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BANANA BUNCHY TOP VIRUS

Banana plant in an advanced stage of infection growing in a neglected plantation.

BANANA BUNCHY TOP is caused by a virus. The disease was recorded as causing serious damage to bananas in Fiji as early as 1889. It is now widespread in the Pacific islands and within the SPC region has been reported from American Samoa, Fiji, French Polynesia, Kiribati, New Caledonia, Northern Mariana Islands, Tonga, Tuvalu, Wallis Island and Western Samoa.

SYMPTOMS

Plants in an advanced stage of infection are stunted and the throat of the plant is choked with a 'rosette' of short, narrow erect leaves to give the typical 'bunchy top' appearance. These leaves, which are brittle and snap off crisply when broken, have yellow margins which may eventually go brown and appear scorched. The root system of such plants is poor and rotten.

When a plant becomes infected, the first newly unfurling leaf may have a yellowish margin. The next leaf to emerge is reduced in size, more yellowish and has recurved blades with wavy margins; but at this stage, a closer examination can reveal the diagnostic symptoms of the disease. If the second or third leaf is held up to the light and examined from the underside, a dot-dash, morse code-like series of dark green lines can be seen running parallel to the veins. These dark green lines continue into the midrib as distinct hooks (Fig. 1). Vein clearing may also occur (Fig. 2). Dark green streaks can often be found on the back of the petioles (Fig. 3).

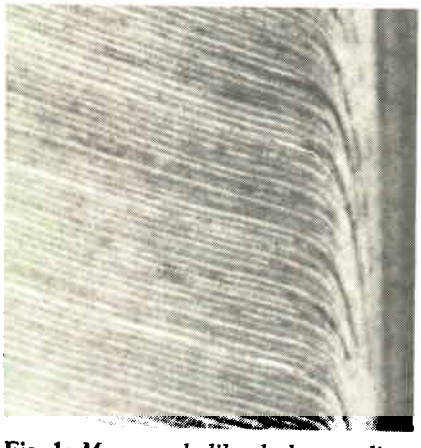

Fig. 1: *Morse code-like dark green lines parallel to the veins and hooks running into the midrib.*

Fig. 2: *Vein clearing.*

INFECTION AND SPREAD

Insect transmission

The banana aphid, *Pentalonia nigronervosa*, when it feeds on an infected banana plant, takes in virus particles together with the plant sap. If it then flies to, and feeds on, a healthy banana plant the virus is transmitted to the new plant which will become infected and eventually develop symptoms. Aphids can be carried long distances by the wind and even the wingless forms can be carried about on banana plants or by people moving from one plantation to another.

When infectious aphids transmit the disease to new plants, the virus enters the sap stream and spreads all through

the plant and into the corm and suckers.

Spread with planting material

Even though they may not show symptoms (in which case the virus is said to be 'latent'), suckers taken from infected plants will almost certainly have the virus within them and eventually develop bunchy top symptoms; so also will suckers growing from pieces of corm from infected plants. The use of such infected planting material is a common way for the disease to be spread. Another way is for infectious aphids to be carried to new sites on planting material.

EFFECT OF THE DISEASE

In some of the Pacific islands, when unselected planting material is used for new plantations it is not unusual to find 20 per cent of plants with symptoms during the first year. If these are not removed the disease spreads rapidly and the situation can become disastrous within 2–3 years. Plants infected with bunchy top at an early stage in their growth do not produce any fruit and all the suckers developing from them are also infected. Unless the disease is controlled, bananas cannot be grown on a commercial scale; in the past, bunchy top has caused very serious losses in Australia, Fiji and Samoa.

CONTROL

Virus-free planting material

Starting plantations with virus-free planting material is the most important aspect of bunchy top control. The best way to ensure good planting material is to have nurseries supplying certified virus-free suckers. Nurseries can be developed by discarding infected plants over several generations combined with intensive aphid control. Such a scheme was successful in Fiji and details of it are available. Failing this, planting material should be taken from plantations which are relatively free of the disease and where infected plants have been regularly rogued out. The suckers and the plants from which they are to be taken should be inspected for symptoms of the disease especially the dark green hooks running into the midrib.

Destruction of diseased plants

Regular inspections must be made in the plantation and removing and destroying diseased plants (roguing) is essential to maintain freedom from the disease. Plants found to be infected must first of all be thoroughly sprayed with insecticide to kill any aphids present. These aphids might otherwise move to new plants and spread the disease. All the plants in the mat must then be dug out and cut into small pieces to ensure that no regrowth can occur. It is also possible to destroy the plants with herbicide injections, but this needs to be further investigated locally.

Maintaining a clean, weed-free plantation aids the early detection of infected suckers. Wild bananas and *Heliconia* species are also hosts of the virus so they should not be grown nearby.

Fig. 3: *Dark green lines on back of petiole.*

Aphid control

It is impracticable to control aphids in the whole plantation but it is very necessary to kill them on infected plants before these are dug out and destroyed. The infected plants and suckers must be thoroughly sprayed including the base of the pseudostem at ground level and especially the throat and funnel leaf. It is an added safeguard to strip away the leaf sheaths and spray the exposed surfaces and to spray the plant remains on the ground after they have been chopped up.

Insecticides which have been used in the region are Malathion, Formothion (Anthio), and Demeton-S-Methyl (Metasystox i); the last two have the advantage of being systemic but Demeton-S-Methyl is very poisonous and must be used with care (see SPC *Pesticide Handbook* for notes on insecticides). Kerosene has been used to kill aphids on infected plants in Western Samoa.

Aphid control is also necessary in nurseries producing virus-free planting material. Frequent sprays of Formothion have been recommended for this purpose. The usually recommended spray concentrations for the insecticides mentioned are: Malathion, 1 fl oz in 3 gallons of water (2 ml/l); Anthio, 1 fl oz in 10 gallons of water (0.6 ml/l); Metasystox i, 1 fl oz in 10 gallons of water (0.6 ml/l).

Legislation

Legislation has been introduced in some countries to make some aspects of the control of the disease mandatory or to permit attempts at eradication. Such measures may be necessary for control campaigns to be successful but are difficult to enforce where bananas are grown in small scattered plantations as they are in the Pacific islands. □

This leaflet was prepared by I. D. Firman, former Plant Protection Officer, South Pacific Commission. The colour photograph is by Marshall Kirby and the black and white prints, reproduced with permission of the Department of Agriculture, Fiji, were prepared from photographs originally taken by K. M. Graham. Further information may be obtained from the Plant Protection Officer, South Pacific Commission.

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