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GALL INSECT IN MUGA SILKWORM (*Antheraea assamensis*) HOST PLANTS, SOM (*Machilus bombycina*) AND SOALU (*Litsea polyantha*): A REVIEW

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ABSTRACT

The golden yellow colour of silk is produced by Muga silkworm, *Antheraea assamensis.* The silk has a high demand in the market due to its unique colour and quality. Muga culture or muga cultivation it's having relation with the Assamese people of northeastern states of India. Muga silkworm is multivoltine in nature. Generally muga silkworm feed on som, soalu (Primary) plants. As well as they are feeding secondary and tertiary plants. These plants are affected by various insects and pests. These reviews mainly focuses on the gall insect of muga silkworm host plants especially in som (*Machilus bombycina*) and soalu (*Litsea polyantha*) plant.

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INTRODUCTION

Muga silkworm, *Antheraea assamensis* is a polyphagous insect and endemic species in the northeastern parts of India. Muga silkworm feed on different kinds of host plants (Bhattacharya *et al.,* 1993). These host plants are divided into three categories such as Primary, Secondary, and tertiary host plants. Som (*Machilus bombycina*) and Soalu (*Litsea polyantha*) are the primary, dighloti (*Litsea salcifolia*), mejankari (*Litsea citrata*) are secondary and *Cinnamomum obtusifolium*, *Cinnamomum glaucescens*, *Actinodaphane obovbata*, *Michelia champa*, *Zizyphus jujube*, *Xanthoxylem rehsta*, *Celastrus monosperma* are tertiary host plants (Neog *et al.,* 2005). All plants are distributed in the Northeastern states (Assam, Meghalaya, Nagaland, Manipur, Arunachal Pradesh, Mizoram) of India. One healthy host plant is needed for getting a good quality of leaves, these good qualities of leaves play a very important role in larval growth and development (Borgohain, 2015). All host plants are attacked by various insect pests, among these gall insects is one of the major insect (Das, 2014). Affection on the leaves of som and soalu by gall insects is a major problem in muga culture. Generally, galls are caused by virus, fungus, nematodes, mites, and insects.

The gall insect secret the toxic saliva, as a result, the formation of malignant tumor-like growth in the leaves (Borgohain, 2015). Gall affected leaves are not suitable for silkworm rearing purposes. Galls are available throughout the year but affection is more June to November. In the case of som and soalu plants, leaves are infested by three types of gall insects. It includes *Pauropsylla beesoni*, *Asphondylia sp.*, *Apanteles sp.* (Singh *et al.,* 2013).

(A) *Pauropsylla beesoni:* It is one of the major gall-forming insects on the leaves of soalu plants. *Pauropsylla beesoni* belongs to order Hemiptera and family Psyllidae (Sahu, 2020). These types of species are seen throughout the year but the peak period is July to October (Summer season). During this season temperature is 25 to 30˚c and as well as relative humidity 80 to 85% (Singh *et al.,* 2013). These temperature and relative humidity create a favorable environment to increase the population of these gall-forming insects on soalu plants. Generally, they are laying the eggs on the leaves in the month of September. One female can lay 150 to 200 eggs (Gogoi, 2013). The shape of the eggs is elliptical and deep violet in colour (Fermandes, 1987). Later it is changed into black and it is a hatch on the leaves. After hatching, very soon

they start feeding by sucking the juices of leaf and it becomes the beginning of the gall formation. They have five nymphal stages and they are increasing the number of antennal segments in each stage. In the last stage, they have five segments. In the final instar, they enter the dormancy period and moult (Saikia, 1998). After completion of the five nymphal instars, it will become an adult. This adult comes out after split and at the time of emergence adults are translucent, later it becomes dark in colour. They start mating within 24 hours for the next generation (Raman, 2007). The population of gall insect (*Pauropsylla beesoni*) is highly influenced by an abiotic factor such as humidity, temperature, rainfall. Nymphal stages are maintained by different extrinsic and intrinsic factors and numerous physiological changes taking place in the leaf tissues. As a result, in the formation of gall on the soalu plants (Singh *et al.,* 2013).

(B) *Asphondylla sp.:* *Asphondylla sp.* is univoltine in nature and galls are present in the lower surface of the leaves. It belongs to order Diptera and family Cecidomyiidae. Affected leaves are not suitable for silkworm rearing purposes. Galls are available throughout the year but the peak period is June to November (Das, 2014). The adult fly entered its eggs into the leaves. After hatching, the larva comes out from the eggshell and crawl towards the lamina, epidermis. Very soon, they start feeding by sucking the turgid cells. Generally, they attack the epidermal cell with the help of mandibles (Tikader *et al.,* 2013). The larva has three instars and pupates inside the malformed gall during the third instar. After pupation, they emerge as adults. Adults have long antennae, legs, and ocelli also present. This species generally attack in the som plant and they prefer in young plants (Singh *et al.,* 2013).

(C) *Apanteles sp.:* This species produces gall in the som leaves. Galls are seen on the upper surface of the leaves (Borgohain, 2015). The shape of the gall is a tumor-like and the larva secreted toxic saliva, as a result, formation of gall on the leaves (Das, 1996). The gall infested leaves become unsuitable for silkworm rearing purposes. In the case of som plants, the affection of gall insects is less compare to soalu plants (Tikader *et al.,* 2013).

Control measure

- Field sanitation is necessary (Das, 2014).
- Infected branches and leaves in the young plants should be removed and burn itself.
- The affected plant should be sprayed with Dimethoate 0.05% (Tikader and Ranjan, 2012).
- Infested plants should be pollarded at a height of 2.5 to 3.00 m from the ground level.
- Chemicals can be applied in the plants like 0.5% Demicron in 15 to 20 days interval (Singh *et al.,* 2013).

Conclusion

From the previous and present research, it is concluded that various insect pest is a major problem for muga culture or muga silk industry due to heavy damages of the host plants. Among this insect pest, gall insect is one of the major insects. Healthy food plants play a very important role in the growth and development of silkworm larvae. As well as it has advantages for getting a good quality of silk. The progressing of the muga silk industry is very slow due to the lack of healthy food plants. That's why it's very much needed to control insect pests for the development of the muga culture.

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