Papaya mealy bug (P. mariginatus) has been spreading fast across the globe in over 50 countries ever since, its first record in the Caribbean islands during 2003. This invasive pest has been reported to infest major crops of economic importance like papaya and mulberry in Southern India ever since the description of the pest from Coimbatore during 2007. It is polyphagous and has been reported on >55 host plants covering more than 25 genera. Papaya occupies 73m ha with production of 257 m ha tones in India while in Karnataka the area is 55 000 ha with production of 409.0 lakh tones.

For the first time papaya mealy bug was noticed accidentally infesting papaya in Hubli during July, 2010 in one of the Kitchen garden (Fig.1). During July, 2011 it was noticed in the Kitchen garden of the first author at Dharwad. The papaya mealy bug fed on the sap of plants by inserting its stylets into the epidermis of the leaf, as well as into the fruit and stem. It injects a toxic substance into the leaves that result in chlorosis, pre mature leaf and fruit drop. The affected papaya plants collapsed within 2 months of infestation. Both leaves as well as fruits of papaya were infested.

Several natural enemies viz., predators Spalgius epius, (Westwood) Scymnus sp. and one parasitoid, Acerophagus papayae Noyes & Schauff were recorded on papaya mealy bug. Among the three natural enemies observed S. epius were in good numbers and found predating upon all the stages of papaya mealy bug (Fig.5). S. epius could successfully complete its life cycle on papaya mealy bug. The life cycle lasted for 14 to 16 days occupying larval and pupal period of 9 to 10 days and 5 to 6 days respectively. The adults (Fig.4) survived for 8-10 days with food.

As the larvae of S. epius is slug like coated with wax coating and camouflaged with mealy bug population, it was very difficult to distinguish the predator from its prey (Fig.2). However, the larvae were found to puate in characteristic rhesus monkey face chrysalis (Fig.3). In addition to S. epius, the lady bird beetle, Scymnus sp was found predating (Fig.6). The mealy bug was also found to be parasitized by A. papayae. The infested leaves and fruits were brought to the laboratory and mealy bugs were reared for maintenance of culture in the laboratory.

Mealy bug was also found infesting papaya in Gulbarga and in Belgaum district (Soundatti) during July, 2011. In addition to papaya and mulberry mealy bug was noticed on parthenium (Parthenium hysterophorus L.), sesbania (Sesbania punicea Cav.), guava (Psidium guajava L.), grasses and other plants. As a first step of management DDVP (Nuvan)2ml /lt spray was taken up but the pest could not be managed. DDVP is the commonly recommended insecticide in the mulberry ecosystem because it is non-toxic to silkworms and hence other insecticides were not.
used. Further, two parasitoids (Acerophagus papayae & Anagyrus loecki) numbering approximately 2000 supplied from NBAII, Bengaluru were released on four acres of mulberry infested with mealy bug. Since the mealy bug population was very high the population of parasitoids released for managing the pest was not adequate (Personal communication).

The predators like, S. epius (Lyceanidae: Lepidoptera), Scymnus sp. (Coccinellidae: Coleoptera) and parasitoid, A. papayae was recorded on papaya mealy bug. The adults of S. epius congregate on the plants infested with papaya mealy bug. This lycaenid predator was commonly associated with natural control of Phenococcus iceroides Green, P. glomeratus Green, Pseudococcus lilacinus Cockerell, and P. citri infesting cotton, Pithocolobium saman (Jacquin), Chinese Rose and Dolichos lablab and Sesbania (Ramakrishan Ayyar, 1929).

Pushpaveni et al. (1973) recorded natural control of Macnellicoccus hirsutus Green on mesta while Mani and Krishnamoorthy (1998) recorded S.epius as natural enemy of mango green shield scale. Papaya mealy bug incidence and occurrence of its indigenous natural enemy, S.epius has been reported on mulberry in western parts of Tamilnadu (Thangamalar et al., 2010).

Although classical biological control through parasitoids like Anagyrus loecki Noyes & Menezes., Pseudleptomastix Mexicana Noyes & Schauf, A. papayae have been reported to keep the pest under check in the Carribbean islands (Muniyappan et al., 2006), the search for the effective parasitoids in India is still elusive. In the present report S.epius is recorded as a potential predator of P. marginatus and investigations will be taken up to explore the utility of this Lycaenid as a biological control agent in papaya and mulberry ecosystems under North Karnataka conditions.

This is first report of papaya mealy bug from north Karnataka. The detailed studies on bio-ecology and management of mealy bug both on papaya as well as mulberry are in progress at the Department of Agricultural Entomology, College of Agriculture, UAS, Dharwad. Special emphasis will be given to exploit the possibility of utilising indigenous natural enemies that have been recorded in this ecosystem, apart from exotic ones.


References
