ABSTRACT

Agriculture plays a greater role in the economic status of developing countries; as it provides livelihood to vast majority of people. The most pressing problem today in agriculture is the need to reduce the losses of crops and their products from the attack of insect pests. *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae) is one of the most serious pest of cotton, pulses, vegetables and many other important crops in India and abroad causes heavy losses to crops. However, this pest is polyphagous and has been recorded feeding on more than 300 plant species, of which 56 families are heavily damaged. However in the recent past, while the use of insecticides has helped to increase crop production up to some extent but repeated use of pesticides has resulted in health hazards, ecological imbalance, resurgence of pests and environmental pollution besides the destruction of beneficial natural enemies of pests, increased level of pesticides residues in soil, water, food and fodder crops have been noticed. Biological control is a major component of integrated pest management which has a maximum contribution of naturally occurring parasitoids, predators, and pathogens have great potential as biological control agents of insect pests. The present study focuses on the utilization of biocontrolling agents such as *Chelonus blackburni* and *Trichogramma brasiliensis* on pest *H. armigera*.

In the present investigation study focused on the following chapters; The mass breeding of host and parasitic insects is one of the important aspects of integrated pest management especially biological control of insect pest. However in the present study the mass breeding of host
insects (*Phthorimaea opercuella* (Zeller), *Corcyra cephalonica* (Stainton) for the rearing of parasitoid *Chelonus blackburni* Cameron was studied at laboratory conditions. Mass production of the host insect in potato tuber moth (*P. operculella*) using potato was carried out under laboratory conditions. The result indicated that PTM eggs gave maximum number of adults of parasitoid for further utility in bio control of hosts.

Mass rearing of *C. blackburni* was also carried out on the host insect, *C. cephalonica* as an alternative hosts. When the parasitoids are reared on large scale on these hosts, the parasitoids are reared on *H. armigera* eggs and recorded the parasitism. Study also reflects the developmental period of parasitoid and both the hosts, this would help in the management of release of parasitoids on host eggs in the field and at lab conditions, to manage their life cycle too. Mass multiplication of parasite *C. blackburni* and their host forms the strategy of IPM.

Second chapter deals with the study of Influence of *C. blackburni* on growth and food consumption by host *H. armigera*, wherein Effect of parasitism on Food Consumption, weight gain by larva of *Helicoverpa armigera* was studied. Thus parasitization affects food consumption and weight gain in parasitized larvae.

Haemocyte types and total and differential counts in unparasitized and parasitized *H. armigera* larval study reveals the significance of haemocytes and their role in providing the immunity to insect pest, *H. armigera*. Different types of haemocytes have been studied which play important role in the protection of insect against invading pathogens and parasitoids. Hence, identification of various types of insect blood cells based on the structure and function is significant for the insect pest control. Endoparasitoids must avoid haemocytes-mediated immune responses to develop in the
host larvae. The effect of parasitisation of *C. blackburni* on *H. armigera* revealed highly prominent changes in the total haemocytes count (THC). It is also found that the data obtained in the present study suggest immune system plays important role in the *H. armigera* parasitized larvae.

Histological study of *H. armigera* midgut parasitized by *C. blackburni*: Objective of this study was to describe the morphological variations and massive destruction of the mid gut epithelium and other changes in the tissue level of *H. armigera* by histochemical techniques, also the study reveals the effect of parasitization by *C. blackburni* on the mid gut tissues of the *H. armigera* in the control of insect, since most of the physiological activities are going on in this region and mid gut is the organ of interest for the study of insect control.

The study also focused on Antennal sensilla of hymenoptera parasitoid *C. blackburni*. The antennae are the primary appendages bearing olfactory sensilla involved in olfaction thereby guiding *C. blackburni* to find its host. The antennae posses many sensillae which play vital roles during host-finding and acceptance behaviors for the oviposition in the host.

In the final chapter, Tritrophic interactions in Chickpea/Pigeon pea- *H. armigera* - *C. blackburni* was studied. However, the present study demonstrates that *C. blackburni* antenna displays sensitivity to almost all thirty eight plant volatile compounds evaluated, as observed in EAG responses. This is probably due to the wide molecular receptive range of the olfactory receptors allowing it to parasitise on a wide range of lepidopteran host eggs. The study also focused on the EAG responses. Based on this electrophysiological data, future studies on chemical analysis combined with relevant
behavioural studies would yield informative data for successful utilization of the parasitoid, *C. blackburni* in bio-control programmes against *H. armigera* for effective pest management strategy.