



### Managing Menace of Insect Pests on Custard Apple

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In custard apple cultivation, insect pests remain as a major constrains in India. About 20 species of insect pests have been reported to attack the crop. The article discusses in short about management of pests of custard apple.

#### Introduction

Custard apple or sugar apple (*Annona squamosa* L) is one of the important minor fruit crops belonging to the family Annonaceae. Fruit is also called as *Sharifa* or *Sitaphal* in the vernacular. It is grown throughout the India except temperate region. The major custard apple growing states are Maharashtra, Gujarat, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Bihar, Assam, Rajasthan, Orissa and Tamil Nadu (Singh et al., 2013). Fruits can be called as a delicacy of dry region due to its very sweet delicate flesh and are rich in carbohydrate mainly in the form of sugar, protein, calcium, phosphorus and iron. In custard apple cultivation, insect pests remain as a major constrains in India. About 20 species of insect pests has been reported to attack the crop (Butani, 1979), of which the mealy bug species viz., Striped mealy bug, *Ferrisia virgata* (Cockerell), Pink mealy bug, *Maconellicoccus hirstus* (Green), Citrus mealy bug, *Planococcus citri* (Risso), Passion vine mealy bug, *Planococcus pacificus* Cox (Hemiptera: Pseudococcidae) and Mango mealy bug, *Perissopneumon ferox* Newstead are the major one causing significant fruit yield loss.

#### Biology

Attack of mealy bug found to be more under dry weather climate and very often the heavy incidence occurs following periods of prolonged drought. Activity is most common during the month of July to October. The heavy infestation upto 40-80% occurs during November (Kapadia et al., 2009). These mealy bug species survive under protected areas as cracks and crevices of the bark, at the base of petioles, on the underside of leaves and between the fruit eyes. They are small soft bodied insects, pink in colour and covered with white mealy wax coating. Eggs also protected by waxy filamentous secretion of ovisac. They are active and mobile during entire life span and reproduce both sexual and asexual (parthenogenesis) mode. Females lay 100-300 eggs; incubation period is 3-4 days. The nymphal duration is around 45 days. The longevity of males is

1 to 3 days while that of females extends from 36 to 53 days. Parthenogenesis is a common mode of reproduction.

### Nature and damage symptoms

Both nymphs and adults are damageable, they fasten their mouth at fissure and furrow of rounded fleshy tubercles of the green fruits and suck the sap through piercing and sucking action. If the infestation occurs on developing stage, the fruit size becomes diminished, shrivelled and undergo premature dropping. These mealy bugs also infest at fruit stalks, leaves and terminal shoots causing, yellowing and drying symptoms. Bugs excretion contains honeydew which encourages the growth of sooty mold on leaves and fruits and also attracts black ants which help in the spread of these mealy bugs. The sooty mould also reduces the photosynthetic efficiency of the plant.



Completely mealy bugs infested fruit



Nymphs and adults inflicting damage

### Management

Although synthetic insecticides are the major tool for mealy bug control due to their waxy coating they fail to give good control. Therefore, integrated approaches are essential to manage this pest. Prophylactic measures are necessary to achieve the expected control. Use of pest free planting material for planting would help to avoid further spread.

### Cultural control

Collection and destruction of all infested plant parts such as leaves, peduncle, twigs and fruits. Racking of soil around the tree region during flowering and repeat after one month upto 75cm depth and mixing of dust formulation of insecticides such as lindane 1.3% at 10 kg/ acre could be done.

**Mechanical control**

Pruning of branches attached to ground and banding of stem bottom with polythene sheet (30 cm wide) pasted with grease would be effective to control further spread. Put a band of Lindane swab around the tree trunk leaving 30 cm from the main stem.

**Biological control**

Application of 5% neem seed kernel extract or spot application of neem oil 5ml/lit along with detergent 1g/lit on infested parts would arrest further spread. Ants are the major spreading agent from infested place to another place, so they should be removed. Follow ant control methods such as destruction of ant holes, red ant nests and skirting of citrus trees after fruit harvest which prevents the ant migration through side branches.

Release of *Cryptoleamus montrouzieri* (ladybird beetle) @ 10 Nos./ tree would be effective to predate upon the eggs and nymphs of the mealy bugs. Releases of ladybird beetle *C. montrouzieri* were made @ 30 larvae/plant twice at 15 days interval found to be significantly suppressed the mealybugs *Ferrisia virgata* (Ckll.) and *Maconellicoccus hirsutus* (Green) population on custard apple (Mani and Krishnamoorthy, 2007). Spray biopesticides viz., *Verticillium lecanii* (Potency  $2 \times 10^8$  C.F.U /gm) 10gm/l and *Beauveria bassiana* (Potency  $10^8$  spores/ml) 10ml/l. Application of *V. lecanii* at 2.0 g/l water combined with spreaders/stickers: Ranipal at 1 ml/l water and Teepol at 1 ml/l water found to be effective against *M. hirsutus* (Makadia et al., 2009; Kulkarni and Patil, 2013). The exotic parasitoid *Leptomastix dactylopii* capable of causing mortality under field condition ranged from 0.41 to 2.72% and it could be good choice for biological control of mealy bug, *Planococcus citri* (Mani et al., 2007).

**Chemical control**

Foliar application of quinalphos 0.05% immediately after appearance of mealybug crawlers and followed by spraying of triazophos 0.04% after 15 days found to be effective at early stage of infestation (Kapadia et al., 2009)

**Other minor pests**

Yellow scale, *Aonidiella orientalis* (Newstead) (Hemiptera: Diaspididae), Black scale, *Parasaissetia nigra* (Neitner) (Homoptera: Coccidae), Helmet scale, *Saissetia coffeae* (Walker) (Hemiptera:Coccidea), Soft scale, *Ceroplastes floridensis* Comstock (Hemiptera: Coccidae). Scale insects infest the leaves and twigs and feeds from the phloem of the plant. Due to their feeding leaves plant loose their vigor, leaves become yellow and defoliation of leaves resulted into reduction in fruit set. Dieback of small twigs and premature fruit drop also could be happened.

Fruit fly, *Dacus zonatus* (Saunders) (Diptera: Tephritidae), a polyphagous pest, the maggots feed on the fruit flesh causing the fruit to rot. Maggot bore into the semi ripened fruits and cause direct damage by puncturing the fruit skin to lay eggs. Fly can be controlled by destroying all damaged and fallen fruits and by ploughing round the trees in January and February to kill the pupae. Collection of fallen infested fruits and dispose them by dumping in a pit and covering with soil. Provide summer ploughing to expose the pupa and monitoring the

activity of flies with methyl eugenol sex lure traps would be effective. Use bait spray combining any one of the insecticides and molasses or jaggery 10 g/l, fenthion 100EC 1ml/l, dimethoate 30 EC 1 ml/l, carbaryl 50 WP 4 g/l at 2 weeks interval before fruit ripening will reduce the egg laying.

White fly, *Dinteuopora decempuntata* (Quaintance & Baker) (Hemiptera: Aleyrodidae). Nymphs suck the sap and secrete honeydew which acts as a medium for the growth of sooty mould fungus, ultimately forms a black coating on the upper surface of leaves. This affects the photosynthesis of leaves. For the management of white fly, insecticides like dimethoate 0.1% and dichlorvos 0.1% can be applied.

Fruit borer, *Anonaepestis bengalella* (Reg), (Lepidoptera: Pyraulidae) caterpillar bore into the fruits and making irregular tunnels and damaging mesocarp. The presence of excreta of the caterpillars near the entry holes on the affected fruits. Affected fruits fall to ground. The growth of affected fruits is arrested. Collect and destroy the damaged fruits. Spray Quinalphos / Carbaryl / Chlorpyrifos @ 2ml/litre of water two times once at flower formation and second at fruit set.

### Conclusion

Attack of insect pests is one of the major constrains in custard apple cultivation, yield loss due mealy bug species is more and much care is needed to manage this pests. Use of pest free planting material, field sanitation, collection and destruction of mealy bug infested leaves, petiole and fruits and proper pruning of orchard would pave the way to reduce the pest population. Racking of soil around the tree twice during flowering and fruiting stage and mixing of dust formulation, stem banding will avoid the migration of crawlers from infested to non-infested tree. Release of ladybird predator, *Cryptoleamus montrouzieri* during the month of July to September could causes the significant population reduction. Application of entomopathogenic fungi, *Verticillium lecanii* and *Beauveria bassiana* also found to be effective against mealy bug species. Spot spray of neem oil and neem seed kernal extract suppress the pest population and also encourages the natural control under field condition. Timely application of synthetic insecticides like quinalphos, triazophos and dimethoate has been recommended for mealy bugs as well as other insect pests of custard apple.

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