



Stem Rust: In Crop Management

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When suitable conditions occur stem rust can be an important disease of wheat. Wheat growers must therefore actively monitor crops, as well-timed foliar fungicide applications can minimise losses, should conditions favour stem rust development.

Symptoms

Stem rust is characterised by reddish-brown, powdery, oblong pustules. The pustules have a characteristic torn margin and can occur on both sides of the leaves, on the stems and the glumes (Figure 1). As the plant matures, the pustules produce black spores known as teliospores, particularly on the leaf sheaths and stem. In contrast to stripe rust, which is yellow, stem rust is much darker in colour.



Figure 1. Wheat crop severely affected by stem rust.

Stem rust in Victoria

Conditions that favour stem rust epidemics are rare and occur on average once every 16 years. However, when conditions are conducive and susceptible varieties are grown, losses can be significant. The most severe epidemics occurring in Victoria (in descending order of severity) were: 1973, 1947, 1934, and 1955. In 1973 stem rust reduced the Victorian wheat harvest by about 25%.

It is unlikely that stem rust losses would be that severe in current times due to the increased cultivation of stem rust resistant varieties and the availability of effective foliar fungicides. However, where susceptible varieties are grown farmers need to actively monitor crops with a view to applying fungicides if necessary.

Stem rust can occur in all regions of Victoria where susceptible varieties are grown. However, the likelihood in any region is dependent on local conditions as stem rust is less likely in drier environments and most likely in the wettest production areas.

Conditions favourable to stem rust

The likelihood of a stem rust outbreak is increased by several factors including:

- *Inoculum build up.* Rust inoculum on volunteer wheat before sowing, especially locally, but even in neighbouring states, increases the likelihood of a stem rust outbreak.
- *Susceptible varieties.* Widespread planting of susceptible varieties increase stem rust risk.
- *Favourable weather conditions.* Good spring rain: if the 2 requirements above are met and there is a wet spring, an outbreak is likely to occur.

Variety ratings

The latest information on reaction to stem rust is presented in Table 1.

Table 1. Reaction of wheat varieties to stem rust

Variety	Reaction	Variety	Reaction
Annuello	R	H45	MR-MS
Barham	MR	Janz	MR
Bolac	MS	Kelalac	MS-S
Camm	S	Meering	S
Carinya	MR	Mira	R
Catalina	MR-MS	Mitre	R
Chara	MR-MS	Ouyen	MR-MS
Correl	MR-MS	Peake	MR-MS
Derrimut	R-MR	Sentinel	R-MR
Diamondbird	R	Yitpi	S
Frame	MS	Young	MR

^A R = Resistant; MR = Moderately resistant; MS = Moderately susceptible; S = Susceptible; VS = Very susceptible

* Ratings based on limited data should be treated with caution.

There are a number of strains of stem rust present in eastern Australia and current information suggests that the strain able to attack varieties containing the VPM stem rust

resistance is dominant. It is important that growers are aware of their varieties' disease reaction to stem rust and consult a current Cereal Disease Guide (AG1160).

Management of stem rust in crops

Even though stem rust can potentially cause significant yield losses, its effects can be minimised with the timely application of foliar fungicides following active monitoring. Stem rust is most severe in susceptible varieties when it begins to develop in the crop before flowering with losses of 50% possible. Yield losses from later infections are possible but not as severe.

There is only limited information on the management of stem rust in Victoria and control recommendations are largely based on experience in Western Australia. The following recommendations are given for the management of stem rust in crop.

Monitoring

As stem rust requires warmer conditions than stripe rust for development, it is advisable to begin monitoring for stem rust from flag leaf emergence onwards. Monitoring will be necessary in seasons when stem rust has been detected in the region or on volunteer plants before sowing.

Guidelines for monitoring for stem rust in wheat crops:

- Inspect wheat crops every 7 to 10 days from flag leaf emergence to early dough grain development, but when stem rust is detected within a region increase inspection frequency to every 4 to 7 days.
- Carefully inspect different plant parts, especially lower stems, for symptoms of stem rust. Spend at least 15 minutes walking through each wheat crop.
- If stem rust is detected, walk through the paddock in a 'W' pattern and collect 10 stems from 10 random locations (total 100 stems) and determine the number with any stem rust.

When to spray

Table 2 can be used as a guide for application of foliar fungicides. Note that this table is not based on Victorian data, but on limited experimental data from Western Australia. Fungicides will give better control of stem rust if they are applied early in the epidemic as early epidemics are the most damaging. A late, low level occurrence of stem rust (ie after mid-dough) will have a minimal impact on yield.

Choice of fungicide

Fungicides applied early in a stem rust epidemic can reduce the affects of stem rust on wheat yield and quality. In Victoria there are three active ingredients registered for use on stem rust: a large number of products containing tebuconazole (e.g. Folicur® 430SC fungicide), a large number of products containing propiconazole (e.g. Tilt® 250EC systemic fungicide or Nufarm Bumper® 250EC fungicide) and Tilt® Extra fungicide which contains cyproconazole and propiconazole. Under high pressure only maximum label rates should be used. Read the label

before use and check that the product is registered for the intended use.

Table 2. A guide to when to spray

Growth stage	% stems infected ^A	Crop rating	
		MS-S	MR-MS
Before ear emergence	1-5	Spray	Monitor
	> 5	Spray	Spray
Ear emergence – mid dough	> 5	Spray	Monitor
	>50	Spray	Spray
After dough stage and 4 weeks grain filling left	>50	Spray	Spray

^A Stems selected at random across crop.

Life cycle

Stem rust is caused by the fungus *Puccinia graminis*, which requires a living host to survive from one season to the next. The most important host is susceptible volunteer wheat growing during the summer/autumn. In addition to wheat, stem rust can also survive on barley, triticale, and some grasses.

Wheat varieties susceptible to stem rust enable inoculum levels to build up on volunteers during the summer, especially during wet summers that promote the growth of self-sown wheat. These plants can become heavily infected with 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.

Rust spores are wind-blown and can be spread over large areas in a short time. Wet conditions and temperatures of approximately 15-30°C favour the establishment of stem rust within crops.

Further information

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

(click on Crops and pastures, Cereals)

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

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*

The previous version of this Information Note was published in June 2007.



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