

## Original Research Article

# The Relative Diversities and Abundance of Different Insect Pollinators on Mustard

Vikas Singh<sup>\*</sup>, V. K. Dubey, Navneet Rana and Gajendra Chandrakar

Department of Entomology, IGKV, Raipur, India

*\*Corresponding author*

## ABSTRACT

The diversity and abundance of different insect visitors on mustard (*B. juncea*) ecosystem were studied at IGKV, Raipur. The observations of relative abundance of important pollinators visiting on mustard blossom were recorded as insect/m<sup>2</sup>/minute at different hours of the day. Total of eight insect visitors belonging to three different orders viz., Hymenoptera, Diptera and Coleoptera were found visiting on mustard flower. The highest contribution of per cent relative abundance and average insect population were observed in the order Hymenoptera as 84.64% with 22.15 insect visitors/m<sup>2</sup>/min, respectively. In general the higher activities of honeybees were recorded during 12:00h and 15:00h, respectively.

### Keywords

Pollinator,  
Diversity,  
Abundance,  
Mustard

## Introduction

Agricultural production forms one of the most important economic sectors (FAOSTATS, 2013) where the quality of most crop species is increased by pollination (Klein *et al.*, 2007; Gallai *et al.*, 2009). Positive relationships between the richness and abundance of floral resources and pollinator diversity and activity have been found at the landscape level (Klein *et al.*, 2003). Animal pollinators are thought to contribute in 15 up to 30% of global food production (McGregor 1976) and bees are recognized to be the most important pollinating taxon (Delaplane and Mayer 2000). Rapeseed and mustard are the third most important edible oilseed crops of the world after soybean and oil palm, mostly pollinated by insects. Flowers of mustard are a prime source of pollen and nectar, making them a desirable site for various pollinating

insect groups, mainly belong to the orders hymenoptera, diptera, coleoptera, lepidoptera, thysanoptera, hemiptera and neuroptera (Free, 1993; Kearns *et al.*, 1998; Mitra and Parui, 2002; Mitra *et al.*, 2008). In this study, we used mustard to investigate the diversity and abundance of pollinator insects in relation to flower phenology and pod set. The diversity and abundance of pollinator insects was observed in relation to time and flower phenology.

## Materials and Methods

The trial was carried out to document the pollinator diversity and abundance in mustard ecosystem at Department of Entomology, College of Agriculture, IGKV, Raipur, Chhattisgarh during 2014-15. Mustard was raised without any insecticidal

sprays with all the recommended agronomic practices. Different insect visitors were collected by sweep method on mustard throughout the blooming at an hourly interval from 0800 to 1700 hour and kill and preserve as dry specimens. Insect collection should be started after 3 days of commencement of flowering and continued till 90 per cent flowering is over. The collected insects were differentiated as insect visitors and pollinators by observing their behaviour on flowers. Similarly, observations on frequent insect visitors to the mustard flower were recorded daily on per square meter area for five minutes at 1000, 1200 and 1500 hour throughout the flowering period. The abundance of the different pollinators recorded on mustard flower and it were expressed as mean number of pollinators/m<sup>2</sup>/minute.

## Results and Discussion

### Diversity of pollinators/ visitors on mustard ecosystem

On mustard, total of eight insect visitors (Table 1) belonging to three different orders viz., Hymenoptera, Diptera and Coleoptera were found visiting on mustard flower. In which three species viz., *Apis florea*, *Apis dorsata* and *Apis cerana indica* from the family Apidae and one species *Xylocopa iridipennis* from the family Xylocopidae and one species from the family Scollidae were observed under order hymenoptera.

One species *Syrphus corollae* from the family Syrphidae and one species *Musca domestica* from the family Muscidae were observed under order Diptera. Similarly, one species *Coccinella septumpunctata* from the family Coccinellidae were found under order Coleoptera. Our findings are also in agreement with the findings of Goswami and Khan (2014), who reported a total of 19

insect visitors belonging to order Hymenoptera (15), and Diptera (4), were found to visit the mustard blossoms, in which maximum number of families belonged to order hymenoptera viz. apidae, scollidae, xylocopidae, halictidae, magachilidae and sphecidae. Lepidopteran visitors belonged to families Pieridae. Besides this some Dipteran visitor belonged to families these were Syrphidae and Muscidae were observed on mustard flowers. Abrol (1989) recorded 20 species belonging to 12 families of Hymenoptera and Diptera and found that *Apis cerana*, *A. mellifera*, Halictid bees, *Halictus* sp. and *Lasioglossum* sp., were the most numerous visitors and important pollinators of *Brassica* crops.

### Relative abundance of pollinators on mustard ecosystem

On mustard, the highest contribution of per cent relative abundance and average insect population (Table 2) (Fig. 1 and 2) were observed in the order Hymenoptera as 84.64% with 22.15 insect visitors/m<sup>2</sup>/min, respectively. Among Hymenoptera, maximum contribution of per cent relative abundance and average insect population was observed in the family Apidae as 81.11% and 21.23 insect visitors/m<sup>2</sup>/min, respectively. Whereas, in the family Xylocopidae and Scoliidae contribution of per cent relative abundance as 01.38% and 02.15% and average insect population as 0.36 and 0.56 insect visitors/m<sup>2</sup>/min were found on mustard flower. In the order Diptera, family Syrphidae the contribution of relative abundance and average insect population was observed as 09.00% and 2.36 insect visitors/m<sup>2</sup>/min, respectively. Similarly, per cent relative abundance and average insect population of other insect pollinators were observed as 06.36% and 1.66 insect visitors/m<sup>2</sup>/min, respectively. In

general the higher activities of honeybees were recorded during 12:00h and 15:00h, respectively. These results are in conformity with the earlier recorded observations of Goswami and Khan (2014) on *mustard*, which revealed that activity of honey bees was higher at 12:00 h (66.31%) as compared to other bees which were equally active at 10:00h (21.74). In Hymenopterans, the honeybees (*Apis* bees) were observed maximum (57.55 %) followed by non *Apis* bees (21.06 %) and the scolid wasp (1.35 %). Similarly Thakur *et al.*, (1982) and Rana *et al.*, (1997) also observed higher foraging

activity at 12:00 h of both *A. mellifera* and *A. indica* than at 09:00 h. Bhowmik *et al.*, (2014) reported hymenopteran species were reported to be common with significantly active throughout the day, followed by Coleoptera, Diptera and Lepidoptera. Abundance of Hymenoptera was observed to be maximum (52.74 %) followed by Coleoptera (25.45 %), Diptera (11.66 %) and Lepidoptera (10.13%). The peak foraging activity of the members of Hymenoptera, Coleoptera, Lepidoptera and Diptera was observed to be at 12 p.m., 1 p.m., 12 p.m. and 2p.m. respectively.

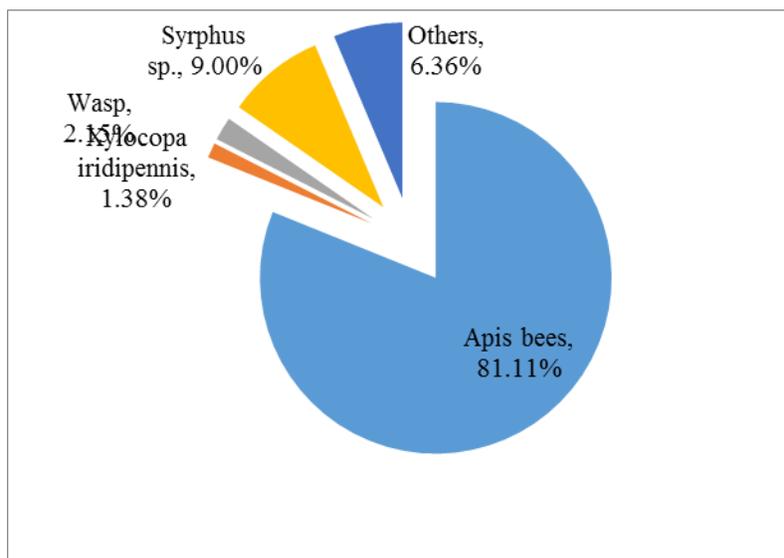
**Table.1** Diversity of different insect visitors on flowers of Mustard (*B. juncea*)

S No	Common Name	Scientific Name	Order	Family
1	Little honeybee	<i>Apis florea</i>	Hymenoptera	Apidae
2	Rock bee	<i>Apis dorsata</i>	Hymenoptera	Apidae
3	Indian honeybee	<i>Apis cerana indica</i>	Hymenoptera	Apidae
4	Carpenter bee	<i>Xylocopa iridipennis</i>	Hymenoptera	Xylocopidae
5	Wasp	-	Hymenoptera	Scollidae
6	Syrphid fly	<i>Syrphus corollae</i>	Diptera	Syrphidae
7	House fly	<i>Musca domestica</i>	Diptera	Muscidae
8	Ladybird beetle	<i>Coccinella septumpunctata</i>	Coleoptera	Coccinellidae

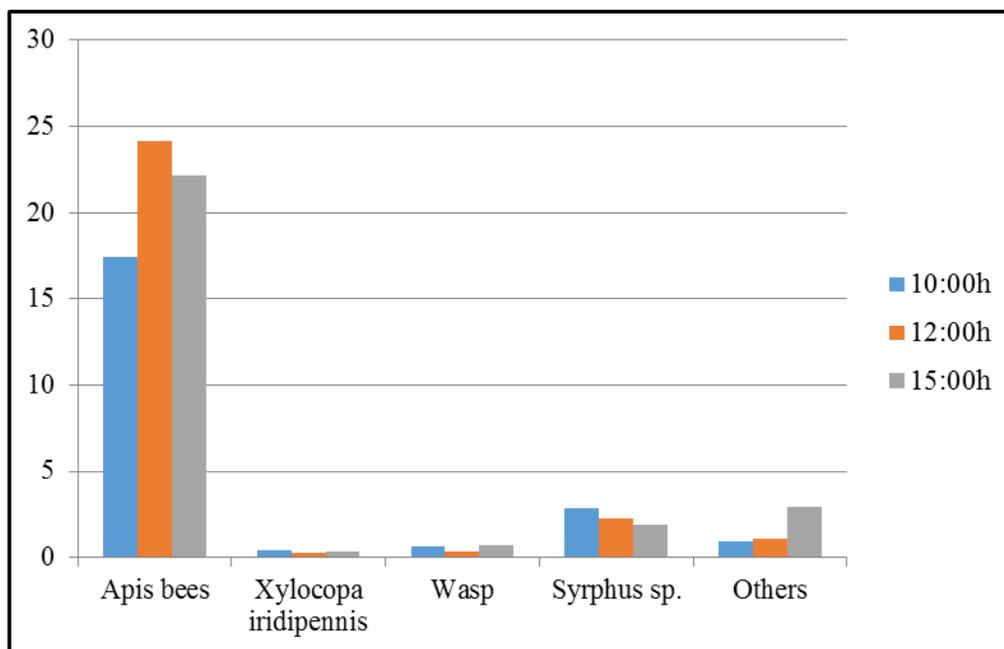
**Table.2** Relative abundance and average insect population on flowers of Mustard

Insect Group	Per cent abundance (insect visitors/m <sup>2</sup> /min)				
	10:00h	12:00h	15:00h	Mean	Percent Abundance of Pollinators
<i>Apis</i> bees	17.43	24.13	22.13	21.23	81.11%
<i>Xylocopa iridipennis</i>	0.45	0.30	0.33	0.36	01.38%
Wasp	0.63	0.33	0.73	0.56	02.15%
<i>Syrphus</i> sp.	2.87	2.27	1.93	2.36	09.00%
Others	0.93	1.13	2.93	1.66	06.36%
<b>Total</b>	22.31	28.16	28.05	26.17	<b>100%</b>

**Fig.1** Relative abundance of pollinators of mustard



**Fig.2** Average population of insect visitors/m<sup>2</sup>/minutes on flower of mustard



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