Asian J. of Bio Sci. (April, 2008) Vol. 3 No. 1 : (81-83)

Effect of colony strength and weather factors on the incidence of greater wax moth (*Galleria mellonella* Linn.)

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(Accepted : December, 2007)

A study was conducted to record the incidence of greater wax moth *Galleria mellonella* in strong and weak colonies of Apis cerana. The rate of infestation of greater waxmoth was observed throughout the year in the weaker colonies with the highest per cent infestation being in October to February. Where as, the infestation was found to be lower during August. Further, the strong colonies with greater wax moth infestation was fairly high during March, the lowest per cent infestation was noticed during December and September.

Key words: Greater wax moth, Incidence, Colonies.

INTRODUCTION

The Greater waxmoth, *Galleria mellonella* is considered as a notorious pest of honey bee colonies which is well distributed throughout the world. The larvae often destroy the un protected 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. It also feeds on pollen stores, bee pupae and larve. The larvae while feeding form tunnels and silken webs inside the comb structure. The presence of tunnels is the indication of waxmoth infestation and capable of converting the comb into a mass of silken webs and debris. Thus, the greater waxmoth is responsible for heavy economic losses to bee keepers (Paddock, 1918; Kapil and Sihag, 1983).

MATERIALS AND METHODS

The incidence of the greater waxmoth, *Galleria mellonella* in strong and weak colonies of A*pis cerana* was studied in the UAS Apiary, GKVK campus, Bangalore. Observations on the number of colonies infested, number of combs present, the number of combs damaged , larval population, per cent colony infestation and number of deserted colonies were recorded from October 1997 to September 1998. The data on various weather parameter *viz.*, temperature (^{0}C), relative humidity (%), rainfall (mm) and sunshine hours at GKVK prevailing during this period of study were collected from meteriological center, GKVK to determine their influence on the wax moth infestation and their population. Pearsons product movement correlation was employed to verify the nature of association between the various weather and incidence parameters. All sets of data were verified only for linear associations (Snedecor and Cochran,1967).

RESULTS AND DISCUSSION

The incidence of greater waxmoth was recorded in both strong and weak colonies of *Apis cerana* from October 1997 to September 1998 (Table-1). The incidence was maximum in March (47.37%), followed by February (42.10%) and April (41.18%). Whereas it was found to be comparatively lower in July (11.76%) followed by June (15.38%) and August (16.67%). The data clearly indicated that, the highest per cent infestation was observed throughout the year in weak colonies as compared to the strong colonies. The incidence of greater waxmoth in the weaker colonies revealed that the maximum per cent (100%) infestation was recorded during October to February. Whereas it was found to be comparatively lower in August (28.57%) followed by June and July (33.33%). Examination of strong colonies revealed a lesser infestation of the moth as compared to the weaker colonies. All the strong colonies were completely free from the greater waxmoth during October , June and July .The highest number of colonies with greater waxmoth infestation was noticed in March (35.71%), followed by February (31.25%) and May (28.57%). The number of strong colonies with greater waxmoth infestation was comparatively lower in December and September (6.66%)followed by August (9.09%) and November (10.0%).

Inter–relationships verified between the number of strong colonies and per cent infested strong colonies ,total

number of colonies and per cent infested total colonies were found to be non- significant .Correlation co–efficient were 0.135 (P>0.43) and –0.184 (P>0.28) between the number of strong colonies and per cent infested strong colonies, total number of colonies and per cent infested total colonies, respectively. However, there was a highly significant negative relationship between the number of weak colonies and per cent infested weak colonies (r = -0.788; P<<0.01). The relationship between these two parameters was given by the equation Y = 122.19-12.84X, where Y was the per cent infested weak colonies and X = number of weak colonies (Table 2).

Studies on the correlations between the waxmoth infestation and prevailing weather condition in GKVK over a period of one year (October 1997 to September 1998) are presented in Table 3. Inter-relationships verified between the per cent infested colonies, mean number of greater waxmoth larvae and the weather factors were all found to be non –significant.

The per cent colonies infested by greater waxmoth and its mean larval population were positively correlated with mean temperature .The correlation co-efficient value for mean per cent infested colonies and mean temperature was 0.324 (P>0.05). The correlation co-efficient values for mean larval population and mean temperature was 0.170 (P>320). The relative humidity showed a negative correlation with the per cent infested colonies and also with mean larval population. The correlation value for per cent infested colonies and relative humidity was -0.292 (P>0.08) and the same for

Table 1 : Incidence of Greater waxmoth, *Galleria mellonella* in strong and weak colonies of *apis cerana*.

Month	No. of colonies observed			Per cent infested colonies		
	Strong	Weak	Total	Strong	Weak	Total
October 1997	5	3	8	0.00	100.00	37.50
November	10	4	14	10.00	100.00	35.71
December	15	3	18	6.66	100.00	22.22
January 1998	18	2	20	22.22	100.00	30.00
February	16	3	19	31.25	100.00	42.10
March	14	5	19	35.71	80.00	47.37
April	11	6	17	27.27	66.66	41.18
May	7	7	14	28.57	42.85	35.71
June	7	6	13	0.00	33.33	15.38
July	11	6	17	0.00	33.33	11.76
August	11	7	18	9.09	28.57	16.67
September	15	7	22	6.66	42.85	18.18

Table 2 : Relationship among number of colonies observed and per centage of colonies (Strong, weak and total colonies) infested with *G. mellonella*

Parameters	r	Regression equation	P and Significance
No. of strong colonies Vs per cent infested strong colonies	0.135	-	>0.43 ^{NS}
No. of weak colonies Vs per cent infested weak colonies	-0.788	Y= 122.19-12.84X	<0.01 **
Total no. of colonies Vs per cent infested total colonies	-0.184	-	>0.28 ^{NS}

* : Significant at P <0.05 ** : Significant at P <0.01 NS : Non-Significant

Table 3 : Relationship among per cent Greater wax moth infested colonies, mean number of larvae and weather parameters

Parameters	r	Regression equation	P	Significance
Per cent infested colonies Vs				
Mean temperature	0.324	-	0.054	NS
Relative humidity	-0.292	-	0.084	NS
Sunshine hours	0.290	-	0.086	NS
Mean No. of larvae/colony Vs				
Mean temperature	0.170	-	0.320	NS
Relative humidity	-0.171	-	0.317	NS
Sunshine hours	0.228	-	0.181	NS

NS : Non-Significant

mean larval population was –0.171(P>0.31). The per cent infested colonies due to greater waxmoth was positively correlated with bright sunshine hours showing correlation co-efficient value of 0.290(P>0.08).The bright sunshine hours showed a positive correlation with the mean larval population (r =0.228; P>0.18).

The present study clearly indicated that the rate of infestation of greater waxmoth was higher in the weaker colonies as compared to the stronger colonies. The strong colonies were completely free from the greater waxmoth during October, June and July . However ,the infestation was observed throughout the year in weaker colonies. These findings are in conformity with the observations made by Earp (1925),Grout (1946)and Warren and Huddleston (1962) where they reported that the infestation of greater waxmoth was observed throughout the year in the weaker colonies .

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