FLOWERS VISITED BY STINGLESS BEES, *Tetragonula laeviceps* SMITH

***GADHIYA, V. C. AND PASTAGIA, J. J.**

DEPARTMENT OF ENTOMOLOGY
N. M. COLLEGE OF AGRICULTURE
NAVSARI AGRICULTURAL UNIVERSITY
NAVSARI - 396 450, GUJARAT, INDIA

****E.MAIL: kvksurat@nau.in***

ABSTRACT

With a view to know the flowers visited by stingless bees, Tetragonula laeviceps, roving surveys were carried out at Navsari Agricultural University Campus. Stingless bees, T. laeviceps has ability to visit a wide range of flower. In present study, 34 different plant species were visited by stingless bees. Stingless bees visited the flowers of vegetable crops like Cucumber, Onion, Radish, Cauliflower, Indianbean, Tomato, Brinjal and Chilli. The flowers of fruit crops visited by stingless bees were Coconut,* Papaya, *Banana, Mango, Guava, Muskmelon and Watermelon. Stingless bees visited flowers of oil seed crops like* Mustard, *Castor, Sunflower, Niger and Sunhemp. In pulse crops, stingless bees visited Greengram,* Blackgram *and* Cowpea. *The ornamental flower plants visited by stingless bees were Hibiscus, Hamelia, Gardenia, Ixora,* Chrysanthemum, *Turnera, Gaillardia and Gultora.* The forage crops like *Lucerne and weed crops like field bind weed and Lantana camara were also found to be visited by stingless bees.

KEY WORDS: Flowers, Stingless bees, Tetragonula laeviceps

INTRODUCTION

Stingless bees, *Tetragonula laeviceps* are the smallest of the honey producing bees. They are highly social insects like honey bees, living in permanent colonies, nesting in old walls, logs, crevices and such other concealed places. Stingless bees are hymenopterous insects belong to the super family Apoidea, family Apidae and sub family Meliponinae. Meliponinae consists of two genera *Melipona* and *Trigona* which belong to the tribe *Meliponinae* and *Trigonini*, respectively. *Meliponinae* include eight genera having fifteen sub genera and more than five hundred species (Wille, 1983). Until now, it has been reported that *T. irridipenis* is the only species found in India, but recent identification stingless bees collected from South Gujarat region revealed the presence of *T. laeviceps* in India (Patel, 2013). Stingless bee colonies are perennial and usually consist of hundreds or thousands of workers (Wille, 1983). They are found in colonies ranging from a few dozen to 100,000 or more workers and are highly social bees (Michener, 2000).

MATERIALS AND METHODS

To study the flowers visited by stingless bees, roving surveys were made at 15 days interval in Campus of Navsari Agricultural University, Navsari, Gujarat, India during the peak activity period throughout the year 2013. Each time, different crop plants

available at Navsari Agricultural University campus was observed randomly for the visit of stingless bees. The plants visited by the stingless bees were recorded.

RESULTS AND DISCUSSION

The observations presented in Table 1 revealed that the stingless bee, *T. laeviceps* has ability to visit a wide range of flower. In present study, 34 different plant species were visited by stingless bees. The stingless bees, *T. laeviceps* visited the flower of vegetable crops, fruit crops, oil seed crops, pulse crops, forage crops, weed crops, ornamental and flower plants. The visit of *T. laeviceps* on different flowers of various crops was also depicted photographically.

The observation recorded on flowers visited by stingless bees revealed that in vegetable crops, the crops like cucumber, *Cucumis sativus* L., Onion, *Allium cepa* L., Radish, *Raphanus sativus* L., Cauliflower, *Brassica oleracea* var. botrytis and Indianbean, *Lablab purpureus* L. were visited during the January - February months during flowering period of respective crops. The vegetables like Tomato, *Lycopersicon esculentum* L., Brinjal, *Solanum melongeana* L. and Chilli, *Capsicum annum* L. flowers were visited by stingless bees during January to March. The observations on fruit crops revealed that bee visited Coconut, *Cocos nucifera L., Papaya, Corica papaya* L. and Banana, *Musa paradisiaca* Linn. throughout the year, while it visited Mango, *Mangifera indica* L. in the month of January to March, Guava, *Psidium guajava* Linn. in September to February, Muskmelon, *Cucumis melo* L. during August to November and Watermelon, *Citrullus lanatus* var. lanatus during the month March to April. With respect to oil seed crops, stingless bees visited flowers of *Mustard, Brassica juncea* L. during December to February, Castor, *Ricinus communis* L. during November to April; Sunflower, *Helianthus annuus* L. during January to March; Niger, *Guizotia abyssinica* (L.f) Cass. during November to January and Sunhemp, *Crotalaria juncea L. during* January to March. In pulse crops, stingless bees visited Greengram, *Vigna radiata L. during* February to March, *Blackgram, Phaseolus mungo* L. during August to September and *Cowpea, Vigna unguiculata* L. during March to April and August. The observations on ornamental flower plants revealed that stingless bee visited flowers of Hibiscus, *Hibiscus sabdariffa* L.; Hamelia, *Hamelia patens* Jacq.; Gardenia, Gardenia jasminoides Ellis; ixora, *Ixora coccinea* L.; *Chrysanthemum, Chrysanthemum indicum* L.; Turnera, *Turnera subulata* Sm.; Gaillardia, *Gaillardia pulchella* Foug. throughout the year, while it visited flowers of Gultora, *Caesalpinia pulcherrima* L. during February to April. *The forage crops like* Lucerne, *Medicago sativa* L. was also found to be visited by stingless bees during January to April. On weed crops, the stingless bees were found to visit Field bind weed, *Convolvulus arvensis* L. during January to March and *Lantana camara* L. throughout the year.

Similar surveyed were also conducted by various researchers in past, which tally the present findings on stingless bee visits to various crops. In the lowland neotropics, 52 species of plants visited by *Melipona* and 108 of the 128 species visited by other stingless bee species (Roubik, 1979). *Trigona fulviventris guianae* have been recorded visiting the flowers of eggplant (Engel and Dingemans-Bakels, 1980). Honey bees and stingless bees were the most common insects visiting onion flowers in Brazil

(Lorenzon *et al*., 1993). Appanch *et al.* (1986) reported *T. erythrogastra* Nikolsky forages on a wide variety of plants belonging to at least 16 families. Melendez-Raminez *et al.* (2002) recorded the bee visitors of pumpkin (*Cucurbita moschata* Duchesne), cucumber (*Cucumis sativus* L.), melon (*Cucumis melo* L.) and watermelon (*Citrullus lanatus* L.), on 14 sites in Yucatan, Mexico. These crops were found to be visited by 58 species of bees. *Partamona bilineata* Say was the second most dominant species and *Trigona fulviventris* ranked fifth. The other stingless bee visitors were *N. perilampoides* Cresson, *Trigona nigra* Cresson, *Cephalotrigona zexmeniae* Cockerell, *Melipona beecheii* Bennett and occasionally *Plebeia frontalis* (Friese) and *Scaptotrigona pectoralis* (Dalla Torre). Stingless bees were the most common insects visiting mango flowers in Australia and Brazil. In Australia, *Trigona* were the most efficient pollinators of mango as they leave many pollen grains on the stigma after a visit, which made them the most important pollinators of mango (Muthuraman *et al.*, 2012). Thus, the present findings are in agreement with the earlier reports. Muthuraman *et al.* (2013) recorded visits of *Trigona irridipenis* on cereals like Finger millet, Pearl millet, Sorghum, Maize; Pulses like Redgram, Blackgram, Greengram, Lab lab and Cowpea; Oil seed crops like Sunflower, Mustard and Castor; Fruit crops like Pomegranate, Mango, Citrus, Banana, Papaya, Guava and Gooseberry; Vegetables like Brinjal, Onion, Ash gourd, Pumpkin, Bottle gourd, Bitter gourd and Drum stick; Ornamental plants like Tuberose, Rose and Coral vine; Weed crops like Lantana and Tridax and trees like Coconut, Areca nut, Neem, Teak, Tamarind and Eucalyptus.

CONCLUSION

From the above results, it can be extracted that the stingless bees, *T. laeviceps* has an ability to visit a wide range of flowers like, vegetable crops, fruit crops, oil seed crops, pulse crops, forage crops, weed crops and ornamental and flower plants.

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Table 1: Flowers visited by stingless bees, *T. laeviceps* Smith

Sr. No.	Scientific Name	Common Name	Month
Vegetable crops			
1.	*Lycopersicon esculentum* L.	Tomato	January - March
2.	*Solanum melongeana* L.	Brinjal	January - March
3.	*Capsicum annum* L.	Chilli	January - March
4.	*Cucumis sativus* L.	Cucumber	January - February
5.	*Allium cepa* L.	Onion	January - February
6.	*Raphanus sativus* L.	Radish	January - February
7.	*Brassica oleracea* var. botrytis	Cauliflower	January - February
8.	*Lablab purpureus* L.	Indian bean	January - February
Fruit crops			
9.	*Mangifera indica* L.	Mango	January - March
10.	*Musa paradisiaca* Linn.	Banana	Throughout year
11.	*Cocos nucifera L.*	Coconut	Throughout year
12.	*Corica papaya* L.	Papaya	Throughout year
13.	*Psidium guajava* Linn.	Guava	September - February
14.	*Citrullus lanatus* var. lanatus	Water melon	March - April
15.	*Cucumis melo* L.	Musk melon	August - November
Oil Seed crops			
16.	*Brassica juncea* L.	Mustard	December - February
17.	*Ricinus communis* L.	Castor	November - April
18.	*Helianthus annuus* L.	Sunflower	January - March
19.	*Crotalaria juncea L.*	Sunhemp	January - March
20.	*Guizotia abyssinica* (L.f) Cass.	Niger	November - January
Pulse crops			
21.	*Vigna radiate L.*	Green gram	February - March
22.	*Phaseolus mungo* L.	Black gram	August - September
23.	*Vigna unguiculata* L.	Cowpea	March - April and August
Forage crops			
24.	*Medicago sativa* L.	Lucerne	January - April
Weed crop			
25.	*Lantana camara* L.	Lantana camara	Throughout year
26.	*Convolvulus arvensis* L.	Field bind weed	January - March
Ornamental and Flower plants			
27.	*Hibiscus sabdariffa* L.	Hibiscus	Throughout year
28.	*Hamelia patens* Jacq.	Hamelia	Throughout year
29.	Gardenia jasminoides Ellis	Gardenia	Throughout year
30.	*Ixora coccinea* L.	Ixora	Throughout year
31.	*Chrysanthemum indicum* L.	*Chrysanthemum*	Throughout year
32.	*Turnera subulata* Sm.	Turnera	Throughout year
33.	*Caesalpinia pulcherrima* L.	Gultora	February - April
34.	*Gaillardia pulchella* Foug	Gaillardia	Throughout year

Flowers visited by stingless bees, *Tetragonula laeviceps* Smith

Radish, *Raphanus sativus* L.

Cauliflower, *Brassica oleracea* var. botrytis

Brinjal, *Solanum melongeana* L.

Onion, *Allium cepa* L.

Indian bean, *Lablab purpureus* L.

Mustard, *Brassica juncea* L.

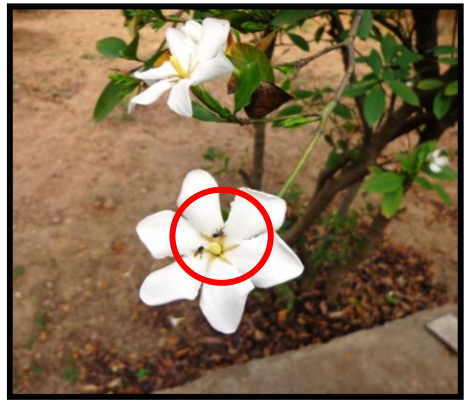
Sunflower, *Helianthus annuus* L.

Sunhemp, *Crotalaria juncea* L.

Niger, *Guizotia abyssinica* (L.f) Cass.

Field bind weed, *Convolvulus arvensis* L.

Hamelia, *Hamelia patens* Jacq.



Gardenia, *Gardenia jasminoides* Ellis

Gultora, *Caesalpinia pulcherrima* L.

***Chrysanthemum, Chrysanthemum indicum* L.**

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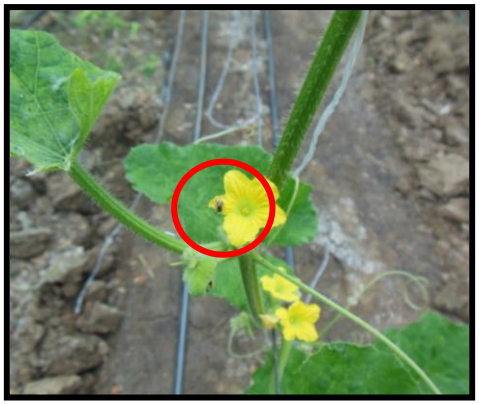
Turnera, *Turnera subulata* Sm.

Gaillardia, *Gaillardia pulchella* Foug.



Muskmelon, *Cucumis melo* L.

[MS received: September28, 2015]

[MS accepted: November 04, 2015]