N O T E

Inundative Releases of Hymenopterous Parasitoids against *Diatraea considerata* (Lepidoptera: Crambidae) on Sugarcane in Northwestern Mexico[1]

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The most important sugarcane insect pest in Sinaloa, Mexico, is the stalkborer, *Diatraea considerata* Heinrich (Rodríguez-del-Bosque and Smith 1997, Insect Sci. Appl. 17: 305-314). Importation of seed cane from areas farther south along the Mexican Pacific coast is probably responsible for current infestation of this pest in Sinaloa (Smith and Rodríguez-del-Bosque 1994, Biol. Control 4: 249-253). The northern expansion of the *D. considerata* range has apparently occurred without a concomitant range extension of its natural enemies. The objective of the study presented herein was to evaluate the potential of inundative releases of *Trichogramma atopovorilia* Oatman & Platner and the recently introduced and established braconid *Macrocentrus prolificus* Wharton on *D. considerata* in its expanded range.

The study was conducted in four 100-ha sugarcane fields near Los Mochis from March 2001 to February 2002. In all fields, *M. prolificus* had been previously introduced inoculatively as early as 1995, and establishment was confirmed by previous samplings, in which *T. atopovorilia* was also detected. Each field included two treatments, each established in one half of the field (50 ha): (a) inundative releases of *T. atopovorilia* and *M. prolificus*; and (b) check, with no releases during the period of study, except for resident populations of both parasitoids already present in the fields. Releases of *T. atopovorilia* were bimonthly; whereas, those of *M. prolificus* were monthly, both from March to December 2001. On every release date, 64.5 cm^2 piece of a cardboard containing *T. atopovorilia* pupae were placed in five sites within one ha, emerging approximately 30,000 adults. Similarly, approximately 2,500 *M. prolificus* adults were released per ha in five sites by using 150-ml plastic cups. Rearing and release methods of both parasitoids were according to procedures described by

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Arredondo (1994, Proc. Workshop on Stalkborers, pp. 16-23) and Smith et al. (1993, ICIPE, Nairobi, 89 p.).

Each field was sampled monthly for *D. considerata* eggs and larvae to determine parasitization from April 2001 to February 2002 in both released and check areas. In each field, treatment and on each sampling date, 50 plants were randomly selected within 5 ha at the center of the 50-ha field, removed, transported to the laboratory, and dissected for *D. considerata* eggs and larvae. Additionally, eggs were searched and collected randomly during 1 h within the same 5-ha area. Eggs were placed in groups of 10 to 20 and larvae singly, in 6-cm diam plastic Petri dishes and reared under laboratory conditions (27 ± 1°C; 70% RH) for stalkborer development or parasitoid emergence. Larvae were supplied with 1 cm^3 of an artificial diet (Badilla et al. 1994, DIECA, Costa Rica, 22 p.) every 2 to 3 d. For each sampling date, percent parasitism was estimated for each parasitoid species by dividing the number of parasitized eggs (by *T. atopovorilia*) or larvae (by *M. prolificus*) by the total number of eggs or larvae collected, and multiplying by 100. Percentages of parasitism by either *T. atopovorilia* or *M. prolificus* were compared between treatments by Chi-square tests ($P < 0.05$).

Eggs were detected from April to November 2001, peaking in July with 200 eggs/h. Eggs were not found from December 2001 to February 2002. Larvae were present throughout the study with peak densities in September 2001 with >4 larvae/stalk. Overall, inundative releases of both parasitoids did not cause a greater parasitism of

Table 1. Mean (± SEM) parasitism by *T. atopovorilia* and *M. prolificus* on *D. considerata*, in inundative release and check plots, Los Mochis, Sinaloa, Mexico. 2001–2002*

	T. atopovorilia		*M. prolificus*	
Date	Released	Check	Released	Check
Apr 2001	21.5 ± 1.8 a	17.5 ± 2.1 a	19.3 ± 3.1 a	19.1 ± 3.7 a
May	68.5 ± 9.4 a	53.5 ± 5.5 b	23.3 ± 4.1 a	17.0 ± 3.0 a
Jun	55.0 ± 4.7 a	47.1 ± 6.0 a	19.1 ± 2.0 a	18.0 ± 2.0 a
Jul	30.7 ± 3.7 a	36.2 ± 4.6 a	15.1 ± 1.6 a	9.1 ± 1.2 a
Aug	17.6 ± 1.3 a	9.1 ± 1.8 a	12.2 ± 3.2 a	18.2 ± 3.9 a
Sep	34.5 ± 4.2 a	29.8 ± 3.4 a	5.2 ± 1.3 a	7.7 ± 1.4 a
Oct	23.2 ± 3.7 a	29.8 ± 4.1 a	2.3 ± 0.5 b	8.9 ± 1.6 a
Nov	59.7 ± 6.1 a	45.3 ± 8.2 b	2.1 ± 0.7 a	3.2 ± 0.7 a
Dec	**	**	2.4 ± 0.5 a	4.3 ± 0.8 a
Jan 2002	**	**	2.9 ± 0.7 a	6.1 ± 1.0 a
Feb	**	**	3.9 ± 1.1 a	4.9 ± 0.9 a
Average	38.8 ± 6.4 a	33.5 ± 5.9 a	9.8 ± 2.3 a	10.6 ± 1.8 a

* Means across four fields. Means within a column followed by the same letter are not significantly different (Chi-square, $P < 0.05$).

** No eggs found.

the stalkborer as compared to that of the check plots (Table 1). Although in only two months, *T. atopovorilia* parasitism was significantly greater in the release plot than the check, those differences may not have any ecological meaning in terms of the impact on the population (Van Driesche 1983, Environ. Entomol. 12: 1611-1622). Similarly, in only one month, *M. prolificus* was significantly different between the two treatments, which may be attributed to random error caused by the heterogeneous distribution of both host and parasitoid. Both parasitoids, one native and the other exotic, seem to be well established in this region. However, the inundative release of these numbers of parasitoids in the sugarcane agroecosystem is apparently not an adequate strategy for controlling the stalkborer.