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## Seasonal incidence of wasps in *Apis mellifera* L. colonies at Nauni, Solan (Himachal Pradesh)

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### Abstract

Two species of wasps, *Vespa auraria* and *V. magnifica* are found visiting the apiary of *Apis mellifera* L. colonies at Nauni, Solan district, Himachal Pradesh, during July, 2015 to June, 2016. The incidence of *V. auraria* was found maximum in September ( $366.23 \pm 30.38/\text{day}$ ) followed by wasp's visits in August ( $297.77 \pm 28.89/\text{day}$ ), October ( $280.69 \pm 32.62/\text{day}$ ), November ( $238.26 \pm 23.69/\text{day}$ ) and July ( $129.23 \pm 6.89/\text{day}$ ). No visits of wasps were observed during December, 2015 to March, 2016 in University apiary at Nauni. The wasps reappeared again in April ( $1.8 \pm 0.32$ ), May ( $4.45 \pm 0.58$ ) and June ( $12.54 \pm 0.88$ ). *V. magnifica* was also noticed visiting apiary only on few occasions during October to November months at Nauni. Its visits ranged between 1 to 3 wasp per day. Incidence of *V. auraria* showed significant positive correlation with temperature ( $r = 0.759$ ) and relative humidity ( $r = 0.665$ ).

**Keywords:** Seasonal incidence, wasp, *Apis mellifera*, *Vespa auraria*, *Vespa magnifica*

### Introduction

The presence of honey, bees wax, brood, pollen, nectar and favourable environmental conditions available inside the hive invite a number of enemies. The health and vigour of honey bee colonies are threatened by numerous pests, predators and diseases (Chen *et al.* 2006) [1]. Amongst the predators, wasps and hornets pose by far the most serious threat to beekeeping industry. Quite a good number of insect pests often cause appreciable damage to honey bees round the year and particularly during the floral dearth period, posing threat to beekeeping industry. These include wasps, wax moths, weaver ants, beetles, robber fleas, dragon flies and mites etc., apart from lizards, frogs, rats, bee eaters and diseases. Wasps are the one of the major threat to beekeeping industry. Wasps are not only mortal to the bees, but also burgle their egg, brood and honey stores. So an attempt has been made to study the seasonal incidence of wasps in Nauni, Solan, and Himachal Pradesh as per the previous study conducted by Rana *et al.* 2000 [4].

### Materials and Methods

Field experiments were conducted in the Apiary of the Department of Entomology at Main Experiment Station of Department of Entomology, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, situated at  $33.3^\circ\text{N}$  latitude,  $70.70^\circ\text{E}$  longitude and 1256 m amsl., to find out the types of insect species and their peak period of incidence on honeybee (*Apis mellifera*) during July 2015 to June 2016. Five bee colonies of *A. mellifera* were selected randomly for daily observations on the species of insect enemies visiting/infesting the bee hives. These included mainly the two wasp (*V. auraria* and *V. mandarina*) species. The data on number of wasps visiting apiary per day were recorded. The incidence of wasps was correlated with weather (temperature, relative humidity and rainfall) parameters.

### Results and Discussion

Incidence of *Vespa auraria* in *A. mellifera* apiary under stationary conditions during July, 2015 to June, 2016 is presented in Table 1. The incidence of *V. auraria* was found maximum in September ( $366.23 \pm 30.38/\text{day}$ ) followed by wasp's visits in August ( $297.77 \pm 28.89/\text{day}$ ), October ( $280.69 \pm 32.62/\text{day}$ ), November ( $238.26 \pm 23.69/\text{day}$ ) and July ( $129.23 \pm 6.89/\text{day}$ ). No visits of wasps were observed during December, 2015 to March, 2016 in University apiary at Nauni.

The wasps reappeared again in April ( $1.8 \pm 0.32$ ), May ( $4.45 \pm 0.58$ ) and June ( $12.54 \pm 0.88$ ). *V. magnifica* was also noticed visiting apiary only on few occasions during October to November months at Nauni. Its visits ranged between 1 to 3 per day. Incidence of *V. auraria* showed significant positive correlation with temperature ( $r = 0.759$ ) and relative humidity ( $r = 0.665$ ).

These investigations got support from the findings of earlier workers (Kumar *et al.* 1998 and Rana *et al.* 2000) [2, 4]. They have reported maximum incidence of *V. auraria* during July to November when temperature and relative humidity was

high. A positive correlation between number of *V. auraria* and *V. mandariana* in honey bees colonies was established by Sharma and Mattu (2014) [6] with temperature and relative humidity. The present investigations are also in line with the studies conducted by Sharma *et al.* (1979) [5] and Kumar *et al.* (1998) [2] at Solan, who also noticed low incidence of *V. auraria* during June and peak in September. Similar studies were conducted by Nagaraja and Rajagopal (2003) [3], who also reported that the maximum infestation was observed during October to November in southern regions of Indian subcontinent.

**Table 1:** Incidence of *Vespa auraria* in *A. mellifera* apiary at Nauni, Solan during July, 2015 to June, 2016

Period	Wasp visits/ day (no.)	Weather parameters		
		Temperature (°C)	Relative humidity (%)	Rainfall (mm)
July, 2015	129.23 $\pm$ 6.89	24.1	79.00	294.40
August	297.77 $\pm$ 28.89	24.0	80.00	102.20
September	366.23 $\pm$ 30.38	30.4	68.00	41.60
October	280.69 $\pm$ 32.62	19.00	58.00	34.60
November	238.26 $\pm$ 23.69	15.5	57.00	7.60
December	0.00	11.00	59.00	42.50
January, 2016	0.00	10.85	56.00	4.00
February	0.00	13.05	56.00	35.60
March	0.00	16.65	55.00	87.50
April	1.8 $\pm$ 0.32	21.45	45.00	25.60
May	4.45 $\pm$ 0.58	23.65	57.00	56.50
June	12.54 $\pm$ 0.88	25.55	60.00	110.50

#### Pearson correlation Matrix (r) =

Temperature  $\times$  wasp = 0.759\*

Relative Humidity  $\times$  wasps = 0.665\*

Rainfall  $\times$  wasps = 0.176

(\* Significant at 5%)



A. *Vespa auraria*



B. *Vespa auraria* attack on *Apis mellifera*

#### Conclusion

Incidence of *Vespa auraria* was found maximum in September ( $366.23 \pm 30.38$ /day) followed by wasps visits in

August ( $297.77 \pm 28.89$ /day), October ( $280.69 \pm 32.62$ /day), November ( $238.26 \pm 23.69$ /day) and July ( $129.23 \pm 6.89$ /day). *V. magnifica* was also noticed visiting apiary only on few occasions during October to November months at Nauni. A positive correlation was established between number of *V. auraria* in *A. mellifera* colonies with temperature ( $r = 0.759$ ) and relative humidity ( $r = 0.665$ ).

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