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Natural enemies of Greater Wax Moth *Galleria mellonella* Linnaeus in Honey Bee Colonies

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A B S T R A C T

Among the different natural enemies recorded on Greater wax moth the hymenopteran larval parasitoid, *Apanteles galleriae* Wilkinson was considered as important species. During the course of investigation, one more species of hymenopteran parasitoid (*Antrocephalus galleriae* Subbarao), two species of ants (*Solenopsis geminata* Fab. and *Camponotus compressus* Fab.), one species each of ear wig (*Euborellia stali* Dohrn) and Spider (*Theridion sp*.), one each of fungal (*Beauveria bassiana* Bals) and viral (*Densonucleosus virus*) pathogens were recorded.

Introduction

The bee wax, a by- product of apiculture has numerous uses in bee keeping as well as in other industries. It is chiefly used to manufacture the comb foundation sheets on which bees construct their combs. The cosmetic and the pharmaceutical industries are the other large users of bee wax. The greater wax moth *Galleria mellonella* Linnaeus is a notorious pest of honey bee colonies. The larvae often destroy the unprotected combs in storage or in colonies that become weakened, especially in warm climates with mild winter. Larvae consume the honey bee comb, particularly the brood combs. The larvae while feeding forms tunnels and silken webs inside the comb and cause greater damage to the comb structure. The greater wax moth is responsible for heavy economic losses (60-70%) to bee keepers.

Greater wax moth is also affected by several parasitoids, predators and pathogens. Of these, hymenopteran larval parasitoid *Apanteles galleriae* is the most important enemy of greater wax moth.

Materials and Methods

Observations were recorded on the incidence of different species of wax moth parasitoids by counting the number of adult parasitoids and their pupae in all the bee colonies of *Apis cerana* in Apiray. Further, all wax moth larvae (178/5 colonies) collected were provided with food and were enclosed in a transparent plastic container and parasitoids that emerged (24 No's) were recorded. Larvae dead due to fungal infection were identified by mycelial growth found on the mummified

stages. Soft, fragile and discoloured dead larvae, some time appearing like black scales were considered as bacterial or viral infections. The different species of predators such as ants, spiders and earwigs that occurred were collected, killed, preserved and identified. Linear correlation was employed to verify the nature of association between the different incidence parameters of greater wax moth (Snedecor and Cochran, 1967).

Results and Discussion

Parasitoids

Apanteles galleriae (Hymenoptera: Braconidae) was observed to parasitize the larvae of Greater wax moth in the apiary. The adult parasitoid is black coloured with short antenna. Males could be identified by the blunt abdomen whereas, females have long ovipositor. One or two eggs were found to be laid on each larva. However, only one succeeded in completing the life cycle. The parasite larva came out of the host body by rupturing and pupated in a small white silken cocoon. Only one parasite emerged per single larva.

The total number of greater wax moth larvae were collected from the five colonies of *Apis cerana* and reared in the laboratory. The number of parasitoids that emerged from the Greater wax moth larvae was counted from October to September. The per cent parasitization and sex ratio were recorded (Table 1). The total population of greater wax moth larvae was highest (34/5 colonies) during April and declined later, the population of Greater wax moth fluctuated and erratic in distribution during February, then the population increased gradually reaching a peak by May (12/22 larvae) and later declined reaching zero level by July. Per cent parasitization was maximum during May (54.54%) and subsequently declined reaching zero by July. The earlier observations from several workers indicated that it was found to parasitize 15 per cent of wax moth larvae (Shimamori, 1987). The sex ratio (F: M) was maximum (1: 2) during June, followed by April (1: 1.5) and May (1: 1.4) (Table 1).

Three aspects of the incidence parameters viz., number of wax moth larvae, number of wax moth larval parasitoids and per cent parasitization in five colonies were considered for understanding their inter relationships for the entire year from October to September (Table.2). It was observed that the number of parasitioids exerted highly significant (n = 12; <0.01) was observed between these two parameters. Observations indicated a significant relationship of Y= - 3.09 + 0.37 X where, Y = number of parasitoids and x = number of wax moth larvae in five colonies (Table.2). Inter-relationship verified between number of wax moth larvae and per cent parasitization was also found to be significant, the correlation co-efficient was 0.592 (P<0.04). The relationship is established by the equation Y=-6.65 + 1.18 X, where, Y = per cent parasitization and X = number of wax moth larvae.

Antrocephalus galleriae (Hymenoptera: Chalcididae) was observed parasitizing the pupae of wax moth (20-30% parasitization).

The adult parasitoid is dark black, antenna short and geniculate. The hind femur is swollen largely. The parasitoid jumps often before flying. The adults jumped out whenever exposed for observations.

Predators

Solenopsis geminata (Hymenoptera: Formicidae) a smaller common red ant was observed to feed on the larvae of greater wax moth (12/colony) in the weak and also in the deserted colonies of *A. cerana.*

Table.1 Incidence of *Apanteles galleriae* on greater wax moth, *Galleria mellonella*

Months	No. of waxmoth larvae / 5 colonies	No. of *A. galleriae* adults	Parasitization (%)	Sex ratio F:M
October	11	0	0.00	0.00
November	08	0	0.00	0.00
December	05	0	0.00	0.00
January	09	0	0.00	0.00
February	15	2	13.33	1:1
March	09	2	22.22	1:1
April	34	10	29.41	1:1.5
May	22	12	54.54	1:1.4
June	25	3	12.00	1:2
July	08	0	0.00	0.00
August	17	0	0.00	0.00
September	15	0	0.00	0.00

Table.2 Relationship among number of greater wax moth larvae, number and per cent Parasitization of *Apanteles galleriae*

Parameters	n	r	Regression equation	P< and significance
No. of wax moth larvae v/s No. of *A. galleriae* adults	12	0.760	Y=3.09 + 0.37 X	<0.01**
No. of wax moth larvae v/s per cent parasitization	12	0.592	Y=6.65+1.18X	<0.04*

*: Significant at P<0.05; **: Significant at P<0.01

Camponotus compressus (Hymenoptera: Formicidae), is a bigger common black ant and it was found to feed on the larvae of Greater wax moth (23/colony) in the weaker colonies of *A. cerana.*

Euborellia stall (Dermaptera: Carcinophoridae), a small black coloured ear wig was found to feed on the early instar larvae of Greater wax moth (4/colony) in the debris on the bottom board of *A. cerana* colonies.

Theridion sp. (Araneae: Theridiidae) is a small black coloured spider was observed to feed on the larvae of Greater wax moth (3 / colony) in the weaker colonies of *A. cerana.*

Pathogens

Beauveria bassiana: The infected larvae of Greater wax moth were collected in the colonies of *A. cerana.* (13-18%). The white mycelial growth on the larvae infected the occurrence of this fungal pathogen.

Denso Nucleosus Virsu (DNV): The viral infected larvae were collected in the weaker colonies of *A. cerana* (13-18%) near Bhagamandala of Kodagu district. The lesions in the cells of the different parts of the body of Greater wax moth larvae infected by Denso Nucleosus virus was observed.

During the survey for a period of three years, only few colonies showed extremely low infection levels of pathogens. Thus, the contribution of disease causing agents for the mortality of greater wax moth does not appear to be important in its management.

Probably, as a consequence of previous studies

on larval mortalities due to pathogens remained as only reports of occurrence (Pavlyushin, 1976; Bergoin and Bres, 1968; Gross *et al.*, 1990).

References

Bergoin, M., and Bres, N., 1968. Tissue lesions in larvae of the lepidopteran *Galleria mellonella* infected with dense nucleus virus. *Bull Apic. Doc. ScL Tech. Inf.*, 11:5-12.

Gross, O., Tussen, P., Weinberg, D. and Tal, J., 1990. Expression of densonucleosis virus Gm DNV in *Galleria mellonella* larvae: Size analysis and *in vitro* translation of viral transcription products. *J. Invert. Path.*, 56: 175-180.

Pavlyushin, V.A., 1976. Role of the toxins produced by the fungus *Beauveria bassiana* in the pathogenesis of an experimental mycosis of the bee moth. *Mikologiyai Fitopatologiya.*, 10: 225-227.

Shimamori, K., 1987. The biology of *Apanteles galleriae*, a parasitoid of the two species of wax moth. *Honey bee Sci.*, 8: 107-112.

Snedecor, G.W., and Cochran, W.G., 1967. *Statistical methods.* Iowa State University Press, Iowa. 593 pp.

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