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Different insect Pollinators fauna on mustard Corp

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Abstract

Among all the orders observed majority Hymenoptera insect pollinators were found most dominating for the pollination, second dominating pollinator insect order is Diptera followed by Coleoptera and Lepidoptera was observed on the mustard flowers during two *Rabi* flowering season (2020-21 to 2021-22). The recorded data of *Rabi* season 2020-21 & 2021-22 showed almost same insect pollinator faunas on mustard crop. That's indicated the insect order Hymenoptera is most dominating but in order Hymenoptera most dominance is *Apis* Genus (mainly *Apis. florea* F., *Apis. mellifera* L., *Apis. dorsata* F. and *Apis. cerana* F.) mostly bee species was observed on the mustard flowers.

Keywords: Hymenoptera, diptera, lepidoptera, coleoptera, *Apis*, pollinator, faunas, dominating and mustard

Introduction

For the pollination, insect pollinators play the vital role in both natural and agro-ecosystems. Almost all flowering plant species required pollinating mediums (living or non leaving mediums) in all cultivated and non cultivated crops. Most angiosperm depends on animals for sexual reproduction (Potts *et al.*, 2010; Albrecht *et al.*, 2012) [2, 1]. Pollination occurs from pollen transferred from the anther (male part) to the stigma (female part) of another flower. The pollinators are the biotic agent, animal or vector which helps to move the pollen from anther to the stigma of a flower (Willmer *et al.*, 1994; Das *et al.*, 2018) [3, 4]. Mustard has green foliage, leaves in which upper leaves partially clasping the stem. The stem is well branched. The branching depends on variety and each terminates in an inflorescence. The inflorescence is an elongated raceme; the flowers are pale yellow, densely clustered at the top with open flowers borne at or above the level of terminal buds and open upwards from the base of the raceme (Downey *et al.*, 1980; Subedi and Subedi, 2019) [5, 6]. Flower of mustard is formed in the stem elongates after the leaf stop growing which are highly attractive to pollen and nectar feeding insects due to its bilateral, bright yellow flowers (Abrol, 2007) [7]. The stem has many branches, small leaves and bright yellow stamens and ovary (Subedi and Subedi, 2019) [6]. Brassica crops are very attractive for insect pollinators for a good source of pollens and nectar (Masierowska, 2003) [8]. Cross-pollination is favored in mustard and self-pollination can assure pollination at late flowering (Eisikowitch, 1981; Free, 1993; Abrol, 2007) [9, 10, 7]. The yellow color of the flower with shallow placement of visible nectar mostly attracts bees, flies and butterflies. It is cross-pollinated crop and requires sufficient pollinating agents for better pollination and seed production. Honeybees have also been documented as the most frequent visitor of mustard flowers (Free and Nuttall, 1968) [11]. Honeybees visit rapeseed flowers for collection of both pollen and nectar which results into florets crosspollination (Williams, 1994; Sharma *et al.*, 2004) [3].

Method and Materials

Studies was conducted at Krishi Vigyan Kendra Morena under the Department of Entomology, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh. Krishi Vigyan Kendra Morena is located at 26.4795° N, 77.9887° E. This study was made during *rabi* season of 2020-21 and 2021-22 on mustard crop. The experimental field was kept completely free from any pesticidal spray during flowering period. Observations will be recorded at weekly interval for different groups of pollinators visiting the mustard crop during flowering period at 0800, 1000, 1200 and 1600 hours for five minutes in each square meter area from two spot during peak flowering period in mustard crop. The data arranged in the manner of averaged time wise and group wise to infer the pollinator fauna as well as the dominance (in per cent value) of particular group.

Results and Discussion

The findings of foraging activity of different insect pollinators faunas on mustard crop during two Rabi flowering season (2020-21 to 2021-22) was recorded in table-1 & 2 and presented in fig.-1A & 1B. The observations were recorded from the flower initiation of mustard crop and record the foraging activity of different insect pollinators faunas. The data of Rabi season 2020-21 & 2021-22 foraging activity of different insect orders of pollinators and majority of insect pollinators was recorded from order Hymenopteran and it was found most dominating (90.213 & 88.306%) for the pollination in mustard crop after the Hymenoptera insects second dominating pollinator insect order is Diptera (8.085 & 9.274%) followed by Coleoptera (1.277 & 1.613%) and Lepidoptera (0.426 & 0.806%) respectively with two Rabi

seasons The results of the present investigation are almost similar to those reported by earlier workers. Kunjwal *et al.*, (2014) [13] observed a total of 30 species belonging to four orders Hymenoptera, Diptera, Lepidoptera and Coleopteran visiting on mustard crop among them, Hymenoptera were the major insect pollinators. It was also observed that *A. mellifera* was most abundant species in all the varieties of mustard crop than other bees. Kamel *et al.*, (2015) [14] The findings of this study was in agreement with the findings of Jitendra kumar *et al.* (1994) [15], Thakur and Kashyap (1998) [16], Abrol (2007) [7], Tri Atmowidi *et al.* (2007) [17], Balina *et al.* (2012) [18], Goswami *et al.* (2013) [19], Roy *et al.* (2014) [20], Sajjanar and Eswarappa G (2015) [21], Bajjiya and Abrol (2017) [22], Akhtar *et al.* (2017) [23], Deelak *et al.* (2018) [24] and Singh *et al.* (2018) [25].

Table 1: Pollinator Fauna on Mustard Crop during Rabi Season 2020-21

Sr. No.	Order	Family	Insect species	Dominance (%)	Oder wise Dominance (%)
1	Hymenoptera	Apidae	<i>Apis. florea</i> F.	16.038	90.213
2	Hymenoptera	Apidae	<i>Apis. mellifera</i> L.	14.623	
4	Hymenoptera	Apidae	<i>Apis. dorsata</i> F.	12.264	
3	Hymenoptera	Apidae	<i>Apis. cerana</i> F.	12.264	
5	Hymenoptera	Halictidae	<i>Nomia</i> sp.	9.906	
6	Hymenoptera	Apidae	<i>Braunsapis</i> sp.	9.434	
7	Hymenoptera	Halictidae	<i>Halictus</i> sp.	8.019	
8	Hymenoptera	Anthophoridae	<i>Ceratina hieroglyphica</i> Smith	6.132	
9	Hymenoptera	Anthophoridae	<i>Pithitis</i> sp.	4.717	
10	Hymenoptera	Megachilidae	<i>Megachile Lanata</i> F.	2.830	
11	Hymenoptera	Anthophoridae	<i>Amegillia</i> sp.	3.774	
12	Diptera	Muscidae	<i>Musca domestica</i>	36.842	8.085
13	Diptera	Syrphidae	<i>Megaspis argyrocephala</i> Macquart	31.579	
14	Diptera	Syrphidae	<i>Helophilus quadrivilitus</i> Weideman	21.053	
15	Diptera	Syrphidae	<i>Ischiodon scutellaris</i> F.	5.263	
16	Diptera	Syrphidae	<i>Paragus serratus</i> F.	5.263	
17	Lepidoptera	Spingidae	<i>Hemaris</i> sp.	100.000	0.426
18	Coleoptera	Coccinellidae	<i>Coccinella sepetempunctata</i> L	100.000	1.277

Table 2: Pollinator Fauna on Mustard Crop during Rabi Season 2021-22

Sr. No.	Order	Family	Insect species	Dominance (%)	Oder wise Dominance (%)
1	Hymenoptera	Apidae	<i>Apis. florea</i> F.	14.530	88.306
2	Hymenoptera	Apidae	<i>Apis. mellifera</i> L.	13.248	
4	Hymenoptera	Apidae	<i>Apis. dorsata</i> F.	11.111	
3	Hymenoptera	Apidae	<i>Apis. cerana</i> F.	11.111	
5	Hymenoptera	Halictidae	<i>Nomia</i> sp.	8.974	
6	Hymenoptera	Apidae	<i>Braunsapis</i> sp.	8.547	
7	Hymenoptera	Halictidae	<i>Halictus</i> sp.	7.265	
8	Hymenoptera	Anthophoridae	<i>Ceratina hieroglyphica</i> Smith	5.556	
9	Hymenoptera	Anthophoridae	<i>Pithitis</i> sp.	4.274	
10	Hymenoptera	Megachilidae	<i>Megachile Lanata</i> F.	2.137	
11	Hymenoptera	Anthophoridae	<i>Amegillia</i> sp.	3.419	
12	Diptera	Muscidae	<i>Musca domestica</i>	2.991	9.274
13	Diptera	Syrphidae	<i>Megaspis argyrocephala</i> Macquart	2.564	
14	Diptera	Syrphidae	<i>Helophilus quadrivilitus</i> Weideman	1.709	
15	Diptera	Syrphidae	<i>Ischiodon scutellaris</i> F.	0.427	
16	Diptera	Syrphidae	<i>Paragus serratus</i> F.	0.427	
17	Lepidoptera	Spingidae	<i>Hemaris</i> sp.	0.427	0.806
18	Coleoptera	Coccinellidae	<i>Coccinella sepetempunctata</i> L	1.282	1.613

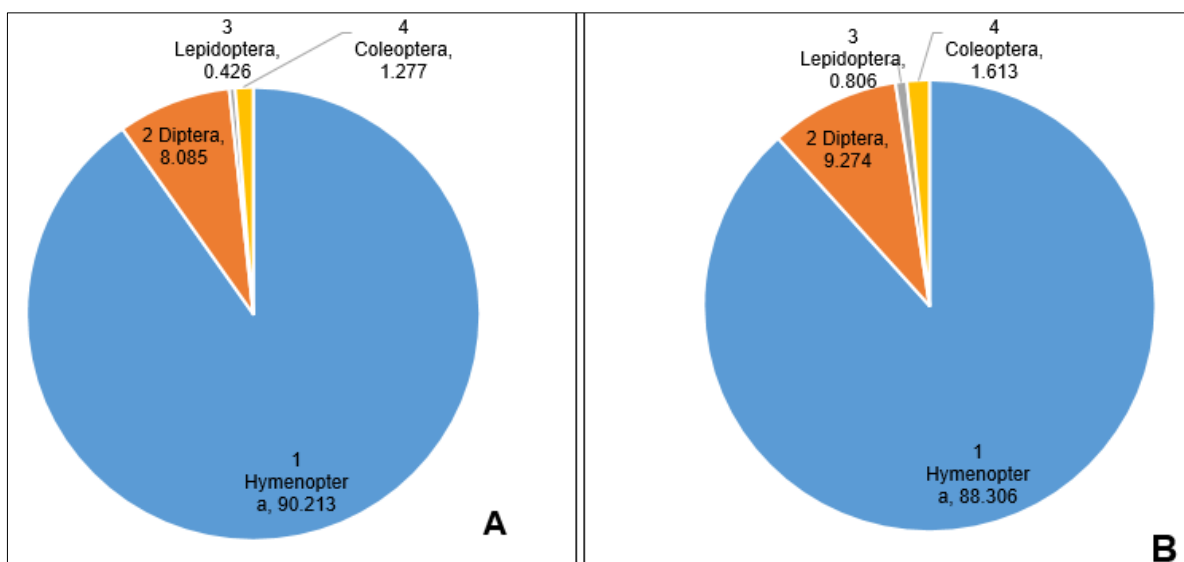


Fig 1: Pollinator Fauna on Mustard Crop during *Rabi* Season 2020-21 (A) and 2021-22 (B) Order wise Dominance (%)

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Author Contribution Statement

¹M.B. and A.S.Y. conceived, designed research and conducted experiments. A.S.Y. and N. contributed to analytical tools. M.B. and N. wrote the manuscript. All authors read and approved the manuscript.

Conflicts of interest/competing interests

There are no conflicts of interest among the parties involved in the investigation and among the authors. All the authors undergo mutual interests in this investigation.

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