

Fine-tuning the RL

AHDB

*from theory
to field*

The AHDB Recommended List is part of the fabric of arable farming and is the engine driving many variety decisions. *CPM* takes a look under the bonnet of the RL and finds out how the ‘engine’ is being tuned to deliver varieties with good resilience to growers.

By Lucy de la Pasture

The RL has its fans and its critics but remains a unique reference source for growers, containing a treasure chest of information about the varieties chosen to join its ranks. Even so, the process behind its compilation is evolving to provide even more information to help growers choose the varieties that uniquely suit their own farms.

The trialling process behind the suite of RLs, which are produced for eleven crops, is vast — with no fewer than 800 varieties tested in excess of 42,000 plots in more than 400 trials every year, explains AHDB’s Paul Gosling.

One of the problems the cereal RL has encountered in recent years is the changing dynamics of the wheat yellow rust population, which has led some varieties to succumb to the disease in

the field much more than their resistance rating would suggest they should.

In an attempt to keep up with the shifting pathogen pressure, AHDB overhauled the system for the current edition (RL 2021/22), explains Paul.

“Previously an average of the previous three years’ trials data was used to calculate the rust ratings. The new rating system for yellow rust is more sensitive to pathogen population change, so if a variety becomes more susceptible over the three years, the rating now reflects that.”

But AHDB also recognises that changes happen within a season, so a wheat yellow rust ‘watch list’ has been introduced to highlight varieties which may be susceptible to relatively uncommon pathotypes of yellow rust.

Closer monitoring

“The watch list provides a best guess for the varieties which benefit from closer monitoring. The data coming in from the RL trials takes time to process so the idea behind the watch list is to highlight varieties which may perform differently to their RL ratings to provide an early warning system.”

Wheat brown rust and spring oat mildew ratings have already received a similar make-over but the improvements to rating disease characteristics won’t stop there, says Paul. “We’d like to introduce net blotch ratings for spring barley, if limits to budget can be overcome.”

In oilseed rape, variety ratings for resistance to verticillium wilt will be

introduced for the 2023 RL, provided sufficient data can be generated — as a soil borne disease, it sometimes manifests itself in crops and sometimes doesn’t, which gives an element of uncertainty, he explains.

“An autumn vigour assessment for OSR is also planned. An initial protocol was developed for autumn 2020 but proved challenging for trials operators so only limited data was generated. The protocol will be revised for 2021.

“We’ve also developed a protocol to rate the resilience of OSR varieties to damage caused by the larvae of cabbage stem flea beetle, and this was trialled in the spring of 2020 and 2021. It will help pull the varietal resilience to larval feeding apart,” he says.



The AHDB RL is evolving to evaluate the resilience of varieties to new threats, such as cabbage stem flea beetle larvae, says Paul Gosling.

“There’s an opportunity to use the resilience already present to carry the weight of disease management.”



Lodging ratings will be getting an overhaul to tease out the differences in standing power between varieties which currently have very similar scores on the RL.

Other changes to the RL are being implemented over the next few years, highlights Paul. One of these will be to change the way lodging ratings are calculated in both wheat, barley and oats.

"The idea is to separate out the varieties more than their RL scores currently suggest. Winter barley varieties, in particular, have very similar lodging ratings but we know they perform differently in the field."

Under the current rating assessment it's practically impossible for a variety to be given a 9 (highest score) for lodging resistance. When the system is revised to 'stretch' the difference between varieties, some ratings will go up and others will go down. This will enable growers to more easily identify lodging characteristics that correspond to a variety's field performance, he says.

Another area of interest is the nutrient use efficiency (NUE) of different varieties

and it's a subject that's been discussed at length by the RL wheat committee, says Paul.

"It would be expensive to measure NUE properly and there's a scientific argument that NUE is already reflected in the yields achieved — with higher yielding varieties having more efficient genetics for NUE, but we are keeping an eye on breeding developments."

High input regime

The protocol for the RL trials means the varieties are grown under a relatively high input regime, with everything bar the kitchen sink thrown at them. This doesn't necessarily reflect the way they are grown in the field, so AHDB are starting to look more closely at exploiting genetic potential on farm, adds Don Pendergrast, AHDB's head of Integrated Pest Management (IPM).

The mantra of IPM is becoming central to agriculture, he notes, driven by a move towards more sustainable farming practices, as well as a reduced armoury of chemistry due to regulation and resistant weeds, pests and diseases.

"There's good variety development around disease resistance and the genetics are fairly well understood. That means there's an opportunity to use the resilience already present to carry the weight of disease management," he believes.

"Generally the genetic potential of varieties isn't fully utilised in the field as fungicide programmes tend to be



Yellow rust presents a particular challenge to the RL because of its diverse and dynamic population.

designed in response to disease pressure and don't always fully take into account the genetic potential of the variety."

As a result there's an AHDB focus to reduce the intensity of fungicide use in programmes, with septoria management at the heart of work to improve the exploitation of varietal resistance on farms.

"The idea is to promote on-farm trials to generate discussions between agronomists and farmers about how to make the change to a more sustainable, less risk-averse approach to applying fungicides."

Making decisions based on data generated either on the farm, or locally on the same soil type, has become popular in recent years because of the insight it gives growers. Later this year, AHDB will ►

Maximise margins not yield

Scottish grower Will Hamilton and daughter Annabel farm 970ha on the Berwickshire coast and like many fellow farmers, they're evaluating varieties by the full agronomic package on offer, rather than on yield alone.

"Disease resistance has become an important driver of variety decisions and provides an opportunity to cut back on fungicide costs. Varieties in RL trials receive a comprehensive input programme and I'd been seeing fungicide use on the farm getting far closer to the level used in the RL trials than I'd have liked. The newer varieties with better disease resistance are allowing us to reverse that trend," he says.

Will says it's important the RL bears in mind what it is that growers are actually looking for in varieties. Maximising margins by reducing inputs and using more integrated management approaches is the direction of travel for the industry for conventional and regenerative farmers alike. In his role as chair of the RL wheat

committee, Will says the RL has to reflect this change in attitudes.

"One of the things being discussed is the effect of different tillage systems on variety performance. This is something we're going to look at, but the budget is already tight. That's led to dropping some of the RL activities which weren't generating useful data — such as monitoring for *Septoria nodorum*."

Disease resistance ratings are central to the RL, but the nature of some pathogens is presenting problems, with yellow rust the prime example. "The yellow rust population is so diverse and dynamic that it makes keeping up with changes in varietal susceptibility difficult. There's been really positive feedback on the new rating system and 'watch list', which are examples of how the RL is being modified to be of maximum use to growers."

Sitting both sides of the fence, Will can see the value in setting up an AHDB on-farm trials network



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to get more insight into local varietal performance. "I find the trials on my own farm fascinating, but I've also seen big differences in varieties in trials just a couple of miles apart. You have to be careful not to read too much into limited data and this is where national trials data can provide a solid platform to refer to," he concludes.



Trials in the LiveWheat Project have highlighted differences in varieties when it comes to their ability to suppress weeds.

► launch a practical on-farm trial protocol which aims to help growers investigate fungicide programmes on their farms, explains Don.

"The protocol will help growers with trial lay-out so that the results obtained are the most effective. It will also help growers interpret their own data. Essentially it's citizen science to encourage the best use of on-farm generated results.

"We'll offer two different approaches. One will be to become part of a network of farm trials with partnership and direct engagement with AHDB — all adopting the same protocol so that different concepts to help reduce fungicide inputs can be tested, such as leaving out the T0," he explains. "The second way of working will be for growers who don't wish to collaborate as part of a network but can still use the trials protocol in their own bespoke farm trials."

Don sees the initiative as a way of evaluating the potential for change and empower growers to evaluate different fungicide strategies, matching them to genetics at a very local level. He believes this will be a way of giving growers and agronomists more confidence to reduce inputs, where appropriate, and provide a platform to discuss results.

Further help with distinguishing the varieties likely to excel under lower input regimes comes in the form of the 'LiveWheat' project, a collective experiment using field-scale varieties on commercial farms, run by the Organic Research Centre (ORC). This has generated results that could potentially complement the RL.

The work, led by Dr Ambrogio (Ambro) Costanzo of ORC, will develop the network of farms and researchers further. It currently

involves 15 organic/low-input farms and generates datasets that describe the field performance of winter wheat varieties. It will include a special emphasis on weed abundance and community composition, disease symptoms, and key yield and quality components.

In cooperation with AHDB, datasets will be analysed and compared with external data sources, including climatic and environmental data. Use of standardised protocols for the on-farm trials, including the use of carefully selected control varieties, will allow for direct comparison with RL trial data.

LiveWheat Project

"The LiveWheat project is now in its second season but builds on work carried out in the EU H2020 LIVESEED project, which was initiated in the 2017-2018 season," says Ambro. "The first season for LiveWheat was a challenging one because of the weather in 2019-2020 but we obtained results from thirteen winter wheat varieties, tested across a network of eight farms."

The research to date has highlighted the potential benefits offered by the genetics of historic varieties, such as Maris Widgeon — particularly where it comes to competitiveness with weeds and yield advantage, he explains.

"In the trials we're also seeing the potential of some modern varieties to suppress weeds because of their vigour and ground coverage in early spring."

Ambro points out that the trials to date have been subject to some extreme weather conditions — with the heat and drought in summer 2018, and the wet autumn followed by spring drought in 2019-2020. The cold, dry start to 2021, followed by the coldest, wettest May since records began has added to the extremes experienced.



Plans are afoot to rate the resilience of OSR varieties to damage caused by the larvae of cabbage stem flea beetle.

"We have data from four very different seasons, so we'll be able to interrogate the data to look at the possible effects of climate change possibilities on the resilience of varieties over the longer term," he adds.

Importantly, the results to date highlight the effect of management strategies as well as the effects of genetics and environment, revealing that the 'farmer factor' is just as important as these other factors in a low input or organic system. ■



AHDB will launch a fungicide trials protocol later this year to help farmers network and evaluate fungicide programmes on their own farms.

Research roundup

From Theory to Field is part of AHDB's delivery of knowledge exchange on grower-funded research projects. CPM would like to thank AHDB for its support and in providing privileged access to staff and others involved in helping put these articles together.

For further information:

AHDB Project No 21130028 'AHDB Cereals & Oilseeds Recommended Lists' runs from April 2021 to March 2026 at a cost of £8,282,000 to AHDB, total project value £22,229,529. The project consortium is:

AHDB, British Society of Plant Breeders (BSPB), Maltsters' Association of Great Britain (MAGB) and UK Flour Millers (UKFM).

AHDB Project No P1907309 'Farm-based organic wheat variety trials network (LiveWheat)' runs from January 2020 to December 2021 at a cost to AHDB of £63,125 (in-kind), £228,125 with funding from Defra. The project is led by Organic Research Centre, with industry partners UK Centre for Ecology & Hydrology (UKCEH) and Met Office.