Preference of *Apis florea* for pollen hosts and the relation between their foraging activity and climatic factors

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Abstract

Various environmental factors influenced the foraging activity of bees (Ribbands, 1993; Johanson and Mayer, 1987). There are various factors such as temperature, light intensity, rain, wind, and time of day influencing foraging activity. Kapil and Jain (1980) observed that air temperature acts as an influencing factor to initiate bee activity but cessation was independent of air temperature. The suitability of atmosphere temperature coupled with relative humidity and light intensity not only favoured the initiation but also leads to maxima in bee activity. 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 In *Apis mellifera* foraging started at temperature of 15°C-18°C and 80-82 per cent relative humidity (Kapil and Brar, 1971). Abady (1975) reported that commencement of flight each day was determined by the time of sunshine and the temperature, interacting in a complex fashion. Sihaag and Aborl (1986) reported that two mutually inter related factors viz. relative humidity and solar radiation has greatest direct effects or appericiable indirect effects.

Keywords :*Apis florea,*foraging,humidity,foragers,species,diurnal

Materials 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 three *Apis species* viz. *A.florea,.* 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 2 sq m were randomly taken and bee counts were extrapolated as number of bees per 100 sq m area. Data on ambient temperature and relative humidity were also monitored.

RESULTS

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%).

Diurnal foraging pattern of *A.florea* on different crops showed the general activity remained highest on *B.campestris* var. toria, following by *R.sativus.* On *B.campestris* var. toria flowers, their number reached at maximum around midday (12:00h, 1604 bees/ 100 sqm) but on *R.sativus* flowers it attained maximum activity around 11:00 h (845 bees/ 100sqm). Other crops were relatively much less attractive as evident from their population density on these crops, i.e. *A.cepa* attracted up to 63 bees /100sqm and *B.campestris* var. yellow sarson up to 54 bees / 100sqm. The number of pollen collectors on per unit area on these crops was direct indication of their preferences for pollen on *B.campestris* var. toria flowers, pollen collection started after 09:00h and all the foragers visiting these flowers were found gathering pollen during 11:00 h 12:00h. The percent pollen collectors decreased thereafter 16:00 h only 45 per cent foragers were found collecting *B.compestris* var. toria pollen. No pollen collector was observed at 17:00h. Likewise on *R.sativus* flowers maximum pollen collection was evident on *A.cepa* and *B.campestris* var. yellow sarson flowers. Sun flowers pollen was collected by a few bees only in the morning up to 10:00h. Bees showed bimodal activity on *R.sativus* and *A.cepa* while on *B.campestris* var. toria and *B.juneca* var. yellow sarson, the pattern of activity was unimodal, it was due to temperature differences in winter and summer months.

Discussion

Present study carried out with six plants species including oil seed crops and a few vegetables crops blooming simultaneously revealed that *A.florea* showed differences in pollen preference for these plant species. *A.florea* showed highest preference of *B.campestris* var. toria and *R.sativus* pollen and least for *A.cepa* pollen.. 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). Morphometric comparisions of all pollen pallet types in this study also showed 100percent of the pollen representing only a single plant species, indicating individual worker consistency in honeybees 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.This study also revealed similar results. Other workers also reported different

foraging preferences of *Apis* species on toria. Murrell and Nash (1981) in Bangladesh recorded a thesis in the early morning and crop was dominated with *A.cerana* bees.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.melifera* 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.melifera* visited and alfalfa by all the three *Apis* species for nectar. Bees with sunflower pollen loads, which they collected incidentaly or deliberatrly, were most frequent early in the day, probably associated with the time of anther dehiscence, as also mentioned by some other workers (fell, 1986., Toit, 1988). A florae bees were negligible in number were without pollen pallets. Palacio (1987) suggested that preference for pollen may be inherited or can be increased by breeding. Differential flower preference for pollen by the *Apis* species further suggests some kind of special adaptions or conditioning for selecting a pollen host.

Summary

The observation on population dynamics of bee foragers and pollen collectors of *A.florea* 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 colletors visiting a crop were made during major blooming period. Data on ambient temperature and relative humidity were also monitored. The general activity of *A.florea* remained highest on *B.compestris* var. toria following by *R.sativus.* The *Apis* species showed differences in pollen preferences for these plant species. *A.florea* showed highest preference for *B.campestris* var. toria and *R.sativus* pollen and least for *A.cepa* pollen.

References

Kapil, R.P. and Kumar., S. (1975) Foraging activity of *Apis dorsata* fab on *Brassica juneca.* Hook and Thoms. J.Bombay Nat. Hist. Soc. 71:327-331.

Langridge, D.F. and Goodman, R.D. (1975) A study on pollination of oil seed rape *(Brassica campestris) Aus. J. Exp. Agric. Anim. Husb.* 17:319-322.

Abady, A.R.B. (1975) Measurement of flight activity of foraging behavior in relation to weather for different races of honeybees, using an automatically recording scale hive. German federal Republic.p.85.

Corbet, S.A., Kesslake, C.J.C.,Brown, D., Morland, N.E.(1984) can bees select nectar rich flower in a patch. *J.Apic Res 23:*234-242.

Fell, R.D. (1986) Foraging behavior of *Apis mellihera L.* and Bombus sp. On the oil seed sunflower *(Helianthus annus L.) J.Lans Ent. Soc.59(1):* 72-81.

Jain, K.L. (1992) Pollen collection activity of honeybees in alfalfa and sunflower seed crops in semitropical region. Forage Res. 18: 140-144.

Jain, K.L. (1985) Analysis of nectar as a factor determining bee flower relationship, Ph.D. Thesis. Haryana Argic. Univ. Hisar, 168pp.

Johanson, C.A. and Mayer, D.F. (1987) Observation on honeybee foraging behavior. Am. Bee. J.127:194-196.

Kapil, R.P. and Jain , K.L. (1980). Biology and utilization of insect pollination for crop production .Final tech. Report. Hisar : Haryana Agric. Univ. press. P.80.

Kumar,J., Mishra, R.C., Gupta , J.K. (1985) The effect mode of pollination on Allium species with observation on insects as pollinator*. J.Apic Res 11*:175-180.

Langridge, D.F. and Goodman, R.D. (1975) A study on pollination of oil seed rape *(Brassica campestris) Aus. J. Exp. Agric. Anim. Husb.* 17:319-322.

Moezel, G. Vander, Delfs , J.C. Plati, J.S., Loneragan, W.A., Bell, D.T. (1987) Pollen Selection by honeybees in Shrublands of the Northen sand plains of Western Australia *J.Apic. Res. 26(4):* 224-232.

Mohar, N.A. and Jay, S.C.(1998) Nectar and pollen collecting behavior of honeybees on canola *(Brassica campestris L) J.Apic Res. 27:*131-136.

Murrell, D.C. and Nash, W.T. (1981) Nectar secretion by toria *(Brassica campestris L. V. toria)* and foraging behavior of three *Apis* species on toria in Bangladesh. *J.Apic Res. 2:* 34-38.

Palacio, M.A. (1987) Estudio de la relation plants pollinzador para la production de semilla de trebol roja *(Triflium pretense L.)* en S.E. de la provincial de Buenos Aires. Tesis para obtender el tituol de ingeniero, Agronomo Agrosis, UNMDP, Balcarce, Argentina.

Schmdit, L.S., Schmidt, J.O., Rao, H., Wang, W., Ligen, X.U.(1995) Feeding Preference and survival of young worker honeybees (Hymenoptera : Apiadae) Fed rape, sesame and sunflower pollen. *J.Econ. Entomol. 88 (6):* 1591-1595.

Sihag, R.C. (1984) Influence of environmental factors on the pollination activity of bees. *Environ. Eco 2:* 149-152.

Singh, S. (1996) Qualitative analysis of pollen as a factor determining flower preferences in honey bees. M.S.c. Thesis CCS Haryana Agriculture University, Hisar, p.106.

Basualdo, M., Bedascarrasbure , E., De jong , D.(2000) Africanized honeybees (*Hymenoptera: Apiadae)* have a greater fidelity to sunflowers than European bees J. Econ, Entomol. 93(2): 304-307.