



Association And Relative Abundance Of Honeybee And Other Insect Pollinators In Niger (*Guizotia abyssinica* Cass.) Under The Agro Climatic Conditions Of Ranchi, Jharkhand

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ABSTRACT

The insects visiting niger flowers were collected from open pollinated plot with the help of insect collection net (hand net) during the flowering of the crop which commenced in the last week of October, 2012 and continued up to first week of December, 2012. Of the different insect visitors, those which were seen working on niger flower- heads, were considered to be the pollinators and were taken in to consideration for the study. The collection showed that a total of 13 insect species belonging to nine families under three orders viz., Hymenoptera, Lepidoptera and Diptera visited the niger flowers. Honeybees were observed to be the foremost pollinator fauna visiting the niger flowers under agro climatic conditions of Ranchi, Jharkhand. Among different honeybee species, *A. mellifera* constituted 41.38 per cent of the total pollinators recorded and surpassed rest of the pollinators, hence, it was considered to be the key pollinator. It was followed by *A.c.indica* (34.48%), *Trigona* sp. (6.9%) and *A. dorsata* (4.31%). The other pollinators collected, belonged to the orders Lepidoptera and Diptera and members of these two insect orders contributed 12.93 per cent of the total pollinators. Among non- hymenopteran pollinators, butterflies and moths belonging to the order Lepidoptera and families Danaidae, Nymphalidae, Pieridae, Hesperidae and Lycaenidae formed the leading group. Among dipteran pollinators, Syrphids were found to be the dominant visitors of niger. Among different honey bee species, *A.mellifera* visited the crop in higher proportion (47.07 %) followed by *A. cerana* (40.50 %), *Trigona* sp. (7.99%) and *A. dorsata* (4.44%). Maximum bee visitation (7.45 bees/m²/minute) was recorded during 1000h to 1200h followed by 1400-1600h (6.15bees/m²/5minute), while the minimum (4.5 bees/m²/minute) was observed during 1600-1800h followed by 1200-1400h(4.85 bees/m²/minute) and 0800 to 1000h (5.2bees/m²/ minute).

INTRODUCTION

Honeybee and some closely related social hymenoptera derive their food exclusively from flowers. While thus foraging on the floral products, these insects are instrumental in disseminating pollen and consequently accomplish the job of pollination par excellence .There effective use as a tool in increasing production is apparently in its infancy in our country.Pollen transfer depends upon the foraging mode of flower visitors which, in turn, would determine whether the visitor is a pollinator or non pollinator. However, different species may differ in their capacity to effectively pollinate a flower type in spite of their equal abundance (Kumar *et al.*,1994).Therefore, characterization of pollinators on the basis of their abundance, foraging modes and pollinating efficiency is an important component of crop pollination ecology and a pre-requisite for determining the pollination requirement of a crop (Williams,1977).Keeping this idea in view the present study was therefore planned in order to acquire more information on the insects visiting niger flower, and also to know the relative abundance of foraging honeybees.

MATERIALS AND METHODS

The studies were carried out at apiary of the Department of Agricultural Entomology, of Birsa Agricultural University, Kanke, Ranchi, Jharkhand from October to December 2012 (the blooming period of the crop). Various insect species, visiting niger flowers were collected by sweep method on target crop using cone hand net. Sweeping was done throughout the blooming of cultivar at an hourly interval from 0800 h to1700h. Insect collection was started three days after commencement of the flowering and continued up

to 90 per cent flowering. Collected insects were identified by comparing with reference insects from authentic sources. Abundance (number of bees/m²/minute) of different pollinators visiting on niger flower- heads were recorded at different hours of the day starting from 0800h in the morning to 1800h in the evening at an interval of two hours. Observations were recorded at the open pollinated plots. For studying the relative abundance, population of insect pollinators was recorded by taking direct count on flower heads of the plants covering an area of one sq m in each replication. Five such places were selected randomly for taking insect counts.

RESULT AND DISCUSSION

Insect pollinators visiting niger flower

The collection showed that a total of 13 insect species belonging to nine families under three orders viz., Hymenoptera, Lepidoptera and Diptera visited the niger flowers. Honeybees were observed to be the foremost pollinator fauna visiting the niger flowers under agro-ecological condition of Kanke, Jharkhand. Among different honeybee species, *A. mellifera* constituted 41.38 per cent of the total pollinators recorded surpassing rest of the pollinators, hence, it was considered to be the key pollinator. It was followed by *A.c.indica* (34.48%), *Trigona* sp. (6.9%) and *A. dorsata* (4.31%). The other pollinators collected, belonged to the orders Lepidoptera and Diptera and members of these two insect orders contributed 12.93 per cent of the total pollinators. Among other pollinators, Lepidopterans formed the most dominant group which mainly included butterflies and moths of family Danaidae, Nymphalidae, Pieridae, Hesperidae and Lycaenidae. Among Dipteran pollinators, Syrphids were found to be the dominant visitors of niger. The present findings are in close agreement with (Mohanrao and Suryanarayana 1990) who reported honeybees as the main pollinators of niger. The present results also endorse the reports of Panda *et al.* (1995) who reported *A.c.indica*, *A.dorsata* and *Trigona* sp. as chief pollinating insects. Two more insect species i.e., *Junania* sp. and *Euploea core* were earlier reported to be pollinators in niger by Dhakal and Pandey (2003). The findings are also in close agreement with Viraktmath *et al.* (2001) who reported *A.mellifera* as a chief pollinator of niger. They also reported *Dannaus chrysippus*, *Catopsilia pyranthae*, *Vespa* sp. as other pollinators of niger. The present findings are in agreement with the report of Choudhary and Kumar (1998) and Kulkarni and Dhanorkar (1998) who reported Apoidea as the most pollinator group of niger.

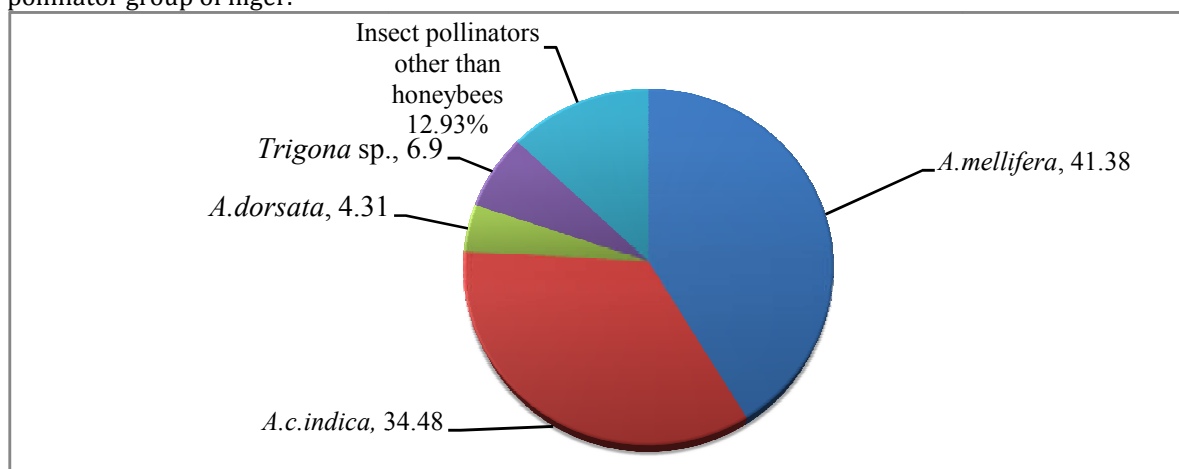


Fig.-1: Different species of insect pollinators visiting niger flower (%)

Table-1: Different species of insect pollinators visiting niger flower

Sl. No	Scientific name	Common name	Order	Family	Insect count/ 100 sweep	Proportion (%)
1.	<i>Apis cerana indica</i>	Indian bee	Hymenoptera	Apidae	40	34.48
2.	<i>Apis dorsata</i>	Rock bee	Hymenoptera	Apidae	5	4.31
3.	<i>Apis mellifera</i>	European bee	Hymenoptera	Apidae	48	41.38
4.	<i>Trigona</i> sp.	Stingless bee	Hymenoptera	Melliponidae	8	6.90
5.	<i>Vespa</i> sp.	Wasp	Hymenoptera	Vaspidae	2	
6.	<i>Dannaus chrysippus</i>	Monarch butterfly	Lepidoptera	Danaidae	1	
7.	<i>Junania</i> sp.	Peacock pancy	Lepidoptera	Nymphalidae	1	

		butterfly				12.93
8.	<i>Ergolis</i> sp.	Common castor butterfly	Lepidoptera	Nymphalidae	1	
9.	<i>Catopsila pyranthae</i>	Motteled emigrant	Lepidoptera	Pieridae	2	
10.	<i>Hesperia comma</i>	Common skipper	Lepidoptera	Hesperiidae	3	
11.	<i>Euploea core</i>	Common core	Lepidoptera	Nymphalidae	1	
12.	<i>Zizinia</i> sp.	Blue butterfly	Lepidoptera	Lycaenidae	1	
13.	<i>Heliophilus</i> sp.	Hover fly	Diptera	Syrphidae	3	
Total					116	100

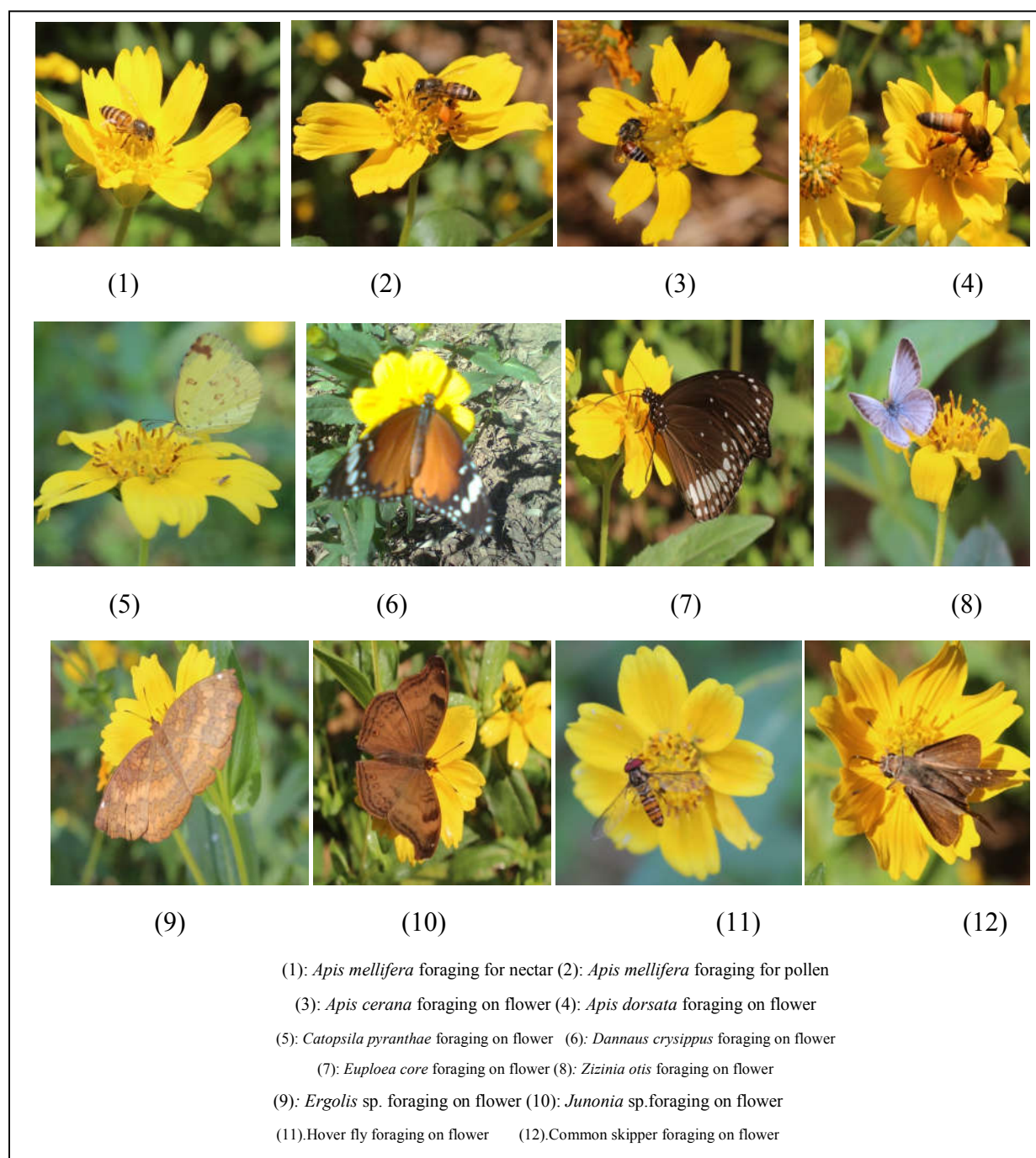


Fig-2: Pollinators visiting niger flower

Relative abundance of bees

Among different honey bee species, *A.mellifera* visited the crop in higher frequencies (47.07 %) followed by *A.cerana* (40.50 %), *Trigona* sp. (7.99%) and *A.dorsata* (4.44 %). Maximum bee visitation (7.45 bees/m²/minute) was recorded during 1000h to 1200h followed by 1400-1600h

(6.15bees/m²/5minute),while the minimum (4.5 bees/m²/minute) was observed during 1600-1800h followed by 1200-1400h(4.85 bees/m²/minute) and 0800 to 1000h (5.2bees/m²/ minute).

The present findings are in the line with Panda *et al.* (1995) who reported that *Apis* species visited niger crop in higher frequencies than the *Trigona* sp. at various day hours. The results also endorsed the findings of Bhatnagar *et al.*(2011) who reported *A.mellifera* as more abundant species (5.70 bees/inflorescence/5m) than *A.cerana* (5.26 bees/inflorescence /5min) in *Brassica* crop. Partap and Verma (1994) observed peak foraging of *A.cerana* between 11.00h and 14.00h at 09.00h, 12.00h and 15.00h, respectively, on radish. Results indicates that maximum bee visitation on niger was observed during 1000 to 1200h,while minimum during 1600-1800h.The above findings, however, do not find support from the results of Deshraj and Rana (1993) and Chakravarty (2000) who reported that the activity of bees was significantly high at 12.00h.The results are, however, in conformity with Singh *et al.*(2005) who recorded highest intensity of *A.mellifera* at 1000-1200h (3.7-3.8 bees/m²/min) on *B.rapa* var.toria. Arya *et al.*(1994) observed that insect pollination were more active between 0800 to 1100h with higher increase in evening hours.

Table-2: Relative abundance of honeybees/ pollinators on niger flowers at different day hours

Day hour	No. of bees/m ² /5minute					Mean	Relative abundance (%)
	08:00-10:00h	10:00-12:00h	12:00-14:00h	14:00-16:00h	16:00-18:00h		
<i>A. mellifera</i>	9.40 (3.15)	14.60 (3.89)	9.80 (3.20)	10.40 (3.30)	8.80 (3.05)	10.60 (3.32)	47.07
<i>A.cerana</i>	9.0 (3.08)	12.20 (3.56)	7.20 (2.77)	9.80 (3.20)	7.40 (2.81)	9.12 (3.084)	40.50
<i>A.dorsata</i>	0.60 (1.05)	0.80 (1.14)	1.40 (1.38)	1.80 (1.52)	0.40 (0.95)	1.0 (1.21)	4.44
<i>Trigona</i> sp.	1.80 (1.52)	2.20 (1.64)	1.0 (1.22)	2.60 (1.76)	1.40 (1.38)	1.80 (1.50)	7.99
Mean	5.20 (2.18)	7.45 (2.52)	4.85 (2.13)	6.15 (2.43)	4.50 (2.05)		

- Each value represents mean of 5 observations at each sampling time.
- Figures in the parentheses are $\sqrt{(x+0.5)}$ transformed values.

	SEm±	CD(5%)
Bee species	0.05	0.15
Day hours	0.06	0.16
Bee species x Day hours	0.12	0.33

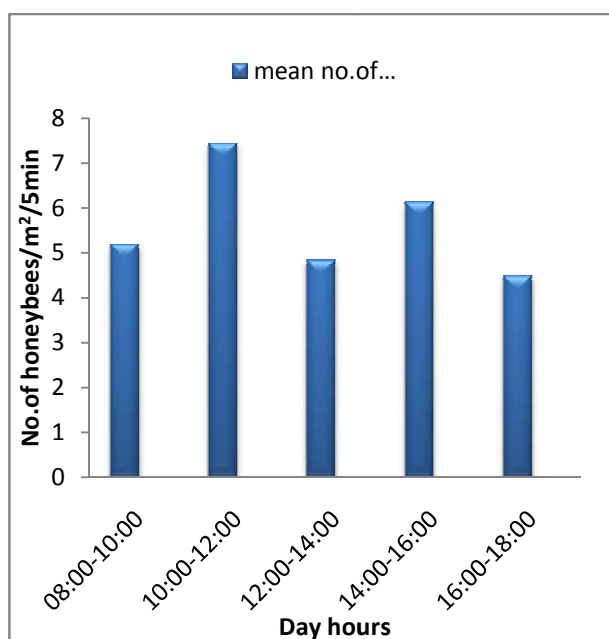


Fig.3: Relative abundance of honeybees at different hours of the day honeybees (%)

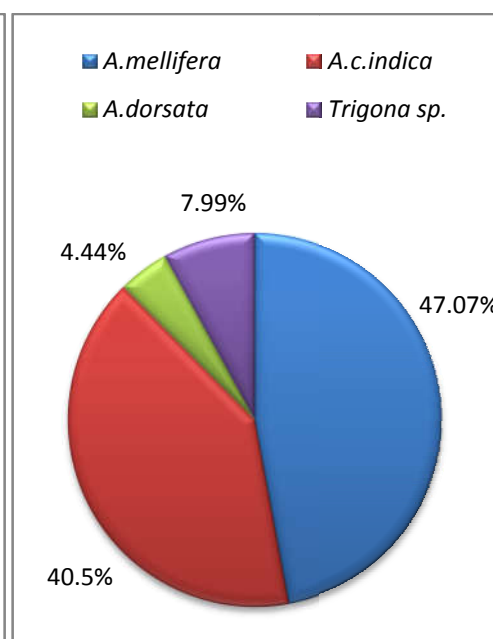


Fig.4: Relative abundance of

CONCLUSION

It can be concluded that honeybees were observed to be the main pollinator fauna of niger constituting 87 per cent of total pollinators under agro-ecological condition of Kanke, Jharkhand.

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