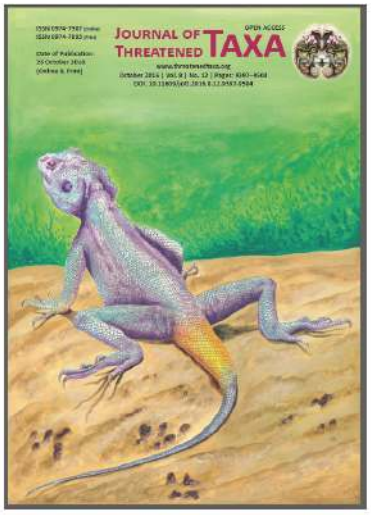
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SHORT COMMUNICATION

AN OBSERVATION ON THE FRUIT FEEDING BEHAVIOR OF BUTTERFLIES IN SOME AREAS OF BANGLADESH

Tahsinur Rahman Shihan

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An observation on the fruit feeding behavior of butterflies in some areas of Bangladesh

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Abstract: Very little information has been found about the behavior of fruit feeding butterflies in Bangladesh. So this was an attempt to know about the fruit feeding behavior of butterflies from different areas of Bangladesh. The study was conducted during June 2014 to September 2015. A total of 11 species and 53 individuals of butterflies of two families feeding on 11 species on the fruits of 11 families were reported. The greatest number of species (five) fed on *Averrhoa carambola*, *Psidium guajava* and *Mangifera indica* followed by *Ananas comosus* feeding by two species and remaining fruit species feeding by one species of butterfly.

Keywords: *Euthalia aconthea*, fruit feeding, Nymphalidae.

The fruit feeding habit evolved several times in nymphalid butterflies probably as an escape route from periods of low flower abundance (Krenn et al. 2001). Most fruit-feeding species have a proboscis adapted to suck fluids from moist surfaces, which is morphologically different from that of nectar-feeding butterflies (Krenn 2010). Fruit feeding butterflies feed on rotting fruits, faeces, tree sap and some other decaying organic matter (Young 1975; DeVries 1987). Due to their attraction to rotting fruits, these butterflies are easily sampled with bait traps and have been extensively used as models to assess levels of anthropogenic disturbance to the environment (Shuey 1997; Ribeiro et al. 2008, 2012; Bonebrake et al. 2010).

Fruit feeding butterflies are usually attracted to the volatiles produced by the fermentation process of their food sources, which differs from nectar-feeding butterflies that are attracted mainly by color displays (Sourakov et al. 2012). This opportunistic behavior could be especially important in periods when their natural food sources are scarce. In India, Palot & Radhakrishan (2006) reported 12 species of butterflies of family Nymphalidae feeding on rotten jackfruit.

However, the feeding behavior of adult butterflies is an often neglected topic in the study of butterfly biology (Hall & Willmott 2000) and very little information has been found about the behavior of fruit feeding butterflies in Bangladesh. So this was an attempt to know about the fruit feeding behavior of butterflies from different areas of Bangladesh.

Methods and Materials

An observation of fruit feeding behavior was conducted from June 2014 to September 2015 in natural conditions such as on over-ripe fruits fallen under trees, half eaten ripe fruits left by birds, rotten fruits under trees or on trees and the remains of fruit fed upon by birds. The butterflies' behavior was carefully observed.

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Butterfly Flocks

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Identification of species, GPS location, name of place, dates, times of feeding, duration of feeding and the names of fruits were noted on the spot. Butterflies were identified using the field guide by Kehimkar (2008), and Kunte (2000), and feeding fruits were identified by the literature of Hossain et al. (2009).

The location was noted with a Garmin GPS. Photography of live specimen was taken with Canon 1100D and Canon 600D with 55–250 mm lens. The duration of feeding was measured by a stop watch.

Result and Discussion

A total of 11 species and 53 individuals of butterflies of two families feeding on 11 species on the fruits of 11 families were reported. The greatest number of species (five) fed on *Averrhoa carambola*, *Psidium guajava* and *Mangifera indica* followed by *Ananas comosus* feeding by two species and remaining fruit species feeding by one species of butterfly.

Euthalia aconthea fed on the greatest variety (6 species of fruits) followed by *Ypthima baldus* (3 species of fruits) and *Mycalesis mineus, Mycalesis perseus* and *Hypolimnas bolina* (2 species of fruits). *Mycalesis visala, Lexias pardalis*, *Junonia iphita*, *Jamides celeno*, *Elymnias hypermnestra*, *Melanitis leda, Junonia almana* and *Ariadne merione* fed on only one type of fruit. Observation details are given in Table 1.

This study also show that the number of species (Nos) and number of individual (Noi) of fruit feeding butterflies that were observed the highest in the month Jan–Feb (Nos=05 and Noi=32) followed by the month May–Jun (Nos=04 and Noi=14), Jul–Aug (Nos=04 and Noi=05) and Sep–Oct (Nos=02 and Noi=02). On the other hand Nos and Noi were lowest (n= 0) in the months Nov–Dec and Mar–Apr during the study period. A comparison among the number of species (Nos) and number of individuals (Noi) in different months is given in Fig. 1.

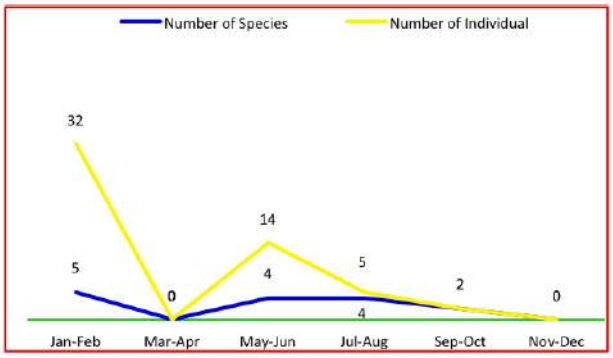


Figure 1. Comparison among number of species (Nos) and number of individuals (Noi) in different months

1. *Ananas comosus* (Pineapple): *Euthalia aconthea* was spotted in mid June 2014 at Jahangirnagar University campus (23°52'47.14"N & 90°16'16.54"E) feeding on the juice of *A. comosus* fruit part for two minutes and *Mycalesis mineus* was also observed feeding on the juice of *A. comosus* for one minute. Both these fruits had been discarded by shop keepers. *Mycalesis mineus* was observed early in June 2015 at Ghagra (22°39'6.08"N & 92°8'32.67"E), Rangamati.

2. *Annona squamosa* (Sugar Apple): *Ypthima baldus* was seen feeding on scattered fruit parts under *Annona squamosa* tree in a garden of Chuadanga (23°37'53.91"N & 88°51'0.33"E) on 23 August 2015 for three minutes.

3. *Artocarpus heterophylus* (Jackfruit): In India, Palot & Radhakrishan (2006) noted *Parthenos sylvia, Euthalia aconthea, Euthalia lubentina, Neptis hylas, Moduza procris, Tanaecia lepidea, Charaxes fabius, Orsotrioena medus, Mycalesis perseus, Melanitis leda, Elymnias hypermnestra* and *Junonia iphita* feeding on rotten *A. heterophylus*. In the present study, however, the author observed a *Mycalesis visala* feeding from an over-ripe *A. heterophylus* fruit parts for four minutes beside a road in Ghagra (22°39'6.08"N & 92°8'32.67"E), Rangamati.

4. *Averrhoa carambola* (Carambola): Twenty individuals of *Melanitis leda*, five individuals of *Elymnias hypermnestra*, three individuals of *Mycalesis perseus*, three individuals of *Ypthima baldus* and one *Euthalia aconthea* were seen up taking juice for 30–40 sec from rotten fruits under a Carambola tree in Chuadanga (23°37'53.52"N & 88°51'0.51"E).

5. *Carica papaya* (Papaya): *Euthalia aconthea* was only spotted once feeding for 30sec on a ripe half-eaten papaya on a tree in Chuadanga (23°37'53.52"N & 88°51'0.51"E).

6. *Ficus auriculata* (Fig sp.): Both male and female *Lexias pardalis* (Archduke) fed on juice from ripe and rotten fruit fallen under a Fig tree for five minutes in Marma para (22°30'9.12"N & 92°12'16.31"E), Kaptai National Park, Rangamati.

7. *Litchi chinensis* (Litchi): *Euthalia aconthea* was seen only once feeding on the juice of a Litchi fruit for 10sec in Chuadanga (23°37'53.52"N & 88°51'0.51"E) on 07 May 2015.

8. *Mangifera indica* (Mango): *Euthalia aconthea*, *Junonia iphita*, *Mycalesis mineus* and *Jamides celeno* were seen to feed on over-ripe and half eaten fruit left behind by Squirrel and Rhesus Macaque. *Euthalia aconthea* and *Junonia iphita* were spotted in Rangamati District (22°39'42.26"N and 92°10'5.94"E) feeding for 45min and 30sec, respectively. On the other hand,

Table 1. Overview of fruit feeding behavior of butterflies in different areas of Bangladesh

Fruit name	Family	Butterfly name	Family	Date	Location
Ananas comosus (L.) Merr. (Pineapple)	Bromeliaceae (Subfamily: Bormelioidae)	*Euthalia aconthea* (Cramer, 1777)	Nymphalidae (Subfamily: Limenitidinae)	19.vi.2014	Jahangirnagar University
		Mycalesis mineus (Linnaeus, 1758)	Nymphalidae (Subfamily: Satyrinae)	04.vi.2015	Rangamati
Annona squamosa L. (Sugar Apple)	Annonaceae	*Ypthima baldus* (Fabricius, 1775)	Nymphalidae (Subfamily: Satyrinae)	23.viii.2015	Chuadanga
Artocarpus heterophyllus Lam. (Jackfruit)	Moraceae Tribe: Artocarpeae	*Mycalesis visala* (Moore, 1857)	Nymphalidae (Subfamily: Satyrinae)	04.vi.2015	Rangamati
Averrhoa carambola L. (Carambola)	Oxalidaceae	*Melanitis leda* (Linnaeus, 1758)	Nymphalidae (Subfamily: Satyrinae)	30.i.2015	Chuadanga
		Mycalesis perseus (Fabricius, 1775)	Nymphalidae (Subfamily: Satyrinae)	30.i.2015	Chuadanga
		Elymnias hypermnestra (Linnaeus 1763)	Nymphalidae (Subfamily: Satyrinae)	01.ii.2015	Chuadanga
		Ypthima baldus (Fabricius, 1775)	Nymphalidae (Subfamily: Satyrinae)	03.ii.2015	Chuadanga
		Euthalia aconthea (Cramer, 1777)	Nymphalidae (Subfamily: Limenitidinae)	15.vi.2015	Chuadanga
Carica papaya L. (Papaya)	Caricaceae	*Euthalia aconthea* (Cramer, 1777)	Nymphalidae (Subfamily: Limenitidinae)	24.ix.2015	Chuadanga
Ficus auriculata Lour. (Fig)	Moraceae	*Lexias pardalis* (Moore, 1878)	Nymphalidae (Subfamily: Limenitidinae)	16.xi.2014	Kaptai National Park
Litchi chinensis Sonn. (Litchi)	Sapindaceae (Sub family: Sapindoideae)	*Euthalia aconthea* (Cramer, 1777)	Nymphalidae (Subfamily: Limenitidinae)	07.vi.2015	Chuadanga
Mangifera indica L. (Mango)	Anacardiaceae	*Euthalia aconthea* (Cramer, 1777)	Nymphalidae (Subfamily: Limenitidinae)	26.v.2015	Rangamati
		Junonia iphita (Cramer, 1779)	Nymphalidae (Subfamily: Nymphalinae)	26.v.2015	Rangamati
		Mycalesis mineus (Linnaeus, 1758)	Nymphalidae (Subfamily: Satyrinae)	08.v.2015	Kaptai National Park
		Jamides celeno (Cramer, 1775)	Lycanidae (Subfamily: Polyommatinae)	07.vi.2015	Kaptai National Park
		Mycalesis perseus (Fabricius, 1775)	Nymphalidae (Subfamily: Satyrinae)	15.vii.2015	Chuadanga
Musa sapientum L. (Banana)	Musaceae	*Hypolimnas bolina* (Linnaeus, 1758)	Nymphalidae (Subfamily: Nymphalinae)	07.x.2014	Rangamati
Psidium guajava L. (Guava)	Myrtaceae (Sub family: Myrtoideae) Tribe: Myrteae	*Euthalia aconthea* (Cramer, 1777)	Nymphalidae (Subfamily: Limenitidinae)	03.vii.2014 16.vii.2015 19.vii 2015	Chuadanga
		Elymnias hypermnestra (Linnaeus, 1763)	Nymphalidae (Subfamily: Satyrinae)	04.vii.2015	Chuadanga
		Ariadne merione (Cramer, 1777)	Nymphalidae (Subfamily: Biblidinae)	13.vii.2015	Chuadanga
		Hypolimnas bolina (Linnaeus, 1758)	Nymphalidae (Subfamily: Nymphalinae)	13.vii.2015	Chuadanga
		Ypthima baldus (Fabricius, 1775)	Nymphalidae (Subfamily: Satyrinae)	16.vii.2015	Chuadanga
Azadirachta indica A. (Neem)	Meliaceae	*Junonia almana* (Linnaeus, 1758)	Nymphalidae (Subfamily: Nymphalinae)	08.vii.2015	Chuadanga

Mycalesis mineus was spotted in Kaptai National Park (22^{0}30'8.24"N & 92^{0}12'4.28"E) feeding for seven minutes. Interestingly *Jamides celeno* of family Lycaenidae was also seen taking juice for 30min from a ripe *Mangifera indica* fruit in Kaptai National Park (22^{0}30'8.16"N & 92^{0}12'30.63"E). Both male and female *Euthalia aconthea* were also seen taking juice from a rotten *Mangifera indica* and one individual of *Mycalesis perseus* was taking juice from a ripe *Mangifera indica* in a fruit garden in Belgachi railgate para (23^{0}37'53.52"N & 88^{0}51'0.51"E), Chuadanga for 5min and 42sec, respectively.

9. *Musa sapientum* (Banana): One individual of *Hypolimnas bolina* was seen on October 2014 up taking juice from *M. sapientum* in a stationery shop in Rangamati (22^{0}39'26.51"N & 92^{0}10'22.73"E) for 1 minute.

10. *Psidium guajava* (Guava): *E. aconthea*, *Ariadne*



Image 1. *Euthalia aconthea* taking juice from *A. comosus* fruit part in Jahangirnagar University, Dhaka.



Image 2. *Mycalesis mineus* feeding on juice from *A. comosus* fruit part in Ghagra, Rangamati.



Image 3. *Ypthima baldus* feeding on juice from scattered fruit parts of *Annona squamosa* in Chuadanga.



Image 4. *Mycalesis visala* taking juice from over-ripe *Artocarpus heterophylus* fruit parts in Ghagra, Rangamati.



Image 5. *Lexias pardalis* feeding on *Ficus auriculata* in Kaptai National Park.



Image 6. *Euthalia aconthea* feeding on *Mangifera indica* in Rangamati District.

merione, *H. bolina, Elymnias hypermnestra* and *Ypthima baldus* were spotted in a fruit garden of Chuadanga (23^{0}37'53.52"N & 88^{0}51'0.51"E) taking juice from a half-eaten guava left by birds and squirrels and another over-ripe one which had fallen under its tree. *Y. baldus* fed from scattered fruit part for 20 sec. *H. bolina* was seen up taking juice for 50sec. *Ariadne merione* was seen taking juice for 5–7 minutes. Both male and female *E.*



Image 7. *Junonia iphita* feeding on *Mangifera indica* in Rangamati District.



Image 8. *Mycalesis mineus* feeding on *Mangifera indica* in Kaptai National Park.



Image 9. *Jamides celeno* feeding on *Mangifera indica* in Kaptai National Park.



Image 10. *Hypolimnas bolina* taking juice from *M. sapientum* in a stationery shop in Rangamati.



Image 11. *Euthalia aconthea* taking juice from *Psidium guajava* in Chuadanga.



Image 12. *Ariadne merione* feeding on half eaten *Psidium guajava* in Chuadanga.

aconthea fed on *P. guajava* juice for 30–40 minutes. Six different individuals of *E. aconthea* were recorded while feeding.

11. *Azadirachta indica* (Neem): One *Junonia almana* was seen feeding on *Azadirachta indica* fruit at Chuadanga on July 2015 for 10min.

In conclusion the number of species (Nos) and



Image 13. *Hypolimnas bolina* feeding on fallen *Psidium guajava* in a fruit Garden in Chuadanga.



Image 14. *Ypthima baldus* feeding from scattered parts of *Psidium guajava* in Chuadanga.



Image 15. *Melanitis leda* feeding on *Averrhoa carambola* fruit.



Image 16. *Euthalia aconthea* taking juice from *Averrhoa carambola* fruit in Chuadanga.



Image 17. A female *Elymnias hypermnestra* feeding on *Averrhoa carambola* fruit on its tree.

number of individual (Noi) of fruit feeding butterflies are highest in the month of Jan–Feb (Nos=05 and Noi=32) when flowers are scarce and most of the fruits are easily available, so they take their essential nutrition or food from the over-ripe fruits and juices. In comparison with flower nectar, fruits are large in size and contain larger amounts of sugars than flowers. Single fruit easily provides food for many butterflies at a time, but flowers do not, which prevents intra species and inter species competition for their food. The present work is significant as it reports on the fruit feeding behavior of butterflies which has not been recorded earlier.

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