Information Sheet

2. DISEASES

2.10 Sugarcane rust

There are three rust species (types) that infect sugarcane: brown rust, orange rust and the most recent, 'tawny' rust.

Sugarcane has until recently been infected by two rust species (types), brown rust *(Puccinia melanocephala)* and orange rust *(Puccinia kuehnii)*. 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, but was observed in Florida for the first time in 2007 before spreading throughout the Americas. The disease was later reported in western and central Africa in 2010 but has not as yet been observed in southern Africa.

In 2008, a third, unknown rust was found on sugarcane. The rust, proposed name tawny rust *(Macruropyxis fulva sp. nov.)* was observed on N25 in Swaziland and has since spread to most cane-growing areas in South Africa. The disease has also been reported in Mozambique and Zimbabwe.

Yield effects

Rust reduces photosynthesis and uses up nutrients while invading the plant. They damage the epidermis of the leaf, affecting the plant's ability to regulate water loss and cause 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. 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 systemic and therefore does 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 to breed 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 good resistance to brown rust but has some susceptibility to tawny rust. Mixed rust infections on one variety have also been observed.

Genetic changes in rust pathogens can sometimes result in resistant varieties becoming more susceptible. The breakdown of brown rust resistance has been reported from a number of 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

Two fungicides are currently registered for the management of rust on sugarcane in South Africa (Table 1). Apply fungicides to actively growing crops before or at the first sign of rust. Absorption will be poor when leaves are stressed or severely infected and the chemicals will not be as effective.

Table 1: Fungicides registered against rust on sugarcane in South Africa

Trade name	Producer	Target	Rate	No. applications
Abacus®	BASF	Brown rust Tawny rust	1.6 L per ha in 200 L water	2
Amistar® Xtra	Syngenta	Brown rust Orange rust*	500 mL per ha in 300-400 L water	2

*Not yet observed in SA - forms part of the Orange Rust Incursion Plan.

Nutrition

High nutrient levels and nutrient imbalances may result in your crop being more prone to rust infection. Avoid applying excess fertiliser, particularly following green manure 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 yellow flecking that can be seen on both leaf surfaces. The flecks gradually elongate to form linear lesions that are also 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. 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 *(see Page 4)*. They are also often variety specific and are favoured by slightly different climatic conditions which may help with identification.

Brown rust

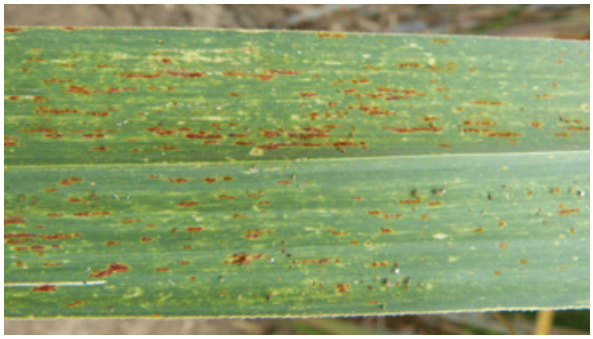
Brown rust tends to be most severe when conditions are cool and moist, and relative humidity is high in autumn and spring. Symptoms are most common and severe on N29, N37 and N42. Moderate to severe infections have also been observed on N39, particularly in the plant crop. The newly released variety N59 has developed mild to moderate symptoms in some areas. N14, N25 and N32 (degazetted) may become infected in the irrigated north during autumn and early winter. Brown rust infects young cane (usually less than 6 months old) making the effective application of fungicides possible.

Tawny rust *(previously known as African sugarcane rust)*

Tawny rust is a new disease of sugarcane in South Africa. It is widespread and infects a number of important varieties under both irrigated and rainfed conditions. Symptoms have been most common and severe in late autumn and in spring/early summer on N16, N25, N41, N48, N49 and N57. Tawny rust infects cane of all ages - the disease becomes more difficult to manage with fungicides as the cane increases in height.

Orange rust

Orange rust has not as yet been observed in southern Africa. Of the South African varieties tested in Florida and Australia, only N32 (degazetted) has shown some susceptibility. The disease is usually observed in summer and early autumn, infecting more mature cane (usually older than 6 months), making the disease more difficult to manage with fungicides.



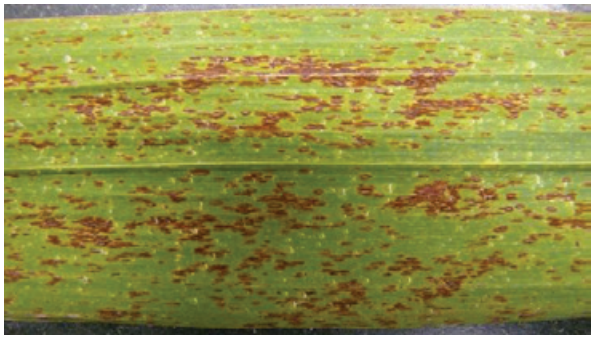


Photo credit: Sushma Sood, USDA

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

Updated by Sharon McFarlane (SASRI Scientist: Plant Pathology)

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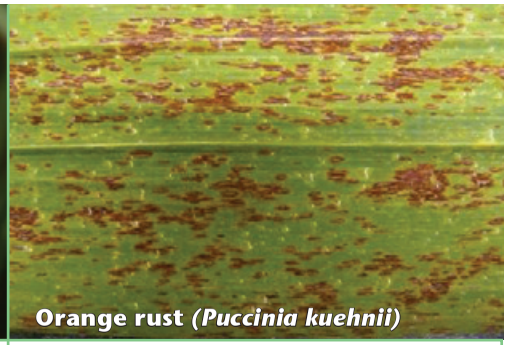
Characteristics of the three rust species infecting sugarcane

	 Brown rust *(Puccinia melanocephala)*	 Tawny rust *(Macruropyxis fulva sp. nov)*	 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
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 3 mm wide
Distribution on leaf	More concentrated near the leaf tip	More concentrated near the leaf tip	More concentrated towards the leaf base, tend to occur in groups
Spores			
Colour	Cinnamon to orange-brown	Bright orange when fresh becoming dark-reddish brown over time	Orange
Position on leaf	Mainly on lower leaf surface Very rarely on upper leaf	Most abundant on lower leaf surface Common on upper leaf surface	Mainly on lower leaf surface Very rarely on upper leaf surface
Abundance (fresh pustules)	Usually sparse	Abundant, easily transferred to clothes and skin	Relatively abundant
Age of cane	Less than 6 months	All ages	Usually more than 6 months
Favourable conditions	Cool (less than 25°C), misty or light rain, heavy dews, high humidity	Cool (15 to 23°C), misty or light rain, heavy dews, high humidity	Warm, wet, high humidity
	Limited by temperatures exceeding 30°C	Limited by temperatures exceeding 30°C	Limited by temperatures exceeding 30°C
Season			
Most common but not limited to:	August to November, March to June	August to October, June	November to April
Other notes		Often most severe on the leaves closest to the ground in young plants As fresh orange spores disperse, more difficult to distinguish from brown rust	