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ACTIVITY OF INSECTIVOROUS BAT IN RELATION TO ITS PREY ITEMS

N.Subash and G.Raju*

Department of Zoology, Pioneer Kumaraswamy College, Nagercoil - 629 003, Tamil Nadu - India

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For Correspondence:

G.Raju

Department of Zoology, Pioneer Kumaraswamy College, Nagercoil - 629 003, Tamil Nadu - India

E-mail:

mjsubash2006@gmail.com

ABSTRACT

The activity of insectivorous bat in relation to its prey items was analysed. Insect activity was measured by collecting and counting the total number of insects in order wise by using the Light trap. Activity of bat was measured by visual counting of the number of visits, to the foraging ground per hour. Fiveobservations were made at different time interval.Hymenopterainsects weremore (60.37%) at different time interval, when the insect activity increased the foraging activity of bat also increased. Among all the five collections Hymenoptera occupied the top level (54.55%) followed byColeopteran (30.96%),Hemiptera (7.98%),Diptera(4.03%) and Lepidoptera (2.48%).

INTRODUCTION

Bats may be the most misunderstood animal in the world, although as consumers of enormous numbers of insects, they rank among the most beneficial. Among various pests, farmers encounter, insects are the chief competitors against which they have to fight for ever. The agro-ecosystem analysis indicates that bats are the real agents who do pest control in tropical plains and the rain forests of India (Vanitharani, 2004). The most common insect orders consumed by bats are Coleoptera, Lepidoptera, Diptera, Hymenoptera and Isoptera (Verts*et al*., 1999; Pavey*etal*., 2001). Insectivorous bats have many morphological adaptations to capture and handle prey in flight and there are also more crucial (Evan and Sanson, 1998). Wing morphology aids the bats to do various flight performances and to capture prey in their aerial feeding habits (Vanitharani, 1998; Pavey and Burwell, 2000;Clarin*et al.*, 2013).

MATERIALS AND METHODS

Study animal

Observations were made on flying insectivore's bats near the street light during night. These bats are active during night time, fly and forage on insects near the street lamp. They posses good echolocation and find their prey even in complete darkness. They feed on different insects while flying, which may also include pests.

Study area

The study area is surrounded by paddy field and trees such as neem, fig etc of ThenkalamPuthur, Tirunelveli District, Tamil Nadu, India. Observations were made on the bats foraging near the street lamps of the village.

Observations of insect activity

Insect activity was directly monitored by collecting and counting the total number of insects. Light trap was used to collect the insect. A large number of different insects were collected in this trap. The light trap was operated throughout night from 7pm to 6am. The collected samples were sorted out, counted and identified up to order level.

Observation of feeding-behavior

The number of bat visit to the feeding ground was counted per hour. The count was made throughout night from 7pm to 6am. All these observations were carried out once in a week. Totally five observation were made. The bat flight activity is observed and recorded.

RESULTS Bats are nocturnal and are active during night hours. The activities including the feeding and flight were recorded. Insect activity is high in the first half (7pm to 1am) of the night hours. In this study five observations were made. Results were given from the Table 1 to Table 5.

In the first observation more number of Hymenoptera insects werecollected (60.37%). Highest foraging visit of bat was in between 7pm to9pm, then up to 3am and it was moderate then decreased sharply. In the second observation, more number of insects were collected when compared to all the observation. This may be due to the effect of rainfall in the previous day. Among the collected insects, the Hymenoptera was more (53.99%).The insect activity was also higher from 7pm to 12amand it gradually decreases. Like that the activity of bat was also higher up to 12am and it gradually decreased. In the third observation also Hymenoptera was higher than other insect (40.47%).Highest insect activity was observed from 8pm to 11pm activity of bats was also higher from 8pm to 11pm. Higher level of activity was exhibited by hymenoptera (46.20%) in the fourth observation. It may be due to minimum rainfall. The activity was moderate in all times. In the final observation, Hymenoptera was higher (57.0.9%). Insect activity was very low in all times. The activity of bates was higher from 9 pm to 12am. The number of foraging visit was very low when compare to all previous observation. Among the total number of insects collectedHymenoptera occupied the top level (54.55%) followed by Coleoptera (30.96%),Hemiptera (7.98%), Diptera(4.03%) and Lepidoptera (2.48%).

DISCUSSION

Insectivorous bats may avoid potential completion for food through spatial or temporal partitioning of feeding area (Swift and Racey, 1985) differences in foraging strategies (Fenton, 1972; Fenton and Bell, 1979; O'Shea and Vaughar, 1980) andby selection of different taxonomic or size classes of prey. Some bats specialize on particular order of insect (Black, 1974; Buchler, 1976; Fendon *et al.*,1977) orat least do so seasonally (Anthony and Kunz, 1977;Fenton and Thomas, 1980).However, a majority of species can probably be classified as opportunistic feeding upon a wide range of available prey(Belwood and Fullard, 1976; Ferton, 1982; Swift *et al*., 1985) also showed that most species are opportunistic, selecting from a wide variety of prey, including Hymenoptera, Lepidoptera, Diptera, Hemiptera and Coleoptera. Despite this variability in prey selection, size of the prey generally can be related to size of the bats, smaller bats eating smaller insects (Ross, 1967).

In the present study, insect were more active in night up to 12am,the activities of bats were also high during these hours. After 12am the insect activity decreased. In this study third, fourth and fifth observation the insect activity was very low, itmay be due tominimum rainfall. In all the five observations the activity of bats decreased from 12am onwards, the feeding may be completed. So there was no need for further foraging visit on that particular day.

The highest activities of bat as well as insect were coinciding. The bat may visit the foraging ground more times when the availability of insects was more. Likewise it may visit another foraging area when the availability of insects decreased in the previous foraging ground. Among the collected insects Hymenoptera was 54.55% higher followed by Coleoptera (30.96%) Hemiptera (7.98%) Diptera (4.03%) and Lepidoptera (2.48%) this composition depends upon the vegetation, climatic conditions of that particular area. Among the collected insects, few may be the beneficial one but most of them were pests. So the insectivorous bats play vital role in the biological control of pests.

Table 1. Insects collected at different time interval in first observation

Insect Order	Time										Total	(%)
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5		
Hymenoptera	289	60	23	35	41	38	41	10	18	28	556	60.37
Lepidoptera	8	4	2	4	1	0	0	0	1	0	20	2.17
Diptera	15	8	4	3	16	15	0	0	0	0	61	6.63
Hemiptera	11	4	3	12	2	1	6	1	3	2	45	4.88
Coleoptera	105	31	26	20	21	13	8	3	7	5	239	25.98
Total number of insects											921	
Foragingvisit (day 1)	18	1425	956	265	365	250	485	228	66	28	4096	

Table 2. Insects collected at different time interval in second observation

InsectOrder	Time										Total	(%)
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5		
Hymenoptera	250	300	175	100	150	100	78	44	30	15	1142	53.98
Lepidoptera	12	0	2	0	0	1	0	0	0	0	15	71
Diptera	20	8	12	3	5	7	3	4	4	0	66	3.12
Hemiptera	10	15	15	6	21	28	23	9	11	6	144	6.81
Coleoptera	180	115	100	15	23	40	39	13	9	7	748	35.375
Total number of insects											2115	
Foraging visit (day2)	205	709	1007	243	37	198	173	33	93	95	2793	

Table 3. Insects collected at different time interval in third observation

Insect Order	Time										Total	(%)
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5		
Hymenoptera	4	6	10	22	5	10	15	8	9	15	104	40.47
Lepidoptera	0	3	3	6	4	0	0	4	1	3	24	9.34
Diptera	0	0	0	4	0	0	0	2	2	0	8	3.11
Hemiptera	2	4	6	11	6	2	3	7	6	4	51	19.84
Coleoptera	0	9	12	16	8	11	7	1	6	0	70	27.24
Total number of insects											257	
Foragingvisit (Day 3)	0	211	1065	368	58	1	151	11	54	194	2113	

Table 4. Insects collected at different time interval in fourth observation

Name of insects	Time										Total	(%)
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5		
Hymenoptera	8	8	9	9	6	4	5	7	8	9	73	46.20
Lepidoptera	2	2	0	0	0	0	0	3	6	0	13	8.23
Diptera	0	1	2	0	3	0	0	3	0	0	9	5.70
Hemiptera	5	0	1	4	4	2	1	0	3	1	20	12.65
Coleopteran	3	6	1	6	3	6	3	4	7	4	43	27.22
Total number of insects											158	
Foragingvisit (day 4)	0	68	465	272	40	326	30	11	178	18	1408	

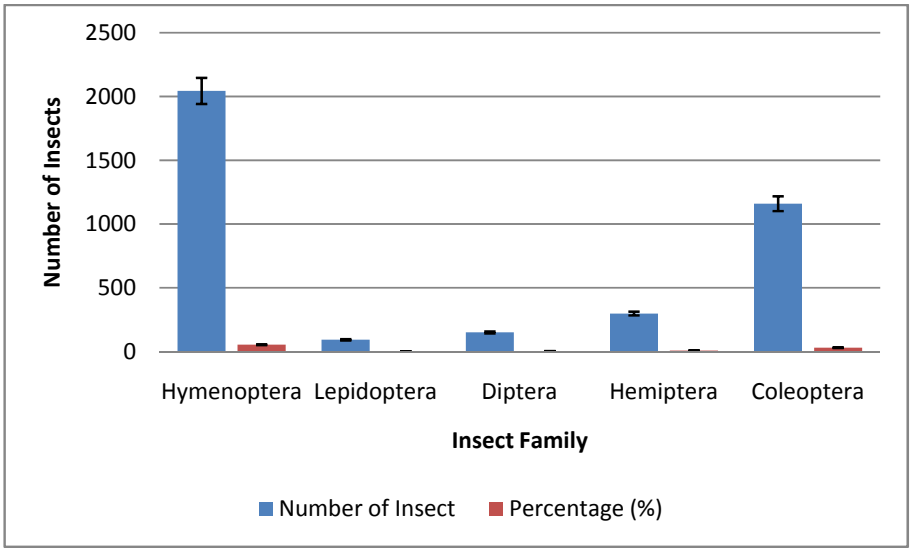
Table 5. Insects collected at different time interval in fifth observation

Name of insects	Time										Total	(%)
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5		
Hymenoptera	14	8	10	12	9	22	40	35	15	14	169	57.09
Lepidoptera	0	0	1	1	0	4	6	8	1	0	21	7.09
Diptera	0	0	0	0	1	0	4	2	0	0	7	2.37
Hemiptera	0	0	2	2	4	8	12	6	2	3	39	13.18
Coleoptera	1	3	6	6	8	3	6	15	6	6	60	20.27
Total number of insects											296	
Foragingvisit (day 5)	0	9	354	301	174	389	20	64	19	0	1330	

Table 6. Total Number of Insects collected in all observations

S.No	Insect Order	Number of Insect	%
1.	Hymenoptera	2044	54.55
2.	Lepidoptera	93	2.48
3.	Diptera	151	4.03
4.	Hemiptera	299	7.98
5.	Coleoptera	1160	30.96

Fig 1. Percentage of different orders of insect family



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