

# FUNGICIDE MANAGEMENT OF MUNGBEAN POWDERY MILDEW FACT SHEET



**GRDC**  
GRAINS RESEARCH  
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CORPORATION

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## Mungbean powdery mildew

### KEY POINTS

- Powdery mildew is a very common disease of mungbean crops.
- Currently available fungicides can only suppress mungbean powdery mildew in the paddock and will not eliminate it totally.
- Detection of DNA markers for resistance to tebuconazole (Group 3) and azoxystrobin (Group 11) highlight the risk of reduced fungicide sensitivity evolving.
- With little genetic resistance available, disease management relies on time of sowing and fungicides.
- Early summer sowing can reduce the risk of yield loss and the need to apply fungicide treatments.
- Late-season powdery mildew will not affect yield but can inhibit desiccant performance with a significant impact on grain quality.
- Apply AFREN FR5 principles to prolong the effective life of available fungicides.
- Spray only as needed and for economic benefit, using the free PowderyMildewMBM app for guidance.

**Mungbean powdery mildew is a common airborne disease of mungbean crops that can lead to significant grain yield losses when aggravated by conducive weather conditions and inadequate fungicide control.**

The laboratory detection of genetic markers for fungicide resistance in mungbean powdery mildew isolates highlights the potential for development of reduced sensitivity and possibly fungicide resistance. As a result, any fungicide use needs to be strategic and supported by good agronomic practices.

### Disease risk and management

Mungbean powdery mildew outbreaks can develop as soon as temperatures

Photo: © Levente Kiss.



Powdery mildew on mungbean cv. Jade-AU

drop during late summer or early autumn.

Symptoms usually start with the appearance of small white colonies on the upper leaf surfaces of the lower canopy which can, under conducive conditions, rapidly spread to cover large parts of both the upper and lower surfaces of leaves. Leaf petioles, stems and green pods can also be covered with powdery mildew later in the season.

Replicated paddock trials have shown that powdery mildew can cause yield losses of up to 40 per cent if epidemics develop before flowering, weather conditions favour infection throughout the growing season, and no fungicide sprays are applied for disease management.

### Early sowing can minimise losses

When powdery mildew symptoms first appear after flowering, the infection is unlikely to have a significant impact on grain yield.

Therefore, sowing early in summer can be the best way of managing the disease without relying on fungicide treatments.

Late-planted mungbean crops are generally at greater risk of powdery mildew infection, while early sowing can allow the crop to reach the green pod stage before powdery mildew may become widespread.

### Varietal resistance

All mungbean cultivars grown in Australia have some degree of susceptibility to powdery mildew.

Jade-AU<sup>®</sup>, the most commonly grown variety, is considered 'moderately susceptible' (MS) to the disease, while Opal- AU<sup>®</sup>, released in 2020, has a rating of 'moderately resistant' (MR).

Recently introduced varieties, such as Green Taipan<sup>®</sup>, are still vulnerable to powdery mildew infection. Consequently, disease management relies heavily on fungicide applications.

For more specific varietal information, growers should seek advice from a pulse agronomist.

## Fungicide control options

Fungicide products that are currently registered or permitted for the control of powdery mildew in mungbeans contain 430 g/L tebuconazole, or a mixture of 222 g/L azoxystrobin and 370 g/L tebuconazole. Tebuconazole belongs to the Mode of Action (MoA) Group 3 (demethylase inhibitor, DMI) fungicides; azoxystrobin is one of the MoA Group 11 (quinone outside inhibitor, QoI) fungicides.

In 2024, replicated paddock trials indicated significant grain yield responses to treatments with products containing azoxystrobin and/or tebuconazole.

## Fungicide resistance status

A research collaboration between crop pathologists at the University of Southern Queensland (UniSQ) Centre for Crop Health and Queensland Department of Agriculture and Fisheries (QDAF) has revealed that mungbean powdery mildew is caused by two distinct fungal pathogens: *Podosphaera xanthii* and *Erysiphe vignae*.

DNA analysis of mungbean powdery mildew samples collected in southern Queensland has detected the DNA markers for resistance to both Group 3 and Group 11 fungicides in some of the sampled *Podosphaera xanthii* populations; and the resistance marker to Group 11 fungicides in some *Erysiphe vignae* populations.

While products that contain azoxystrobin and/or tebuconazole remain effective against the disease, these laboratory detections indicate a substantial risk of reduced fungicide sensitivity evolving in mungbean powdery mildew populations.



Photo: © Kirsty Owen, University of Southern Queensland.  
Heavy powdery mildew infection on mungbean cv. Jade-AU at flowering/green pod stage.

## Fungicide resistance terminology

**When a pathogen is effectively controlled by a fungicide, it is defined as sensitive to that fungicide. As fungicide resistance develops, that sensitive status can change to:**

### ■ REDUCED SENSITIVITY

**When a fungicide application does not work optimally but does not completely fail. This may not be noticeable at a paddock level, or the grower may find previously experienced levels of control require higher chemical concentrations up to the maximum label rate. Reduced sensitivity must be confirmed through specialised laboratory testing.**

### ■ RESISTANCE

**When a fungicide fails to provide disease control in the paddock at the maximum label rate. Resistance must be confirmed by laboratory testing and be clearly linked to a loss of control when using the fungicide correctly in the paddock.**

### ■ LABORATORY DETECTION

**A measurable loss of sensitivity can often be detected in laboratory in-vitro tests before or independent of any loss of fungicide efficacy in the paddock. Laboratory testing can indicate a high risk of resistance or reduced sensitivity developing in the paddock.**

## Agronomic strategies to support fungicides

The conventional recommendation for managing mungbean powdery mildew is to spray fungicide at the first sign of disease followed by a second fungicide treatment two weeks later. Growers may also include a preventive fungicide treatment with their first insecticide spray, before there is any sign of powdery mildew in the paddock.

However, replicated field trials have shown that preventive sprays have no value in mungbean powdery mildew management. The only outcome of such preventive treatments is the increase of production costs due to the cost of the fungicide.

Strategic agronomy practices that help reduce disease pressure and infection risk will support the lasting effectiveness of the available fungicide products.

### ■ If possible, sow early in the summer season

While mungbean powdery mildew can infect plants at any growth stage, the high summer temperatures, over 30°C during the day, and over 26°C during the night, combined with low relative humidity, do not favour infections and the spread of the disease. Therefore,

crops planted later in the summer growing season are generally more exposed to the risk of damaging epidemics that start developing as soon as the high temperatures drop and the relative humidity increases.

Crops sown early in the summer season have a greater opportunity to reach flowering and pod filling before the disease risk becomes elevated.

### ■ Use the Powdery Mildew MBM app

The free PowderyMildewMBM smartphone app developed by the Western Australian Department of Primary Industries and Regional Development (DPIRD) calculates the financial viability of using fungicide to control powdery mildew in mungbean paddocks.

It takes account of growth stage, forecast weather, fungicide costs, grain yield benefits and grain prices to arrive at best case, worst case and most likely estimates of a financial gain from a withheld, single or double fungicide treatment.

Trials conducted by UniSQ Centre for Crop Health and Queensland Department of Agriculture and Fisheries (QDAF) over 2022-24 demonstrated and validated the app, which made the right recommendation



in every trial case - including when recommending not to spray.

The PowderyMildewMBM app offers growers an easy support tool for making spray decisions that can help protect grain yields, profits and future fungicide efficacy.

■ **Spray for economic benefit, not disease elimination**

It is not always economical to spray against mungbean powdery mildew. ‘Don’t spray if it won’t pay’ is logical and memorable advice.

Fungicides should only be used if there is financial return on their application, without expecting complete elimination of the disease from paddocks.

Replicated field trials have indicated significant grain yield responses to treatments with products that contain azoxystrobin and/or tebuconazole. Strategic use of these products, when recommended by the PowderyMildewMBM app, should provide economic benefits to growers.

However, full control of the disease was never achieved during replicated trials in 2022, 2023 and 2024, or in paddocks managed by growers and advisers during this period.

■ **Post-flowering fungicide applications will not increase yield but may protect grain quality**

Powdery mildew epidemics that begin after flowering or start to build up at the end of the season following fungicide sprays recommended by the PowderyMildewMBM app, will not have a significant impact on grain yield.

However, late season outbreaks of the disease can affect desiccant performance. This may impact harvestability and, more importantly, grain quality. Grain from poorly desiccated crops can easily receive a lower quality classification with a significant loss in value.

Growers should consider both factors when considering a late season fungicide application.

If reducing disease with fungicide will provide an economic benefit by supporting desiccation and grain quality, a tebuconazole-only product should not be used if the preceding spray was tebuconazole only.

■ **Unnecessary fungicide use may only increase resistance risks**

Over-use of fungicides may encourage fungicide resistance to develop in mungbean powdery mildew pathogen populations. To help reduce the pathogen's exposure to fungicides, treatments should be withheld if disease control is unlikely to provide an economic benefit, and the available fungicides should be



Photo: © GRDC

A healthy mungbean crop.

used in rotation to provide a dynamic control regime. Reduced sensitivity to the available fungicide products would lead to significant long term economic losses for mungbean growers.

Therefore, strategic applications of fungicides will lead to financial gain each season and also long-term by prolonging the effectiveness of the available products.

## Summary

The detection of DNA markers for both Group 3 (DMI) and Group 11 (QoI) resistance in mungbean powdery mildew highlights the potential for fungicides to lose efficacy if mismanaged. Growers should follow the AFREN Principles (see graphic) for all crops and pathogens, regardless of their formal fungicide resistance status, to minimise disease pressure and fungicide resistance risks.

# AFREN PRINCIPLES

AUSTRALIAN FUNGICIDE RESISTANCE EXTENSION NETWORK

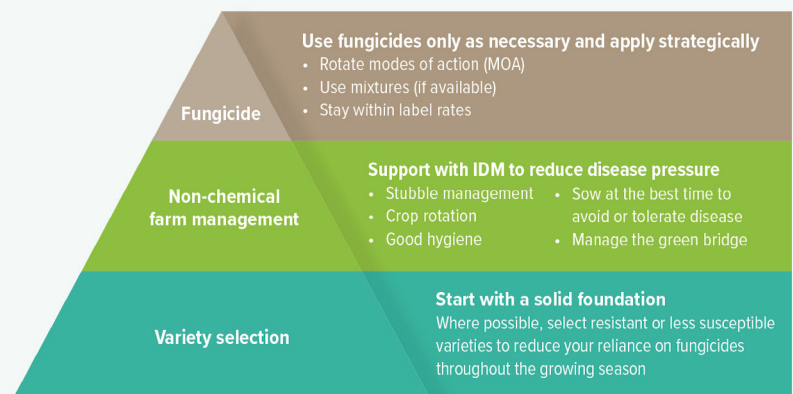


The Fungicide Resistance Five provides a creed to follow.

### The Fungicide Resistance Five

- 1 Avoid susceptible crop varieties
- 2 Rotate crops – use time and distance to reduce disease carryover
- 3 Use non-chemical control methods to reduce disease pressure
- 4 Spray only if necessary and apply strategically
- 5 Rotate and mix fungicides/MOA groups

Growers should seek to provide a strong and reliable foundation of resistant or less susceptible crop varieties, supported by non-chemical integrated disease management (IDM) that can be complemented by strategic and responsible use of fungicides.



## FREQUENTLY ASKED QUESTIONS

### How does fungicide resistance develop?

Fungicide resistance occurs when fungicide resistant strains of a pathogen come to dominate the pathogen population in a paddock or region. Repeated applications of the same fungicide will control the non-resistant population but allow these resistant strains to thrive.

For more on the causes and effects of fungicide resistance, read the GRDC AFREN Fact Sheet 'How Fungicide Resistance Develops'. (See 'Useful resources'.)

### How do I know if I have a fungicide resistant disease in my crop?

There are no reported incidents of fungicide paddock failure or reduced effectiveness in mungbean powdery mildew.

If a fungicide application fails to exhibit full control of the disease, or if the application rate for a fungicide must be steadily increased from application to application, there is cause for concern.

### Who do I contact?

Contact your pulse agronomist or adviser and have them review the crop and your fungicide application records. If they are concerned, they can seek expert input and submit samples for fungicide resistance testing if required.

Alternatively, you can visit the [AFREN website](#) 'About' page for details of fungicide resistance experts in your region.

## REFERENCES

The content in this Fact Sheet is based on the content and sources included in the AFREN Guide Fungicide Resistance Management in Australian Grain Crops. (see 'Useful Resources'.)

## ACKNOWLEDGEMENTS

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## MORE INFORMATION

**Australian Fungicide Resistance Extension Network** [afren.com.au](http://afren.com.au)

## GRDC CODE

**CUR2302-002RTX**

## USEFUL RESOURCES

### Powdery Mildew MBM app

- Search Apple App Store or Google Play for 'PowderyMildewMBM'.
- GRDC article including information, usage guidance and case studies: [grdc.com.au/\\_data/assets/pdf\\_file/0014/430340/GRDC-Update-Paper-Sparks-Adam-July-2020.pdf](http://grdc.com.au/_data/assets/pdf_file/0014/430340/GRDC-Update-Paper-Sparks-Adam-July-2020.pdf)

### AFREN Podcast

*Mungbean powdery mildew; fungicide sensitivities and management for Queensland growers* featuring Professor Levente Kiss, Director of the University of Southern Queensland's Centre for Crop Health. [afren.com.au/resources/resources-podcasts](http://afren.com.au/resources/resources-podcasts)

### GRDC Update Paper

*Management of mungbean powdery mildew* [grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2024/07/management-of-mungbean-powdery-mildew](http://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2024/07/management-of-mungbean-powdery-mildew) (July 2024)

### GRDC Grow Notes - Mungbean

General information on mungbean cultivation, management and harvest (April 2018)

[grdc.com.au/resources-and-publications/grownotes/crop-agronomy/grownotesmungbeansnorthern](http://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/grownotesmungbeansnorthern)

### GRDC GroundCover article

*Hold the spray when it comes to powdery mildew* [groundcover.grdc.com.au/crops/pulses/hold-the-spray-when-it-comes-to-powdery-mildew](http://groundcover.grdc.com.au/crops/pulses/hold-the-spray-when-it-comes-to-powdery-mildew) (GRDC GroundCover North, Issue 170, May-June 2024, Page 42)

### Australian Fungicide Resistance Extension Network (AFREN)

Dedicated site for the latest fungicide resistance information, reference materials, case studies, grower survey and news. [afren.com.au](http://afren.com.au)

### AFREN Fungicide Resistance Management Guide

Comprehensive guide to fungicide resistance issues, instances and management.

[afren.com.au/resources/#management-guide](http://afren.com.au/resources/#management-guide)

### GRDC Fact Sheet

#### **Understanding how fungicide resistance develops in cropping systems**

[afren.com.au/wp-content/uploads/2022/03/5542-AFREN-Fungicide-Resistance-Fact-Sheet\\_FA\\_online.pdf](http://afren.com.au/wp-content/uploads/2022/03/5542-AFREN-Fungicide-Resistance-Fact-Sheet_FA_online.pdf)

**DISCLAIMER** While every effort has been made to ensure the scientific accuracy and currency of all information and recommendations, our understanding of fungicide resistance is constantly developing and readers are advised to seek further information regarding fungicide resistance from the [AFREN](#), [CCDM Fungicide Resistance Group](#) and [CropLife Australia](#) websites.

Not all active constituents/products in each MOA group are registered for use on the target pathogens indicated in each region.

It is the responsibility of growers and advisers to ensure that the fungicide is registered, or that permits are current, for the target pathogen, crop and region.

Current information on registered fungicides can be found on the [APVMA website](#).

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