

Controlling Uzi through Hyperparasitoids

I.K. Pai

In India, Uzi fly *Exorista bombycis*, an endoparasitoid of mulberry silkworm, was first confined to North-eastern region, especially to Bengal. During 1980, it spread to Karnataka and today, it is omnipresent in sericultural areas of the country.

Though there are conflicting reports about the quantum of loss caused by this tachinid fly, it is reported that the general crop loss

Biocontrol of pest and diseases is assuming greater importance in recent days as they are natural and more eco-friendly. The author briefs about various hyperparasitoids available for controlling the uzi menace.

in Karnataka is 12.48%, 11.87% and 9.42% respectively during rainy, winter and summer seasons. As of now, there are a number of cultural and chemical methods in practice to contain the menace. However, the use of biological controls is relatively of recent origin.

Biocontrol

In biological control, mostly natural enemies are being used. These agents should have high

searching ability, synchronomous with host life, host specificity, adaptations to field conditions, easy rearing to multiply and easy mass production for field use.

If one goes through the above parameters, there are several natural enemies of *Exorista bombycis* such as *Brachymarta intermedia*, *B. luqubris*, *Dirhinus anthracia*, *D. himalayanus*, *Exoristobia philippinensis*, *Mormoniella vitripennis*, *Nesolynx dipterae*, *N. thymus*, *Pachycrepoides veerannal*, *P. vindimmae*, *Spalangia cameroni*, *S. endius*, *Spilomicrus karnatakensis*, *Tetrasticus howardii*, *Trichopria khandalus*, *Trichospilus diatrae* (all insect parasitoids); *Comptonotus compressus*, *C. pallidus*, *Monomorium Sp*, *Tapinoma melanocepholum* *Dermentes valpinus*, *Gangylus gangyloides* (all insect predators); *Acroditheres tristis*, *Corvus spendens*, *Dendrocitrus vagabunda*, *Dicrurus odismilites*, *Passer domesticus* (all vertebrate predators); *Bacillus thuringiensis*, *Isaria fumosorosea*, *Spicaria rubidopurpurea* (all pathogens).

Nesolynx thymus (Girault) (*Hymenoptera: Eulophidae*) which is a popular biological controlling agent of uzifly because of its high reproductive rate and higher female ratio. Besides, there are few more natural enemies useful in containing the menace. They are:

Nesolynx dipterae

(*Hymenoptera: Eulophidae*): It is also a hymenopteran member, gregarious pupal ectoparasitoid. Gravid females lay eggs on 1-8 days old *E. bombycis* pupae. Each female parasites 2-4 pupae and lays 114-132 eggs. The larval stages feed on host fluid. Male and female progeny ratio ranges from 1:8 to 1:26. Life cycle is completed within 17-23 days.

Exorista philippinensis Ashmead (*Hymenoptera: Encyrtidae*): It is also a gregarious ectoparasitoid, wherein the adults are black and females are larger in size with pointed abdomen. Though males are polygamous, females are monoandrous. Within a day of emergence, they start ovipositing. The complete life cycle takes about 14-16 days. The damage is caused by the adult female parasitoid inserting its ovipositor into the puparium and the eggs are deposited within the body. A single female can lay as many as 94-135 eggs, which hatch in 5-6 days. These adults cut the puparium to emerge out. On an average about 60 individuals develop from a single host pupae. In this parasitoid, the female are prominent (95 females: 5 males), though males developed by parthenogenesis parasitoid by cutting open the puparium of the uzi.

Trichopria Sp. (*Hymenoptera: Diapriidae*): It is a larval-pupal endoparasitoid of uzifly. The adults are grayish black, minute, active insects, completing life cycle in

Mass Multiplication steps

- * Collect uzi maggots from cocoon markets.
- * Allow them to pupate in sand bed.
- * Collect two days old pupae for parasitism.
- * Place 30 pupae in 500 ml sterilized empty saltine bottle.
- * Release parasites @ 1:5 (Host:Parasite) ratio.
- * Provide a drop of Vitamin for 10 ml. dilute honey (50%) in wax strip as adult food.
- * Place it in cool place for parasite development.
- * An average of 110-120 parasitoids are developed from a pupa.

Later, two days old adults of *N. thymus* are collected from a oviposition cage and transferred to 1000 ml conical flasks or release containers. These parasitoids are transited to the release site preferably during evening time and released within one to two hours after sunset, inside the rearing room, near the moutage storing place, at a rate of about 1 lakh adult parasitoids for rearing 100 dfls. The release rate will be about 8,000; 16,000 and 76, 000 during 4th and 5th instar and after cocoon harvest, respectively. The doors and windows are closed for 1-2 hrs, during the release.

pupae of *E. bombycis* within 20-22 days. A single host can lead to the production of about 40 parasitoid adults, with sex ratio 1:1.77 (Male:female). They emerge out by cutting holes in the walls of host puparium. The extent of parasitization varies within season and place ranging from 2.96 to 9.20%. a total of 20-30 individuals emerge from a single host.

Dirhinus anthracia Walker (Hymenoptera: Chalcididae): In this species, females are bigger than males. It works as solitary pupal ectoparasitoid of uzi. Female is known to have only one mating in her life time and the gravid female can lay 82-157 eggs. The life cycle is completed within

22-28 days. The sex ratio is 1:5.25 (Male:Female).

Brachymeria lugubris (Walker): It is a solitary endoparasitoid of *E. bombycis* and is found in India, China, Japan and Australia. Adult female is black and 4.5 to 5.5 mm long, legs black with innerside of fore and mid tibia bearing brown with a minute tan spot at the apex of hind femur. The pubescence are silvery and densely distributed.

Tetrastichus howardii: It is a gregarious uzi pupal endoparasite. Mated female flies, sit near the integumental area of 1-4 days old pupae and pierces the puparium with ovipositor to lay eggs in the body of pupae to produce about 242 new individuals. The eggs

take about 16-17 days and fully mature adults emerge out of the pupae by making holes in the puparium.

Pachycropoides veerannai: Here, the males are smaller than the females and have narrow abdomen with blunt end. Females are known to be blackish in colour with 2.01 mm length, mate only once in their life time that too in air for 2-5 minutes and such mated females alight on uzi pupae, prick with ovipositor and deposit eggs inside the body of uzi pupae. After completing their egg, larval and pupal stages, adult emerge out by cutting the puparium of uzi pupae.

Pachycropoides vndimmae (Rondani): It is a solitary pupal endoparasite of uzi. It completes its life cycle within 24-26 days. 2-3 parasites cut open the puparium of uzi and emerge out. Sex ratio is 1:4 (Male:female).

Spilomicrus karnatakensis: It is a gregarious larval endo-parasitoid of *E. bombycis*. It completes its life cycle within 21 days. It has a high rate of parasitization of host pupae. About 33 individual parasitoids emerge out from 1-3 holes made on the puparium by the adult parasitoids. Sex ratio is 1:1.5 (Male:Female).

It is important to see that these parasitoids are produced enmass and made available to the farmers. The Sericulture Department of Tamil Nadu Agricultural University, Coimbatore, is actively engaged in mass production of these parasitoids, as an effective biocontrol of uzifly and also supplies the same to the farmers at a very nominal price.

The author is with Department of Zoology, Goa University, Goa.

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