme of Bontima was lower yielding by over 0.5t/ha, with Adexar also 0.4t/ha behind Siltra.



Light leaf spot



How much to spend on oilseed rape this spring will be a key decision for growers. Lower commodity prices has put pressures on budgets, not least after costs of pest control in the autumn increased for some growers without neonicotinoid

insecticidal seed treatments to tackle cabbage stem flea beetles and aphids transmitting turnip yellows virus.

For crops that have survived the pest attacks and are coming out of winter in good shape, protecting them against diseases such as light leaf spot and *Sclerotinia*, as well as making sure crop architecture is managed to maximise light penetration, will be important to producing the highest yields and returns.

Crop Monitor's preliminary forecast for light leaf spot shows that disease, in particular, will need watching, even in southern England, where the disease is increasingly a threat. It suggests a high risk of light leaf spot virtually everywhere in the UK due to the high infection levels on pods and stems last season, resulting in carryover of inoculum on trash. Already symptoms are being seen across UK trials sites.

The risk alert is based on the percentage of crops with more than 25% plants infected, but Julie Smith, plant pathologist at ADAS Rosemaund, warned at the recent AICC conference that the disease might be underestimated. "We have data to show if there is 15% infection when crops reach stem extension, you can expect a yield reduction of 5%."

Several factors help light leaf spot proliferate, including varieties chosen primarily for yield, favourable weather as well as the proximity to last year's infected trash, her colleague Faye Ritchie says.

"The disease can cycle in the crop every six weeks in warmer conditions and can remain active in cooler temperatures, so a normal southern winter isn't going to stop it."

The constant source of inoculum makes control difficult, especially as fungicides work as protectants, she notes. "Timing is everything. At high risk sites an autumn spray should have been used and then all crops should be checked for the disease from January."

Not only does it give more control than Filan, and offer light leaf spot control, it is around £15/ha cheaper

To help assess the threat, leaf samples from the suspect plant and surrounding ones should be incubated in a warm place for up to 48 hours to confirm symptoms. "Pre-stem extension there is no threshold for treatment so treat as soon as infection is seen. Once stem extension begins, spray when 15% of plants are infected."

The benefit of a well-timed spray programme was highlighted in 2014. Average light leaf spot control across ADAS and ADAS / HGCA trials hit 90% when crops were re-treated pre-stem extension in February. In previous years, the figure was closer to 50-60% when spraying was delayed to late stem extension.

The average uplift from a two-spray programme (November / February) in ADAS / HGCA trials at Malton, North Yorkshire, a high risk site, was 0.6t/ha. "That's by no means atypical," she says.

Autumn applications of 0.46 L/ha of Proline help set the foundation for successful light leaf spot control, says Tim Nicholson, a

Bayer CropScience commercial technical manager. "If growers haven't managed to spray for light leaf spot yet, then be prepared to spray as soon as ground conditions allow, as untreated or early November treated crops are already showing symptoms."

A watchful eye

Crops then need to be monitored carefully from around four weeks after treatment, with follow-ups applied if symptoms are seen.

Effective control through to stem extension will see the crop out of danger – Proline application at flowering to control *Sclerotinia* will top up light leaf spot control.

Sclerotinia is the other main disease oilseed rape growers need to watch out for, and again a two spray approach is best where disease pressure is high or flowering is prolonged.

"Growers can keep costs under control using Proline for *Sclerotinia* control," says Mr Nicholson. "Not only does it give more persistent *Sclerotinia* control than Filan, and offer light leaf spot control, it is around £15/ha cheaper."

Key Messages

- High risk of light leaf spot
- Monitor for symptoms if already treated
- Treat ASAP if not yet tackled
- Proline cost-effective option for *Sclerotinia* control

Overcoming flea beetles

Oilseed rape crops that avoided the worst flea beetle attacks have established well. We speak to three growers to see how the pest affected spend and how crops are measuring up

to deliver returns



Cambridgeshire
Paul Drinkwater
Abbots Ripton Farming Company,
Huntingdon

Despite being hit hard by flea beetle, oilseed rape crops are back on track at Abbots Ripton Farming Company near Huntingdon, Cambridgeshire.

The attack happened at the start of September, recalls crop production manager Paul Drinkwater, who is growing three varieties on most of his 460ha of OSR. PR46W21, semi-dwarf PX 113 on lighter land and DK Cabernet are the key varieties and he is growing some Advance as a potential Cabernet replacement.

Fortunately, the early harvest allowed crops to be drilled in good time; the farm's heaviest boulder clay soils were direct drilled on 11 August and the lighter land completed two weeks later. "That was early for us, but we knew we had a potential problem with flea beetle."

The strategy worked. Although the pest initially stopped crops in their tracks when the weather warmed up, most were robust

enough to recover and grow away and are on track to top the farm's 4t/ha average.

Treat half a crop like half a crop, and that's what you'll end up with

"We were left with a few windows where slugs took over but overall I'm not complaining – we've not lost any crops," says Mr Drinkwater.

"We did use Mesurool on some seed but the attack came later and I suspect the effects had worn off. If it's available next year I'll stick with it to help crop emergence."

The power of protection

One unwelcome legacy is a higher insecticide bill. "We applied two cypermethrin sprays, which had little effect, and went back in late September with Plenum. We've spent about £30/ha, four times more than normal.

"We did save a bit on fungicide. We used difenoconazole with the Plenum as there was not much *Phoma*, and intended to add

Proline to our Astrokerb spray in November. But

conditions weren't right and then the weather closed in."

Crops are not over-thick, thanks to seed rates of 3kg/ha or less, but plants are huge, says Mr Drinkwater. An early spring Folicur at 0.7 L/ha will damp down growth. However, if the lack of fungicide protection does allow light leaf spot in he'll switch to Prosaro.

Sclerotinia protection usually consists of a single Proline spray at mid flower. "It's not a big problem, but it's protection all the way with this disease, so if it is wet we'll go again at petal fall."

Crops look set to achieve the farm's 4t/ha average, which, if sold at the budgeted £250/t plus oil bonuses will leave a small profit, says Mr Drinkwater. However, he'd be reluctant to curb inputs even on poor stands.

"You can never tell how a crop will turn out, but treat half a crop like half a crop, and that's what you'll end up with."

Oxfordshire
Colin Woodward
Great Tew Farms, Chipping Norton

Good-looking oilseed rape crops will get the attention they deserve this season at Great Tew Farms, near Chipping Norton, Oxfordshire.

Rains immediately after drilling prompted rapid establishment and ideal growing conditions for the 210ha of Harper and DK Extrovert, and crops haven't looked back, says farm manager Colin Woodward.

"We sowed the rape on 21-24 August into a pretty dry seed-bed, not ideal on our heavy soils. But 40mm of rain fell, as forecast, soon afterwards. All the seed was treated with Mesurool, and half the area was dressed with chicken litter and the rest with anaerobic digestate.

"The combination certainly helped with flea beetle control. Crops grew away very evenly." No follow-up insecticides were needed.

Mr Woodward is already reasonably confident of achieving his budgeted output of £1250/ha, based on the farm's five-year average yield of 4.5t/ha and £270/t, including oil bonuses. "We sold quite a lot early so we should make that target," he says.

Not surprisingly variable costs won't be trimmed – crops would have to be very poor for that to happen. "We cannot afford to take our foot off the pedal – yield is the key profit driver. We are only just about breaking even,

so we are pushing hard to achieve 5t/ha across the board."

Making an impact

Despite that, Mr Woodward did save a fungicide in the early autumn as *Phoma* was all but absent. He waited until the end of November to apply 0.3 L/ha of Proline to protect the crop from light leaf spot, now the number one OSR disease on the estate and a real threat to the thick crops. The fungicide was applied with Astrokerb to clear out blackgrass and problem broad-leaved weeds.

Herbicide costs are slightly higher. He avoided a pre-em application as he was worried about the heavy rain washing chemical down to germinating seed, so he applied Elk in September, but dry soils compromised control.

An early spring growth regulator has been pencilled in at green bud, given the forward state of the crop. Proline will be added for *Sclerotinia* control where light leaf spot threatens.

"It had a significant impact last summer – it was hard to spot in the thick crops but we had a lot of small seed. Overall yields slipped to 4.2t/ha," says Mr Woodward.

A follow-up fungicide with a different mode of action will go on at mid flower. Where no light leaf spot occurs, he'll apply the fungicides at mid-flower and petal fall, unless it is very dry when a straight strob will be applied as necessary.

Cheshire
Andrew Shaw
Aston Grange, Runcorn

Good establishment and strong autumn vigour set up oilseed rape crops at S & A Shaw's Aston Grange, Runcorn, Cheshire, and most of the 120ha now looks strong. The only slight concern is about 24ha that has suffered pigeon damage, says Andrew Shaw, a partner in the family farming business.

"But I'm not too worried – in the past, pigeon-damaged crops have produced some of our best yields. And this year we are trying 30cm rows for the first time, double our usual spacing, drilled at 2.8-3.4kg/ha. Plants have developed strong root systems – provided I can get some nitrogen on the affected areas in mid-February they should recover quickly."

Two passes with a Vaderstad TopDown, shallow then deeper, created fine, moist seed-beds on the farm's sandy loam and clay loam soils. "We were dreading flea beetle," recalls Mr Shaw. "But we drilled in good time

– half went in around the 20 August after barley and the rest after wheat a few days later.

"We applied three lots of cypermethrin – one with the pre-em herbicide, another with some Falcon we applied to control volunteers, and then the last 0.5 L/ha of Proline we applied to keep *Phoma* and light leaf spot in check. We saw very little sign of flea beetle attack – unlike some crops further south ours got away with it well, this year at least."

Whether a crop is worth £350/t or £200/t, you can't risk losing yield

All varieties – hybrids Compass and PR46W21 as well as conventional variety Charger – showed excellent vigour in the conditions. He is also trying some of Bayer's new oil-rich hybrid Fencer.

"Up until October you couldn't really see any difference between them," he notes. "Since

then, Fencer has edged away and the difference is quite striking. Whether that will help yield remains to be seen, but pigeons don't seem to be bothering it as much."

Fields are now being assessed for propyzamide applications. "We don't suffer from blackgrass – brome is our main problem," says Mr Shaw. "We have to plough before potatoes and we also plough before winter barley to help control. It seems to pay off – some fields won't need any further herbicide."

Folicur at 0.7 L/ha will optimise plant architecture at green bud. This will be followed by Proline at 0.5 L/ha to control *Sclerotinia* – the aim is to apply one application just before petal fall, though that will depend on the weather.

Overall the oilseed rape is pretty much on budget, Mr Shaw reckons. "We average 4.5t/ha and are aiming for 5t/ha, but regardless of how a crop looks or the price, we will stick to our spending plans.

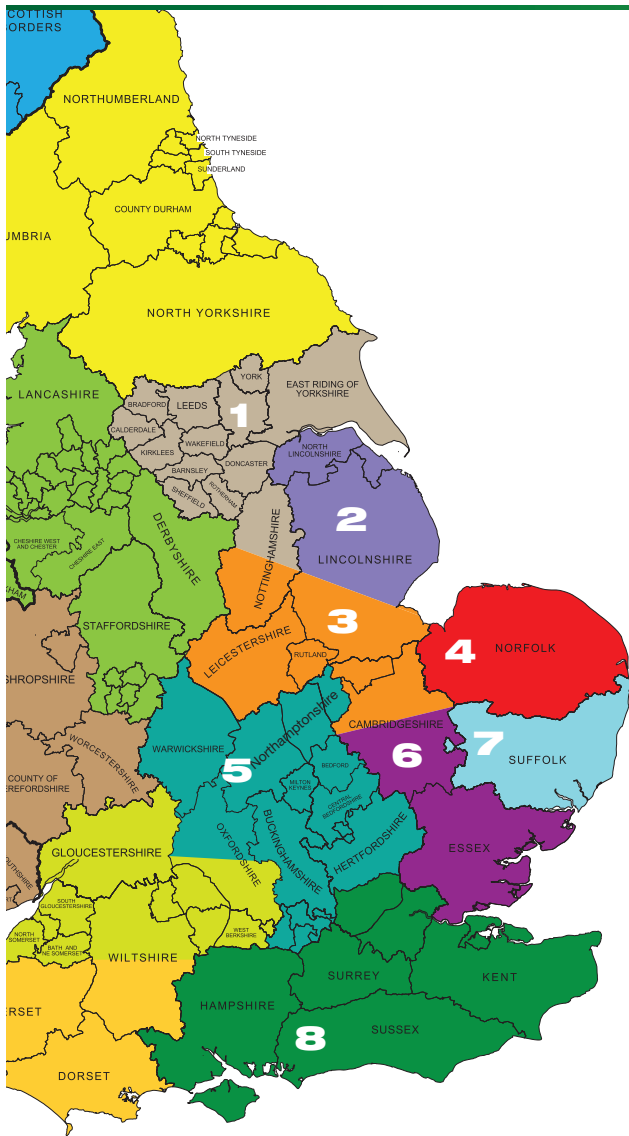
"Whether a crop is worth £350/t or £200/t, you can't risk losing yield."

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