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Review Article

Mango Shoot Gall Maker, *Apsylla cistellata* Buckton (Homoptera: Psyllidae) and its Management - A Review

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Abstract

Mango (*Mangifera indica L.*) is one of the highest produced fruit crop. It is known as the king of the fruit. However, mango shoot gall maker (*Apsylla cistellata* (Buckton)) is a newly rising constraint for its production. Yield is reduced to 96% in case of heavy infestation. The twigs of the plant on which fruit is set, the pest forms gall on the twigs. The twigs may suffer die-back. This article gives a brief idea about the pest and its effective management.

Keywords: Mango; Gall; Mango Shoot Gall Maker

Introduction

Mango (*Mangifera indica* L.) also known as the King of the fruit is the major fruit crop of Nepal, India and many tropical countries. Globally mango is the eighth most produced fruit with the production of over 43 million tonnes of which India ranks as the largest producer with the production of 16,196,000 tonnes [1]. Fruit is an essential diet component supplying vitamins and minerals and so the demand is increasing every year.

Mango suffers from many pests out of which mango shoot gall maker is the pest which is recently spreading and gaining economic importance. Gall is found locally on different plant on many trees of South Asian Subcontinent. This may serve as source of infection. Gall maker infests the mango tree and reduces the yield. The heavily infested tree yield 10 - 12 kg of fruits while a normal plant may yield to 300 kg [2]. Thus a proper knowledge of the pest is a must for its proper management so as to ensure the fruitful yield. Management of the pest is likely to increase the return from the fruit crop to the farmers. This article is targeted to increase the knowledge of the farmers regarding the pest and to adopt proper control measures.

Materials and Methods

Many researchers have done researches on the mango shoot gall maker and its biology. The researches were also performed on the management measures and the efficacy of the chemicals used for management. Such articles were viewed regarding the Mango (*Mangifera indica* L.) and its management. Necessary information was collected about the insect pest problem and its management. Relevant information found was compiled and summarized.

Insect pest problem

Psyllids are sap sucking insects widely distributed over tropical countries. Mango shoot gall makers are small brownish black insects resembling mini-cicadas of size 1 - 10 mm [3]. They camouflage themselves so that they are not easily noticed in their niche. Due to the attraction fetched by them for yellow colour, yellow sticky traps are used for their monitoring [4].

Biology

Life cycle is completed with eggs, five nymphal stages and adults with life span of 200 days, 140 days and 30 - 72 hours respectively [5] in contrast six nymphal instars according to Kumar. Peculiarly, pelagic nymphs start to feed sap inside the midrib with-

out proper hatch. First instar nymphs suck the sap by residing in egg case which causes the induction of galls. The buds are modified into galls. Older instar nymphs migrate to the formed galls for further sucking to gain its nourishment [6].

Egg: The common egg laying site is the midrib of the tender leaves. The egg laying season corresponds between third week of February to third week of March. Freshly laid eggs are like rectangular block along with no differentiation between inner contents and the chorion. It measures 0.13 mm in length and 0.07 mm in width.

First instar: It is pinhead sized with red eyes, small antennae and long and one segmented proboscis. The length and width is usually 0.36 mm and 0.24 mm respectively. This stage is observed from end of August to mid-October.

Second instar: It appears from the end of the September to third week of October. The first instar moult at ovipositional site giving the second instar which then moves to the nearby shoot galls formed at that time. The body consists of red eyes and conspicuous segmentation. The body is translucent without setae except apices of tarsi. Average size is 0.89 mm in length and 0.35 mm in width.

Third instar: Body size remarkably increases attaining length of 1.50 mm and width 0.74 mm. Initiation of wing pad can be seen however the head and thoracic regions are not distinguished. Eyes become dark red and ground color of body changes to brownish yellow.

Fourth instar: The proboscis is present as a beak like structure. Body size and the wing pad increases along with antennae segmentation to eight segments. The length and width increases to 2.04 mm and 0.95 mm respectively. The instar lasts to December.

Fifth instar: Head and thorax are distinct with the increment of antenna segments to ten. The length and width increases to 2.39 mm and 1.12 mm respectively. The stage is commonly found between third week of December to third week of January.

Sixth instar: Head, thorax and abdomen distinct. The body turns to psylline type, elongated and robust. Antennae slender with terminal segment having hair like setae. Trochanter is absent in legs. The size measured 2.61 mm and 1.21 mm in length and width respectively. The stage is common in mid-January to mid-February lasting till third week of March.

Adult: The body color is brownish black with light brown abdomen. All body parts are clearly distinguished. Antennae long and ten segmented and wings exceed in length than abdomen. The fore wings are longer than hind wings. The abdomen is bulged in female while that for male is tapering. The size of male and female is clearly distinct. Female sizes 3.09 mm in length and 1.76 mm in width. In contrast, size of male is 1.80 mm and 0.95 mm in length and width respectively.

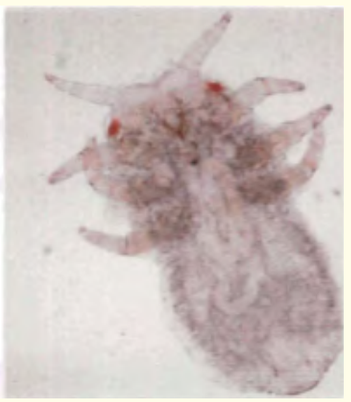
Figure 1: Freshly laid egg.

Figure 2: First nymphal instar.

Mounted

Unmounted

Figure 3: Second nymphal instar.



Mounted

Unmounted

Figure 4: Third nymphal instar.

Mounted

Unmounted

Figure 5: Fourth nymphal instar.

Mounted

Unmounted

Figure 6: Fifth nymphal instar.

Mounted

Unmounted

Figure 7: Sixth nymphal stage.

Figure 8: Adult (male).

Figure 9: Adult (female).

Pest Incidence

Insect infestation varies according to the season and variety of mango [7]. They usually infest on March- April. Female lays eggs on midrib of leaves. They generally do not infest young trees below five years of age however the older trees are the most preferred one [3].

Damage

A. cistellata induces gall by its feeding action which imposes wound and changes the chemistry of the cell. This causes stress in the plant resulting in the auxin production leading to gall formation. *A. cistellata* Buckton induces fir-cone-like galls on the vegetative shoot of mango [8]. Infested twigs may suffer die-back. Yield is greatly reduced.

Figure 10: Gall formation in place of apical and axillary buds.

Management

Management of the shoot gall maker can be made using various techniques.

1. Application of Dimethoate 0.03% three times at 20 days interval was found most successful for the control of mango shoot gall maker [9].
2. Application of Phosphamidon 0.05% three times at 15 days interval starting from second fortnight of September [10].
3. Bark pasting with Dimethoate.
4. Bark injection of Dimethoate @ 0.3 ml a.i./cm circumference [6].
5. Spray 2,4-D @ 150mg/l of water (as in Shivankar and Rao)
6. Imidacloprid 0.006% [7].
7. Pruning and burning of gall.
8. Removal of egg bearing leaves from infested plants [11,12]
9. Appropriate use of nitrogenous fertilizer
10. Use of resistant varieties like Makaram, Mulgoa, Delhi etc [6].

Conclusion

Mango shoot gall maker is small brownish-black sap sucking insects. Initial instar of nymphs suck sap from phloem during which it alters the chemistry of cell and induce the gall formation. Infestation by the pest highly decreases (upto 96 percent) the production of the fruit from the mango tree. Intensity of damage depends on variety, season and intensity of infestation. Destruction of infested shoot and use of systemic pesticides can be effectively used against mango shoot gall maker out of which application of Dimethoate 0.03% three times at 20 days interval was found most successful for the control of mango shoot gall maker. The proper control of the pest helps to increase the return to the farmers. Further research on the management of mango shoot gall maker should be done so as to get proper control on the yield loss caused by it.

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