e ISSN–2321–7987 | ●●● Article ●●● |Visit us : *www.researchjournal.co.in*|

Papaya mealybug and its management

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The papaya mealybug (PMB), *Paracoccus marginatus* Williams and Granara de Willink (Hemiptera : Pseudococcidae), native to Mexico and Central America, is a small hemipteran found to attack several genera of host plants. First report of its occurrence was in 1995 and thereafter it has spread to more than 15 countries. In India it was recorded during July 2008 on Papaya (*Carica papaya* L), mulberry (*Morus* spp.), jatropha (*Jatropha curcus* L.) and tapioca (*Manihot esculenta* Crantz) besides incidence on flower crops, vegetables and fruits crops damaged/infested by this invasive pest is growing at an alarming rate. It was found to cause extensive damage to weed plants especially *Parthenium hysterophorus*. Recently it has been found to attack the mulberry (*Morus* spp.) crop, the sole food plant for mulberry silkworm, *Bombyx mori* L.

Distribution: The pest has been reported in Coimbatore, Tirupur, Erode, Salem, Namakkal and Karur districts of Tamil Nadu. The pest is now spreading to other districts too. The pest has been recently noticed in other states such as Karnataka, certain parts of Andhra Pradesh and Malappuram and Thrissur districts of Kerala. The pest has now spread to Pune area of Maharashtra also and is likely to be reported from other parts of the country as well.

Discription of papaya mealy bug :

– The adult female is yellow, approximately 2.2 mm long and 1.4 mm wide and is covered with a white waxy coating.

– A series of short waxy caudal filaments, less than 1/4th the length of the body exists around the margin.

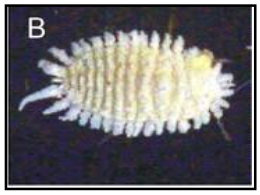
– Adult males are pink, especially during the pre-pupal and pupal stages, but appear yellow in the first and second instars.

– Adult males are approximately 1.0 mm long, with an elongate oval body that is widest at the thorax (0.3 mm).

– Adult males have ten-segmented antennae, a distinct aedeagus, lateral pore clusters, a heavily sclerotized thorax and head, and well-developed wings.

– Two characteristics that are important in distinguishing *P. marginatus* adult females from all other species of *Paracoccus* are: the presence of oral-rim tubular ducts dorsally restricted to marginal areas of the body, and the absence of pores on the hind tibiae.

– The female papaya mealybug can easily be identified by the presence of eight antennal segments, in contrast to nine in pink hibiscus mealybug, *Maconellicoccus marginatus*.



– Ovisac is three to four times the body length and develops ventrally beneath the body of the female.

When pressed, the body fluid of yellow colour comes out.

Biology : Females have no wings, and move by crawling short distances or by being blown in air currents. Females usually lay 100 to 600 eggs. Eggs are greenish yellow and are laid in an ovisac that is three to four times the body length and entirely covered with white wax. Egg-laying usually continuous over a period of one to two weeks. Eggs hatch in about 10 days, and nymphs or crawlers begin to actively search for feeding sites. Adult males may be distinguished from other related species by the presence of stout fleshy setae on the antennae and the absence of fleshy setae on the legs. Females have three instars whereas males have four instars. Males have longer development time (27-30 days) than females (24-26 days) at 25 ± 1^0 C, 65±2 % RH and 12:12 (L:D) photoperiod. Adult females attract the males with sex pheromones. Under greenhouse conditions, reproduction occurs throughout the year.

Host range of the mealybug: This mealybug is polyphagous attacking several agricultural and horticultural crops like tapioca, pigeonpea, cotton, okra, tomato, brinjal, teak, silk cotton, *Jatropha*, mulberry, *Plumeria* and numerous weeds like *Parthenium hysterophorous, Sida acuta, Acalypha indica, Eupatorium adenophorum* and *Cassia sericea.*

Damage:

Initially the mealybugs colonize the lower side of the papaya leaves along the veins and later cover all the fruits

rendering them unmaretable. The loss is reported to n the range of 60-80 per cent. Due to the explosive growth of the mealybug populations and the toxins produced, the younger plants are killed outright. Heavy sooty mould also develops due to the secretion of honey dew by the mealybugs.

Management strategies : For management of mealybugs, it is important to know the species present as management programs for the various mealybugs may differ. Plant protection products are of limited effectiveness against mealybugs because of the presence of waxy covering of its body. Management of mealybug involves the following tactics:

Cultural and mechanical:

– Monitoring and scouting to detect early presence of the mealybug.

– Pruning of infested branches and burning them.

– Removal and burning of crop residues.

– Removal of weeds/alternate host plants like Hibiscus, Parthenium etc. in and nearby crop.

– Avoiding the movement of planting material from infested areas to other areas.

– Avoiding flood irrigation.

– Prevention of the movement of ants and destruction of already existing ant colonies.

– Sanitization of farm equipment before moving it to the uninfested crop.

– Application of sticky bands or alkathene sheet or a band of insecticide on arms or on main stem to prevent movement of crawlers.

Biological control:

– Natural enemies of the papaya mealybug include the commercially available mealybug destroyer *Cryptolaemus montrouzieri*, ladybird beetles, lacewings, hover flies, *Scymnus* sp. and certain hymenopteran and dipteran parasitoids. Conservation of these natural enemies in nature plays important role in reducing the mealybug population.

– In the nature, lepidopteran predator, *Spalgis epius* (Lycaenidae) is a well known representative of carnivorous butterfly feeding on various species of pseudococcids and coccids. *S. epius*, being the dominant predator, feeds efficiently on the ovisacs, nymphs and adult of papaya mealybug.

– Three species of encyrtid parasitoid *Acerophagous papayae*, *Pseudleptomastix mexicana* and *Anagyrus loecki*, known to suppress the papaya mealybug.

Chemical control:

– Locate ant colonies and destroy them with drenching of chlorpyriphos 20 EC @ 2 .0 ml/litre of water.

– Spot application of insecticide immediately after noticing mealybug on some plants in the crop field.

– Use of botanical insecticides such as neem oil (1 to 2%), NSKE (5%), or Fish Oil Rosin Soap (25g/litre of water) should be the first choice .

– Apply recommended chemical insecticides as the last resort such as profenophos 50 EC (2 ml/litre), chlorpyriphos 20 EC (2ml/litre), buprofezin 25 EC (2 ml/litre), dimethoate 30 EC (2 ml/litre), thiomethoxam 25 WG (0.6 g/ litre), imidacloprid 17.8 SL (0.6 ml/litre).

– Avoid repeating the use of the same chemical insecticide as there are chances for development of resistance in the pest.

– Drenching soil with chlorpyriphos around the collar region of the plant to prevent movement of crawlers of mealybug and ant activity is useful.

Received : *10.03.2014* ***Revised :*** *21.10.2014* ***Accepted :*** *08.11.2014*