



Foraging Reward and Foraging Behavior Of Insect Visitors On Mango Flowers During Blooming Period

Usha^{1*} and Poonam Srivastava²

¹Ph. D. Agricultural Entomology, ²Assistant Professor,

Department of Entomology, College of

Agriculture, G.B Pant University of Agriculture & Technology, Pantnagar, Uttarakhand,

Pin-263145

*Corresponding author email: ushamauryaento@yahoo.com

ABSTRACT

Most of the mango cultivars are benefited from cross pollination and required external bio agents to accomplish this process. The production of nectar for the attraction of insects also indicates that the mango is entomophilous. Mango flowers are visited by flies, wasps, bees, butterflies, moths, beetles, ants and various bugs sucking the nectar and some other insects takes pollen for feeding purpose. Among them bees of Apidae family viz., *Apis mellifera*, *Apis dorsata*, *Apis cerana indica*, *Tetragonula laeviceps* and *Xylocopa aestuans* are frequent visitor and foraged mango flowers to take both pollen and nectar simultaneously. However, ants and *Vespula orientalis* visited flowers only for the nectar. Similarly, all the dipteran species visited on mango flowers only for nectar although the greater amount of pollen were adhered on their body during visitation which facilitate the pollination. During the process of nectar and pollen collection *A. mellifera*, *A. dorsata*, *A. c. indica*, *T. laeviceps*, *X. aestuans* and *C. septempunctata* were recorded as a top-worker or side worker. Whereas, some hymenopterans viz. *Ants*, *V. orientalis* and *Polistes sp* were visits as a side worker to take nectar from the flower. On the other hand different species of syrphid flies viz. *E. balteatus*, *S. corollae*, *E. tenax*, *M. orientale*, *Eupeodes sp.* and some other dipterans like House fly (*Musca domestica*) and Blue bottle fly (*Calliphora sp.*) were observed as side worker on the flowers of mango.

Key Words: *Apis mellifera*, *Apis dorsata*, *Apis cerana indica*, *Tetragonula laeviceps* and *Xylocopa aestuans* etc.

Received 19.08.2018

Revised 26.09.2018

Accepted 12.11.2018

INTRODUCTION

Mango, *Mangifera indica* L. (family : Anacardiaceae) rightly called the "King of Fruits" is grown all over the country as this is the only fruit that the poor as well as the rich equally enjoy. The fruit of mango is the rich source of vitamin-A, vitamin-B6, vitamin-C, vitamin-E, copper, potassium, carotenoids, polyphenols and flavonoids like *beta-carotene*, *alpha-carotene*, and *beta-cryptoxanthin* [8]. According to new research study, mango fruit has been found to protect against colon, breast, leukemia and prostate cancers. The mango is native to South Asia from where it was distributed worldwide to become one of the most cultivated fruits in the tropics. This fruit is cultivated in the largest area i.e. 2,312 thousand ha and the production is around 15.03 million tons, contributing 40.48% of the total world production of mango. Mango is the national fruit of India and main producing states are Uttar Pradesh, Uttarakhand, Andhra Pradesh, Karnataka, Bihar, Gujarat and Tamil Nadu [2].

Most of the mango cultivars are benefited from cross pollination and required external bio agents to accomplish this process. The production of nectar for the attraction of insects also indicates that the mango is entomophilous. Mango flowers are visited by flies, wasps, bees, butterflies, moths, beetles, ants and various bugs sucking the nectar and some transfer the pollen but a certain amount of self pollination also occurs. Observations have shown that among various insect, most important floral visitors are belonging to the order Diptera (Syrphid flies and hover flies), Hymenoptera (Honeybees, stingless bee, bumble bee, solitary bees and other non apis bees), Lepidoptera (Moths and Butterflies) and Coleoptera (Beetles). Du and Swart [3] examined the insect foragers for nectar, pollen and bee glue in a 14 hectare mango orchard in S. Africa (Lesitele Valley). Low frequencies of foragers indicated limited quantities of

available pollen and nectar. Honey bees however were most frequent pollinator. **Panda et al. [7]** noticed that three species of *Apis* collected either nectar or pollen in their single trip. A flower visit was scored as successful if the bee made direct contact with the stigma that could allow pollen transfer to occur. The petals of flower plays very important role in foraging behaviour of honeybees as pollinator [4].

MATERIAL AND METHODS

The Experiments were conducted at Horticulture Research Center, Pattharchatta, Department of Entomology, College of Agriculture, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, during the 2013.

This experiment was conducted on 5 randomly selected trees of mango to take observations for nectar and pollen collecting activity of insect pollinators. Daily observations on insect pollinators were recorded on 10 panicles per tree in all directions at two hours interval.

The treatment details are given below:

Details of Treatments:

H1 = 08.00 AM

H2 = 10.00 AM

H3 = 12.00 Noon

H4 = 02.00 PM

H5 = 04.00 PM

RESULTS AND DISCUSSION

The foraging reward of insect visitors on mango flowers during the blooming period of the year 2013 is presented in the table 1. It was observed that bees of Apidae family viz., *A. mellifera*, *A. dorsata*, *A. c. indica*, *Tetragonula laeviceps* and *Xylocopa aestuans* visited on mango flowers and take both pollen and nectar simultaneously. However, ants and *Vespula orientalis* visited only for the nectar. Ahmad [1] reported that when an individual honeybee finds a source of nectar or pollen it continues to collect from one source until it is exhausted or recruited to another source. This behaviour is advantageous to the plants as it facilitate cross-pollination. The syrphid flies, viz *E. balteatus*, *S. corollae*, *E. tenax*, *M. orientale*, *Eupeodes sp.* and *Musca domestica L.*, *Musca. sp.*, *Calliphora sp.* visited on mango flowers only for nectar but the greater amount of pollen were adhered on their body during visitation. Syrphid flies (*E. balteatus*, *S. corollae*, *E. tenax*, *M. orientale*, *Eupeodes. sp.*), *M. domestica*, *Musca sp.* and *Calliphora sp* were take nectar from the mango flower. But the pollen were attached on their body. As stated by Jiron and Hedstrom [5] who observed that the most common visitors on the mango flowers were Dipterans (Syrphidae, Calliphoridae and Sciaridae) 51.6 per cent of all visitors; Lepidopterans (Nymphalidae and Lycaenidae) 33 per cent, Coleopterans (Cantharidae) 11.6 per cent, and Hymenopteran (Apidae) 13.6 per cent. Some of these insects fed on pollen or nectar, while other preyed on other visitors. Syrphid flies, Calliphorid flies and Tachinid flies had greater amounts of pollen attached to their bodies rather than other visitors. Some Hemipterans, Love bugs: *Plecia nearctica*, Lepidopterans, Monarch Butterfly: *Danaus plexippus* and *Pieris rapae* and Coleopetrans: *Coccinella septumpunctata* were also found visting on mango flower for nectar only. Of these *Coccinella septumpunctata* take nectar and pollen both.

Table 1: Foraging reward for insect visitors of mango flowers during the year 2013

Sl. No.	Common name	Scientific Name	Pollen Collector (P)	Nectar Collector (N)	Pollen+Nectar Collector (P+N)
1	European honey bee	<i>Apis mellifera L.</i>	-	-	P+N
2	Giant honey bee	<i>Apis dorsata Fab.</i>	-	-	P+N
3	Indian honey bee	<i>Apis cerana indica Fab.</i>	-	-	P+N
4	Stingless bee	<i>Tetragonula laeviceps Smith</i>	-	-	P+N
5	Carpenter bee	<i>Xylocopa aestuans L.</i>	-	-	P+N
6	Ant (Unidentified)	-	-	N	-
7	Wasp	<i>Vespula orientalis</i>	-	N	-
8	Wasps	<i>Polistes sp</i>	-	N	-
9	Syrphid fly	<i>Episyrphus balteatus DeGeer</i>	-	N	-
10	Syrphid fly	<i>Syrphus corollae Fab.</i>	-	N	-
11	Syrphid fly	<i>Eristalis tenax L.</i>	-	N	-
12	Syrphid fly	<i>Melanostoma orientale L.</i>	-	N	-

13	Syrphid fly	<i>Eupeodes sp.</i>	-	N	-
14	Housefly	<i>Musca domestica L., M. sp.</i>	-	N	-
15	Blue Bottle fly	<i>Calliphora sp.</i>	-	N	-
16	Love Bugs	<i>Plecia nearctica</i>	-	N	-
17	Monarch Butterfly	<i>Danaus plexippus</i>	-	N	-
18	Cabbage Butterfly	<i>Pieris rapae</i>	-	N	-
19	Humming moth	<i>Macroglossum stellatarum</i>	-	N	-
20	Lady bird beetle	<i>Coccinella septumpunctata</i>	-	-	P+N

Foraging behaviour for insect visitors of mango flowers The perusal of the data on foraging behaviour of insect visitors showed in Table 2 indicate that *A. mellifera*, *A. dorsata*, *A. c. indica*, *T. laeviceps*, *X. aestuans*, *Calliphora sp.* and *C. septumpunctata* were recorded as a top-worker or side worker during the process of the collection of nectar and pollen. Whereas, some hymenopterans viz. Ants, *V. orientalis* and *Polistes sp.* visited as a side worker to take nectar from the flower. On the other hand different species of syrphid flies viz. *E. balteatus*, *S. corollae*, *E. tenax*, *M. orientale*, *Eupeodes sp.* and some other dipterans like House fly (*Musca domestica*) and Blue bottle fly (*Calliphora sp.*) were observed as side worker on the flowers of mango. The low population of *P. nearctica*, *D. plexippus*, *P. rapae* and *M. stellatarum* rarely observed on mango on the side branches. The above results also supported by Mattu [6] who reported that *A. mellifera* and *A. c. indica* were found as top as well as side workers.

Table 2: Foraging behaviour of Insect-Pollinators visiting on Mango flowers during the year 2013

Sl. No.	Common name	Scientific Name	Top worker (T)	Side worker (S)	Top +Side Worker (T+S)
1	European honey bee	<i>Apis mellifera L.</i>	-	-	T+S
2	Giant honey bee	<i>Apis dorsata Fab.</i>	-	-	T+S
3	Indian honey bee	<i>Apis cerana indica Fab.</i>	-	-	T+S
4	Stingless bee	<i>Tetragonula laeviceps Smith</i>	-	-	T+S
5	Carpenter bee	<i>Xylocopa aestuans L.</i>	-	-	T+S
6	Ant (Unidentified)	-	-	S	-
7	Wasp	<i>Vespula orientalis</i>	-	S	-
8	Wasps	<i>Polistes sp</i>	-	S	-
9	Syrphid fly	<i>Episyrphus balteatus DeGeer</i>	-	S	-
10	Syrphid fly	<i>Syrphus corollae Fab.</i>	-	S	-
11	Syrphid fly	<i>Eristalis tenax L.</i>	-	S	-
12	Syrphid fly	<i>Melanostoma orientale L.</i>	-	S	-
13	Syrphid fly	<i>Eupeodes sp.</i>	-	S	-
14	Housefly	<i>Musca domestica L., M. sp.</i>	-	S	-
15	Blue Bottle fly	<i>Calliphora sp.</i>	-	-	T+S
16	Love Bugs	<i>Plecia nearctica</i>	-	S	-
17	Monarch Butterfly	<i>Danaus plexippus</i>	-	S	-
18	Cabbage Butterfly	<i>Pieris rapae</i>	-	S	-
19	Humming moth	<i>Macroglossum stellatarum</i>	-	S	-
20	Lady bird beetle	<i>Coccinella septumpunctata</i>	-	-	T+S

CONCLUSION

The bees of Apidae family viz., *A. mellifera*, *A. dorsata*, *A. c. indica*, *Tetragonula laeviceps* and *Xylocopa aestuans* foraged mango flowers for taking both pollen and nectar simultaneously. However, ants and *Vespula orientalis* visited flowers only for the nectar. Similarly, all the dipteran species visited on mango flowers only for nectar although the greater amount of pollen were adhered on their body during visitation which facilitate the pollination. During the process of nectar and pollen collection *A. mellifera*, *A. dorsata*, *A. c. indica*, *T. laeviceps*, *X. aestuans* and *C. septumpunctata* were recorded as a top-worker or side worker. Whereas, some hymenopterans viz. Ants, *V. orientalis* and *Polistes sp* were visits as a side worker to take nectar from the flower. On the other hand different species of syrphid flies viz. *E. balteatus*, *S. corollae*, *E. tenax*, *M. orientale*, *Eupeodes sp.* and some other dipterans like House fly (*Musca domestica*) and Blue bottle fly (*Calliphora sp.*) were observed as side worker on the flowers of mango.

REFERENCES

1. Ahmad, R. (1987). Honey bee pollination entomophilous crops. In Honey bee Research Programme, Pakistan Agricultural Research Council, Islamabad. 101 p.

Usha and Srivastava

2. APEDA. (2011). Agriculture Exchange. Indian Horticulture Database.
3. Du Toit, A. P. and Swart, D. (1993). Pollination of mango in letsitele valley during 1992. Flowering season. Yearbook, South African Mango Growers Assoc., 13: 129-130.
4. Hogarth, Corey, R. and Mendhan, Neville. (1999). Canola hybrid seed production with apetalous lines, New Horizons for an old crop. Proceedings of the 10th International Rape Seed Congress, Canberra, Australia, 1-5.
5. Jiron, L.S. and Hedstrom, T. (1985). Pollination ecology of mango. Turnalba, 35(3): 269-277.
6. Mattu, V.K. 2012. Morphometric and behavioural studies on Indian honeybee (*Apis cerana indica* F.). *Ph.D. Thesis, Himachal Pradesh University, Shimla, India.*
7. Panda, P.; Rath, L.K.; Padhi, J. and Panigrahi, D. (1995). Relative abundance and foraging behaviour of common bee species on higher in Phulbani District, Orrisa, India. *Indian Bee Journal*, 57: 10-14.
8. USDA. 2012. National Nutrient data base.

CITATION OF THIS ARTICLE

Usha and Poonam Srivastava. Foraging Reward and Foraging Behavior Of Insect Visitors On Mango Flowers During Blooming Period. *Bull. Env. Pharmacol. Life Sci.*, Vol 8 [1] December 2018 : 99-102