Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2019; 7(4): 1092-1094

Received: 16-05-2019
Accepted: 18-06-2019

Vikash Kumar Sankhala
Department of Entomology, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

Varsha Phanan
Department of Nematology, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

Suman Maurya
Department of Plant pathology, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

Correspondence
Vikash Kumar Sankhala
Department of Entomology, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

Diversity of insect pollinators on sweet basil (*Ocimum basilicum* Linn.) under natural field conditions

Vikash Kumar Sankhala, Varsha Phanan and Suman Maurya

Abstract
Studies on diversity on insect pollinators sweet basil was carried out at Instructional Farm, Rajasthan College of Agriculture, MPUAT, Udaipur. In the present study, the insect pollinator diversity was recorded during the flowering period from 21/08/2017 to 29/10/2017 on sweet basil. The major insect pollinators belonged to 5 different orders: Hymenoptera, Lepidoptera, Coleoptera, Diptera and Hemiptera that were observed during different hours of the day. The maximum Shannon Weaver diversity index (1.20) for transect sampling was observed during 16:00 to 18:00 hours; while minimum (0.94) was during 10:00 to 12:00 hours. The Shannon Weaver diversity index for insect pollinators trapped in the colored bee bowls (Yellow, White & Blue), white bee bowl was recorded maximum (1.59) and minimum in yellow bee bowl (1.51); whereas, in yellow pan trap (1.34) was observed.

Keywords: Sweet basil, insect pollinators, insecta, shannon- weaver diversity index, bee bowls

Introduction
Among medicinal and aromatic plants, the genus *Ocimum* is widespread over Asia, Africa and Central and Southern America; it appears to have its center of diversity in Africa. The first ever cultivation of basil is believed to be in India and is an extremely versatile group consisting of about 160 species (Pullaiah, 2006) [5]. With a geographic distribution spread over the tropical, sub-tropical and warmer parts of the temperate regions. A systematic field investigation on the world distribution of the genus is still lacking. It is found throughout India, ascending up to 1800 m in the Himalayas and in the Andaman and Nicobar Islands (Pullaiah, 2006) [5]. Sweet basil (*Ocimum basilium* Linn: Lamiaceae), perhaps the most popular and widely used culinary herb, is a tender annual, aromatic plant with a spicy odour and flavour. Majority of the wild plants are entomophillic (Ollerton *et al*. 2011) [3]. and thereby insect pollinators forms an essential component in the maintenance of biodiversific plant communities and ecosystem functioning.

Materials and Methods
To establish the diversity of insect pollinators visiting the standing crop of sweet basil grown at the Instructional farm, Rajasthan College of Agriculture, Udaipur, all the flower visiting insects were collected at different hours of the day (06:00-08:00, 08:00-10:00, 10:00-12:00, 12:00-14:00, 14:00-16:00 and 16:00-18:00 hours of the day) from ten randomly selected plants of sweet basil at different locations within the crop area. The sampling was done by transect sampling using an insect net at weekly intervals at different hours of the day as mentioned above.

Using the standard methodology of bee bowls for monitoring pollinator populations developed by the FAO, small cups painted on the inside with fluorescent yellow, white and blue paints were used. The bowls were filled half with soap solution (5%). 6 bowls in each plot (2 of each colour) were placed 3 meter apart randomly and numbered at about canopy height. While collecting specimens weekly from the bee bowls a tea strainer were used and specimen tubes (as many as the number of traps) were taken for collection. The specimens from the strainer were transferred to a separate specimen tube, with proper label including the date of observation, crop, location and trap number in the crop. After returning to the lab, the specimens were washed with alcohol (70%) diluted in distilled water, dried on filter paper and then mounted using appropriate insect pins and labeled.

Yellow pan traps used were to catch many flying insects. Yellow pan traps are shallow trays painted yellow using either enamel yellow paint or fluorescent yellow. The tray was half filled with water and a few drop of liquid soap was added. The traps were placed on the ground in the field with 2 such traps in each replicate. The pan traps were kept for 24 hours for recording observations on flower visitors.

Data Analysis

Shannon-Weaver Diversity index calculated by using following formula.

Shannon-Weaver Diversity Index

$$H' = -\sum_{i=1}^{S} p_i \ln p_i$$

Where,

- n is total number of organisms of a particular species,
- N is the total number of organisms of all species

Results

The insect pollinator diversity was recorded during the flowering period from 21/08/2017 to 29/10/2017 on sweet basil. The major insect pollinators belonged to 5 different orders: Hymenoptera, Lepidoptera, Coleoptera, Diptera and Hemiptera that were observed during different hours of the day. The maximum Shannon Weaver diversity index (1.20) for transect sampling was observed during 16:00 to 18:00 hours; while minimum (0.94) was during 10:00 to 12:00 hours. The Shannon Weaver diversity index for insect pollinators trapped in the colored bee bowls (Yellow, White & Blue), white bee bowl was recorded maximum (1.59) and minimum in yellow bee bowl (1.51); whereas, in yellow pan trap (1.34) was observed.

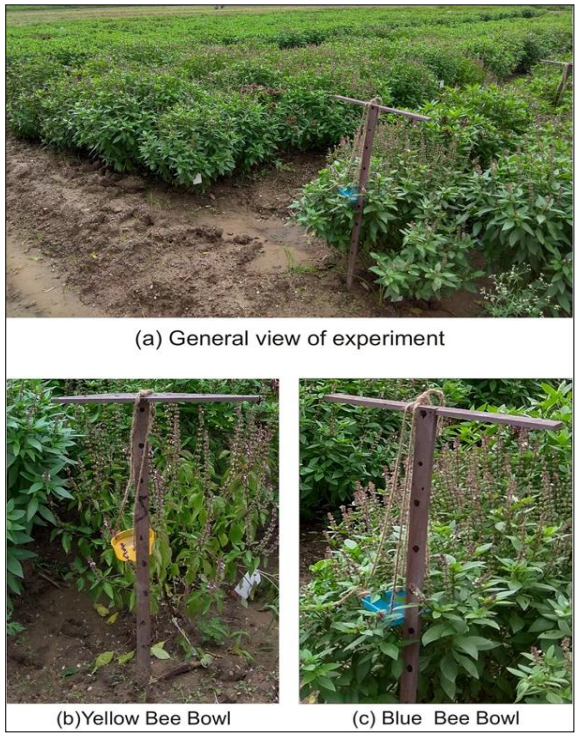

Fig 1: general view of experiment and placement of bee bowls

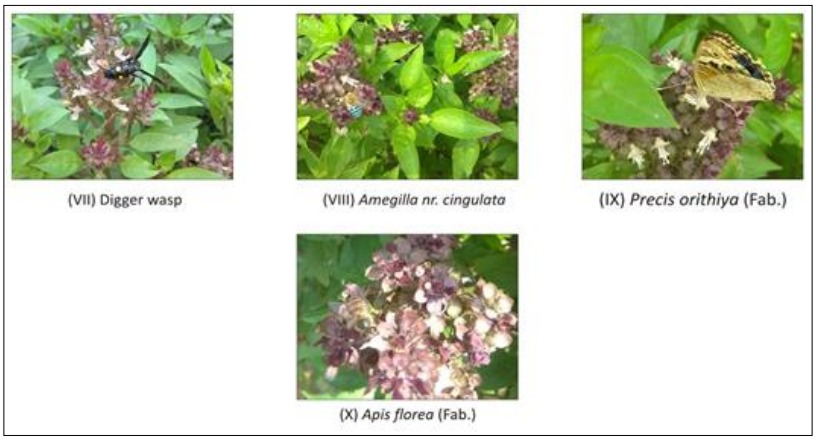

Fig 2: Diversity of Insect Pollinators on Sweet Basil (*Ocimum basilicum* Linn.) during *Kharif*, 2017

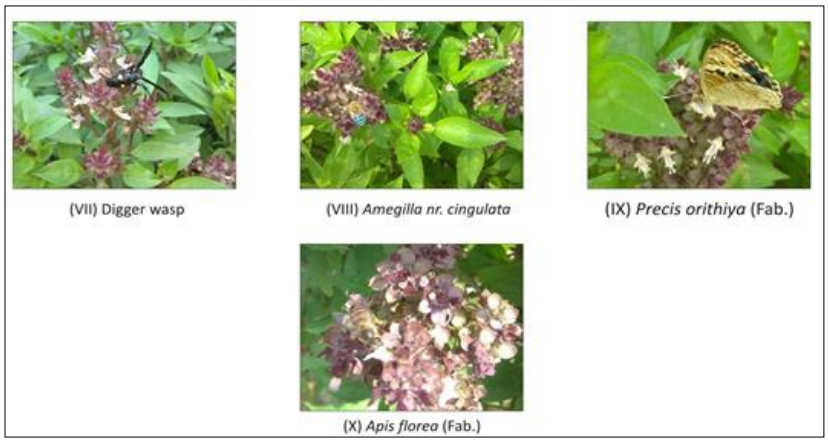

Fig 3: Diversity of Insect Pollinators on Sweet (*Ocimum basilicum* Linn.) *Kharif*, 2017

Table 1: Seasonal mean population of insect pollinators at different times of the day under transect sampling during *Kharif*, 2017

Pollinators from insect orders	Mean pollinators						Total of the days (%)
	Mean pollinators during different hours of the day						
	6 to 8	8 to 10	10 to 12	12 to 14	14 to 16	16 to 18	
Lepidoptera	09.29	09.00	14.71	11.43	08.29	07.14	55.58
Hymenoptera	01.00	03.00	08.00	11.14	06.14	02.86	29.84
Diptera	00.71	01.57	01.14	01.14	01.00	01.57	6.62
Coleoptera	00.71	00.43	00.29	00.00	00.14	00.29	1.73
Hemiptera	01.43	01.14	00.43	01.57	01.14	01.00	6.23
Shannon-Weaver Diversity Index	01.00	01.16	00.94	01.03	01.11	01.20	

Table 2: Seasonal weekly population of insect pollinators on different colour of bee bowls and yellow pan trap during *Kharif*, 2017

Pollinators from insect orders	Mean pollinators collected in differently colored bee bowls and yellow pan trap			
	Yellow	Blue	White	Pan Trap
Lepidoptera	2.57	6.14	3.43	0.57
Hymenoptera	5.29	4.29	4.29	3.57
Diptera	0.86	5.43	2.29	1.71
Coleoptera	2.71	1.14	1.86	1.14
Hemiptera	2.00	1.71	1.14	0.43
Shannon-Weaver Diversity Index	1.51	1.56	1.59	1.34

Discussion

The major insect pollinators belonged to 5 different orders: Hymenoptera, Lepidoptera, Coleoptera, Diptera and Hemiptera that were observed during different hours of the day. The maximum diversity of pollinators belonged to Lepidoptera (55.58 percent) and Hymenoptera (29.84 percent) on the basis of transect sampling. Present finding are in close conformity with the earlier work of Banjo *et al*. (2006) [1]. Found Hymenoptera was the most abundant order on *O. basilicum* accounting for 50.7 per cent pollinators. Similarly Tri Atmowidi *et al*. (2007) [6]. Recorded a total of 5,955 pollinator insects associated with *Brassica rapa* were observed. They belonged to 19 species and 4 orders (Hymenoptera, Lepidoptera, Coleoptera, and Diptera, for 95, 2.17, 2.07 and 1%, respectively) while, Chaudhary (2006) [4]. Reported six Apoidea species visiting fennel (*Foeniculum vulgare* Mill.) including hymenopterans (47.1%) and dipterans (50.3%) that were the most prominent groups contributing 39.5 per cent of the total visitors.

References

1. Banjo AD, Lawal OA, Aina SA. Insect Diversity of Two Medicinal Labiate in South Western Nigeria, Journal of Entomology. 2006; 3:298-304.
2. Shannon CE, Weaver W. The mathematical theory of communication, University of Illinois Press, Urbana, 1949.
3. Ollerton J, Winfree R, Tarrant S. How many flowering plants are pollinated by animals? *Oikos*. 2011; 120:321-326.
4. Chaudhary P. Diversity, foraging behaviour of floral visitors and pollination ecology of fennel (*Foeniculum vulgare* Mill.), Journal of Spices and Aromatic Crops. 2006; 16:34-41.
5. Pullaiah T. Encyclopedia of world medicinal plants. 2006; 4:1663-1667.
6. Tri Atmowidi, Damayanti Buchori, Sjafrida Manuwoto, Bambangsuryobroto, Purnama Hidayat. Diversity of Pollinator Insects in Relation to Seed Set of Mustard *(Brassica rapa* L.: Cruciferae), Hayati Journal of Biosciences. 2007; 14:155-161.