

Management of Indian gypsy moth in dry temperate zone

***Lymantria obfuscata* Walker (Lepidoptera: Lymantriidae), commonly known as Indian gypsy moth is a serious pest of horticultural and forest trees such as apple, poplar, salix and seabuckthorn in dry temperate zone Spiti of Himachal Pradesh. They have a single generation per year with eggs as dormant stage for more than eight months. Initially the young larvae bite small holes on new leaves, complete defoliation and fruit damage by the larvae has been recorded in severely infested apple trees. In case of fruits, larvae scrap the skin and make holes. The badly damaged fruits fall off, while those which recover become deformed with scars on the skin. It is advisable to collect and destroy egg masses. The larvae can be trapped in gunny burlaps tied on tree trunk near ground level, and destroyed.**

THE Indian gypsy moth, *Lymantria obfuscata* Walker (Lepidoptera: Lymantriidae), occurs in Indian subcontinent and recognized as a distinct species since 1865, is a polyphagous insect-pest. In cold desert (dry temperate zone) Spiti, it is found infesting a wide variety of horticultural and forest trees such as apple (*Malus pumila* Miller), pear (*Pyrus communis* L.), apricot (*Prunus armeniaca* L.), seabuckthorn (*Hippophae* sp. L.), willow (*Salix* sp. L.) and poplar (*Populus* sp. L.). In the recent past, populations of *L. obfuscata* attained outbreak proportions in apple growing areas of lower Spiti adjoining to district Kinnaur of Himachal Pradesh leaving trees completely leafless, which ultimately leads to significant economical losses to farmers.

Although there are several species of Lymantriidae reported throughout the globe, *Lymantria obfuscata* and *Lymantria dispar* L., 1758 are primarily of economic importance for horticultural growers. As per the available literature, the biology and host range of both are broadly similar.

Life cycle

L. obfuscata has one generation per year passing through four life stages: egg, larva (caterpillar), pupa and adult (moth). The pest undergoes complete metamorphosis with six larval instars and overwinters in the form of egg masses. The larval stage is the destructive stage as it feeds on foliage voraciously.

Appearance

Adult gypsy moth appears in late April and remains active till mid July on apple plantations. Before copulation, the male shows some signs of pre-copulatory behaviour indicated by twitching of antennae and shaking of the body. Simultaneously, female moth responds by protracted and retracted last abdominal segment of their abdomen.



a. Indian gypsy moth egg masses; b. initial larval stages; c. larva; d. pupa; e. adult male

Mating occurs during day time and lasts for about one and a half hour.

Immediately after copulation, female starts egg laying in batches on the bark of old apple trees and other adjoining places like under surface of big stones, cracks and crevices of mud walls around orchard covering the egg masses with golden brown hairs. Egg laying continued for less than a week and an average of 250-400 eggs are laid in clusters by each female. Incubation period of the eggs ranged from 9 to 10 months. This period is also concluded as dormant stage due to fall in temperature and non-availability of food during severe winters and eggs starts hatching with the onset of summers (April).

Egg hatching phase ranged from one to four weeks depending upon the abiotic conditions (rise in temperature). After hatching, first instar larvae remain in groups and starts feeding on upper surfaces of leaves forming small perforations. They remain hidden during



a. Exuviae of Indian gypsy moth larvae; **b.** hidden larvae in grass and fallen leaves of apple during day time

the daylight and feed during night. There are five larval instars in the life cycle of this insect-pest. The full grown larva is about 45 mm.

Feeding takes place during the non-sunny hours of the day and at night. During the middle of the day, the caterpillars congregate in colonies of hundreds of individuals on the bark of the trunk, underside of the branches, in forks, under the shelter of epicornic shoots and the foliage (fallen dry leaves) of ground plants, under stones, etc.

Fully fed and matured larvae stop feeding, body start shrinking and thickening in size. Larvae do not spin any cocoon around its body. Pupae almost naked, reddish brown with only a few strands of silken threads attached loosely to its body. Female pupae are characteristically larger than male pupae. The pupal period lasts for 10-14 days and emergence of moths occurs during July-August.

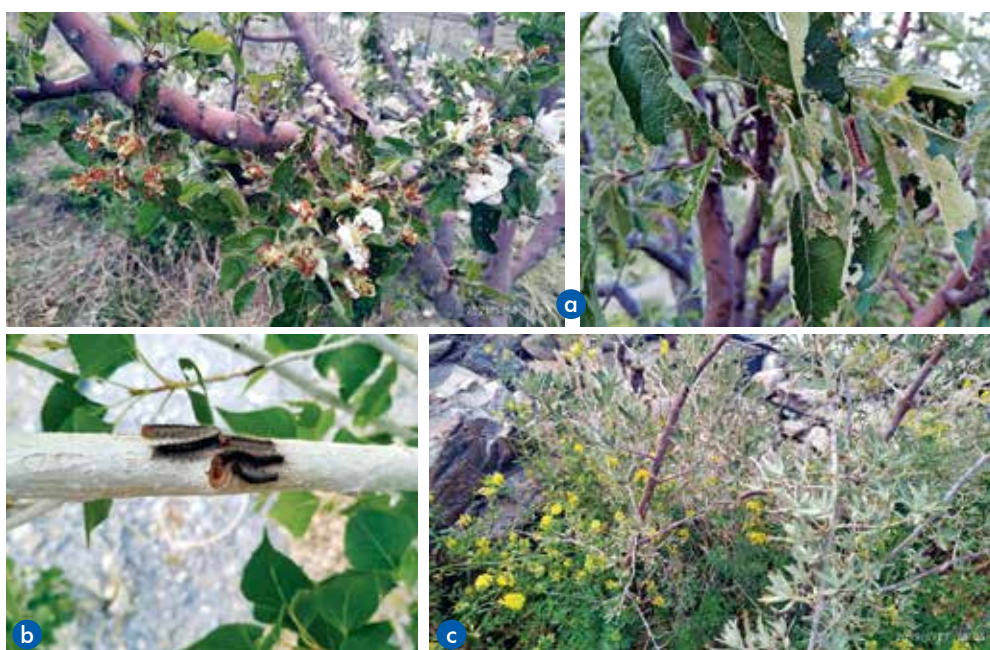
In adults of gypsy moth, sexual dimorphism is well distinct. Female moths larger in size and dirty creamish whereas males smaller than females and have brownish bodies. In males, wings are well developed. Front and hind wings dissimilar in venation and in shape. Female moths are apterous possessing feebly developed wings and bulky body and therefore are unable to fly. Male moths have functional wings and can perform its normal flight in a zig zag manner during the day.

Nature of damage

Indian gypsy moth is an important defoliator and a destructive pest of many horticultural temperate fruits such as apple, apricot and forest plants such as seabuckthorn, willow and poplar in cold desert (dry temperate zone) Spiti. The larvae of Indian gypsy moth defoliates the plants completely and results in failure of fruit development. The caterpillars of Indian gypsy moth causes defoliation of leaves and their feeding increases with the subsequent instars and the caterpillars feed voraciously on the entire tender

leaves, sometimes leading to scrapping of early stage fruits resulting in non economic value. The first instar larvae usually remain on the lower surface of leaves and remain suspended by long silken threads which later carried away by wind from tree-to-tree. Caterpillars are nocturnal and gregarious in habit. They aggregate in large numbers on the ground (under the fallen dry leaves) near the base of the trees, crevices of bark or on lower parts of well shaded main branches. After dusk, the larvae start crawling through tree trunks and feed there. In the near future, this pest may assume more serious and destructive position if adequate control measures were not undertaken immediately. This warrants attention of the orchardists of the region for its timely and proper control.

Initially the young larvae bite small holes on new leaves, and later whole of the leaf is eaten and only mid rib or petiole is left. Complete defoliation and fruit damage by the larvae has been recorded in severely infested apple trees. Foliage with low tannin content is voraciously fed by gregarious nocturnal larvae. Smaller larvae damage both leaves as well as fruits. In case of fruits, larvae scrap the skin and make holes. The badly damaged fruits fall off, while those which recover become deformed with scars on the skin.



Infestation of Indian gypsy moth larvae infesting on **a.** apple; **b.** poplar; **c.** seabuck thorn



a. Jute bag used as burlap by farmers to trap larvae; **b.** Application of insecticide by farmer against Indian gypsy moth

Management practices

- i. It is advisable to collect and destroy egg masses.
- ii. The larvae can be trapped in gunny burlaps tied on tree trunk near ground level, and destroyed.
- iii. The caterpillars hide in grasses grown and fallen leaves at the ground level of tree during hot sunny days. Therefore, orchard should be kept clean, followed by collection and destruction of larvae.
- iv. Spraying of 500 ml of Dimethoate 30 EC or 2.0 kg of Carbaryl 50 WP in 500 liters of water per hectare has also been found effective to manage the pests.
- v. Spray the aerial parts with Fenvalerate 0.03%, Chlorpyrifos (0.04%), Deltamethrin (0.0028%) are found effective in managing larval population.

SUMMARY

Indian gypsy moth larvae cause serious damage to apple tree foliage during early to mid stage of tree development during season causing considerable losses in yield. The attack by Indian gypsy moth larvae at early blossom stage is more serious and they sometimes cause complete crop failure by deforming the fruits with no economic value. Insecticides applied to the foliage are usually recommended before complete blossoming of flowers.

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