

# 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 phytoplasma and are common in south east Asia. WLD recently caused a major disease epidemic in Laos in a sugar factory in the south central Savannakhet Province and has recently been found in China. If WLD was introduced to Australia, it could cause major yield losses to the sugar industry. Issues such as resistant varieties and alternative hosts require further research.

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*(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).*

## 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 ratooning 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.

## VECTORS

Two vectors for WLD have been found in Thailand. The insects are a planthopper, *Matsumuratettix hiroglyphicus* and a leafhopper *Yamatotettix flavovittatus*. The vectors increase the dispersal of WLD both within already diseased crops and between diseased and healthy crops and are active at different times of the year. 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 devastating. Failed ratoons demand early replanting, resulting in high costs to sugarcane farmers.

## 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 developed 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 transfer of diseased planting material. Particularly in South East Asia, this has led to inter-country spread. The disease is also spread by local planthoppers and leafhoppers. 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 e.g. *Saccharum spontaneum* has been identified as a natural host.

## CONTROL

Planting of disease-free planting material is of prime importance for the control of WLD. WLD can be partially eliminated from diseased planting material by hot water treatments (50°C for two hours, or 54°C for 20 minutes). However, the pathogen is not completely eliminated, so care in selecting disease-free, or minimally diseased planting material for treatment is important.

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).

## COUNTRIES AFFECTED

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



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



(Above) White leaves in the spindle of a diseased sugarcane plant, the first symptom of the disease.

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