

SUCCESSION OF VARIOUS INSECT POLLINATORS/ VISITORS VISITING ON NIGER FLOWERS (*GUIZOTIA ABYSSINICA* CASS.) IN NORTH ZONE OF CHHATTISGARH

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Abstract: The succession of 15 insect pollinators/ visitors were recorded during 2012-13, amongst them *Apis cerana indica* appeared first on niger flower followed by *Apis florea*, *Danaus chrysippus*, *Pelopidas mathias*, *Musca domestica*, *Vespa cincta*, *Apis dorsata*, *Nezara viridula*, *Coccinella septempunctata*, *Eristalis* sp., *Amata passalis*, *Chrysomya bezziana*, *Leptocoris acuta*, *Dysdercus cingulatus* and *Sarcophaga* sp. They were found visiting on niger flower throughout the blooming period.

Keywords: Succession, Insect pollinators/ visitors, Niger flowers

INTRODUCTION

Oilseed crops are very important from which we get oils and fats. They are used as edible oils and in the manufacture of soaps, paints, varnishes, vanaspati and medicines. The oil cakes are used as cattle feed and manures. They are classified into two groups according to the nature of uses as follows-(a) Edible oil cakes - The oil cakes that are used as cattle feed are known as edible oil cakes. The rapeseed and mustard, sesamum, linseed, sunflower, soybean, niger, groundnut and safflower oil cakes are the edible oil cakes. (b) Non-edible oil cakes - The oil cakes that are not suitable for feeding to cattle and mainly used for manuring crops are known as non edible oil cakes. Caster and safflower oil cakes are the non-edible oil cakes (Das, 1997).

Among the edible oilseed crops, the niger (*Guizotia abyssinica* Cass., Compositae) is an important oilseed crop cultivated in Ethiopia and India. It is a branched annual herbaceous plant, grows upto a height of 1.8 metre. The niger plant complete its life cycle in 3-4.5 months. The yellow flower heads of 2-3 cm develop in the leaf axil, in a cluster of two to five. Each head contains about eight ray florets and 40 to 60 hermaphrodite disk florets. Within the disk floret, the anthers are united to form the corolla tube. The style extends through this tube, and the hairy forked stigma is above. The floret opens and liberates its pollen early in the morning, the style emerges about mid day, and the stigma lobes separate and curl backward by evening.

In Ethiopia, it is cultivated on waterlogged soils where most crops and all other oilseeds fail to grow and contributes a great deal to soil conservation and land rehabilitation. The average yield of niger in Ethiopia is 182.06 kg ha⁻¹ which is due to various constraints including inadequate supply of plant nutrient and poor seed setting due to lack of effective pollination. It is a dicotyledonous herb, moderately to well branched and grows up to 2 m tall. The seeds

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contains approximately 40 per cent oil, which is pale yellow with nutty taste and a pleasant odour. The oil and seeds are free from any toxin and oil taste is similar to *desi* ghee. The oil is used for culinary purposes, anointing the body, manufacturing paints and soft soaps and for lighting and lubrication. The niger oil is good absorbent of fragrance of flowers due to which it is used as a base oil by perfume industry. Niger oil can be used for birth control and treatment of syphilis. Niger seed cake is a valuable cattle feed particularly for milch cattle. Niger is also used as a green manure for increasing soil organic carbon. The fatty acid composition of 75-80 per cent linoleic acid, 7-8 per cent palmitic and stearic acids, and 5-8 per cent oleic acid, (Getinet and Teklewold, 1995).

MATERIAL AND METHOD

The experimental field was upland, plot size 10x10 m (Single Plot), Crop – Niger, Variety- JNC-9, Spacing- 30 x 10cm were kept. When the niger crop start flowering the insect pollinators/ visitors were counted starting from 0700 up to 1700 hrs at two hour intervals once every week, on randomly selected places from one square meter area within five minutes during early as well as peak flowering period. Time wise and insect group wise dominance of a particular group were undertaken.

RESULT AND DISCUSSION

The niger flowers attract various species of insects belonging to the order Hymenoptera, Diptera, Lepidoptera, Hemiptera, Coleoptera for nectar and pollen or both for feeding purpose. Among them, 15 species of insect pollinators/visitors were recorded visiting on niger flowers on variety JNC-9. The succession of various insect pollinators/visitors visiting on niger flowers are discussed under the following heads-

1. Indian honey bee (*Apis cerana indica*)

The 1st appearance of *A. c. indica* was observed in 4th week of November 2012 (12.83 bees/5min/m²) and gradually increased in last week of November 2012 (22.66 bees/5min/m²) and maximum population was found during 1st week of December 2012 (36.50 bees/5min/m²). Further, it declined during 2nd week of December 2012 (34.33 bees/5min/m²) and slightly increased during 3rd week of December 2012 (36.16 bees/5min/m²) thereafter, it decreased during 4th week of December 2012 (20.83 bees/5min/m²), 1st week of January 2013 (16.16 bees/5min/m²) and 2nd week of January 2013 (6.5 bees/5min/m²). The average population was 23.24 bees/5min/m² (Table 1). These findings corroborated the results of Mohapatra and Sontakke (2012) recorded hymenopterans visiting on sesamum namely *Apis cerana indica*, *A. dorsata*, *A. florea*, *Trigona irridipenis*, *Andrena sp.* *Bombus sp.* and *megachile sp.* as a regular visitors.

2. Little bee (*Apis florea*)

The population of *Apis florea* was observed in fourth week of November (0.83 bee/5min/m²). It increased in 1st week of December (1.16 bees/5min/m²) and reached its peak in 2nd week of December (1.66 bees/5min/m²). It decreased in 3rd week of December (1.00 bee/5min/m²) and regain with increasing trend (1.16 bees/5min/m²) in 4th week of December and again decreased with (1.00 bee/5min/m²) and 0.66 bee/5min/m² respectively in first and second week of January 2013. The average population of bees was 0.93 bee/5min/m². (Table 1). Kumar *et al.* (2010) who reported the visitors on cotton hybrid, among honey bees, *Apis florea* was most predominant visitor followed by *Apis cerana indica*. Saeed *et al.* (2012) reported that *Apis florea* and *A. dorsata* also exhibited the highest visitation rates and frequencies on bitter gourd.

3. Monarch butterfly (*Danaus chrysippus*)

Monarch butterfly was first observed in last week of November (1.00 monarch butterflies/5min/m²) and similar trend of population was recorded in 3rd week of December 2012. The peak activities were observed in 1st week of January 2013 (0.83 monarch butterfly/5min/m²) and again decreased (0.33 monarch butterfly/5min/m²) in 2nd week of January 2013. The average population of monarch butterflies was 0.66 monarch butterfly/5min/m² (Table 1). Nath and Viraktamath (2010) recorded eight species of pollinators on sunflower and among these, five species belonged to Hymenoptera and three species to Lepidoptera. Among Lepidoptera, *Danaus chrysippus*, followed by *Pieris sp.* and *Papilio demoleus* were recorded as major pollinators.

4. Rice skipper (*Pelopidas mathias*)

Pelopidas mathias was first observed in last week of November 2012 (0.83 rice skipper/5min/m²).

Thereafter, it disappeared in 1st week of December 2012. It further appeared (1.33 rice skippers/5min/m²) in 2nd week of December 2012 with decreasing population (0.5 rice skipper/5min/m²) in 3rd week of December 2012 to 4th week of December 2012 (0.33 rice skipper/5min/m²). Further, it increased (0.66 rice skipper/5min/m²) during 1st week of January 2013 and 1.00 rice skipper/5min/m² in 2nd week of January 2013. The average population was 0.58 rice skipper/5min/m² (Table 1). Atmowidi *et al.* (2007) recorded on mustard as visitor and accounted 0.34 per cent flower visitor. Jadhav *et al.* (2010) recorded on sunflower and Saeed *et al.* (2012) recorded on bitter gourd.

5. House fly (*Musca domestica*)

The presence of house flies were recorded from first week of December to second week of January with mean population of 1.20 house flies/5min/m² with a range of 0.5 to 3.16 house flies/5min/m². The peak population of 3.16 house flies/5min/m² was noticed during first week of December (Table 1). These results are in close conformity with the findings of Saeed *et al.* (2008) who recorded the pollinators on onion with effective bee species, *Apis dorsata* and *A. florea* which were greater than true flies, *Episyrphus balteatus*, *Eupeodes sp.*, *Musca domestica* and *Eristalinus aeneus*.

6. Wasp (*Vespa cincta*)

Its first appearance was recorded during 1st week of December 2012 (0.66 wasp/5min/m²) and decreased during 2nd week of December 2012 (0.50 wasp/5min/m²) further similar population was found during 3rd week of December 2012 (0.50 wasp/5min/m²) and disappeared during 4th week of December 2012 with further appearance during 1st week of January 2013 (0.33 wasp/5min/m²). The peak population was recorded during 2nd week of January 2013 (1.16 wasp/5min/m²). The average population was 0.39 wasp/5min/m² (Table 1).

The present findings are more or less in conformity with the earlier reports of Dhurve (2008) who observed the wasp on niger flowers. Jadhav *et al.* (2010) recorded the *Vespa tropica* and *Polistine sp.* visiting on hybrid sunflower.

7. Rock bee (*Apis dorsata*)

The period of activity of rock bee was started from first week of December 2012 to second week of January 2013 with a range of 3.00 to 8.5 bees/5min/m² with its maximum density of 8.5 bees/5min/m² in the first week of December (Table 1). Mohapatra and Sontakke (2012) who recorded the honey bee species namely- *Apis cerana indica*, *A. dorsata*, *A. florea*, *Trigona irridipenis*, *Andrena sp.*, *Bombus sp.* and *Megachile sp.* on sesamum. Saeed *et al.* (2012) observed different pollinators on bitter gourd and among these, *A. dorsata* was the prominent pollinator.

8. Green sting bug (*Nezara viridula*)

The period of activity of bug was started from first week of December, third week of December with a range of 0.33 to 0.5 green stink bug/5min/m² and its maximum population of 0.5 green stink bug/5min/m² recorded in the third week of December. Further, it was disappeared from fourth week of December to second week of January. The mean population of bugs was noticed i.e. 0.20 green stink bug/5min/m² (Table 1). The present results are in close agreements with that of Thapa (2006) who recorded green sting bug an insect visitor visiting on buckwheat, radish and rapeseed flowers. Navatha and Sreedevi (2012) who reported *Nezara viridula* as visitor of castor with its relative abundance of 4.80 per cent.

9. Lady bird beetle (*Coccinella septempunctata*)

The lady bird beetle was recorded with first appearance during 1st week of December 2012 (0.50 lady bird beetle/5min/m²). Thereafter, it disappeared in remaining period of December 2012. It again appeared during 1st week of January 2013 (0.83 lady bird beetle/5min/m²) with slight decreased during 2nd week of January 2013 (0.50 lady bird beetle/5min/m²). The average population was 0.22 lady bird beetle/5min/m² (Table 1). Jadhav *et al.* (2010) recorded the *Coccinella* visiting on sunflower flower. Wahab and Ebadah (2011) who reported the *Coccinella undecimpunctata* a flower visitor on black cumin.

10. Syrphid fly (*Eristalis sp.*)

The 1st appearance of *Eristalis sp.* was observed in first week of December (1.33 syrphid flies/5min/m²) and it decreased in 2nd and third week of December (1.00 and 0.66 syrphid fly/5min/m²). It slightly increased in 4th week of December (0.83 syrphid fly/5min/m²) and further decreased in 1st week of January 2013 (0.66 syrphid fly/5min/m²) and 2nd week of January 2013 (0.33 syrphid fly/5min/m²). The average population of flies was 0.60 syrphid fly/5min/m² (Table 1). Dhurve (2008) who reported *Eristalis sp.* (15.71 per cent) as a pollinator on niger. Jadhav *et al.* (2010) who also recorded *Eristalis quinquestratus* as a nectar forager on sunflower. Saeed *et al.* (2012) who also observed the *Eristalinus laetus* as a pollinator of bitter gourd.

11. Tiger moth (*Amata passelis*)

The first appearance of tiger moth was noticed during 2nd week of December 2012 (0.66 tiger moth/5min/m²) and less number was recorded

during 3rd week of December 2012. Thereafter it was disappeared during 4th week of December 2012, 1st week of January 2013 and 2nd week of January 2013 (Table 1). The present results are in the line with the findings of Dhurve (2008) who recorded the tiger moth as a visitor on niger flower.

12. Blow fly (*Chrysomya bezziana*)

Its 1st appearance was recorded during 2nd week of December 2012 (0.66 blow fly/5min/m²) and slightly decreased during 3rd week of December 2012 (0.50 blow fly/5min/m²) thereafter, slightly increased during 4th week of December 2012 (0.66 blow fly/5min/m²) further, it disappeared during 1st week of January 2013 and 2nd week of January 2013. The average population was 0.22 blow fly/5min/m² (Table 1). Sajjad *et al.* (2008) who reported various pollinators on onion blooms, among them the dipterans species composed 72 per cent of syrphid flies and 28 per cent non-syrphid flies i.e. *Musca domestica*, *Calliphoridae* sp. and *Sarcophaga* sp.

13. Rice bug (*Leptocorisa acuta*)

The 1st appearance was noticed during 3rd week of December 2012 (0.83 rice bug/5min/m²) and further it disappeared during 4th week of December 2012, 1st week of January 2013 and 2nd week of January 2013 (Table 1). The present result corroborated the findings of Thapa (2006) who noticed rice ear head bug visiting on litchi flower.

14. Red cotton bug (*Dysdercus cingulatus*)

First appeared during 3rd week of December 2012 (0.66 red cotton bug/5min/m²) with similar trend during 4th week of December 2012. Further, it disappeared during 1st and 2nd week of January 2013. The average population was 0.14 red cotton bug/5min/m² (Table 1). Earlier reports supported the observation by Thapa (2006) who reported the red cotton bug as a flower visitor on radish blooms.

15. Tachinid fly (*Sarcophaga sp.*)

The first appearance was found during 3rd week of December 2012 (0.50 tachinid fly/5min/m²) and maximum population was recorded during 4th week of December 2012 (0.66 tachinid fly/5min/m²). Further, it disappeared during 1st and 2nd week of January 2013. The average population was 0.14 tachinid fly/5min/m² (Table 1). The present results are in close conformity with the findings of Saeed *et al.* (2012) who reported the *sarcophaga* sp. as a pollinator visiting on bitter gourd.

Table 1. Succession of various insect pollinators/ visitors visiting on niger flowers during Year 2012-13

SNo.	Pollinator s/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	Ist App r.12.83	22.66	36.5	34.33	36.16 Peak activity	20.83	16.16	6.50	23.24
2.	Little bee	<i>Apis florea</i>	Hymenoptera	Apidae	0.00	Ist appr. (0.83)	1.16	1.66 Peak activity	1.0	1.16	1.0	0.66	0.93
3	Monarch butterfly	<i>Danaus chrysippus</i>	Lepidoptera	Danaidae	0.00	Ist appr. (1.00)	1.00 Peak activity	0.66	1.00	0.50	0.83	0.33	0.66
4	Rice	<i>Pelopidas</i>	Lepidoptera	Hesperiidae	0.00	Ist appr.	0.00	1.33 Peak	0.50	0.33	0.66	1.00	0.58

	skipper	mathias	ra			(0.83)		activity					
5	House fly	<i>Musca domestica</i>	Diptera	Muscidae	0.00	0.00	Ist appr. (2.33)	3.16Peak activity	1.00	1.00	1.66	0.50	1.20
6	Wasp	<i>Vespa cincta</i>	Hymenoptera	Vespidae	0.00	0.00	Ist appr. (0.66)	0.50	0.50	0.00	0.33	1.16Peak activity	0.39
7	Rock bee	<i>Apis dorsata</i>	Hymenoptera	Apidae	0.00	0.00	Ist appr.(8.50) Peak activity	8.33	5.83	5.83	5.33	3.00	4.60
8	Greensting bug	<i>Nazara viridula</i>	Hemiptera	Pentatomidae	0.00	0.00	Ist appr. (0.33)	0.00	0.50Peak activity	0.00	0.00	0.00	0.10
9	Lady bird beetle	<i>Coccinella septempunctata</i>	Coleoptera	Coccinellidae	0.00	0.00	Ist appr.(0.50)	0.00	0.00	0.00	0.83 Peak	0.50	0.22
10	Syrphid fly	<i>Eristalis sp.</i>	Diptera	Syrphidae	0.00	0.00	Ist appr.(1.33) Peak activity	1.00	0.66	0.83	0.66	0.33	0.60
11	Tiger moth	<i>Amata passalis</i>	Lepidoptera	Amatidae	0.00	0.00	0.00	Ist appear.(0.66) Peak activity	0.33	0.00	0.00	0.00	0.12
12	Blow fly	<i>Chrysomya bezziana</i>	Diptera	Calliphoridae	0.00	0.00	0.00	Ist appear.(0.66)	0.50	0.66Peak activity	0.00	0.00	0.22
13	Rice bug	<i>Leptocoris acuta</i>	Hemiptera	Alydidae	0.00	0.00	0.00	0.00	Ist appear(0.83)	0.00	0.00	0.00	0.10
14	Red cotton bug	<i>Dysdercus cingulatus</i>	Hemiptera	Pyrrhocoridae	0.00	0.00	0.00	0.00	Ist appear(0.66)	0.66Peak activity	0.00	0.00	0.16
15	Tachinid fly	<i>Sarcophaga sp.</i>	Diptera	Sarcophagidae	0.00	0.00	0.00	0.00	Ist appear(0.50)	0.66 Peak activity	0.00	0.00	0.14

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