

# NATURAL PARASITISM OF *CHRYSODEIXIS CHALCITES* AND *AUTOGRAPHA GAMMA* (LEP.: NOCTUIDAE) EGGS ON TOMATO FIELDS

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With 2 figures and 2 tables

**ABSTRACT.** A survey for *Chrysodeixis chalcites* Esper and *Autographa gamma* L. (Lep.: Noctuidae) eggs was carried out on tomato fields during the summer season of 1993 and 1994, in order to study egg parasitism. Only two species were found to parasitize *C. chalcites* and *A. gamma* eggs: *Telenomus* sp. (Hym.: Scelionidae) and *Trichogramma cordubensis* (Hym.: Trichogrammatidae). The natural egg parasitism rates were higher in the first year (62.30% for *A. gamma* and 48.39% for *C. chalcites*) than in the second (25.16% for *A. gamma* and 10.91% for *C. chalcites*). *Telenomus* sp. was the parasitoid with higher parasitism rates on both host species. Furthermore, this parasitoid always appeared earlier in the fields than *T. cordubensis*.

## INTRODUCTION

The use of egg parasitoids for the control of pests has long been an essential part of pest management strategies in crop protection. Numerous egg parasitoids are effective natural enemies of important agricultural and forestry pests, and among these, the genus *Trichogramma* WESTWOOD is worldwide used in several pest management programs (LI-YING, 1994).

In biological control it has been proved a valid practice to choose indigenous oophagous species to mass produce and release on the target crop, because local parasitoids are likely to be more adapted to the environment. According to this, the attributes of the different oophagous species occurring on distinct agroecosystems need to be assessed in order to improve the success of pest management programs.

In São Miguel island, parasitoids of the genus *Trichogramma* and *Telenomus* HALIDAY are known since 1989 (PINTUREAU *et al.*, 1991). Therefore, the study of native

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egg parasitoids regarding their occurrence on different local crops must be explored. This paper reports on *Chrysodeixis chalcites* Esper (Lep.: Noctuidae) and *Autographa gamma* L. (Lep.: Noctuidae) egg parasitism on tomato fields at São Miguel island.

## MATERIAL AND METHODS

During the summer season of 1993 (from 9 Jun. 1993 until 22 Sep. 1993) and 1994 (from 7 Jun. 1994 until 11 Oct. 1994) a weekly survey for *C. chalcites* and *A. gamma* eggs was carried out in order to study egg parasitism on tomato fields at Ribeira Grande - São Miguel, Açores. *C. chalcites* and *A. gamma* eggs were identified by their chorion structure and micropylar area under a stereo microscope. The Lepidoptera eggs were surveyed on 200 tomato plants, with the observation of 3 leaves per plant. The encountered eggs were individually isolated in glass tubes (7x1cm), kept at 22°C, 75±5% RH and L:D 16:8, for daily observation of the hatching larvae or parasitoids, as well as the number of parasitoids per host.

A comparative analysis based on Wilcoxon-Mann-Whitney Test was made between the two-year field data regarding the egg parasitism for each parasitoid species.

## RESULTS AND DISCUSSION

Only two species were found to parasitize *C. chalcites* and *A. gamma* eggs on the tomato fields: *Telenomus* sp. (Hym.: Scelionidae) and *Trichogramma cordubensis* VARGAS & CABELLO (Hym.: Trichogrammatidae). However, the proportion of different oophagous on the parasitism of both host species was always favourable to *Telenomus* sp. (Table 1): In both years, the number of *A. gamma* eggs parasitized by *Telenomus* sp. was significantly higher (U=414.500, Z= -2.919, p=0.0035, Wilcoxon-Mann-Whitney Test) than by *T. cordubensis*; For *C. chalcites*, this difference was not significant (U=559.500, Z=-1.351, p=0.1766, Wilcoxon-Mann-Whitney Test), although the number of host eggs parasitized by *Telenomus* sp. was also higher than by *T. cordubensis*.

**TABLE 1** - Number of collected eggs and parasitism rates by *T. cordubensis* and *Telenomus* sp., for each host species during the summer seasons of 1993 and 1994.

	1993		1994	
	<i>A. gamma</i>	<i>C. chalcites</i>	<i>A. gamma</i>	<i>C. chalcites</i>
Nº of host eggs	183	217	155	55
<i>T. cordubensis</i> (%)	9.29	6.91	3.23	3.64
<i>Telenomus</i> (%)	53.01	41.47	21.94	7.27

According to BAI *et al.* (1992) and SCHMIDT (1994), the number of progeny in *Trichogramma* depends, among other factors, on the host egg volume and availability. The mean number of *Trichogramma* adults emerging from *C. chalcites* and *A. gamma* field collected eggs oscillated from one to two wasps per host, except for *C. chalcites* eggs collected in 1994, where mean values of three adults were observed. Probably this was due to the fact that in this year the egg populations of *C. chalcites* was very low. For *Telenomus* sp. only one adult emerged per host egg. No cases of multiparasitism were observed, which seems to indicate that the females from both parasitoids species have a high discriminative capacity towards previous parasitized eggs.

*C. chalcites* and *A. gamma* egg parasitism rates were higher in 1993 for both *Telenomus* sp. and *T. cordubensis*, although the observed differences were not significant (Table 1, 2). The lower parasitism rates observed in 1994 were probably due to the heavier use of insecticides in this year when compared to the previous one.

**TABLE 2** - Statistical comparison between 1993 and 1994 parasitism data for *T. cordubensis* and *Telenomus* sp.

Wicoxon-Mann-Whitney Test (p)*	1993 vs 1994	
	<i>A. gamma</i>	<i>C. chalcites</i>
<i>T. cordubensis</i>	0.6476	0.4461
<i>Telenomus</i>	0.1096	0.0588

\* With a significance of 5%

Figures 1 and 2 respectively represent the number of *C. Chalcites* and *A. gamma* eggs weekly found on 600 tomato leaves, and the egg parasitism by *Telenomus* sp. and *T. cordubensis*. It should be stressed that the first *C. Chalcites* and *A. gamma* eggs were parasitized by *Telenomus*. The earlier appearance in the summer season of the genus *Telenomus* in tomato fields as also been observed by MEIRROSE *et al.* (1991) and in other ecosystems by GARCIA *et al.* (1995). Also during the host's peak populations this species was an important biological control agent, achieving a parasitism rate of 55% for *A. gamma* and 46% for *C. chalcites* eggs, during the period between 17 August and 22 September 1993.

## CONCLUSIONS

The results of the present study show that *T. cordubensis* and *Telenomus* sp. can be used on biological control programs against *A. gamma* and *C. chalcites* on azorean tomato

fields. *Telenomus* sp. seems to be a very promising biocontrol agent against these pests, due to the high rates of natural egg parasitism that were achieved during the summer season. However, further research on mass production and releasing techniques of this parasitoid need to be performed, in order to fully assess the potential of *Telenomus* sp. as a biocontrol agent.

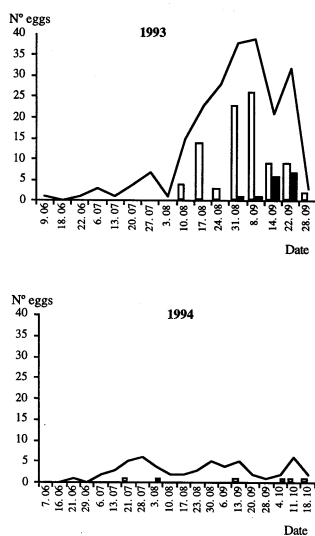


Fig. 1 - Number of *C. chalcites* eggs weekly collected (—) and their parasitism by *Telenomus* sp. (□) and *T. cordubensis* (■), during the summer seasons of 1993 and 1994.

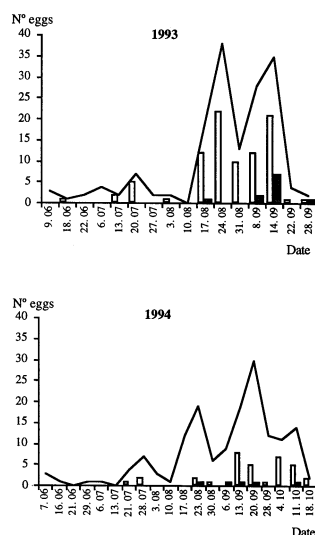


Fig. 2 - Number of *A. gamma* eggs weekly collected (—) and their parasitism by *Telenomus* sp. (□) and *T. cordubensis* (■), during the summer seasons of 1993 and 1994.

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