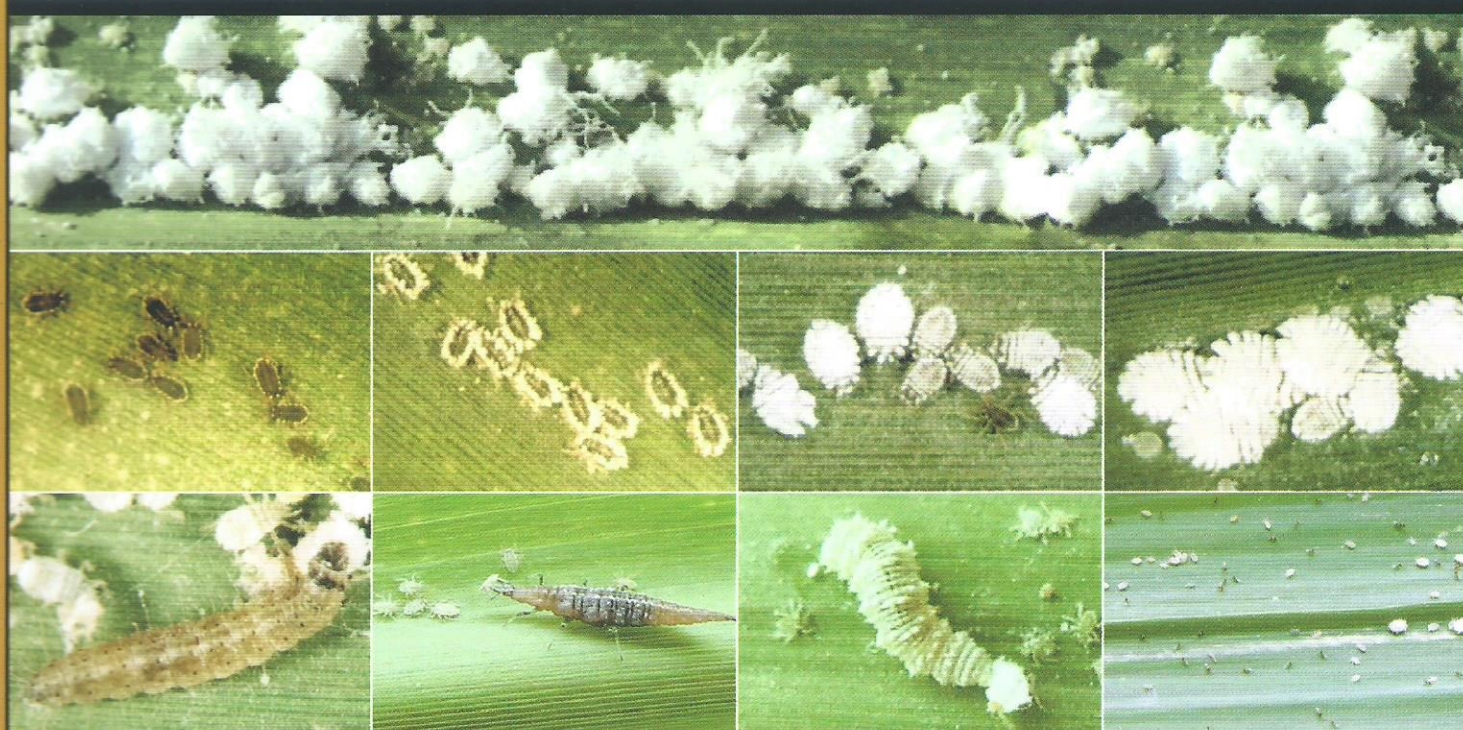


Biological control of the sugarcane woolly aphid

A success story



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The Sugarcane Woolly Aphid

During 2002, outbreak of the sugarcane woolly aphid (*Ceratovacuna lanigera*) (Plate 1) was noticed in the states of Maharashtra and Karnataka. By 2003-2004, this became a serious pest affecting large areas in these two states. In Maharashtra 267 thousand hectares of sugarcane were heavily infested by the aphid, with the districts of Sangli, Satara, Kolhapur and parts of Pune and Solapur, being affected the most. In Karnataka, a total of 61 thousand hectares was affected during the same year. The districts of Belgaum and Bidar were the worst hit.

The pest has since then spread to Andhra Pradesh, Tamil Nadu and Kerala in the south, and Uttaranchal and Bihar in the north.

Failure of chemical insecticides

Chemical pesticides gave only temporary relief and often farmers had to spray repeatedly. Apart from being uneconomical, indiscriminate use of chemicals can result in environmental pollution, mortality of natural enemies and toxicity hazards to those involved in spraying operations.

Natural enemies

By the year 2004 several natural enemies were found feeding on the woolly aphid. Thirty-one species of predators and seven parasitoids have been recorded to attack the woolly aphids. Of these, a neuropteran predator, *Micromus igorotus* (Plate 2) and a lepidopteran predator, *Dipha aphidivora* (Plate 3) were found to rapidly colonize woolly aphid infested sugarcane fields and reduce the pest populations.

The syrphid, *Eupeodes confrater* (Plate 4) was also found to feed on the woolly aphid in fairly good numbers in the cold season. A few species of ladybird beetles too feed on the woolly aphid (Plate 5 a,b).



Plate 1. a. The sugarcane woolly aphid b. Sooty mould on honeydew of aphid

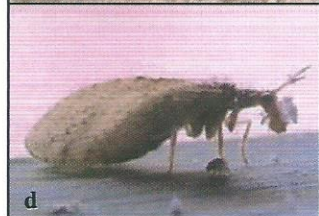


Plate 2. *Micromus igorotus*
a. Eggs b. Larva c. Pupa
d. Adult

Establishment of a parasitoid

A parasitoid, *Encarsia flavoscutellum* brought from Assam in December, 2004 has established well in Mandya district of Karnataka.



Biological control – A viable solution to the woolly aphid problem

Conservation

Since natural enemies were found to control the woolly aphid effectively, farmers were advised not to apply chemical insecticides. In areas where chemical pesticides were not applied, the natural enemies multiplied rapidly and devoured the woolly aphid preventing outbreak situations. Therefore, chemical pesticides should not be sprayed particularly in areas where predators are present.

Augmentation

Early colonization by predators as the population of aphids begins to build up can control the pest successfully. Therefore frequent monitoring is necessary to enable early detection of the pest and the presence of natural enemies. If the natural enemies are not seen, the predators may be collected from areas of abundant occurrence and released for early suppression of the pest.

Mass production of predators for field release

A simple method of mass production of *Dipha* and *Micromus* on aphids grown in shade nets was developed.

Method: Erect field cages of size 5 x 5 meters made of 50 per cent shade net (Plate 5c) and bamboo poles on a six month old sugarcane crop colonized by the aphids. After the aphid has multiplied and covered the plant to an extent of 60 to 70 per cent, release 50 grownup larvae or pupae of *Dipha/Micromus*. The predators will multiply on the developing aphid populations and about 1500 to 2500 predators can be harvested from a single cage in about 60 days. The cages can be relocated to fresh locations for further production of the predators. During periods of pest abundance, the predators can also be multiplied on woolly aphids in the laboratory.

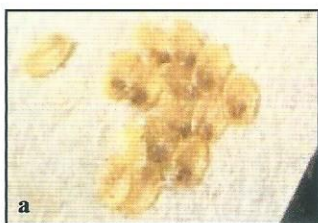


Plate 3. *Dipha aphidivora*
a. Eggs b. Larva c. Pupa
d. Adult



Plate 4. *Eupeodes confrater*
a. Eggs b. Larva c. Adult

Efficacy in farmers' fields

Experiments in farmers' fields have shown that release of either 1000 larvae of *Dipha* or 2500 larvae of *Micromus* per hectare as soon as woolly aphids are seen results in very good control of the pest in 45-60 days. Releases should however be repeated based on recurrence of the pest.

ICAR and DBT support to biocontrol programmes



Plate 5. Ladybird beetles
a. *Anisolemnia dilatata*
b. *Synonyma grandis*;
c. Shade net

The Project Directorate of Biological Control of the Indian Council of Agricultural Research took up research on biocontrol of the pest on priority basis under its core programme as well as a project funded by the Department of Biotechnology of the Government of India and within a short span of two years developed the biocontrol strategies using predators for the sustainable management of the woolly aphids. Demonstrations were conducted in farmers' fields in Maharashtra, Karnataka and Tamil Nadu to show the benefits of biocontrol. Farmers were trained on the methods of collection, field release and conservation of predators.

Collaborative effort leads to success

The Project Directorate of Biological Control in collaboration with the entomologists of the Vasantdada Sugar Institute and Mahatma Phule Krishi Vidyapeeth, Pune; University of Agricultural Sciences, Dharwad; Tamil Nadu Agricultural University and the Sugarcane Breeding Institute, Coimbatore

popularised the biological control of woolly aphids through demonstrations and training of farmers and extension officers of the Departments of Agriculture as well as sugar mills during the years 2004-2005 and 2005-2006. These concerted efforts resulted in the successful management of the aphid. In Maharashtra as well as Karnataka, woolly aphid occurrence was seen only at low intensity until October, 2006. The farmers now refrain from spraying chemical insecticides since the predators are widely prevalent keeping the pest under control. In Karnataka and Tamil Nadu also, the pest is now being controlled naturally by the predators.

Biocontrol strategy for woolly aphid management

1. Apply only the recommended doses of chemical fertilizers. Excessive application of nitrogenous fertilizers will result in outbreak of the aphids.
2. Monitor the sugarcane crop for the early detection of the pest. The aphid outbreak occurs in patches, particularly in shady areas where the humidity is higher.
3. If the predators are present, conserve them by avoiding spraying of chemical pesticides.
4. Since *Micromus* pupates in the leaf sheaths of the lower leaves, the detashed leaves should not be burnt but left behind in the field to allow the adults to emerge.
5. If the predators are not seen, release *Dipha* (1000/ha) or *Micromus* (2500/ha) two - three times depending on the incidence of the pest. (The pest population will be controlled within 60 days.)

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