

Do you know your rusts?

There are two well-known rust diseases of sugarcane – orange rust caused by *Puccinia kuehnii* and brown rust caused by *Puccinia melanocephala*. During the 1970s brown rust spread to many sugar industries throughout the world and, consequently, was known as ‘common’ rust. It appeared in Australia in 1978. Orange rust, although present in Australia since the 1890s, was considered a minor disease and was confined to the Asia-Pacific region.

Of course, things changed in 2000 when an orange rust epidemic swept through the industry – the ‘rare’ rust became ‘common’ in Australia. To avoid confusion ‘common rust’ was given the more descriptive name of brown rust. The two rusts can be distinguished by symptoms, environmental requirements and spore characteristics. Both diseases show elongated lesions on the leaf. In a fresh infection, the underside of the leaf shows masses of spores erupting from the lesion, known as a pustule.

Orange rust occurs in all cane-growing districts in Queensland and New South Wales and the disease is prevalent in humid summer conditions. Orange rust pustules are orange when fresh, shorter than those of brown rust and tend to form in clumps, more towards the leaf base (Photo 1).

Brown rust occurs during dry weather with cool nights and dews. Brown rust is most often seen in the spring in northern districts, and in late spring and into the summer in the south. Brown rust pustules are brown and are more elongated. The



PHOTO 1 | Orange rust pustules in clumps.



FIGURE 1 | Orange rust spores. Optimum temperature for orange rust spore germination is 17-23°C.

pustules are spread evenly, located more towards the leaf tip (Photo 2). Orange rust spores are larger than brown rust and golden-orange in colour (Figure 1). By looking at the spores under the microscope, you can easily see that the spores have a thick wall at the apex and have large spines.

Brown rust spores are smaller than orange rust, and are red-brown in colour (Figure 2). When observed under the microscope, brown rust spores can be distinguished from orange rust spores because the entire wall of the spore is of uniform thickness, the spines are very small but more numerous and several pores will be prominent. The pustules also contain some very distinctive structures known as paraphyses (see Figure 2).

During an epidemic in Mackay, losses due to orange rust in the susceptible variety Q124 were up to 45%. Since that time, with lower infection pressures, the losses are more likely 15-20% in susceptible varieties. Losses in other districts are likely to be similar to this latter figure, and will vary with the weather experienced each year. The best conditions for orange rust are a long and extended wet season.

Brown rust yield loss research was carried out soon after the disease entered Australia, in the late 1970s to the early 1980s. Trials were undertaken with fungicides and in the most susceptible varieties losses were around 25%. As with orange rust, losses will vary with season and weather conditions.



PHOTO 2 | Brown rust in Q190^{fl}. Pustules are more towards the tip.

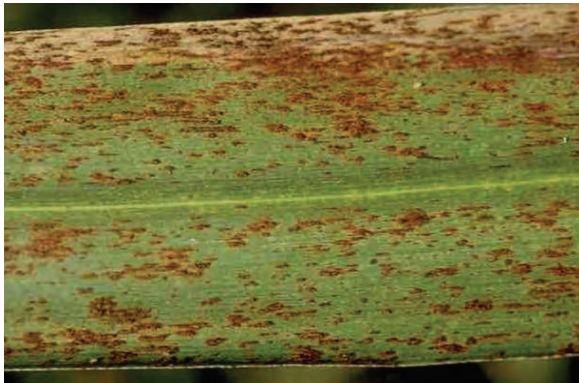


FIGURE 2 | Brown rust spores. Optimum temperature for brown rust spore germination is 11-27°C.

Both orange rust and brown rust are controlled by planting resistant varieties. Any variety coming through the BSES breeding program that is highly susceptible to either rust is discarded. Rust fungi in other crops are known to mutate so that they can attack previously resistant varieties. This is what we believe happened when Q124 suddenly became susceptible to orange rust.

Changes in susceptibility of sugarcane varieties has been rare in the past but it is possible that we may see it again in the future.

Below photos: Orange rust.



A close-up of a diseased leaf showing the lesions of orange rust.



Diseased leaf with orange rust lesions.



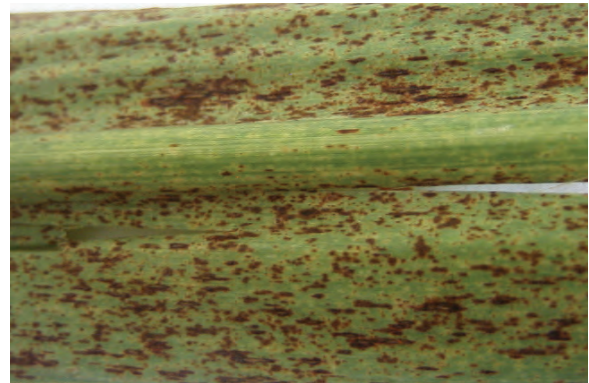
A diseased crop of Q124 – dead leaves on standing cane caused by orange rust.

Planting no more than 30-40% of any one variety on a farm is a good strategy to limit the risks from disease outbreaks.

Fungicides were used to control orange rust as an interim control measure while Q124 was being replaced by resistant varieties. Aerial application of fungicides is effective for control of orange and brown rusts but is generally not required if resistant varieties are available.

For more information visit bses.com.au.

Below photos: Brown rust.



Brown rust on sugarcane leaf.



In brown rust the initial yellow spots on the leaves increase in size and turn a rusty brown.



Brown rust in a field of young Q117 plant cane.