Phenacoccus solenopsis Tinsley

Body oval, often quite large; somewhat rounded in lateral view; dark reddish to almost black; legs reddish in grown up female; covered by thin, white, mealy wax, with dark dorso-submedial bare spots on intersegmental areas of thorax and abdomen, these areas forming 1 pair of dark longitudinal lines on dorsum; ovisac absent from dorsum, but well developed ventrally; eggs yellow; with 18 pairs of lateral wax filaments, posterior pairs longest, up to 1/7th of length of the body. Surface of lateral filaments rough.

Pseudococcus jackbeardsleyi Gimpel & Miller

Body oval; slightly rounded in lateral view; body colour variable from light yellow to reddish orange; mealy wax covering body, thin enough so that body colour shows through; with 4 longitudinal lines on dorsum - two broad dorsomedial line and two thin submarginal lines; dorsomedial lines cross with the horizontal segmental line to form darker depressions on abdomen; ovisac formed with loose long thin wax filaments; eggs pinkish orange; with 17 lateral wax filaments, posterior filament longer than body (almost 2 times the length of the body) and next pair about half as long as posterior pair; lateral filaments as long as body width. Primarily occurring on foliage of host. Surface of lateral filaments rough.

Pseudococcus longispinus (Targioni Tozzetti)

Adult female elongate ovate; slightly rounded in lateral view; earlier instars dull pinkish orange but older examples greyish orange. Legs and antenna yellowish, darker than derm. Dorsum thinly covered with white mealy secretion, almost completely hiding the colour of the insect. Margin with a complete fringe of white tassels (seventeen on each side), which are shorter in front and increase in length towards the posterior extremity, the terminal four being exceptionally long, approximately two times as long as the length of the body of the insect. Lateral filaments about half as wide as body. Two short flattened filaments, together forming a tube, proceed from the anal ring, and lie between the long caudal processes. Ventral surface almost nude. With 2 thin longitudinal lines on marginal area; mid dorsal area on dorsum with irregular patch with less wax dusting (looks as though the wax dust has been erased).

Publishedby

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ICAR—NBAIR publication:09/2022

A PICTORIAL GUIDE FOR THE IDENTIFICATION OF MEALYBUGS INFESTING CASSAVA

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Cassava (*Manihot esculenta* Crantz) is cultivated throughout the year in India, in states viz., Tamil Nadu, Kerala, Andhra Pradesh and the North-East. Many insects and mites are known to cause damage and affect cassava cultivation throughout the world. The major pests of cassava include whiteflies, mealybugs and mites.

Mealybugs (Hemiptera: Pseudococcidae) are soft bodied insects with piercing-sucking mouth parts and a covering of flocculent, white, waxy threads. Mealybug infestation may occur in the crevices of stem, on foliage, vegetative shoot apex, on roots, and are extremely difficult to detect.

A total of 24 species of mealybug have been reported to infest cassava throughout the world, whereas in India, ten species of mealybugs were documented to colonise on this host plant. These species are *Ferrisia virgata* (Cockerell), *Maconellicoccus hirsutus* (Green), *Nipaecoccus viridis* (Newstead), *Paracoccus marginatus* Williams & Granara de Willink, *Phenacoccus madeirensis* Green, *Phenacoccus solenopsis* Tinsley, *Planococcus citri* (Risso), *Pseudococcus jackbeardsley* Gimpel & Miller and *Pseudococcus longispinus* (Targioni Tozzetti).

Recently, *Phenacoccus manihoti* Matile Ferrero invaded India through Kerala and has spread to Tamil Nadu and is causing severe damage.

Of the above listed species of mealybugs only seven species viz., *F. virgata*, *P. marginatus*, *Ph. madeirensis*, *Ph. solenopsis*, *Ps. jackbeardsleyi*, *Ps. longispinus* and *Ph. manihoti* are of regular occurrence and on several occasions, they have been found to coexist on a single infested leaf, branch or shoot tip. This makes it even more difficult to assign correct identity to the damage causing species. There are several instances of failed biological programmes due to erroneous identity of mealybug species.

This folder documents field identification characters of mealybug species that have established as pests on cassava and the recently introduced mealybug species.

Ferrisia virgata (Cockerell)

Adult female at first dull yellowish orange, afterwards brownish, paler beneath. Dorsum powdered with white mealy secretion which, in older females conceals the colour of the insect except at definite paired patches on the thorax and abdomen, where the derm remains visible. Posterior extremity with a conspicuous pair of stout, tapering, waxy tassels, 0.8 times as long as body; the rest of the body with numerous long, fine, straight, glassy filaments. These glassy filaments are extremely fragile, falling off on touch; they are constantly produced. Lateral wax filaments completely absent. The female, during oviposition, rests upon a pad of silky white filaments, and wisps of the same material surround its body.

Paracoccus marginatus Williams & Granara de Willink

Body elongate oval; somewhat flattened dorso-ventrally; body yellow; legs light yellow; mealy wax covering body, not thick enough to hide yellow body, without bare areas on dorsum, but segmental lines clearly visible; ovisac ventral; with 15 to 17 lateral wax filaments, posterior pair of filaments conspicuously longer, filaments anterior to posterior pair small, inconspicuous on thorax and head, posterior pair about 1/8 length of body; surface of the wax filaments rough. Primarily occurring on foliage of host. Damage on tender parts causes twisting and crinkling. Oviparous, eggs cream or light yellow. Body turns black in 70 % alcohol.

Phenacoccus madeirensis Green

Body oval; somewhat flattened dorso-ventally; body greyish green; legs and antenna reddish in completely grown up female; covered by thin, white mealy wax, with two longitudinal lines on submarginal area and two depressed areas around spinal area making mid-dorsal line look a little elevated from the derm; with 4 -5 tiny wax outgrowths arranged horizontally on all abdominal and thoracic segments; with 18 pairs of lateral wax filaments, posterior pairs longest, about 1/8th or less of length of the body. Ovisac is formed with thick white wax; eggs yellow. Specimens in alcohol with 1 pair of dorso-submedial dark lines on thorax and abdomen.

Phenacoccus manihoti Matile Ferrero

Body oval, dorso-ventrally flattened; irrespective of the age of the female, body colour rosy pink or yellow; completely grown up females with two different body colours can be seen in one a single patch of infestation; body lightly dusted with fine mealy wax powder but body colour can be seen through; segmentation clearly visible; caudal and lateral wax filaments poorly developed, stub like, formed as wax flakes on the dermal swelling on each body segment, giving wavy appearance to the body margin. Eggs bright yellow; ovisac ventral, thick, cottony; body remains yellow in 70 % alcohol.