Executive summary of UGC project File No.- 40-364/2011(SR)

Name: Dr (Mrs) Dipsikha Bora

Affiliation: Dibrugarh University

Address: Department of Life Sciences, Dibrugarh university, Dibrugarh-786004

Title : "Bitrophic perspectives in interaction of *Antheraea assama* (Lepidoptera: Saturniidae) with its host plants"

The objectives of the poject proposal were aimed at understanding the basics underlying the mechanism adopted by muga silk worm, *Antheraea assamensis* Helfer (=*A. assama* Westwood) in host plant selection. This silkworm is the producer of golden yellow muga silk and its cultivation has cultural adherence to the ethnic societies of Assam. The insect is reared under semi-domesticated condition and as no artificial diet has been developed yet, the larval stages are reared in outdoor condition which expose them to the challenges posed by the changes in outdoor environment. They are also susceptible to the attack of parasitoids and pathogens. The present study has created basic knowledge with respect to feeding behaviour of the insect, certain factors behind their host selection .

The first objective was aimed at determining the phagostimulating and deterring fractions of the host plants . The study revealed that the diethyl ether extract of the leaves were the most preferred extract among the different solvent extracts used to study feeding preference of *Antheraea assamensis* (=*A. assama* Westwood). The monosaccharides and polysaccharides were responsible for food acceptance while acid, glycosides and alkaloid extracts contained the phago-deterrent compounds. The lipid fractions of the host plants were the key factors in host plant selections and the non-polar and polar lipids of the non-host plants were the key factors behind the oligophagic habit of the silk worm, *A. assamensis* . The second objective was to determine the chemosensory organs which were responsible for accepting or deterring the host plant chemicals. We found that the larvae of *A. assamensis* used a combination of olfactory and gustatory sensilla in accepting the host

plants. The galeal sensilla styloconica and labrum epipharynx are responsible for accepting the plant chemical compounds. Based on sign-rank test, Labrum epipharyngeal sensilla with higher ranking can be said to be more competent than the galeal sensilla in the rejection of non- host for *A. assamensis* larvae. Further the olfactometric tests revealed that both antennal and maxillary palpi sensilla of *A. assamensis* were competent in accepting the host and rejecting the non-host. In the third objective, we showed that the regurgitant could induce production of a number of volatile terpenoid compounds which could be of importance to the host plant as such compounds have already been shown by my laboratory to be attractive to parasitoid of *A. assamensis*. These compounds were both of monoterpenoid and sesquiterpenoid in nature. In addition a good number of C6 volatiles were also detected . We found that except D-limonene and geraniol in case of the other chemicals, there was enhancement in release of the chemicals in response to regurgitant application. The most prominently enhanced chemical in case of *P. bombycina* were Terpinene, B-Citronellol, R-(-)-α-Phellandrene , B-Carryophylene , α-Humulene , ϒ-Caren, Cis-3-hexane, Cis-jasmone and Decanal and in case of *L. monopetala* , they were (1)-s-β-pinene, Terpinene, Nerol B-Citronellol, R-(-)-α-Phellandrene , B-Carryophylene , α-Humulene , ϒ-Caren, Cis-3-hexane, Decanal, Dodecanal and Cis-jasmone. These volatile chemicals mentioned here may be said to constitute the inducive defense response of the plants due to feeding by *A. assama*. As for the fourth objective, we analyzed the regurgitant by using HPLC and electrospray analysis which conformed that the regurgitant of *A. assamensis* also contained volicitin like fatty acid-amino acid conjugate. When bioassay was done applying the different fractions to the plant saplings , we obtained different blends of volatiles to be released by the saplings. From the blends of volatiles we considered a group of terpenes , C6 volatiles , cis-jasmone , methyl salicylate , 3-methyl indole and a benzenoid for comparative details of the efficacy of the different fractions of the regurgitant. The results suggested that in the regurgitant of *A. assamamensis,* there are different combinations of fatty acid-amino acid conjugates which might act differently to induce the release of different blends of volatile chemicals produced by different pathways.

The aforesaid mentioned results can be used further in influencing feeding behaviour of *A. assamensis* leading to better growth and hence higher productivity. The study also revealed feeding effect on emission of host plant volatiles which can be further studied for their effect on pests and parasitoids present in sericulture field for their management in environment friendly way.