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## Visitation time of *Apis cerana Indica* on some important flowers.

S.PUSHPALATHA, Assistant Professor, Department Entomology, Faculty of Agriculture,

Annamalai University. Entopushpa1@gmail.com

### Abstract

Honey bees visitation rates by counting how many flowers inflorescences were probed per unit time for 3 plant species like Shoe flowers, Sunflowers, cow pea etc., additionally. We made a census of the bees diversity on the studied plant species Honey bees managed pollinated was very speedy (13.4 flowers/ minutes) when compared to the other non-Apidae bees (4.3 flowers/minutes). Our census showed that the plants attracted range of insects, with the honey bees as the most abundant visitors(34%). Therefore, rate differences can't be explained by particular specializations. Lastly, we discuss potential implications of our conclusions for pollination. The ability to use and learn colour to optimally discriminate profitable food sources from inefficient ones is prerequisite for an efficient foraging strategy. The study validates the reported foraging strategies of bees based on colour stimulus, energetic value, handling time, flow rate and flight distances between flowers.

Key words: Indian honey bee, Various flowers, visiting time.

### Introduction

Many factors, both plant and insects centred can affect pollination. From the plant perspective, these may includes quality, quantity and comporal/spatial variation of pollen production and the receptivity of the stigma because bees' pollination is a generally indirect effect of foraging behaviour (with some well-known expectations). Plants have also evolved adaptations that influence pollinating bees, such as providing rewards, developing nectar guides to help direct pollinator movement and placing the rewards so that pollinator must contact the stamens or stigma. In addition, pollinating that effect their efficacy as pollinators, such as how much pollen they typically collect on their bodies and their degree of flowers constancy. Another important factor contributing in pollination is the movement of pollinators between flowers, where a higher visitation rate should result in a greater amount of pollination, if all else is equal

Previously, flower visitation rate has been mostly investigated from the plant perspective, where researches quantity visits by different pollinator on particular plant species may reflect a specialization or advantage of that particular pollinator, plant pair, such as the proficiency of humming birds. What is less known is whether there are general, broadly constituent differences in the visitation rate between insect functional groups.

Foraging activity can be classified into water, nectar, pollen or resin foraging according to the resource forager bees collect. The type of foraging, whether for pollen or nectar, is considered to be colony – level trait with a genetic component and is affected by the genotype of bee strain. It has also been found that under shortages of pollen or in conditions of poor pollen quality the honey bee colonies increase the proportion of pollen foragers without increasing the foraging rate. The foraging choice between pollen (protein) and Nectar ( carbohydrate sources) is influenced by insulin receptor substrates (IRS).

Honey bees collect pollen and nectar as food for the entire colony and in this process they pollinate plants. Although honey and pollen comprise the main honey diet of honey bees, they do collect other liquids and juices from plants and fruit exudates as well. Honey bees have wide range of nutritional requirements, including vitamins, minerals, lipids, proteins and carbohydrates. Honey bees need these nutrients for taking care of their young ones, the development of young workers and the overall survival of the colony.

The number of pollen foragers shows maximum variation during different times of the day and on different days of the year compared to that of nectar foragers and of non-foragers Reddy and Bai,(1979), Reddy (1979) found in Bangalore, Karnataka, that the preparation of pollen foragers, the pollen stores in the hive and the amount of brood reared followed a similar pattern. Relative humidity and rainfall showed a significant positive relationship with pollen gathering activity, but not with nectar gathering activity. Temperature and wind speed did not affect the foraging activity. Pollen gathering activity, but not nectar foraging, increased on the day of solar eclipse mainly in populous colonies (Diwan,1980).

*Apis cerana indica*, a common honey bee sub species in this region, is an important pollinator with maximum foraging activities during flowering seasons. The present study aims to determine the flower preference and time spent by those local honey bees on it for collection of nectar and pollen.

## Materials and Methods

### Keeping sugar Solution

By using coconut shells/plastic containers were filled with sugar solution of sugar syrup feeding is given normally in the proportion of 1 : 1 ( Sugar : Water ) as a simulative feeding.

### Some of the materials we usually for rearing bees

Newton's bee hive consisting the (Brood frame, Brood chamber, following parts like super frame, super chamber) and must wear Bee veil (bee helmet), gloves for our protection. Indian honey bees are the most favourable bees adapted by the bee keepers.

The study was carried in a small apiary maintained at the Entomology department, Annamalai University – 8 colonies of *Apis cerana indica* in the department, Newton bee hives were taken for the study. Morning and evening hours foraging efficiency of a colony was measured in terms of number of bees with pollen load entering the hive. The floral sources present near the colonies of which bees reached for pollen collection were observed. Honey bees play a vital role in foraging behaviour of worker bees such as weather, distance of the food source from the hive, food quality, quantity of nectar and the pollen.

There is usually shortage of floral resources during summer and rainy seasons i.e., from June to August ( Mishra and sharma,1977). Bees activity is more during the honey flow seasons. In this present investigation, the pollen and nectar yielding plant species has been identified and studied during March, 2012-2015 at the department of Entomology, Faculty of agriculture, Annamalai University, Annamalai Nagar, Tamilnadu. Annamalai Nagar belongs 11°24' N latitude of equator and 79° 41' E longitude and altitude +5.79msl the bee hives along with colonies were brought from Marthandam and YMCA ( young Men Christian Association). Installing bee colonies were done during January and February months Colonies were installed near mango tree.

### Seasonal bee Colony strengthening with forage availability

The colony strength as well as honey bee products mostly depends on the availability and type of bee flora to level of colony management practice ( Bista and Shivakoti,2001)

The bees foraging at least 1.5 km from their colonies and the proportion of foragers flying to one field declined, approximately linearly, with radial distance ( Osborne,2007). Hence, apiary site should be near by the good honey bee forage plants in order to obtain good honeybee products and colony strength ( Jacobs et al., 2006)

## Observation and Results

Date were collected from June 27 to October 30, 2018 on days when the insects were actively foraging. The number of days spent collecting data per plant was largely determined by bloom period and days with good weather and once an insect was spotted, we would count the plants were found in large adjacent patches or were nearby plants growing close together. Once we completed a rate count for the one insect, we should walk further down the patch or to another plant to find different insect. Which decreases the likelihood of pseudo-replication. Usually it would take down the patches. We also noted whether during the one minute observation period the insects left the target plant to visit neighbouring plants

This was rare occurrence (12 times over the entire study period, 0.0004% of visits) even though all of our target plant locations were in natural or semi-natural landscape.

One – way analysis of variance (ANOVA) yields no statistically significant differences on the visitation time spent on five plots for each flower type.

Visitation time of bees on the flowers

±Observation plots	Mean ±S,D for time spent on flowers (Sec)		
	Shoe flower	Sunflower	Cow pea
1	27.48 ± 11.14	34.9 ± 9.51	30.0 ± 4.31
2	23.51 ± 6.79	40.8 ± 6.59	29.31 ± 6.71
3	20.61 ± 4.44	52.6 ± 5.80	31.21 ± 7.40
4	23.07 ± 4.22	36.6 ± 5.20	35.01 ± 5.21
5	25.15 ± 5.43	29.37 ± 12.11	20.31 ± 6.43
Total ± S.D	23.97 ± 6.99	36.72 ± 5.21	29.42 ± 4.32
F	1.370	1.752	1.215

## Discussion and conclusion

Bees activity observed with dawn and dusk time and worker bees activities noticed. The observation hours like 6.45 am, 7.00 am., 7.15 am, 7.30 am, 8.0 am and 9.00 am. Similarly the evening activities of honey bee also noticed during evening hours like 5.45 pm, 6.00 pm, 6.15 pm and 6.30 p.m

The colony of honey bee needs warmth, sun, nectar, pollen and water to thrive. The temperature needs to be at least 12.c for the bees to be able to fly out to collect food. Honey bees collect nectar from flowers as food and store it in their hive for the water

Over 500 years ago Geoffrey Chaucer coined the phrase “as busy as bees” in his Canterbury Tales centuries on, our results confirm that this widely accepted expression is in fact time regarding bee foraging behaviour. Bees, especially the numerically abundant Apidae bees, visit many more flowers per minute than other types of insects not all bees were busy within the non- Apidae bees, while had a speedy 13.4 flowers / minute rate, the other non-apidae bees visited 4.3 flowers / minutes.

The above table shows the bees spent less time (visiting time) on shoe flower, when compared to sunflower and cowpea.

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