ICAR-NATIONAL BUREAU OF AGRICULTURE INSECT RESOURCES, BENGALURU

Success is Sweet:
Biological Control Saves Sugarcane from Woolly Aphid

An outbreak of the sugarcane woolly aphid (*Ceratovacuna lanigera*) was noticed in Maharashtra and Karnataka during 2002. By 2003-2004, this became a serious pest affecting large areas in these two states. In Maharashtra, 2,67,000 ha of sugarcane was heavily infested by this pest, parts of Pune and Solapur were affected the most. In Karnataka, 61,000 ha were affected during the same year.

Failure of chemical pesticides

Sugarcane growers resorted to spraying chemical pesticides to control the pest. Unfortunately, the chemicals gave only temporary relief and often farmers had to spray repeatedly. There was cause for alarm because apart from being uneconomical, indiscriminate use of chemicals was leading to environmental pollution, mortality of natural enemies as well as health hazards to those involved in spraying operations.

Biological control – The most viable solution to the problem

**Identification of natural enemies:** Thirty-one species of predators and seven parasitoids were found to naturally suppress the woolly aphid. Out of all, *Micromus igorotus*, a neuropteran predator, and *Dipha aphidivora*, a lepidopteran predator, were found to rapidly colonise the woolly aphid-infested sugarcane fields and reduce the pest populations.

The syrphid, *Eupeodes confrater*, and a few species of ladybird beetles were also observed to feed on the woolly aphid. A parasitoid, *Encarsia flavoscutellum*, originating from Assam, has established well in Mandya district of Karnataka.

**Conservation:** Since natural enemies were found to control the woolly aphid effectively, farmers were advised not to apply chemical pesticides. In areas where chemicals were not applied, the natural enemies multiplied rapidly and devoured the woolly aphid, thus preventing outbreaks.

**Augmentation:** Early colonisation by predators, even as the pest population began to build up, finally resulted in successful control of the pest. Frequent monitoring of the pest enabled its early detection. Wherever the natural enemies were not seen, predators were collected from areas of abundant occurrence and released for early suppression of the pest.

**Mass production of predators:** A simple method of mass production of both *Dipha* and *Micromus* was simultaneously developed. The method involves erecting field cages of 5 x 5 metres made up of 50% shade-net and bamboo poles on a six-month-old sugarcane crop colonised by the aphid. After the aphid has multiplied and covered the plant to an extent of 60–70%, around 50 mature larvae or pupae of *Dipha/Micromus* are released. The predators start multiplying on the developing aphid population and 1,500–2,500 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 the woolly aphid in the laboratory.
Support from ICAR and DBT

ICAR–NBAIR (then Project Directorate of Biological Control or PDBC) took up research on biocontrol of the pest on a priority basis under its core programme as well as under a project funded by the Department of Biotechnology, Government of India, and within a short span of two years, developed the biocontrol strategy using predators and parasitoids for the sustainable management of the woolly aphid.

Collaborative effort leads to success

PDBC in collaboration with the entomologists of Vasantdada Sugar Institute and Mahatma Phule Krishi Vidyapeeth (Pune); University of Agricultural Sciences (Dharwad); and Tamil Nadu Agriculture University and Sugarcane Breeding Institute (Coimbatore) popularised the biocontrol strategy through demonstrations, and training of farmers, extension officers of the Department of Agriculture and representatives of sugar mills. These concerted efforts resulted in the successful management of the aphid. In Maharashtra, Karnataka and Tamil Nadu, the woolly aphid is under total control now.

Recommended biocontrol strategy for woolly aphid management

1. Apply only the recommended doses of chemical fertilisers. Excessive application of nitrogenous fertilisers will result in the outbreak of the woolly aphid.
2. Monitor the sugarcane crop for early detection of the pest. The aphid outbreak occurs in patches, particularly in shady areas where 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 lower leaves, the detrashed leaves should not be burnt but left behind in the field to allow the adults to emerge.
5. If predators are not seen, release *Dipha* (@ 1,000/ha) or *Micromus* (@ 2,500/ha) 2–3 times depending on the incidence of the pest. The pest population will come down within 60 days).

Outcome

During 2003–2004, the woolly aphid was observed in 3.13 lakh ha of sugarcane in Maharashtra and Karnataka. It was brought down to 0.82 lakh ha in these areas, only through the natural enemies, viz. *Encarsia flavoscutellum*, *Micromus igorotus* and *Dipha aphidivora*. An estimated benefit of approximately Rs 398.23 crores was realised through this biocontrol intervention.

![Sugarcane woolly aphid](image1)

![Sooty mould due to woolly aphid infestation](image2)
Biocontrol agent *Micromus igorotus*

Biocontrol agent *Dipha aphidivora*

Biocontrol agent *Eupeodes confrater*

Biocontrol agent *Encarsia flavoscutellum*