



Sustainable Solutions

Above and beyond

Dependability and marketability are probably some of the most desirable characteristics in a variety. CPM finds out about a system that goes above and beyond the AHDB Recommended List to help identify the most reliable performers.

By Lucy de la Pasture

Growing crops is a risky business at the best of times. Making the right variety choices lies at the heart of managing a host of potential liabilities — from the weather, diseases, grassweeds and the market itself.

The AHDB Recommended List has long been the guide to varietal characteristics and provides valuable information when it comes to choosing a variety to suit different situations and markets. But in spite of the hoops varieties have to go through to be selected onto the RL, some candidate varieties get overlooked due to blips in their performance, whereas others excel in RL trials but bomb for various reasons as a commercial crop.

Those varieties which remain growers' favourites have achieved that status through reliable performance year-on-year, with respectable yields and grain quality that assures a readily marketable crop. But how can you pick out new varieties which will prove to have longevity and versatility before the market has gained enough experience to draw its own conclusions?

Agrii asked itself that very question. Building on the advisory list it's been compiling for many years, the company developed metrics around variety sustainability in 2020 to find the answer, explains Agrii's John Miles.

"We asked what would constitute a sustainable variety with longevity and wide market appeal and then used these characteristics from its own extensive network of national and regional trials to develop a Variety Sustainability Rating (VSR) to differentiate varieties. It's not intended to be a replacement for the RL, it complements it."

Variety choices

The cereal VSR is based on 11 key characteristics which include resistance to the three main foliar diseases, lodging resistance (treated and untreated), yield resilience under high disease pressure, yield consistency, grassweed competitiveness, orange wheat blossom midge resistance, specific weight and latest optimum sowing date.

One of the challenges growers face when making variety decisions is the number of varieties available, says John. "The VSR helps signpost varieties that will be dependable in any given situation. Variety choice isn't something that should be oversimplified because farming businesses are so diverse — large and small farms, multiple businesses where arable is just a part, livestock, proximity to market intakes and associated haulage costs. All of these affect attitudes to risk and therefore variety choice."

The VSR captures the very best genetic material, but this is also reflected by the market. "Some varieties, such as Skyfall,

“We’ve evolved the scoring to be more critical of lower ratings, introducing a minus figure to penalise weaknesses that could lead to increased production costs and higher risk.”

have remained popular for a number of years. These are good allrounders that the market promotes and supplies," he explains.

"A more recent variety with a high VSR is KWS Dawsum and its potential has already been captured by the market. In contrast,



John Miles explains that they asked what would constitute a sustainable variety with longevity and wide market appeal and then used these characteristics to develop a Variety Sustainability Rating (VSR) to differentiate varieties.

RGT Bairstow also rates highly for VSR but hasn't had the same market impact which it should do."

The VSR may also capture genetically strong varieties which failed to make RL selection so has fallen outside of the system, explains John.

"One of these is Fitzroy, a hard Group 4 winter wheat bred by Secobra, which just missed going into RL trials but has strong genetics (Evolution x Stigg). The Stigg parentage brings good disease resistance traits and Evolution brings a good growth habit.

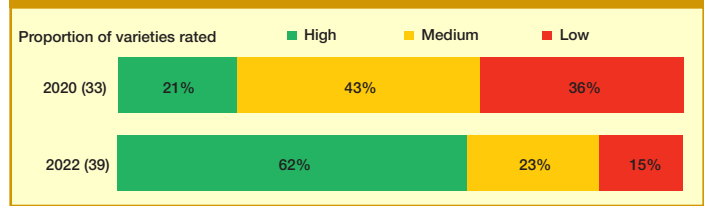
"Another example is LG Tapestry which was an RL candidate that wasn't selected. Yet it has market versatility (feed and distilling potential), yields well and has strong disease

resistance traits with OWBM resistance. Both of these varieties have a high VSR," explains John.

The higher the VSR, the better the blend of disease resistance but Agrii trials also measure resilience under disease pressure, which gives a better indication of the interaction of diseases that commercial crops will experience.

Another key trait is lodging. "There's nothing that ruins a grower/agronomist relationship like flat crops," he quips. "The dry springs we've experienced of late reduce lodging risk, so some of the newer varieties on the RL will be more suited to dry springs as they haven't really been tested for lodging risk. However, Agrii trials take place at sites where lodging risk is maintained and this feeds into its rating."

Winter wheat VSR progression



Source: Agrii, 2023

VSR also takes into account specific weight, an important metric because the specific weight achieved in farm trials is generally lower than those recorded on the RL, notes John. "Some varieties have a very low safety margin, a point proven recently by Theodore."

Agrii also conducts trials with and without herbicide to assess grassweed suppression and yield. Sowing date is also

assessed and as a result of these metrics, Agrii has utilised Skyfall in the East to help combat blackgrass and maximise the opportunity for late drilling.

Since 2020, when the VSR system was first introduced, the proportion of varieties that fall into the high, medium and low categories has already shifted, reflecting the 'cleaner' genetic material breeders are bringing to market and grower demand for ▶

There's merit in agronomic merit

It's not just cereal varieties that have received a sustainability rating, oilseed rape has had a similar review. Agrii's David Leaper highlights the AHDB process whereby varieties are assessed for their 'agronomic merit' and this metric is used within the various selection committees to help them find the strongest varieties to promote to the RL.

"A high agronomic merit suggests a variety with better agronomic

characteristics because factors such as disease resistance and lodging have been taken into account. We saw merit in this approach for OSR and have added other useful variety traits and characteristics to develop our VSR."

Ever since cabbage stem flea beetle's impact on OSR became devastating, there have been calls for AHDB to introduce a vigour rating to the RL but this has proved difficult. Even though breeders measure vigour, they adopt different criteria to do so, explains David.

So Agrii has taken the bull by the horns and now conducts its own autumn and spring vigour assessments for its replicated trials, scoring varieties from 1-9, which ultimately feed into the VSR.

"In years where growing conditions are good in the autumn, we see less of a demarcation between varieties and there's a bigger difference when conditions are adverse. In late drilling slots, the most vigorous varieties are the best choice," he says.

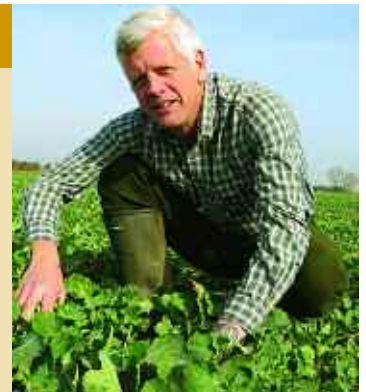
In spring, David says vigour differences are much more visible and it's the faster growing varieties, that are best able to mitigate the

effects of CSFB larvae, such as the hybrids Hanneli, Ambassador and DK Exsteel, as well as conventional variety Aardvark.

Other characteristics are also given a weighting that influences the VSR and these include stem health, with verticillium (also known as stem stripe) one of the key diseases affecting this. Traits such as turnip yellows virus resistance are also given a slight weighting and a simple addition of the 'points' awarded to a variety across the whole range of characteristics and traits provides its VSR, which is banded into high, medium and low categories, explains David.

The vagaries of growing OSR are well known and it's one of the reasons VSR can provide a useful guide to variety selection, he adds. "Yield isn't the driver when looking at OSR varieties, even though it's still the key criteria in the official RL system where a variety has to outperform a comparator variety by 2% for automatic consideration for the RL.

"The trauma of CSFB over a prolonged period has changed the way OSR is now grown, we're now adopting broader rotations, sowing



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earlier, taking 'holidays' from OSR in the rotation, and we've changed practices," says David.

"What growers need on farm is consistency and performance with characteristics that can offset the risk of CSFB damage. That means varieties that will establish in a difficult autumn or when sown late, as well as having good resistance to lodging and disease."

Summing up, David believes the VSR provides a helpful guide that aims to add to the information available on the RL to help confront some of the big challenges facing OSR growers.



One of the diseases the oilseed rape VSR takes into account is verticillium, which can affect late season stem health and yields.

▶ disease resistant varieties, says John. As a result, many more varieties are falling into the high VSR category.

"In 2020, only 21% of the 33 varieties rated obtained a high VSR, with 36% in the low category. By 2022, 62% of the 39 varieties rated were in the high VSR bracket with just 15% scoring poorly."

That provided a new challenge, so the VSR rating system was pulled apart to provide even more differentiation between the highly rated varieties, explains John. "We wanted to be able to address problems like Skyfall, which scores highly on important metrics but if it's a bad yellow rust season and crops require additional fungicides then you have to question its sustainability."

The same applies to varieties

which have very good septoria resistance, he adds. "If good septoria resistance comes with a susceptibility to brown rust or lodging, then perhaps it's not as sustainable as the VSR indicates. We didn't want one score swaying the overall VSR rating, so we've revised the metrics."

New rating system

Under the new rating system, a 'very high' VSR category has been introduced to differentiate the 'best of the best'. "We've evolved the scoring to be more critical of lower ratings, introducing a minus figure to penalise weaknesses that could lead to increased production costs and higher risk when growing a variety."

As a result, Skyfall has dropped its rating — its weakness being penalised in spite of all of the varieties

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With input prices still high but grain and oilseed prices well below the level reached in 2022, there's little doubt that the stakes are rising in 2023. That means making decisions on the farm which maximise profitability have never been more important.

In this new series, CPM has teamed up with Agrii's Green Horizons initiative to explore ways in which farm-focused research is helping to raise both economic and environmental sustainability.

Better informed variety choice is just one part of this

initiative's practical programme of action, which includes charting paths to net zero, maximising soil health and evaluating crop protection alternatives as well as all-round farm efficiency improvement.

Up-to-date information on all these areas is available from www.agrii.co.uk/greenhorizons

benefits, says John. "KWS Extase has maintained its high VSR, but KWS Palladium has moved up to a 'very high' VSR. Of the Group 3 wheats, Tapestry has been promoted to 'very high'. KWS Dawsum and LG Typhoon achieve very high

VSRs in Group 4, with Fitzroy maintaining its high rating.

The same rating process is applied to winter barley where Belfry and SY Armadillo lead with 'very high' ratings and SY Kingsbarn drops to the medium category, adds John. ■

Tussock trials give early warning

When it comes to yellow rust, good surveillance along with appropriate management is the name of the game. Since 2014, Agrii has tracked yellow rust (*Puccinia striiformis*) development in untreated tussock plots, comprising more than 30 current and indicator wheat varieties at 14 locations across the UK.

Over this time, the work has provided growers with invaluable early warnings of changes in yellow rust virulence on particular genetics, allowing them to reduce their growing risks through both variety choice and management, according to cereal pathologist Dr Rosemary Bayles.

"Varieties that have been highly resistant but then succumb to changes in the continually-evolving yellow rust population are the highest risk. Especially so, if we don't keep a close enough eye on the changing pathogen-host interactions and grow too large an area of genetically similar varieties in reasonably close proximity."

Agrii's tussock trial monitoring provides a practical picture of the way the disease is actually

developing and has picked up major changes in virulence on Hereford and Cougar in recent years.

Varieties with Hereford parentage, such as Gleam and Shabras, only started showing significant issues with yellow rust from 2020. The first suggestion of a problem became apparent in Hereford and Shabras tussocks in 2017, building-up sufficiently in 2018 and 2019 for the programme to give growers a timely warning to take extra care with related varieties.

In the same way, issues with Cougar were first identified in the tussocks in 2020 which led to warnings over varieties like LG Astronomer and Illuminate, Merit and RGT Bairstow and Stokes, now recognised as moderately susceptible.

"My biggest concern at the moment is the large area of UK wheat with Timaru genetics. Our monitoring of Costello, KWS Siskin and, more recently, KWS Parkin has shown little, if any, virulence here up to 2019.

"From 2020, we started to detect what could be the first signs of

change. While this has only been at a meaningful level (10%+) in one variety at one site and in one season so far, it does indicate some virulence to the genetics," she says.

"This and the fact that a few sites have shown levels of 5% or more on Siskin means we're keeping a close eye on things in both our tussock trials and the untreated plots in the larger-scale Agrii variety trials."

From this surveillance work, Agrii

puts together a diversification chart each year to help agronomists and their growers choose combinations of varieties with the least risk of yellow rust spread between them.

Rather than by specific resistance genes, varieties are grouped by common ancestry through their pedigrees on the one hand and by the latest virulence of the yellow rust population towards them on the other.

Yellow rust diversification chart

Pathology group	Pedigree group					
	A: Hereford	B: Timaru	E: Cassius	F: Revelation	K: Cougar	O: Other
1: Very little virulence	*****	*****	*****		*****	*****
	*****	*****			*****	*****
	*****	*****				*****
	*****	*****				*****
	*****	*****				*****
	*****	*****				*****
2: Some virulence			*****	*****	*****	*****
			*****	*****	*****	*****
			*****	*****	*****	*****
					*****	*****
					*****	*****
					*****	*****
3: Widespread virulence	*****					*****
	*****					*****
	*****					*****

Varieties in the same Groups (A-K) have a common parent in their ancestry, so may well depend on a similar source of resistance. Varieties in Group O have various pedigrees, so their sources of resistance may well be different from each other as well as from varieties in Groups A-K. Source: Agrii, 2023