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A simplified mass culturing technique for *Sturmiopsis inferens* Tns.

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ABSTRACT

Attempts were made to simplify the culturing technique of the Tachinid parasitoid, *Sturmiopsis inferens* Tns. The results showed that removal of chorion ensheathing the parasitoid maggots before inoculation on host larva did not increase the per cent parasitisation significantly and this time consuming step in the breeding technique may be dropped. Modified King's technique in which maggots are suspended in 0.15% agar agar and allowed to find the host larva on their own was as effective as that of hand inoculation of individual host larva with parasitic maggots (Scaramuzza's technique). Both these modifications in the breeding technique enabled mass production of the parasite at reasonable cost.

Key words: *Sturmiopsis inferens*, mass culturing

The Tachinid, *Sturmiopsis inferens* Tns., is an important larval parasitoid of sugarcane shoot borer, *Chilo infuscatellus* Snell. (David and Easwaramoorthy, 1986). It also parasitises the stalk borer, *C. auricilius* Ddgn. (Singh, 1977) and Gurdaspur borer, *Acigona steniellus* Hampson (Chaudhary *et al.*, 1980) in substropical India to a considerable extent. Studies carried out in the laboratory (Jai Rao and Baliga, 1968; David *et al.*, 1980) showed that it is an effective parasitoid of several species of moth borers infesting sugarcane. Preliminary field testing showed that the parasitoid can be colonised against shoot borer in areas where it occurs as a serious pest (David and Kurup, 1988).

One of the pre-requisites for large scale field colonisation is a rapid, simple and less expensive technique of parasitoid production. Generally, the parasitoid is multiplied following the technique of Scaramuzza (1930) developed for breeding *Lixophaga diatraeae* Tns. In this technique, mated females are dissected and the uteri are transferred to 1% saline or distilled water. The uterine membrane is removed and maggots are released and the ensheathing chorion is removed from the maggots artificially with fine needles under a binocular dissection microsope. After removing the chorion, two maggots are transferred onto the host insect body using a fine camlin hair brush. Both these steps are time consuming and limit the large scale multiplication of the parasitoid. So, attempts were made to simplify the technique and the results are presented in this paper.

MATERIALS AND METHODS

The stock culture of the parasitoid was maintained at 27 ± 1° C and 80 ± 10 percent relative humidity as described by David *et al.* (1980). Mated females after completion of the gestation period as indicated by the oozing out of a few maggots on the glass plate of the gestation cage were dissected in distilled water. Maggots obtained from 30 fertile females were used for the study. Maggots which had shed the chorion naturally before dissection were separated using a fine camlin hair brush under a binocular microscope. The maggots ensheathed with chorion were divided into two portions and in one chorion was removed artificially as in Scaramuzza's technique using needles. Maggots which had shed the chorion naturally and those in which chorion was removed artifically and, maggots ensheathed with chorion were inoculated separately on the intersegmental region of healthy fourth or fifth instar larvae of shoot borer using a camlin hair brush @two maggots/larva. The inoculated larvae were reared on sugarcane shoot bits as described by David *et al.* (1980) until pupation. Parasitioid puparia were collected from host larvae and pupae and per cent parasitisation worked out for different treatments.

In the second experiment, the usefulness of the technique developed by King *et al.* (1979) for mass breeding *L. diatraeae* was compared with Scaramuzza's technique with suitable modifications. In the modified King's technique, the maggots after dissection were suspended in 0.15% agar agar solution without the removal of chorion. Usually 500 maggots were suspended in 5 ml of agar solution and this was uniformly spread over a Petri dish (15 x 2 cm). Fourth and fifth instar larvae numbering 250 (Host: Parasite ratio

1:2) were allowed inside the Petri dish. The Petri dish was covered with the cover and the whole setup was covered with a black cloth and left for 25 minutes. Then the host larvae were removed, dried over filter paper and transferred to their respective diets. *C. infuscatellus* larvae were reared on shoot bits as described earlier. *Chilo partellus* and *Galleria mellonella* (L.) larvae were reared on artificial diet developed by Taneja and Leuschner, (1985) and Srivastava (1979, Personal communication) respectively. For shoot borer larvae, shoots were changed on alternate days, until pupation, while sorghum borer and greater wax moth larvae were allowed to pupate in the diet. Parasitoid puparia were collected and percent parasitism worked out.

RESULTS AND DISCUSSION

There was no significant difference between the level of parasitism of shoot borer larvae when inoculation was done using maggots with ensheathing chorion or those in which chorion had been removed artifically (Table 1). The study clearly indicated that there is no need to remove the chorion manually, which is a laborious, skilled and time consuming process. Probably host mediated chemicals, stimulated the maggots to break open the chorion, when they were inoculated with ensheathing membrane.

TABLE 1. Effect of removal of chorion on parasitization by *S. inferens*

Treatments	No. of larvae inoculated	Number pupated	Number of puparia recovered		Per cent parasitisation
			from larvae	from pupae	
Chorion removed artificially	1040	169	67	29	48.0[a]
Chorion removed naturally	1332	232	66	28	36.2[b]
Chorion unremoved	1230	201	72	35	45.3[a]

Numbers followed by the same letters are not statistically different (DMRT)

TABLE 2. Comparative study of the inoculation methods of *S. inferens*

Host	Method of inoculation	No. of larvae inoculated	No. of larvae pupated	No. of puparia recovered	Per cent parasitisation
Chilo infuscatellus	Scaramuzza's technique	5404	807	500	47.97[a]
	King's technique	5264	723	417	57.68[a]
Chilo partellus	Scaramuzza's technique	2704	974	268	25.79[b]
	King's technique	3541	955	424	43.48[a]
Galleria mellonella	Scaramuzza's technique	3048	1705	672	39.41[a]
	King's technique	3005	2042	750	36.73[a]
Sesamia inferens	Scaramuzza's technique	4477	1189	2366	69.49[a]
	King's technique	2153	600	570	52.29[a]

Numbers followed by the same letters are not statistically different (DMRT) for that host

Significantly low level of parasitism (36.2%) was noticed when shoot borer larvae were inoculated with maggots that had shed chorion naturally. In nature, larviposition by *S. inferens* started on the sixth day after adult emergence and continued upto twentyfirst day (David *et al.*, 1988) indicating that the maggots were deposited as and when they developed. But in laboratory, generally flies are dissected around eighth to fourteenth day only when more than 80% of the maggots have completed their development. Hence those maggots that were retained inside the uterus after shedding of chorion for a considerable period for want of host may have lost their parasitising ability.

The level of parasitism obtained in King's technique is comparable with that in the Scaramuzza's technique (Table 2). In fact, significantly higher level of parasitism was noticed in King's technique in case of *C. partellus*. The maggots when suspended in agar solution and allowed within short distances of the host insect were able to find the host and parasitise them. This simplifies the breeding technique to a large extent and also reduces the cost of parasite production. Normally, a technician can inoculate only 400-500 host larvae per day in Scaramuzza's technique, but in King's technique, subject to the availability of host and parasite any number of larvae can be inoculated within an hour.

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