

Pollen hosts preference and the relation between their foraging activity as well as climatic factors in *Apis mellifera*

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Abstract

Each bee species has its particular ecological threshold level, below which no activity can take place. The ecological threshold is required for normal activity of bee species. It differs inter and intra-specifically depending upon level of adaptability of a species in a given environment. Jain and Dhingra (1995) found that for *Apis mellifera*, threshold approached at an 18.5°C and for light intensity between 800-5000 lux. Verma and Daulta (1986) reported that peak foraging activity for *A.C. indica* occurred at 0900-1130h when temperature was 21°C and 25°C. Jain (1985) concluded from his studies that various bee species respond differently to a host plant on the basis of quality and quantity of nectar and their morphological adaptations. He further reported that flower preferences also depend upon the feeding history of a bee species during larval as well as adult stage.

Keyword-flower, larval, feeding, cepa, blooming, *Apis*, nectar

Material and methods

The observations on population dynamics of bee foragers and pollen collectors were carried out on some oil crops, such as *Brassica campestris* var. toria, *Brassica juncea* var. yellow sarson, *Helianthus annuus* (Sunflower) and two vegetable crops i.e. *Raphanus sativus* (Radish) and *Allium cepa* (onion) grown for seed purpose involving *A.mellifera*. Direct counts of the number of foragers and the pollen collectors visiting a crop were made for 2-3 different days at an interval of 5-7 days during major blooming period. Each day observations were made on these crops at an hour interval between 08:00h in winter and from 07:00h to 19:00h in summer months for these observations four different plots, each measuring to 2sqm were randomly taken and bee counts were extrapolated as number of bees per 100sqm area. Data on ambient temperature and relative humidity were also monitored.

Result

The meteorological conditions i.e. the maximum day temperature (°C) and morning relative humidity (%) prevailed during the respective blooming periods of various crops also recorded. The maximum day temperature was at the lowest in the month of January and February (12°C) and it went high up to 45°C in the month of April and May. The morning humidity was at minimum in the month of April (29%) and maximum in the month of December to February (96.5%). Data in depicts highest foraging of *A.mellifera* on *H.annuus* and their number reached at maximum around 12:00h (1558bees/ 100sqm) but they were mostly the nectar collectors. Pollen collectors were only up to 21 at 07:00h as their number decreased to nil at 10:00h. On *B.juncea* var. yellow sarson viz. was visited only 221 bees/100sqm at 11:00h, *R.sativus* crop was least foraged (29 bees/100sqm) but per cent pollen collectors were maximum on this crop (100% at 12:00h) and on *B.campestris* var. toria crop (100% around noon), followed by *B.juncea* var. yellow sarson at 12:00h. *A.cepa* flowers were not

preferred by *A.mellifera*. No forager was observed on this crop. Foragers showed bimodal activity on *H.annus* and *B.campestris* var. toria, while on others it had been unimodal pattern of activity. Data clearly evident that *B.juncea* var. yellow sarson was preferred by *A.mellifera* bees. *H.annus* crop was visited maximum by *A.mellifera* bees for nectar, but prove least preferred as pollen source.

Similarly Highest number of *A.mellifera* foragers was also evident on *H.annus* plants, but its pollen was least preferred. *A.cepa* flowers were also not at all visited by this species.

Discussion

. Highest number of *A.mellifera* foragers was also evident on *H.annus* plants but its pollen was least preferred. *A.cepa* flowers were also not at all visited by this specie It is concluded that *B.campestris* var. toria and *R.sativus* were more preferred crops; in this area while *B.juncea* var. yellow sarson was intermediately preferred; *A.cepa* crop being less preferred and *H.annus* as a non-preferred pollen source. Flower preference for pollen in bees is not uncommon (Corbat et al., 1984). Moezel *et al.*. (1987) showed that among a total of 44 species exploited by honeybees for pollen only a few like Leucopagan and Acacia species were abundantly visited with high degree of constancy during foraging forays by individual bees. In these study, during the peak hours of bee activity on *B.campestris* var. toria, 100 per cent *A.mellifera* bees were observed collecting pollen while Langridge and Goodman (1975) observed 72 per cent of honey bees collected nectar only, 25 per cent collected nectar and pollen, and only 3 per cent collected pollen. Singh (1996) observed up to 85 per cent pollen collectors during peak hours of *A.mellifera* activity. *B.campestris* var. toria was mostly collected between 10:00h and 14:00h (Mohr and Jay, 1988). It is well established fact that *H.annus* flowers in general are less preferred by honeybees for pollen collection (Jain, 1992). It has also been found true in this study. A few *A.mellifera* cultivars such as Africanized honeybees have reported to collected significantly larger proportion of sunflower pollen than European honeybees (Basualdo et al., 2000). Jain (1992) also made a comparative study of various honeybee species visiting alfalfa and sunflower, and reported that in summer, on sunflower only *A.mellifera* visited and alfalfa by all the three *Apis* species for nectar. The fact that *A.mellifera* colonies experienced serves loss to brood and pollen stocks on these sunflower and alfalfa crops also indicate their least preference for their pollen (Jain, 1992). Schmidt et al. (1995) however reported sunflower pollen readily consumed by young *A.mellifera* bees on feeding in cages. In this study *A.cepa* flowers were least visited by *A.mellifera*. In these study, during the peak hours of bee activity on *B.campestris* var. toria, 100 per cent *A.mellifera* bees were observed collecting pollen

Summary

The observation on population dynamics of bee foragers and pollen collectors of, *A.mellifera* were carried out on some oil crops, such as *Brassica campestris* var. toria, *Brassica juncea* var. yellow sarson, *Helianthus annus* (sunflower) and two vegetable crops i.e. *Raphanus sativus* (radish) and *Allium cepa* (onion) grown for seed purpose. Direct counts of the number of foragers and the pollen collectors visiting a crop were made during major blooming period. Data on ambient temperature and relative humidity were also monitored. Highest number of *A.mellifera* foragers was also evident on *H.annus* plants, but its pollen was least preferred. *A.cepa* flowers were also not at all visited by this species.

Table 1: Diurnal foraging pattern of *A.mellifera* on different plant species (Total foragers/100m²).

Plant Species	Day Time(h)						Mean
	08:00	10:00	12:00	14:00	16:00	18:00	
<i>B.campestris</i>	0	165	25	29	46	13	36
Var. toria (22)	(0)*	(165)	(25)	(29)	(46)	(13)	(36)
<i>B.campestris</i>	0	200	213	171	104	0	95
Var. Yellow (44) sarson	(0)	(125)	(113)	(171)	(104)	(0)	(95)
<i>R.sativus</i>	0	8	29	12	4	0	8
(0) (4)	(0)	(8)	(29)	(12)	(4)	(0)	(8)
<i>A.cepa</i>	No foragers						
<i>H.annus</i>	629	933	1558	1316	1220	1237	
1091 (2)	(0)	(8)	(0)	(0)	(0)	(0)	(0)

*Per cent pollen collector.

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