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ANALYSIS

Insect visitors of *Murraya Paniculata* (L.) Jack

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ABSTRACT

The diversity and frequency of insects visiting *Murraya paniculata* (L.), which is a tropical, evergreen plant found in the campus of Loyola College, were assessed. The visiting times of the insects were studied by direct observation. Six species of insects belonging to two orders were seen to frequently visit the flowers of the plant during the study period. Of the six species observed, two species are of the order Hymenoptera belonging to apidae family and the remaining four species were Lepidopterans wherein two species come under the order Nymphalidae and the other two species belong to Pieridae and Papillioniae respectively. The visiting hymenopterans belonging to Apidae family include *Apiscerana* and *Apis florae* and the Lepidopterans belonging to Nymphalidae family include *Hypolimnas bolina* commonly called Great eggfly and *Euploea core* also referred to as the common crow. The Lepidopteran visitors belonging to Pieridae family include *Catopsilia pomona* commonly called common emigrant or lemon emigrant and those belonging to Papilionidae include *Graphium nomius* commonly called spot swordtail.

Keywords: Diversity, *Murraya paniculata*(L.), Hymenoptera, Lepidoptera.

1. INTRODUCTION

Murraya paniculata (L.) also known as *Murraya exotica,* belongs to the citrus family Rutaceae and is a tropical, evergreen plant, known to bear small, white, scented flowers. It is native to many South East Asian countries, China, Indian subcontinent and Australasia. It is commonly known as mock orange or cosmetic bark tree and has emetic, antipyretic (Chopra et al., 1982), carminative, anti-inflammatory (Calixtoet al., 2000), analgesic (Chevallier, 1996) and anti-ulcer activities.

The successful propagation and distribution of species is possible only with the stability of insect species that aid in pollination in their natural habitat (Shivannah and Tandon, 2014). Hence, it is imperative to study the insect visitors, in particular their diversity and frequency, of a particular plant to predict their abundance and distribution in the near future. In case of economically important plants, data regarding the

insect visitors could help chart out conservation strategies. In addition to the above mentioned points, insect visitors of flowering plants could potentially help in assessing the quality of a particular site in the ecosystem (Mutinet al., 2009) and give a deeper understanding of pollination ecology, as insects play a vital role in pollinating a plant (Gross and Werner, 1983).With regard to amount of work done in the area of reproductive ecology, it can be said that there exists a lacuna as the data available is very limited and there is an urgent need to carry out research in these lines. Hence an attempt has been made in the present investigation to assess the diversity and frequency of the insect visitors of *Murraya paniculata*.

2. MATERIALS AND METHODS

The study was conducted in the sprawling campus of Loyola College (13.0620° N, 80.2340° E), present at the heart of the Chennai city, Tamil Nadu, which houses *Murraya paniculata* plants. The activity pattern of the insect visitors was recorded by direct observation and the insect visitors were collected for the purpose for identification. The diversity and frequency of the insect visitors of *Murraya paniculata* were observed between 6.00 AM to 4.30 PM in the month of June.

3. CALCULATION

Daily observations were made on a bunch of 40 flowers for three days in the plant for ten and a half hours starting from 6.00 AM. The visitors were counted every half an hour during the observation period and the data was multiplied by 2 to estimate the number of visitors visited in an hour.

The formula used to calculate the frequency of insect visitors is given below

Total number of flowers visited in 30 min (n_x) = $n_1+n_2+n_3+n_4+$…….

Where,

n_1; n_2; n_3; n_4, etc., are the number of flowers visited by the insect in each bout

Total number of flowers visited in 01 hour = n_x x 2

Frequency of visits= total number of flowers visited in 01 hour/ total number of flowers in the study plot (Shivannah and Tandon, 2014)

4. RESULTS

A total of six species of insects (Bee: 2 species and Butterfly: 4 species) were found to frequent the flowers of *Murraya paniculata* plant during the study period. *Apiscerana* and *Apis florae* are the two bee species that visited the pant. The butterflies that visited include *Hypolimnas bolina*, *Euploea core*, *Catopsilia pomona* and *Graphium nomius*. The frequency by which they visit each flower among the 40 flowers selected for the study was observed and noted. The observation was carried out for a month and the mean values were calculated for every visitor. The frequencies of the different insect visitors are tabulated in Table 1. The graphical representation of the visitors *Apiscerana, Apisflorea, Hypolimnas bolina, Euploea core, Catopsilia Pomona* and *Graphium nomius* are given in Fig. 1, 2, 3, 4, 5 and 6 respectively. The pictorial representation of insect visitors has been depicted in Fig 7.

Table 1

Frequency of insect visitors of *Murray paniculata*

Time Slot	Visitor A (*Apiscerana*)	Visitor B (*Apisflorea*)	Visitor C (*Hypolimnas bolina*)	Visitor D (*Euploea core*)	Visitor E (*Catopsilia Pomona*)	Visitor F (*Graphium nomius*)
06.00 to 06.30	1.3	1.36	0.01	0	0	0
07.00 to 07.30	2	1.38	0	0	0	0.03
08.00 to 08.30	1.8	1	0.06	0	0	0
09.00 to 09.30	0.8	0.56	0.01	0.05	0	0.06
10.00 to 10.30	0.48	0.61	0.13	0.1	0.01	0.03
11.00 to 11.30	0.21	0.2	0.06	0.06	0.01	0
12.00 to 12.30	0.1	0.05	0	0	0.01	0.06
13.00 to 13.30	0.06	0.05	0	0	0.06	0.01
14.00 to 14.30	0.01	0.05	0	0.01	0.06	0.03
15.00 to 15.30	0.03	0.05	0.06	0.06	0.08	0.01
16.00 to 16.30	0.1	0	0.05	0.06	0	0.01

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http://www.discovery.org.in/s.htm

Figure 1
Frequency of *Apiscerana* at different time durations

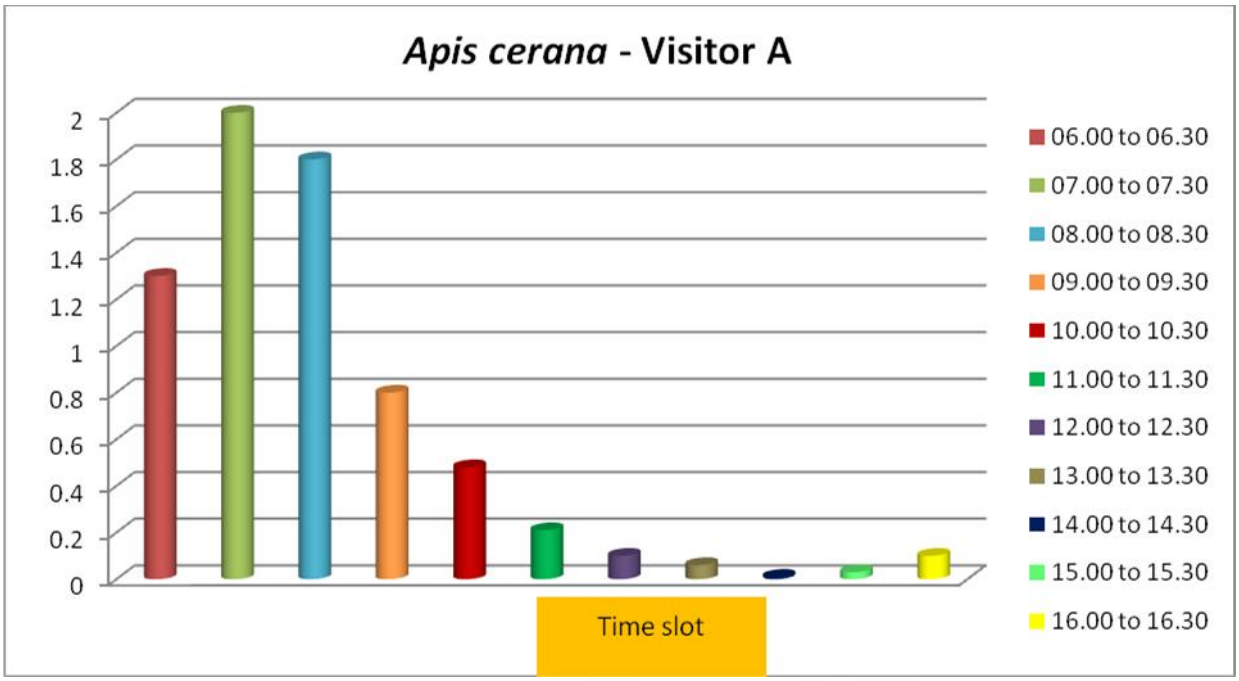

Figure 2
Frequency of *Apisflorea* at different time durations

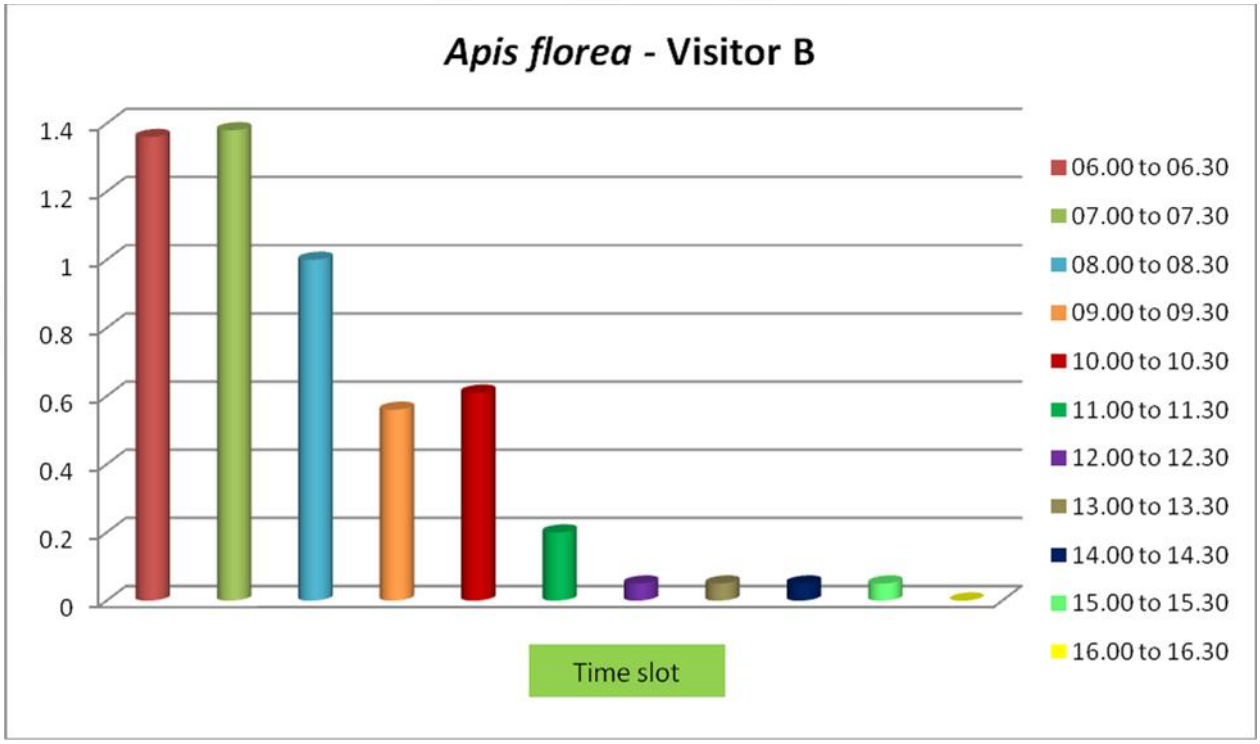

Figure 3
Frequency of *Hypolimnas bolina* at different time durations

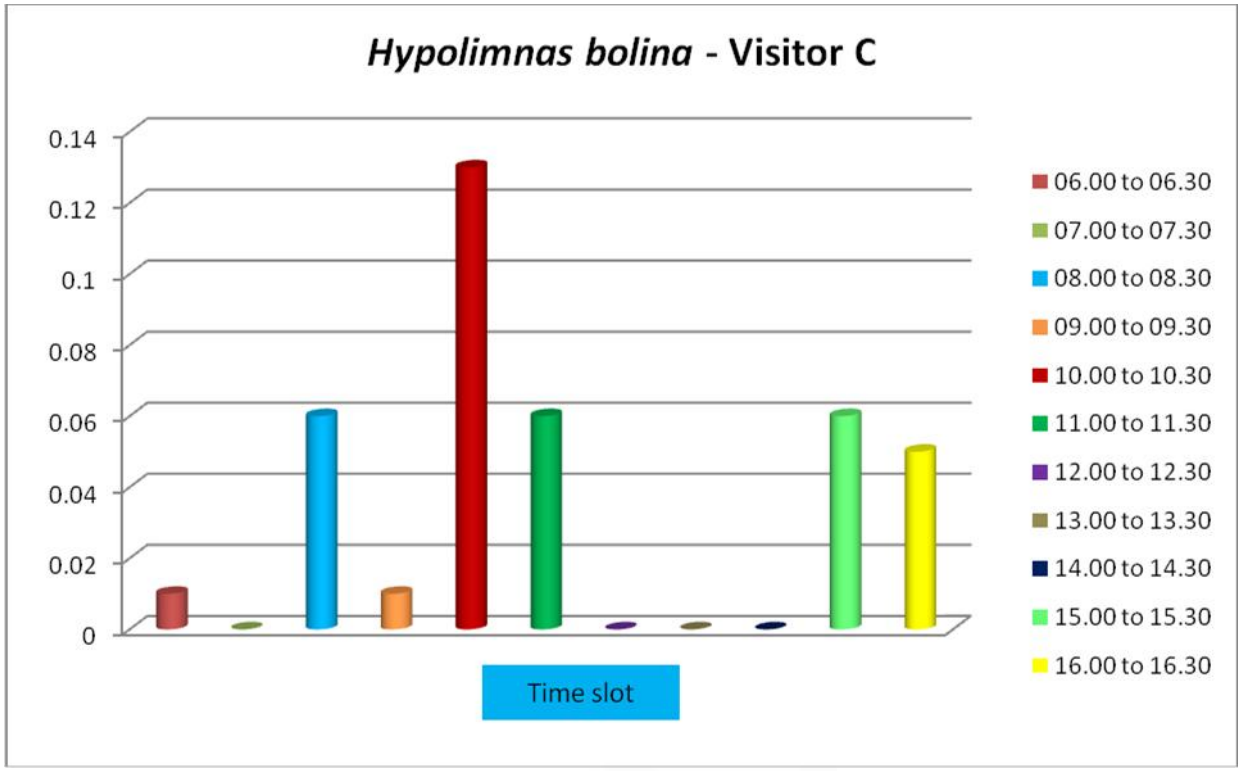

Figure 4
Frequency of *Euploea core* at different time durations

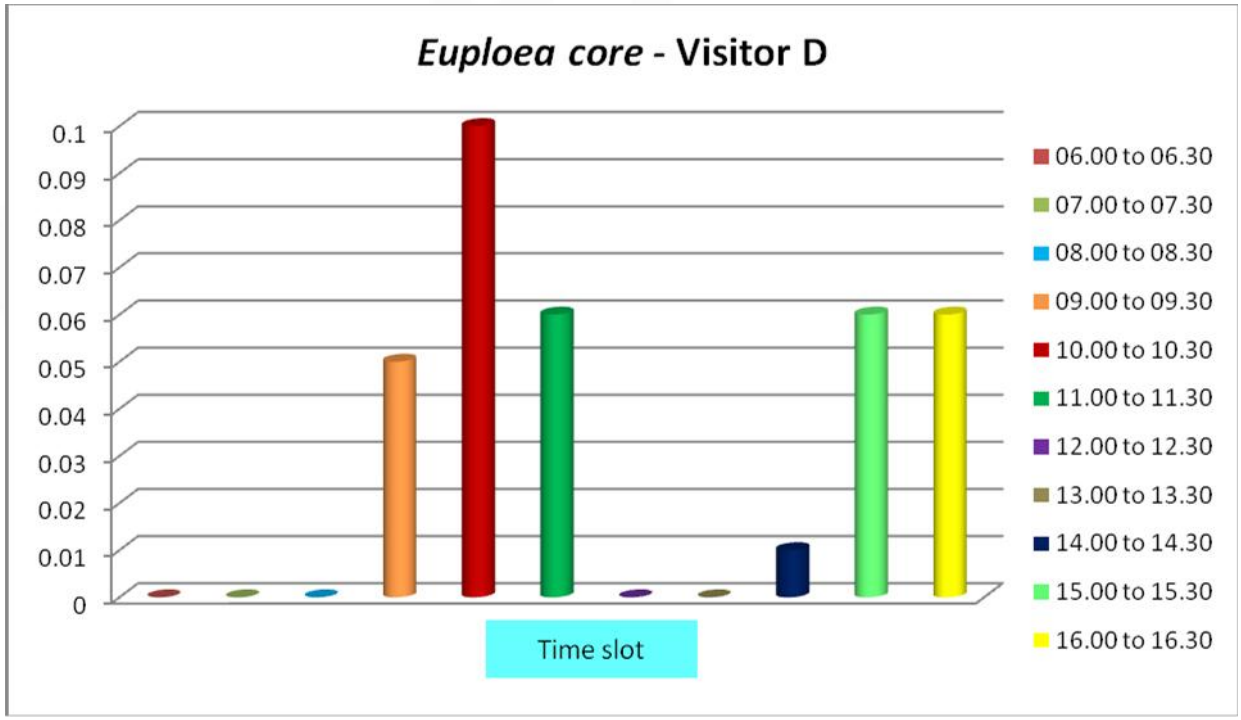

Figure 5
Frequency of *Catopsilia pomona* at different time durations

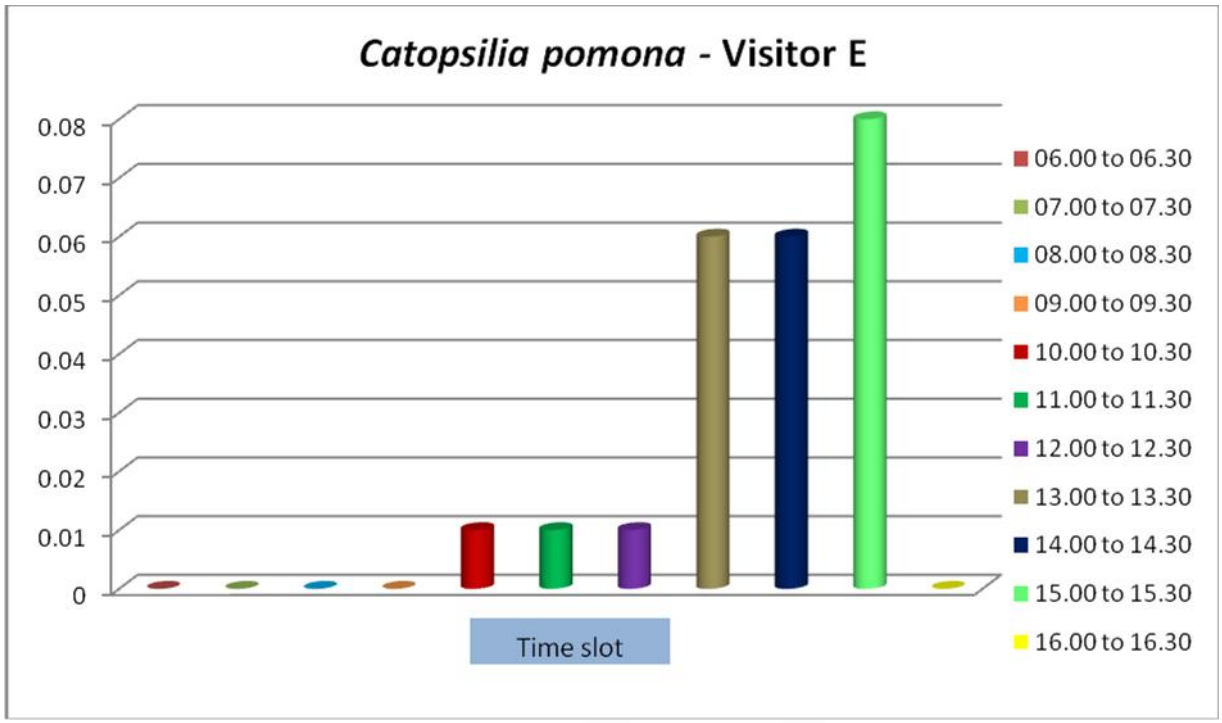

Figure 6
Frequency of *Graphium nominus* at different time durations

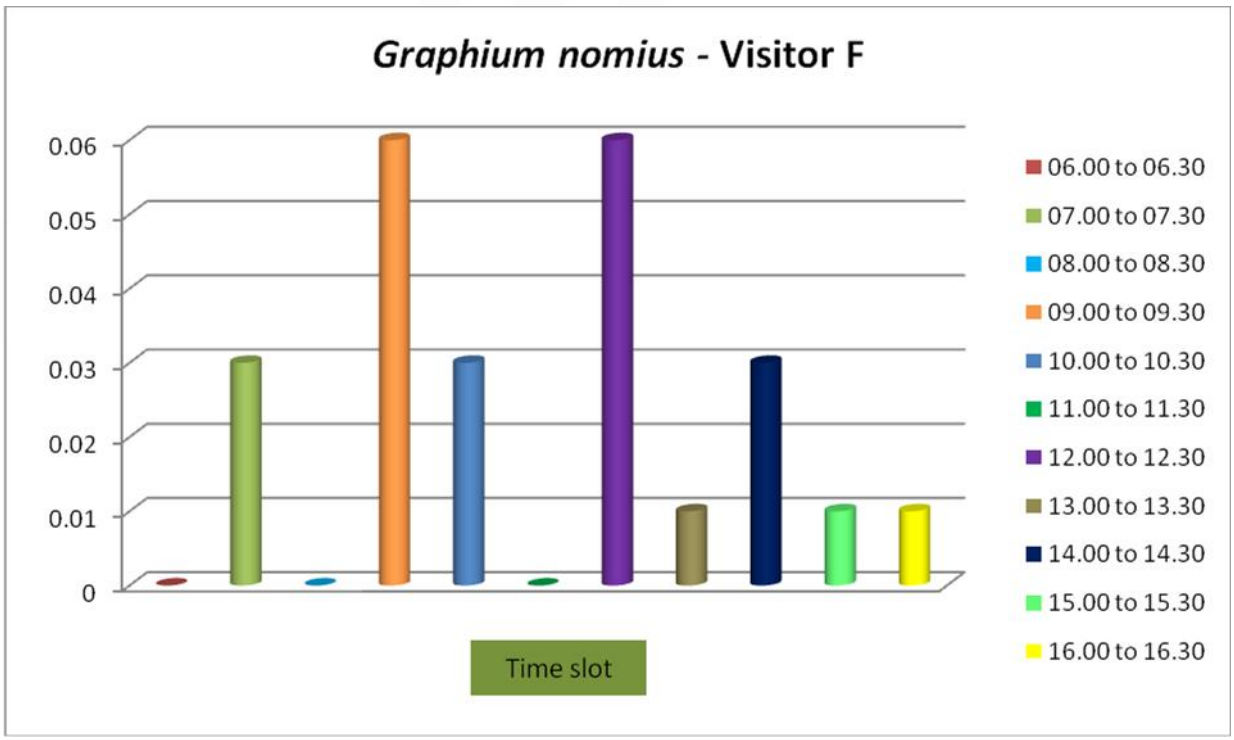

Figure 7

Pictorial representation of Insect visitors of *Murraya paniculata* (L.)

1. Insect visitor, *Apis cerana*;
2. Insect visitor, *Hypolimnas bolina*;
3. Insect visitor, *Graphium nomius*;
4. Insect visitor, *Eupoloea core*

The frequency of *Apis cerana* visiting the flowers was at its peak during the morning hours from 7.00 A.M. to 8.00 A.M. and showed a gradual dip towards the afternoon hours. The frequency of *Apis florea* was at its peak during 6.00 A.M. to 8.00 A.M. and showed a gradual dip towards the afternoon hours. The frequency of the butterfly, Great eggfly showed a steep increase during the mid day hours from 10.00 A.M. to 11.00 A.M. and the organism was in its visits in notable frequency during the other time slots such as 8.00 A.M. to 9.00 A.M., 11.00 A.M. to 12.00 noon and 2.00 P.M. to 4.00 PM. The frequency of the butterfly, Common crow was similar to the frequency of Great eggfly with some minor discrepancies. The frequency of the butterfly, Common emigrant was high during the late aftenoon hours from 3.00 P.M. to 4.00 P.M. The frequency of the butterfly, Spot swordtail was high during the morning hours from 9.00 A.M. to 10.00 A.M. and 12.00 noon to 1.00 P.M. and the frequency was in a normal range in other time slots namely 7.00 A.M. to 8.00 A.M., 10.00 A.M. to 11.00 A.M. and 2.00 P.M. to 3.00 P.M.

5. DISCUSSION

The insect visitors observed can be classified into two groups viz., bees and butterflies. Bees are efficient and important pollinators and have been the sole reason for the distribution of many plant species. Their efficiency can be attributed to their elongated proboscides. Their importance rises as it can be seen that they are the only insects among Aculeata endowed with long proboscis. They are the most adapted to anthophily. Most flowers are known to have features that have co-adapted in order to enable bees to collect pollen and nectar for their larvae. A significant level of such co adaptation can be witnesses in most plants visited by the bees and those flowers of *Murraya paniculata* are no exception. Thus a pollination complex of sorts is formed constituted by the bees and the flowers they visit.

With respect to the butterflies, some of them are known to mix pollen with nectar and then feed on the mixture (DeVries, 1979). Butterflies are frequent visitors of flowers that are brightly colored and scented and those of *M. paniculata* are white and scented. Butterflies again visit flowers that are structurally adapted to enable pollination. Short and abrupt movements seen in butterflies and bees cause them to spend a

considerable amount of time hovering over patches of flowers. It can be said that the flowers of *M. paniculata* are structurally adapted to enable feeding by both bees and butterflies.

6. CONCLUSION

The effective management on reproductive ecology of wild and cultivated plants is essential for sustaining our biodiversity and improving our yield. Conservation and management of our plant diversity is going to be a major challenge in the coming decades, particularly in tropical countries which are rich in biodiversity. Reproductive failure is the major reason for pushing a large number of tropical species to the vulnerable category (Shivannahand Tandon, 2014). Thus, in order to protect the already flourishing plant species and to ensure its continued survival, studying their insect visitors is essential. Further research in this line will help establish the insects responsible for the survival of each plant species. This will serve to come up with conservation strategies for the continued survival of the plants concerned.

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