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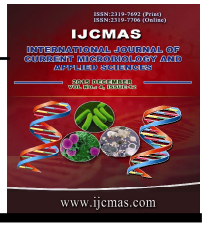

Original Research Article

Biodiversity of Insect Pests Complex in Muga Ecosystem in Narayanpur, Assam, India

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Keywords

Biodiversity, *Antheraea assamensis* Helfer, *Perseae bombycina*

A B S T R A C T

Insect pest complex of muga ecosystem was studied under the agro-climatic conditions of Narayanpur, North Lakhimpur inorder to develop a suitable pest management strategy. During the present investigation as many as 16 (sixteen) different insect pests belonging to 10 orders and 13 families were recorded infesting on silkworm, *Anthereae assamensis* Helfer as well as the muga host plant, som, *Persea bombycina* throughout the year. The insect pests infesting the silkworm belongs to the family Tachnidae, Braconidae, Formicidae, Pentatomidae, Ichneumonidae, Vespidae and Mantidae whereas the insect pests infesting the host plant, Som belongs to the family Cerambyciidae, Scarabaeidae, Saturniidae, Aphidiidae, Cecidomyiidae, Thripidae and Hodotermitidae.

Introduction

Narayanpur (26°59'47" N and 93°53"49"E) is a town located in North Lakhimpur District (24°45' &27°53' N and 94°42' & 94°20' E) of Assam, North Eastern Region of India. This zone is endowed with a climatic condition favourable for Muga Culture and hence, has established as an important cottage industry for the rural folk by providing them sustainable livelihood. The present production of raw silk in Assam is 117 million tones accounting to 0.65 % of the national raw silk production while rest of the production is contributed by the other north eastern states (Singh, R.N, 2013).The Muga silkworm, *Antheraea assamensis* (Helfer) which produces the golden muga silk is endemic to Assam and is a semidomesticated, polyphagus, multivoltine species. Muga rearing being outdoor, its yield is constrained by several natural abiotic and biotic vagaries, one of which is predation of silkworm and muga host plant by insect pests that damages crop significantly. Information on pest's complex in a particular agroclimatic conditions is a prerequisite, which helps in designing a successful pests management strategy (Srilaxmi, K.and Paul, R. 2010). Earlier several authors have reported that insect pest infesting a particular crop differs from place to place. There are also reports that muga silkworm and the host plant is attacked by different insect pests from different parts of

the country and other country as well (Chaudhury, 1981; Thangavelu *et al.*, 1988; Singh & Das, 1996). Application of insecticides for their control is not advocated as their residual effect is harmful for the silkworm.

Hence, considering, the importance of muga culture in this region, the present study was undertaken to identify the insect pests infesting the silkworm and host plant so as to develop a successful pest management strategy which will be a boon for the muga farmers in achieving good harvest.

Materials and Methods

Studies were conducted for monitoring the insect pests infesting muga ecosystem in the rearing field of Muga Silkworm Seed Organization, P3 Unit, Central Silk Board, Narayanpur during 2011 and 2012 under the agro climatic conditions prevailing in Narayanpur.

This rearing field covers an area of 11 acres with 10 plots and 4300 som plants in 3x3 spacing. Observations on the incidence of the pests were made at weekly intervals following plant inspection method (PIM).Identification was carried out as per relevant keys and assistance of entomologists. The nature of attack, period of activity and extent of damage were recorded and accordingly they were ranked as major and minor pests.

Results and Discussion

The data recorded on the insect pests infesting muga ecosystem are presented in Table 1 and 2. From the data it was observed that under the agro-climatic conditions of Narayanpur, altogether 16 insect pests belonging to 10 orders and 13 families were found infesting the silkworm as well as the host plant. Of these, some were classified as major pests depending upon their intensity of attack and the rest were classified as minor pests.

The major insect pests infesting muga silkworm are Uzi fly (*Exorista sorbillans*) that infest late instar (IV & Vth) larvae and wasps that infest early instar larvae. Reddy, 2010 had also reported that uzi fly is a serious endoparasitoid with maximum infestation in 5^{th} instar larvae and at harvesting of cocoons during Chotua and Jarua crop in Upper Assam.

Similarly, Singh *et al.*, 1993 also reported that the muga silkworm suffers heavy loss due to infestation by the uzi fly to the extent of as high as 86 % in Boko area during Jarua crop Among the major insect pests infesting the host plant are the stem borer (*Aeolesthes holosericea*), Mango Hairy caterpillar or colloquially called ‘Amphutukoni’ (*Cricula trifenestrata*) and the termites.

The insect pests infesting the silkworm belongs to the family Tachnidae, Vespidae, Ichneumonidae, Braconidae, Formicidae, Pentatomidae and Mantidae whereas the insect pests infesting the host plants belong to the family Cerambyciidae, Scarabaeidae, Saturniidae, Aphidiidae, Cecidomyiidae, Thripidae and Hodotermitidae. Earlier, Singh & Das (1996) had reported a total of 39 (thirty nine) insect specimens belonging to twenty five families infesting primary muga food plants and muga silkworms (*Antheraea assama)* from RMRS, Boko, Assam.

From the study it is clear that certain pests and predators attack muga host plant and silkworm. Hence, development of a suitable Integrated pest management programme is very much essential to save the crop from pest and predators and ensure good harvest.

Table.1 Insect Pests and Predators Infesting Muga Silkworm

Sl.No	Commom Name	Scientific Name	Order	Family	Status	Nature of attack	Stage of attack	Period of activity
1.	Uzifly	*Exorista sorbillans*	Diptera	Tachinidae	Major	The Uzi fly mostly attack the 4th and 5th instar larvae ultimately killing the larvae. A Single female prefers to lay eggs directly at inter segmental region of the larval body. After hatching, the maggots penetrates into the larval body and starts feeding on inner tissues/fat bodies then maggots comes out from the body and pupates in the soil. The silkworm parasitized by Uzi fly in early instars are killed before attaining spinning stage, while those parasitized in the late 4th & 5th instars spin cocoons of weak built and from such cocoons Uzi maggots emerge by piercing, thus rendering cocoons unfit for reeling and reduces the market value of the cocoons. Presence of egg(s) or black scar on the body of the silkworm larvae and maggot emergence hole in the cocoons indicates uzi infestation.	Attack the late instar larvae.	Serious endo-parasitoid particularly during *Jarua* (Dec.-Jan.) and *Chotua* (Feb.-Mar.) crop seasons causing 15 to 20 % loss.
2.	Braconiid fly	*Apanteles glomeratus*	Hymenoptera	Braconiidae	Major	*Apanteles* lays eggs inside larval body of the silkworm by inserting the ovipositor through tubercles. The maggots of the fly feed on the tissue of the silkworm and come out through the tubercles after maturation. The mature maggots form pupae in aggregation outside the body of the silkworm larvae.	Attack the early instars larvae.	Peak activity during summer and winter months.
3.	Red Ant	*Oecophylla smangoline*	Hymenoptera	Formicidae	Major	These predators generally attack in groups and carry the young larvae to their nests They attempt to feed on the appendages including hairs and setae, of the advance stage larvae by biting. This cause swelling, paralysis and eventually death of the larvae.	Attack the early and late instars larvae.	Throughout the year. Peak attack is during Summer Season. i.e Aherua (May-June) & Bhodia (July-Aug).
4.	Carpenter ant	*Componotus* sp.						
5.	Fire ant	*Solenpopsis* sp.						

6.	Cantheconid bug	*Eocanthecona furcellata*	Hemiptera	Pentatomidae	Minor	Feeds on the haemolymph of the hosts, which it sucks by piercing the larval body. They generally attack the middle of the body so that the larvae cannot escape. Generally the 1st and 2nd instars silkworm larvae are killed with one prick while later instars can withstand 4 to 5 pricks.	Attack the late instars	Peak activity is during Aherua (May-June) & Bhodia (July-Aug) crop. Its population starts declining by October and the bug goes under hibernation during December and February.
7.	Reduviid bug	*Syncanus collaris*	Hemiptera	Pentatomidae		Sucks the larval haemolymph with its long proboscis. Early instar larvae are more likely to be attacked by this predator. The bug can inflict injury to 30 – 40 silkworm larvae in a day. Early instars larvae are usually attacked by this predator.	Attack the early instars	Peak activity is during Aherua (May-June) & Bhodia (July-Aug) crop
8.	Wasps	*Vespa orientalis*	Hymenoptera	Vespidae	Minor	They pick up the tiny silkworm larvae from the host plants and kill them. They cause maximum damage during early instars rearing.	Attack the late instars	Peak activity is during Aherua (May-June) & Bhodia (July-Aug) crop
9.	Praying mantis	*Heirodula westwoodi*	Dictyotera	Mantidae	Minor	Nymphs and adult carry away the early instars larvae which are easy to feed on. They also inflict injury on the late instar larvae, which die however the injury is deep.	Attack early and late instars larvae	This insect is active throughout the year.

Table.2 Insect Pests Infesting Muga Host Plant

Sl.No.	Commom Name	Scientific name	Order	Family	Status	Nature of attack	Period of Activity
1.	Stem borer	*Aeolesthes holosericea*	Coleoptera	Cerambicidae	Major	Bores through the main trunk penetrating the innermost layer and moves upward eating the soft succulent part. The affected plant can be detected easily from the litters of the borer.	Peak attack is during January-May
2.	Mango hairy Caterpillar/Amphuktoni	*Cricula trifenestrata*	Lepidoptera	Saturnidae	Major	Defoliate the plants leaving only the veins	March-July
3.	Termites/White ants	Microtermes sp. Odontotermes sp. Trinervitermes sp.	Isoptera	Hodotermitidae	Major	They form earthen sheath on the stem and feed on the bark. They also damage the roots of both young and full grown trees and moves upward slowly. The growth of the plant is stunted.	October - December
4.	Aphids	*Schizoneuraphis himaleyensis* *Aphis craccivora*	Homoptera	Aphiididae	Minor	Both nymph and adult found in colonies on tender buds, shoots, lower surface of leaves and suck the sap which results in curling and reduction in size of the leaves.	February-October
5.	Leaf Gall	*Aspondylia sp.* *Sarcophaga misera* *Sarcophaga sericea*	Diptera	Cecidomyiidae	Minor	Specific galls formed on leaves. The gall forming cecidomyiid induces a simple spherical gall in lower surface and tapering in the terminal region of the leaves.	June -February
6.	Beetle	*Xylotrupes gideon*	Coleoptera	Scarabidae	Minor	Adult beetles mainly bore at the base of the stem and also on tree trunks and feed internal tissues. Repeated attack affects the growth of the plant.	May-October
7.	Thrips	T*hrips flavus*	Thysanoptera	Thripiidae	Minor	Nymphs and adults lacerate the epidermal leaf tissues and suck the oozing sap leading to damage of the guard cells and finally drying of the leaves.	Peak activity during February-June

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