

RESEARCH

FORAGING BEHAVIOR OF INDIAN HONEY BEE, *APIS CERANA INDICA* (HYMENOPTERA-APIDAE) ON SPONGE GUARD, *LUFFA CYLINDRICA* L. FLOWERS IN SURGUJA DISTRICT OF CHHATTISGARH, INDIA

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Abstract: A study was undertaken at Raj Mohini Devi College of Agriculture and Research station, Ambikapur (Chhattisgarh) substation of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) India. The foraging behavior of Indian honey bee, *Apis cerana indica* was observed in sponge guard flowers during 17 August 2022- 21 September 2022. The maximum foraging activity of honey bee was observed second week of September 2022 (2.82 bees/5min/m²) followed by first week of September 2022 (2.48 bees/5min/m²) and fifth week of August 2022 (2.04 bees/5min/m²) however the lowest population was recorded during fourth week of August 2022 (0.16 bees/5min/m²). Similarly during the different hours of the day, the maximum population of honey bees was recorded at 1000 hrs. (2.33 bees/5min/m²) followed by at 1200 hrs. (1.82 bees/5min/m²) and at 800 hrs. (1.72 bees/5min/m²). However, the lowest population was recorded at 1600 hrs. (0.52 bees/5min/m²).

Keywords: Sponge guard flowers, *Luffa cylindrical*, *Apis cerana indica*, Foraging behavior

INTRODUCTION

The vegetable sponge gourd, *Luffa cylindrica* (L.) Roem., family Cucurbitaceae originated in the tropics of Africa and South East Asia, is also known as dishrag gourd, loofah gourd, smooth gourd, tooria etc (Oboh and Aluyor, 2009; Filipowicz, 2014; Manjunath, 2016). Its fruits are eaten fresh like cucumbers, cooked as a vegetable or used in soups. A colourless, odourless and tasteless oil produced from its seeds can also be used in cooking. The fibrous material inside the mature sponge gourd fruit is commercially used for engine filters, doormats, table mats, mattress or shoulder pad stuffing and for absorbing sound (Azeez *et al.*, 2013). Furthermore, the sponge gourd fruits have been identified as source of several medicinally important groups of compounds (Joshi *et al.*, 2004; Azeez *et al.*, 2013; Partap *et al.*, 2012). *Luffa cylindrica* is a trailing or climbing annual that has monoecious inflorescences (Singh, 1958; Bhattacharyya and Chakraborty, 2014). Its plant bears both male and female flowers which are produced in the leaf axils with 4 to 20 staminate flowers and one pistillate flower in the same axil (Silva *et al.*, 2012). These flowers open in the early morning and are open only a day (Singh, 1958). Due to their monoecious inflorescence sponge gourd requires transfer of pollen from the staminate to the pistillate flowers. Several insect pollinators, belonging to different orders have been recorded as

pollinating agents in cucurbitaceous plants (Thapa, 2002; Agarwal and Rastogi, 2010; Bodlah and Waqar, 2013; Manjunath, 2016). However, the pollination in sponge gourd is reported to be principally assisted by the Apis bees (Collinson, 1976; Meléndez-Ramirez, 2002; Stanghellini *et al.*, 2002; Bhattacharyya and Chakraborty, 2014). The limited bloom period for the respective flower makes the pollinator visitation a limiting factor for the successful reproduction (Stanghellini *et al.*, 1997). During rainy periods sponge gourd from its profuse and continuous blossoming provide good nectar and pollen source that help the bees for colony build up and hence has excellent nutritional value. Considering the importance of sponge gourd especially for bees and meager information on its pollinators and pollination mechanism from this region, present study was carried out.

MATERIALS AND METHODS

Experimental Location: The experiment was conducted in Honey Bee Park field of Raj Mohini Devi College of Agriculture and Research station at Ambikapur, Surguja district of Chhattisgarh during 2022. This station is situated at an altitude 230 8°33.7596" N and a longitude 83°10'44.0184" E. The foraging behavior of Indian honey bee, *Apis cerana indica* was observed in Sponge guard flowers during 17 August 2022 to 21 September 2022. The

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population of above honey bee sp. was recorded at seven days intervals per 5min/m². 10 spot were randomly selected and count the number of honey bees visiting by visually observation starting from 8000 hrs to 1600 hrs, its total population was recorded and at the end it was averaged.

RESULTS AND DISCUSSION

The result depicted in Table 1. and Figure 1. that the population of Indian honey bee, *Apis cerana indica* was recorded initiation of foraging activity during third week of August 2022 (0.15 bees/5min/m²) during this period the population was recorded highest at 1200 hrs. (0.40 bees/5min/m²) and peak population recorded during second week of September (2.82 bees/5min/ m²) during this period the population was recorded highest at 1000 hrs. (3.80 bees/5min/m²) and its lowest population was recorded at 1600 hrs. (1.10 bees/5min/m²). Similarly, during the different hours of the day, the maximum population of honey bees were recorded at 1000 hrs. (2.33 bees/5min/m²) followed by at 1200 hrs. (1.82 bees/5min/m²) and at 800 hrs. (1.72 bees/5min/m²). However, the lowest population was recorded at 1600 hrs. (0.52 bees/5min/m²).

The results are more or less similar to the earlier workers Dalio (2013 and 2015) recorded the foraging behaviour of honey bee, *Apis mellifera* on *Parthenium* and *Trianthema*. Said *et al.* (2015) who recorded the foraging activity of Himalayan bee, *Apis ceana* on sunflower, Painkra (2016) who observed the foraging activity of rock bee, *Apis dorsata* on lajwanti grass, Painkra and Shaw (2016) recorded the foraging activity of honey bees on niger flowers. Kumar and Singh (2016) noticed the foraging activity of bees on coriander flowers and Painkra *et al.* (2014) recorded the foraging behavior of honey bees on niger flowers. Painkra (2018, 2019) observed the foraging activity of giant bee, *Apis dorsata* on *Ageratum conyzoides* an coriander flower. Painkra and Kumaranag (2019) who recorded the foraging activity of stingless bee in sunflower and in broccoli flowers. These findings are in agreement with the earlier workers, Painkra, (2019) observed that the maximum foraging activity of Italian bee at 10.00AM (43.30 bee/5min/m²) followed by at 12.00 Noon (21.57 bee/5min/m²) and at 08.00AM (13.42bee/5min/m²) however the minimum activity was recorded at 2.00 PM (12.55 bee/5min/m²).



Fig. 1: Experimental field of Sponge guard



Fig. 2: Observation to be recorded



Fig. 3: *Apis mellifera* recorded on Sponge guard flowers

Table 1. Mean population of *Apis cerana indica* visited/5 min/m² in sponge guard flowers during 17 August 2022 to 21 September 2022

<i>Apis cerana indica</i> (Number of bee visited/5min/m ²), at different two hours interval of the day (hrs)								
S. No.	Date of observation	800 (hrs)	1000 (hrs)	1200 (hrs)	1400 (hrs)	1600 (hrs)	Total	Mean
1	17/08/2022	0.00	0.30	0.40	0.10	0.10	0.90	0.18
2	24/08/2022	0.20	0.20	0.10	0.20	0.10	0.80	0.16
3	31/08/2022	1.50	2.90	2.40	2.50	0.90	10.20	2.04
4	07/09/2022	2.80	3.60	3.30	2.10	0.60	12.40	2.48
5	14/09/2022	3.40	3.80	3.10	2.70	1.10	14.10	2.82
6	21/09/2022	2.40	3.20	1.60	0.90	0.30	8.40	1.68
Total		10.30	14.00	10.90	8.50	3.10	46.80	9.36
Mean		1.72	2.33	1.82	1.42	0.52	7.80	1.56

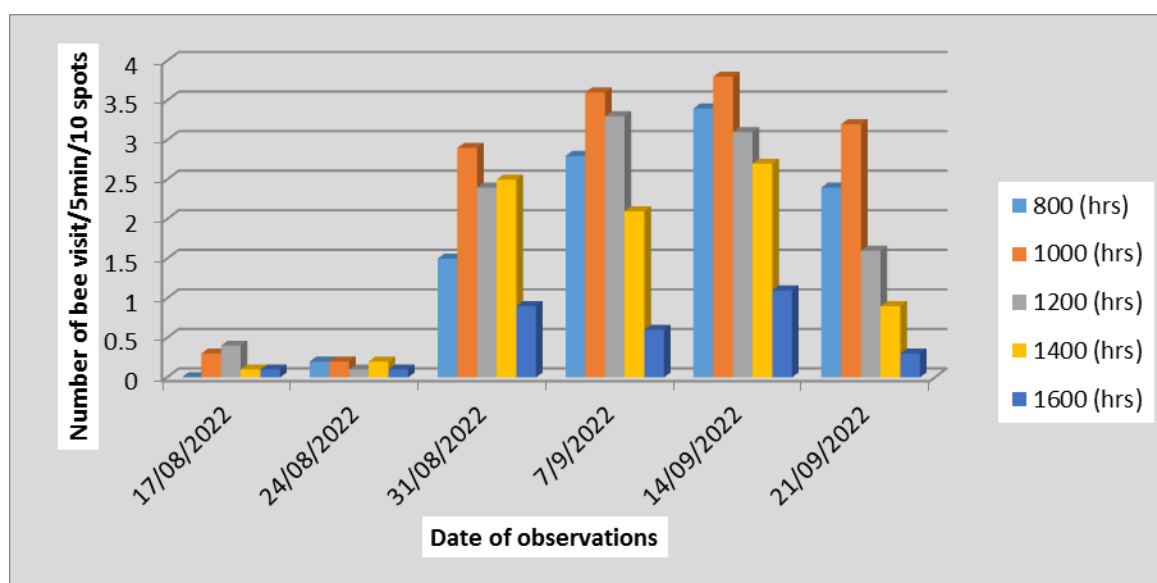


Fig. 1 : Mean population of *Apis cerana indica* visited/5 min/m² in sponge guard flowers during 17 August 2022 to 21 September 2022

CONCLUSION

In conclusion, the present study revealed that the maximum foraging activity of honey bee was observed second week of September 2022 (2.82 bees/5min/m²) followed by first week of September 2022 (2.48 bees/5min/m²) and fifth week of August 2022 (2.04 bees/5min/m²) however the lowest population was recorded during fourth week of August 2022 (0.16 bees/5min/m²). Similarly during the different hours of the day, the maximum population of honey bees was recorded at 1000 hrs. (2.33 bees/5min/m²) followed by at 1200 hrs. (1.82 bees/5min/m²) and at 800 hrs. (1.72 bees/5min/m²). However, the lowest population was recorded at 1600 hrs. (0.52 bees/5min/m²). Hence, being an entomophilous plant, Sponge gourd requires adequate visit of insect pollinators which will help in better pollination resulted into better fruit set. Thus, to allow the frequent visit of different pollinators decision should be taken regarding any chemical measure during the flowering period.

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