

RATOON STUNTING DISEASE

INTRODUCTION

Ratoon Stunting Disease (RSD) was discovered by BSES pathologists in 1944. It is now recognised worldwide as probably the most economically important disease of sugarcane. RSD is found in all districts in eastern Australia, but has not been found in Western Australia. Disease incidence is related to the degree to which appropriate management strategies are applied.



CAUSAL ORGANISM

The disease is caused by the bacterium *Leifsonia xyli* subsp. *xyli*, which infects the xylem (water transport) vessels of the sugarcane plant. The bacterium is rod shaped, typically with a slight bend and measures 0.25-0.5 μm by 1-4 μm .

SYMPTOMS

RSD leads to no external symptoms other than stunting. Diseased fields often have an 'up-and-down' appearance due to differing levels of stunting in adjacent stools.

The only other visible symptoms are red-orange dots or 'commas' in the vascular traces in the nodal tissue (which can be seen when stalks are sliced open with a sharp knife), and a faint pink discoloration of the growing point of young plants. These symptoms

are not always present, and some varieties can show similar symptoms when not infected.

YIELD LOSS

RSD causes yield losses from 5-60% depending on the susceptibility of the variety and the weather conditions. Yield losses are higher when the cane is suffering moisture stress. Average yield losses are around 15-20%.

DIAGNOSIS

The bacterium that causes RSD is found at the highest concentration in xylem vessels; it is also possible to detect the bacterium in leaves and leaf sheaths. SRA currently uses a DNA molecular assay (qPCR) to specifically detect the pathogen.

The SRA RSD laboratory tests approximately 8-10,000 samples each year for the Australian sugarcane industry. This helps ensure new crops are established from disease-free planting material and also provides feedback on disease incidence in commercial crops.

Sampling for RSD diagnosis involves collecting at least 16-20 stalks throughout a field. Selecting stunted stools in a crop can increase the chances of detecting the disease, if it is present.

SPREAD

The two primary methods of disease spread are the use of infected planting material and contaminated cutting equipment.

The bacterium is highly contagious and can be spread for many metres down a row after a planter or harvester cuts a diseased stalk or plant.

Any implement that cuts the stalk or makes contact with the freshly-cut end of the sett or billet may readily spread RSD. Some of the more common implements that spread RSD are cane knives, whole-stalk and billet planters, harvesters, cane-stripping machines, haul-out vehicles used to transport billets to planters and chain saws used to trim bundles of stalks. The recirculating fungicide spray system on planting machines can carry the bacterium and spread the disease.

An implement can be disinfected by:

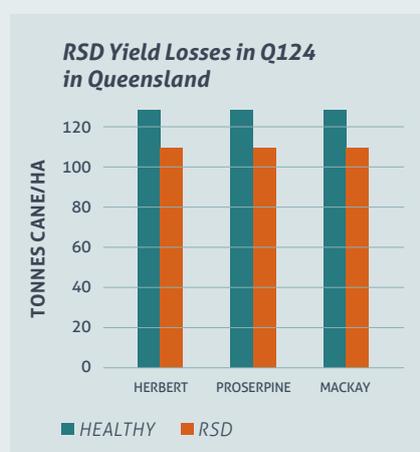
- Removing all soil and plant material with water and detergent under high pressure.
- Knives and parts of machines that come in contact with cut surfaces should be treated with a registered product containing didecyldimethylammonium chloride (Steri-maX). The disinfectant should be left in contact with the implement for 5 minutes before use and applied according to label directions. Other disinfectants are suitable for small-scale application (70% methylated spirits or sodium hypochlorite).
- On harvesters: the base-cutter, butt-lifter roller, chopper-box and extractor fans should be disinfected when cutting cane to be sent to the mill. When cutting billets for planting, the whole feed-train should be disinfected, as well as the base-cutter, chopper-box and extractor fans.

If diseased volunteer plants from the previous crop are present, the newly-planted crop will become infected with RSD during the first harvest. The

practice of 'ploughout-replant' (when a new crop is planted within a few weeks of ploughing out the previous crop) has resulted in a sharp increase in RSD incidence in some districts.

MANAGEMENT

Control has been effective in most parts of the Australian sugarcane industry. The keys to controlling the disease are planting disease-free (approved) seed and preventing infection of healthy crops by disinfecting planting and harvesting equipment. In districts where there is a high acceptance of approved seed and a high percentage of RSD plant source inspections, the disease has generally been kept at low levels.



Disease-free seed is produced for distribution to farmers by repeatedly hot-water treating (50°C for 3 hours) nucleus or mother-plot cane. It is essential that disease-free (approved) seed is planted into fallow ground with no volunteers.

RESISTANT VARIETIES

Some varieties have partial resistance to RSD (eg. Q200(b) and Q208(b)) and disease spread is restricted in these varieties.

Many highly productive varieties, such as KQ228(b) and Q242(b) are highly susceptible and yield losses can be substantial. SRA has never actively selected for RSD resistance as recommended management strategies are effective when applied appropriately. Resistance ratings have been applied to commercial varieties - as a guide for growers and adoption / extension staff.

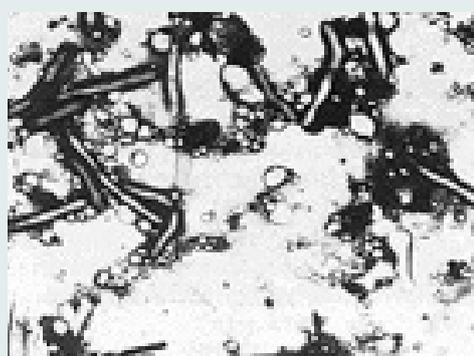
FOR FURTHER INFORMATION

If you would like further information on RSD management, contact your local adviser.

REFERENCES

- David MJ, Gillaspie AG Jr, Harris RW, Lawson RH. 1980. Ratoon stunting disease of sugarcane: Isolation of the causal bacterium. *Science* 210, 1365-1367.
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- Croft B, Magarey R and Whittle P. (2000) Disease management. In: *Manual of cane growing* (eds Hogarth DM and Allsopp PG. SRA, Brisbane.

(Below left) RSD bacteria under an electron microscope. (Below) Red dots in nodes of RSD infected stalk (left) compared to a healthy stalk (right).



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