Pacific Pests, Pathogens & Weeds - Fact Sheets

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Banana wilt phytoplasma (372)

Photo 1. Internal symptoms (discontinuous streaks and pocket rots) in a cooking banana (ABB genome, Kalapua subgroup), Papua New Guinea.

Photo 2. Wilting cooking bananas growing near dead or dying coconut palms, Furan, Madang Province, Papua New Guinea. The coconuts are infected with phytoplasma, and the disease is known as Bogia coconut syndrome. The bananas are infected with the same phytoplasma, and the disease is called banana wilt associated phytoplasma, BWAP.

Common Name

Banana wilt associated phytoplasma. The abbreviation is BWAP.

Scientific Name

There is no scientific name for the disease, the common name, *Banana wilt associated phytoplasma*, BWAP, is used. The same phytoplasma is considered the likely cause of Bogia coconut syndrome (**see Fact Sheet no. 229**).

Phytoplasmas were first associated with banana wilt in 2008. These were in plants growing among coconuts showing signs of Bogia coconut syndrome in Madang Province, Papua New Guinea. Molecular tests of the16S ribosomal protein gene (16Sr RNA) have shown that the same phytoplasma appears to be present in both species, and that it is related to a coconut lethal yellowing phytoplasmas recorded from Nigeria. Note, Bogia coconut syndrome is referred to as *Cocos nucifera lethal yellowing* in some publications.

Distribution

Several provinces of Papua New Guinea, and Maleai Island, just south of Shortland Island, Solomon Islands. The latter is south of Bougainville, Papua New Guinea.

Hosts

Musa species, principally cooking bananas or plantains (ABB according to the international convention for naming banana types), and coconuts.

Symptoms & Life Cycle

A serious disease, invariably fatal. The leaves yellow slowly, collapse and die (Photo 1). Internally, the stems show discontinuous black or brown streaks in the vascular parts (Photo 2), and pockets of wet rot.

It is not possible to say that phytoplasmas are definitely the cause of the disease in bananas; this is because it is not possible to grow phytoplasmas outside the banana plant and then infect healthy bananas to see the effect. However, phytoplasmas have been found in the phloem of banana plants using molecular tests, and this is good evidence that they are the cause of disease. The phloem is part of the vascular bundles of stems which carry foods from the leaves to the roots.

A similar severe wilt of cooking banana has been found on Maleai island, Choiseul Province, Solomon Islands, close to the Autonomous region of Bougainville, Papua New Guinea. Plants showed yellowing and/or leaf death, and unfilled fruit bunches, with internal stem

symptoms similar to those described above in Papua New Guinea.

Spread of phytoplasmas occurs when sap-feeding insects feed on the phloem of infected plants. In the case of BWAP, the insect (or insects) which spreads the disease is not yet known. Because the phytoplasma in banana is identical to the phytoplasma in coconuts in Papua New Guinea, the same insect, or one closely related, is likely to spread the disease.

To date, in Papua New Guinea, interest has centred on *Zophiuma pupillata* (Hemiptera: Lophopidae), which breeds on coconuts and is common on that host and also betel nuts. It is less common on banana. Phytoplasmas are frequently detected in both adults and nymphs.

Several other insects from different families are also common on coconuts and found to contain phytoplasmas; one of them is a species of *Proustia*, an insect that is known to spread phytoplasma diseases of coconut (India) and sugarcane (Southeast Asia).

However, just because phytoplasma are found in an insect does not mean that it spreads the phytoplasma. The task now is to find out which ones do.

Impact

The discovery of this disease is the cause of considerable concern in Papua New Guinea and Solomon Islands where banana is an important food crop. On Maleai Island, Solomon Islands, all plants of one variety appeared diseased. By contrast, in Papua New Guinea, the disease is widespread throughout the country, but the number of plants with symptoms in any locality is small. The concern in both countries is twofold: one, the disease will increase in severity; and, two, spread will occur to coconuts. In all areas, where bananas are infected by the disease, coconuts appear healthy, apart from the Madang area.

Detection & inspection

Look for bananas with yellowing, leaves that die slowly, with internal dark, discontinuous lines and pockets of rot. Confirmation of the phytoplasma is done using molecular tests.

Management

BIOSECURITY

Internal quarantine containment is recommended in Solomon Islands. Many parts of the country has been surveyed in recent years without finding BWAP symptoms. The recommendation specifically suggests a ban on the movement of bananas from the Shortland Islands of which Maleai Island is a part.

It is important to alert biosecurity authorities if banana plants are found with wilted yellow leaves as descrtibed in this fact sheet.

CULTURAL CONTROL

Banana plants should be removed, cut up and buried as soon as symptoms are first seen; it is important not to leave suckers which will also be infected, even if not showing symptoms. Ideally, plants should be sprayed with insecticide before they are cut down to kill insects which may otherwise spread the disease (see below).

If insecticide is used, after 48 hours dig out the stool, including the main plants and all suckers. Chop the plants, including the corms, into small pieces. Burn or bury them.

CHEMICAL CONTROL

The choice of chemicals for killing insects on diseased plants, before removal from the soil, depends on whether they are grown for household use or for sale.

- *Banana for home use*: Use kerosene, aiming to spray the 'throat', the V-shaped area where the leaves meet and where insects hide.
- *Commercial plantations*: The following have been recommended for Pacific island countries: dimethoate (400 g/L), used at 75 ml/100L; diazinon (200 g/L), used at 1.5 ml/L; acephate (75% WP), used at 1.3 g/L. Note, in Australia, the use of dimethoate is restricted, and the use of the chemical remains under review. Diazinon use is also under review. Acephate does nnt have approval for use in the EU, and is under review in Australia.
- Synthetic pyrethroids are likely to be effective.

AUTHOR Grahame Jackson

Information from Anne Vezina (2013) A new disease of banana? ProMusa. (http://www.promusa.org/blogpost229-A-new-disease-of-banana); and Davis *et al*. (2012) A new wilt disease of banana plants associated with phytoplasmas in Papua New Guinea (PNG) (2012). Australasian Plant Disease Notes 7:91-97. (https://www.researchgate.net/publication/257801469); and Pilotti *et al.* Putative vectors of a phytoplasma associated with coconut *(Cocos nucifera)* in Madang Province, Papua New Guinea. International Journal of Agriculture and Forestry 4:365-372 (doi: 10.5923/j.ijaf.20140405.04); and from Davis *et al.* (2015) First record of a wilt disease of banana associated with phytoplasma in

Solomon Islands. Australasian Plant Disease Notes 10:14. (https://link.springer.com/article/10.1007/s13314-015-0163-4). Photos 1&2 Richard Davis, Northern Australia Quarantine Strategy, Department of Agriculture, Cairns, Australia.

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