


King Immanual, J. 1996. Field studies on the interaction of fruit bat Cynopterus sphinx with a few species of plants. M.Phil. Dissertation, Manonmaniam Sundaranar University, Tirunelveli.


Law, B.S. 1994. Nectar and Pollen: dietary items affecting the abundance of the common blossom bat *Syconycteris australis* is southeastern Australia.


Nakamoto, A., Kazumitsu Kinjo., and Masako Izawa. 2009. The role of Orii’s flying fox (*Pteropus dasymallus inopinatus*) as a pollinator and a seed disperser on Okinawa-jima Island, the Ryukyu Archipelago, Japan.


From

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To

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Respected Sir,


Corrections before viva voce – Certificate

Ref: RES/Ph.D/VIVA/R-2/2416, dated 25-06-2014

The thesis for Ph.D submitted by my scholar D. Stephenraj was evaluated and the examiner has suggested revision before the viva voce examination. Accordingly, the scholar obtained the copy of the Ph.D thesis and effected corrections as suggested by the examiner.

This is to certify that all the corrections were carried out by the scholar and the thesis is being resubmitted.

Further, I request that viva voce can be held as soon as possible and necessary action from your end may kindly be initiated.

Thanking you

Yours sincerely

Encl: List of corrections incorporated in the thesis
FOLLOWING CORRECTIONS HAD BEEN MADE IN THE THESIS
AS PER THE SUGGESTIONS GIVEN BY THE EXAMINER

1. The page number given in the content had been changed as in the body text.
2. The scientific name of ‘Jamun’ was wrongly written as *syzium cumini*, and had been changed as *syzygium cumini*. The generic and species name in the table of pg 93, that were written together had been corrected.
3. References that were not written single format/uniformity had been changed, and a uniformity is followed in writing references.
4. In a few places, the first letter of a name quoted in reference list is written in small letter in the thesis text, such names were changed as per the norms and first letter was changed as capital letter.
5. Spelling mistake/typographical error in line no.11 of Pg. 21; Fling-Fox was changed as flying fox.
6. Repetition of references in the list had been deleted.
7. Reference that was mistakenly written with suffix “a” had been corrected.
8. In reference column, in the case of same author(s), ascending order of year was followed.
9. Androecium had been wrongly spelled as andricium in Pg. 133, it had been corrected as androecium.
10. Missing reference that were quoted in the body text and were not included in the reference list had been corrected and new reference was added.
11. An overall conclusion was added at the end of thesis (Page No. 129) as a separate chapter with heading ‘General Conclusion’.

Guide signature with seal
Nocturnal pollination of Parkia biglandulosa by nectar feeding bat, Cynopterus sphinx

Bat–flower interactions appear to be an important factor in the reproductive phenology and population structure of plants. In the Old World tropics, pteropodid bats visit at least 141 species of plants for nectar or pollen, including many economically important species. Nectar-feeding bats pollinate flowers in exchange for nectar and pollen rewards. These bats promote out-breeding and contribute towards maintaining genetic diversity of plant population. Pollination mutualisms also provide the following benefits to plants: reduced pollen waste (compared to alternative methods such as wind pollination), longer transport distance, higher pollination success at low plant densities and higher rate of out-crossing and gene flow.

Parkia biglandulosa (Mimosoideae: Leguminosae) is a tall, handsome tree species distributed in tropical regions of Asia, Africa and South America. In Parkia species, the densely flowered spherical inflorescence, capitula, is mostly covered with fertile flowers. Sterile flowers, present in the proximal region of capitula, secrete nectar that is stored in a nectar ring. The capitula are visited for nectar by bats; other visitors include birds, insects and non-flying mammals.

The objective of the present study was to observe pollination of Parkia biglandulosa by the nectar-feeding bat Cynopterus sphinx.

Visual observations were made on the nectar-feeding behaviour of megachiropteran bat, Cynopterus sphinx (Chiroptera: Pteropodidae) and pollination of Parkia biglandulosa in Tenkasi, Tirunelveli district, Tamil Nadu, South India (8°55′W lat., 77°16′E long.). Fourteen species of megachiropteran bats are known from India and Cynopterus sphinx is sympatric in the study area, a medium sized fruit bat (average forearm length 70.2 mm; body mass 45 g). Observations were made twice a week throughout the entire flowering season. Four trees were found in the study area and the total number of capitula available was determined by cluster sampling method. Observations were initiated at 18.00 h and ended at 6.00 h on each observation night, taking advantage of the available diffuse light. During each observation, the number of foraging flights and feeding strategies of bats was noted every hour throughout the night. Mist-net studies were carried out during five nights, other than observation days to examine pollen in the fur of the bats visiting capitula.

Observations reveal that during the flowering season from October to December, nectar production occurs in the nectar ring of capitula of Parkia biglandulosa. The main pollinator, Cynopterus sphinx lands on the capitula to feed on the nectar (Figure 1). It also settles on the lower and middle branches of the tree, at the height of ca. 10 m, to reach the flowers. In the present study, an average of 52 individuals of Cynopterus sphinx visited a mean of 300 capitula per night. The foraging periodicity is characterized by unimodal pattern of activity that occurred from 20.00 to 23.00 h (Figure 2). Similar pattern of activity peak is dominant among frugivorous and nectarivorous species, although bimodal patterns have also been reported in several species.

We also found that the seasonality and availability of capitula influenced the frequency of bat visits. For instance, during the peak season (flowers ca. 540), a maximum number of bat-visits per night (ca. 75 visits) was recorded (Figure 3). Thus the magnitude of foraging activity of bats was correlated with the number of available flowers ($r = 0.865$). Using mist-net, 10 adult males and 14 adult females were captured in five nights between 20.00 and 01.00 h in the vicinity of the flowering tree during foraging hours.
Observations show that about 45.8% bats was found loaded with pollen on their fur. This species inadvertently collect pollen on the ventral side of the body as it landed on the capitula to feed the nectar. Pollen carrying by the nectar feeding bats is also reported; pollen of *Ceiba pentandra* was observed on the abdomen, wings and head of *Cynopterus sphinx* and on the bodies of *Rousettus leschenaulti* and *Pteropus giganteus*. The presence of pollen on the body and wings of these bats strongly suggests that they are important pollinators.

In South India, two species of pteropodid bats, *Cynopterus sphinx* and *Pteropus giganteus* visiting capitula and feeding on nectar from *Parkia biglandulosa* under natural conditions has also been reported. It may be concluded that the availability of capitula and the nectar reward may have a significant influence on the foraging behaviour of bats and possibly on the reproductive potential of *Parkia* species.


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