



Rusts of Barley

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Rusts are important diseases of barley which can cause severe crop damage in susceptible varieties in certain years. Rusts can, however, be effectively controlled with resistant varieties and appropriate management.

*There are three rusts which can attack barley. Leaf rust (*Puccinia hordei*) is the most common and less damaging of the three. Stem rust (*Puccinia graminis*) is less common but can cause severe crop loss in favourable years. Stripe rust (*Puccinia striiformis*) of barley is currently an exotic disease of barley but barley grass stripe rust can attack some susceptible varieties.*

Symptoms

Leaf rust

Pustules of leaf rust are small and circular producing a mass of orange-brown powdery spores predominantly on the upper leaf surfaces (Figure 1). Later in the season, pustules also develop on leaf sheaths. The pustules easily rub off on a finger. As the crop matures the pustules turn dark and produce black spores embedded in the old plant tissues.

Leaf and stem rust may be confused but are distinguished by their colour and size, leaf rust being lighter coloured, smaller and rounder than stem rust.



Figure 1: Leaf rust symptoms on barley leaf (Courtesy R. Park)

Stem rust

The large pustules are oval to elongated and are often surrounded by a characteristic torn margin (Figure 2). The pustules are full of reddish-brown spores which fall away easily. They can occur on stems, leaf surfaces, the leaf

sheaths and heads. As a plant matures, the pustules produce black spores that do not dislodge.



Figure 2: Stem rust symptoms

Stripe rust

Symptoms are very similar to stripe rust in wheat. Bright yellow-orange spores form pustules which occur in stripes along the leaves (Figure 3). In young leaves, the pustules tend to be scattered across the leaf. Spores rub off easily onto a finger. Barley grass stripe rust and barley stripe rust have the same symptoms. If this disease is suspected, it should be reported to Department of Primary Industries pathology staff.



Figure 3: Barley grass stripe rust symptoms on barley

Economic Importance

Leaf rust occurs in susceptible varieties in high rainfall regions in most years. Early infections can result in yield

losses up to 20%. Stem rust is potentially the most devastating disease of the three rusts, able to cause complete crop loss. However, suitable conditions for a severe outbreak are rare. Barley grass stripe rust can cause yield loss greater than 20% in susceptible varieties in some years. If barley stripe rust is introduced to Australia, it will cause severe losses in many varieties.

Disease cycles

Leaf rust

In most cases, leaf rust requires green volunteer barley plants to survive over summer to enable it to infect new crops the following autumn.

However, in areas where the weed Star of Bethlehem (*Ornithogalum umbellatum*) occurs, the black spores are able to infect this plant and undergo a sexual reproductive cycle producing a new generation of spores to re-infect barley. The existence of a sexual cycle means the formation of new strains of rust, increasing the chance of the rust overcoming current resistances.

Currently this weed is more common in South Australia but there are isolated occurrences of it through the Victorian cropping zone so its potential as a host should not be ignored.

Development of the disease is most rapid during warm (15-20°C) moist (rain or dew) weather. Crops sown early, when nights are still warm, are often more severely infected.

Stem rust

Stem rust survives the summer mainly on volunteer wheat, barley, triticale and some grasses including common wheat grass and barley grass. Spores are spread from these hosts to the new crop by the wind.

High humidity and heavy dew favour development of the disease. It is most rapid at temperatures near 20°C and is markedly reduced by temperatures below 15°C and above 40°C.

Wet summer weather causes growth of self-sown wheat, barley and other hosts of stem rust. These plants can become heavily infected with stem rust in the autumn and be a source of rust for the new season's wheat crop. If these conditions are followed by a mild winter and a warm wet spring, the chances of a stem rust epidemic are high.

Barley grass stripe rust

Barley grass stripe rust survives over summer on self sown barley and barley grass. Barley grass stripe rust was first reported in Australia in 1998, therefore little is known about the conditions that favour infection.

Management

Resistant varieties

The most effective way to control all rusts of barley is to grow resistant varieties. To correctly select varieties with resistance, it is essential to consult an updated Cereal

Variety Disease Guide (Agriculture Note AG1160: *Cereal disease guide*). It is important to note that these rusts are able to produce new races which are capable of attacking varieties that were resistant when they were first released so up to date guides must be consulted.

Resistant varieties not only reduce the amount of disease in a crop, and therefore the yield loss, but also reduce the chance of the rusts mutating enabling them to attack previously resistant varieties. Therefore, to protect the resistant varieties that are currently available it is essential to grow resistant varieties when possible.

Cultural practices

Since these rusts survive predominantly on self sown barley over summer it is essential to remove this source of inoculum. Use of heavy grazing, or herbicides to remove this green growth is important, especially in wet summers. If the spring is very favourable for the diseases even small amounts of rust that were not destroyed in the autumn can multiply to cause serious yield losses in the spring.

Seed treatment

There are no seed treatments registered for rust control in barley, however, it is strongly recommend that seed treatments be used for the control of smuts and other barley diseases.

Foliar fungicides

There are a range of foliar fungicides available that will give disease suppression for up to 3-4 weeks of leaf rust in barley (See Agriculture Note AG1190: *Cereal foliar fungicides*.)

More Information

Agnotes: www.dpi.vic.gov.au/notes

(click on Crops and pastures, then Cereals)

Hollaway G and Bedggood W, *Cereal foliar fungicides* (Agnote 1190)

Hollaway G, *Cereal Disease Guide* (Agnote1160)

www.dpi.vic.gov.au (click on Agriculture and Food, then Crops, pastures and weeds, then Grain crops)

Victorian Winter Crop Summary

Wallwork, H (2000) *Cereal Leaf and Stem Diseases*

Wallwork H (1999) *Cereal Disease: The Ute Guide*.

Wurst M, Wilhelm N, Brennan R (2001) *Winter Cereal Nutrition: The Ute Guide*.

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