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Shoot Gall Psylla: an Emerging Threat to Mango Orchards of Uttarakhand

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In recent time, mango shoot gall psylla pest emerged as a most noxious pest in the state of Uttarakhand owing to its ability to transform reproductive and vegetative buds into galls results in poor to no fruit setting on affected mango plant. In Dehradun conditions it was observed that the severity of the infestation was as high as 70-80 per cent in Dushehari, followed by Bombay Green (40-55%) and Mallika (20-25%) whereas pest infestation was not noticed in the cv. Amrapali. Management of pest is possible by spraying of profenophos @ 2 ml/litre in the second week of March followed by Dimethoate (0.15%) or Thiomithoxam (0.05%) in second fortnight of August to first fortnight of September.

Introduction

Mango (*Mangifera indica* L.) is the most popular among the tropical fruits of the world. It has been rightly described as 'King of fruits' owing to its historical and religious importance, attractive aroma, delicious fruit quality with richness in vitamins and minerals, accessibility to the common man, liking by the masses and adaptation in large area under cultivation ranging from near coastal areas to the Himalayan foot hills. Mango is one of major fruit crop of Uttarakhand contributing highest (18.82%) share in fruit production of the state, with an average productivity of 4.07 MT/ha which is significantly lower than the average mango productivity (7.33 MT/ha) of the country (NHB database, 2014-15, 2nd Advance Estimates). The Major reason behind lower productivity of state is change in population dynamics of insect pest under changing climatic scenario. Mango shoot gall psylla (*Apsylla cistellata,* Buckton) popularly known as *Ghundi rog* in Uttarakhand is recognised as most noxious pest owing to its ability to transform reproductive and vegetative buds into galls results in poor to no fruit setting on affected plant. Since last two-three years, major mango producing belts of the state (Almora, Nainital and Dehradun districts) are facing severe incidence of shoot gall psylla. It was observed that the pest incidence was more prominent in older orchards whereas younger plants (less than five year old) were found least affected. The Occurrence of this pest is also common in the important mango belts of Uttar Pradesh, Bihar, West Bengal and Terai regions of Northern India.

Symptoms

The most peculiar feature of this pest is a distinguished appearance of conical gall (Picture 1) in place of inflorescence causing partial to complete crop loss due to the failure of panicle formation. The infested buds get converted into hard green conical galls, inside

Picture 1. Conical gall formation at terminal portion

which the psyllid nymphs develop into adults. Due to irritation caused by feeding of nymphs the buds develop into scaly leaves that imbricate the central axis. They suck the sap and exude whitish sticky droplets through their anal openings and these gradually dry. The shoot gall dries out after the rise of psyllid grown-ups in March. It was observed during survey that varieties like Dushehari, Langara, Chausa, Bombay Green and Mallika, are more susceptible whereas, Amrapali was least affected. Practically there was no fruit set on affected shoot due to the transformation of reproductive and vegetative buds into galls.

- The activity of the pest starts from August.
- The galls dry out after emergence of adults in March.
- The adult females lay eggs in the midribs as well as in lateral axis of new leaves.
- Nymphs emerge from eggs during August-September and crawl to the adjacent buds to suck cell sap. As a result of feeding, the buds develop into hard conical green galls.
- The galls are usually seen during September-October consequently, there is no fruit set.

Pest Identification

Nymphs: Freshly hatched nymphs are yellowish in colour, but a change in size and colour with time occurs.

Adults: adults are 3-4 mm long brownish black head and thorax and light brown abdomen.

Eggs: are white in colour laid on the midrib of the leaves in the month of March-April.

Biology of the Pest

Mango shoot gall psylla is a monophagous pest which completes its life cycle in one year. In the month of March-April adult females lay eggs (around 150 Nos.) into the midrib of leaves. They generally prefer mature trees as compare to younger ones (<5 years). Eggs hatching started from middle of August to September coinciding emergence of new vegetative buds which eventually either differentiated into shoot bud or developed into conical shoot gall. Feeding of nymphs and subsequently secretion of certain chemicals through the saliva results in the formation of conical galls in place of apical and axillary buds, in which they later enter, feed, develop and grow till adulthood. Galls are modified axillary and apical bud, which is conspicuous in September. The gall formation is caused by this pest only after the tree starts flowering and fruiting, which directly interfere with the formation of inflorescence and thus adversely affect the yield of mango crop. Total five nymphal instars are present and nymphal period is 140 days. In Dehradun conditions. it was observed that the severity of the infestation was as high as 70-80 per cent in Dushehari, followed by Bombay Green (40-55%) and Mallika (20-25%) whereas pest infestation was not noticed in the cv. Amrapali. Heavily infested tree yielded very fewer fruits. Heavy pest attack was observed in neglected and poorly managed mango orchards. It was reported that a heavily infested tree yields only 10-20 kg fruits as against 300 kg from a healthy tree.

Pest Management

A. Monitoring

To monitor the initial development of pest in the endemic areas survey is a prerequisite. Therefore, for field scouting farmers should be mobilized to observe the pest occurrence in the month of March-April which depict as egg laying on the midrib of leaves and August-September for observation of nymph activity. Capacity building of farmers for pest identification is most important for integrated pest management.

B. Cultural control

To overcome this pest, the Mango orchards need to be maintained with utmost sanitation, discouraging overcrowding of branches and timely plant protection measures are need to be taken. To minimize the shoot gall formation the eggs bearing leaves from a shoot should be

removed in the second fortnight of March every year. However, in advance cases gall with nymphs should be collected and destroyed.

C. Mechanical control

In mechanical control, pruning upto30 cm of affected shoots is more effective and accountable for less number of gall formation when compare to the 15 cm pruning and without pruning.

D. Biological control

A large number of parasites, predator and pathogens are very effective against mango shoot gall psylla. Black lady bird beetle, purplish pirate bug, brown lace pays a significant role in suppression of pest population. Conservation of these beneficial insects is need of hour.

E. Chemical control

Repeated spraying without proper knowledge on the life cycle did not give good result in managing the pest. Hence, application of insecticides had to be synchronized with the laying of eggs and emergence of nymphs. Spraying of profenophos @ 2 ml/litre in the second week of March has been advocated to control oviposition. To control the nymphal emergence, Dimethoate (0.15%) or Thiomithoxam (0.05%) or Quinalphos (0.05%) or Metasystox (0.1%) may be sprayed between second fortnight of August and the first fortnight of September. Once formation of shoot gall taken place, spray of 2, 4-D (150 ppm i.e. 150 mg/litre of water) is advocated during month of October which opens the galls and nymphs are exposed to the prevailing cold and get killed.