



# Banana Bunchy Top

Banana bunchy top disease is caused by a virus called *banana bunchy top virus* (BBTV). The disease was recorded as causing serious damage to bananas in Fiji Islands as early as 1889. The virus is widespread across the Pacific Islands region, but distribution is patchy. It is present on some islands, absent on others. By late 2004, laboratory test records confirming presence of BBTV in Fiji Islands, Tonga, Samoa and New Caledonia had been published. There are also unpublished laboratory test records of BBTV in Guam and on Wallis Island (but not Futuna). In addition there are reliable reports, dating back many years, of distinctive symptoms of the disease seen in the field in Tuvalu and American Samoa. These records are not known to have been confirmed in a diagnostic test.

## 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, giving the typical “bunchy top” appearance. These leaves are brittle and snap off crisply when broken. They also have yellow margins that may eventually turn brown and appear burnt. The root system of such plants is poor and decayed.

When a plant becomes infected, the first and second leaf produced after infection may also have a yellowish margin. The third leaf to emerge after infection is reduced in size, more yellowish and has wavy leaf edges that curve upward (Figure 1).

At this stage, closer examination can reveal further symptoms that help with



Figure 1: Banana plant with bunchy top

(Photo: Richard Davis)

preliminary field diagnosis of the disease. However, in the case of critical diagnoses such as new outbreaks in new areas, these must be confirmed properly in a laboratory.

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 (Figure 2). Vein clearing may also occur.

Dark green streaks can often be found on the back of the petioles (Figure 3).



Figure 2: Dark green lines ending as hooks at the midrib of leaves of bunchy top infected banana.

### EFFECT OF THE DISEASE

In some 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 can become disastrous within 2–3 years. Plants infected with bunchy top at an early stage in their growth do not produce any fruit; 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 (in Queensland up to 95% reduction in production), Fiji Islands and Samoa.

### INFECTION AND SPREAD

Banana bunchy top virus particles exist and multiply in the phloem sap of *Musa* species.

#### 1. Transmission by insects

Local transmission occurs when the banana aphid, *Pentalonia nigronervosa*, feeds on an infected banana plant and takes in virus particles together with the plant sap. If the infected aphid feeds on a healthy banana plant, the virus is passed on to that plant and it will become infected and eventually develop symptoms. Aphids can be carried long distances

can be carried about by people on banana suckers or leaves.

#### 2. Spreading by 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. They will eventually develop bunchy top symptoms.

The disease is believed not to be spread by cutting tools.

In Tonga, neglected plantations have been found to be breeding grounds for the aphid vector and a source of inoculum for the spread of the disease.

### MANAGEMENT OF THE DISEASE

#### 1. Cultural methods

##### *Virus-free planting material*

Using planting material that is free from the virus is the best way to control bunchy top. The SPC Regional Germplasm Centre and national tissue culture centres in the Pacific supply virus-free plantlets to countries.

If planting material is taken from plantations it should be relatively free of the disease if regular roguing (removal and destruction) of infected plants has been practised. The suckers and the plants from which they are to be taken should be inspected for symptoms of the disease, especially dark green hooks running into the midrib.

Maintaining a clean, weed-free plantation aids the early detection of infected suckers. Wild bananas (*Musa* species) are also hosts of the virus, so they should not be grown nearby. Neglected or old plantations should also be cleared.

##### *Aphid control*

It is impractical to control aphids in the whole plantation, but it is necessary to



Figure 3: Dark green streaks on the back of petioles of bunchy top infected

(A) Spray thoroughly with insecticide (especially where arrows are pointing)



(B) One week after spraying with insecticide, spray with glyphosate



(C) Burn dead banana plants



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. The leaf sheaths should be stripped away and exposed surfaces sprayed. Kerosene has been used to kill aphids on infected plants in Samoa. Diesel and mineral oil have also been suggested for use.

Insecticides should be applied as a spray to the point of runoff to aphid-infested plants and suckers. The

recommended spray rates for insecticides are:

- Dimethoate (400g/L). Use at 75ml/100L
- Diazinon (200g/L). Use at 1.5ml/L
- Acephate (Orthene) (75% WP). Use at 1.3g/L

*Destruction of diseased plants*

Regular inspections for infected plants must be made in the plantation. Removal and destruction of diseased plants is essential to maintain freedom from the disease. One week after

treatment to kill the aphids, either infected plants must be sprayed with glyphosate (Roundup, Sting) or a k-p must be stuck into the base of the trunk and all suckers.

*Legislation*

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

Product	Active ingredient	Rate (ml product/L water)
To kill the aphids--		
Dimethoate	400g/L	0.75ml/L
Diazinon	200g/L	1.5ml/L
Acephate (Orthene)	75% WP	1.3g/L
To kill the banana plant--		
Glyphosate	360g/L	100ml/L

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