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BEE VISITORS (APOIDEA) ON *ALLIUM CEPA* L. IN WESTERN RAJASTHAN

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A study was conducted for determination of bee species composition that visits onion (*Allium cepa* L.) in Western Rajasthan. It is a biennial plant, best cultivated in fertile soils having good drainage. In Western Rajasthan,the seed yields of *A. cepa* crops may often be lower than the expected,because of adverse climatic, edaphic or cultural factors, but also because of the inadequate number of bee pollinators. In absence of bee pollination, fruit or seed set is affected adversely evenif all the cultural practices are followed meticulously. Bee pollinators start visiting early flowers of the crop and increase quality andquantity of the seed yield.The collection on flowerings and identificationof bee species revealed that the crop is visited by 16 species of Apoidea. They belong to various families: Halictidae (06 spp.: *Nomiaelliotii* Smith, *Pseudapis tegulata* Smith, *Lasiogl ossum* spp., *Halictus* spp., *Ceylalictus* spp., *Nomioides* spp.); Apidae (06 spp.:*Crocisa ramose* Lepeletier, *Ceratina propinqua* Cameron, *Ceratina sexmaculata* Smith, *Amegilla quadrifasciata* de Villers, *Amegillaniveo-cincta* Smith, *Epeolus* spp.), Megachilidae (04 spp.: *Megachiles tirostoma* Cameron, *Megachile argentata* Spinola, *Megachile creusa* Bingham, *Megachile studiosa* Bingham), The study concluded that there was no visitor identified in family Andrenidae, Colletidae and Melittidae on this crop in the specified area. Onions are cultivated and used around the world as a food item. They are usually served cooked, as a vegetable or part of a prepared savoury dish, but can also be eaten raw or used to make pickles or chutneys. The paper presents apprehension about the effectiveness of this visitor's on the referred crop for the first time.

Key words- *Allium cepa* L., Apoidea, Megachilidae, Halictidae, Apidae, Western Rajasthan

Onion (*Allium cepa* L.) is a biennial crop. It is naturally cross pollinated by insects, especially honey bees, solitary bees and Diptera (Lederhouse *et at.*1972). Onion also known as the bulb onion or common onion is a vegetable and is the most widely cultivated species of the genus *Allium* in India. It is usually treated as an annual and harvested in its first growing season. The bulb of onion consists of swollen bases of green foliage leaves and fleshy scales. Onion makes an important source of vegetable and its seeds are source of condiments (Baswana,1984). *A. cepa* L. is a liliaceous crop, which is grown in different parts of world and its cultivation is becoming popular in India (Sihag, 1985). In India it has been grown in 0.52 million ha with the production of 6.5 million tones.

MATERIALS AND METHODS

Present observations were recorded on onion flower planted in a farm at Chokha village of Jodhpur. The crop was planted in the month of November and December 2016. It started flowering in the month of February. The collection of bees was made during month of March and April 2016. Bees were collected by direct-sweeping method. Collections were made every 3 day in flowering period until the end. Collected bees were instantly killed with the help of Benzene fumes in a killing bottle. They were brought to the laboratory and properly spread for the identification. Confirmation of identification was based upon microscopic observations involving vital body parts such as mouth parts, wings, head, thorax, abdomen and genitalia etc.

FIELD OBSERVATIONS

A total of 321 bees were collected on *A. cepa* from Chokha villageof Jodhpur. These were identified 16 species grouped into 11 genera incoming from 3 families of Apoidea (Halictidae, Megachilidae, Apidae) (Table 1). No bee has been recorded on this crop from Andrenidae, Colletidae family. On a normal sunny day most of the bees started their foraging activities around 8:00 A.M. i.e. when sufficient amount of sunshine was spread all over the fields. Their population and activity reached to its peak at round 12:00 to 1:00 P.M. and most of the bees began to return their nests around 3:00 to 5:00 P.M. onwards. Table 1 illustrates the bee species identified, their activity periodicity, population density and the floral resource recorded on the flowerings in the field.

Table 1: Apoidean Bee visitors observed on *Allium cepa* L.

S. No.	Family	Species	Activity Periodicity	Population Density	Attracting Resource Nectar / Pollen	
	Halictidae					
1		*Nomiaelliotii* Smith, *1875*	8:00AM-3PM	+++	N	P
2		*Pseudapistagulata* Smith, *1875*	8:00AM-3PM	++	N	P
3		*Lasioglossum sp.*	8:00AM-3PM	+	N	P
4		*Halictus sp.*	8:00AM-3PM	+	N	P
5		*Ceylalictus sp.*	8:00AM-3PM	++	N	P
6		*Nomioides sp.*	8:00AM-3PM	+++	N	P
	Megachilidae					
7		*Megachilestirostom* Cameron, *1913*	8:00AM-3PM	++	N	P
8		*Megachileargentata* Spinola, *1806*	8:00AM-3PM	+++	N	P
9		*Megachilecreusa* Bingham, *1898*	8:00AM-3PM	++	N	P
10		*Megachilestudiosa* Bingham, *1897*	8:00AM-3PM	+	N	P
	Apidae					
11		*Crocisa ramose* Lepeletier, *1841*	8:00AM-3PM	++	N	-
12		*Ceratinapropinqua* Cameron, *1897*	8:00AM-3PM	+++	N	P
13		*Ceratinasexmaculata*	8:00AM-3PM	++	N	P
14		*Amegilaquadrifaciata* de Villers, *1789*	8:00AM-3PM	+	N	P
15		*Amegilaniveocincta* Smith, *1854*	8:00AM-3PM	++	N	P
16		*Epeolus sp.*	8:00AM-3PM	+++	N	-

RESULTS AND DISCUSSION

It is a well-known fact that number of flowering plants use insect as pollen vectors and they actually depend on the visits of insect for their pollination. Present study was done to explore the pollination bees on a very short duration of plant *Allium cepa* L. Its flowering attracted a total of 16 species of bee which have been identified belong to 11 genera incoming from 3 families of Apoidea.

So far around 650 species of bees have been recorded from India which are identified to 65 genera grouped under 6 families (Gupta, 2003). It was fascinating to record more than 50 species in the Thar Desert of Western Rajasthan on a single crop. Following account details the family-wise data with regard to various genera and species found on this crop. Bees of family Colletidae, Andrenidae and Melittidae were not collected from *A. cepa*. A total of 4 species of family Megachilidae were collected on its flowering. All 4 species have been recorded on this crop during all time in a day little after sunshine until 3 PM. to 4 PM. Member of this family can collected huge amount of pollen grains on their scopa which is prominently located at

the ventral surface of the abdomen and bears quite long dense bristles. Megachilidae bees can be seen seating on flowers of *A. cepa*, staying on it for a good time and slowly returning in reverse pattern loaded with pollens.

A total of 6 species were identified under 4 genera of family Apidae. They had enough affection for the nectar and pollen of *A. cepa* and therefore a good number of bees were seen working on its flower. They belong to genera *Thyrues* Panzer, *Ceratina* Latreille, *Amegilla* Friese and *Epeolus* Latreille.

A total of 6 species identified under 6 genera of family Halictidae ,may be referred as the top pollinators for this crop. They belong to genera *Nomia* Latreille, *Pesudapis* Kirby, *Halictus* Latreille, *Ceylalictus* Strand, *Nomioides* Schenck and *Lasioglossum* Curtis.

Apis floria Fabricius were collected in huge numbers on this crop. Their working span was quite longer too, in comparison to the bees of family Halictidae and Megachilidae. Apidae constitutes second largest group of bees which have been recorded with 4 genera including 6 species on referred crop. Genus *Thyreus* Panzer includes cleptoparasitic bees. They lack pollen collecting apparatus therefore, they are incapable of collecting pollen grains. They were often seen tracking behind *Amegilla* species to their nests and lay their eggs on the provisioning deposits collected by the *Amegilla* females.

One can conclude from Table 1 that which of the species may be considered quite effective pollinator on *A. cepa*. Further studies are definitely required to make comparison in efficiencies for the referred act in between non-*Apis* & *Apis* species as well as among both groups themselves. This has been established that the principal factors which determine the effectiveness of pollinators can be briefed as they should be found in abundance, their flight periodicities should be the maximum on flowering and their visiting rate (the number of flowers visited per minute by a bee) should be considerably enough also (Free,1970;Ozbek, 1976;Richards,1993).

Bee pollination is necessary for many cross pollinated crops especially in the case of seed production e.g. onion (*A. cepa* L.) (Mayer and Lunden, 2001). The role of managed honey bee (*Apis mellifera* L.) in onion pollination has widely been documented by many authors (Kumar *et al.* 1989; Rao and Suryanarayans, 1989; Ahmed and Abdalla, 1984; Mayer and Lunden, 2001; Tolon and Duman, 2003), but managed bee pollination is not always possible in all environments.

Authors suggest that identical studies should be made by pollination and bee biologists to explore further possibilities of pollinator bees towards intensive and more effective pollination on wild and cultivated crops (Rajpurohit and Gupta, 2006).

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