

STUDIES ON THE DIFFERENT SPECIES OF INSECT POLLINATORS/VISITORS VISITING BUCKWHEAT FLOWERS

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Abstract: Studies on the succession of various species of insect pollinators/visitor visiting on buckwheat flowers was undertaken at Research cum Instructional Farm of RMD CARS, Ajirma, Ambikapur (C.G.) of Indira Gandhi Krishi Vishwavidyalaya Raipur during year 2016-2017. Total 10 species of insect pollinators/ visitors were found visiting on buckwheat flowers. Amongst the pollinators/visitors, *Apis cerana indica* appeared first on buckwheat flower followed by *Apis florea*, *Danaus chrysippus*, *Eristalis* sp., *Apis dorsata*, *Musca domestica*, *Dysdercus cingulatus*, *Amata passelis*, *Chrysomya bezziana*, *Coccinella septempunctata* and *Vespa cincta*. They were found visiting on buckwheat flower throughout the blooming period.

Keywords: Buckwheat, Succession of insect pollinator/visitors

INTRODUCTION

Buckwheat is the most important crop of the mountain regions both for grain and greens. It occupies about 90% of cultivated lands in the higher Himalayas with a solid stand. It is a short duration crop (2-3 months) and fits well in the high Himalayas where a crops growing season is of limited period because of early winter and snow fall. In the higher Himalayas, up to 4500m, this is the only crop grown (Joshi and Paroda, 1991).

Buckwheat, *Fygopyrum esculentum* L. is an important pseudocereal crop grown extensively in the hilly areas of Northern Hill Zone of Chhattisgarh specially at Mainpath block in Surguja district in approximately 10-15 ha. Area is by the "Tibbati" refuge people in the past 7-8 year. It is herbaceous plant, grows upon a height of 3-4 meter. The buckwheat plant is complete its life cycle in 90-115 days. The white flower heads of 2-3 cm develop in the leaf axil.

Buckwheat is cross pollinated and an entomophilic plant. Honey bees are the major pollinators. The cultivation of buckwheat along with bee keeping may produce 40 to 60 kg of honey per hectare, due to its extended flowering period for more than 30 days (Rajbhandari, 2010).

MATERIALS AND METHODS

The experiment was conducted at Research cum Instructional Farm of RMD CARS, Ajirma, Ambikapur of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during rabi season in year 2016-17. It was upland single plot keeping plot size 10x10m, variety- Local spacing 20x10cm. When the buckwheat crop started flowering different honey bee species were recorded starting from 0600hrs to 1800hrs at two hours intervals one square

meter area within five minutes early as well as peak flowering period of crop.

RESULTS AND DISCUSSION

The finding of the present study of various insect pollinators/visitors visiting buckwheat flower under the following heads:

Indian honey bee (*Apis cerana indica*)

The visit of Indian honey bee (*Apis cerana indica*) was observed from 4th week of November 2016 to 2nd week of January 2017. Their occurrence was gradually increased from 1st week of December 2016 (48.00 bees/5min/m²), 2nd week of December 2016 (57.14 bees/5min/m²) and it was reached its peak population during 3rd week of December 2016 (70.14 bees/5min/m²), thereafter, its population was decreased during 4th week of December 2016 (59.85 bees/5min/m²), 5th week of December 2016 (31.00 bees/5min/m²), and 1st week of January 2017 (14.57 bees/5min/m²), its population was again decreased during full flowering period (14.57 bees/5min/m²) and last 2nd week of January 2017 population was declined (8.14 bees/5min/m²). The mean population was 40.82 bees/5min/m².

These findings are in close agreement with earlier reports of Neves (2008) he found missing out from 6.00 to 9.00 AM a period when the flower had 100% visible pollen grains and 100% stigmatic respectively. Ahmad and Srivastava (2002) reported that among the eleven species of Hymenoptera as pollen/nectar collectors, *Apis cerana indica* was found most predominant pollen/nectar collectors on pigeon pea followed by *A. dorsata*, *A. florea*, *A. mellifera*, *Xylocopa fenestrata*, *Halictus viridisima*, *Megachile femorata*, *Cressoniella relata*, *Cressoniella carbonaria*, *Cressoniella anthracina* and *Chalicodoma lanatum*

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Rock bee (*Apis dorsata*)

The Rock bee (*Apis dorsata*) was observed during 4th week of November 2016 (27.42 bees/5min/m²) to 2nd week of January 2017 (5.57 bees/5min/m²) and gradually increased during 1st week of December 2016 (35.85bees/5min/m²), 2nd week of December 2016 (39.71 bees/5min/m²) and then reached its peak population during 3rd week of December 2016 (52.42bees/5min/m²), therefore, its population was decreased during 4th week of December 2016 (46.00 bees/5min/m²), 5th week of December 2016 (9.14 bees/5min/m²), and 1st week of January 2017 its population was more decreased during last flowering period (7.71 bees/5min/m²) and last 2nd week of January 2017 population was declined (5.57 bees/5min/m²). The mean population was 27.28 bees/5min/m². These results are in close related with that of Jadhav *et al.* (2010) recorded *Apis dorsata* as more frequent insects pollinators in hybrid sunflower followed by *Trigona iridipenis* and *Apis cerana indica* whereas Mohapatra *et al.* (2011) recorded on mustard.

Little bee (*Apis florea*)

The activity of little from 4th week of November 2016 (0.57 bees/5min/m²) to 2nd week of January 2017 (0.57 bees/5min/m²). There was first appearance on 4th week of November 2016 (0.57 bees/5min/m²). The activity was increased during starting week of December 2016 (1.42 bees/5min/m²) and 2nd week of December 2016 (1.42 bees/5min/m²). The maximum activity was recorded during 3rd week of December 2016 (1.85 bees/5min/m²) and again increased during 5th week of December 2016 (1.14 bees/5min/m²) and 1st week of January 2017 the population was recorded 1.28 bees/5min/m². The decreased activity was recorded during the 4th Week of December 2016 (1.00 bees/5min/m²) and was very gradually decreased during the 2nd week of January 2017(0.57 bees/5min/m²). The mean population was 1.15 bees/5min/m².

The finding are in close agreements with Mohapatra *et al.* (2011) recorded that *Apis cerana indica*, *Apis dorsta* and *Apis florea*, *trigona iridipenis* and *Bombus* sp. on Indian mustard flowers. Nidagundi and sattagi (2005) on bitter gourd and Rashmi *et al.* (2010) recorded the *Apis florea* on pigeonpea.

Syrphid fly (*Eristalis* sp.)

The major activity period of *Eristalis* sp. was recorded during 4th week of November 2016 (5.85 syrphid fly/5min/m²) and then population was decreased during 1st week of December 2016 (5.28 syrphid fly/5min/m²). Its peak activity was recorded during 2nd week of December 2016 (6.57 syrphid fly/5min/m²). The increased activity period was 3rd week of December 2016 (5.57 syrphid fly/5min/m²) and 5th week of December 2016 (5.57 syrphid fly/5min/m²). The decreased activity was period of 4th week of December 2016 (5.57 syrphid fly/5min/m²) and the last activity was recorded

during 2st week of January 2017 0.71 syrphid fly/5min/m². The mean population of syrphid fly was 4.69 syrphid fly/5min/m².

Miller *et al.* (2013) who recorded the various flowering plants have been shown to attract and sustain populations of aphidophagous syrphidae in agriculture. Thapa (2006) recorded the syrphi fly on broccoli, buckwheat, squash, sesamum, red gram, rapeseed, radish, okra, mango and litchi. Phartiyal *et al.* (2012) observed in citrus the syrphid flies were the most frequency visitors including *Syrphus corolla*, *Episyrphus balteatus*, *Spherophoria* spp. and *Melanostoma* spp.

House fly (*Musca domestica*)

The population of *Musca domestica* was noticed from 4th week of November 2016 (3.00 house flies/5min/m²) to 2nd week of January 2017 (0.42 house flies/5min/m²). The highest population was recorded during the period of 2nd December 2016 (2.85 house flies/5min/m²) and later the peak activity period was recorded during the period of 5th week of December 2016 (3.14 house flies/5min/m²). Thereafter started declined during 1st week of January 2016 (1.57 house flies/5min/m²) and lowest activity was 2nd week of January 2017 (0.42 house flies/5min/m²). The slightly increased during 1st week of December 2016 (2.42 house flies/5min/m²) and the slightly decreased during 3rd week of December 2016 (2.14 house flies/5min/m²). The mean population of house flies ware 2.22 house flies/5min/m².

These are finding in closely related with on wahab *et al.* (2011) who reported the house fly belonging to order Diptera represented a higher number of insects pollinators at 12 noon during the daily activity of seed setting and yield production of black cumin.

Tiger moth (*Amata passelis*)

The population of tiger moth, *Amata passelis* was recorded from 4th week of November 2016 (1.14 tiger moth/5min/m²). The peak activity was recorded during 4th week of December 2016 (1.71 tiger moth/5min/m²) followed by 1st week of December 2016 (1.00 tiger moth/5min/m²) and 2nd week of December 2016 (1.00 tiger moth/5min/m²) and then increased activity during 3rd week of December 2016 (1.42 tiger moth/5min/m²). The population was decreased during 5th week of December 2016 (0.71 tiger moth/5min/m²) and 2nd January 2017 (0.71 tiger moth/5min/m²) and lower population was recorded during 1st week of January 2017 (0.42 tiger moth/5min/m²). The mean population was recorded in (1.01 tiger moth/5min/m²) in weekly.

Present results endorse the finding of Painkra *et al.* (2015) recorded the *Apis florea*, *Danaus chrysippus*, *Eristalis* sp., *Pelopidas mathias*, *Apis dorsata*, *Musa domestica*, visited on niger crop.

Monarch butterfly (*Danaus chrysippus*)

The activity period of monarch butterfly, *Danaus chrysippus* was recorded during 4th week of November 2016 (1.42 monarch butterfly/5min/m²)

and population was increased during 2nd week of December 2016 (1.28 monarch butterfly/5min/m²), 1st week of January 2017 (1.42 monarch butterfly/5min/m²). Its similar activity was recorded during 4th week of December 2016 (1.14 monarch butterfly/5min/m²), 5th week of December 2016 (1.14 monarch butterfly/5min/m²) and the decreased activity period was 1st week of December 2016 (0.85 monarch butterfly/5min/m²). The minimum activity was recorded in 2nd week of January 2017 (0.57 monarch butterfly/5min/m²). The mean population of was recorded 1.19 monarch butterfly/5min/m² in weekly.

The present results more or less similar with Dhakal and Pandev (2003), who reported the butter flies, visited the niger flowers throughout the flowering span. Thakur and Mattu (2010) also reported as a flower visitors and pollinators in Shivalik Hills of Western Himalayas.

Red cotton bug (*Dysdercus cingulatus*)

The population of *Dysdercus cingulatus* was observed during 4th week of November 2016 (0.71 red cotton bug/5min/m²) and the peak activity was recorded in 1st week of December 2016 (1.14 red cotton bug/5min/m²). Whereas, during 2nd week of December 2016 (1.00 red cotton bug/5min/m²), 3rd week of December 2016 (1.00 red cotton bug/5min/m²) and 1st week of January 2017 (1.00 red cotton bug/5min/m²) in similarly. The activity was decreased during 4th week of December 2016 (0.71 red cotton bug/5min/m²) and 5th week of December 2016 (0.57 red cotton bug/5min/m²). Finally, it was not appeared during 2nd week of January 2017 (0.00 red cotton bug/5min/m²). The mean weekly activity period of red cotton bug was recorded 0.76 red cotton bug/5min/m². They early worker Thapa (2006) had observed and reported that the red cotton bug was visiting on radish flowers.

Lady bird beetle (*Coccinella septumpunctata*)

The maximum activity of *Coccinella septumpunctata* was recorded during the 4th week of November 2016 (2.57 lady bird beetle/5min/m²), similar activity was recorded during 1st week of December 2016 (2.57 lady bird beetle/5min/m²). The peak activity was appeared during 2nd week of December 2016 (3.85

lady bird beetle/5min/m²) and its decreased activity was recorded during 3rd week of December 2016 (2.85 lady bird beetle/5min/m²) and 4th week of December 2016 (2.57 lady bird beetle/5min/m²). Its again increased activity was last week of December 2016 (3.28 lady bird beetle/5min/m²). Further, the activity was decreased during 1st week of January 2017 (2.28 lady bird beetle/5min/m²) and the finally, the activity decreased during 2nd week of January 2017 (1.57 lady bird beetle/5min/m²). The weekly mean activity of lady bird beetle was 2.69 lady bird beetle/5min/m².

Earlier reports support the observation by Viraktmath *et al.* (2001) who recorded the relative abundance of pollinator fauna of sesame during two successive seasons. Mahfouz *et al.* studied on the total number of pollinators was highest at 9-11 am followed by that at 11-1 pm, 1-3 pm and 3-5 pm. Sajjanaret *et al.* (2004) observed *coccinella* spp. visited more active during morning hours when flower well opening. Wahab *et al.* (2011) who also reported the lady bird beetle as a visitor of black cumin.

Wasp (*Vespa cincta*)

The population of *Vespa cincta* was observed from 4th week of November 2016 (1.00 wasps/5min/m²) to 2nd week of January 2017 (0.71 wasps/5min/m²). The activity of *Vespa cincta* was recorded during 1st week of December 2016 (1.42 wasps/5min/m²) and its activity period was 2nd week of December 2016 (1.00 wasps/5min/m²). The population of wasps was recorded from 3rd week of December 2016 (1.42 wasps/5min/m²) and then again it was decreased during 4th week of December 2016 (1.28 wasps/5min/m²) and 5th week of December 2016 (1.14 wasps/5min/m²). The maximum activity was found during 1st January 2017 (1.85 wasps/5min/m²) and its last activity was recorded during 2nd week of January 2017(0.71 wasps/5min/m²). The weekly mean activity of wasp was recorded 1.23 wasps/5min/m².

The present results are in line with findings of Jadhav *et al.* (2010), who recorded the wasp on sunflower, a good visitor for nectar. Rashmi *et al.* (2010) who was also observed the wasp on pigeon pea as a nectar forager.

Table 1. The succession of various insect pollinators/visitors on buckwheat flowers during year 2016-17

S. No.	Pollinators/visitors	Scientific name	Order	Family	I	II	III	IV	V	VI	VII	VIII	Mean
1.	Indian honey bee	<i>Apis cerana indica</i>	Hymenoptera	Apidae	(37.71) 1 st appear.	48.00	57.14	(70.14) Peak activity	59.85	31.00	14.57	8.14	40.82
2	Rock bee	<i>Apis dorsta</i>	Hymenoptera	Apidae	(27.42) 1 st appear.	35.85	39.71	(52.42) Peak activity	46.00	9.14	7.71	5.57	27.28
3	Little bee	<i>Apis florae</i>	Hymenoptera	Apidae	(0.57) 1 st appear	1.42	1.42	(1.85) Peak activity	1.00	1.14	1.28	0.57	1.15
4	Syrphid fly	<i>Eristalis sp.</i>	Diptera	Syrphidae	(5.85) 1 st appear	5.28	(6.57) Peak activity	5.85	5.57	5.85	1.85	0.71	4.69
5	House fly	<i>Musca domestica</i>	Diptera	Muscidae	(3.14) 1 st appear peak activity	2.42	2.85	2.14	2.28	(3.00)	1.57	0.42	2.22

6	Tiger moth	<i>Amata passelis</i>	Lepidoptera	Amatidae	(1.14) 1 st appear	1.00	1.00	1.42	(1.71) Peak activity	0.71	0.42	0.71	1.01
7	Monarch butterfly	<i>Danaus chrysippus</i>	Lepidoptera	Danaidae	(1.42) 1 st appear	0.85	1.28	(1.71) Peak activity	1.14	1.14	1.42	0.57	1.19
8.	Red cotton bug	<i>Dysdercus cingulatus</i>	Hemiptera	Pyrrhocoridae	(0.71) 1 st appear.	(1.14) Peak activity	1.00	1.00	0.71	0.57	1.00	0.00	0.76
9.	Lady bird beetle	<i>Coccinella septumpunctata</i>	Hemiptera	Coccinellidae	(2.57) 1 st appear.	2.57	(3.85) Peak activity	2.85	2.57	3.28	2.28	1.57	2.69
10.	wasp	<i>Vespa cincta</i>	Hymenoptera	Vespidae	(1.00) 1 st appear.	1.42	1.00	1.42	1.28	1.14	(1.85) Peak activity	0.71	0.85

CONCLUSION

It is concluded that different species of insect pollinators/visitors visiting on buckwheat flower was worked out. Total 10 species of pollinators/visitors were recorded. Honey bee, *Apis cerana indica* and *Apis dorsata* is the most dominant among all the pollinators/visitors. Other than pollinators/visitors like *Eristalis* sp., *Musca domestica*, *Amata passelis*, *Danaus chrysippus*, *Dysdercus cingulatus*, *Coccinella septumpunctata* and *vespa cincta* were also found visiting on buckwheat flowers. The activity of various insect pollinator/visitors on buckwheat flowers are conducted during 0600, 0800, 1000, 1200, 1400 and 1800 hrs. during interval of every two hours in experiment.

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