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## Research Article

### STATUS OF SWEET BASIL AS BEE FLORA

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#### ABSTRACT

To promote beekeeping as an income generating activity more colonies of bees are required so that increased yield of hive products can be obtained. *Apis* species are major pollinators and help to increase yield of various crops significantly. Populations of wild honeybees will have to maintain along with domesticated *Apis mellifera*. For the survival of large number of bee colonies, large amount of bee forage is required. So plants which provide surplus nectar and pollen, as well as those which provide floral rewards during dearth periods should be identified, planted and propagated. Study revealed that *Ocimum basilicum* was an excellent floral resource which provided both pollen as well as nectar during periods of floral scarcity. Foraging intensity of honeybees showed that they had strong attraction towards experimental plant and foraging frequency indicated availability of more amount of nectar and pollen in its flowers. Investigation of foraging behaviour of *A. mellifera* and *A. cerana* on bloom of plant under study confirmed it as an excellent bee flora of dearth periods as well as in general.

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#### INTRODUCTION

Honeybees depend upon flowering plants for their food requirements. Nectar and pollen are offered as a reward by plants for biotic pollinating agents (Reddy *et al.*, 1992) Nectar is most common type of floral reward furnished by animal pollinated plants to their mutualistic partners (Simpson and Neff, 1983). Presence of floral dearth periods is major problem in beekeeping under Punjab conditions. Every ecosystem has periods of floral scarcity of long or short duration which cause dwindling and desertion of bee colonies. To run apicultural industry efficiently and conserve wild honeybee fauna regular supply of pollen and nectar must be ensured, which are the raw materials for various types of honeybees. It is important to enhance the knowledge about honeybee flora in a particular area for the production of surplus honey, increasing carrying capacity of the area in terms of number of bee colonies of different *Apis* species it can sustain and to meet lean period needs during summer and winter.

Characteristics of vegetation of a given area are considered to be important indicators of its potential for beekeeping. Honeybees do not visit all types of plants for foraging, identification of bee plants and assessing their abundance, their value to bees, season of blooming and flowering duration have a paramount importance for beekeeping management technology and in assessing the potential of an area for beekeeping (Nuru and Hepburn, 2001 and Amssalu, 2004). The

success of beekeeping in the country depends not only on using better strains of bees but also on the abundance and richness of nectar and pollen sources around the apiary (Mattu *et al.*, 1989) as apiculture is floral based industry (Crane, 1990). Plant types and their flowering duration differ from one place to other due to variation in topography, climate and farming practices. So identification of bee plants, plant communities and the knowledge of relationship between bee plants and honeybees is of considerable importance for practical management of honeybees (Amsalu, 2006) in the particular area.

Such research is an important tool that indicates to the beekeepers; the approximate date and duration of blossoming periods of the important honey and pollen plants (Haftom *et al.*, 2012).

One of pollen and nectar providing plants which blooms throughout the year except April, May and December under Punjab conditions is *Ocimum basilicum* which belongs to mint family (Lamiaceae). It is also called "King of Herbs" or the "Royal herb". It is well known for its sweet aroma and special flavor. Basil grows from 30-130cm tall, with opposite, light green, silky leaves. The flowers are small, white in colour and arranged in a terminal spike. After entomophilous pollination, the corolla falls off and four round achenes develop inside the bilabiate calyx. It is sensitive to cold and shows the best growth in hot and dry conditions.

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The main aim of the study was to investigate foraging behaviour of *Apis* species (*A. mellifera* and *A. cerana*) on *Ocimum basilicum* to know its value as bee flora. The expected outcome may enhance the knowledge about foraging behaviour of *Apis* species, management of bee flora, migratory beekeeping, floral calendar and apiculture in general.

## MATERIALS AND METHODS

*Ocimum basilicum* plants were grown near an already running apiary of *A. mellifera* under Punjab conditions. *A. cerana* was visiting the bloom from its natural habitat. Experiments were performed during October to December in 2016. Abundance of the bees (number of bees/m<sup>2</sup>/min) of different types honeybees was noted at fixed hours of day with the help of meter rod and stop clock. Number of flowers visited per minute (foraging frequency) by both the bee species was also noted separately. Initiation and cessation time of bees foraging on experimental bloom was also recorded. Observations of windy days were recorded separately. Data collected were consolidated, analyzed statistically, results were calculated and conclusions were drawn.

## RESULTS AND DISCUSSION

*A. mellifera* and *A. cerana* ( Fig.1&2) started their foraging activity at about 900 and 1030 hours in the morning while their cessation time was 1645 and 1715 hours respectively. *A. cerana* commenced foraging earlier in the morning as compared to *A. mellifera* while the later species worked upto more time in the evening.



Figure 1 *Apis mellifera* pollen forager on *Ocimum basilicum* bloom

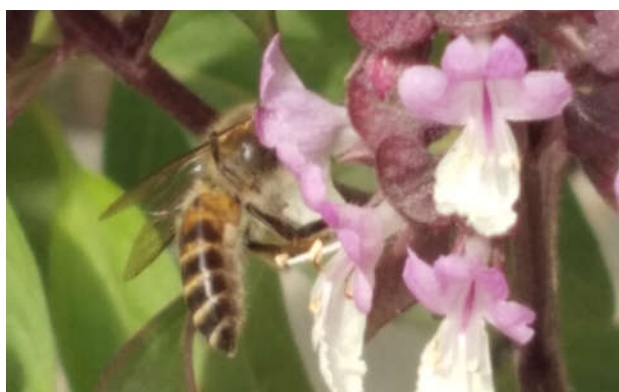


Figure 2 *Apis cerana* forager on *Ocimum basilicum* bloom.

Similar type of information have been reported by many workers (Kapil *et al.* 1971; Dorothy *et al.*, 1981 Bhalla. *et al.*,

1983a) on *Brassica* crops that *A. cerana* began foraging at 900-1000 hours and ceased by 1700h on bloom of *Brassica campestris* var. Toria. Thakur *et al.* (1982) also noticed that *A. cerana* showed considerable activity during morning hours while *A. mellifera* picked up the activity by 1000-1030 hours and remained active till late evening on *Brassica* bloom.

Average abundance of *A. mellifera* and *A. cerana* on bloom of *O. basilicum* was  $5.83 \pm 1.07$  and  $5.67 \pm 1.09$  bees/ m<sup>2</sup>/min., while maximum number of bees per square meter per minute was found  $6.26 \pm 1.34$  (at 1215-1315h) and  $4.16 \pm 0.31$  (at 1115-1315h), respectively (Fig.3). Peak foraging activity is determined by time related floral physiology of plant, environmental factors and innate responses of different honey bee species. Day hours also control foraging behaviour directly or indirectly. Need of colony is also a basic factor in this respect (Synge, 1947; Ribands, 1953 and Percival, 1965). Foraging frequency (number of flowers visited per minute) of pollen foragers of *A. mellifera* and *A. cerana* was  $8.5 \pm 1.03$  and  $9.4 \pm 1.25$  while that nectar gatherers was  $13.3 \pm 1.43$  and  $14.2 \pm 1.87$  flowers/min respectively.

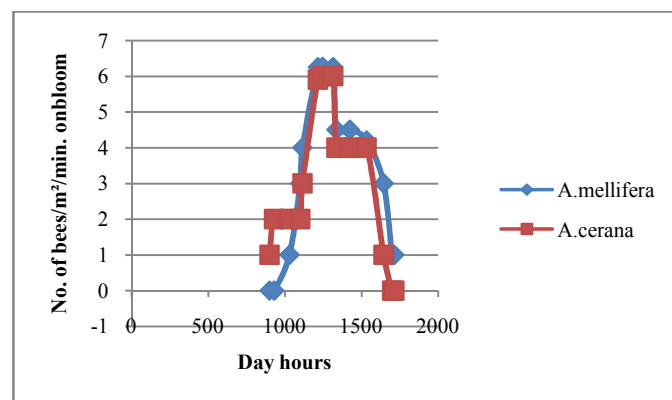


Figure 3 Relative abundance of *Apis* species on bloom of experimental plants at different day hours

Foraging rate of *A. cerana* was more than that of *A. mellifera* however difference was not significant statistically. These findings are in line with the observations taken by Desh Raj and Rana (1994) on *Brassica* crops. Foraging speed varied among different bee species (Gupta *et al.*, 1984).

Foraging rate of pollen collecting bees was lesser as compared to that of nectar gatherers. Similar types of results were shown by many workers (Mishra *et al.* 1988; Adegas and Nogueira, 1992) on *Brassica campestris*.

Foraging speed or foraging rate depends upon instinct foraging behaviour of insect and floral structure of crop concerned (Free, 1970), particularly corolla depth (Gilbert, 1980). Foraging frequency is a trade between the amount of nectar or pollen expected from a flower and time required to take it. More are rewards available more will be the time spent per flower. This parameter might be affected by length of proboscis (Inouge, 1980) Foraging rate also depends on type of floral rewards (working for nectar and/or pollen), bloom condition and density of flowers of particular cultivar.

Study also revealed that on windy days abundance and foraging frequency of forager bees decreased significantly. Similar type of results were shown by many workers (Wilson, 1926; 1929 and Free, 1960) that adverse weather conditions decreased abundance and foraging frequency of bees on various crops.

## CONCLUSION

It may be concluded from results and discussion that *O. basilicum* was good source of pollen and nectar. Its plantation in suggested in kitchen gardens, schools, religious places, farm houses, parks, in and around the apiaries not only for bees but also for its sweet fragrance, spice properties and medicinal value. It provided forage to honeybees during periods of floral scarcity. It is an excellent subsistence bee flora. Recommendations of study if followed will help in improving beekeeping carrying capacity of the particular area, filling floral dearth gaps, managing bee fauna and making beekeeping more profitable. The study will go in the long way to improve bee flora in the concerned ecosystems, honeybee management technology and conserve domesticated as well as wild honeybees.

## References

- Adegas, J.E.B. and Nogueira C., R.H. (1992) Entomophilous pollination in rape (*Brassica napus* L. var. *oleifera*) in Brazil. *Apidologie* 23:203-209.
- Amssalu, B. (2006) Seasonal intensity of flowering and pollen-forage selectivity by honeybees, *Apis mellifera* in central highlands of Ethiopia. Proceeding of the 14<sup>th</sup> annual conference of the Ethiopian Society of Animal production (ESAP) held in Addis Ababa, Ethiopia. Part II. Technical Papers, Addis Ababa, Ethiopia. pp 3-10.
- Amssalu, B., Nuru, A., Radolff, S.E. and Hepburn H.R. (2004) Multivariate morphometric analysis of honeybees in the Ethiopian region. *Apidologie*, 35.
- Bhalla, O.P., Verma, A.K. and Dhaliwal, H.S. (1983a). Insect visitors of mustard bloom (*Brassica campestris* var. sarson), their number and foraging behaviour under mid hill conditions. *J Entomol. Res.*, 7: 15-17.
- Crane, E. (1990) Bees and beekeeping: Science practice and world resource. Henemann News, Hally court Jordan Hill 0X28 Ej.
- Desh, Raj and Rana, V.K (1994) Time spent by *Apis mellifera* L. and *Apis cerana indica*. Proc. II<sup>nd</sup>. Internat. Conf. Apic. Trop. Clim., New Delhi pp 513 -527.
- Dorothy, C., Murrell, J and William, T.N. (1981). Nectar secretion by toria (*Brassica campestris* L. var toria) and foraging behaviour of three *Apis* species on toria in Bangladesh *J. Apic. Res.* 20: 34-38.
- Free, J.B. (1960). The pollination of fruit trees. *Bee wld.* 41: 141-196.
- Free, J.B. (1970) insect pollination of crop plants. Academic press, London and New York.
- Gilbert, F.S. (1980) flower visiting by hoverflies (Syrphidae). *Ann. Rev. Ecol. Syst.* 6: 139-170.
- Gupta, J.K., Mishra, R.C. and Kumar, J. (1984). Nectar surgar production and honeybee foraging activity in different cultivars of cauliflower, *Brassica oleracea* var. botrytis, *Indian Bee J.* 46: 21-22.
- Haftom, G.N., Zelealem, T.G. and Girmay, M.W. (2012) Honeybee flora and floral calendar of northen Ethiopia. LAP LAMBERT Academic publishing GmbH and Co. KG and licensors. ISBN: 978-3-8473-7729-0. 89 pp.
- Inouge (1980). The effect of proboscis and corolla tube lengths on patterns and rates of flower visitation by bumble bees. *Oecologia*, 45: 197-201.
- Kapil, R.P., Grewal, G.S and Atwal, A.S. (1971). Insect pollinators of rapeseed and mustard. *Indian J. Ent.* 33: 61-66.
- Mattu, V.K., Mattu, N., Verma, L.R. and Lakhanpal T.N. (1989) pollen spectrum of honeys from *A. cerana* colonies in Himachal Pradesh, India. International conference on apiculture in Tropical climate, Cario. 146-153.
- Mishra, R.C., Kumar, J. and Gupta, J.K. (1988). The effect of mode of pollination on yield and oil potential of *Brassica campestris* L. var sarson with observations on insect pollinators. *J. Apic. Res.* 27 : 186-189.
- Nuru, A. and Hepburn, H.R. (2001) Pollen grains of some poisonous bee plants of Ethiopia. Proceeding of the 37<sup>th</sup> International Apiculture congress, Durban, South Africa.
- Percival, M.S. (1965). Floral biology. Oxford, Pergamon Press London, U.K., 544.
- Reddy, T.B., Rangaiah, K., Reddi, E.U.B. and Reddi, C.B. (1992) Consequences of nectar robbing in the pollination ecology of *Vitex negundo* (verbinaceae). *Curr. Sci.*, 62(10) 690-691.
- Ribbons, C.R. (1953) The behaviour and social life of honeybees London, IBRA: Dover publication Inc., N.Y., 352.
- Simpson, B.B. and Neff, J.L. (1983) Evolution and diversity of floral rewards. In Handbook of experimental pollination biology (eds Jone, C.E. and Little, R.J.), Van Nostrand Reinhold, New York, pp 117 – 141.
- Syngé, A.D. (1947) Pollen collection by honeybees (*Apis mellifera*). *J. Anim. Ecol.* 16: 122-138.
- Thakur, A.K., Sharma, O.P., Garg, R. and Dogra G.S. (1982) Comparative studies on foraging behaviour of *Apis mellifera* and *A.cerana Indica* on mustard, *Indian Bee J.* 44 : 91-91.
- Wilson, G.F. (1926) Insect visitors of fruit blossoms. *J. Res. Hort. Soc.* 51: 225-251.
- Wilson, G.F. (1929) Pollination of hardy fruit: insect visitors of fruit blossoms. *Ann. Appl. Biol.* 16: 602-629.

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