

# BARLEY POWDERY MILDEW FACT SHEET

## SOUTHERN REGION

### POWDERY MILDEW IN BARLEY AND WHEAT

Powdery mildew is currently under effective control in the southern region when treated seed/fertiliser is used and resistant cultivars are grown. However, care is needed to maintain this situation to minimise the risk of the pathogen developing into a damaging threat to the industry.

#### KEY POINTS

- ▶ Powdery mildew is a windborne fungal disease that survives between seasons on stubble, plant residues and volunteers.
- ▶ The best means for controlling powdery mildew is by avoiding more susceptible wheat and barley varieties.
- ▶ All barley crops other than those rated Resistant (R) should be treated with a fungicide at seeding.
- ▶ If powdery mildew is allowed to develop in crops, there is a serious risk of fungicide resistance developing as well as loss of resistance in current and future varieties.
- ▶ Using different chemistries reduces the risk of resistance developing. If powdery mildew is detected in crops, use a QoI/DMI (strob/triazole) mix for the first foliar spray. If a second spray is required, use a DMI (triazole).



PHOTO: RYAN FOWLER, QUEENSLAND DAFF

*Barley powdery mildew infections appear as white fluffy patches on the leaf surface. These colonies produce windborne spores that spread the disease during the growing season. Infection can spread rapidly from early tillering.*

#### Disease life cycle

Barley powdery mildew is a fungal disease caused by *Blumeria graminis* f.sp. *hordei* and is specific to barley and barley grass.

Wheat powdery mildew is caused by *Blumeria graminis* f.sp. *tritici*.

Infections appear as white fluffy patches on the surface of leaves, leaf sheaths, glumes and awns. These colonies produce windborne spores that spread the disease during the growing season.

Mildew that survives over summer on stubble releases new spores under cool, wet conditions during autumn to infect the new crop. The disease can increase rapidly from early tillering.

The fungus consumes carbohydrates needed by the plant for grain filling.

Severe early infections of susceptible varieties can result in costly yield losses and quality downgrades from tiller abortion, reduced grain size and crop lodging through weakened stems.

#### Disease conditions

Most infection occurs during early crop growth in autumn and winter. The disease tends to diminish as temperatures rise and humidity declines.

Powdery mildew epidemics are favoured by the following factors:

- ▶ infection in the previous season's barley or wheat crop and the fungus carrying over on stubble (note this is only a risk in wheat-on-wheat or barley-on-barley situations);



*A powdery mildew infection showing the black fruiting bodies, cleistothecia, that allow the disease to survive on stubbles.*

## Choose the best variety

The best way to minimise losses and slow or prevent the development of fungicide resistance is to plant the more-resistant varieties and thereby minimise the need for foliar sprays.

However, the pathogen is capable of evolving and overcoming the resistance of some varieties.

This is more likely to occur if the disease is not controlled, as higher populations of the fungus will result in more mutations, leading to loss of resistance.

The barley varieties Grange<sup>®</sup>, Henley and Westminster<sup>®</sup> carry the *Mlo* resistance gene and are likely to maintain durable resistance.

Varieties with other resistance genes are more vulnerable.

## Monitor the crop

Crops of susceptible varieties should be monitored for powdery mildew when conditions for infection are favourable.

Early protective fungicide sprays are much more effective at controlling the disease than sprays that seek to eliminate or reduce existing infections.

This is particularly the case where mildew occurs on the leaf sheaths around the lower stems or low in a thick crop canopy.

Mildew in the head can be very damaging and can only be effectively treated if it is controlled in the crop canopy beforehand.

If the disease is detected in the early stages, treat to protect the upper leaves and reduce head infection.

In later stages, consider the individual crop and its circumstances including growth stage, potential yield, level of infection and weather when deciding whether to treat.

## Fungicides and treatment of crops

Yield losses can be significant if an early infection is not properly brought under control.

Fungicides are more efficient as protectants than eradicants, so apply them before the disease becomes established.

All barley crops, except varieties that are rated Resistant (R), should be treated with a fungicide at seeding.

This prevents epidemics starting in autumn and greatly reduces the need for any later sprays. It also reduces the chance of the fungus evolving new virulences or resistance to fungicides.

Wheat crops are best treated with in-furrow fungicides as seed treatments may shorten coleoptiles and cause emergence problems.

- infected barley volunteers (for barley crops) or wheat volunteers (for wheat crops), which produce inoculum early in the season;
- susceptible varieties;
- cool, wet conditions, which activate the release of stubble-borne spores;
- mild temperatures (15°C to 22°C);
- high humidity – in excess of 70 per cent (note that dew or rainfall is not needed for infection);
- low light intensity;
- high nitrogen nutrition;
- dense crop canopies; and
- other growers upwind not using control treatments at seeding.

Powdery mildew has historically been less common in wheat, but has been causing damage for several years on the Lower Eyre Peninsula and in other areas where the susceptible variety Wyalkatchem<sup>®</sup> was widely grown.

It also occurs where thick crops allow high humidity to be maintained over extended periods of time.



*Triazole resistance in powdery mildew means that barley growers should not use tebuconazole alone, flutriafol, triadimefon or triadimenol if powdery mildew is the target disease or if there is a likelihood of it occurring in the season.*



PHOTO: RYAN FOWLER, QUEENSLAND DAF

High powdery mildew disease levels can reduce barley crop yields by five to 25 per cent.

Treatments applied at seeding on seed or in-furrow can give protection for six to 12 weeks from sowing.

If powdery mildew is detected in crops where the variety is rated Moderately Susceptible (MS) or lower, consider applying an appropriate fungicide immediately to slow the epidemic.

A second spray may be required where the fungus persists.

Where a fungicide is required, use a different chemical than that used at seeding or used previously as a spray. Always use recommended label rates. This will help to reduce the risk of fungicide resistance developing.

A good option is a QoI/DMI (quinone outside inhibitor/demethylation inhibitor) mix for the first foliar spray and a DMI for the second.

In Western Australia resistance in barley to some of the older fungicides has already developed.

This situation arose from the low adoption

of effective seed treatments, the repeated use of the DMI fungicides tebuconazole, flutriafol and triadimenol as foliar sprays, and widespread use of very susceptible varieties such as Baudin<sup>®</sup>.

### Fungicide resistance in the southern region

Powdery mildew populations with resistance to triadimefon, triadimenol, flutriafol and tebuconazole have been detected in barley crops in WA. Similar changes are likely to occur in eastern Australia at some time in the future. Growers can significantly reduce the chances of this happening, or at least delay the time, by avoiding the use of susceptible

**TABLE 1** Active ingredients in fungicide options for the treatment of barley powdery mildew.

Up-front treatments
Fluquinconazole (powder)
Triadimenol + cypermethrin (powder/flowable)
Triadimenol + imidacloprid (flowable)
Triadimenol + triflumuron (flowable)
Flutriafol + cypermethrin (powder/flowable/liquid)
Flutriafol (liquid)
Triadimefon (liquid)
Foliar fungicides
Azoxystrobin + cyproconazole
Epoconazole
Flutriafol
Propiconazole
Propiconazole + cyproconazole
Prothioconazole + tebuconazole
Pyraclostrobin + epoxiconazole
Tebuconazole
Tebuconazole + flutriafol
Triadimefon

varieties, using effective fungicide treatments at seeding and taking care over the use of foliar fungicides.

Growers should avoid using 'weaker' Group 3 DMI foliar fungicides (triadimefon, flutriafol, tebuconazole and triadimenol) for control of powdery mildew.

Instead, growers should consider using triazole fungicides such as epoxiconazole, prothioconazole, propiconazole or cyproconazole. The Group 11 QoIs such as azoxystrobin and pyraclostrobin can also be used in combination with triazoles. Experience in Europe shows that the Group 11 QoIs can lose their effectiveness very quickly when used alone.

### Report the infection

**Due to the concern of changes in the pathogen, including fungicide resistance, report any crop infections to one of the pathologists listed under More information on page 4 of this Fact Sheet.**

## FREQUENTLY ASKED QUESTIONS

### I am finding powdery mildew in my wheat crop. When should I be spraying it?

The chances are that your wheat canopy is fairly thick and that there is infection on the leaf sheaths of the lower stems.

Mildew on these tissues is hard to control especially as the canopy closes. Therefore spraying needs to be done early with full rates of fungicide.

With warmer, dry spring conditions the mildew may not survive but in moist springs it may develop rapidly and infect emerging heads.

At this stage the infection is very hard to control and yield and quality losses may be significant.

### I haven't seen powdery mildew in my barley for a long time. Will it matter if I drop the seed treatment for one year?

It may not matter in any one year. However, if several growers all did the same then it is most likely that this would lead to an outbreak of powdery mildew that would spread between crops and damage them as the early treatments wore off.

You and your neighbours would then need to apply fungicide sprays and there would be an increased risk of fungicide resistance developing and new virulent strains emerging.

## USEFUL RESOURCES

### SARDI Cereal Variety Disease Guide

[www.sardi.sa.gov.au/\\_\\_\\_data/assets/pdf\\_file/0010/217468/Cereal\\_Variety\\_Disease\\_Guide\\_2014.pdf](http://www.sardi.sa.gov.au/___data/assets/pdf_file/0010/217468/Cereal_Variety_Disease_Guide_2014.pdf)

### GRDC Disease Links – Barley Powdery Mildew

[www.grdc.com.au/Resources/Links-Pages/DiseaseLinks#B\\_Powdery\\_mildew](http://www.grdc.com.au/Resources/Links-Pages/DiseaseLinks#B_Powdery_mildew)

### Managing cereal fungicide use Fact Sheet

[www.grdc.com.au/Resources/Factsheets/2013/05/Cereal-fungicides](http://www.grdc.com.au/Resources/Factsheets/2013/05/Cereal-fungicides)

### Foliar applications of fungicides and insecticides Fact Sheet

[www.grdc.com.au/Resources/Factsheets/2012/03/Foliar-Applications-of-Fungicides-and-Insecticides](http://www.grdc.com.au/Resources/Factsheets/2012/03/Foliar-Applications-of-Fungicides-and-Insecticides)

## MORE INFORMATION

### Hugh Wallwork, South Australian Research and Development Institute (SARDI)

08 8303 9382  
hugh.wallwork@sa.gov.au

### Mark McLean, Victorian Department of Environment and Primary Industries

03 5362 2111  
mark.mclean@depi.vic.gov.au

### Richard Oliver, Australian Centre for Nectrotrophic Fungal Pathogens, Curtin University

08 9266 7872  
0414 305 999  
richard.oliver@curtin.edu.au

## PROJECT CODES

DAQ00187, CUR00016, CUR00017, CUR00019

**Acknowledgements:** Hugh Wallwork, SARDI; Mark McLean, Victorian DEPI; Richard Oliver, ACNFP, Curtin University.



#### DISCLAIMER

Any recommendations, suggestions or opinions contained in this publication do not necessarily represent the policy or views of the Grains Research and Development Corporation. No person should act on the basis of the contents of this publication without first obtaining specific, independent, professional advice.

The Corporation and contributors to this Fact Sheet may identify products by proprietary or trade names to help readers identify particular types of products.

We do not endorse or recommend the products of any manufacturer referred to. Other products may perform as well as or better than those specifically referred to.

The GRDC will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

#### CAUTION: RESEARCH ON UNREGISTERED PESTICIDE USE

Any research with unregistered pesticides or of unregistered products reported in this document does not constitute a recommendation for that particular use by the authors or the authors' organisations.

All pesticide applications must accord with the currently registered label for that particular pesticide, crop, pest and region.

Copyright © All material published in this Fact Sheet is copyright protected and may not be reproduced in any form without written permission from the GRDC.

PRODUCED BY WWW.CORETEXT.COM.AU