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Egg Parasitisation in Sugarcane Top Shoot Borer *Scirpophaga excerptalis* Walker (Pyralidae, Lepidoptera)

M. A. H. Miah, M. A. Alam, M. A. Mannan, M. M. Biswas and M. Shahjahan
Sugarcane Research and Training Institute
Ishurdi, Pabna, Bangladesh.

ABSTRACT

Egg parasitisation in sugarcane top shoot borer was surveyed in the SRTI Campus. Three species of Hymenopterous parasites namely, *Telenomus dignoides* Nixon (Scelionidae), *Tetrastichus* sp. (Eulophidae) and *Trichogramma* sp. (Trichogrammatidae) were identified to be associated with egg parasitisation of the top shoot borer. During first generation (February '83 - March '83) 360 egg masses were collected from different commercial plot where 355 fertile egg masses contained 6,623 eggs. During second generation (May '83 - June '83), 362 egg masses were examined where 203 fertile egg masses contained 3,260 eggs. A total of 381 egg masses were collected during overlapping generations (June '83 - September' 83), of which 370 fertile egg masses contained 15,352 eggs. Rate of egg parasitisation during first, second and overlapping generations were 56.59%, 70.06% and 63.51% respectively with average of 62.54%.

INTRODUCTION

Top shoot borer (TSB) is a serious pest of sugarcane in Bangladesh (Hazarika, 1952 ; Ahmad, 1962 ; Kabir and Khan, 1973). They cause damage to the crop at different growth stages. Infestation level ranges from 5 to 100% (personal observation) and estimated loss various from 0.8 to 14.0% by weight and sugar loss varies from 1.5 to 29.6% (Miah *et. al.*, 1980).

The chemical control of sugarcane borers is not satisfactory inspite of considerable development in the field of pesticides (Long and Hensley, 1972). The failure necessitated for biological control (Alba and Estioko, 1981).

The importance of egg parasites in the natural control of sugarcane borers has long been recognized (Metcalfe and Breniere, 1969). Trial with egg parasites have been conducted in the U. S. A., Puerto Rico, Cuba, Jamaica, Madagascar, Taiwan, Mauritius, South Africa, China, Formosa, Japan, the Philippines and in India with success (Metcalfe and Breniere, 1969).

The pre-requisite for rearing of egg-parasites for release is to conduct a survey on native parasites and to record their incidence, abundance and potentiality through

samplings of eggs from the crop fields. Regular survey provides with useful information that aids in planning biological control programme.

The purpose of this study is to assess the potential of these egg parasites for the biological control programme of the Sugarcane Top Shoot Borers (TSB).

MATERIALS AND METHODS

TSB egg masses were collected by clipping of sugarcane leaves from commercial plots (about 2.02 hectare) of the Institute's farm. Frequent collection was conducted during first and second generations depending upon the availability of egg masses. Weekly collections were made during overlapping generations.

Collected egg masses were posted individually in test tubes, plugged with cotton wrapped in tissue paper. Test tubes, after labelling were placed on wooden stands, examined everyday for larvae or parasite. TSB larvae or natural parasites whichever came out of the egg mass were recorded at least for 15 days. Finally the hairs of the egg mass were cleaned by a pair of fine forceps and kept immersed in 10% KOH solution in petridishes for loosening the individual eggs. After one hour the egg mass was ready for microscopic examination. Number of unfertile egg masses were also recorded. They contained neither larvae nor parasites. Hence they were considered ineffective eggs.

Different species of parasites found during the study period were sent to the Commonwealth Institute of Entomology, London, United Kingdom for identification and confirmation.

RESULTS AND DISCUSSION

During first generation (February, 1983 - March, 1983) altogether 360 egg masses were collected. Only 5 egg masses were found unfertile. The rest 355 egg masses cotained 6,623 egg out of which 3,748 eggs were found parasitised and rate of parasitisation was 56.59 percent (Table 1). Similarly during second generation (May, 1983-June,

Table 1. Rate of natural parasitisation of Top Shoot Borer eggs during different generations, SRTI, 1983.

TSB Generations	Number of egg masses collected	Number of* unfertile egg masses	Number of** effective eggs	Number of parasitised eggs	Rate of egg parasitisaton (%)
First	360	5	6,623	3,748	56.59
Second	362	159	3,260	2,284	70.06
Overlapping	381	11	15,352	9,750	63.51
Total/Mean	1,103	175	25,235	15,782	62.54

* Unfertile egg masses—Incapable of developing larvae or parasite

** Effective eggs—In which either larvae or parasite was borne.

1983) rate of egg parasitisation increased as high as 70 06 percent. The rate of egg parasitisation again came down to 63.51 percent during overlapping generations (June, 1983-September, 1983). The mean rate of egg parasitisation from February, 1983 to September, 1983 was 62.54 percent.

Fig 1 shows the weekly pattern of rate of natural egg parasitisation during overlapping generations (Probably third, fourth and fifth generations). There were two peaks of parasitisation level, one in late Jute and the other in early August. No egg mass was available after September.

Three Hymenopterous parasites were involved. These were (i) *Telenomus dignoides* Nixon (Scelionidae), (ii) *Tetrastichus* sp. (Eulophidae) and *Trichogramma* sp. (Trichogrammatidae).

Gupta (1959) mentioned *Telenomus minutum* Riby as egg parasites of top borer in India and Avasthy (1962) mentioned *Telenomus* sp. and *Tetrastichus* sp. as promising indegenous egg parasites of moth borers in India.

Table 2 shows species composition during different generations. *Telenomus dignoides* was the most predominant species. Parasitisation (egg mass basis) by this

Table 2. Parasite composition of Top Shoot Borer egg masses during different generations, SRTI 1983

TSB Generations	Number of ferties egg masses*	*Telenomus* sp.	*Tetrastichus* sp.	*Trichogramma* sp.	Tel.+ Tetra.**	Tel.+ Tri. ***	Total	Rate of egg mass parasitisation (%)
First	335	208 (95.24%)	0 (0.00%)	5 (1.70%)	0 (0.00%)	9 (3.06%)	294 (100.00%)	82.82
Second	203	186 (97.38%)	3 (1.57%)	0 (0.00%)	2 (1.05%)	0 (0.00%)	191 (100.00%)	94.09
Overlapping	370	335 (93.31%)	8 (2.23%)	0 (0.00%)	16 (4.46%)	0 (0.00%)	359 (100.00%)	97.03
Total/ Mean	928	801 (94.91%)	11 (1.30%)	5 (0.59%)	18 (2.13%)	9 (1.07%)	944 (100.00%)	90.95

* Fertilie egg masses Those contained effective eggs.

** *Tel* = *Telenomus, Tetrastichus*

*** = *Trichogramma.*

species was 95.24%, 97.38% and 93 31% during first, second and overlapping generations respectively and the mean was 94 91%. The mean rate of egg mass parasitisation by *Tetrastichus* sp. was 1 30% and by *Trichogramma* sp. was 0.59% the rest 3.20% egg masses were parasitised by any two of the three species.

Alba *et. al.* (1981) found 76.5 percent natural egg parasitisation in Shoot borer *Chilotraea infuscatellus* by *Trichogramma chilotraea* (Trichogrammatidae) and 91.5 percent in stem borer, *Tetramoera schistaceana* by *Trichogrammatoides nana* (Trichogrammatidae). Gupta (1959) reported 15 to 25 percent egg parasitisation by *Telenomus beneficiens* and 4 to 5 percent egg parasitisation by *Trichogramma evanescens* in Top borers, *Scirpophaga nivella*.

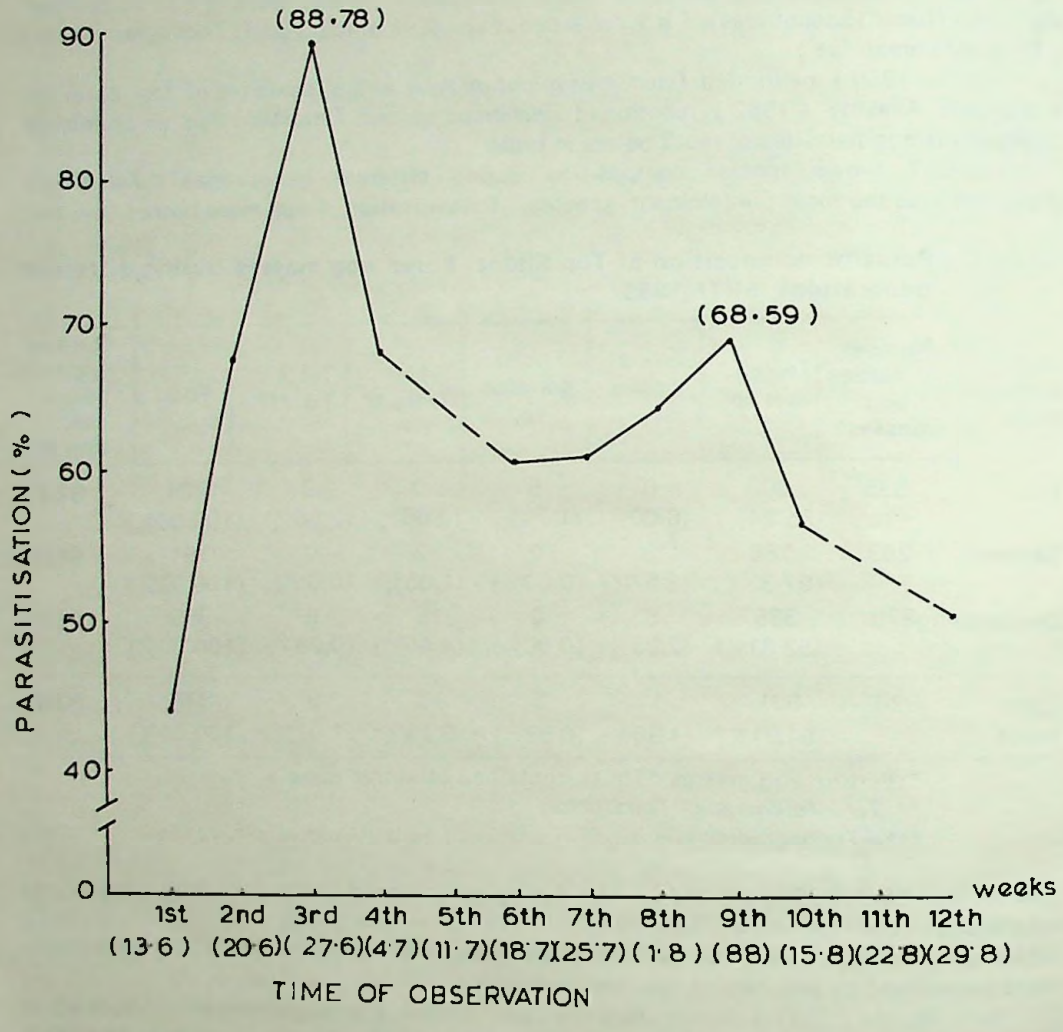

Figure 1. Rate of top Shoot borer egg parasitization during overlapping generations at SRTI in 1983.

Rearing of *Telenomus* sp. has been possible in the laboratory only on the specific host and thus the mass rearing for large scale field release is difficult unless the host is mass reared in the laboratory (South African Sugar Association, Annual Report, 1981-82). Agarwal (1980) stressed for conservation of egg parasites in the field cages by dropping the collected egg masses in cages made of wire gauge and placed in or nearby sugarcane plots. Shahjahan (1979) advised for mechanical manipulation of local egg parasites by putting the collected egg masses in a container covered with very fine meshed thin cloth to let the parasites disperse and search for fresh egg masses where arrested larvae in the container die.

Thus it may be suggested that conservation of *Telenomus* in the field condition would increase the parasite population and decrease the pest (TSB) population.

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