

# What's the score?

## OSR disease

**It's been almost a year since AHDB first published its new verticillium scoring system on the Recommended List, but what was involved in getting there and how do breeders feel about it? CPM delves deeper. By Melanie Jenkins**

**It's a disease which can often be misidentified, and work undertaken by AHDB, NIAB, ADAS and many plant breeders is helping to not only bring the intricacies of verticillium to growers' attention, but to also put more power into the hands of the grower when it comes to variety selection.**

Verticillium longisporium, commonly referred to as verticillium stem stripe, was



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first confirmed in 2007 in winter oilseed rape in the UK. It typically presents symptoms in crops as they ripen and can be present on stubbles after harvest, explains ADAS' Philip Walker. "Although initially it was only reported sporadically, the disease has spread since 2007 with increasing reports of both new and severe infections. The most severely affected crops tend to be located in eastern England, however symptoms have been reported in other OSR cropping areas such as Lincolnshire, Yorkshire and Herefordshire."

### Persistancy

Verticillium is a soil-borne pathogen which survives as microsclerotia on infected plant debris, says Philip. "Once incorporated into the soil it can persist for more than 10 years. When an OSR crop is planted on infected land, the root exudates of the seedlings stimulate the germination of the verticillium fungus which invades the plants through the root tissue and spreads within the plant's vascular tissues. Typically, symptoms then present close to harvest as yellow or brown vertical stripes on the stem surface, grey or silver discolouration under the stem surface, and visible microsclerotia. When the stem debris breaks down, this returns the microsclerotia and infection back into the soil."

The persistent nature of verticillium makes it difficult to control with rotational practices alone unlikely to be an effective control measure, he warns. "Significant yield losses have been known in periods of high temperatures and drought stress in the run up to harvest. Currently there are no fungicides available with specific label recommendations for the control of verticillium in OSR, therefore interest has been driven on the effect of varietal resistance against the disease."

ADAS has run independent variety screening trials sponsored by breeders

since 2014 – the assessment method developed for these trials showed that varietal differences for verticillium could be easily differentiated, explains Philip. "An AHDB project funded from 2016-18 validated this method and showed that

variety reactions to verticillium were significantly and consistently different enough for them to be included for RL testing."

According to AHDB's Catherine Harries, the AHDB project came about in response to concerns raised by levy payers about the future control of verticillium in the absence of fully effective cultural or fungicidal control.

Subsequently, AHDB's verticillium project tested and validated the assessment method for verticillium during a three-year period and provided the recommendation that the differences seen in varieties response to verticillium was great enough to enable a ratings system to be introduced, says Philip. "The methodology devised involved assessing OSR stems from early July onwards when the symptoms of verticillium are most visible and differences between varieties are easily distinguishable."

According to Catherine, the trial sites selected are judged to have a relatively uniform distribution of the disease, with artificial inoculation used (as appropriate) to help ensure this. Each site

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the usual 1-9 disease ratings could be robustly produced, so for the time being the information is presented in three disease-rating categories: moderately resistant (MR), intermediate (I), and susceptible (S). Those in the MR and S categories are statistically significant from each other — so growers can be fairly sure that if they grow an MR variety this will get less disease than if they grow an S variety.”

This assessment method is now used to define resistance ratings for varieties tested on the RL. The varieties currently on the RL have been included in RL verticillium trials since 2022 and up to 44 varieties have been tested across the three years altogether, explains Phillip. “In each year, there has been one trial conducted by ADAS, two by NIAB and one by NPZ UK Plant Breeding, either on naturally infected land or inoculated trials.

The dataset showed that there's a clear separation between the worst and least affected varieties for verticillium infection, and the relative rankings of the varieties were consistent between sites,” he continues.

### Greater choice

“The introduction of the rating systems gives farmers more options to consider when assessing the influence of verticillium on their land and their selection of which variety to grow. Those with a known history of verticillium infection may want to avoid growing susceptible varieties, equally, varieties with better resistance grown on land affected by verticillium are likely to show lower levels of infection, mitigate against yield losses and reduce the potential return of the disease back into the soil.

“It should be noted that the resistance

features four replicates of each variety to minimise site variation effects.

Trial management is similar to the AHDB's main OSR trial series, except fungicide applications are limited to a single autumn treatment targeted at stem canker. Additionally, plots aren't harvested, as plants are pulled up early as part of the disease assessments. Crops are carefully monitored to determine the optimum assessment timing – too early or too late would potentially underestimate symptom incidence and severity.

In each plot, 30 stems are assessed for external (shredding and black microsclerotia) and internal (grey discolouration, revealed by scraping stems) symptoms, with the percentage of the stem circumference affected recorded. These are then assigned to infection classes, which are then calculated for analysis using a 0-100 index scale for verticillium infection, explains Phillip.

The 0 of the index represents no symptoms on any stem whereas 100 represents all stems severely affected or dead, adds Catherine.

Working with NIAB and ADAS allowed the project to identify consistent and reproducible differences in verticillium infection levels between varieties, says Catherine. Following this, RL trials commenced with a view to producing information in the RL from 2023.

“The initial dataset had a large LSD and our consultant statisticians didn't think



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- ▶ data does not indicate tolerance, as it has been known for some susceptible varieties to yield well even under high disease pressure.”

According to AHDB's Paul Gosling, there's been a positive response to the ratings. "Although there's limited data,

they do give farmers guidance on which varieties to avoid if verticillium is a problem for them and which ones to favour.”

And while breeders are keen to see a 1-9 scale on the RL as soon as possible, this is something AHDB also has aspirations to achieve. "Sourcing more data may

enable us to develop a more precise ratings system such as the 1-9 scale," says Paul. "Getting disease assessments for verticillium in the national Variety List (formerly National List) trials would be a good start, but that's not a decision AHDB can make," he concludes. ■

## Keeping up the conversation

Many OSR breeders have been working to raise awareness around verticillium for numerous years and with the introduction of the scoring system to the RL, their efforts are paying off, but what does this mean to them and what would they like to see next?

RAGT's Lee Bennett points out that verticillium can cause losses of up to 34%, so is a potentially serious disease of which he believes varietal resistance is the only way to deal with it. "While we don't specifically breed for verticillium resistance within our varieties, we've had a number that have performed well against the disease, namely RGT Ceos and RGT Blackmoon.

"Although we're focusing on niche aspects such as sclerotinia, if we have good verticillium resistance in parents of new varieties, then it becomes intrinsic within our wider programme. I can see that the RL score brings new knowledge to farmers, but I'm also aware that many are likely to have other issues that'll be their key focus when selecting an OSR variety."

NPZ UK's Chris Guest, who's been keen to promote conversations about verticillium, feels it's useful that there's now a publicly available scoring system in place. "We perceive verticillium as a very important disease because it's a hidden thief of yield. We're seeing the hotspot areas expanding in the UK, and as drilling practices move earlier and earlier, this is exposing crops to a higher risk of the disease. This is one reason why varietal



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selection is important – the other reason being that there's no chemical spray to overcome it."

While Chris understands that the RL letter score is still in its infancy, he's somewhat cautious about the limited data available so far. "The data can be utilised to benefit or discredit – potentially wrongly – when it's limited. And if incidences occur where scoring isn't done at the correct time, inconsistencies could influence results."

Limagrain's Kurtis Scarboro is in agreement, noting that the data presented this year is very limited and only comes from a small number of trial sites. "For it to become more representative we'd like to see more sites scored for verticillium."

Although Chris does want to see a numerical scale like those used to score other diseases, he understands that the data is new and there are a low number of data points to work with. "Hopefully as more data is collected, this will allow for the introduction of the numerical scale. It's important to know which the susceptible varieties are to help spread risk, and improving verticillium tolerance is a key part of our late season stem health breeding focus which can be seen in varieties such as Murray and Maverick."

One aspect of AHDB's scoring system that RAGT's Lee Bennett is looking for clarity on is whether the trials are only being scored on the clinical level of verticillium in the field, rather than the impact to yield from the disease.

And while Elsoms' Mark Nightingale sees the benefits of the RL scoring system, he highlights that verticillium is notoriously difficult to identify. "It can be quite problematic to get good reliable and repeatable data. And because there are lots of different pathotypes, or races, of verticillium, depending on the type you have in the field this can lead to variations in resistance behaviour.

"We've been looking at verticillium across the UK and Europe in our own trials for about 15 years and what we've seen with our conventional variety Hallmark – which has good verticillium resistance – is that it's a strong variety which performs consistently well across different locations."

Kurtis concurs that verticillium symptoms can sometimes be mistaken for other diseases, so ensuring there's a system in place to guarantee results are being accurately assessed is important.

Mark reaffirms that AHDB is right to be scoring the disease, especially with both changes



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to farming practice and the climate. "The RL now provides a good guide to resistance and with the increasingly changing climate, the introduction of verticillium scores is a really good example of it being adapted to reflect this."

But he also feels it would be beneficial to add verticillium testing to the Variety List testing system in the East/West region. "This would provide two more years of additional data to improve the dataset for recommendations going forward. Giving farmers and growers greater confidence in variety choice if this is an issue in their area of the country."

According to Limagrain's Florentina Petrescu, before verticillium scores were added to the RL, farmers affected by verticillium would approach the firm to ask about how varieties performed against the disease. "We have our own dataset and can advise growers to a certain extent but having access to scores on the RL will make things much easier for them."

Kurtis suggests that although Limagrain and other breeders do their own screening trials, it's important that this is backed up by independent data. "We've seen good results with a number of varieties such as Attica, LG Auckland and LG Academic, so the RL can now help to independently confirm what we're seeing and presenting to growers."

Another aspect all of the breeders agree on is that they'd like to see an update to AHDB's distribution of verticillium incidences map. "We'd like to see an update to this as the data is more than a decade old and there's a lot of discussion that the key areas for the disease could have moved or spread," concludes Chris.



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