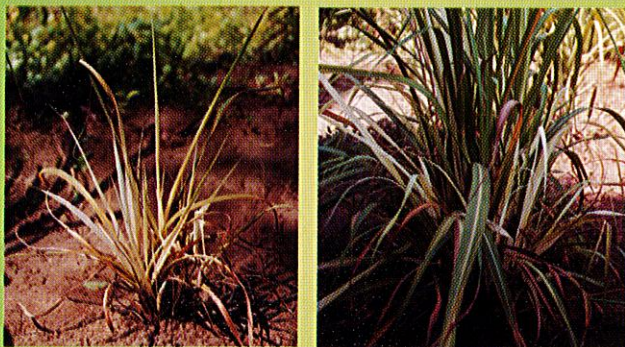


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GRASSY SHOOT AND WHITE LEAF DISEASES OF SUGARCANE IN SRI LANKA



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INTRODUCTION

Grassy Shoot and White Leaf are the most destructive sugarcane diseases caused by phytoplasma. These diseases are found in many sugarcane-growing areas in Africa and Asia including Sudan, Thailand, India, Sri Lanka, etc. In Sri Lanka, symptoms of these diseases were first found in sugarcane plantations in Kantale in 1990 and in Monaragala, Hingurana, Pelwatte and Sevanagala in 1995. On the basis of DNA studies carried out in South Africa and United Kingdom on diseased sugarcane samples from Sevanagala, Pelwatte and Siyambalanduwa sugarcane plantations, only white Leaf Disease (WLD) has been confirmed so far. However, the molecular biological tests have so far failed to confirm the presence of Grassy Shoot Disease (GSD) in Sri Lanka.

At present the symptoms of the two diseases are found in sugarcane plantation in all sugarcane-growing districts. Severe infection of these diseases could cause heavy crop losses both cane yield and quality, over 60%.

CAUSE

Both diseases are caused by a group of micro-organisms called phytoplasma. WLD phytoplasma are larger than those responsible for GSD.

SYMPTOMS

Visual symptoms of the two diseases are quite similar. Therefore, it is difficult to differentiate them by external examination alone. Nevertheless, there are some differences in visual symptoms that are helpful in identifying the two diseases if such symptoms are manifested in the diseased plants.

Grassy Shoot Diseases (GSD)

- Formation of **grass-like** sugarcane plants is the diagnostic symptom of GSD.
- Appearance of a **chlorotic leaf** among the crown leaves in infected shoots is the earliest symptom in the plant crop. Straight prominent **chlorotic creamy stripes** of varying width Parallel to veins are developed. Later these may coalesce resulting in total chlorosis.



Typical symptoms of GSD

- **Excessive chlorotic tillering** from the base giving a grass-like appearance. Later these tillers dry out. This is more common in ratoon crops than in plant crops.
- Premature proliferation of **side shoots** from the bottom to the top of stalks.
- Severe **stunting** of plants.
- Leaves may **reduce in size** with a **soft texture**.
- No millable stalks.

White Leaf Disease (WLD)

- Appearance of total **chlorotic leaves** in the **spindle portion** is the diagnostic symptom of WLD.



Chlorotic leaves

- The initial symptom is appearance of a **single white or cream coloured stripe** parallel to the mid rib on the young spindle leaves. Later these stripes extend to the entire leaf blade appearing severe chlorosis. Sometimes **green mottling** on a white background on chlorotic leaves may occur.



White/cream coloured stripes

- **No side shoots** are formed on the upper part of the infected plants, but leaves on the top are **crowded** giving fan-like appearance due to slow growth of the upper portion of stalks.



Crowded leaves

- **Excessive development of tillers** with shortened internodes resulting in bushy, broom-like appearance to the plant.



Excessive tillering

- Some millable stalks in plant crop.

TRANSMISSION

Both GSD and WLD are sett-borne diseases. In addition, it has been reported that these diseases are transmitted by leaf hoppers; GSD by *Matsumaratettix hirglyphicus* and WLD by *Deltocephales vulgaris*. Experiments are in progress to identify vectors responsible for the transmission of the diseases in local sugarcane plantations. In addition to sugarcane, the causal phytoplasma are known to infect sorghum, elephant grass (*Pennisetum purpureum*), *Brachiaria mutica*, *Cyanodon dactylon*, *Imperata arudinacea* and *Imperata gerardinana* and WLD phytoplasma could infect wild cane (*Saccharum spontaneum*) and therefore they may act as alternate hosts.

CONTROL

Adoption of the following three strategies simultaneously is essential to control the two diseases:

- Use of tolerant varieties: The variety **SL 8306** is more tolerant to the two diseases than other commercially cultivated varieties and hence it should be used for replanting/new planting.
- Control of primary infection: This can be achieved by the following methods:
 - Use of healthy planting material of tolerant varieties (see page 7 for details).
- Control of secondary infection: The following management practices can be adopted:

Control of vectors: Spraying of dimethoate 40% EC at a dilution of 10ml in 10 litres of water could be used for this purpose. The amount required for one hectare is 450

litres at low to moderate foliar development and 650 litres for crops with well-grown foliage.

- Control of weeds to eliminate alternate hosts.
- Rouging out of infected plants.
- Avoiding of ratoons in areas with moderate/severe infection.

Production of healthy planting material

As spread of the two diseases is primarily through infected seed material, **use of healthy planting material** is of paramount importance. This requires elimination of the phytoplasma to get disease-free planting material and then multiplication them as described below.

i. Elimination of the phytoplasma:

The disease-causing phytoplasma could be eliminated by the following two methods:

- Heat treatment of seed setts.
- Meristem culture.

ii. Multiplication:

Disease-eliminated planting material should be multiplied for commercial planting using any of the following nursery programmes:

- a. Raising of primary and secondary nurseries.
- b. Lateral shoot multiplication.

The following practices should be adopted in each of the nursery programme:

**a. Raising of primary and secondary nurseries:
With heat-treated seedcane**

- Harvest seedcane of a tolerant variety from plant of 10-12 months age showing no visual symptoms.
- Sterilise cane knives during harvesting by dipping them in 1% solution of lysol or savlon.
- Cut seedcane into three-budded setts using sterilised knives. Use only the more mature portion of stalk.
- Treat the setts in hot water of 54°C for 50 minutes. Handle the treated seedcane very carefully.
- Dip, treated cane in Bayleton fungicide (1kg 25% w.p. / 1000 l)
- Plant the treated seedcane in a primary nursery in an isolated area (At least 1km away from commercial plantation).
- Inspect the nursery regularly and rouge out if any disease plants are found.
- Spray an insecticide (dimethoate) in two weeks interval.
- Control weeds properly.
- Adopt other recommended crop management practices.
- Harvest the nursery at about 7-8 months age and establish a secondary nursery in an isolated area. Maintain the secondary nursery adopting all the practices mentioned above for the primary nursery.

- Harvest the secondary nursery for planting at about 7-8 months age.

With meristem-cultured plants

In meristem culture method, meri-cloned plants are planted in a primary nursery and then in a secondary nursery. All management practices described under heat-treated nurseries should be adopted.

b. Lateral shoot multiplication

- Get heat-treated seed setts or meri-cloned plants.
- Plant them in a primary nursery.
- Adopt management practices as described above.
- Use the primary nursery as mother stock for lateral shoot multiplication (details of this method are given in a separate bulletin).
- Get potted plants from lateral shoot propagation for field planting.

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