



# Disease fight begins with seed

Knowing a variety's resistance profile can help strengthen defences against disease



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Plant breeding has had a profound effect on the performance of cereal crops grown today. According to NIAB, 90% of the wheat yield increase from 1982 to 2008 has come as a result of how the crop's gene pool has been tweaked. With these advances in yield, it comes as no surprise that there is some divergence in disease resistance on the HGCA Recommended List.

With increasing legislation and environmental concerns around pesticides, and with fewer active ingredients to choose from, it is likely disease resistance will become more of a priority for breeders in future. Certainly gene-marker technology should help this, without the cost in terms of yield often associated with current technology.

In the meantime, there is scope to use varieties to adjust fungicide programmes. But the science is

not straightforward – disease is a moving target as it can adapt to varietal resistance. Understanding some of the parameters can help growers stay one step ahead.

## How do varieties acquire resistance to disease?

★ This is down to the genes of a particular variety. But it may have multi-gene or single-gene resistance. Multi-gene resistance tends to give a variety non-race specific resistance to a range of fungal diseases.

Single gene resistance, particularly single major genes, tends to give race-specific resistance – for example, to a race of yellow rust. This is significant because a variety with an apparently high rust rating can be susceptible if a new race overcomes that single gene resistance. This is what happened with a number of varieties in recent years, such as Oakley and Solstice.

And you cannot predict a variety's resistance rating by studying its parentage – Stigg has the highest resistance on the Recommended List for Septoria tritici, but one parent is Tanker, a relatively weak variety.



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## In what situations will variety make a significant difference?

★ The best way to use varieties to your own advantage is to plant those that are resistant to the greatest disease threats in your region.

Brown rust is a greater risk in the East and South, for example. Septoria is favoured by mild, wet conditions in the West. Mildew is a problem on fertile, organic soils of the Fens (see table, below right).

## How do you take account of yellow rust?

★ Since varietal resistance is race-specific, an epidemic year can tear strips off some varieties, but leave others unscathed. You cannot predict which race will cause the epidemic, so therefore which variety is most susceptible. The damage can also be quite severe – the impact of race changes hit several popular varieties in 2009.

To reduce the risk of rust damage, you can plant varieties with a high Recommended List rating. But this is only part of the story as it may leave large crop areas susceptible to the same race. So it makes sense to reduce the risk further by planting varieties with susceptibility to different races. This is the aim of the yellow rust diversification scheme – a guide as to whether one variety grown next to another will encourage the spread of the disease.

Oakley grown near Solstice is very high risk, for example, since they are both susceptible to the same race. But Oakley and Alchemy are a low risk combination. Details can be found at [www.niab.com](http://www.niab.com).

## Golden rules

- ★ Select varieties with a high degree of resistance to diseases prevalent in your area
- ★ Monitor crops regularly for disease
- ★ Avoid large areas of susceptible varieties, for yellow rust in particular

worth finding out which matures earlier and prioritising your spray programme accordingly.

Some varieties go through growth stages quite quickly. So the ideal timing on a variety such as Cordiale can easily be missed. Again it's worth focusing your strategy to prioritise those with a narrow window.

## How do you plan your spray strategy to optimise varietal resistance?

★ The first step is to be careful with your choice of varieties. Try to go for those with high resistance ratings, and bear yellow rust diversification in mind. It is then a case of knowing where your weaknesses lie, so you can tweak your strategy according to the disease pressure you get. Other factors will also have a bearing on the risk of a disease developing (see table, bottom).

## Test your knowledge

★ Turn to page 19 or go to [www.fwi.co.uk/springfungicides](http://www.fwi.co.uk/springfungicides)

## EXAMPLES OF VARYING FUNGICIDE RESPONSE (HGCA RECOMMENDED LIST 2011-12)

		Untreated yield		Treated yield		Difference	Response to treatment
		%*	t/ha	%*	t/ha	t/ha	
Group 1	Gallant	80.8	8.56	99.6	10.56	1.99	Higher
	Solstice	78.5	8.32	96.7	10.25	1.93	Lower
Group 2	Sterling	82.3	8.72	101.8	10.79	2.07	Higher
	Panorama	87.5	9.28	101.7	10.78	1.51	Lower
Group 3	Robigus	73.9	7.83	100.8	10.68	2.85	Higher
	Warrior	92.2	9.77	100.4	10.64	0.87	Lower
Group 4 soft	Beluga	83.5	8.85	104.3	11.06	2.20	Higher
	Denman	89.5	9.49	103.5	10.97	1.48	Lower
Group 4 hard	KWS Santiago	85.3	9.04	107.5	11.40	2.35	Higher
	Stigg	96.8	10.26	101.4	10.75	0.49	Lower

\* Percentage of treated control (10.6t/ha)

NB HGCA Recommended list fungicide programme considerably more intensive than commercial programmes

## Yellow rust is particularly good at breaking down varietal resistance.

## How does fungicide timing affect different varieties?

★ How a variety progresses through growth stages can make a difference to its disease burden.

One variety may have reached the ideal timing for T2 a long way in front of another. So it's

## DISEASE THREATS BY REGION

	Moderate Risk	High Risk	Low Risk
Septoria tritici	East – but some hot spots	Wetter West Country	
Yellow rust	West	East – particularly fertile coastal areas	
Brown rust	Midlands	South and East	North of the Humber
Mildew	All regions	High N soils, (for example, Fens)	

## RISK OF DISEASE DEVELOPING

Factor	Risk	Impact	
		Higher	Lower
Early sowing	Eyespot	Solstice	Grafton
Early sown/high N	Septoria tritici	Cordiale	Warrior
High yellow rust area	Yellow rust	Oakley	J B Diego
Late sowing	Mildew	Conqueror	Ketchum

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