

Making the RL live



*from theory
to field*

There's a vast array of data that lies behind the disease ratings on the HGCA Recommended Lists. CPM finds out what's being done to increase access to it and build more value for growers.

By Tom Allen-Stevens

For decades, the HGCA Recommended Lists have formed the basis of variety decisions on disease for UK growers. It's likely the first thing you'd hear about a new wheat variety after its name, group and yield performance is its yellow rust or septoria rating. Once on farm, a variety's disease ratings underpin the season's spraying schedule — you may even feel safe enough with what the RL says about relative disease performance to plan and prioritise programmes around it.

But is the RL worthy of such a high level of trust? "Nationally, there's potentially a huge level of crop loss that depends on good disease management," notes Dr Jenna Watts of HGCA.

"With the potential loss of chemistry and build-up of pathogen resistance, growers are ever more dependent on reliable sources of

information on which to base their decisions. That's why there's considerable resource that goes into the ratings on the RL, and it's easy to underappreciate just how much work is involved."

Even so, the RL is limited in what it can currently deliver. "It's important to bear in mind that RL data is historical — the current season won't be built into the ratings, and it won't tell you about the disease pressure your crops are facing."

Warrior race

And it's not until the system breaks down that it becomes apparent just how much it's relied on — this happened in 2011 when the new Warrior yellow rust race turned disease ratings upside down and exposed a potential Achilles heel.

"Through the standard RL disease monitoring, it's very difficult to pick up these changes. But there was robust monitoring, through the UK Cereal Pathogen Virulence Survey (UKCPVS), for example, that had picked it up. Growers received the information they needed, but it did highlight a requirement for more regular updates."

That's been the basis of some recent initiatives that are adding a live, in-season element to the benchmark RL data. "We're doing our own regular disease monitoring of untreated trials at some RL sites in addition to the work undertaken to compile the RL data. It makes sense to make this information available to growers within

“ Although the RL is robust, you cannot slavishly rely on it. ”

the season," notes Jenna Watts.

And what a season it's been to introduce such a service — by the end of May, septoria for example was threatening to wreak havoc on crops across the UK that generally have a high yield potential, she reports. "Monitoring towards the end of May showed the top leaves were still clear, but heavy symptoms on leaves lower down the crop canopy. There's a very high risk, depending on what the weather does, and still a lot riding on decisions that are taken between now and when the crop senesces."

Such a season may be tricky for growers to manage, but it feeds a valuable array of data into the RL system, according to Dr Simon Oxley of HGCA, who manages the RL and the network of cereal and oilseed trials that lie behind it. "The disease ratings are calculated using 3-5 years data from untreated UK trials. Where we've a large dataset, such as for *Septoria tritici*, or where there's the potential for changes in pathogen race, such as for rusts, data from three seasons are used," he explains.

With 64 winter wheat untreated trials, each given five or six assessments every year, this builds into a very thorough picture of how the varieties perform, he notes. "An important part of this is the data validation. HGCA employs NIAB to validate the



Jenna Watts reckons it's easy to underappreciate just how much work goes into the disease ratings on the Recommended Lists.

analysed data to make sure there are no surprises and to investigate any that are thrown up. Where there's very little disease, that data is valid but not used as part of the calculations as it doesn't highlight varietal differences."

The mean severity over a number of years is calculated for each disease in each variety. Those with the highest and lowest disease severity are used to set fixed points

from which to compare other varieties (see chart on page 14).

"Once current RL varieties have been plotted, candidate varieties can be lined up and given a 1-9 score. You can compare this year's ratings to last year's, and the varieties should line up, but if they don't, you know something's happened and it warrants further investigation."

Resistance breakdown

Disease resistance breakdown as a result of a new rust race is a typical cause. "That's where the UKCPVS helps us validate the data. Where a variety has been resistant in years one and two, but confirmed as susceptible in year three to a new race which has become widespread, we'll discard the earlier data and it'll be the most recent score that's carried forward. As well as replicated, untreated trials, data is drawn from single replicate disease observation plots and inoculated, replicated trials, explains Simon Oxley. "The inoculated trials are particularly valuable when assessing how varieties perform under high disease pressure. Decisions on which isolates to use in the rust trials are made by the UKCPVS to ensure that they're representative of the current UK populations.

When a new race is suspected, the pathogen is bulked up and seedlings inoculated often before it's actually confirmed as such."

This is an important part of the validation, he notes. "In its first year, a new rust race may be identified in some regions, but not all. Before we start changing ratings and including the race in inoculated RL trials, we have to be sure it will become endemic."

So what happened in 2011? "As the Warrior race took hold, the monitoring work correctly identified the change in varietal susceptibility, and this information was disseminated to growers through HGCA Topic Sheets. This ensured we had robust ►

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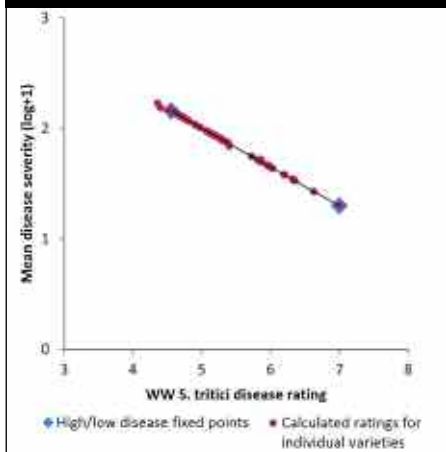


A thorough validation system ensures a robust and reliable set of data, maintains Simon Oxley.

▶ data for current RL varieties, but not for candidates, since at the time, they weren't included in inoculation trials in the UKCPVS, which focusses on new races. That's a change we've made as a result, so growers can be confident the ratings on the current RL and through any Topic Sheet updates are robust."

But the RL system is set up to cater for potential changes in septoria populations, points out Simon Oxley. "All varieties' susceptibility will shift from year to year as pathogen populations evolve, and since the data is relative in any one year, the RL will remain a true picture of a variety's relative susceptibility. It's just worth noting that an effective chemical strategy for a variety with a score of 6 for septoria five years ago may not be as effective as one you'd use these days for a variety with the same score. Fungicide performance against *Septoria tritici* is tested in HGCA Fungicide performance research,

Calculation of RL disease ratings for individual varieties



High and low disease points (blue diamonds) are calculated from the mean disease severity of established RL varieties, then other varieties are plotted (red dots) to work out their rating.

Research round-up

HGCA project 3752, Recommended Lists 2012-2016, encompasses the on-going trials work undertaken to produce the RL. Part of the work is varietal disease resistance which aims to give varieties a disease resistance rating on a scale from 1 (least resistant) to 9 (most resistant). The HGCA Recommended List is managed and co-funded by a project consortium consisting of BSPB, HGCA, MAGB and nabim. Its annual cost to HGCA is £1.26 million.

HGCA project 2140008, HGCA Disease Monitoring Network 2014, runs from April to Sept 2014. It aims to monitor naturally occurring disease on existing winter wheat, winter barley

and winter oilseed rape untreated trial plots in England and Scotland in 2014. Carried out in house by HGCA, its cost is £12,506.

HGCA project 3802, Provision of a weather station network for HGCA Recommended List variety trial field sites, runs from Nov 2012 to Oct 2015. It aims to provide weather data for RL core trial sites, add value to the RL and increase its value as a research tool. Led by Agrii, its cost is £118,218, funded by HGCA.

The HGCA Disease Monitoring platform can be accessed by clicking on the link under Disease Monitoring at www.hgca.com/monitoring.

however, which is updated annually."

The relative importance of all diseases and how they're conveyed through the RL are kept under constant review, he adds. "Light leaf spot in oilseed rape is a good example — the cut-off criteria for the northern list is 6, and a variety with a score below this won't get on. But for the East/West list it's 3 — although that's currently up for discussion."

Standard protocol

Ramularia ratings are now given for spring barley varieties, but not for winter types. "We have to be confident that trials operators aren't only aware of the disease but can assess it to a standard protocol which allows us to build up a robust dataset before we offer ratings."

This is proving a challenge with verticillium wilt, he reports. "It's likely inoculated trials will be the way forward, but we've yet to decide when will be the right time to assess varieties due to the sporadic nature of the disease in a trial."

But one step Simon Oxley is taking is to offer growers greater access to regional data gathered through the RL trials. "It can be important for certain diseases — rhynchosporium behaves differently in Scotland to how it does in the west of England, for example. It should be possible to cluster RL trials on a regional basis, so you can get a clearer understanding of how a variety will perform in your area.

"It won't be as robust as the national data, but it will represent a good comparison with commercial information, for example, and I'm keen to ensure growers make more use of the RL data. We can't make the sun shine, but we can help explain what happens to particular varieties when it doesn't."

And a clearer picture of this is quite literally what another change to the RL trials

is now bringing. Under a new four-year project that started in Nov 2012, a network of weather stations has been set up, feeding back data that can be directly related to disease progression.

"As well as rainfall, temperature, humidity and sunshine levels, we're also monitoring soil moisture and temperature, and leaf wetness — information that's hard to get from standard monitoring stations," notes Dr Paul Gosling of HGCA, who oversees the network.

There are 31 weather stations in total, including one in Northern Ireland. All are at RL trials sites, apart from an additional station at the Cereals event site in Cambs and one in Cornwall. The network is managed by Agrii, with data collected daily and sent back to HGCA.

"It's been a steep learning curve setting

There are 31 weather stations in total, across the UK, at RL trials sites, one at the Cereals event site in Cambs and one in Cornwall.





up the network, ensuring all the stations are in the correct place and that the technology works correctly,” reports Paul Gosling. “We now have one full season’s data and can start to decide how to make best use of it.”

With the website now set up, a review will take place in Sept, and HGCA is looking for feedback from growers on the service itself.

The ultimate aim is to assess disease risk within each season, using modelling work and knowledge of disease progression at the trials sites. “The phoma forecast is a very good example of a useful service this network can provide. Having weather data alongside good, trials-based disease data puts us in a very strong position to bolt on some valuable services.”

Additional assessments

One that’s been bolted on this year is a disease-monitoring service, notes Jenna Watts. Additional assessments of levels of disease have been sent back by trials operators at a sub-set of winter wheat, barley and OSR RL sites, with the information gathered and commentary being made available to growers through the HGCA website (www.hgca.com/monitoring).

“We get the information weekly on a Wednesday, and update the website by Friday. For each site, it gives you the latest on disease progress, according to variety risk group, alongside a summary of the weather data and a brief commentary,” she notes.

This brings growers an accurate in-season picture of how disease is developing that’s directly related to the RL ratings. “It’s also a valuable tool for



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research, and will feed into projects developing new disease-forecasting tools.”

An important part of the project will be to assess the value of this new information drawn from the RL trials, and what further services can be built in, she adds. “A review will take place in Sept, and we’re also looking for feedback from growers on the service itself. Growers already rely on the RL for robust, national data on variety performance, and we’re hoping they’ll shape how the data can be personalised to become more regional and current.” ■

Good interpretation as important as the data itself

In a normal year, Peter Riley of Prime Agriculture would advise his clients not to draw too many conclusions from untreated trials until July.

“That’s not the case this year, however,” he states. “By the start of June the levels of disease we were seeing in untreated crops were very apparent — you can see quite clearly where the differences lie.”

Having reliable, independent and robust data to draw on when making decisions about varieties is crucial, he feels. “That’s what you get with the RL, and there’s sufficient volume of information for you to pick out the strengths and weaknesses of varieties — those differences invariably play out in the field.”

But proper interpretation of the data is equally crucial, he stresses. “In the first instance, we’d assess the suitability of a variety by the farm situation — septoria ratings may be less of a priority for a grower in the East with plenty of sprayer capacity, for example. But where the

sprayer is stretched, and especially with an early sown crop, we’d look for a better disease package.

“The tricky one to judge is yellow rust. We’ve seen how a new rust race can come in, so that what appeared on paper to be a strong resistance clearly wasn’t by the end of the season. Although the RL is robust, it shows you cannot slavishly rely on it, and it’s where the value of a professional advisor to interpret in-season information really pays dividends.”

This is where the new monitoring and reference data coming through from the RL sites will help, he believes. “Real-time information from the trial sites will be very useful — the RL is by its very nature at least a year out of date. But that data must still be interpreted correctly for the individual farm and situation.

“The weather data, and how these relate to disease development in a season, will be particularly valuable — I’m constantly referring back to specific conditions to learn how they’ve



Peter Riley will be using the weather data to learn how disease has developed within a season.

affected the progress of a disease, so having a reliable source of this information will help our understanding of diseases as they develop new challenges for us.”