

# RAMULARIA LEAF SPOT IN BARLEY

# FACT SHEET



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## Barley disease added to watchlist

### KEY POINTS

- Understanding the behaviour of *Ramularia* leaf spot (RLS) of barley in Australia is at an early stage
- RLS symptoms are often mistaken for other leaf diseases, especially net blotches
- Unlike the net blotches RLS lesions are restricted by leaf veins
- Where conditions are conducive yield penalties could be similar to those overseas although, generally, Australian environmental conditions are considered less favourable to the disease.
- No evidence of fungicide resistance in RLS has been detected in Australia to date
- Fee-for-service leaf tissue testing is available



Barley in Western Australia with a mixed infection of SFNB and RLS

### What is Ramularia?

Ramularia leaf spot (RLS) is a fungal disease in barley plants that can potentially reduce grain yield and quality. RLS is caused by the pathogen *Ramularia collo-cygni*, which is a seed and wind-borne fungus that produces toxins called rubellins. The toxins react with light to damage the leaf tissue. In addition to these lesions, premature leaf death can occur, which in turn reduces grain yields and can cause grain quality issues. The disease is endophytic, meaning the fungus lives within the plant for part of its lifecycle, without causing damage or disease symptoms, before becoming pathogenic. RLS was first detected in Australia in a barley crop in Tasmania in 2016. Further testing over the past few years has uncovered RLS in barley crops in most Australian grain growing regions. International research findings suggest the disease becomes more active during a cool, wet spring, which correlates to its prevalence in the higher rainfall growing zones in Australia. Infected seed does not show any symptoms and no seed testing is commercially available that

can identify infected seed. The disease is often mistaken for other leaf spotting symptoms, such as the net blotch diseases or physiological leaf spotting (an abiotic plant stress response which does not respond to fungicide application), which may lead to crop mismanagement.

### Latest research

International research on *Ramularia* has shown yield penalties of up to 30 per cent in infected crops. While there is limited research on the impact of RLS on barley yields in Australia, researchers suspect that where conditions are conducive yield penalties could be similar to those in UK and other parts of Europe – although, generally, Australian environmental conditions are less favourable to the disease. An irrigated trial in Tasmania in 2018 identified the severity of RLS was significantly influenced by cultivar and cultivar season length, with winter barley varieties demonstrating a greater tolerance to RLS than spring varieties (GRDC project FAR0003). In this trial, eight out of the 10 spring cultivars tested had leaf infection

levels greater than 25 per cent, while the winter cultivars showed infection levels at around 10 per cent. In a separate trial, fungicide applications applied to spring cultivars were found to reduce yield impacts of all foliar diseases including RLS, with yield improvements of up to 24 per cent over the untreated control (there was a small amount of net blotch present at these sites, but negligible relative to the *Ramularia*). Agronomy trials held in Western Australia's Esperance region in 2018 included RLS assessments, and yield penalties of up to eight per cent correlated with increased RLS infection levels.

### What to look for

Symptoms of RLS are often confused or mistaken for other leaf diseases, especially the net blotches which also cause rectangular brown lesions with a chlorotic orange/yellow halo. However, unlike the net blotches, RLS lesions are restricted to within the leaf veins. RLS lesions are often only 5mm long but lengthen as lesions merge and senesce. Lesions will begin to appear on the upper leaves from flowering onwards, often as brown specks, similar to other diseases. Growers in the UK and Europe use a '5R' guide to assist them to identify the disease<sup>1</sup>.

#### THE '5R' LESIONS ARE:

1. Ringed with yellow margin of chlorosis
2. Rectangular shape
3. Restricted by the leaf veins
4. Reddish-brown colouration
5. Right through the leaf.

Towards the end of the season, tiny white spores may be found on the underside of the leaf, seen by using a hand lens or a macro lens on a camera.

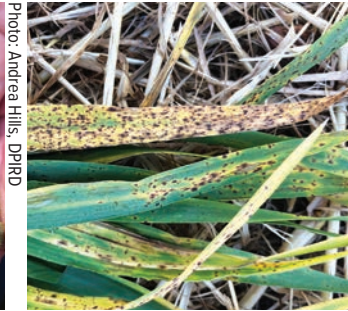
Often RLS will be found simultaneously with other leaf spotting and other leaf diseases such as net blotches.

<sup>1</sup> Agriculture and Horticulture Development Board 2018. United Kingdom.

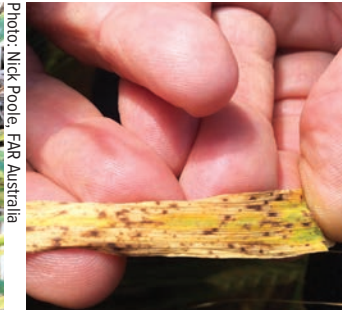
## Visual signs of RLS



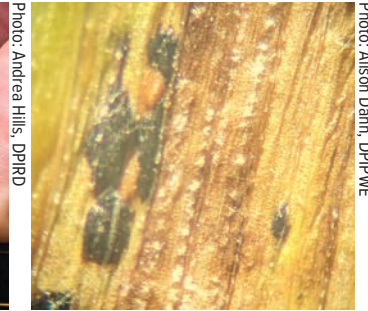
RLS lesions seen on the top of the leaf.



A heavily infected barley crop.



RLS on a barley leaf.



The underside of a barley plant leaf showing the white spores produced by the fungal disease.

## Management

In Australia, products containing benzovindiflupyr and propiconazole (such as Elatus® Ace fungicide) are registered to treat RLS. There has been limited research on RLS in Australia to guide management; however, international work has shown that fungicide applications need to be applied before leaf symptoms appear. Application should occur at early stem elongation (growth stage 31-32) up until awn peep stage (growth stage 49). This fungicide application window is likely to coincide with the management of other, more common, fungal diseases in barley, such as net blotches. Other fungicides registered for use in barley, applied at a similar plant stage, may provide some incidental control of RLS (always follow the label directions for use).

## Seed

In some high *Ramularia* risk regions of the world growers have been advised to plant seed from a crop with no or low levels of infection. The relevance of seed

testing/clean seed approaches under Australian conditions are not yet known. However, initial investigations by the WA Department of Primary Industries and Regional Development (DPIRD) reveals seed that has tested positive does not always result in visible or detectable RLS infections in the following season. For example, there were no visible or detectable *Ramularia* symptoms at some of the sites that were sown with infected seed. At other sites there was detectable *Ramularia*, although RLS visual symptoms could not be clearly distinguished due to the presence of spot type net blotch.

## Crop testing

Leaf samples taken from the time of stem elongation are the most appropriate for testing. Fee-for-service leaf tissue testing for RLS is available, including from:

- Department of Primary Industries, Parks, Water and the Environment (DPIPWE), Tasmania on 1300 368 550
- Diagnostic and Laboratory Services (DLS) at the WA Department of Primary Industries and Regional Development (DPIRD), on (08) 9368 3351
- SARDI, Plant and Soil Health, [https://pir.sa.gov.au/research/services/crop\\_diagnostics/seed\\_and\\_crop\\_testing](https://pir.sa.gov.au/research/services/crop_diagnostics/seed_and_crop_testing)

## Resistance

There is evidence in Europe and New Zealand that RLS has evolved fungicide resistance to some chemistries, so rotating and mixing fungicides/modes of action will be critical to long-term management strategies (see <https://afren.com.au/youve-got-to-keep-it-complicated/>). The limited research in Australia so far indicates fungicides from all three major groups (SDHIs, DMIs and QoIs) are effective. Further research at the Centre for Crop and Disease Management (Curtin University) is assessing the fungicide resistance status of isolates from Australia.

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### FURTHER RESEARCH

A two-year national GRDC-invested research project is surveying the distribution of RLS across Australian grain growing regions.

### GRDC CODE

**DAW1909-003**



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