

## **NECTAR FEEDING BEHAVIOR OF SOME BUTTERFLIES IN THE BOTANICAL GARDEN OF DHAKA UNIVERSITY**

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**Abstract:** Nectar feeding behavior of butterflies belonging to the families Nymphalidae, Danaidae, Pieridae, Lycaenidae and Papilionidae were studied in the Botanical garden of Dhaka University. The highest and the lowest duration of searching time was  $39 \pm 2$  and  $36 \pm 5$  seconds respectively for the *Catopsila pomona* and *Zizina otis*. The highest and the lowest duration of feeding was  $13.0 \pm 1$  and  $9.9 \pm 0.9$  seconds respectively for the *Danaus chrysippus* and *Zizina otis*. The longest proboscis ( $12.6 \pm$  mm) was recorded in *Danaus chrysippus*. The deepest corolla ( $22 \pm 5$ mm) was found in the flower of *Cosmos bipinnatus* plants. The proboscis of 4 butterfly species named *Eurema hecabe*, *Jononia almana*, *Catochrysopes strabo* and *D. chrysippus* was highly correlated with the corolla tube of *Cosmos bipinnatus*, *Tephrosia purpurea* and *Tagetes erecta* respectively.

**Key words:** Butterflies, nectar feeding, proboscis, corolla.

### **INTRODUCTION**

Butterflies are ecologically diverse group of insects showing complex foraging behavior during searching for food and nectar (Sourakov *et al.*, 2012). The nectar of flower is the main source of adult nutrition (Ômura and Honda, 2005). The butterflies exhibit distinct differences for flower preference (Jennersten, 1984). They choose plants as nectar sources depending on various factors including colors and odors of flowers (Jolivet 1986, Weiss 1997, Dosa 1999, DeVries *et al.*, 1999 and Sourakov 2012). Odor sometimes acts as a synergist with color as the important cue of foraging (Ômura and Honda, 2005). The floral scent is a vital signal used by butterflies initially to identify and subsequently to recognize and distinguish among worthwhile plants (Andersson, 2003).

The usefulness of butterfly foraging depends on the corolla depth and proboscis length which limits the range of flowers from which nectar can be extracted (Porter *et al.*, 1992 and Corbet, 2000). Although a good number of researches were conducted on morphology and taxonomy of different butterfly species in Bangladesh but works on the nectar feeding behavior of adult butterflies are not available. Therefore, the objectives of the present investigation are to study the nectar feeding behavior of different butterfly species including the relationship between the corolla depth and the proboscis lengths of some adult species.

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### MATERIAL AND METHODS

The study was conducted in the Botanical garden of Dhaka University during March, 2011 to February, 2012.

Ten species of butterflies belonging to five different families were selected for the present study. The flowering plants of the garden were observed to record the nectar feeding behavior of the selected butterflies. During the observation, each nectar plant was observed for ten minutes at a time for the visit (if any) at intervals of a period of 8 hours starting from 8 am to 4 pm once in each month. The records were maintained as the duration of searching for a suitable flower and the duration for nectar feeding by each day. The records were also kept on the number of species of butterflies visited the host plant during the whole period of study. The nectar searching period was observed on the basis of the time during which a butterfly remained on wing near the host plant or hovering over the host plants before sitting on a flower for nectar feeding. The duration of feeding was counted from the moment of dipping the proboscis into the flower corolla till the moments of its withdrawal. 'Tukey's honest significance test' was accomplished to compare the duration of searching for food and the duration of feeding of different butterfly species.

The depth of corolla tube of the flowers and the lengths of the proboscis of the butterflies were measured in millimeter. Four species of butterflies named, *Eurema hecabe*, *Catochrysops stabo*, *Junonia almana* and *Danaus chrysippus* were selected for this study. Simple linear regression lines were produced by comparing the data of corolla depths of flowers and the proboscis lengths of the respective butterflies using Microsoft Excel version 2010.

### RESULTS AND DISCUSSION

Eight families of flowering plants were noted to be visited by 10 species of butterflies (Table1). The family Compositae comprised of two species of plants *Cosmos bipinnatus* (Cosmos) and *Eupatorium odoratum* (Asam lata) which were foraged by maximum 9 species of butterflies named *Catopsila pomona*, *C. pyranthe*, *D. chrysippus*, *E. blanda*, *E. hecabe*, *J. almana*, *J. atlites*, *Leptosia nina* and *Papilio polytes*. The family Verbenaceae contained the species of *Clerodendrum infortunatum* (Bhat) and *Lantana camara* (Lantana), foraged by 8 individuals of butterflies. Individuals of 7 species of butterflies were noted to take nectar from two species of plants *Tagetes erecta* (Gada) and *Zinnia elegans* (Zinia) under the family Asteraceae. The plants of *Gomphrena pulchela* (Botamphul) family Amaranthaceae was visited by 6 species of butterflies. The family Labiateae was represented by *Salvia* sp. which is attracted by the butterflies of 6 species. The family Vitaceae has one species *Vitis lanceolaria*

(Harina lata) which was also visited by 6 butterfly species. The family Apocynaceae is represented by a single species *Rauwolfia serpentina* (Sarpogandha) which was also foraged by 5 species of butterflies. The plants belong to the family Vitaceae are climbers, Apocynaceae are herbs and the others are shrubs.

**Table 1. Plants used for nectar feeding by different butterflies**

Common name	Name of Plants			Name of Butterflies
	Scientific name	Family name	Type	
Asam lata	<i>Eupatorium odoratum</i>	Compositae	Shrub	<i>Catopsila pyranthe</i> , <i>C. pomona</i> , <i>Danaus chrysippus</i> , <i>Eurema blanda</i> , <i>E. hecabe</i> and <i>Zizina otis</i> .
Cosmos	<i>Cosmos bipinnatus</i>	Compositae	Shrub	<i>E. blanda</i> , <i>E. hecabe</i> , <i>Junonia almana</i> , <i>J. atlities</i> , <i>Leptosia nina</i> and <i>Z. otis</i> .
Bhat	<i>Clerodendrum infortunatum</i>	Verbenaceae	Shrub	<i>D. chrysippus</i> , <i>E. blanda</i> , <i>E. hecabe</i> , <i>Papilio polytes</i> and <i>Z. otis</i> .
Lantana	<i>Lantana camara</i>	Verbenaceae	Shrub	<i>C. pomona</i> , <i>C. pyranthe</i> , <i>E. blanda</i> , <i>E. hecabe</i> , <i>L. nina</i> and <i>P. polytes</i> .
Gada	<i>Tagetes erecta</i>	Asteraceae	Shrub	<i>C. pyranthe</i> , <i>C. pomona</i> , <i>D. chrysippus</i> , <i>J. almana</i> , <i>J. atlities</i> , <i>L. nina</i> , and <i>P. polytes</i> .
Zinnia	<i>Zinnia elegans</i>	Asteraceae	Shrub	<i>C. pyranthe</i> , <i>C. pomona</i> , <i>J. almana</i> , <i>J. atlities</i> , <i>L. nina</i> and <i>P. polytes</i> .
Botamphul	<i>Gomphrena pulchela</i>	Amaranthaceae	Shrub	<i>D. chrysippus</i> , <i>E. blanda</i> , <i>E. hecabe</i> , <i>J. almana</i> , <i>J. atlities</i> and <i>Z. otis</i> .
Salvia	<i>Salvia</i> sp.	Labiatae	Shrub	<i>E. blanda</i> , <i>E. hecabe</i> , <i>J. almana</i> , <i>J. atlities</i> , <i>L. nina</i> and <i>Z. otis</i> .
Harina Lata	<i>Vitis lanceolaria</i>	Vitaceae	Climber	<i>C. pyranthe</i> , <i>C. pomona</i> , <i>E. blanda</i> , <i>E. hecabe</i> , <i>L. nina</i> and <i>P. polytes</i> .
Sarpogandha	<i>Rauwolfia serpentina</i>	Apocynaceae	Herb	<i>C. pomona</i> , <i>C. pyranthe</i> , <i>E. blanda</i> , <i>E. hecabe</i> , and <i>Z. otis</i> .

The duration of nectar searching and the duration of feeding are shown in Table 2. The longest duration of nectar searching was  $39.33 \pm 2.1$  seconds for *C. pomona* and the shortest ( $36.1 \pm 4.5$ sec.) for *Z. otis*. The highest and the lowest duration of feeding were  $13.0 \pm 1.4$  and  $9.9 \pm 0.9$  seconds respectively, for the *D. chrysippus* and *Z. otis*.

The present study indicated that the maximum numbers of butterflies were attracted to the yellow and violet flowers. These findings agree with the work of Bakowsk and Boron (2005). However, Goulson and Cory, (1993), mentioned that floral colors and scent together exerts important signals for foraging. According to Dover, (1989), representatives of the family Pieridae and Nymphalidae need

more time to drink nectar. In the present study *Catopsilia pomona* (Family – Pieridae) took more time to search water and *Junonia almana* (Family – Nymphalidae) need more time to feed nectar (Table 2).

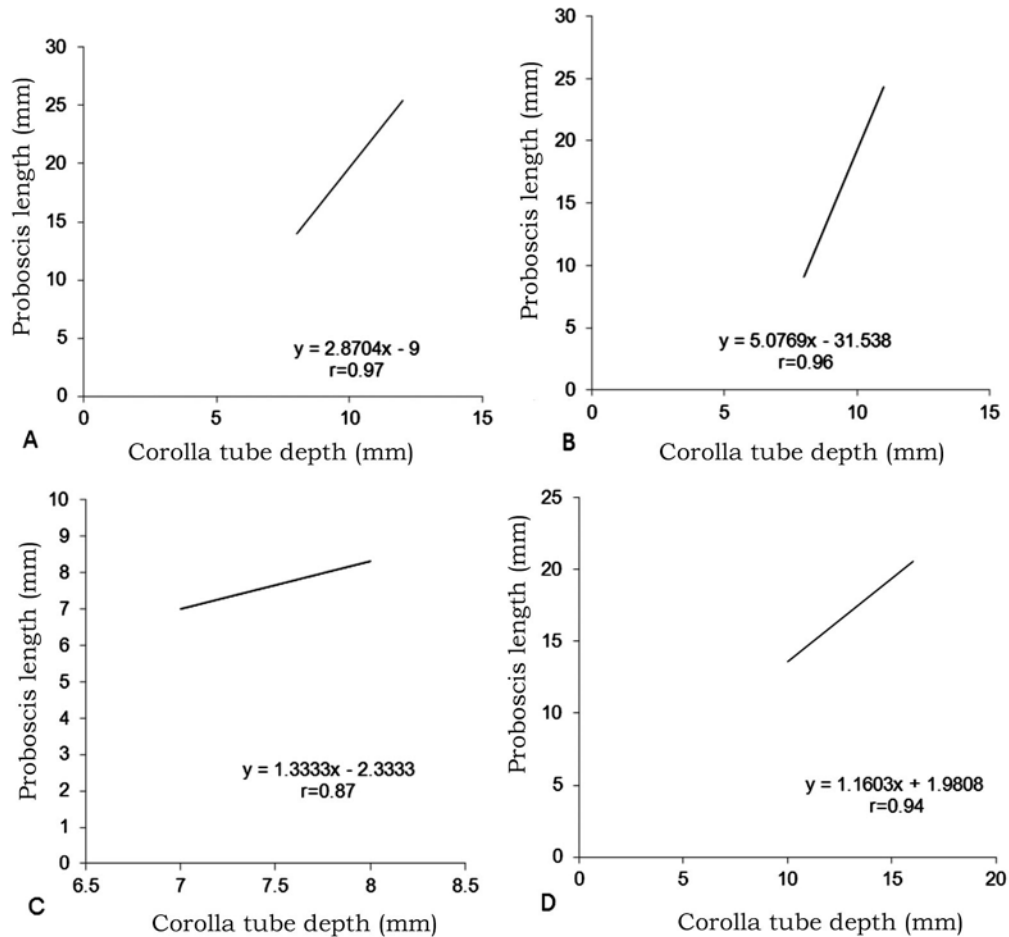


Fig. 1. Relation between Corolla tube depth and Proboscis length of four butterflies foraged in four flowers. A. *Eurema hecabe* and *Cosmos bipinnatus*. B. *Junonia almana* and *Cosmos bipinnatus*. C. *Catochrysops strabo* and *Tephrosia purpurea*. D. *Danaus chrysippus* and *Tagetes erecta*.

Relationships between the proboscis lengths of four selected species of butterflies and the corolla tube depths of the specific flowers are presented in Figure 1. Results indicated that the proboscis lengths of the selected butterflies were largely correlated with the depth of corolla of respective host plant. It is often assumed that long tongued species of butterflies (Nymphalidae and Pieridae) prefer to forage more nectar producing plants (Bakowsk and Boron, 2005). In the present study proboscis length of *E. hecabe* (Family – Pieridae), *J. almana* (Family- Nymphalidae) and *D. chrysippus* (Family- Danaidae) were highly

**Table 2. Nectar searching and nectar feeding time (Seconds) of butterflies at different temperatures**

Name of foragers	Duration of feeding (second) (Mean ± SD)	Duration of searching (second) (Mean ± SD)	Temperature (°C) (Mean ± SD)
<i>Jononia almana</i>	12.9a ± 0.3	38.8a ± 2.7	25.2 ± 1.6
<i>Junonia atlites</i>	11.9b ± 0.7	37.8b ± 2.2	24.0 ± 1.0
<i>Eurema blanda</i>	10.7c ± 1.0	37.2b ± 4.1	23.6 ± 1.2
<i>Eurema hecabe</i>	10.8c ± 1.4	37.1b ± 4.1	23.5 ± 1.3
<i>Catopsila pyranthe</i>	10.5c ± 0.8	38.7a ± 2.7	24.3 ± 1.0
<i>Catopsila pomona</i>	11.7b ± 1.2	39.3a ± 2.8	23.5 ± 0.5
<i>Zizina otis</i>	9.9d ± 0.9	36.1c ± 2.1	23.8 ± 0.98
<i>Leptosia nina</i>	10.9c ± 1.5	36.8c ± 4.5	24.5 ± 1.6
<i>Danaus chrysippus</i>	13.0a ± 1.4	37.8b ± 2.6	23.0 ± 0.8
<i>Papilio polytes</i>	10.3d ± 2.4	36.6c ± 2.1	24.2 ± 1.1

N= feeding and searching bouts in each species. Mean indicated by different letters are significantly different from each other.

correlated with the corolla tube depth of *Cosmos bipinnatus* (Family - Compositae) and *Tagetes erecta* (Family – Asteraceae). All the butterfly species studied were strongly associated with the plant family Compositae, Verbenaceae and Asteraceae.

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