

NATURALLY OCCURRING PARASITOIDS OF THE INDIAN MEAL MOTH, *Plodia interpunctella* Hübner (Lepidoptera: Pyralidae) IN ALBUQUERQUE, NEW MEXICO**CARLOS A. BLANCO¹**

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The Indian meal moth (IMM), *Plodia interpunctella* is one of the most important grain and grain products pests worldwide. Due to its economic importance, repeated control efforts have reduced its susceptibility to insecticides. Therefore, there is a need to use alternative methods of control such as microbial agents (Mardan & Harein 1984), parasites (Brower & Press 1990) and/or the integration of chemical, biological and/or other methods of control (Brower & Press 1990, Cuperus *et al.* 1990).

Although many studies have reported IMM biological control agents, the number of parasitoid species that actually control its populations is limited. Among them are *Trichogramma pretiosum* Riley (Hymenoptera: Trichogrammatidae) (Brower 1982), *Bracon hebetor* Say (Hymenoptera: Braconidae) Keever *et al.* 1986), *Spilochalcis albifrons* (Walsh) (Hymenoptera: Chalcididae) (Hansen 1980), and *Venturia canescens* (Gravenhorst) (Hymenoptera: Ichneumonidae) (Podoler 1974, Gordh 1991).

In this report a complex of three parasitoid species acting simultaneously, two of which have not been previously reported as having the IMM as a host, are documented.

Late instar larvae of the IMM on an artificial diet (Morrison & Crawford 1970) were obtained from a laboratory colony at The University Of New Mexico Biology Department. Larvae and diet medium were placed inside 5 plastic containers (39.5 x 27.0 x 14.0 cm) with a 2.0 cm band of glycerin applied to the inside upper edge to prevent escape. The containers were partially submerged in the center of a plastic pan with 5 cm of water to avoid possible migration of larvae and/or infestation by any ground-dwelling arthropods. IMM larvae and/or pupae were exposed for a period of 3-14 d to naturally occurring parasitoids on the outside back porch of a residence in metropolitan Albuquerque, New Mexico. After the period of exposure, insects and diet medium of each of the 5 plastic containers were placed in 930 ml Ball® mason jars, each containing approximately 300 ml of diet and insects. The jars were closed with a piece of chiffon cloth under the lid and kept in horizontal position under the porch roof. Newly emerged insects were regularly removed from the jars with an aspirator. Voucher specimens were deposited at the University Of New Mexico's insect collection.

Three parasitoid species: *Clausicella sp.* (Diptera: Tachinidae), *V. canescens* and *Mesostenus gracilis* Cresson (Hymenoptera: Ichneumonidae) were reared from the IMM larvae and pupae (Table 1). The three parasitoids were effective only in parasitizing IMM pupae, the reduced rate of parasitism found when only larvae were exposed, probably occurred on pupal stage.

Table 1. Emergence of Indian meal moth and naturally occurring parasitoids outdoors in Albuquerque, New Mexico, U.S.A.

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IMM exposure period	IMM	C. sp	Adults emerged			
			VcF	VcM	MgF	MgM
02-09 June 92	352	35	524	8	62	0
18-25 June 92	280	54	64	0	14	0
13-18 July 92	12	0	11	0	2	0
01-08 Aug. 91 and 92	189	49	111	0	50	2
08-11 Aug. 91	189	45	104	4	75	0
26-29 Aug. 91	211	4	13	0	18	0

IMM= Indian meal moth, *C. sp*= *Clausicella* sp., *VcF*= *V. canescens* female, *VcM*= *V. canescens* male, *MgF*= *M. gracilis* female, *MgM*= *M. gracilis* male.

Parasitism caused by *Clausicella* sp. averaged 7.5%. The average time for 50% emergence of these flies was approximately 40 days; 90% emergence was achieved in 56 days. *Clausicella* sp. population fluctuated during the course of this study. Sex ratio for this species was not determined.

V. canescens, a reported parasite of the IMM (Gordh 1991, Harvey et al. 1993), had an average period of 35 days for 50% emergence of its population, and took 60 days to complete 90% emergence. The parasitism rate observed by this wasp was the highest of the three parasitoids, the average of the 2 year study was 33%. The female: male sex ratio was 98.6:1.4.

M. gracilis a reported parasite of 5 different pyralid moths (Gordh 1991), has not been previously reported parasitizing IMM. Its parasitism throughout the study averaged 8.9%, the development time for this wasp was shorter than that of the other 2 parasitoids, its female: male sex ratio of 99.1:0.9 similar to *V. canescens*.

Parasitism by these 3 species averaged 49.4% throughout the study, suggesting that a moderate reduction of IMM population can be achieved under natural conditions. The high wasp's female: male sex ratios indicate that the parasitoids population may increase rapidly.

During September 1991 and 1992 several of the wasps obtained in the study were introduced into a kitchen, with a severe (1991) and moderate (1992) IMM infestation. Moth population declined inside the kitchen due to removal of infested material, use of sticky traps and pheromone capsules and introduction of the 2 wasp species. Several *M. gracilis* were found flying around the kitchen window during April of 1992 and 1993, the only species that appear adapted to parasitize and survive indoors.