RESEARCH ARTICLE

FORAGING ACTIVITY OF STINGLESS BEE, *TETRAGONULA IRIDIPENNIS* SMITH (HYMENOPTERA-APIDAE-MELIPONINAE) IN SUNFLOWER

G.P. Painkra* and Kumaranag, K.M[1]

All India Coordinated Research project on Honey Bees and Pollinators
IGKV, Department of Entomology, RMD College of Agriculture & Research Station, Ambikapur - 497001 (Chhattisgarh) India
[1]Project Coordinating Unit, Division of Entomology, IARI, New Delhi, India 110012

Received-04.08.2019, Revised-26.08.2019

Abstract: A field observation was undertaken during 2018-19 to study the foraging activity of stingless bee on different hours of the day on sunflower. The observation was started from 2nd week of April 2019 to 4th week of May 2019. The population of bee (5.05 bees/ 5 plants/5min/plot) was recorded in between 8.00-9.00AM. It was recorded least among all over the five observations. However, its population was increased suddenly and reached its peak (8.17 bees/5plant/5min) in between 10.00 to 11.00AM followed by (5.17 bees/5plants/5minutes) at 12.00- 13.00 PM, (7.14 bees/5plants/5 minutes) at 14.00-15.00 PM and (5.12 bees/5plants/5 minutes) in between 16.00-17.00PM. The maximum blooming period and population of bees was recorded on 1st week of May 2019 (9.08 bees/5plants/5 minutes) followed by 4th week of April (7.92 bees/5plants/5 minutes) and 3rd week of April (6.56 bees/5plants/5 minutes) however, the lowest population was recorded on 4th week of May (3.6 bees/5plants/5 minutes).

Keywords: Foraging activity, Sunflower, Stingless bee, *Tetragonula iridipennis*, Meliponinae

INTRODUCTION

Sunflower is an important oilseed crop belongs to family Asteraceae, Genus- Helianthus.
It is also called wild sunflower, Sol sikkel (Danish), Sonnenblume (German), Girasol (Spanish), Tournesol (French) etc. Its binomial name is *Helianthus annus.* It has various synonyms like- *Helianthus aridus* Rydb, *H. erythrocarpus* Barti, *H. macrocarpus* DC, *H multiforus* Hook, *H. ovatus* Lehm, *H. platycephalus* Cass., *H. tubaeformis* Nutt etc. The sunflower is said that it was first domesticated by America. It has only a single inflorescence atop an unbranched stem and height about 5-6 feet. The name sunflower may derive from the flower's head shape which is like the sun. Its leaves are broad, rough and mostly alternate. They are sexually sterile and may be yellow, red, orange or other colors. The flowers in the center of the head are called disk florets. This crop is required fertile, moist well drained soil with heavy mulch.
It is important edible oil. It is used a wild bird food and livestock forage. Its flower is used as a dye, stem is used as paper, clothes and microscope slide mounts. Roots can be used as a snake bite and spider bites. Since it has yellow color flower which contains ample quantity of pollen and nectar. Due to yellow color flower it attracts the different insect pollinators specially honey bees. So, in this chapter a honey bee species stingless bee, *Tetragonula iridipennis* Smith is being mentioned.

MATERIALS AND METHODS

The observation was undertaken at Rajmohini Devi College of Agriculture and Research Station, Ambikapur of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) under All India Coordinated Research Project on Honey Bees and Pollinators. The sunflower crop was grown in three plots in plot size 4x3 m^2 and spacing 60x30 cm (Variety- PAC-334) considering three replications. The stingless bee population was documented with randomly selected five plants from each plot starting from 8.00-9.00 AM to 16.00-17.00 PM at one hour intervals at five minutes during weekly intervals.

RESULTS AND DISCUSSION

The result depicted in table 1. the foraging activity of stingless bee on different hours of the day on sunflower was studied. The observation was started from 2nd week of April 2019 to 4th week of May 2019. The population of bee (5.05 bees/ 5 plants/5min/plot) was recorded in between 8.00-9.00AM. It was recorded least among all over the five observations. However, its population was increased suddenly and reached its peak (8.17 bees/5plant/5min) in between 10.00 to 11.00AM followed by (5.17 bees/5plants/5minutes) at 12.00-13.00 PM, (7.14 bees/5plants/5 minutes) at 14.00-15.00 PM and (5.12 bees/5plants/5 minutes) in between 16.00-17.00PM. The maximum blooming period and population of bees was recorded on 1st week of May 2019 (9.08 bees/5plants/5 minutes) followed by 4th week of April (7.92 bees/5plants/5 minutes) and 3rd week of April (6.56 bees/5plants/5 minutes) however, the lowest population was recorded on 4th week of May (3.6 bees/5plants/5 minutes).
Similar results were achieved by earliesr workers **Amano** *et al.* (2000) who studied on stingless bee

*Corresponding Author

and pollinators, Bruijn and Sommeeijer**(**1997) colony foraging of different species of stingless bee. Ghazi *et al.* (2014) foraging activity of stingless bee. Saravanan *et al.* (2004) studied on behavior of stingless bee, Saravanan and Alagar (2007) foraging activity of stingless bee. Vijayan, *et al.* (2018) season and timing on the foraging activity of stingless bees, Painkra (2019) who worked on foraging activity of stingless bee on broccoli flowers . Gadhiya and Pastagia (2015) flowers visited by stingless bee , Wahizatul afzan azmi, *et al.* (2015) who studied on melissopalynology and foraging activity of stingless bee, Julieta Grajales-Conesa, *et al.* (2012) citrus floral extracts on the foraging behavior of stingless bee, Rahman *et al.* (2015) diversity and distribution of stingless bee in India, Robert Kajobe (2008) foraging behavior of Afro-tropical stingless bee, Brunno Kuhn-Neto *et al.* (2009) long distance foraging and recruitment by a stingless bee, Sara D. Leonhardt, *et al.* (2007) foraging loads of stingless bee, Anchalee sawatthum (2015) pollen food source diversity of stingless bee, Karthick *et al.* (2018) prospects and challenges in melioniculture, Ester Judith SLAA *et al.* (2006) stingless bee in applied pollination practice, Heard (1999)studied on stingless bee pollination.

Table1. Stingless bee population on sunflower crop during 2018-19.

Date of observations	**Bee population/5 plants /5minutes/plot Different hours of the day**					
	8.00-9.00 AM	**10.00-11.00AM**	**12.00-13.00PM**	**14.00-15.00 PM**	**16.00-17.00 PM**	**Average**
14/04/19	5.8	7.00	4.00	6.2	3.8	5.36
21/04/19	7.4	9.2	5.00	7.6	3.6	**6.56**
28/04/19	6.2	10.2	8.2	9.2	5.8	**7.92**
05/05/19	5.2	16.6	7.8	8.4	7.4	**9.08**
12/05/19	5.8	6.2	5.00	7.2	6.4	6.12
19/05/19	2.8	4.2	3.6	6.2	5.6	4.48
26/05/19	2.2	3.8	2.6	5.2	4.2	3.6
Average	**5.05**	**8.17**	**5.17**	**7.14**	**5.12**	

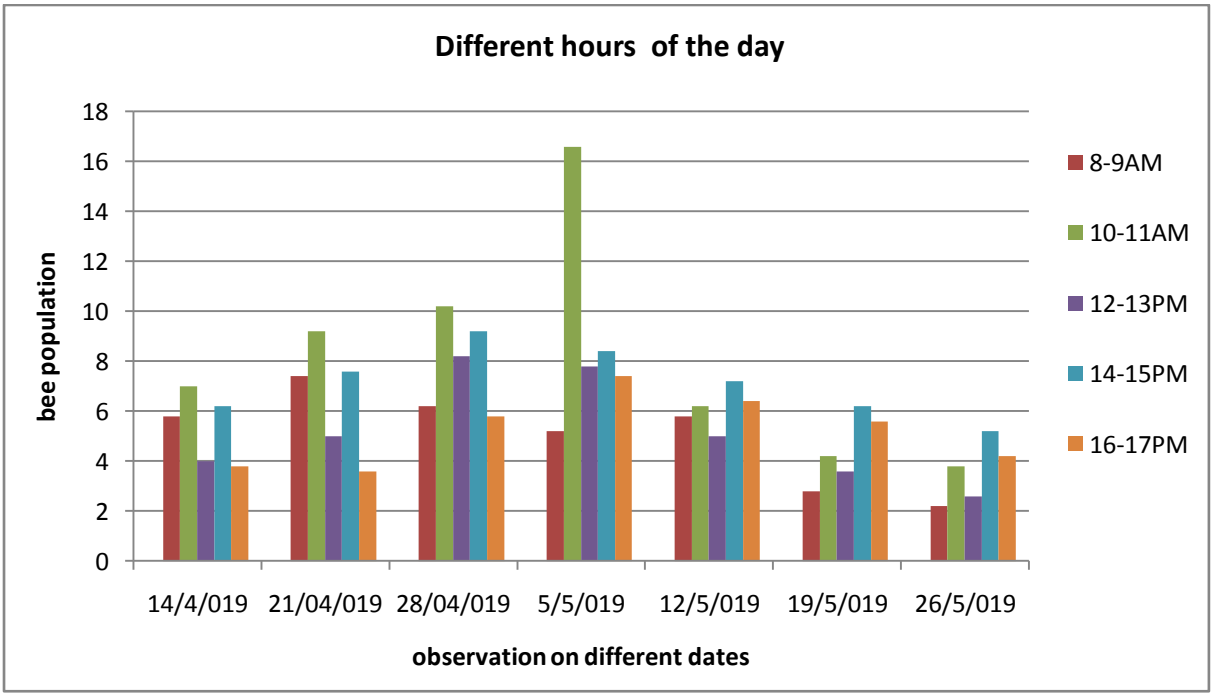

Fig 1. Foraging activity of stingless bee on sunflower.

(A) Sunflower crop

(B) Stingless bee foraging on sunflower bloom

CONCLUSION

It is concluded that the stingless bee population was observed maximum visiting on sunflower in between 10.00 AM to 11.00AM followed by in between 14.00 to 15.00PM, 12.00 to 13.00PM and 16.00 to 17.00PM however the lowest activity was recorded in between 8.00 to 9.00AM. Due to availability of nectar and pollen or both ample quantities at the morning hours the bees attracted for collection of pollen and nectar this time is most suitable for foraging of stingless bee.

ACKNOWLEDGEMENT

The authors are highly thankful to Project Coordinating Unit, All India Coordinated Research Project on Honey Bees and Pollinators, Division of Entomology, IARI, New Delhi for providing the financial support and technical guidance during the study of stingless bee and also thankful to all the staffs of RMD College of Agriculture and Research Station, Ambikapur (Chhattisgarh).

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