DOWNY MILDEW

Sugar Research Australia

INTRODUCTION

Sugarcane downy mildew is a disease found in parts of south-east Asia and some Pacific islands. It causes significant yield losses in Papua New Guinea and the Philippines. Once a major disease of Australian sugarcane, it was eradicated from commercial fields in 1957.

(Top left) *Image 1. Classic leaf streak symptom in the early stages.*

(Top right) *Image 2. Brick red leaf symptoms seen as the leaf ages.*

CAUSAL ORGANISM

The disease is caused by several oomycete species in the *Peronosclerospora* genus, including *P. sacchari* and *P. philippinensis*. This disease can affect infect other grasses and crops such as *Miscanthus*, corn and sorghum.

SYMPTOMS

There are two easily identifiable symptoms of downy mildew: leaf streaks and leaf shredding. The two symptoms are related to different stages in the pathogen life-cycle.

Classic leaf streak symptoms are initially white (Image 1), turning yellow and then brick red with age (Image 2). They are associated with the asexual stage of the pathogen and can be seen at any time of the year.

Streaks run parallel to the leaf veins. A white down is produced on the underside of affected leaves on hot humid nights. The down is the diagnostic symptom of the disease, and gave rise to the name 'downy mildew' (Image 3, over page).

The leaf shredding symptom (Image 4, over page) is associated with the sexual stage of the pathogen and is more common at cooler times of the year. The pathogen produces a large number of oospores inside the leaf, causing the leaf to shred. Leaf shredding is less common than the leaf streaking symptom and not all varieties show both symptoms.

DIAGNOSIS

Diagnosis by visual symptoms, especially down production, is usually reliable. Brown oospores (~50 micron) are visible using a light microscope within shredded leaf. However molecular methods are required to determine the species involved. A number of PCR tests have been developed by SRA.

YIELD LOSS

Maximum yield losses in Papua New Guinea are estimated at approximately 40%. Losses in commercial crops tend to be lower, depending on the incidence and severity of the disease.

TRANSMISSION

The disease is spread by two types of spores, conidia (asexual) and oospores (sexual). Conidia are produced in the down under hot, humid conditions and remain viable for only a few hours. Spread via conidia is limited to about 400 m. The role of oospores in spreading downy mildew is uncertain; oospores are robust and remain viable for much longer (perhaps years).

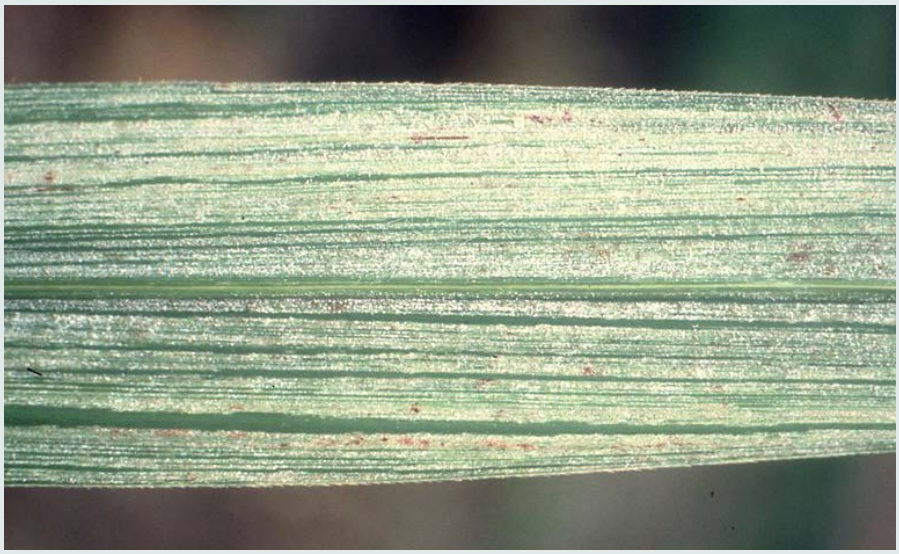
Downy mildew infects the whole plant, so the planting of diseased material will also spread the disease.

The disease is also found on other plants, such as corn, which was an important alternative host when downy mildew was present in Queensland.

Corn can also act as a sentinel crop for downy mildew because it can be infected with many species of *Peronosclerospora*. Any downy mildew symptoms on corn or maize should be investigated.

CONTROL

The most important control strategy is the planting of resistant varieties. The Australian incursion was eradicated by the adoption of resistant varieties and roguing of infected plants. Hot water treatment is effective for eliminating the disease from infected planting material and several fungicides have activity against the downy mildew pathogens. These fungicides would assist in the eradication of the disease in the event of an incursion.



(Above) *Image 3. White down on the underside of leaves.*

(Above) *Image 4.Classic leaf shredding symptom.*

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.