# Information Sheet

## 9.4 Sugarcane rust

*Three rust species (types) infect sugarcane: brown rust, orange rust and tawny rust.*

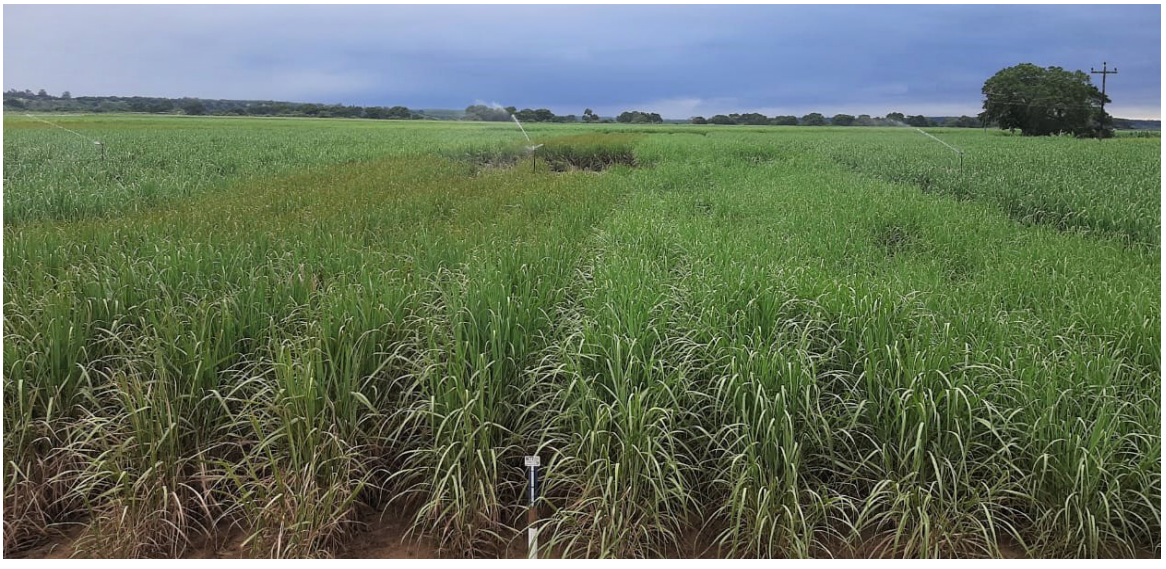
Sugarcane is infected by three rust species, brown rust *(Puccinia melanocephala)*, orange rust *(Puccinia kuehnii)* and tawny rust (*Macruropyxis fulva*). Brown rust is widespread, infecting cane throughout Africa, Asia, Australasia, and North and South America for many years. It was first reported in South Africa in 1941. Orange rust was initially confined to Asia and Australasia and was classed as a minor disease before an apparent genetic shift in the pathogen resulted in serious losses in Australia between 1999 and 2001. Since then, the disease has spread through much of the sugarcane growing world, including Mauritius (2018), Reunion (2019) and Angola (2020). Orange rust spores were detected on traps at Komati from 2016 and the disease was observed for the first time on sugarcane in South Africa in February 2022. Tawny rust is a relatively new disease of sugarcane, first observed on N25 in Swaziland in 2008 before infecting a range of varieties in southern Africa. The grass *Miscanthidium capense* is thought to represent the native original host of tawny rust. This rust has yet to be reported in countries outside southern Africa.

## Yield effects

Rust reduces photosynthesis and uses up nutrients while invading the plant. The disease damages the epidermis of the leaf, affecting the ability of the plant to regulate water loss, causing severely infected leaves to die prematurely. All these factors contribute to yield loss, the extent of which depends on the severity and persistence of the infection.

Yield losses resulting from brown rust infection range from 10 to 40% while losses of 15 to 43% have been demonstrated for orange rust in other countries. Losses of 10% have been recorded for tawny rust but greater reductions in yield can be expected when infections are severe.

Severity, persistence and associated yield loss will vary from year to year depending on the climatic conditions and the varieties being grown.



## Spread

Rust produces spores that are microscopic, light and hardy making them well adapted to rapid short and long distance dispersal by wind and water splash.

Rust is not spread by planting seedcane from an infected field.

## Management

**Resistant varieties**

Varietal resistance is the best and most economical management option. It becomes more challenging, however, to breed and select for resistance when more than one rust pathogen attacks a crop. Resistance to one rust does not mean a variety will be resistant to the others e.g. N12 has excellent resistance to brown rust but has some susceptibility to tawny and orange rust. Mixed rust infections on one variety have been observed.

Genetic changes in rust pathogens can sometimes result in resistant varieties becoming more susceptible. The breakdown of brown and orange rust resistance has been reported in some countries and has often been associated with a popular variety occupying more than 50% of the area under cane in a region. Planting no more than 30% of your farm to one variety can reduce the risk and impact of pests and diseases.

**Fungicides**

Registered fungicides are available for the management of rust on sugarcane in South Africa (Table 1). Apply fungicides to actively growing, susceptible varieties before or at the first sign of rust. Absorption will be poor when plants are stressed or severely infected and the chemicals will not be as effective. Follow instructions on the product label.

**Table 1: Fungicides registered for the management of rust on sugarcane in South Africa**

| Trade name | Target | Rate (L/ha) | No. applications | Active ingredient | Registration holder |
|---|---|---|---|---|---|
| Abacus Advance | Brown rust, tawny rust | 1.6 | 2 | pyraclostrobin : epoxiconazole | BASF South Africa |
| Amistar Xtra | Brown rust, orange rust | 0.5 | 2 | azoxystrobin : cyproconazole | Syngenta South Africa |
| Calculus 125 SE | Brown rust, tawny rust | 1.6 | 2 | pyraclostrobin : epoxiconazole | FarmAg Intl (Cedar Fall Properties) |
| Evito T | Brown rust, tawny rust | 0.5 | 2 | fluoxastrobin : tebuconazole | Arysta LifeScience South Africa |
| Opera | Brown rust | 1 | 2 | pyraclostrobin : epoxiconazole | BASF South Africa |

**Nutrition**

High nutrient levels and nutrient imbalances may result in the crop being more prone to rust infection. Avoid applying excess fertiliser, particularly following green manure or cover crops. Rust tends to be more severe in cane that is growing rapidly, is not stressed and has a dense canopy.

## Symptoms and factors that can be used to distinguish the different types of rust

Early symptoms of all three types of rust are similar and include white to yellow flecking that can be seen on both leaf surfaces. The flecks gradually elongate to form linear lesions that are visible on both leaf surfaces. These develop parallel to the leaf veins and darken from the centre. Spores erupt from the lesions after 10-14 days, breaking the leaf epidermis and giving the surface a rough appearance. This is mainly seen on the lower leaf surface. Whole fields can quickly become infected, changing from green to orange-brown within one to two weeks. As the disease progresses, each rust type presents its own unique symptoms, making it possible to distinguish them from each other when infections are fresh *(see Page 4)*.

**Brown rust**

Brown rust tends to be most severe when conditions are cool and moist, and relative humidity is high in autumn and spring-early summer. Brown rust infects young cane (usually 6 months old or younger) making the effective application of fungicides possible. Symptoms are most common and severe on N37 and N42. Moderate to severe infections have at times been observed on N27, as well as N39, which is particularly prone to infection in the plant crop. The newly released varieties N59, N69 and N75 have developed moderate to severe symptoms in some areas. N14 and N25 may become infected in the irrigated north during autumn and early winter.

**Tawny rust**

Tawny rust is a relatively new disease of sugarcane. While it is common in both irrigated and rainfed areas from year to year, it is only observed periodically in Mpumalanga and seldom in Amatikulu and the coastal zone of the North Coast. Symptoms are most common and severe in late autumn and spring. Tawny rust infects cane of any age and becomes more difficult to manage with fungicides as cane height increases. The disease infects a number of important varieties with N57 being the most susceptible variety currently being grown. Other varieties that are likely to show moderate to severe symptoms when conditions are favourable include N16, N25, N41, N48, N49, N53, N67 and N71.

**Orange rust**

Orange rust was identified for the first time in South Africa in February 2022 on newly released N76. The disease has since been observed in most areas, on a wide range of varieties and at various growth stages. Orange rust has been observed to infect cane from December to May in the SA industry. The disease can infect cane of any age and becomes more difficult to manage with fungicides as the cane increases in height.

*Please see Page 4 for characteristics of the three rust species infecting sugarcane.*

| |  *Brown rust (Puccinia melanocephala)* |  *Tawny rust (Macruropyxis fulva)* |  *Orange rust (Puccinia kuehnii)* |
|---|---|---|---|
| ***Lesions (pustules)*** Colour | Dark brown to reddish-brown | Dark brown to reddish-brown, may be some purpling around the border | Orange to orange-brown to reddish-brown |
| Size | Up to 20 mm long and 3 mm wide | Up to 20 mm long and 3 mm wide | Up to 4 mm long and 0.5 mm wide |
| Distribution on leaf | More concentrated near the leaf tip | More concentrated near the leaf tip | Often more severe in the middle of the leaf, extending to leaf tip<br><br>Note: may be confused with yellow sugarcane aphid (YSA) damage |
| ***Spores*** Colour | Cinnamon to brown when fresh | Bright orange when fresh | Orange to cinnamon-brown |
| Position on leaf | Mainly on lower leaf surface Very rarely on upper leaf | Most abundant on lower leaf surface but also on upper leaf surface | Mainly on lower leaf surface but may be observed on upper surface when severe |
| Abundance (fresh pustules) | Usually sparse | Abundant, easily transferred to clothes and skin | Relatively abundant |
| ***Age of cane*** | Usually 6 months or younger | All ages | All ages |
| ***Favourable conditions*** | Cool (16 to 22°C), misty or light rain, heavy dews, high humidity<br><br>Limited by temperatures exceeding 30°C | Cool (15 to 23°C), misty or light rain, heavy dews, high humidity<br><br>Limited by temperatures exceeding 30°C | Warm, wet, high humidity<br><br>Limited by temperatures exceeding 30°C |
| ***Season*** Most common but not limited to: | April to June, August to September - October | April to June, August to October | December - May |
| ***Other notes*** | | On young plants, often most severe on the leaves closest to the ground<br><br>Becomes more difficult to distinguish from brown rust as fresh orange spores disperse | |

*Sharon McFarlane (Senior Pathologist)*

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