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BLACK LEAF STREAK
OF BANANA



Banana leaf affected by black leaf streak.

BLACK LEAF STREAK is caused by a fungus now usually called *Mycosphaerella fijiensis*. It was first noticed in Fiji in 1963 and apparently spread rapidly throughout the country so that it more or less completely replaced Sigatoka disease caused by the similar fungus *Mycosphaerella musicola*.

It is now widespread in the Pacific islands and within the SPC region has been reported from American Samoa, Cook Islands, Fiji, French Polynesia, New Caledonia, Papua New Guinea, Solomon Islands, Tonga, the former Trust Territory of the Pacific Islands, Vanuatu and Western Samoa.

SYMPTOMS

The first clearly visible symptoms of the disease are reddish-brown streaks on the lower surface of the leaf (this is in contrast to Sigatoka disease which first appears as yellow streaks clearly visible on both surfaces of the leaf). These streaks usually appear on the third or fourth youngest leaves. The young streaks change gradually into elongated spots with grey or buff-coloured centres surrounded by a dark brown or black border and often there is a yellow transitional zone between the border and the normal green of the leaf. Under wet conditions when dew or rain is present on the leaf the border of the spots appears very black and water-soaked. When the infection is very intense, and such that each square centimetre of leaf may contain one or more streaks, the typical spot development may not occur, but large areas of the leaf go black and then dry out and wither.

Sometimes streaks are densely aggregated in a band several centimetres wide on either side of the leaf mid-rib. This, when it occurs, is a very characteristic feature of the disease, but sometimes streaks are more numerous on the margins of the leaf and near the tip.

INFECTION

Two types of spore are produced by the fungus. The conidia of its *Cercospora* state develop on the early reddish-brown streaks mainly on the lower leaf surface. The ascospores of the *Mycosphaerella* state of the fungus are produced from the older diseased leaves. Infection by both spore types occurs on the young leaves as, or shortly after, they unfurl.

Rapid development of the disease is favoured by warm (23–28°C), rainy or humid weather.

EFFECT OF THE DISEASE

The number of leaves a banana plant has at flowering affects bunch weight, and the number present between flowering and harvest affects maturation and thus the quality of the fruit.

Banana plants on which black leaf streak is not controlled often retain less than eight healthy leaves up until the time of flowering instead of a possible thirteen or more. By the time the bunch is ready to harvest there may be no healthy leaves left.

At least four leaves and preferably more should still be present at the time of harvesting the bunch to ensure good quality fruit. With reduction in leaf numbers the yield of fruit is also reduced and the quality is poor so that uneven and premature ripening occurs. It is possible for banana leaves to remain healthy on the plant for over 200 days, but when black leaf streak is severe their life span may be reduced to less than 50 days.

CONTROL

Cultural methods

Cultivation practices which tend to increase humidity and reduce ventilation in the plantation such as close planting, excessive weed and grass growth and too many suckers per plant

should be avoided and so should infertile and badly drained soils.

Removing dead leaves and taking them away from the plantation may be helpful in reducing the number of ascospores available for infection, but would only be useful where adjacent neglected plantations were not contributing to the spore load and thus negating the effect.

Resistant cultivars

Most bananas are susceptible to black leaf streak especially the types normally grown in the region for the production of export fruit. No suitable resistant cultivars for this purpose are yet available.

Some of the plantains, however, are somewhat less susceptible and may retain four or more leaves until harvest even when exposed to heavy infection.

Chemical control

Under the circumstances of banana cultivation in the region, sprays are best applied by motorised knapsack mist-blowers. A powerful robust machine with tank agitation should be used. Emission rates should be checked regularly to make sure the required volume of spray per hectare is being delivered. The machine should be run at full throttle and the emission rate altered if necessary by using nozzles of different diameter.

In the past, benomyl has been the standard chemical used throughout the Pacific to control black leaf streak. Resistance to benomyl was found in Western Samoa in 1980. This has required a change of recommendation to control the disease in Western Samoa, and to reduce the chances of resistance developing elsewhere.

For Western Samoa

Use either Calixin or mancozeb.

Calixin

(per mist-blower—12 litre capacity)

Calixin	200 ml
(active ingredient 80% tridemorph)	
Misting oil	1.3 l
Emulsifier	30.0 ml
Water	to 12.0 l

Apply 5 mist-blower tanks of spray per hectare (2 per acre).

Preparation: In one bucket, mix the Calixin with the water. In another bucket mix the emulsifier with the oil. Then pour the Calixin/water mixture into the oil while stirring well. Add the spray mix to the mist-blower tank. **Do not** add Calixin directly to the oil as it will form a thick solution which will not mix with water.

Mancozeb

(per mist-blower—12 litre capacity)

Mancozeb fungicide (a.i. 80%)	454.0 g
Misting oil	3.5 l
Emulsifier	30.0 ml
Water	to 12.0 l

Apply 5 mist-blower tanks of spray per hectare (2 per acre).

Preparation: In one bucket mix the fungicide with 3–4 litres of water. In another bucket stir the emulsifier into the oil. Then pour the fungicide/water mix into the oil while stirring. Pour into mist-blower and use remaining water to rinse out the buckets and add the rinsings to the mist-blower tank.

For other Pacific Islands

Use Calixin or mancozeb (as above) or Benlate.

Benlate

(per mist-blower —12 litre capacity)

Benlate (a.i. 50% benomyl)	57.0 g
Misting oil	3.5 l
Emulsifier	30.0 ml
Water	to 12.0 l

Apply 5 mist-blower tanks of spray per hectare (2 per acre).

Preparation: Use the same method as for mancozeb (above).

Benlate is still effective in all Pacific countries except Western Samoa, but if it is used continuously, resistance may develop. If Benlate is preferred, then its use should be alternated with one of the other recommended chemicals.

In many areas of the Pacific, pre-emulsified misting oil is now available. This is a standard banana misting oil to which emulsifier has been added during manufacture. The use of pre-emulsified oil simplifies the preparation of spray mixes; it is used in the

same way as ordinary misting oil, but no extra emulsifier is needed.

Sprays should normally be applied every 2 weeks. During the drier months the interval between sprays may be extended to 3 weeks. Spraying should be avoided on very hot sunny days and in windy weather.

Good quality fruit cannot be obtained without spraying to control black leaf streak, but **spraying is a costly operation and will be economic only if attention is given to all other aspects of pest and disease control and to good crop husbandry.** □

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Banana burrowing nematode (SPC Advisory Leaflet 5, 1977)

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