Yellow rust in wheat

**Latest information**

- Information on the seedling and adult plant resistance for current Recommended List winter wheat varieties is available online: [www.hgca.com/ukcpvsex](http://www.hgca.com/ukcpvsex)
- Azoles, SDHI, strobilurin and morpholine fungicides are all effective at protecting crops from yellow rust and are best used in mixture

**Action**

- Monitor all crops regularly for rust symptoms, focusing on early sown crops in high-risk regions
- Use resistant varieties to reduce disease pressure in a conducive year
- Grow resistant varieties alongside susceptible varieties to limit the spread of disease
- Protect high-risk crops early and maintain protection throughout the season

**Importance**

Yellow rust can reduce wheat yields by 50% in untreated crops. These losses can be prevented using a combination of varietal resistance and fungicides.

The repeated appearance of new yellow rust races continues to challenge varietal resistance, emphasising the importance of the balance between varieties and fungicides in managing the disease.

**High-risk situations**

**Coastal regions** stretching from Essex up to Fife are most at risk of yellow rust, with early sown crops in the region around the Wash being most likely to develop the first early disease outbreaks.

Other areas of the UK have a moderate risk of disease, particularly around estuaries or rivers where the humid microclimate suits the yellow rust fungus. Very susceptible varieties can be at risk outside these areas.

**Early sown crops** are at greater risk, as fungal spores spread from the previous year’s affected crops and from volunteers in late summer. Mild winters will increase the risk of the disease overwintering, leading to high infection in the spring.

**Cool, damp conditions** are conducive to the development of the disease. Hot, dry spells in the summer are likely to limit yellow rust development but such conditions may increase the risk of brown rust.

**Monitoring**

Monitor crops regularly for discrete yellow lesions on leaves. Yellow rust and brown rust can be difficult to differentiate in the winter. In the spring, symptoms commonly occur in lines on the leaf and lesions are typically yellow in colour.

New yellow rust races can appear so check all varieties for yellow rust lesions, even those with high resistance ratings.

**Vrietal resistance**

Vrietal resistance should be considered as a useful option in limiting the incidence and spread of yellow rust as part of an integrated approach.

Resistance can be measured at the seedling stages (up to stem elongation) and also at the adult plant stages. Both of these measures can give useful information. For example, a variety can be susceptible at the seedling stage but resistant at the adult plant stage and knowledge of this can help to allay fears when yellow rust is seen in the autumn.

The HGCA Recommended List provides information only on the resistance of adult plants, as this is the most important stage for growers. Information on the seedling and adult plant resistances of current varieties to the most recent races of yellow rust is available on the HGCA website and updated annually by the UK Cereal Pathogen Virulence Survey: [www.hgca.com/ukcpvsex](http://www.hgca.com/ukcpvsex)

Using all of this information, combined with regular monitoring in the field, will help to keep growers ahead of possible race changes.
Races of yellow rust

The term ‘race’ describes the ability of a disease isolate to cause disease on particular varieties. This is determined by the interactions between plant resistance genes and the isolate.

Where a recognition event occurs, the plant defence mechanisms are activated to prevent disease development. When pressure is placed upon a disease population, e.g. through over-reliance on a single resistance gene, changes may occur within the disease population. These changes can mean that disease isolates are no longer recognised by the plant resistance gene and disease develops.

New races may also arrive into an area through weather patterns, travel or trade. New races of yellow rust are typically named after the previously resistant variety upon which they were first identified.

Diversification groups

Information on variety diversification can help determine the risk of spread so preventative treatments can be prioritised in high disease pressure situations.

For almost 40 years, the UKCPVS has produced diversification tables to help growers limit the risk of the spread of yellow rust between varieties.

Varieties have historically been grouped according to their underlying resistance genes, with the aim of encouraging use of varieties with a diverse mixture of resistance genes. This meant that, should one resistance gene be overcome during a season, the spread of yellow rust would be limited.

The methods used to determine diversification groups worked well in the past as the pathogen population changed in a stepwise manner. Using the UKCPVS data it was possible to group varieties according to the reaction to different rust isolates collected in the previous year.

Since 2011, however, with the incursion of the Warrior race this grouping has become more difficult. The Warrior race is much more diverse than the older UK races and this diversity means that the varieties all react in slightly different ways, making it difficult to group them.

For this reason, diversification grouping is currently not possible. However, susceptible varieties should be grown alongside more resistant varieties to limit the spread of the disease.

The UKCPVS will continue to look at the reaction of adult plants in the field and produce diversification tables in the future, where possible.

Fungicides

Azole fungicides provide effective protection, including many older azoles (e.g. tebuconazole, cyproconazole, epoxiconazole, prothioconazole, metconazole).

The Succinate Dehydrogenase Inhibitor (SDHI) fungicides (e.g. bixafen in Aviator Xpro, isopyrazam in Seguris and fluxapyroxad in Adexar) are also effective and most strobilurin fungicides continue to remain effective (e.g. pyraclostrobin, picoxystrobin, azoxystrobin).

For short term knock-down, the morpholine fungicides (e.g. fenpropidin, spirioxamine, fenpropimorph) have good activity when used in a fungicide mixture.

UK Cereal Pathogen Virulence Survey (UKCPVS)

In order to alert growers as soon as possible to changes in varietal resistance, HGCA co-funds the UKCPVS.

Samples of yellow rust are sent in throughout the season by growers, agronomists and trial operators to build a picture of current races of yellow rust that are established in the UK.

Samples from resistant varieties are particularly interesting and can indicate a race change. The survey will examine these samples closely, and if confirmed, alert growers as soon as possible.

Further information

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G58: Wheat disease management guide (HGCA, updated annually)

G49: Cereal growth stages – a guide for crop treatments (HGCA, 2009)

UK Cereal Pathogen Virulence Survey (funded by HGCA and Fera)

G41: The encyclopaedia of cereal diseases (HGCA/BASF, 2008)

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