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INSECT POLLINATOR'S FAUNA, ABUNDANCE AND THEIR FORAGING ACTIVITY ON HONEY PLANT, *AMMI MAJUS* L.

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ABSTRACT

The flowers of honey plant attracted three species of apidae, two from vespidae, formicidae and sphecidae and one species each from halictidae, eumenidae of order hymenoptera, one species from diptera and two species from lepidoptera. The mean abundance of *Apis florea* (5.53/plant/5 min) was maximum compared to other pollinators. The pollen and nectar foragers of *A. cerana*, *A. florea* and *Trigona iridipennis* showed significant fluctuation at different hours of the day.

INTRODUCTION

Honey plant is an important biennial herbaceous plant belonging to the family Umbelliferae. The plant is indigenous to Egypt and is widely distributed in Europe, Mediterranean region, Abyssinia and west Africa. It has gained recognition as an export material. The crop is grown commercially for supplying the raw materials to therapeutic industries. The seeds possess 60 per cent of the furano-coumarins. Xanthotoxin is the major component in the seeds of honey plant which increases the melanin pigment in the skin on exposure to ultra-violet rays. It is commonly used in the treatment of leucoderma or vitiligo and also in formulating suntan lotions. (Ajit singh, 1995). Plant-pollinator relationship in most of the medicinal crops revealed many research gaps that are to be filled by making use of efficient bee pollination, except some of the studies by Youngken (1950); Barbier (1958); Sajjanar (2002) and Shilpa (2006) on bee pollination in some of the medicinal and aromatic crops. Hence, the present studies were undertaken to study the relationship between the crop and the pollinators.

MATERIAL AND METHODS

The study was carried out at the herbal Garden, Division of Horticulture, Gandhi Krishi Vignana Kendra, University of Agricultural Sciences, Bangalore. Ten plants were randomly selected to record the different species of pollinators visiting the flowers of honey plant. The pollinators visiting crop were collected, preserved and identified with the help of Insect taxonomist, Dept. of Entomology. GKVK, Bangalore. The abundance of the insect pollinators and the foraging activity of honeybees visiting honey plant flowers were recorded from 0600 to 1800 h at hourly interval for five minutes during their peak flowering period and were expressed as mean number of pollinators visited per plant for five minutes.

RESULTS AND DISCUSSION

Fourteen species of insect visitors were recorded on honey plant, which included eleven species belong to order hymenoptera, one species to diptera and two species to lepidoptera. Among hymenopterans three species of apidae viz., *Apis cerana, A. florea* and *Trigona iridipennis*, two species each from formicidae (*Componatus sericeus* and *Oecophylla smargdina*), vespidae (*Ropalidai margiinata* and *Polistes stigma*) and sphecidae (*Philanthus sp*. and unidentified species).One species each from eumenidae (*Eumenes conica*) and halictidae (*Halictus sp.*) were recoded on honey plant flowers more frequently. One unidentified species from syrphidae of order diptera and one species each from pompillidae (*Pompilus sp.*) and arctidae (*Amata sp.*) of order lepidoptera were also found foraging on the

flowers of honey plant. The per cent abundance of *Apis cerana, A. florea* and *Trigona iridipennis* were 32.00, 43.21 and 14.47 respectively. Whereas per cent abundance of other pollinators was 10.32 (Table 1). The mean abundance of different pollinators visiting flowers showed the maximum intensity of *A.cerana* (5.53/plant/5 min), followed by *A. cerana* (4.08/ plant/ 5 min), *T. iridipennis* (1.85/ plant/ 5 min) and other pollinators (1.32 /plant/ 5 min) (Table 2). However, variation in number of insect visitors and their abundance on honey plant may be due to type of crop, weather conditions of the area and also availability of forage source that vary from place to place. The greater abundance by *A. florea* might be due to presence of more feral colonies of *A. florea* in the vicinity of the experimental site. Pollen and nectar foragers of *A. cerana, A. florea* and *T. iridipennis* showed significant variations at different hours of the day (Table 3). The peak pollen foragers of *A. cerana* and *A. florea* were observed at 1200 h with 7.11 and 9.65 /plant/5 min, respectively, whereas *T. iridipennis* was found abundant at 1100 h (2.51 /plant/5 min). The peak pollen foragers of different species of honeybee species were observed during late morning or mid day hours. This may be due to increased availability of pollen during morning hours and as the day progressed there will be depletion of pollen availability towards evening hours, which might have drastically reduced the number of pollen foragers. Similarly, *A. cerana* and *A. florea* showed their peak nectar foraging activity at 1200 and 1000 h with 3.03 and 3.14 /plant/5 min, respectively and *T. iridipennis* at 1100 h (1.24 /plant/5 min). Similarly, peak nectar foraging during mid day hours might be due to increased quantity of nectar with increased sugar concentration in the nectar of the flowers. Similar observation was reported by Mohan Rao and Singh (1997) on red salvia, Sajjanar (2002) on spice basil and Shilpa (2006) on chamomile.

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Table: 1 Insect pollinators and their per cent abundance of honey plant, *Ammi majus* L.

Order	Family	Species	Per cent abundance (%)
Hymenoptera	Apidae	*A. cerana indica* Fab.	32.00
		A. florea Fab.	43.21
		Trigona iridipennis Smith.	14.47
	Vespidae	*Ropalidai margiinata* L.	10.32
		Polistes stigma Fab	
	Halictidae	*Halictus sp.*	
	Sphecidae	Unidentified	
		Philanthus sp.	
	Eumenidae	*Eumenes conica De. Geer*	
	Formicidae	*Camponatus sericeus* Fab.	
		Oecophylla smargdina Smith.	
Diptera	Syrphidae	Unidentified	
Lepidoptera	Pompilidae	*Pompilus sp.*	
	Arctiidae	Amata sp.	

Table- 2: Abundance of insect pollinators visiting honey plant, *Ammi majus* L.

Time (hr)	Mean No. of Pollinators /plant /5 min			
	Apis cerana	***Apis florea***	***Trigona iridipennis***	**others**
0600	0.00 (1.19) ^{a}	0.00 (1.00) ^{a}	0.00 (1.17) ^{a}	0.00 (1.13) ^{abc}
0700	2.15 (1.19) ^{a}	3.65 (1.28) ^{ab}	0.25 (1.04) ^{a}	0.45 (1.06) ^{ab}
0800	2.30 (1.22) ^{a}	4.05 (1.61) ^{bcd}	1.05 (1.13) ^{a}	1.07 (1.12) $_{abc}$
0900	2.60 (1.44) ^{ab}	4.25 (1.71) ^{cde}	2.20 (1.56) ^{bc}	2.40 (1.22) $_{abcd}$
1000	4.70 (1.66) ^{abc}	7.52 (2.05) ^{efg}	2.67 (1.55) ^{bc}	2.27 (1.50) $_{de}$
1100	6.85 (1.83) ^{bcd}	10.27 (2.03) ^{defg}	3.75 (1.64) ^{bcd}	2.85 (1.56) $_{e}$
1200	10.15 (2.16) ^{cde}	11.20 (2.30) ^{g}	2.45 (1.66) ^{cd}	3.15 (1.60) $_{e}$
1300	8.00 (2.28) ^{de}	11.10 (2.19) ^{fg}	2.22 (1.77) ^{d}	2.35 (1.49) $_{de}$
1400	5.77 (2.65) ^{e}	7.40 (1.96) ^{cdefg}	2.45 (1.81) ^{d}	1.05 (1.42) $_{cde}$
1500	4.12 (2.24) ^{de}	4.40 (1.92) ^{cdefg}	3.10 (1.70) ^{cd}	1.22 (1.50) $_{de}$
1600	3.32 (1.85) ^{bcd}	3.30 (1.89) ^{cdef}	1.25 (1.45) ^{b}	0.35 (1.36) $_{bcde}$
1700	2.07 (1.66) ^{abc}	2.87 (1.58) ^{bc}	1.85 (1.53) ^{bc}	0.00 (1.31) $_{bcde}$
1800	1.05 (1.49) ^{ab}	1.92 (1.62) ^{bcd}	0.92 (1.44) ^{b}	0.00 (1.00) ^{a}
Mean	4.08	5.53	1.85	1.32
S.Em±	0.58	0.17	0.08	0.09
CD @ 5%	1.67	0.51	0.24	0.26

Figures in the parenthesis are $\sqrt{X+1}$ transformed values.

Means followed by same letter in a column do not differ significantly by DMRT at 5 per cent level.

Table-3: Pollen and Nectar foraging activity of honeybees on honey plant, *Ammi majus* L.

Time (hr)	Mean No. of foragers / umbel / 5 min					
	Apis cerana		*Apis florea*		*Trigona iridipennis*	
	PF	NF	PF	NF	PF	NF
0600	0.00 (1.00) [a]	0.00 (1.00) [a]	0.00 (1.22) [a]	0.00 (1.32) [ab]	0.00 (1.00) [a]	0.00 (1.00) [a]
0700	1.21 (1.12) [a]	0.90 (1.09) [a]	2.33 (1.20) [a]	1.32 (1.12) [a]	0.21 (1.02) [a]	0.00 (1.00) [a]
0800	1.21 (1.56) [bc]	1.13 (1.11) [ab]	2.51 (1.65) [b]	1.44 (1.14) [a]	1.01 (1.51) [bc]	0.00 (1.00) [a]
0900	1.62 (1.70) [c]	0.93 (1.67) [c]	3.09 (2.13) [cd]	1.14 (1.36) [ab]	1.53 (1.59) [cd]	0.60 (1.45) [abc]
1000	2.65 (2.24) [ef]	2.03 (1.78) [cd]	4.35 (2.11) [cd]	3.14 (1.57) [bc]	1.52 (1.69) [cd]	1.14 (2.02) [de]
1100	4.21 (2.47) [g]	2.65 (2.03) [de]	8.24 (2.32) [de]	2.03 (1.62) [bcd]	2.51 (1.77) [e]	1.24 (1.67) [bcd]
1200	7.11 (2.97) [h]	3.03 (2.26) [e]	9.65 (2.50) [e]	1.56 (1.92) [cde]	1.36 (1.79) [e]	1.12 (1.95) [cde]
1300	5.53 (2.54) [g]	2.25 (2.08) [de]	9.14 (2.30) [de]	1.83 (1.93) [de]	1.45 (1.58) [cd]	0.75 (1.92) [cde]
1400	4.23 (2.39) [fg]	1.43 (2.14) [e]	5.23 (2.05) [cd]	2.11 (2.14) [e]	1.51 (1.63) [d]	1.00 (2.04) [de]
1500	2.85 (2.21) [de]	1.14 (2.20) [e]	3.19 (2.01) [cd]	1.15 (2.08) [e]	1.27 (1.43) [b]	1.05 (2.04) [de]
1600	2.26 (2.06) [d]	1.04 (2.06) [de]	2.26 (1.84) [bc]	1.01 (1.87) [cde]	1.27 (1.58) [cd]	0.00 (2.19) [e]
1700	2.03 (1.61) [bc]	0.00 (1.78) [cd]	2.50 (1.58) [b]	0.00 (1.37) [ab]	1.76 (1.62) [d]	0.00 (1.75) [bcde]
1800	1.00 (1.52) [b]	0.00 (1.44) [bc]	1.55 (1.15) [a]	0.00 (1.41) [ab]	0.86 (1.51) [bc]	0.00 (1.36) [ab]
Mean	2.76	1.27	4.16	1.29	1.25	0.53
S.Em±	0.01	0.01	0.01	0.01	0.01	0.01
CD @ 5%	0.05	0.02	0.03	0.02	0.03	0.04

Note: PF- Pollen foragers, NF- Nectar foragers

Figures in the parenthesis are $\sqrt{X+1}$ transformed values.

Means followed by same letter in a column do not differ significantly by DMRT at 5 per cent level.