PLANT PATHOLOGY NOTE: NO. 10

FIJI DISEASE OF SUGAR CANE AND ITS VECTOR

By G.R. Kula, Acting Chief Plant Pathologist, D.P.I., Konedobu
and G.R. Young, Senior Entomologist,
D.P.I., Bubia, Morobe Province

INTRODUCTION

Fiji disease of sugar cane is caused by a virus. There is little information available regarding the characteristics of this virus. The name came from Fiji island, where the disease was first observed and studied. This disease was reported as early as 1914 in Papua New Guinea by a cane collecting expedition. It is widespread in this country.

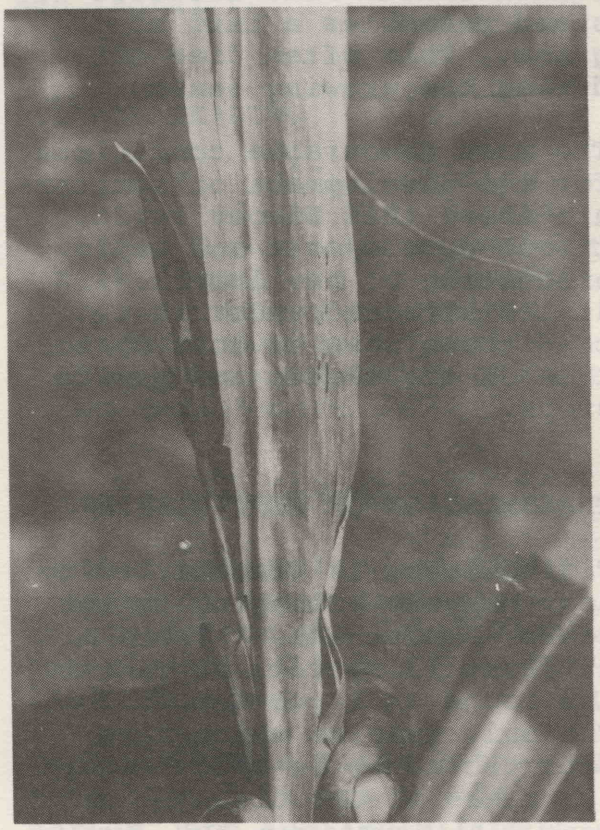
SYMPTOMS

The first symptoms (signs) of Fiji disease of sugar cane on affected plants are non-specific and could be mistaken for other diseases caused by nematodes and other soil borne pathogens. These non-specific symptoms are stunted growth, and a change in leaf texture and colour.

Positive identification of Fiji disease of sugar cane based on symptoms can only be made when galls (hard lumps) appear on the under surface of the leaf blade, midrib or on the leaf sheath.

The galls are long and narrow. They may be up to 5 cm long and 2-3 mm wide. At first, the galls are light green, but they gradually turn white.

Fiji disease of sugar cane causes severe stunting in all parts of an affected plant. If an actively growing plant becomes infected, the internodes (the distance on the stem between leaves) remain short, young leaves do not grow as long as usual, they become stiff and sharp-pointed and they are usually a darker green than healthy leaves.



Typical non-specific symptoms of Fiji disease of sugar cane.

Specific symptoms of Fiji disease of sugar cane. Affected plants have shortened and distorted leaves (left hand photograph). Galls are produced on the lower surface of the leaf (right hand photograph).

When infected seed pieces are planted, the shoots usually remain small. The infected stand resembles a tuft of grass. This often dies out during the growing season.

The most favourable conditions for the development of symptoms are those that favour rapid tissue development and rapid production of new leaves. Stalks affected under these conditions show obvious distortion of the leaves and growth stops.

TRANSMISSION OF FIJI DISEASE

Fiji disease is transmitted by leaf hoppers belonging to the genus *Perkinsiella*. There are at least 13 species of *Perkinsiella* found in Papua New Guinea. The only species which have been proved to be vectors (carriers of the disease) are *Perkinsiella vastatrix* and *Perkinsiella saccharicida*. However, some other Papua New Guinea species probably transmit the disease as well.

It appears that *Perkinsiella* nymphs have to feed on infected sugar cane plants in order to transmit Fiji disease. Adult *Perkinsiella* that have not fed on diseased plants in the nymphal stage cannot transmit the disease. *Perkinsiella* leaf hoppers are generally found feeding on *Saccharum officinarum*, *Saccharum edule* and *Saccharum robustum*. *Saccharum officinarum* and *Saccharum edule* are the most favoured hosts in the Morobe Province.

Adult *Perkinsiella* are brown to blue-black coloured and 4-5 mm in length.

The adults and nymphs shelter in the leaf axils and funnels during the day. When *Perkinsiella* is common on sugar cane, the honey dew excreted by the insect covers the leaves and sooty mould grows on the honey dew. High populations of *Perkinsiella* are often associated with ants, which protect the leaf hopper from its natural enemies.

ERRATUM

HARVEST 7(2), 1981

PLANT PATHOLOGY NOTE: No. 10 Fiji disease of sugar cane and its vector

The insects pictured on p. 91 and the description on p. 90 are not *Perkinsiella* adults but *Eumetopina flavipes*.

Adult *Perkinsiella* are 5-6 mm in length, and brown coloured. The feelers stick out from the head giving the insect a 'horned' appearance. The forewings are light coloured and the last quarter of the wing has thick brown stripes.

the female lays the eggs in the midrib of the leaf on the upper surface. In coastal Papua New Guinea the eggs probably hatch in 10 to 15 days, and the nymphal stages occupy 20 to 30 days. Once the adult stage is reached the leaf hoppers are able to migrate and infect healthy plants.

CONTROL OF FIJI DISEASE

Resistant varieties

The main method of control is the use of resistant varieties of sugar cane. All varieties of sugar cane imported into Papua New Guinea for commercial evaluation are screened for resistance to Fiji disease.

The Bureau of Sugar Experiment Station in Queensland has bred many resistant varieties. Some of these are being tested in Papua New Guinea.

Biological control

The only successful instance of biological control of *Perkinsiella* has been from Hawaii. The predator used in Hawaii is native to P.N.G., and does not significantly affect the incidence of Fiji disease here.

the country. It is possible that different species of *Perkinsiella* could carry different strains of Fiji disease. For this reason, before sugar cane setts are transported from province to province the setts should be dipped in 0.05% chlorpyriphos plus a wetter and sticker (such as 'Triton B' and 'Agral').

FURTHER READING

Bull, R.M. (1977). Chemical control of the Fiji disease vector *Perkinsiella saccharicida* Kirk (Homoptera:Delphacidae) in a Bundaberg cane plant production plot. *Proceedings of the Queensland Society of Sugar Cane Technologists, 1977*.

FURTHER INFORMATION

Further information on Fiji disease of sugar cane can be obtained from the Chief Plant Pathologist, D.P.I., P.O. Box 2417, Konedobu.

Copies of this Plant Pathology Note and of others in the series, are available from: Publications Officer, Publications Section, D.P.I., P.O. Box 2417, Konedobu.

Perkinsiella *adults*

LIFE CYCLE

The female lays the eggs in the midrib of the leaf on the upper surface. In coastal Papua New Guinea the eggs probably hatch in 10 to 15 days, and the nymphal stages occupy 20 to 30 days. Once the adult stage is reached the leaf hoppers are able to migrate and infect healthy plants.

CONTROL OF FIJI DISEASE

Resistant varieties

The main method of control is the use of resistant varieties of sugar cane. All varieties of sugar cane imported into Papua New Guinea for commercial evaluation are screened for resistance to Fiji disease.

The Bureau of Sugar Experiment Station in Queensland has bred many resistant varieties. Some of these are being tested in Papua New Guinea.

Biological control

The only successful instance of biological control of *Perkinsiella* has been from Hawaii. The predator used in Hawaii is native to P.N.G., and does not significantly affect the incidence of Fiji disease here.

Chemical control

Effective chemical control of *Perkinsiella* has been achieved in Queensland by aerially spraying chlorpyriphos. The period of control was about 28 days. There is little scope for such methods in Papua New Guinea due to the expense and the short period for which control would be achieved.

There are many different species of *Perkinsiella* leaf hopper in Papua New Guinea. Many of these species are restricted to certain parts of the country. It is possible that different species of *Perkinsiella* could carry different strains of Fiji disease. For this reason, before sugar cane setts are transported from province to province the setts should be dipped in 0.05% chlorpyriphos plus a wetter and sticker (such as 'Triton B' and 'Agral').

FURTHER READING

Bull, R.M. (1977). Chemical control of the Fiji disease vector *Perkinsiella saccharicida* Kirk (Homoptera:Delphacidae) in a Bundaberg cane plant production plot. *Proceedings of the Queensland Society of Sugar Cane Technologists, 1977.*

FURTHER INFORMATION

Further information on Fiji disease of sugar cane can be obtained from the Chief Plant Pathologist, D.P.I., P.O. Box 2417, Konedobu.

Copies of this Plant Pathology Note and of others in the series, are available from: Publications Officer, Publications Section, D.P.I., P.O. Box 2417, Konedobu.