

# Leaf scald

## Introduction

Leaf scald is a serious disease that occurs in all regions of the Australian sugarcane industry. Leaf scald can cause extensive yield losses in highly susceptible varieties through death of stalks and poor ratooning. Major epidemics of leaf scald have occurred in the Central and Burdekin regions. Leaf scald is rare in the Bundaberg region.

Leaf scald can cause major disruption to disease-free seed schemes. In some cases, plots may have to be relocated to areas isolated from known sources of disease.

Approximately 20% of clones in the SRA/CSIRO selection programs are discarded due to leaf scald susceptibility. The disease restricts the use of parent clones.

## Causal organism

The disease is caused by the bacterium *Xanthomonas albilineans* (Ashby) Dowson, which infects the xylem (water transport) vessels of the sugarcane plant. The bacterium is rod shaped.

## Symptoms

Leaf scald has three stages of symptom development.

### Latent phase

- Leaf scald can remain latent in some varieties for long periods (>12 months) while showing no symptoms. Stress can trigger the infected plant to pass from the latent phase into the chronic or acute phase.

### Chronic phase

- Leaf scald causes a range of symptoms including chlorotic (white) stripes and patches of chlorotic tissue on leaves, side shooting beginning at the base of stalks and burning of the leaf tips. When stalks are sliced open, the vascular bundles are red in the nodes.

Within the white stripes on leaves is a well-defined white pencil-line that runs along the vein; this pencil-line is specific to leaf scald.

### Acute phase

- In some susceptible varieties, leaf scald will cause sudden death of whole stools.
- Usually, the dead stalks will show some chronic stage symptoms particularly on side shoots or suckers.

Leaf scald symptoms often appear when cane is placed under stress such as dry weather.

### Yield loss

Leaf scald can cause complete crop loss, though this is rare. Losses depend on the percentage of stools affected. When the number of affected stools is low, surrounding stools can compensate, but as the percentage of diseased stools increases, losses will also increase. Ratoons can fail. Large numbers of dead stalks can affect sugar quality.

Losses in Australia have been negligible in recent years because highly susceptible varieties are not released to growers. The loss of potentially high yielding susceptible varieties is a hidden cost of the disease.

Management of the disease through approved seed schemes and hot water treatment is another significant cost to the industry.



Typical leaf scald pencil-line.



Top of plant showing scalding and chlorosis.

## Diagnosis

Diagnosis of leaf scald is by visual inspection for the specific pencil-line symptom and the other characteristic symptoms.

Diagnosis can be confirmed by isolation of the causal bacterium and identification of the isolated bacteria by ELISA or polymerase chain reaction (PCR) assays.

## Spread

The primary methods of spread of the disease are by planting infected cuttings, by contaminated cutting implements and by wind-blown rain.

Because leaf scald has a latent phase, the disease can be spread in planting material, even if the plant source is inspected for symptoms. It is believed that this is how leaf scald was unknowingly spread around the world.

Any implement that cuts the stalk or comes in contact with the freshly cut end of the sett or billet can spread leaf scald readily. Implements that can spread leaf scald include cane knives, whole stalk and billet planters, and harvesters.

An implement can be disinfected by:

- Removing all soil and plant material with water and detergent under high pressure.
- Spray cutting surfaces and parts that come in contact with cut surfaces with a registered product containing 0.1% benzalkonium chloride or didecyldimethyl ammonium chloride. The disinfectant should be left in contact with the implement for 5 minutes before use.
- 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 chain should be disinfected as well as the base-cutter, chopper box and extractor fans.

Leaf scald can be spread by wind-blown rain, especially during severe weather events. The bacteria can only survive for a few days outside of a plant. Leaf scald naturally infects a number of grasses including paspalum, blady grass, *Brachiaria*, guinea grass and itch grass. The disease is often found associated with river or creek systems, which may harbour infected grasses.

Diseased volunteer plants can carry the disease from one crop to the next.

## Management

Control of leaf scald involves a combination of deploying resistant varieties, disease-free or approved seed schemes and hygiene. Some level of varietal resistance is required to control the disease.

Disease-free seed is produced for distribution to farmers by repeated cold-soak long hot-water treatment (40 hour soak in water at ambient temperature followed by 50° C for 3 hours) of nucleus or mother plot cane. If leaf scald is common in an area, the mother plot and approved seed plot may have to be located in a low risk area.

## Resistant varieties

All clones in the SRA CSIRO selection program are screened for resistance. Crosses between susceptible parent clones are not made to reduce the numbers of susceptible clones coming through the program.

Clones are screened for resistance by cutting the shoot of 6-month-old cane above the growing point and painting it with juice from a diseased stalk. The plants are grown through to maturity and rated according to the number showing symptoms and the severity of symptoms.

Some varieties are extremely resistant and rarely show any symptoms.

## For further information

If you want further information on control of leaf scald contact your local adviser.

## References

Rott P and Davis MJ. (2000). Leaf scald. In: *A guide to sugarcane diseases* (eds Rott P, Comstock JC, Croft BJ and Sauntally AS. CIRAD/ISSCT, Montpellier.

Croft B, Magarey R and Whittle P. (2000) Disease management. In: *Manual of cane growing* (eds Hogarth DM and Allsopp PG. SRA, Brisbane.