

# managing yellow leaf spot

in stubble retained systems in Central West NSW

Project code CWF00018

## KEY MESSAGES

- Stubbles carrying high loads of yellow leaf spot inoculum are the major source of crop infection. Decomposition or removal of stubble reduces inoculum.
- Yellow leaf spot is most severe when successive wheat crops with low genetic yellow leaf spot resistance are grown on retained stubble.
- Management of yellow leaf spot in CWFS districts should focus on disease identification and good agronomic practice.
- Timely urea application may improve crop performance over a fungicide.
- Don't confuse yellow leaf spot with nutrient deficiencies, leaf tipping or frost damage.

## What is yellow leaf spot?

Yellow leaf spot, or tan spot as it is commonly referred to outside of Australia, is being seen more often within the central western area of NSW due to the increase in the levels of retained stubble. The stubble borne fungus (*Pyrenophora tritici-repentis*) can survive between subsequent crops where infected stubble is present.

The disease is capable of surviving for up to two years in wheat and barley stubble, particularly in dry seasons.

With this in mind it is increasingly important to be able to identify the yellow leaf spot disease in cereal crop stubble.

## Identification

Yellow leaf spot is a widely misdiagnosed disease throughout Central West NSW as it is quite commonly mistaken for nitrogen deficiency, frost damage and aluminium toxicity. As well as visual indicators, the conditions prior to sowing and post sowing need to be taken into account.

### Prior to sowing:

The risk of a yellow leaf spot infection should be assessed pre-sowing on a paddock by paddock basis. If lengthy wet conditions are being experienced, small pinhead size fruiting bodies may begin to appear on the



previous year's cereal stubble. The fruiting bodies will most likely form around the nodes. If high levels of infected stubble are identified within the paddock the infection can cause multiple outbreaks.

#### Post sowing:

During the growing season the key symptom is the development of small tan coloured spots surrounded by a yellow ring. These rings may vary in size and in some cases join together causing the leaf to die. The continuation and severity of yellow leaf spot in crops tend to occur when wet conditions persist throughout the growing season.

#### Mature plant:

The symptoms for yellow leaf spot in the mature plant can be identified as having a more distinct yellow to brown spot than in younger plants. The lesions will be much more dense towards the bottom of the plant, with fewer lesions further up the plant.

#### Post flowering:

The disease can also cause pink pigmentation of the stems which can infect the seed during grain-filling and reduce the seed's viability, but this is not common in Central West NSW unless a very wet, mild spring is experienced.

## The disease cycle

#### Primary stage:

The disease cycle of yellow leaf spot commences during a lengthy period of moist conditions throughout the autumn period, and even a light dew can provide enough moisture for the disease to establish. The optimal temperatures for the commencement of the disease cycle ranges from 10-30 degrees Celsius. These conditions allow the mycelium from the infected stubble to form a pinhead structure. These pinhead size fruiting bodies contain sexual fungal spores, which are known as ascospores.

When the fruit matures, an increase in pressure causes the ascospores to erupt and disperse. This eruption process requires a temperature of 15 degrees Celsius, as well as humid conditions. The ascospores can travel up to 10 centimetres from the stubble inoculum source and are capable of landing on adjacent seedlings.

If the surface of the leaf remains moist for a period of six hours, the spores will infect the plant and create a lesion. In most cases in the Central West region the early infection of seedlings does not progress to adult plants.

If moist conditions do continue early in the season however, the initial infection may get progressively worse as the plant matures.

#### Secondary stage:

Following on from the primary infection, if moist conditions continue the primary lesion will begin to develop asexual spores known as conidia. The conidia can be spread by rain drop explosion as well as by wind.

Conidia can travel much further than ascospores. They are capable of travelling up to 100 metres and can infect neighbouring crops and stubbles.

### Seed infection:

The infection that is seen in wheat seed is commonly known as red smudge. The pink fungal mass in the head of the plant will only occur over long wet and humid conditions during the grain-filling period when there are a large number of airborne spores present. This is rarely seen in the CWFS area. If an infected seed is sown it has the potential to perpetuate the yellow leaf spot disease cycle, and reduce vigour and yield in those plants.

## Control

### Stubble management:

If a paddock has a history of yellow leaf spot or there is a paddock within 100 metres that is known for yellow leaf spot issues, it may be worth managing the stubble directly in

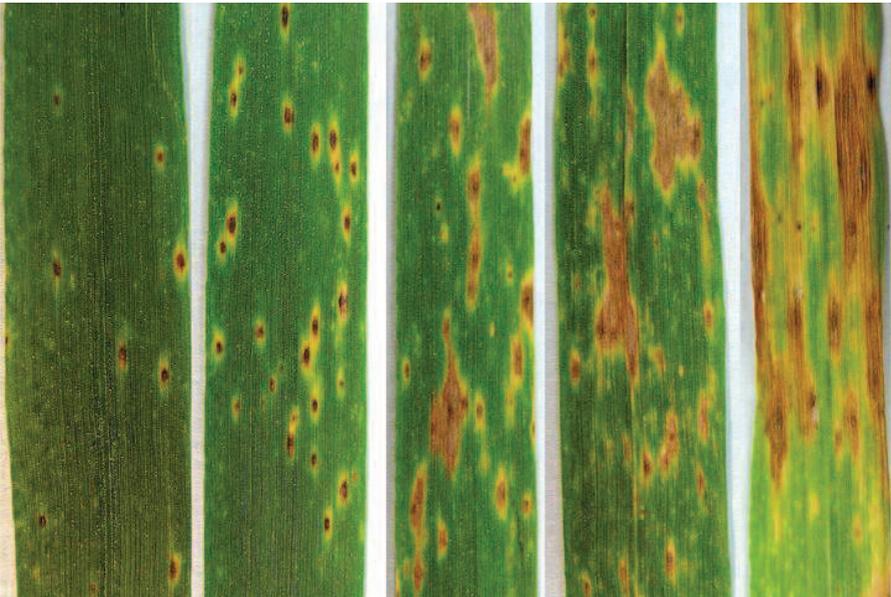
those paddocks. This may include burning, grazing or cultivating the stubble to reduce the amount of inoculum.

### Avoid growing susceptible varieties:

By growing varieties rated moderately resistant or better, the in-crop pressure of yellow leaf spot is significantly reduced. It should be noted that complete resistance to the disease is not needed to achieve sustainable control.

### The risk of wheat on wheat:

The risk of infection can be aggravated by growing back to back cereal crops such as a wheat on wheat rotation. Generally just one year out of wheat will noticeably reduce the risk of early infection. However, there may



Yellow leaf spot is often confused with nutrient deficiency, leaf tipping or frost damage. Look for tan coloured spots surrounded by yellow rings. If unsure seek agronomic advice. (Picture supplied by GRDC).

still be a disease risk from older stubbles that have not broken down if conditions have remained dry.

### Crop rotations:

Using non-host species as a break crop has been shown to reduce inoculum loads by up to 95 per cent in a single year where good stubble breakdown occurs.

Yellow leaf spot is a major pathogen of wheat only which means any other crop species are non-host control options. An example of a highly effective break crop rotation against yellow leaf spot would be one year of field peas followed by one year of canola.

### Fungicides:

When it comes to applying fungicides for yellow leaf spot timing is critical. The fungicide will only persist for up to three weeks which means that follow up control measures may be required in crops that have a high level of inoculum in wet conditions.

If only one spray is planned it should be applied when the plant is at growth stages GS31 and GS32. If wet conditions persist and a second spray event is planned, the second spray should be applied between GS39 and GS49.

Some studies suggest promoting crop growth with urea or combining urea with fungicides may be a better management approach than using fungicides alone (et al Ciara Beard and Anne Smith, Department of Agriculture and Food). In the Central West area of NSW it has been observed there is no significant benefit to yield by applying fungicides in dry conditions.

## Case study:

### Peter Stuckey, Condobolin.

Peter farms a 10,000 ha dryland property 25 km north of Condobolin. He mainly crops wheat, barley, oats and canola while also growing field peas and lucerne as break crops. His farm is divided into areas of continuous cropping, grazing for livestock and traditional mixed farming although this regime isn't rigid and may change in the future.

The wheat crops in the 2015 season followed field peas, canola or long fallow with only one paddock of wheat on wheat. One long fallow paddock of Suntop® wheat showed a small amount of yellow leaf spot that was noticed by his agronomist.

Although yellow leaf spot has not been a big issue in the past, to prevent a re-occurrence of the disease in one particular paddock (of older farming country) Peter applied good early nutrition with 80 kg MAP followed by 60 kg of urea during July as the season progressed with good rains and plentiful soil moisture.

The paddock affected followed a long fallow and Peter believes any yellow leaf spot that was present survived on grasses during a pasture phase. Peter and his agronomist decided nutrition was a better form of control than fungicide application and applied the urea. The disease seemed to disappear after that. They missed the opportunity for a second application of urea but the disease was barely noticeable in the paddock and expected yield loss from it was minimal. In 2016 Peter planned to grow barley in that particular paddock.

In the future if wet seasons persist, Peter sees there could be a problem with yellow leaf spot in situations where wheat is continually

cropped. However, if the break crops they are currently growing become uneconomical other options may be considered to reduce the risk of yellow leaf spot developing.

At this stage they will not burn stubbles even if affected by yellow leaf spot as Peter believes the benefits of retaining stubble far outweighs that of burning and would prefer to grow a break crop as an alternative measure.

Scan the QR code to listen to a podcast of Peter's case study or follow the link below.



<http://cwfs.org.au/podcast/yellow-leaf-spot-in-stubble/>

## Latest research & updates

- Wheat disease management in Victoria 2017. Author: Grant Hollaway, Joshua Fanning, Melissa Cook and Mark McLean (Agriculture Victoria, Horsham) | Date: 21 Feb 2017.
- Yellow leaf spot reduced yields in susceptible varieties by approximately 20% in field experiments in the Wimmera and Mallee during the wet season of 2016. Losses were less than 6% where resistant varieties were grown. Fungicide control was shown to be variable, but the best control was achieved with two sprays applied at growth stages Z31 and Z39.

- <https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2017/02/heat-disease-management-in-victoria-2017>

## Acknowledgements & useful links

Scan the QR code to view a video of Steven Simpfendorfer speak on yellow leaf spot at a CWFS workshop in 2015 or follow the link below.



<https://www.youtube.com/watch?v=nDUDn38dM2M>

- “Is it worth spraying?” - Grains Research & Development Corporation. <http://grdc.com.au/Research-and-Development/GRDC-Update-Papers/2013/02/Yellow-leaf-spot-Is-it-worth-spraying/3/3>

This guideline has been developed by Central West Farming Systems Inc. (CWFS) as part of the Maintaining Profitable Farming Systems with Retained Stubble initiative, funded by the Grains Research and Development Corporation (GRDC). The initiative involves farming systems groups in Victoria, South Australia, southern and central New South Wales and Tasmania collaborating to validate current research at a local level and address issues for growers that impact the profitability of cropping systems with stubble; including pests, diseases, weeds, nutrition and the physical aspects of sowing and establishing crops in heavy residues.

During 2012 discussions with local producers resulted in CWFS identifying 13 subjects that impact on the management decisions for producers in Central West NSW.

Since then CWFS has undertaken a range of research, development and extension (RD&E) activities focusing on these subjects. These publications are an attempt to capture those activities and provide regionally specific guidelines for producers aiming to retain stubble in Central West NSW.

A primary part of this work has been to correlate existing resources and research from several organisations and CWFS thanks these respective organisations for their work. CWFS and the GRDC also thank the experts who technically reviewed these guidelines.

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The above information on yellow leaf spot identification and management has been produced over a number of years by the NSW Department of Primary Industries (DPI), GRDC and various research bodies in the US. CWFS thanks them for allowing reproduction of much of their information.

### Disclaimer

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