

Research Note**FORAGING PREFERENCE OF *Apis cerana* F. AND *Apis mellifera* L. TO BROCCOLI UNDER CAGED AND OPEN CONDITIONS IN CHITWAN****F. R. Devkota¹ and R. B. Thapa²**¹Agriculture Development Office, Dailekh and²Institute of Agriculture and Animal Sciences, Rampur, Chitwan, Nepal**ABSTRACT**

A study was conducted to evaluate foraging behavior of *Apis cerana* F. and *Apis mellifera* L. in broccoli blooms under caged and open conditions in Chitwan, Nepal during 1999-2000. The study showed that both the bee species preferred open plot for foraging and *A. cerana* F. foraged significantly ($P < 0.05$) higher number of broccoli flowers (an average of 11.39 and 12.11 flowers per minute) as compared to *A. mellifera* L. (an average of 9.03 and 10.89 flowers per minute) under caged and open conditions, respectively. The number of bees foraging per plant was not significantly different, showing broccoli bloom equally preferable to both honeybee species.

Key words: *Apis cerana* F., *A. mellifera* L., foraging, broccoli blooms, open and caged plots

INTRODUCTION

Both the honeybees, *Apis cerana* F. and *A. mellifera* L. are the major pollinators of cole crops, including broccoli (*Brassica oleracea* var. *italica* Plenck.) (Mcgregore, 1976; Devkota, 2000). Scientists often compare the impact of insect pollination of crops including honeybee pollination with the naturally open pollination by using mosquito net cages (Partap, 1999). But, question arises among research workers whether the foraging and pollination activity or efficiency of honeybee differs under such artificially controlled and natural conditions. This study attempts to compare foraging activities of the two species of honeybees (*A. cerana* F. and *A. mellifera* L.) in broccoli crop under caged and open conditions of inner terai, Chitwan, Nepal.

MATERIALS AND METHODS

The study was conducted in inner terai i.e. Chitwan valley during 1999-2000. Twenty four broccoli saplings were grown in each plot (10 m² size) replicating four times (16 plots in four blocks) using RCB design and two species of honeybees- *A. mellifera* L. and *A. cerana* F. (each colony with two framed broods) were evaluated for pollination under open and caged conditions. When the crop started anthesis (on January 22, 2000), the plots were covered with mosquito nets (4 m x 2.5 m x 2.5 m), honeybee colonies were placed on the respective experimental plots starting from initial blooming to final sesasion and observations recorded on foraging activities- time spent by bees per flower and number of flowers visited by bees per minute using electronic stopwatch. Comparative analysis was performed on foraging activities of the two honeybee species under caged and open conditions using MSTAT-C software package.

RESULTS AND DISCUSSION

The two bee species (*A. cerana* and *A. mellifera*) differed significantly ($P < 0.05$) on the number of flower visits per minute (Table 1). Native bee (*A. cerana*) showed higher flower visiting efficiency as compared to European bee (*A. mellifera*). The average number of flower visited by a cerana bee was 11.387 and 12.107 per minute as compared to 9.033 and 10.889 flowers per minute by *A. mellifera* under caged and open conditions, respectively. Both the species showed lesser flower visiting frequency under caged conditions as compared to open conditions as indicated by higher numbers of bees visiting more flowers in open than in caged plots. However, *A. cerana* showed higher foraging efficiency both under caged and open conditions. Thus, *A. cerana* seems an efficient pollinator of broccoli crop under Chitwan condition.

The number of bees foraging per plant was not significantly different in these two species, clearly indicated that the broccoli crop was equally preferable floral resource to both of the species. Maximum foraging efficiency was observed between 30-80% blooming stage while it was minimum for both of the species under open

conditions, while slight deviation was observed under caged conditions, in which irregular fluctuations were observed for foraging activity of both of the bee species (Figure 1). The higher number of bees foraging per plant at the terminal stage of the crop bloom under caged conditions was probably due to starvation with scarcity of food source. A number of factors are involved to affect the presence of bees for floral rewards and has been observed significantly different to different interval of day and stages of flowering (Aly and Hassan, 1999). Sharma (2000) also reported that apple blooms were more attractive to *A. cerana* than to *A. mellifera*. The finding is in agreement with observation of Verma (1992) and Partap and Partap (1997) that *A. cerana* started foraging earlier and showed higher foraging efficiency both under caged and open conditions.

Table 1. Foraging broccoli flowers by *A. cerana* and *A. mellifera* under caged and open conditions in Chitwan

Parameter	<i>Apis cerana</i>		<i>Apis mellifera</i>		Grand mean	C.V. (%)
	caged	open	caged	open		
Average number of flowers visited per minute	11.387 ab	12.107 a	9.033 c	10.887 b	10.853	8.66
Average time spent per flower	3.950 a	4.013 b	6.507 a	6.410 a	5.220	3.99
Average number of bees per plant	4.240 a	1.697 b	5.797 a	2.253 b	2.497	43.29

Figures in rows with same letters are not significantly different at 5% level by LSD (the number of observation for each parameter, n=120)

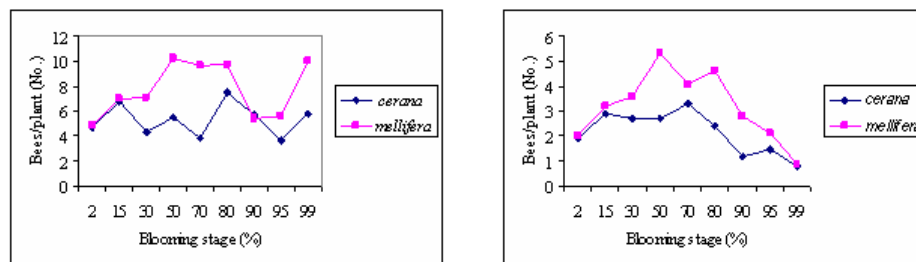


Figure 1. Number of bees foraging per plant with respect to blooming stage under caged (left) and open (right) field conditions

From the study it is clear that the broccoli blooms are preferable to both of the bee species, *A. cerana* and *A. mellifera*. Although, both of the bee species showed a slight deviations in their foraging activities in cage, the overall foraging trend was similar under caged and open conditions, with higher pollination efficiency of *A. cerana* in open as well as under caged conditions, and thus *A. cerana* seems an efficient pollinator of broccoli crop under Chitwan condition.

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