

ON UTILIZATION OF *TRICHOGRAMMA EVANESCENS* WEST. TO
CONTROL THE LESSER SUGAR-CANE BORER,
CHILO AGAMEMNON BLES. IN SUGAR-CANE FIELDS
IN EGYPT. 1. PILOT STUDIES

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(Received 23 - 4 - 1988)

INTRODUCTION

Sugar-cane is one of the strategic crops in Egypt, where its cultivated area reaches about 250.000 feddans yearly. The lesser sugar-cane borer, *Chilo agamemnon* Bles., is considered the major insect pest infesting sugar-cane plantations and causes considerable reduction in yield's quantity and quality.

El-Sherif (1974) and Isa (1979) stated that Menia Governorate suffers the highest infestation by this pest, where chemical control is not effective against it. These authors found that the egg-parasite, *Trichogramma evanescens* West., is very efficient especially during August, September and October, when percentage of parasitism reaches up to 80%. Utilization of this parasite as a biological control agent against numerous lepidopterous pests was very successful in many countries, i.e. against the sugar-cane borer, *Diatraea saccharalis* in Cuba (Hardy et al., 1969) and in Columbia (Amaya, 1982) and the European corn borer, *Ostrinia nubilalis* Hübner, in France (Voegelé et al., 1975), Switzerland (Suter and Ramser, 1978) and West Germany (Hassan, 1981, 82 & 85).

Therefore, biological control by *T. evanescens* seems to be a promising procedure against *C. agamemnon* in sugar-cane fields in Egypt and the present study represents a first trial towards this aspect.

METHODS AND TECHNIQUE

Rearing of the host

The Mediterranean flour moth, *Anagasto (Ephestia) kuehniella* (Zeller), was used as a host for production of *T. evanescens* in the laboratory. Adults of this host were obtained from infested wheat flour brought from the mills. These adults were confined for oviposition in metal cylindrical cages (20 cm high and 8 cm diameter), with wire screen bottoms. Eggs were easily collected daily from a Petri-dish set below the oviposition cage and were transferred to glass jars (20 cm high and 12 cm diam.). The jars were provided with sterilized wheat flour to serve as food for the larvae. The emerged moths were collected by means of a spirator introduced to the oviposition cages.

Rearing of T. evanescens

The parasite was obtained from parasitized eggs of *C. agamemnon* collected from sugar-cane fields in Menia Governorate to be reared in a conditioned room at $25 \pm 2^\circ\text{C}$ and 60-70 % R.H. It was reared on eggs of *E. kuehniella* glued to 2 x 4 cm paper cards (approximately 1000 eggs/card). The eggs were exposed to adult parasites for 24 hours in glass vials (12 x 5 cm), covered with muslin. Droplets of honey were scattered on the inner surface of the vials to serve as food supply for the parasites. The parasitized eggs were removed to similar vials (1 card/vial) and kept until emergence of adult parasites.

Release of Trichogramma

Release of the parasite was carried out at Abo-Qorqas district, Menia Governorate in the season 1984, to assess its efficiency against *C. agamemnon* on sugar-cane. 50,000 adult parasites were released in a 800 m² plot of sugar-cane by emptying the vials containing newly emerged parasites onto sugar-cane plants. Releasing was done at interspaces of 10 m in both directions. Eggs of *C. agamemnon* were collected from sugar-cane plants just before and 24 hours after release to estimate percentages of parasitism. Eggs were collected also at 20 m apart from the release plot, in north, south, east and west directions 48 hours after release to estimate movement capacity of the parasite.

Another experiment was carried out in 1984, 46,000 parasites were released in one feddan plot at 20 m interspaces. On harvesting, 197 plants were cut and examined to estimate the rate of infestation. 205 plants in an untreated plot, 2 km. away from the treated area, were also examined as control.

A third experiment was conducted in 1985 in which release of the parasite was started just after locating the eggs of *Chilo* on sugar-cane plants, since natural parasitism was found to be low during May and June. Sugar-cane plants were examined weekly (starting from April, 3) for tracing *Chilo* eggs and the release of *Trichogramma* started on April 30 when the first clusters of eggs were noticed. Releasing was carried out weekly in two plots; one and two fed., at interspace of 20 m. The one fed. plot received 6 releases of 30,000 parasites each (a total of about 180,000 parasites), starting from April 30 to June 1. The second 2 fed. plot received 3 releases at a rate of 20,000 parasites/release/fed. (a total of about 120,000 parasites), starting from April 30 to May 15. On harvesting, rates of infestation in the joints and stalks of sugar-cane plants were estimated in the experimental plots and in another far away control plot. Numbers of girdled plants were also recorded.

RESULTS AND DISCUSSION

In the preliminary experiment (in 1984), natural parasitism by *T. evanescens* on eggs of *C. agamemnon* reached 19% (in 122 eggs collected). Parasitism % reached 100% (in 115 eggs) in the treated plots 24 h after release. At 20 m apart from the release plot, the percentages reached 100% (in 52 eggs), 100% (in 69 eggs), 61% (in 70 eggs) and 48% (in 84 eggs) two days after release, in the north, south, east and west directions, respectively.

Stinner et al. (1974) reported that individual releases of 19,000 - 387,000 *T. pretiosum* per acre on up to 48 acres of cotton resulted in parasitism of *P. gossypiella* eggs averaging from 33 - 81% with some movement of the parasites up to 400 feet within 2 days. When eggs of *Ostrinia nubilalis* parasitized by *T. evanescens* were distributed in a sugar-cane field by El-Sherif (1974), parasitism % in eggs of *Ostrinia* distributed 5 - 30 m apart from the distributed parasitized eggs ranged 6.7 - 80%.

In the second experiment, rates of infestation by *C. agamemnon* in the release plot reached 8.4% in the joints and 56% in the stalks on harvesting. The respective figures in the control plot were 11.7 % and 70%. It could be deduced that using *Trichogramma* resulted in approximately 28% and 20% reductions in the infestation in the joints and stalks, respectively.

Hassan and Hall (1980) noted that one release of *T. evanescens* against *O. nubilalis* in maize at a rate of 135,000 adults/ha resulted in 75% reduction in the number of *Ostrinia* larvae compared with the untreated control.

It appeared in the third experiment carried out in 1985 (Table I), that

rates of infestation by *C. agamemnon* on harvesting reached 4.6% in the joints and 41% in the stalks after 6 releases of *Trichogramma* and 5.3% and 46%, respectively, through 3 releases. The respective figures in the untreated plot were 11.8% and 74.5%. These results clearly show that utilization of *T. evanescens* as a bio-control agent against *C. agamemnon* in sugar-cane fields resulted in 61% and 45% reduction of infestation in the joints and stalks, respectively, through 6 releases and 55% and 38% through 3 releases. Respective percentages of girdled plants of 8.5%, 12.5% and 15% were reported for the treated and control plots.

Oatman and Planter (1978) released *T. pretiosum* in processing tomatoes at rates of 200,000 - 318,000/0.4 ha in 1970-1974. On harvest, it was found that injury by *H. zea* was considerably less in the release field (0.9%) than in the non-release one (5.4%).

TABLE I

Rates of infestation and girdled plants in sugar-cane in plots treated with *T. evanescens* and in an untreated plot at Abou-Korkas, Menia Governorate, in 1985.

Treatment	No. of joints examined	Infestation %	No. of stalks examined	Infestation %	Girdled plants %
6 releases	3297	4.6	200	41	8.5
3 releases	3111	5.3	200	46	12.5
Control	2909	11.8	200	74	15.0

SUMMARY

Release of *T. evanescens* was undertaken to control the lesser sugar-cane borer, *C. agamemnon*, in sugar-cane fields in Menia Governorate during 1984 and 1985. Release of 50,000 adults of this parasite in 800 m² resulted in 100% parasitism on *Chilo* eggs 24 h after release. Compared with control fields, one release of 46,000 parasites in one feddan plot showed, on harvesting, 28% and 20% reductions in infestation of joints and stalks, respectively. On the other hand, 3 releases of the parasite, during May, at a rate of 20,000 parasites/release/ feddan resulted in 55% and 38% reduction in infestation in joints

and stalks, respectively. Six releases, during May-June, at a rate of 30,000 parasites/release/feddan resulted in 61% and 45% respective reductions in infestation.

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