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The Relative Diversities and Abundance of Different Insect Pollinators on Sunflower

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ABSTRACT

The diversity and abundance of different insect visitors on sunflower (*Helianthus annuus* L.) ecosystem were studied at IGKV, Raipur. The observations of relative abundance of important pollinators visiting on sunflower heads were recorded as insect/m^2/minute at different hours of the day. In sunflower, the honeybee was recorded as the major pollinator with an average of 25.11 insect visitors/m^2 / min. Xylocopa was the second insect pollinator with an average of 2.74 insect visitors/m^2 /min, whereas other pollinators were comparatively less active. Similarly, activities of pollinators on sunflower heads were found during 10:00h, 12:00h and 15:00h as 34.39, 35.27 and 34.50 insect visitors/m^2 /min, respectively. The higher activities of honeybees and xylocopa was recorded during 10:00h and 12:00h, respectively.

Key words *Pollinator, diversity, abundance, sunflower*

Sunflower (*Helianthus annuus* L.) is an important oilseed crop in India and ideal for cultivation in any season because of its wider adaptability, drought tolerance, short duration, photo and thermal insensitivity characteristics. Among various oilseed crops, sunflower is considered as a third most important next to soybean and groundnut (Hegde *et al.* 2009). It has low seed rate and high seed multiplication ratio (1:80). It is a cross pollinated crop and pollinators play an important role in getting higher yields. The floral arrangement, sequence of flower opening, colored petals and strong scent allows them to be assisted when visited by pollinating insects such as, bees, wasps and occasionally ants, beetles, moths and butterflies and flies (Labandiera *et al.* 2007). Majority of insect pollinators belong to three orders *viz.*, Hymenoptera, Lepidoptera and Diptera.

MATERIALS AND METHODS

The trial was carried out to document the pollinator diversity and abundance in sunflower ecosystem at Department of Entomology, College of Agriculture, IGKV, Raipur, Chhattisgarh during 2014-15. Sunflower was raised without any insecticidal sprays with all the recommended agronomic practices. Different insect visitors were collected by sweep method on sunflower 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 sunflower capitulum (head) 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 sunflower heads and it were expressed as mean number of pollinators/m^2/minute.

RESULTS AND DISCUSSION

Diversity of pollinators/ visitors on sunflower ecosystem

On sunflower, total of nine insect visitors (table 1) belonging to four different orders *viz.,* Hymenoptera, Diptera, Lepidoptera and Coleoptera were found visiting on sunflower capitulum (head). In which three species *viz., Apis florea, Apis dorsata* and *Apis cerana indica* from the family Apidae and one species from the family Xylocopidae and one species from the family Scollidae were observed under order hymenoptera. One species *Syrphus corolla* from the family Syrphidae and one species *Musca domestica* from the family Muscidae were observed under order Diptera. Similarly, one species *Pieris brassicae* from the family Pieridae under order Lepidoptera and one species *Coccinella septumpunctata* from the family Coccinellidae under order Coleoptera were found, respectively. Our findings are also in agreement with the findings of Deodikar *et al.* (1976), Satyanarayana and Seetharam (1982) and Jadhav *et al.*(2011) who reported several insect pollinators from sunflower capitulum belonged to order Hymenoptera (*Apis* and non-*Apis* species), Lepidoptera (Moths and butterflies) and Diptera and Coleoptera. Krishna (2014) also recorded different 45 pollinators on sunflower during the study, among them 12 species belonged to Hymenoptera, 16 species belonged to Lepidoptera, 5 species belonged to Diptera, 4 species belonged to Hemiptera and 8 species belonged to Coleoptera.

Relative abundance of pollinators on sunflower ecosystem

On sunflower, the highest contribution of per cent relative abundance and average insect population (Table 2) (Fig. 1 & 2) were observed in the order Hymenoptera as 82.46% with 28.63 insect visitors/m^2 /min, respectively. Among Hymenoptera, maximum contribution of per cent relative abundance and average insect population was observed in the family Apidae as 72.32% and 25.11 insect visitors/m^2 /min, respectively. Whereas, in the family Xylocopidae and Scoliidae contribution of per cent relative abundance as 07.90% and 02.24% and average insect population as 2.74 and 0.78 insect visitors/m^2 /min were found on sunflower capitulum (head). In the order Diptera, family Syrphidae the contribution of relative abundance and average insect population was observed as 06.38% and 2.22 insect visitors/m^2 /min, respectively. Similarly, per cent relative abundance and average insect population of

Table 1. Diversity of different insect visitors on flowers of Sunflower

S No	Common Name	Scientific Name	Order	Family
1	Little honeybee	*Apis florea*	Hymenoptera	Apidae
2	Rock bee	*Apis dorsata*	Hymenoptera	Apidae
3	Indian honeybee	*Apis cerana indica*	Hymenoptera	Apidae
4	Carpenter bee	*Xylocopa iridipennis*	Hymenoptera	Xylocopidae
5	Wasp	-	Hymenoptera	Scoliidae
6	Syrphid fly	*Syrphus corolla*	Diptera	Syrphidae
7	House fly	*Musca domestica*	Diptera	Muscidae
8	Cabbage butterfly	*Pieris brassicae*	Lepidoptera	Pieridae
9	Ladybird beetle	*Coccinella septumpunctata*	Coleoptera	Coccinellidae

Table 2. Relative abundance and average insect population on Sunflower

Insect Group	Average insect population (insect visitors/m^2 /min)				
	10:00h	**12:00h**	**15:00h**	**Mean**	**Relative Abundance of Pollinators**
Apis bees	28.47	24.13	22.73	25.11	72.32%
Xylocopa iridipennis	1.93	3.73	2.57	2.74	07.90%
Wasp	0.43	1.17	0.73	0.78	02.24%
Syrphus spp.	1.65	2.87	2.13	2.22	06.38%
Others	1.91	3.37	6.34	3.87	11.16%
Total	34.39	35.27	34.5	**34.72**	**100.00%**

other insect pollinators were observed as 11.16% and 3.87 insect visitors/m^2 /min, respectively. In general the higher activities of honeybees and xylocopa were recorded during 10:00h and 12:00h, respectively. Our findings are in conformity with observations made by Swaminathan and Bharadwaj (1982) they recorded the most frequenting bee species as *A. dorsata*. Similarly Deodikar *et al.* (1976), Panchabhavi and Devaiah (1977), and Satyanarayana and Seetharam (1982) and Jadhav *et al.* (2011) also reported *A. dorsata* was the most frequent visitor though other insects *viz., A. cerana, A. florea, Milipona* sp., *Xylocopa* sp. butterflies and moths did pollinate the sunflower crop.

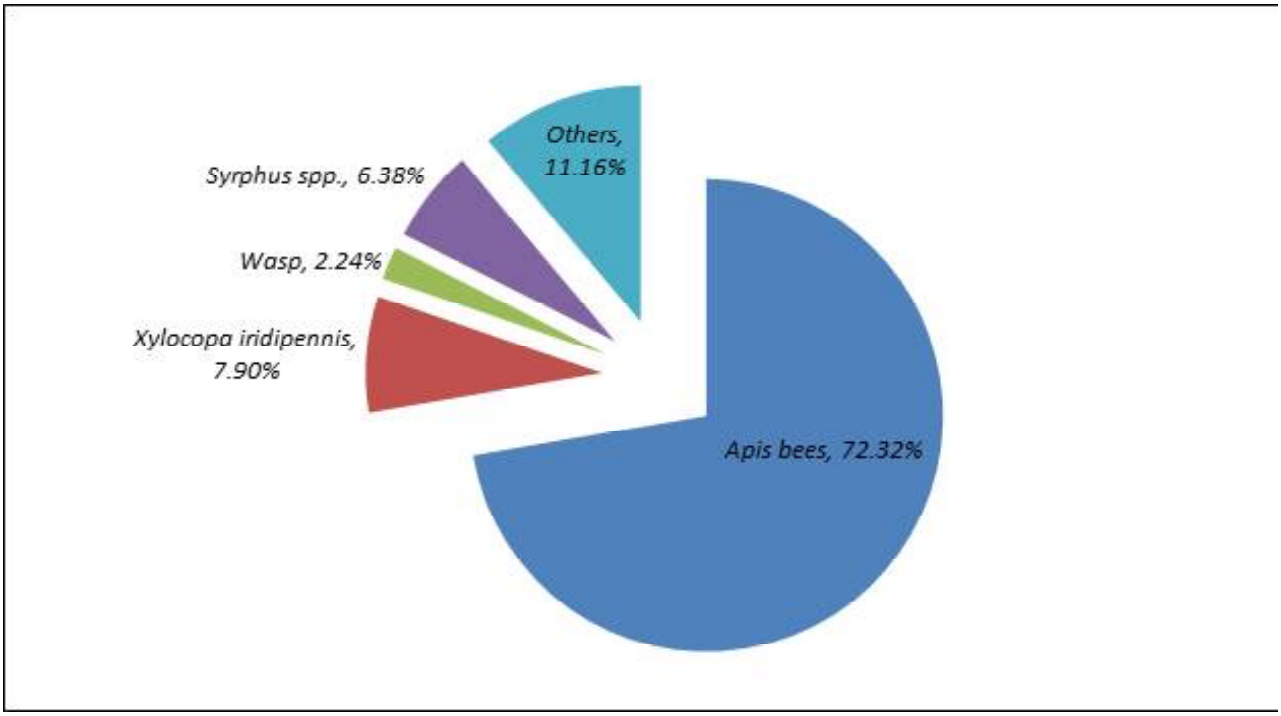

Fig. 1. Relative abundance of Pollinators on Sunflower

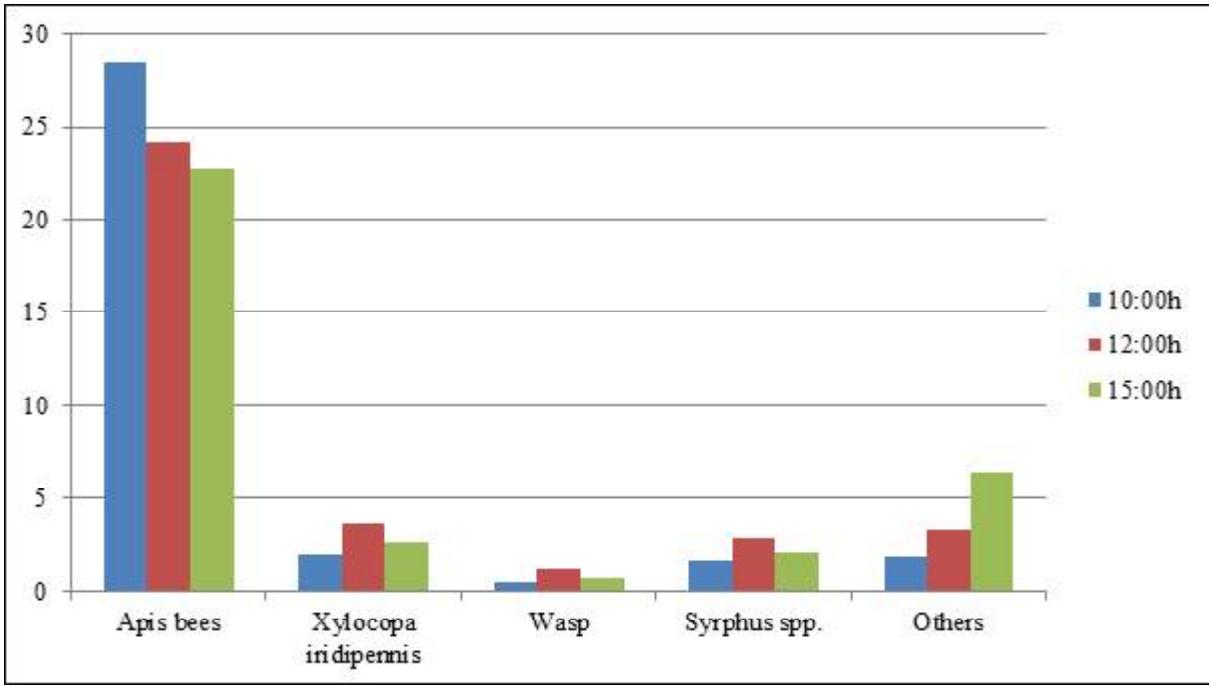

Fig. 2. Average population of insect visitors/m^2 /min on Sunflower

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