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Managing barley powdery mildew in the face of fungicide resistance

DPIRD-69

Barley powdery mildew populations resistant to some fungicide active ingredients are present in the WA grainbelt. Integrated disease management strategies to manage the disease include growing varieties with improved resistance and strategic use of fungicides.

It is important for the industry to minimise losses due to powdery mildew, reduce reliance on fungicides, and prevent further resistance development to fungicides.

Early powdery mildew infection in barley can cause yield loss in susceptible barley varieties of up to 25% and late infection up to 10%. Resurgence of powdery mildew every year is mainly due to growing susceptible barley in disease prone environments. Disease is primarily managed by using resistant varieties and foliar fungicides.

Barley powdery mildew (*Blumeria graminis* f. sp. *hordei*) was a threat to production of susceptible barley varieties, particularly in higher rainfall favourable environments until barley variety Baudin was phased out.

Since 2012, Western Australian barley growers have noticed a decline in control of powdery mildew for some triazole based (DMI) fungicides such, as tebuconazole, propiconazole, flutriafol, due to mutations that occurred in CYP51 gene in the mildew-causing pathogen populations across the wheatbelt.

Managing the disease should be based on integrated disease management to reduce further fungicide resistance development.

Integrated management of powdery mildew

Implementing an integrated disease management approach, including strategic use of fungicides, will minimise losses due to powdery mildew, reduce reliance on fungicides, and prevent further resistance development to fungicides.

Grow a variety with powdery mildew resistance

Reduce the proportion of area sown to barley varieties rated very susceptible (VS) or susceptible (S) to powdery mildew. Where possible, use varieties with better resistance carrying the *Mildew Locus O* (*MLO*) gene, because they generally do not require fungicides for powdery mildew management. The *MLO* gene is more stable than other mildew resistance genes currently possessed by Australian barley varieties.

The barley disease resistance profiles and ratings in WA are available from the current WA Crop Sowing Guide.

Current popular malting varieties such as RGT Planet, possess resistance to powdery mildew. In 2023, Maximus CL was affected with powdery mildew pathotype. Even though categorised as resistance to moderately resistance(R/MR), Maximus CL is now rated as susceptible.

Feed varieties, such as Combat, Compass, Fathom, Flinders, La Trobe, Litmus, Scope, and Titan AX have a good source of resistance to powdery mildew.

The decision to grow malt or feed variety should be based on market price and demand, the seasonal outlook and, if choosing to grow susceptible varieties, the capacity to implement other in-crop integrated management strategies.

Variety selection should be based on the disease situation experienced in the previous season and the seasonal outlook.

For popular varieties with resistance genes and powdery mildew susceptibility grown in Western Australia, see the [2024 Western Australian crop sowing guide, by Brenda J. Shackley, Stacey Power et al. \(dpird.wa.gov.au\)](#)

If a barley variety susceptible to powdery mildew is grown in the region:

- control volunteer barley plants prior to seeding, particularly of susceptible varieties. This will reduce inoculum of powdery mildew (and leaf rust) carried into the season.
- avoid sowing back into barley stubble from highly infected crops, as powdery mildew is carried as fruiting bodies on infested stubble.
- avoid growing extremely dense canopies, as they make it difficult to get adequate penetration of the fungicide and foster ideal conditions for powdery mildew development. Management practices that enhance canopy size include high rates of nitrogen at or just after seeding. Grazing crops before stem elongation can reduce canopy size and may reduce disease pressure without affecting crop yield.
- balance crop nutrition, particularly ensuring adequate potassium on deficient soils and avoid excess use of nitrogen fertiliser.
- timely applications of effective fungicides

Fungicide management on powdery mildew susceptible varieties

High disease pressure regions: high-medium rainfall, VS-S varieties, historically frequent fungicide usage required for powdery mildew management (such as on WA's south-coast).

Seed or fertiliser applied fungicides

If reduced efficacy of flutriafol in-furrow and fluquinconazole seed dressing has been observed locally, the length of protection provided by is likely to continue to decline, requiring alternative approaches or increased rates (observe label instructions) to maintain length of protection.

Moderately susceptible or more resistant varieties are unlikely to need specific fungicide protection from powdery mildew at sowing but may require foliar fungicide protection during the season. Seed dressing or in-furrow products applied to manage other diseases may provide some degree of protection from powdery mildew, but it is best to use a registered product to get effective mildew control.

A list of the products registered for use on barley is available from the page, Registered seed dressing and in-furrow fungicides for broadacre crops in Western Australia, on the department website at [dpird.wa.gov.au](#).

Foliar fungicides

Thirteen compounds from 4 modes of action (FRAC Code 3, 5, 7, and 11) are registered in Australia for powdery mildew control in barley. A list of these is available from the page, Registered foliar fungicides for broadacre crops in Western Australia, on the website at dpiird.wa.gov.au.

Powdery mildew pathogen populations resistant to triazole based actives, such as tebuconazole, flutriafol and propiconazole, are now widely distributed in WA. Products with these actives will have reduced efficacy and are not recommended for powdery mildew control. Use of these actives will increase the selection pressure further on the fungicide resistant strains of powdery mildew.

One way to reduce the resistance development of the pathogen is to use fungicide mixtures with different modes of action. The following fungicides, containing mixtures of both a strobilurin (Group 11), and an uncompromised triazole (Group 3) active ingredient, or succinate dehydrogenase (Group 7) and an uncompromised triazole based Group 3 products, should be used to control powdery mildew:

- such as azoxystrobin + cyproconazole
- azoxystrobin + epoxiconazole
- azoxystrobin + propiconazole
- pyraclostrobin + epoxiconazole
- benzovindiflupyr + propiconazole
- prothioconazole + bixafen
- mefentrifluconazole + fluxapyroxad

Use one application per season of each of these strobilurin or SDHI based fungicide mixtures as part of a fungicide resistance management strategy. A powdery mildew specific multisite amine (Group 5), spiroxamine, is also registered.

Strobilurin products are protectant chemicals and should not be applied to heavily infected crops. In multiple spray programs, use strobilurin in rotation with one of the uncompromised triazoles, to minimise potential pressure on this chemistry.

For greatest efficacy, apply fungicides before significant levels of disease establish in crop.

Use the fungicide to protect the crop rather than attempt to recover the crop. Monitor crops regularly for presence of disease and use fungicides to allow maximum disease control and maintain effective green leaf area.

The product choice, rate, and water volume used should reflect the range and time of onset of the diseases to be managed, and the density of the canopy. It is important to read the product label. When repeated applications are required, observe restrictions on maximum dose rates and applications.

Note

Foliar fungicide products should not be used more than 2 applications per season.

Lower disease pressure regions: medium-low rainfall, less frequent fungicide use for powdery mildew

If mildew has not been a regular focus of disease management in previous seasons, the requirement for prophylactic seed dressing or in-furrow fungicide application for powdery mildew should not be required:

- use appropriate foliar fungicides to manage disease threats present in the cropping system
- if repeated applications of fungicide are required within the season, utilise uncompromised fungicides as part of a rotation of products
- apply fungicides according to the label directions and restrictions.

More information

Refer to the department website at dpird.wa.gov.au for more information about the following:

- Diseases and pests of barley
- Control the green bridge for pest and disease management

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