Sugar Research Australia

Information Sheet

IS13087

White leaf disease (WLD)

Introduction

White leaf disease (WLD) was first recognized in Thailand in the 1950s. The disease has caused serious yield losses in Thailand and has some similarities to grassy shoot (GSD) and green grassy shoot diseases (GGSD). All three are caused by a phytoplasma. GSD was the first recognized in India in the 1940s. These three diseases are common in south east Asia. WLD is currently causing a major disease epidemic in Laos in a sugar factory in the south central Savannakhet Province. If WLD was introduced to Australia, it could cause major yield losses to the sugar industry. Issues such as diagnostic techniques, resistant varieties and alternative hosts require further research.

Causal organism

The disease is caused by a phytoplasma. These organisms infest the phloem tissues in the sugarcane vascular bundles. The phytoplasma is difficult to detect, not only because of its small size (requiring an electron microscope) but also because of the limited occurrence of the phytoplasma within the tissues.

Symptoms

The main symptoms of WLD are spectacular, pure white leaves. Heavily infested crops attract attention and it is not difficult to spot these crops even when travelling past at high speed. Initial symptoms consist of streaks along one side of the younger leaves and some mottling – as these develop, whole leaves may turn white. Generally the younger leaves are affected first and diseased stools may show white leaves in the spindle area, while older leaves remain green.

When the disease is severe, stools become markedly stunted and yield is greatly reduced. This leads to poor rationing and failed crops. Advanced infestations are characterized by very gappy crops and greatly reduced yields. Yield losses can be 100%.

The differences between GGSD, GSD and WLD can be summarized as: GGSD does not show any white leaves, GSD has white leaves and grassy tillering, while WLD has white leaves but does not lead to grassy tillers.

Vector

A vector for WLD has been found in Thailand. The insect is a planthopper, *Matsumuratettix hiroglyphicus*. The vector increases the dispersal of WLD both within already diseased crops and between diseased and healthy crops. Research is required to identify potential vectors in other countries where WLD is found.

Yield loss

WLD is capable of causing major yield losses in susceptible varieties. Severe stunting of the sugarcane stool and poor ratooning mean that losses can be devestating. Failed ratoons demand early replanting, resulting in high costs to sugarcane farmers.

Above: A severely WLD-affected sugarcane crop in Laos. Note the very obvious white leaf symptoms in almost all stools within the crop (‘healthy’ crop in background).

Above: Stick-length section of a sugarcane crop affected by WLD. This more than likely is a result of planting diseased planting material – a significant means of disease spread.

Diagnosis

Phytoplasma diseases may be diagnosed using molecular tools. General assays for phytoplasmas have been developed and also primers to specifically identify WLD.

SRA has accessed the molecular tools necessary to identify WLD should a disease incursion occur in Australia. More research would be useful to examine the relationship between the phytoplasmas causing WLD, GSD and GGSD.

In the field, WLD is diagnosed by the pure white leaves in affected stools and the severe stunting of the crop, particularly in later ratoons. The initial white leaves are produced in the spindle and typically older leaves at this stage remain green. WLD does not produce grassy shoot growth (multiple tillering) and this distinguishes it from GSD and GGSD.

Spread

WLD is rapidly spread through the transport planting of diseased planting material. Particularly in South East Asia, this has led to inter-country spread. The disease is also spread by planthoppers: in Thailand, the vector is *Matsumuratettix hiroglyphicus*. Further work is needed to determine the vector(s) in other countries. The disease is not spread mechanically (by cane knives, harvesters, etc).

Alternative hosts

Only limited information is available on alternative hosts for WLD; wild *Saccharum* species may be alternative hosts in some situations – *Saccharum spontaneum* has been indentified as a natural host.

Control

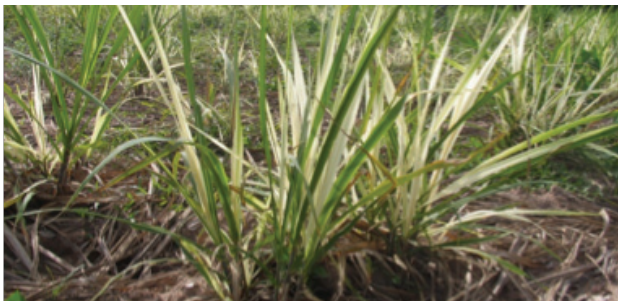
Planting of disease-free planting material is of prime importance for the control of WLD. WLD is largely eliminated from diseased material by hot water treatments (50°C for 2-3 hours). As for RSD, there is a low level of 'escapes' – stalks where the pathogen is not completely eliminated, so care in the selection of disease-free, or minimally diseased planting material is important for hot water treatment.

Resistance to WLD requires further research. There seems to be a very limited amount of resistance to the other phytoplasma diseases (GSD and GGSD) in commercial varieties in either Thailand or Vietnam. Further work into resistance screening is needed. When a disease epidemic is occurring, the most important management strategies are to eliminate badly diseased crops and to replant with disease-free planting material into fallow ground (no volunteers).

If you suspect you may have seen any of these this disease please contact the exotic pest hotline on 1800 084 881, SRA, or your local Productivity Service

Countries affected

WLD has been recorded in the following countries: Japan, Pakistan, Sri Lanka, Taiwan, Thailand and Laos.



Above: White leaves, typical of WLD infection, in a crop in Laos. Note the other affected stools showing white leaf symptoms in the background.

Above: Plant crop affected by WLD. Early symptom expression is characterized by the youngest leaves appearing white with older leaves remaining green.

Above: White leaves in the spindle of the affected sugarcane plant, the first symptom of the disease.