



Information Sheet

2. DISEASES

2.1 Ratoon Stunt (RSD)

Under the terms of the Sugar Industry Agreement (2000), Clause 77, RSD is a legislated disease. As such, the disease must be reported to the Local Pest, Disease and Variety Control Committee and must be managed according to the rules prescribed by the Committee (Clauses 78-80).

Ratoon stunt, formerly known as ratoon stunting disease (RSD) can cause substantial yield loss. This important disease, caused by the bacterium *Leifsonia xyli subsp. xyli*, occurs throughout the sugarcane industry although infection levels differ widely from region to region. The disease often goes unnoticed because there are no easily recognisable symptoms, and can only be reliably identified by submitting samples to SASRI for testing.



Figure 1. Effect of RSD on cane yield under irrigated conditions

Effect on yield

The effect of RSD on yield differs among varieties, but most can be severely affected. The disease slows down growth, resulting in a reduction in cane height and diameter but usually has little effect on cane quality. Yield losses range from 0.1 to 0.5% for every 1% stools infected depending on variety and growing conditions. Average yield losses of approximately 17% could be expected in heavily infected fields under rainfed conditions, while losses under irrigated conditions would be around 15%. Losses are more severe when the crop suffers from moisture stress.

Spread

RSD is spread mainly by:

- Planting infected seedcane.
- Survival of RSD in volunteers and plant debris after infected crops are eradicated and fields replanted.
- Transmission from infected to healthy plants through wounds caused by farm implements, especially those used during planting and harvesting operations e.g cane knives, mechanical planters and harvesters.

Management strategies

RSD is regarded as one of the easier diseases to manage because it is not airborne and has no known insect vectors e.g. aphids or leaf hoppers. Sugarcane is also the only known host of the RSD bacterium in nature. By following some key steps, the risk of introducing RSD onto the farm can be minimised and if already present, levels can be reduced over time.

The key steps to managing RSD are:

Planting only certified or approved seedcane in commercial fields. Refer to SASRI's Seedcane Production Manual for information on the requirements for, and production of, seedcane. Remember to source seedcane for gap-filling from a certified or approved nursery.

Ensuring the thorough eradication of the old crop before replanting. Replanting fields within a few weeks of eradication is not good practice as volunteer regrowth and infected plant debris are common sources of infection in newly planted fields. Check the RSD status of fields that are due to be eradicated by sending samples to SASRI for testing.

Give all fields, but especially those that were previously infected with diseases such as RSD, smut or mosaic, a break from cane before replanting so that volunteers can be identified and removed effectively. The break can include the winter months to minimise the short-term effects on production. Consider planting cover crops during the break. The chosen cover crop should preferably be low-growing so that volunteers can be seen easily and removed from the field. The benefits of cover crops are discussed in SASRI Information Sheet 14.2 and SASRI's Green Manuring Manual. Recommended fallow periods (fields must be inspected monthly and volunteers must be removed during the fallow period):

- *Certified nursery blocks* – overall not less than 12 months with a minimum of 6 months totally free of sugarcane.
- *Approved nursery blocks* – overall not less than 9 months with a minimum of 6 months totally free of sugarcane.
- *Commercial fields* – a minimum of 3 months totally free of cane.
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Knowing the RSD status of your fields. RSD does not have consistent symptoms that can be easily recognised in the field. For accurate diagnosis, submit samples to SASRI for testing. Diagnosis has three main purposes:

- 1) to check the health of seedcane,
- 2) to check the RSD status of old ratoons due for replanting, and
- 3) to check the RSD status of fields where yields fall below expectations.

RSD bacteria live inside the xylem (water conducting) vessels of the stalks, so for accurate diagnosis, the xylem sap (not the cane juice) needs to be extracted. This extracted sap is then sent to SASRI for testing, usually using the evaporative binding-enzyme immunoassay (EB-EIA) which has been used for a number of years to routinely diagnose RSD. The disease can also be diagnosed using phase contrast or immunofluorescence microscopy and molecular methods.

In most cases, the SASRI Biosecurity teams will collect samples from the fields to be tested but growers can take their own samples and deliver to the Biosecurity office provided arrangements have been made for the samples to be received. When taking samples, the following points should be noted:

- The samples must be taken from maturing cane that is at least nine months of age to ensure the populations of RSD bacteria in the stalks are high enough to be detected.
- Select stalks from poorly grown stools in all parts of the field to increase the likelihood of detecting RSD in what is a relatively small sample.
- The lower portion (50-100 cm) of each stalk is required – the RSD populations are highest in the lowest internodes.
- Bundle the stalks from a field or section of field together securely and label with the farm, field and crop details.
- Deliver the stalk samples to the Biosecurity office as soon as they've been collected. The sap must be extracted on the day of collection. Delays can seriously reduce the accuracy of diagnosis. If the stalks are too dry, another sample will need to be collected from the field.

Standard RSD sample sizes:

- *Commercial fields:* 20 stalks per 5 ha field or section of field.
- *Certified or approved seedcane nurseries:* 40 stalks per 1 ha seedcane block. Separate 40-stalk samples must be taken 1) from blocks that exceed 1 ha, 2) from blocks that are planted to different varieties, 3) where seedcane of one variety was obtained from a different source, or 4) where seedcane of one variety was prepared and planted on different dates.

Field hygiene. Cleaning cane knives with a disinfectant such as Jeyes Fluid (10% solution) or methylated spirits (75% solution) when cutting cane minimises the risk of RSD spread. A contact time of approximately five minutes is required for Jeyes Fluid to be effective. A knife-cleaning device (shown below) can be used to remove soil and plant debris from the knife blade to facilitate disinfection. Methylated spirits should be prepared in a knapsack sprayer to reduce the risk of evaporation and can be sprayed onto the knife blade – a few seconds is required for effective disinfection.

In a commercial situation where in-field cleaning is not always practical, knives should at least be disinfected when moving from one field to another and at the end of each day. More frequent disinfection (preferably after every metre of row cut) is necessary when harvesting seedcane. Extra knives should be allocated to each cutter to ensure that knives are disinfected properly. Knives used for cutting seedcane should be kept separate from those used in commercial fields.

It is difficult and time-consuming to disinfect mechanical harvesters effectively. All parts of the harvester that come in contact with cut cane surfaces need to be washed with a high pressure sprayer to remove plant and soil debris before applying the disinfectant.



Knife cleaning apparatus

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