At the stem of the problem

> *"It's all about building an awareness of risk."*

Technical Stem-based disease survey

The stem-based complex can be most difficult to identify, with a number of issues raised in a recent *CPM*/Bayer survey. In a bid to bring growers answers, *CPM* has delved deep into the symptoms, situations and solutions for these yield-robbing diseases.

By Charlotte Cunningham

Of all winter wheat diseases, the stem-based complex is probably one of the hardest to identify.

Stem-based browning could be just that, or it could be eyespot. And if it is, then is it sharp or true eyespot?

Add in mildew and fusarium to the mixture and you have quite a range of disease threats.

In short it isn't easy, and even some of the best plant pathologists have been perplexed at times — especially as these diseases often strike when plants are still small, making observation difficult.

Stem-based diseases include foot rot, microdochium and mildew, but according to a recent survey carried out by *CPM* and Bayer, it's eyespot (true) and fusarium that sit at the top of the table when it comes to the biggest threats on farm, with 77% and 58% of growers stating it as their main stem-based threat to winter wheat crops, respectively.

But just how much of an issue are they?

"Yield reductions average about 5%, but in severe infections, losses can be as high as 30%," explains Kerry Maguire, fungicide development manager at Bayer. "These losses are due to impeded nutrient flow to the roots and water and nitrogen to the leaves later in the season. This leads to stunting, poor root systems with associated low drought tolerance, and whitehead formation. This can be further compounded by crop lodging, as basal lesions cause stem breakage."

Quite challenging

The difficulty in identifying these stem-based diseases appears to be one of the biggest reasons for failing to mitigate against them, with 61% of growers stating that identifying stem-based diseases can be tricky in some situations, and a further 19% noting the identification process as quite challenging.

"One of the most challenging issues is that when there's a mixture of diseases in a crop, the plant can just look really brown and it can be quite difficult to separate what the complex actually is," explains Kerry.

According to agronomist Patrick Stephenson, identification is probably more difficult early in the season as classic symptoms may not have developed. "The differences between the stem-based complex are often small and many start out as a brown smudge," he says.

"At this early stage they affect the same area, stem bases or leaf sheaths. But classic symptoms can also be difficult to identify with distinguishing characteristics not always developing as described in the manual.

"Defined symptoms don't always emerge until the period after optimum control."

However, what typically separates stem-based browning from the disease complex is the penetration of leaves and stems, adds Patrick. "Stem-based browning only affects one side of a leaf whereas disease will penetrate leaf or stem surface. This is particularly true of eyespot and fusaria."

Perhaps rather Interestingly, 39% of growers said they didn't know whether or not the stem-based complex is increasing in frequency, adding further weight to the argument that they really are difficult diseases to comprehend, adds Kerry. "They can be very patchy — some areas can be affected and others won't. Likewise, you'll only ever come across them in some years.

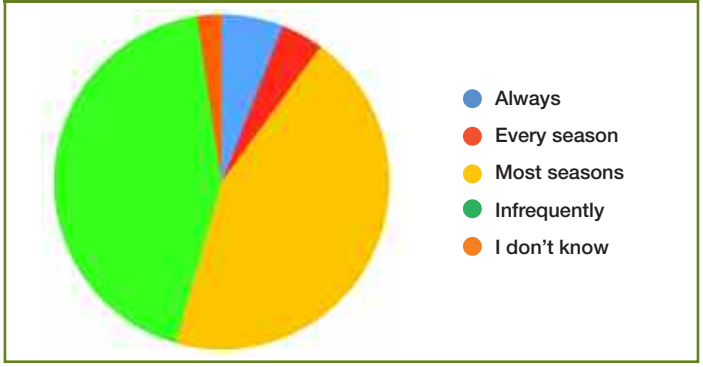
"From our own trials last year, we were quite surprised at just how much eyespot was left in the field after harvest. In my opinion, if you really want to get a handle on your disease levels, then it's worth looking at the crop both in the early season and after harvest. If you can see disease in the stubble, you're likely to have a problem the following year."

Fiona Burnett, professor of applied plant pathology at SRUC agrees that it can be hard to know whether stem-based diseases are on the rise in winter wheat, however, their presence in other crops could shine a light on the severity of the issue. "Typically, the UK grows a lot of 'white rotations' and we're actually seeing stem-based problems appear in winter and spring barley now too.

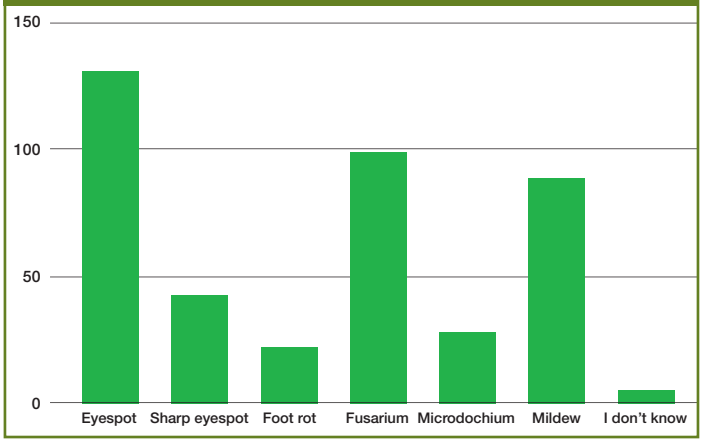
"Basically, that means it's becoming problematic in more than just wheat, which could indicate that the issue is spreading."

Yield reductions average about 5%, but in severe infections, losses can be as high as 30%, says Kerry Maguire.

How often do stem-base diseases threaten winter wheat crops on your farm?



What are your most common stem-based threats?



Fiona also raises an interesting point about chemical usage and how perhaps growers are unintentionally masking some of the underlying issues. "I think one of the reasons there's such uncertainty as to whether the stem-based complex is increasing in frequency and severity could be due to the increased usage of SDHIs at T1. It may be that some growers are managing eyespot, even if they're not directly targeting it."

With the disease causing issues to stem integrity and strength, crop lodging is often a tell-tale sign that something isn't quite right— even if there are no obvious signs of disease.

Crop lodging was widely reported last spring, and the survey revealed that 38% of growers experienced lodging — but field area was small and the damage was negligible — while 14% said lodging varied from field to field, with the hardest hit crops suffering quite significant yield losses.

In contrast, 34% said they didn't really have a problem.

Good understanding

"Lodging is caused by so many different things, such as heavy rain late in the season," explains Kerry. "It's hard to tell exactly what the cause is unless you've got a good understanding of your nutrient and disease levels.

Fiona agrees and adds: "If you've grown a crop with a good strong stem and applied PGR effectively, then of course, eyespot or a mixture of diseases could be a factor. But there are also so many other things that need to be considered."

What's more, for those growers who did have lodging issues, the majority (60%) said this occurred despite applying PGR, creating some confusion. "A lot of the lodging I saw last year was high up in the crop, so this could be down to sub-optimal PGR timings, rather than just a disease issue," adds Kerry.

If the crop has lodged, it's important to find out why, so looking at the stem base for any signs of disease is essential, says Fiona Burnett.

To be proactive and to try to drill down into exactly what the reason behind crop lodging could be, Fiona advises getting out into the field and examining the stem base for any clues.

"Often, people are disappointed in yields, but overlook the role crop lodging can play — in particular, discounting any kind of influence diseases such as eyespot and fusarium could have played.

"If the crop has lodged, it's important to find out why, so looking at the stem base for any ▸

Spotting eyespot

The survey presented growers with two pictures and asked them to identify which was true eyespot. An impressive 80% answered correctly, but for the other 20% that weren't sure, what is the best way to identify an incidence of true eyespot?

"Don't be afraid to get out in the field and pull up young crops or stubble to look for eyespot," says Kerry. "A tip from me is to use your finger nail to rub the surface of the plant. If you can rub off the black dot, then you've probably got eyespot.

"Due to the sheer tenacity of the pathogen to infect the stem, identifying and targeting it at this early stage is key."

80% of growers managed to correctly identify true eyespot (left)

To spray, or not to spray

When it comes to PGR timings, 45% of growers said they targeted the T0 and T1 slots, while 21% stretched this to include T2.

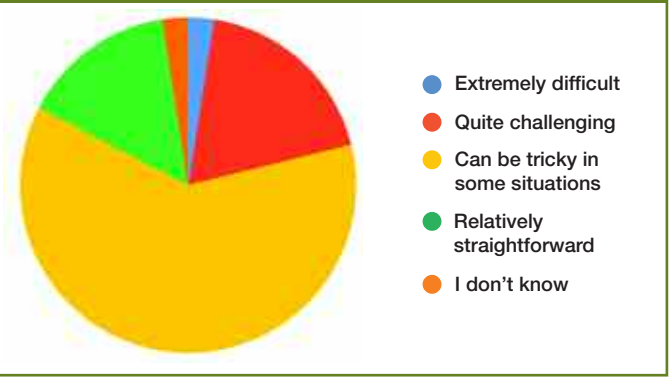
And for fusarium specifically, the majority of growers (38%) said they always look to achieve some suppression at GS32/T1 or GS39/T2 and back up with a robust T3 spray, while 28% said early fusarium pressure is an indication of a heighted fusarium/mycotoxin risk, so they would treat with the most effective active at GS65/T3.

But what's the best approach?

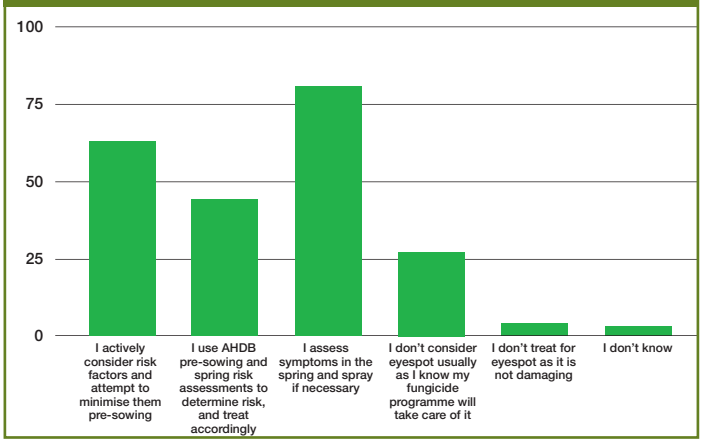
'This season could be particularly interesting," says Patrick. "In previous seasons we've typically needed four fungicide sprays to control a range of diseases from GS30 onwards. But possibly not this spring."

He adds that a T0 may not be required, should early season septoria or yellow rust pressure be light. "Prothioconazole is the best azole against the stem-based complex but others used at GS30 have some activity, and it's an opportunity to apply a specific mildewcide if needed. Stem-based pressure might have been masked by fungicide use in the past."

How challenging is it to identify stem-based diseases?



Which best describes your approach to controlling eyespot?



▸ signs of disease is essential. Of course, as we know, it can be difficult to identify, but it can help with deciding whether low yields due to lodging are potentially a result of disease, or whether it's more of a management issue.

"Where you think it could be a disease issue, my advice is to take the whole basket of risk into account, as quick field examinations can miss vital things. It's all about building an awareness of risk."

With chemical efficacy and availability a difficult area for arable growers across the board, recent years have seen a shift in attitude — looking at the bigger picture around a problem, rather than just heading to the chemical store.

This theory is also important when it comes to tackling stem-based diseases, says Fiona.

The survey revealed 46% of growers actively consider varietal risk to stem-based diseases when it comes to selecting a variety to grow. "Front-loading your risk management is so important for disease control, so opting for varieties with more robust protection will help to give you an extra edge before the seed is even in the ground," notes Fiona.

However, despite growers' desire to select these more robust varieties, they aren't always easily available, she adds. "If we look at septoria for example, varietal resistance is getting much better, but with eyespot, we're not seeing that improvement as much, which provides a bit of conflict for growers.

"If you can't have everything in one variety, the advice from me is to select something that satisfies your main risk. Hopefully we'll see varieties with improved eyespot resistance going forward."

Front-loading risk was a consistent theme throughout the survey, with 37% of growers stating they actively consider risk factors (when it comes to controlling eyespot) and attempt to minimise them pre-sowing.

In contrast, 47% said they take

Eyespot assessment — what's your risk?

Back in 2004, Fiona worked alongside AHDB to create a risk assessment method to identify eyespot within winter wheat crops. While it's now somewhat dated, it remains a useful tool for growers to determine their eyespot risk.

The aim of the project was to develop a risk algorithm allowing growers to accurately determine the need for eyespot treatment in their wheat crop. This was then turned into a scoring-system, with growers able to calculate their risk based on this.

"Base your treatment on your previous experience of the disease, and on the risk assessment which is shown below. Wetter sites with a high preponderance of cereals in the rotation are at greater risk," says Fiona.

The four key stages of calculating risk include:

1. Work out the pre-sowing score — taking into consideration region, soil type, previous cropping, tillage and sowing date.
2. Assess eyespot disease in the spring — at GS31-32, as the % of stems showing visible eyespot symptoms on plants collected at random.
3. Determine final eyespot risk — adding together pre-sowing score and eyespot incidence at GS31-32 to give you a low/medium/high risk assessment.
4. Take action based on the final eye spot risk — Low risk = no action; medium risk = treatment may be justified where eyespot has been a recurring problem, leading to consistent yield reduction; high risk = Treatment may be justified even in fields where eyespot has rarely been known to cause yield damage.

Winner announcement

Congratulations to our winner Keith Norman from Lincs who responded to the *CPM*/Bayer survey on stem-based diseases and has won the fabulous prize of a set of Sonos Smart Speakers.

Keith responded to the survey and completed the tie-breaker question on the smartest way to avoid problems with stem-based diseases. His answer, "a holistic approach — using varietal selection, risk factor analysis, field examination, appropriate fungicide intervention and PGR usage to minimise stem penetration," impressed the judges due to his awareness that it's not a one-size-fits-all answer when it comes to stem-based diseases, as well as the broad range of factors he utilises to minimise risk.

The aim of the survey was to explore the complexities of stem-based diseases. To take part in the next survey, make sure we have the correct details for you by emailing *angus@cpm-magazine.co.uk*

a more reactive approach, assessing symptoms in the spring and spraying if necessary. But Fiona says that the two attitudes aren't mutually exclusive.

"I'm really impressed to see so many people really on board with minimising risk before drilling, where they can. Like with variety choice, this is the mindset you want to be in to keep your chances of susceptibility as low as possible."

Thinking about risk before the seed is in the ground allows growers to reconsider variety choice, restructure the rotational position of crops or even move the sowing date, she adds. "Manipulating sowing dates can be difficult but you can drill in the order of risk."

However, being prepared before sowing doesn't mean you can, or should, take your eye off the ball in the spring, adds Fiona. "The two timings aren't independent of each other. My advice would be to combine the two approaches — do what you can pre-drilling, then reassess the symptoms again in the spring." ■