

## ***Calopepla leayana* (Coleoptera :Chrysomelidae) – A pest of *Gmelina arborea* from Jharkhand with emphasis on its Biology and Control**

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### **ABSTRACT**

*Calopepla leayana* (Coleoptera :Chrysomelidae) is a major pest of *Gmelina arborea* from Jharkhand. A detailed study on the bionomics was done during the period of two years in 2021-2023 and under control measures in laboratory conditions. The pest is active from march-April to November-December. The beetles feed by cutting circular holes on leaves, destroy young buds of the developing shoots which causes negative effect on growth of the plant and sometimes the trees dry up when severe infestation is seen.

Figure : 01

References : 13

Table : 00

KEY WORDS : Bionomics, *Calopepla leayana*, *Gmelina arborea*, Infestation, Pest

### **Introduction**

About 3,50,000 species have been reported under insect order Coleoptera, of which family Chrysomelidae is a major phytophagous group. It includes over 38000 living species. *Calopepla leayana* is a member of family Chrysomelidae, Subfamily – Cassidinae and it is eventually a serious pest of *Gmelina arborea*. Gamhar is an economically important timber tree belongs to family Verbenaceae. Its wood is used in industries and furnitures. It is a commercially a fast growing deciduous tree species. It is widely distributed throughout the greater part of India and neighbouring countries. In India it is widely spread in Jharkhand, Bihar, U.P., West Bengal, North East states, South India etc.

There are many pests which cause damage to Gamhar tree. *Calopepla leayana* is one of them. It causes damage to the leaves and the larval forms feed the leaves and defoliation takes place. The insect attacks the small plants, saplings and the nurseries. The trees are also damaged by the pests, which affect the growth of the plant. Studies were made on the bionomics of defoliator *Calopepla leayana* from India and Bangladesh<sup>1-5</sup>. The defoliator is known to destroy more than 2000 acres of young plantation in a single layer in our country<sup>3,10</sup>. It has been also reported in the list of insect pests of forest plants in India and adjacent countries<sup>4,9, 12</sup>. It has been reported that trees remain leafless for almost half of the period of the growing season due to defoliation by this pest<sup>10</sup>. In North Eastern India the monoculture of *Gmelina arborea* has been abandoned in past because of this pest<sup>3,5,7</sup>. *Calopepla*

*leayana* has been reported as major pest from Meghalaya and Assam<sup>3-8</sup>. The pest as defoliator and its control measure were studied in M.P<sup>10</sup>. *Calopepla leayana* is also reported as defoliator in Odissa<sup>13</sup>. The beetles feed by cutting circular holes on dorsal side of the leaves and growing young buds and then developing shoot. The pest is active in March-April to November – December. The trees are defoliated completely two times – 1<sup>st</sup>ly in May- June and 2<sup>nd</sup>ly in August-September.

### **Materials and Methods**

All stages of life cycle of *Calopepla leayana* were collected from the field and reared in laboratory. Fresh oothecae was also collected which helped in studying the life cycle completely in laboratory. Fresh gamhar leaves were grown every day and older ones were removed out.

### **Life-Cycle**

**Eggs** : Beetles come out from hibernation and the elongate yellow eggs are laid in clusters of 10-100. Eggs are embedded in a forthy secretion. This secretion hardens to form a dome shaped brownish oothecae. Oothecae are laid on the under surface of leaves or on shoots. one female lays upto 15-20 oothecae containing about 30-70 eggs.

**Larvae**: Eggs after hatching give rise to 1<sup>st</sup> instar larvae. Life cycle of *Calopepla leayana* Involves five instar larval stages. The larvae are mostly found on the under surface of leaf and feed it. The larva has a characteristic appearance with pronotal spines on the thoracic and abdominal segments. The anterior pronotal spines being



**Fig. 1 :** *Calopepla leayana* Larva and adult

directed forwards band 9th abdominal segment have a dorsal paired long hooks. When disturbed, the larva flicks the end and filaments up and down and assures defense posture. The life cycle is complete in 1-2 months.(about 35-55 days) .Studies on the biology of the *Calopepla leayana* were done by different workers<sup>1,7</sup>. Infestation period is May- June to October- November .The first instar larvae is light yellow. The 2<sup>nd</sup> and 3rd instar larvae attacks to the plant are fatal. Last two instars *i.e.* 4<sup>th</sup> and 5<sup>th</sup> instars devour upon foliage leaving only the mid rib and veins. The 5th instar larvae are blackish bin colour.

**Pupae:** The full grown larva pupates on the leaf The pupae were yellowish in colour and later the colour changed to multi-coloured. During pupation the last abdominal segment of the pupa was stuck into the leaf.

**Adults:** The beetles were found in groups of 4-6. The full grown adults were feeding on the trunk and leaves of the plant. The males are larger than the females. The beetles of *Calopepla leayana* are 12-16 mm long and have a brilliant metallic colouration with coarsely wrinkled, bluish green to violet blue elytra and a pale yellow to reddish brown pronotum and legs. The legs are at first pale yellow and later deepen to reddish brown. The adult lie dormant for about 8-10 months and recur with commencement of rain and emergence of new leaves shoots and buds.

**Control measures:** As far as forest is concerned, many control measures have been suggested. Instead of monoculture, mixed cropping is always beneficial from the point of pest attack and infestation. It suppresses the potentiality of pest status. Mechanical control is always preferable in a limited area. All the stages of the

life cycle of *Calopepla leayana* can be collected by hand picking or by shaking branches of the trees and collecting the pests in one place and destroying them is one simple way of mechanical control in nurseries or in small areas. Biological control is partially beneficial<sup>3,4</sup>.Artificial breeding of parasites like braconids and chalcids and their liberation in small areas gave good results to some extent. Some chalcids –*Brachimeria* sps. (Hymenoptera) is successful biocontrol method for the pupae<sup>11</sup>. In laboratory, solution was made by mixing 1000ml cow urine, 5 g of chilli (*Capsicum annum*) powder and 5 g of haldi (*Curcuma longa*) powder and was mixed well and kept for half an hour. When this solution sprayed to the pest, mortality rate increased to some extent. This may be applicable in nurseries and would give significant result to low the pest infestation. Herbicides like neem are also useful. Neem (*Azadirachta indica*) leaves were boiled and after one hour cooling it was filtered. 5 ml of neem oil mixed with one litre of neem leaves solution and sprayed over the larvae, the activity of the larvae slowed down . 2-3 tmes repeated spray of neem herbicides showed successful results.

### Discussions

*Calopepla leayana* is a serious pest of gamhar<sup>2,3,6</sup>. Monoculture of *Gmelina arborea* gives rise to pest infestation. It badly affects the growth of the plant. Mixed cropping might give better result. Biological control strategy is suggestable. Eco-friendly biopesticides would also give good results.

### Economic Importance

Defoliation of leaves of gamhar starts from the

beginning of rain till October. The beetles feed on the leaves, buds and shoots of *Gmelina arborea*. As the larva grows, its feeding behaviour changes. The newly emerged larva feeds only the parenchymal tissues of the under leaves. As it grows, it cuts the leaf by making circular holes and at full grown 5th instar larval phase it

eats the whole leaf leaving only the mid rib and side veins intact. In winter season the beetle hibernates under the curled leaves on the ground, inside the holes and cracks of the tree. Heavy attack of *Calopepla leayana* causes complete defoliation of the tree and sometimes the tree dies.

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