FIJI LEAF GALL

Sugar Research Australia

INTRODUCTION

Fiji leaf gall (FLG) has caused major disease epidemics in the Australian sugarcane industry. The most severe epidemic occurred in the 1970-1980 period in the Bundaberg region when the susceptible variety NCo310 was widely grown.

This variety was not only susceptible to FLG but was highly favourable to the insect that spreads the disease. Initially, disease management focused on seedcane inspections with ongoing cultivation of NCo310. However, the disease continued to spread rapidly and most growers close to the centre of the epidemic could only grow a plant and first-ratoon crop before yield losses became severe. It was only when NCo310 was discarded and highly resistant varieties grown that the epidemic was brought under control.

FLG was also recorded in the Central region in the 1980s, but a more rapid application of the control measures led to minimal losses in that region. FLG has now not been seen in the Bundaberg region for over 30 years and in other southern and NSW cane-growing districts for at least 10 years. It appears likely that FLG area freedom for the Australian sugarcane industry could be declared in the next 5-10 years with eradication quite possible.

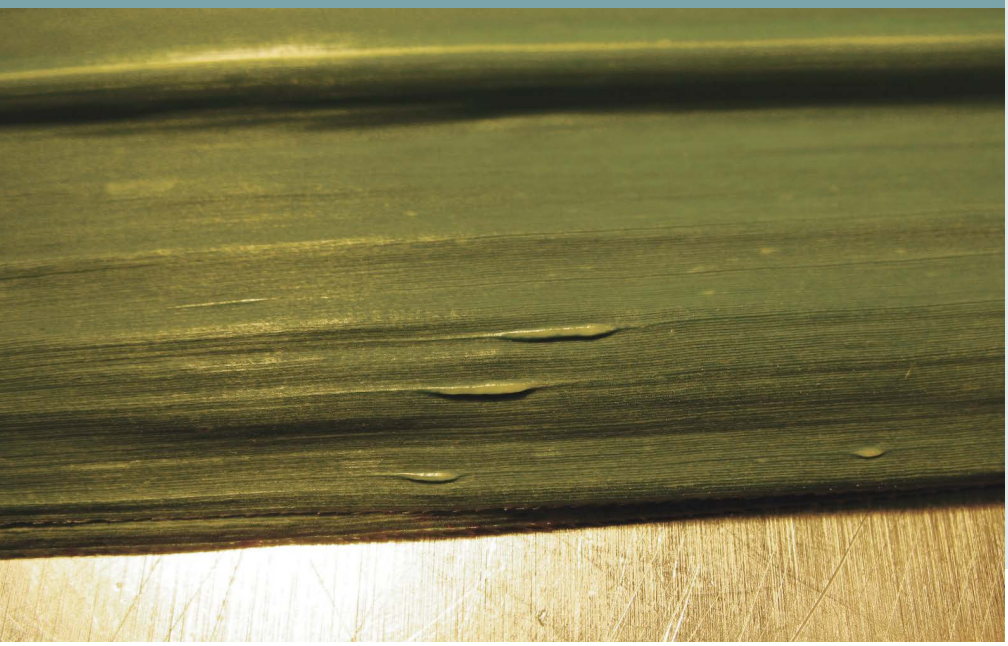
CASUAL ORGANISM

FLG is caused by a virus *(Fiji disease virus)*. The virus particles are 70nm in diameter and have an icosahedral shape. The virus is concentrated in the phloem cells in the leaf galls.

SYMPTOMS

The diagnostic symptom of FLG is the galls on the underside of the leaf blade and midrib. The galls vary in size from 1 mm to up to 200 mm in length, <1 mm to 3-4 mm in width and up to 1-2 mm in height. Galls may be green or white.

FLG causes severe stunting, profuse tillering and death in highly susceptible varieties. Leaves are often shorter than normal and have a ragged edge, giving the appearance that an animal has bitten the top off the plant. Stunted leaves are often darker green. Occasionally the growing point dies, leading to side-shooting. Stunting is particularly severe when diseased stalks are planted and in ratoon crops of highly susceptible varieties.



***(Left)** Typical Fiji leaf galls. **(Right)** Typical stunting and profuse tillering caused by Fiji leaf gall.*

(Above) *Adult planthopper.*

YIELD LOSS

In susceptible varieties, FLG may lead to complete yield loss and ratoon crop failure. For this reason, it has been considered one of our most important diseases.

DIAGNOSIS

Leaf galls are the characteristic diagnostic symptom. Galls form from a proliferation of phloem cells, and this can be confirmed by examination of a gall cross section under a microscope. A highly sensitive molecular assay has been developed to detect the causal agent *(Fiji disease reovirus)*, via a RT-PCR molecular assay. The assay can detect the virus before symptoms develop and is used in quarantine to ensure planting material is disease-free.

SPREAD

FLG is spread by a planthopper *(Perkinsiella* species); in eastern Australia the species is *Perkinsiella saccharicida Kirk.* The virus infects young planthopper nymphs as they feed on the phloem of an infected plant. The virus multiplies in the planthopper, which then is able to transmit the virus for the rest of its life. Older nymphs and adults cannot acquire the virus. The planthoppers feed only on sugarcane and reach their maximum populations during the summer months. Populations of the planthopper play a key role in the development of epidemics. When the vector populations are high, disease spread may be rapid and this was the case during the 1970s in the Bundaberg region. Warm humid weather and lush crops with high nitrogen content favour the planthoppers. Since that time, planthopper populations have been much lower limiting the risk of disease spread. Another important mode of spread is diseased planting material.

MANAGEMENT

FLG is controlled through a combination of resistant varieties, disease-free planting material and quarantine. All three management strategies were important in bringing the Bundaberg epidemic under control. Favourable conditions for the disease and high disease incidence required a high level of varietal resistance to reduce FLG incidence to acceptable levels. Rogueing diseased plants or ploughing out heavily diseased fields can reduce the spread of the disease by removing sources of infected plants. Rogueing is only viable when small numbers of infected plants are present and requires labour-intensive inspections.

Cane planted in spring is more susceptible to infection because the plants are younger when planthopper populations are at their peak.

FLG has not been recorded in districts north of Proserpine. Strict quarantine regulations have historically restricted movement of the disease through the industry.

FLG is regarded as a notifiable disease under *Queensland Biosecurity Act 2014* and any person finding the disease must report the finding to the **DAF/BQ Hotline on 13 25 23 within 24 hours.** There are also restrictions on planting and cultivating cane that is infected with FLG.

RESISTANT VARIETIES

Resistant varieties are a key control measure for FLG. Clones grown in the Central and Southern regions are screened for FLG resistance. Crosses between susceptible parent clones are restricted, thus reducing the number of susceptible clones coming through the program. The resistance screening method involves breeding planthoppers on infected plants in the glasshouse and exposing test varieties to infected planthoppers. Varieties are rated on the percentage of infected plants and the severity of disease symptoms.

FOR FURTHER INFORMATION

If you would like further information on FLG, please contact your local adviser.

REFERENCES

Smith GR. (2000). Fiji disease. In: *A guide to sugarcane diseases* (eds Rott P, Comstock JC, Croft BJ and Saumtally AS. CIRAD/ ISSCT, Montpellier.

Croft B, Magarey R and Whittle P. (2000) Disease management. In: *Manual of cane growing* (eds Hogarth DM and Allsopp PG. SRA, Brisbane.