Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA
Protect Grow Innovate

PestFacts WA

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Leaf rust, powdery mildew, yellow spot/nodorum blotch and flag smut are appearing in wheat

Leaf rust

- Cascade
- Coomalbidgup
- Dalyup
- Munglinup

Image1: Leaf rust pustules on a wheat leaf. Photo courtesy of: Ciara Beard (DPIRD).

Wheat leaf rust has been found at low levels in tillering Brumby (rated SVS) at Cascade. Rust has also been seen at a low levels at Coomalbidgup, Dalyup and Munglinup on Brumby.

Symptoms

Leaf rust pustules are small, circular to oval and can vary in colour from orange to light brown. They usually appear on the upper surface of leaves and on leaf sheaths in cases of heavy infection. Leaf rust requires moisture (rain or heavy dew) or high humidity for spores to germinate and infect leaves. Usually 4-6 hours of leaf wetness are required at optimum temperatures 15-25°C (warm days and dewy nights) for disease to spread rapidly. The primary risks for carryover of rusts are wheat regrowth and volunteer wheat at edges of paddocks or roadsides. This means that it is worth inspecting as well as planting these crops.

Management

Variety selection is the best defence against rust diseases in-crop. Varieties rated as moderately resistant to moderately susceptible (MRMS) or better will show significantly less rusting than a susceptible (S) variety. These varieties are unlikely to require a fungicide application to maintain grain yield except in exceptional years with very high disease pressure. Many current varieties are susceptible to leaf rust.

For variety disease ratings, refer to DPIRD's 2024 Crop Sowing Guide – Wheat.
If rust is detected in a susceptible variety (rated VS to S), fungicide is more likely to be needed to protect yield. In these cases, fungicide should be applied before the epidemic becomes severe, taking into consideration the stage of crop development.

Spraying after crop flowering is normally not economic for leaf rust. As the season progresses and warmer, drier conditions occur, the likelihood of an economic response to fungicide will diminish. Spraying decisions should consider the level of disease in the crop, varietal susceptibility, the time of the season and growth stage of the crop. Additionally, consider the chance of ongoing rainfall after spraying, as this is favourable for disease development. Use high rates of fungicide for longer duration of protection, for example, when season conditions favouring infection are likely to persist, or for more susceptible varieties. Control should be tuned to crop yield potential and crop season length. For a list of registered fungicides to use as foliar sprays, visit DPIRD's Registered foliar fungicides for cereals in Western Australia page.

Rust pathotype testing

Growers and agronomists are encouraged to send samples of all rusts for pathotype testing at any time of the year to the Australian Rust Survey. Possible new rust strains need to be continuously monitored for, as they have implications for existing varieties, and this will assist wheat breeders in developing new resistant varieties. Infected leaf samples should be mailed in paper envelopes (do not use plastic wrapping or plastic lined packages) along with your details and collection information (location, variety etc.) directly to The University of Sydney, Australian Rust Survey, Reply Paid 88076, Narellan NSW 2567. Optional free reply-paid envelopes can be ordered from University of Sydney. For further details refer to the University of Sydney's Australian Cereal Rust Survey page.

Further information

For more information on wheat leaf rust, refer to DPIRD's Managing stripe rust and leaf rust in Western Australia and Diagnosing leaf rust of wheat pages.

Powdery mildew

- Cascade
- Munglinup
- Dalyup

Image 2: Powdery mildew on wheat plants. Photo courtesy of Andrea Hills (DPIRD).

Powdery mildew is appearing in mid-tillering Scepter wheat at Cascade, Munglinup and Dalyup. It is also appearing in Maximus barley at early stem elongation (Z30) at Dalyup. Barley and wheat powdery mildew are host specific and do not cross infect. However, these reports indicate that seasonal conditions are conducive for disease development of both mildews and so monitoring of wheat and barley crops for this and other diseases should be ongoing, particularly in areas where a pre-season green bridge was apparent or susceptible varieties have been sown.

Symptoms

When diagnosing powdery mildew, look for fluffy, white powdery growths of fungal spores on the surface of leaves and leaf sheaths. Infection usually starts low in the canopy and under severe disease pressure can appear on stems and heads. As the infection ages there is a yellowing of the infected tissue and the infected area turns a dull grey colour with small black specks present. A powdery mildew infected crop may appear yellow from a distance. For more information refer to DPIRD's Diagnosing powdery mildew in cereals page.

Temperatures of 15-22°C favour the disease in conjunction with high humidity. Rain does not spread the disease but can create extended periods of canopy humidity which favour disease development. Under favourable conditions, the infection cycle can take as little as seven days causing rapid build-up in crops. Mildew can also disappear rapidly in dry, hot weather and very heavy rain can also wash spores away.

Management

For wheat variety powdery mildew resistance ratings, refer to the department's 2024 Crop Sowing Guide. Infection early in the season on susceptible – moderately susceptible varieties can significantly reduce yield (by up to 25%) while infection at later stages (after Z39) is usually less damaging.

Registered foliar fungicides can be used to control powdery mildew infection; application early in the epidemic before significant disease (eg, first application around stem elongation) development is most effective. For more information refer to the department's Registered foliar fungicides for cereals in Western Australia page.

Testing for powdery mildew fungicide resistance

Wheat powdery mildew is at high risk of developing fungicide resistance so growers are encouraged to use fungicides wisely. As good practice, all fungicide actives should be rotated within and across seasons.

Growers and consultants that suspect fungicide resistance in powdery mildew is occurring in a crop can contact the Centre for Crop and Disease Management's (CCDM) fungicide resistance team via email frg@curtin.edu.au to request further information.

Further information

For more information on powdery mildew visit DPIRD's Diagnosing powdery mildew in cereals and Managing powdery mildew in wheat pages.

Yellow spot/nodorum blotch

- Mullewa
- Sandy Gully

In a Department of Primary Industries and Regional Development (DPIRD) trial at Mullewa evaluating time of sowing in wheat there are several varieties displaying mild yellow spot/nodorum blotch symptoms. The infected plants are at first node growth stage (Z31), sown 8 May with Uniform in-furrow at 400 ml/ha, with irrigation to ensure a timely germination. The trial was sown in canola stubble. A foliar fungicide has subsequently been applied.

In a wheat trial at Sandy Gully there are some tillering wheat plants displaying what appear to be yellow spot symptoms. Nitrogen deficiency is suspected to have exacerbated the necrosis on leaves. The wheat had been sown into a vetch stubble. Nitrogen has recently been applied and the plants will be monitored to see if a fungicide is required at first node. Yellow spot is caused by the fungus *Pyrenophora tritici-repentis* and nodorum blotch is caused by *Parastagonospora nodorum*.

In WA, nodorum blotch and yellow spot often occur together as a disease complex on wheat and are difficult to visually distinguish.

These pathogens are stubble-borne and are therefore high risk in wheat-on-wheat situations. Crop infection is favoured by warm, wet weather. Nodorum blotch is promoted by heavy and frequent rain, while dew can be enough to spread yellow spot.

Symptoms

Image 3: Yellow spot on seedling wheat. Photo courtesy of: Geoff Thomas (DPIRD).

Image 4: Septoria nodorum blotch lesions on wheat leaves. Photo courtesy of: DPIRD.

Yellow spot/nodorum blotch lesions often start as yellow-tan oval spots on leaves that become tan-brown in their centre with a yellow edge as lesions grow. It is very difficult to distinguish yellow spot from nodorum blotch by visual leaf symptoms, even for experienced plant pathologists who rely on lab diagnostic techniques to confirm which pathogen is present. Early in the season, distinguishing the two is not necessary as both can generally be treated with the same registered foliar fungicides. However, after flag leaf emergence, when symptoms are seen moving up the leaf canopy, there is a risk of head infection (glume blotch) if the pathogen is nodorum blotch. It is important to optimise

control of nodorum on leaves to reduce risk of infection of heads. Also, despite being caused by the same pathogen, variety resistance to nodorum on leaves is not necessarily the same as nodorum glume blotch resistance and ratings for both are listed in DPIRD's 2024 Crop Sowing Guide – Wheat.

Correct diagnosis can be worthwhile, particularly as symptoms may not actually be fungal. Leaf spot symptoms can sometimes be physiological, herbicide or insect damage and these do not respond to fungicide application.

Management

Wheat varieties differ in susceptibility to nodorum blotch and yellow spot. To check the susceptibility ratings of different varieties refer to DPIRD's 2024 Crop Sowing Guide – Wheat.

Greatest yield response to fungicide application for nodorum blotch or yellow spot in wheat canopy is achieved through application at flag leaf emergence. However, earlier application (e.g., at first node, Z31) may be considered if a susceptible variety has been sown into wheat stubble. Earlier application may also be considered if disease pressure is high early. A second fungicide spray may be required at or after flag leaf emergence as fungicides will only protect the leaves out at the time of application.

Growers should prioritise disease management of wheat sown on wheat stubble, especially early sown susceptible wheat crops that are nitrogen deficient as these are likely to be more vulnerable to developing disease.

YellowSpotWM is a free app available to assist with making economic fungicide spray decisions for managing yellow spot in wheat. Users can specify factors relating to paddock selection, variety, seasonal conditions, prices and management options so that the output relates to their cropping circumstance. For more information refer to DPIRD's YellowSpotWM page.

More information on registered fungicides can be found at DPIRD's Registered foliar fungicides for cereals in Western Australia page.

Further information

Further information about this disease can be found at the department's Managing yellow spot and nodorum blotch in wheat page.

Flag smut

- Mullewa
- Merredin

There have been reports of early sown wheat in trials at Mullewa and Merredin showing early symptoms of wheat flag smut. The infected plants are at first node growth stage (Z31) and later.

Symptoms

Image 5: Flag smut on wheat. Photo courtesy of: Geoff Thomas (DPIRD).

Flag smut of wheat (*Urocystis tritici*) differs from other cereal smut diseases by exhibiting symptoms in the leaves rather than the heads. Affected plants are often stunted and infected leaves may be curled and distorted. Initially, the grey-black spore masses are invisible under the leaf surface, but between stem elongation and heading, they break through the surface as distinct, long, raised streaks of sooty spores on leaves and leaf sheaths. Infected plants can tiller excessively but symptoms do not always occur on all tillers. Affected tillers do not usually produce grain.

Spores of this fungus are carried on seed and in soil, the spores can survive in soil for up to 7 years. Flag smut infection occurs as the wheat plant germinates and emerges from soil. This process is favoured by warm temps (20°C) and early dry sowing which was common in these regions this year.

Management

To check flag smut resistance ratings of wheat varieties, refer to DPIRD's 2024 Crop Sowing Guide. A number of popular varieties grown in WA are susceptible or worse and are more likely to exhibit higher incidence of disease.

This disease is well-managed by registered fungicide seed dressings, use of more resistant varieties and rotation with nonhost crops (although spores can last for a period of years in soil).

Further information

Further information is available at DPIRD's Diagnosing flag smut of wheat and Cereal smuts and bunts management pages.

For more information on wheat diseases contact Plant Pathologists Kithsiri Jayasena in Albany on +61 (0)8 9892 8477, Ciara Beard in Geraldton on +61 (0)8 9956 8504, Geoff Thomas in South Perth on +61 (0)8 9368 3262 or Andrea Hills in Esperance on +61 (0)8 9083 1144.

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Early spot form and net form net blotches are emerging in barley

- Northampton
- Merredin
- Muresk

Image 6: Spot form net blotch lesions on a young barley plant. Photo courtesy of: DPIRD.

Plant Pathologist Kylie Chambers (DPIRD) has reported that some spot form net blotch (SFNB) lesions and net form net blotch (NFNB) lesions have started to appear on barley crops at Merredin.

A Back Paddock user has also reported SFNB on Maximus barley near Northampton. Technical Officer Corinne Donovan (DPIRD) found SFNB on a barley buffer at a trial site in Muresk.

Image 7: Net form net blotch lesions on young barley plants. Photo courtesy of: DPIRD.

Symptoms and management

SFNB and NFNB can be quite variable in appearance depending on the form of the pathogen, the variety of barley and the stage of infection. Initially, SFNB lesions are dark brown and tend to be rounded. In contrast, early NFNB lesions, while also dark brown, tend to start as very thin, rectangular 'nets'.

Both blotches can cause losses in both yield and grain quality, although they are often most damaging in crops sown with varieties that are rated very susceptible to susceptible with higher yield potential in medium to high rainfall barley growing regions.

Growers in the medium and low rainfall areas should take the spring rainfall outlook into account when deciding if a fungicide application is necessary and in a dry spring there is no additional benefit from fungicide application.

For further information on symptoms and management of blotches see DPIRD's Managing spot form net blotch in continuous barley and Managing net form net blotch of barley in Western Australia pages.

For a list of registered fungicides to use as foliar sprays for managing SFNB and NFNB in barley, visit DPIRD's Registered foliar fungicides for cereals in Western Australia page. DPIRD researchers have found that when SFNB is present early, tillering sprays are not useful in delivering an economic return. For more information on DPIRD's SFNB management trials in low rainfall areas see DPIRD's 2023 PestFacts WA Issue 8 article Early spot-form net blotch is around but stay calm and don't spray.

Further information

For more information on blotches contact Plant Pathologists Andrea Hills, Esperance on +61 (0)8 9083 1144, Kithsiri Jayasena, Albany on +61 (0)8 9892 8477 or Jason Bradley, South Perth on +61 (8) 9368 3982.

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Bacterial blight and Septoria avenae blotch in oats

Bacterial blight

- Wongan Hills
- Merredin
- Highbury

Plant Pathologist Kylie Chambers (DPIRD) has reported finding bacterial stripe blight on oats across the central grainbelt.

There are two types of bacterial blight that affect oats in Western Australia: stripe blight (*Pseudomonas syringae pv. striafaciens*) and halo blight (*Pseudomonas syringae pv. coronafaciens*).

Image 8: Stripe blight on oat leaves. Photo courtesy DPIRD.

Stripe blight is the more common form of the disease in WA. It forms long, red-brown stripes on leaves during winter, which can join into blotches and cause leaf collapse.

Image 9: Halo blight. Photo courtesy of: DPIRD.

Halo blight causes pale green or yellow coloured, oval-shaped spots surrounded by a pale halo with a water-soaked appearance. As the disease develops, these spots turn brown and join together to form blotches.

Both bacterial blights need cool, moist conditions, to infect plants and spread. Normally the infection will stop spreading as canopies dry, and crops are able to outgrow the infection in spring.

It is important not to confuse bacterial blight with fungal diseases like Septoria avenae or oat rusts, as fungicides are not effective against bacterial blight. Currently there are no crop protection chemicals suitable (or registered) to control this disease.

Further information about these diseases can be found on DPIRD's Diagnosing stripe blight in oats and Diagnosing halo blight in oats pages.

Septoria avenae blotch

- Highbury

Image 10: Septoria avenae blotch symptoms on oats. Photo courtesy of: Kylie Chambers (DPIRD).

Plant Pathologist Kylie Chambers (DPIRD) has also reported finding Septoria avenae blotch in oats near Highbury.

Septoria avenae blotch is the most prevalent oat disease in Western Australia. Under high disease pressure, it can impact both hay and grain yield and quality. Septoria symptoms can appear as brown to purple oval shaped spots on leaves. These lesions then develop into larger brown blotches up to 2 cm in size, which can coalesce to cover most of the leaf. Severe infections can lead to plant lodging. Florets and glumes of plants can also develop blotches, which can cause black staining of seed in some varieties.

The main source of infection is infected crop residue from previous seasons. The sexual stage of the fungus occurs on infected stubble following rainfall, whereby the fungus produces ascospores which are spread moderate distances by wind. The ascospores are the source of infection in new crops. Secondary spread occurs when the asexual spores formed in the lesions are spread through the crop canopy by rain splash.

In high disease pressure scenarios, such as continuous oat crops, growing susceptible or very susceptible varieties, and in favourable environments (such as higher rainfall regions) where disease develops into the upper canopy, yield and grain quality losses can occur. In these circumstances, foliar fungicides can reduce disease severity and reduce potential losses to disease.

For a list of registered fungicides to use as foliar sprays for managing Septoria in oats, refer to DPIRD’s Registered foliar fungicides for cereals in Western Australia page.

For more information on Septoria avenae blotch, refer to DPIRD’s Diagnosing Septoria avenae blotch in oats and the DPIRD and AgriFutures Septoria avenae blotch disease management guide.

Further information

To check your oat variety susceptibility ratings to these diseases, refer to DPIRD's 2024 WA Crop Sowing Guide - Oats.

To check out what diseases are impacting oat production, refer to DPIRD's Plant diseases impacting oaten hay production in Australia – a review.

For more information on oat diseases, refer to DPIRD's Oats: leaf diseases page and 2022 Protecting WA Crops article The impact of Septoria avenae blotch and leaf rust on the yield and quality of oaten hay.

For more information on oat foliar diseases, contact Plant Pathologists Geoff Thomas in South Perth on +61 (0)8 9368 3262, Andrea Hills, Esperance on +61 (0)8 9083 1144, Kithsiri Jayasena, Albany on +61 (0)8 9892 8477 or Jason Bradley, South Perth on +61 (8) 9368 3982.

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