Pacific Pests, Pathogens and Weeds - Online edition

Cassava mealybug (329)

Common Name

Cassava mealybug

Scientific Name

Phenacoccus manihoti

Distribution

Asia, Africa, South America. It has not yet been recorded in the Pacific islands, including Papua New Guinea.

Hosts

Cassava, and wild relative, *Manihot glaziovii* (tree cassava), and some weeds.

Symptoms & Life Cycle

The mealybug sucks plant sap, causing leaves to distort, fall, and stems to dieback (Photos 1-5). As the mealybugs feed, honeydew is expelled, falling onto leaves which become colonised by sooty mould fungi; these reduce the exchange of gases and photosynthesis, so weakening the plants further.

Females develop eggs without mating, and lay up to 500 on shoot tips, on the underside of leaves and on leaf stalks. The eggs hatch and the nymphs or 'crawlers' disperse to the top of the plant, settle, moult twice, before becoming adult (Photo 4). Adults are pink, covered in white wax secretions, 1.10-2.6 mm long and 0.5-1.40 mm wide.

Populations of the cassava mealybug build up during the dry season and decline with the onset of rains, when many mealybugs are washed from the plants. The life cycle last about 50 days, with temperatures of 28°C being optimal.

Spread occurs when crawlers move by themselves over short distances, or longer when carried by wind currents, vehicles, animals, birds, on clothing, and during exchanges or distributions of cuttings.

Photo 1. Cassava mealybug, *Phenococcus marginatus*, distorting terminal shoot of cassava.

Photo 2. Cassava mealybug, *Phenococcus marginatus*, distorting terminal shoot of cassava.

Impact

The impact of the mealybug in Africa has been considerable. One review said: "Cassava mealybug spread across the width of Africa in about 15 years. Its accidental introduction damaged a staple crop that is particularly important in times of drought, during a time of drought, leading to famine"[1]. Shoots became heavily infested resulting in low root yields. The loss of leaves was also important as they are a major leafy vegetable in Africa. In addition to the immediate damage, stunting resulted in weak cuttings for the next crop.

Estimation of losses caused by the mealybug (and the green spider mite, *Mononychellus* species) has been put at $2 billion a year, until both were brought under control using natural enemies.

Photo 3. Cassava mealybug, *Phenococcus marginatus*, distorting terminal shoot of cassava. The leaves are short, distorted and bunched.

Detection & inspection

Look at the undersides of leaves and the shoot tips for colonies of the mealybug. However, there are other species which are similar, and because of this identification by experts is essential.

Photo 4. Severe damage to terminal growth by the cassava mealybug, *Phenococcus marginatus*.

Management

QUARANTINE

Although widely distributed throughout Asia and Southeast Asia, *Phenacoccus manihoti* has not yet reached Papua New Guinea, or other Pacific island countries. Therefore, it is necessary to prevent this mealybug from extending its range. Biosecurity authorities need to be alert to the potential pathways that may take this pest across national borders, in particular the movement of cassava shoots for leafy vegetables, planting material, and people.

NATURAL ENEMIES

Natural enemies of the cassava mealybug include ladybird beetle generalists, e.g., *Hyperaspis*, *Exochomus* and *Diomus* species. There are also several specific parasitoid wasps, among which *Apoanagyrus lopezi (Epidinocarsis lopezi)* has been the most effective parasitoid controlling the cassava mealybug since its introduction to Africa and Asia.

Note, ants tend mealybugs for their honeydew. By doing so, they protect the mealybugs from the activities of parasites and predators. To manage mealybugs, it is important to remove the ants, so that biological control can operate.

CULTURAL CONTROL

Before planting:

- Avoid planting in sandy or nutrient poor soil. Alternatively, add manure, and mulch to avoid moisture stress. Mealybugs infestations are a problem in these soils even though parasitoids are present.
- Do not plant infested cuttings. If mealybugs are present, place 20 cm long cuttings in hot water - mix equal amounts of boiling and cold water and immerse cuttings for 5 minutes. Treat a small number and plant, to see if growth is normal before treating all the cuttings.

During growth:

- Ensure cassava crops have adequate nutrition by applying manure or mineral fertilizers. Good plant nutrition has been found to (i) improve the production of chemicals made by the plant that reduce populations of the mealybug, and (ii) produce larger wasps that are more fertile.

After harvest:

- Remove the remains of the crop after harvest, and destroy.
- Do not replant on the same land. Rotate crops with maize, food or forage legumes or vegetables, leaving a 2-3-year interval between crops of cassava on the same land.

CHEMICAL CONTROL

The release of the parasitoid *Apoanagyrus lopezi* has proved very successful wherever introduced against the cassava mealybug; once released, insecticides should be avoided. Their use can make the problem worse by destroying biocontrol agents, parasites and predators. If a pesticide is required, the following are recommended:

- Use horticultural oil (made from petroleum), white oil (made from vegetable oils), or soap solution (**see Fact Sheet no. 56**). The spray will not kill all mealybugs, but it will suppress the population enough to allow predator and parasite numbers to build up and start to control them.
- Several soap or oil sprays will be needed to bring the mealybugs under control. It is essential that the underside of leaves and stems are sprayed thoroughly. It is best to spray between 4 and 6 pm to minimise the chance of leaves becoming sunburnt.
    - White oil:
        - 3 tablespoons (1/3 cup) cooking oil in 4 litres water.
        - ½ teaspoon detergent soap.
        - Shake well and use.
    - Soap:
        - Use soap (pure soap, not detergent).
        - 5 tablespoons of soap in 4 litres water, **OR**
        - 2 tablespoons of dish washing liquid in 4 litres water.
- Commercial horticultural oil can also be used. Note, oil sprays work by blocking the breathing holes of insects causing suffocation and death. They are less likely to kill natural enemies as they are quickly broken down in the environment, and also the development of resistance to them is less likely than is the case when using synthetic pesticides. If destruction of natural enemies is not a concern add malathion or a synthetic pyrethroid that is inactivated rapidly in the environment.
- Use synthetic pyrethroid insecticides to kill ants, which often tend mealybugs for their honeydew, and protect them from effective control by predators and parasitoids.

When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. **Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticides to use should always be sought from local agricultural authorities.**

Photo 5. Dieback of cassava, caused by the cassava mealybug, *Phenococcus marginatus*.

Photo 6. Adults and nymphs of the cassava mealybug, *Phenococcus marginatus*.

Photo 7. The parasitoid, *Anagyrus lopezi*, of the cassava mealybug, *Phenococcus marginatus*.

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Information from Herren HR, Neuenschwander P (1991) *Biological control of cassava pests in Africa*. Annual Review of Entomology 36:257-283; and CABI (2017) Phenacoccus manihoti (cassava mealybug). Crop Protection Compendium. (https://www.cabi.org/cpc/datasheet/40173); and Cassava mealybug *(Phenococcus manihoti)* Plantwise Knowledge Bank. (http://www.plantwise.org/KnowledgeBank/Datasheet.aspx?dsid=40173); and from Parsa S, *et al.* (2012) The cassava mealybug *(Phenococcus manihot)* in Asia: First records, potential distribution, and an identification key. PLoS ONE 7(10). (https://doi.org/10.1371/journal.pone.0047675). Photos 1-5 Kris Wyckhuys (CIAT) and Phanuwat Moonjuntha (Thai DoA). Photos 6&7 Georg Goergen, IITA-Benin.

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