CHLOROTIC STREAK

Sugar Research Australia

INTRODUCTION

Chlorotic streak is found in all sugarcane growing areas in eastern Australia and can cause serious yield losses, particularly in flood prone or waterlogged parts of the industry. The disease is one of the most widespread and common diseases within the Australian sugarcane industry (Figure 1). It was recently discovered to be caused by a protozoan.

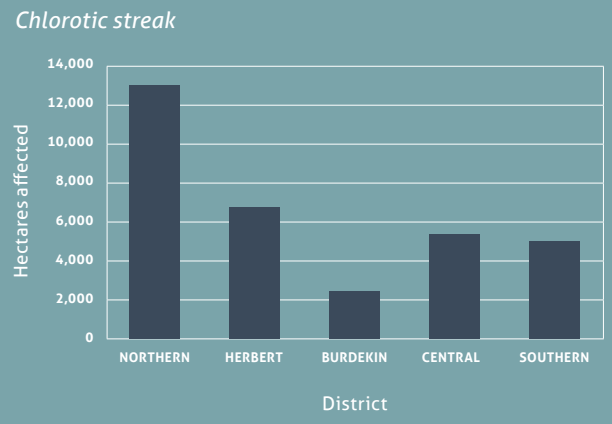

Figure 1: *The influence of region on the incidence of Chlorotic streak disease in Queensland (average of 1980 to 2002 data).*

SYMPTOMS

The main symptoms of chlorotic streak are irregular creamy white streaks with indistinct margins.

Above: *Symptoms of chlorotic streak are irregular creamy white streaks sometimes with patches of dead tissue within the streaks.*

The leaf streaks are irregular with wavy margins; tissue death often occurs in the middle of aging streaks. There may be more than one streak per leaf. Leaf symptom expression depends on soil temperature and so will not always reflect disease status (when no leaf symptoms are observed). A diagnostic assay has been developed but is not yet available on a commercial basis.

Longitudinal slicing of stalks affected by chlorotic streak may reveal short red streaks running through the nodes - these streaks are different in shape to those seen with ratoon stunting disease.

(Above) *Comparison of internal stalk reddening in chlorotic streak (left) and RSD (right).*

YIELD LOSS

Crops affected by chlorotic streak tend to lack vigour, leading to yield reductions of up to 40%. Poor and slow germination and ratooning is a characteristic of the disease.

SPREAD

Chlorotic streak is spread by diseased planting material and by drainage water. The disease is most common in areas prone to flooding and/or waterlogging. The combination of the disease and the deleterious effects of waterlogging can compound the yield losses suffered in infested fields.

The disease can survive for several months in the absence of sugarcane. Recycled irrigation water can spread the disease to crops irrigated with this water.

The disease is not transmitted mechanically by harvesting or planting equipment or other devices such as cane knives. Alternative hosts include a number of common grass weeds.

CAUSAL ORGANISM

Chlorotic streak was first recognised as a disease in 1929 but over 80 years passed before the causal agent was identified. SRA researchers used modern molecular methods and traditional pathology to identify the organism causing the disease.

Using new DNA sequencing technology, they compared the DNA between a healthy and an infected sample. Their investigations eventually led them to a group of organisms called protozoans. The organism is a unique Cercozoa, not closely related to any known organism. It has been named as *Phytocercomonas venanatans*. The organism is about one hundredth of one millimetre in size and is distinguished by two flagella (whip-like structures, pictured below)

MANAGEMENT

Chlorotic streak management relies on the use of disease-free planting material, avoidance of highly susceptible varieties and improved soil drainage.

In some low-lying and flood prone areas, it is impossible to completely eliminate disease spread.

Approved seed is hot water treated to ensure the elimination of chlorotic streak, as well as other diseases such as ratoon stunting disease (RSD) and leaf scald. Chlorotic streak can be eliminated by a short hot water treatment (50°C for 30 minutes). Seed cane should be planted away from flood-prone land, preferably on well-drained sites.

In regions favouring the disease, planting material should be inspected to ensure disease freedom. If chlorotic streak is found, cane from that section of the block with the disease should be avoided or a new seed source that is free of the disease located. Approved seed should be purchased regularly.

***(Above)** The organism causing chlorotic streak, a Cercozoa with two flagella.*

DIAGNOSIS

A PCR-based diagnostic test has been developed for chlorotic streak research, however it is not yet commercially available. It works well on stalk material and expressed sap, meaning that it has the potential to check if planting material is free of the disease.

Current research is looking at ways of combining chlorotic streak and RSD testing.

RESISTANCE SCREENING

Until recently, rating varieties for resistance to chlorotic streak was difficult because replicated field trials with controlled levels of inoculum were challenging to achieve.

Ongoing research is looking at ways of inoculating sugarcane with controlled amounts of the cultured pathogen to develop a resistance screening method. Implementing a rapid routine resistance test would allow highly susceptible varieties to be identified before they are released to industry.

FOR FURTHER INFORMATION

If you would like further information on chlorotic streak please contact your local adviser.