## SCIENTIFIC NOTE

# Egg Parasitoids of *Anticarsia gemmatalis* Hübner (Lepidoptera: Noctuidae) in Soybeans

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Parasitóides de Ovos de *Anticarsia gemmatalis* Hübner (Lepidoptera: Noctuidae) na Cultura da Soja

RESUMO - Levantamentos em lavouras de soja foram conduzidos durante cinco safras (1994/95 a 1998/99) em três localidades no Sul do Paraná, para verificar a ocorrência de parasitismo em ovos de *Anticarsia gemmatalis* Hübner (Lepidoptera: Noctuidae). Foram encontradas cinco espécies pertencentes a três famílias de Hymenoptera: *Trichogramma pretiosum* Riley, *T. rojasi* Nagaraja & Nagarkatti, *T. atopovirilia* Oatman & Platner (Trichogrammatidae), *Telenomus cyamophylax* Polaszek (Scelionidae) e *Encarsia porteri* (Mercet) (Aphelinidae). Destas, *T. atopovirilia* e *E. porteri* são citadas pela primeira vez parasitando ovos de *A. gemmatalis* na América do Sul. O elevado número de espécies encontrado demonstra que os parasitóides de ovos desempenham um papel relevante no controle natural da lagarta da soja; todavia, para o seu potencial ser efetivamente explorado, há necessidade do uso racional de inseticidas seletivos que permitam a sobrevivência desses parasitóides.

PALAVRAS-CHAVE: Insecta, controle biológico, lagarta da soja, *Trichogramma* sp., *Telenomus* sp., *Encarsia* sp.

Although the velvetbean caterpillar *Anticarsia gemmatalis* Hübner is the main defoliator of soybeans in Brazil (Panizzi *et al*. 1977, Ferreira & Panizzi 1978), studies regarding parasitism on this species have been largely restricted to the larval stage (Panizzi *et al*. 1977, Foerster & Guillén 1979), with few attempts to survey the occurrence of egg parasitoids. Hohmann *et al*. (1989) reported *Trichogramma pretiosum* Riley in eggs of *A. gemmatalis* and Zucchi & Monteiro (1997) surveyed the literature on *Trichogramma* in South America. Elsewhere in South America, *T. pretiosum* and *Encarsia* sp. were recorded in Argentina on eggs of *A. gemmatalis* (Frias *et al*. 1991-93).

Field surveys were carried out during four soybean seasons from 1994/95 to 1998/99 in southern Paraná State, Brazil in areas with a history of low insecticide use, to investigate the occurrence of parasitism in eggs of *A. gemmatalis*.

Four methods were used to survey *A. gemmatalis* eggs in the field; l. Random collection of eggs from the plants (40 to 60 eggs/ week); 2. Placement of stiff index cards containing 40 eggs obtained in laboratory and tied to the plants; 3. Direct placement of labora-

tory-obtained eggs on soybean leaves (40 eggs/plant), and 4. Release of *A. gemmatalis* moths in nylon cages covering the whole plant, and collection of the eggs laid by the caged moths. Except for the collection of naturally laid eggs, the eggs were left in the field for a 3-5 day exposure period and then transferred to the laboratory to assess the incidence of parasitism.

The strips containing glued eggs of *A. gemmatalis* was the least effective method to detect parasitism, due to the high rate of predation on the exposed eggs; once the strip was found by a predator, all eggs of the batch were consumed. The other three methods were effective in detecting parasitism; the attachment of laboratory-obtained eggs directly to the leaf surface was the most time-consuming, while the collection of naturally laid eggs depended largely on the skill of the collector to detect the small-size eggs of *A. gemmatalis* on the soybean leaves. Thus, the least time-consuming method was the release of 10 pairs of moths inside a nylon cage containing four soybean plants and the further collection of the eggs 3-5 days after the release of the moths. In this method, the mesh size of the nylon did not preclude the access of adult parasitoids into the cage.

Five species of Hymenoptera belonging to three families were found parasitizing eggs of *A. gemmatalis* in the three areas surveyed (Table 1). Three species of *Trichogramma* were identified: *T. pretiosum* was the most common, being found in all four seasons and in all localities; *T. rojasi* Nagaraja & Nagarkatti was collected in Quatro Barras (1995/96) and Fazenda Rio Grande (1996/99), but not in Lapa, while *T. atopovirilia* Oatman & Platner was found in 1997/98 in Fazenda Rio Grande (Table 1). Neither *T. rojasi* nor *T. atopovirilia* had been previously found in eggs of *A. gemmatalis*. Nagaraja & Nagarkatti (1973) described *T. rojasi* collected in Chile, from eggs of *Tatochila* sp. (Lepidoptera: Pieridae) on *Trifolium* sp. and from *Rachiplusia ou* Guén. (Lepidoptera: Noctuidae) on alfalfa and beans. In Cuba, *T. rojasi* was found parasitizing eggs of *Mocis latipes* (Guén.) (Lepidoptera: Noctuidae) (Galán & Rodríguez 1991). In Brazil, *T. rojasi* is cited by Zucchi & Monteiro (1997) from the specimens collected in this survey in Southern Paraná and identified by Dr. John Pinto from the University of California, Riverside. In Brazil, *T. atopovirilia* was previously recorded from eggs of *Helicoverpa zea* (Boddie) and *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae) collected on maize and from *Erinnyis ello* (L.) (Lepidoptera: Sphingidae) on cassava (Zucchi & Monteiro 1997). Although *T. pretiosum* is the prevalent species of *Trichogramma* in eggs of lepidopterous pests, in Brazil only

Table 1. Egg parasitoids of *A. gemmatalis* collected during four soybean seasons in different localities of southern Paraná State, Brazil.

| | Locality/Crop season | | |
|---|---|---|---|
| Parasitoid species | Lapa | Quatro Barras | Fazenda Rio Grande |
| *Telenomus cyamophylax* | 1994/95 | | 1998/99 |
| *Trichogramma pretiosum* | 1994/95 | 1995/96 | 1996/99 |
| *Trichogramma rojasi* | | 1995/96 | 1996/99 |
| *Trichogramma atopovirilia* | | | 1997/98 |
| *Encarsia porteri* | | | 1997/98 |

Hohmann *et al*. (1989) have previously reported its incidence in eggs of *A. gemmatalis*. In Argentina, *T. pretiosum* was observed in eggs of *A. gemmatalis* by Frías *et al*. (1991-93).

In the 1994/95 soybean season, a new species of *Telenomus* (Hymenoptera: Scelionidae) was found parasitizing eggs of *A. gemmatalis* in Lapa; this species was described by Polaszek & Foerster (1997) as *Telenomus cyamophylax* Polaszek. In 1998/99, *T. cyamophylax* was also collected in Fazenda Rio Grande.

In 1997/98, the survey revealed in Fazenda Rio Grande a species of Aphelinidae not previously cited parasitizing eggs of *A. gemmatalis* in Brazil: *Encarsia porteri* (Mercet). Species of *Encarsia* may have different ontogenies between males and females; some are heterotrophic parasitoids, in which the females develop as primary parasitoids of whiteflies and the males develop in lepidopterous hosts (Stoner & Butler 1965, Gauld & Bolton 1988). In the present survey, only males of *E. porteri* emerged from eggs of *A. gemmatalis*. In Chile, *E. porteri* was found parasitizing eggs of *Rachiplusia nu* (Guenée) (Arretz *et al*. 1994) and *H. zea* (Guerrero *et al*. 1993), and in Argentina, Frías *et al*. (1991-93) reported *Encarsia* sp. in eggs of *A. gemmatalis* in soybeans.

The relative incidence among parasitoid species was not quantified in Lapa and Quatro Barras (1994 until 1997). In 1998/99, in Fazenda Rio Grande, the relative abundance of each parasitoid was assessed, and *T. pretiosum* accounted for over 90%, followed by *T. atopovirilia* (3.6%), *T. rojasi* (2.5%), *T. cyamophylax* (1,5%) and *E. porteri* (0.5%). Despite the strong predominance of *T. pretiosum* during this season, the other parasitoid species may be important under different climatic conditions or at different host densities.

The results show that eggs of *A. gemmatalis* are attacked by a complex of parasitoid species that may have a significant role in the control of the velvetbean caterpillar. However, the indiscriminate use of non-selective insecticides in areas under continuous insecticide pressure may be suppressing the action of these natural enemies. In all localities evaluated in this survey, insecticide use has been restricted; in two of the areas (Fazenda Rio Grande and Quatro Barras), soybean had been recently introduced, and in Lapa, although with a long history of soybean cropping, the study area had been under pest management during the past 12 years, thus with restricted and selective use of insecticides. The large variety of parasitoid species found in these circumstances clearly illustrates the importance of environmental quality on the abundance of beneficial species.

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