# *Research Note*

## *PARASITOIDS OF* PSEUDOPLUSIA INCLUDENS *WALKER (LEPIDOPTERA: NOCTUIDAE) LARVAE ON THE SOUTH COAST OF PUERTO RICO*[1,2]

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Larvae of the soybean looper, *Pseudoplusia includens* (Walker), cause severe damage to the leaves of different host plants (Herzog, 1980; Martorell, 1980), some of which are important crops. Since 1985, heavy infestations of the soybean looper have built up in vegetable crops on the south coast of Puerto Rico. Insecticide suppression is the only tactic used to control this pest. Although some control is achieved with insecticides, high rates per application are necessary to reduce soybean looper populations. Resistance to insecticides by soybean looper larvae was suspected and later confirmed in Puerto Rico (Boethel et al., 1992). For example, with current practices in Puerto Rico, more than two insecticide applications per week are needed during the 60-day growing period of eggplant, *Solanum melongena* L., cv. Rosita.

The lack of adequate control of the soybean looper, along with the concurrent increase in its damage to high-profit crops, makes this pest a major threat to vegetable growers in Puerto Rico. Other control strategies, such as biological control, must be evaluated. The first step in such a project is to survey the area for endemic natural enemies. Therefore, a study was conducted to identify which parasitoids attack soybean looper larvae in the vegetable crops on the south coast of Puerto Rico.

The survey was conducted from 11 December 1990 to 31 October 1991. Weekly samples of soybean looper larvae were obtained from the following vegetable crops: tomato (*Lycopersicum esculentum* L.) cv. Floradel, eggplant (*Solanum melongena* L.) cv. Rosita, sweet potato [*Ipomoea batatas* (L.) Lam.] cv. Camoté, pepper (*Capsicum annuum* L.) cv. Key Largo and lettuce (*Lactuca sativa* L.). The samples were collected in the vegetable production areas on the south coast of Puerto Rico (Salinas, Santa Isabel, Juana Díaz, Yauco, and Guánica). The habitat in which the larval samples were collected was an area of intensive vegetable production. Farmers in that area applied insecticides at least once a week.

The crops were surveyed as they appeared in the field. Weekly samples were collected in tomato starting 11 December and finishing 26 June for a total of 27 samples. Eggplant was first surveyed starting 6 May and ending 25 June and then starting again 10 September and finishing 31 October for a total of 16 samples. The sweet potato survey started 26 February and ended 17 September for a total of 29 samples. Pepper was sampled from 7 May to 12 September for a total of 22 samples; lettuce, from 5 March to 9 May for a total of 10 samples.

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TABLE 1.—*Parasitoids of the soybean looper larvae collected from vegetable crops cultivated on the south coast of Puerto Rico, 1990-91.*

| Crop | SBL[1] | *Cotesia* spp. | *Copidosoma floridanum* | *Glyptapanteles* sp. prob. *guayanensis* | *Voria ruralis* | Total % parasitization |
|---|---|---|---|---|---|---|
| Tomato | 3,277 | 10.89 | 9.37 | 3.39 | 0.24 | 23.89 a[2] |
| Eggplant | 2,399 | 2.42 | 0.50 | 0.33 | 0.00 | 3.25 a |
| Sweet potato | 1,565 | 27.60 | 5.94 | 1.79 | 2.30 | 37.64 a |
| Pepper | 1,030 | 11.07 | 0.87 | 2.23 | 0.19 | 14.37 a |
| Lettuce | 269 | 16.73 | 11.90 | 1.49 | 1.12 | 31.23 a |
| Total | 8,540 | | | | | 22.08 |
| Avg. % parasitization | | 13.74 a | 5.72 ab | 1.85 b | 0.77 b | |

[1]Total number of soybean looper larvae collected during the survey.
[2]Average percentages parasitization not followed by the same letter are significantly different ($P < 0.05$; ANOVA, Tukey test).

Soybean looper larvae (SBL) were collected at random in the field by shaking foliage over a 0.91- × 0.76-m ground cloth. Individual larvae were picked up with forceps and transferred into 30-ml plastic cups containing an artificial pinto bean diet (Burton, 1969). The sampling was conducted at random for each field crop surveyed. Two men per hour were devoted to each crop surveyed. Sampling was usually conducted from 9:00 a.m. to 11:00 a.m.

Cups containing larvae were placed in ice chests and transported to the laboratory. These were placed in the insectaria (25 ± 1° C, 45 ± 5% RH, 12 L:D) and observed daily for parasitoid emergence. Percentage of parasitization was calculated and data obtained were subjected to arc-sin transformation before the statistical analysis. Analysis of variance (ANOVA) and multiple comparisons were calculated on percentage of parasitization among crops surveyed and among the parasitoids collected. Parasitoids recovered were identified by N.E. Wooley (Diptera); P.M. Marsh (Hymenoptera: Braconidae); and M.E. Schauff (Hymenoptera: Encyrtidae), USDA Insect Identification Institute at Beltsville, Maryland.

Four parasitoid species representing three families emerged from SBL larvae collected during the survey. These were *Cotesia* spp. (Hymenoptera: Braconidae) (PR ACC No. 28-91), *Copidosoma floridanum* (Ashmead) (Hymenoptera: Encyrtidae) (PR ACC No. 17-91), *Glyptapanteles* sp. prob. *guayanensis* (Cameron) (Hymenoptera: Braconidae) (PR ACC No. 269-90, 27-30-91), and *Voria ruralis* complex (Diptera: Tachinidae) (PR ACC No. 26-91). Voucher specimens were deposited at the Entomological Museum of the Puerto Rico Agricultural Experiment Station in Río Piedras, Puerto Rico.

Total parasitism of SBL larvae collected (8,540) during the survey was 22.089% (Table 1). No significant differences in percentage of parasitization were detected among the crops surveyed. However, a highly significant difference (D.F. 3, 16; F = 5.76; P = 0.0072) in the parasitization exerted was detected among the species collected. The most abundant parasitoid was *Cotesia* spp., which parasitized 13.74% of all larvae collected. *Copidosoma floridanum*, *Glyptapanteles* sp. and *V. ruralis* parasitized 5.72, 1.85, and 0.77% of the soybean looper larvae, respectively (Table 1). *Cotesia* spp. was significantly different from *Glyptapanteles* sp. prob. *guayanensis* and *V. ruralis*. No significant difference was observed when the percentage of parasitization exerted by *Cotesia* spp. was compared to that of *C. floridanum*.

In Puerto Rico, *C. floridanum* was previously recorded on soybean looper larvae as *C. truncatellum* (Wolcott, 1948; Noyes, 1988). *Voria ruralis* was reported as a parasitoid of the velvet bean caterpillar, *Anticarsia gemmatalis* (Hübner), on soybean in Puerto Rico (Wolcott, 1948). This is the first record of *V. ruralis* parasitizing soybean looper larvae in Puerto Rico. Both species have been previously recorded parasitizing soybean looper larvae in the New World (Beach and Todd, 1985; Grant and Shepard, 1985; Martin et al., 1981).

*Glyptapanteles* sp. prob. *guayanensis* was recorded as *Apanteles guayanensis* attacking a looper caterpillar of the genus *Phytometra* in Puerto Rico (Wolcott, 1948). This is the first report on parasitization of the soybean looper larvae by *Glyptapanteles* sp. prob. *guayanensis* in Puerto Rico. Further studies are needed that can address the pesticide tolerance of *Cotesia* spp. and whether field augmentation can be appropriate for the biological control of the soybean looper larvae on the south coast of Puerto Rico.

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