

List of Flower-visiting Insects Collected in Baghiar-beel, Madaripur, Bangladesh on Some Flowering Plants

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Abstract:

Baghiar-beel is situated in the flood-plain ecosystem at southern part of Bangladesh, which is endowed with rich flora and fauna including various types of flower-visiting pollinating insects. During the present study the bees of following genera were collected from the studied area, which include *Lasioglossum*, *Ctenonomia*, *Nomia*, *Megachile*, *Nomada*, *Amegilla*, *Tetralonia*, *Xylocopa*, *Ceratina*, *Pithitis*, and *Apis*. Despite, there also collected many genera of wasps i.e., *Chrysis*, *Scolia*, *Delta*, *Eumenes*, *Polistes*, *Chalybion*, *Tachytes*, *Stizus*, *Philanthus* and *Cerceris*, as well as flies and other insects from the flowers.

Key words:

Flower-visiting insects, Flowering plants, Bees, Wasps, Madaripur, Bangladesh.

Introduction:

The study of insects is necessary to know their life history, habit and habitat, as well as their role in the ecosystem. Bees are insects of highly economic importance, which feed on pollen and nectar that are natural plant in origin. Study on the relationship between flowering plants and the flower-visiting insects are of great importance to conserve terrestrial ecosystem by conserving plant pollinator mutualism. There are 16,325 described species of bees of 30,000 global ones (Michener, 2000). Among these only few are social bees and honey producing, the rest are solitary or nonsocial bees most of which are involved in the cross pollination of various plant species. In Bangladesh more than 6 species of social bees exist, e.g. *Apis dorsata*, *A. cerana*, *A. florea*, *Trigona fuscobaltiata*, *Bombus eximius* and *B. montivagus* (Bhuiya and Miah, 1990; Alam, 1967). Definitely they have very important role in the ecosystem as a natural pollinators of various plant species.

To produce honey in many countries mainly two species of honeybees are used. One is *Apis mellifera*, and the other is *A. cerana*. *A. mellifera* is European in origin and *A. cerana* is Asian in origin. Both of them produce honey commercially. Recently, their use in the field of crop pollination is a matter of growing demand and high prospect. The present paper is a preliminary report on the flower-visiting insects and flowering phenology that are found at the flood-plain ecosystem in Baghiar-beel, Madaripur, Bangladesh. This is the first report followed by which lists of flower-

visiting insects will be prepared gradually throughout successive studies all over the country. Along with this also the relationship between plants and flower-visiting insects will be investigated, what has a role in the conservation and co-evolution of both organisms.

Methodology:

The Baghiar-beel stands between two districts, Madaripur (Amgram and Kadambari *notitalic*) and Gopalganj (Kalabari union). The total area of the beel is about 4000 hectares. During the present study a total number of 10 villages were surveyed mainly from Amgram union. As the area is in a flood-plain ecosystem thus, the lowlands remain submerged under water for about five months especially during the monsoon. Among the crops grown in the area some mention worthy ones are paddy, pulses and oil seed (mustards). All the people of the Baghiar-beel are totally dependent on the natural resources of this area, which is not seen today as before.

Bees, wasps, flies and other insects were collected by sweeping insect nets on flowering plants. The names of plants were recorded (Table 1), incase of unknown scientific names, indigenous names were recorded. The dates of collecting specimens were also mentioned in Table 1. All the flower visitors were identified to compare with the reference specimens by using a stereomicroscope. Some of the unidentified specimens are kept for sending to the respective taxonomist for identification. The study was conducted from the month of December (1999) to June (2000), where flower-visiting insects were collected through six successive visits. The collections were continued almost from early morning to the evening (6 am- 6 pm).

The vegetations found in the Baghiar-beel area are lowland type. As mentioned above the area is subject to be submerged for a considerable time under the water, therefore, the vegetations here is highly specialized with its ecosystem.

Results and Discussions:

The bees that were found for longer period of time were *A. dorsata*, *A. cerana*, *Xylocopa* sp. and *Lasioglossum* sp., which covered the months from December, 1999 to May, 2000. Rest of the bees was found for short period of time in the area (Table 1). Wasps were found for shorter period of time, which was available mostly during the months of April and May, while numbers of bees were decreasing. This situation hasten as the monsoon proceeded in the area.

The honeybees were found in higher number from January to the April, after that their density decreased, as they have migrated to other places. The number of wild plants was scarce in the area; therefore, the bees mainly dependent on the cultivated crops and homestead garden plants. The wild plants were also a good source of pollen and nectar to the flower visiting insects, which they were low in numbers. When the number of the flowering plants was highm the presence of bees was also high. that

implies a relation between plants and its visitors. It was found clearly that the density of flower-visiting insects was high during the time of mustard blooming season with a peak from December to January; of course the number of species was quite limited.

The wasps that were found for longer time was *Chrysis* sp., *Eumenes* sp. and *Philanthus* sp. The most promising wasp was *Scolia* sp. Though it was found for shorter period of time, but the number of individuals was high. Yamazaki & Kato (2003) reported scolid wasp as a good pollinator of some plants in the grassland ecosystem as body is covered with long hairs. The seasonal variation of flower-visiting insects was shown in Table-2.

Plant pollinator mutualism is a key interaction in a terrestrial ecosystem (Procter *et al.*, 1996). In Bangladesh so far there has not been held any study on the plant pollinator interaction, which was held in many other countries including Japan. Plant pollinator interactions in Japan have been described at various vegetation types: alpine meadows (Yumoto, 1986), sub alpine forests and meadows (Kato *et al.*, 1993), temperate deciduous forests (Kato *et al.*, 1990; Inoue *et al.* 1990; Kakutani *et al.*, 1990), temperate lowland marsh (Kato and Miura, 1996) and temperate evergreen forests (Yumoto, 1987; 1988). In another studies, researchers here reported that the anthophilous insect communities varied in Japan throughout its varied vegetation types (Fukuda *et al.*, 1973; Sakagami and Fukuda, 1973; Go'ukon, 1992; Matsuura *et al.*, 1974; Ikudome, 1978; Ikudome, 1992; Takahashi, 1990; Kato *et al.*, 1999). However, series of studies are necessary on the plant-pollinator interaction in Bangladesh to assess the contribution on the conservation of both organisms, as well as to get maximum benefits for humankind.

Flowering phenology:

First visit Mustards (*Brassica juncea* and *B. napus*) and beans (khesari- *Lathyrus sativus*, kalai- *Vigna mungo*) started growing in large quantity in the cultivating fields (Table 1). Only a few fields had flowering crops and most of those had a few inches tall plants. In the homesteads also had relatively small source of flowers, which was found during this visit.

Second visit Mustard plants had blossomed almost in full size. In the homesteads found numerous long bean flowers (*Lablab purpureus*). All the areas were found full of plantation with different types of field crops. Large numbers of insect visitors were collected from *Brassica juncea*, *B. napus*, *Lathyrus sativus* and *Vigna mungo* fields.

Third visit Mustard flowers had already been finished. Only few guji (*Guizotia abyssinica*) field had presence of flowers, rest all were wild plants (some of those were *shakful*, *bonrundhani*, *telkutch*, *staji kata* and *lohagara kata*). In the *Guizotia abyssinica* field had numerous bees, wasps and flies. At the visiting time alternative source of food for the flower-visiting insects were searched. It was found that they

visited *Phoenix sylvestris* (for juice), *Litchi chinensis*, *Musa paradisiaca*, *M. sapientum* and *Mangifera indica* plants for their foods.

Fourth visit During the fourth visit there was merely no flowering plant in the fields (just plowed dry land only), as well as in the homesteads. Only few roadsides wild plants had some flowers, bees were collecting nectar and/ pollen from there. Plants found mainly were *Ipomoea fistulosa*, akando (*Calotropis procera*) and some other wild plants.

Fifth visit Field crops again started growing in many places (jute, rice, sesame, etc.). Some of the sesame (*Sesamum indicum*) fields had full-grown plantations. The major source of flowers in the study area was sesame and a few other wild plants (the Bangla name of the wild plants even was not known). There were numerous wasps visiting sesame field, which might be collecting nectar. In *radhuni* large number of flower-visiting insects was found. All the bees other than *Xylocopa* sp. had been found to enter into the flowers of sesame for nectar. The presence of flowers in the homesteads, as well as in the wild habitats was very meager. Rainfall was frequent; monsoon water started increasing in the canals and rivers.

Sixth visit From the sixth visit severe scarcity of floral resources was found in the area. Only some wild plants had flowers over which many flies were hovering. Among the wild plants *dotkura*, *koira*, *hatishura*, *bituraj* and *jhamti* were prevalent, where also recorded the presence of *babla* (*Acacia* sp.) and *Tamarindus indica*. The canals, rivers, ponds, and low lands were full of seasonal water. Weather condition was too bad due to heavy rainfall. All the specimens were collected from the above-mentioned wild plants. Most of the flowers were small in size, except for *dholkalmi* (*Ipomoea fistulosa*).

Flower-visiting insects:

First visit Most of the bees were collected from the mustard fields (Table 1). Some were also collected from the homesteads of various parts of the locality. The specimens collected were *A. dorsata*, *A. cerana*, *Xylocopa* sp. and *Megachile* sp.

Second visit Many of *Apis* bees were found in the fields of mustard and bean plants (Table 1). Only two individuals of *Xylocopa* sp. were collected from the *Lablab purpureus*. Bees were also collected from wild flowers. During this visit some hives of two kinds of bees i.e. *A. dorsata* and *A. cerana* were found throughout the studied area (16 hives of *A. dorsata* and 2 of *A. cerana*) in natural condition.

Third visit During the third visit the bees collected were *A. dorsata*, *A. cerana*, *Xylocopa* sp., *Lasioglossum* sp., *Ceratina* sp. and *Pithitis* sp.

Fourth visit There was a totally different scenario than the past during this visit. Most of the bee colonies of *A. dorsata* had left the area, where very small sized 2-3 only

remained. There were only few workers of *A. dorsata* and *A. cerana* in the foraging sites, on the contrary, this time it was found that the number of wasps increased.

Fifth visit Large number of giant bees, large carpenter bees, other wild bees and wasps had been collected during this visit. Presence of *Xylocopa* sp. was highest this time than the previous visit. Number of giant bees was also high compared to the last visit. Numerous individuals of scolid wasp were collected for the first time during this visit.

Sixth visit The presence of bees and wasps were a few. The flower visitors collected were flies and other insects. All were collected from the small wild plants.

Conclusion:

The study on the relationship between flowering plants and flower-visiting insects is of great importance for Bangladesh so as to develop its nature and economy. From a part of the present study it was understood that the knowledge of the local inhabitants on insects was very poor. If they could be made understood the benefits of insects, they might have protected them for the improvement of agriculture. The food supply for bees during the off-season is a serious problem; however, it would be possible to improve in the following ways:

- By protecting source of wild plants.
- By making local people aware in favor of constructing homestead flower gardens.

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References:

1. Alam, M.Z., (1967). A report on the survey of insects and mites of East Pakistan. East Pakistan Agricultural Research Institute Ayubnagar, Dacca-15. Xii, 151 pp.
2. Bhuiya, B.A. and M.I. Miah, (1990). A preliminary report on the Bees (Hymenoptera: Apoidea) of Chittagong. With Brief Biological Notes. Chittagong University Studies, Part II: Science-Vol. 14(2): 61-71.
3. Fukuda, H., S.F. Sakagami, K. Yamauchi and T. Tatsumura, (1973). Biofaunistic survey of wild bees in Hama-koshimizu, eastern Hokkaido. Jap. J. Ecol. 23:160-170.
4. Go'ukon, K., (1992). Ecological survey on wild bee fauna in hanayama-mura, Miyagi Prefecture. Reports of Scientific Studies on Hiyama-Tashiro Natural Environment Conservation Area. Miyagi Prefecture. pp. 192-212. (in Japanese).
5. Ikudome, S., (1978). A wild bee survey in Kochi Plain (Kochi Pref.), Shikoku, Japan (Hymenoptera, Apoidea). Kontyu, Tokyo. 46: 512-536.
6. Ikudome, S., (1992). The environment and wild bee fauna of natural park in a city, with the result taken at Shiroyama Park in Kagoshima City, Japan, and with the appendix of a revised bee list recorded from the mainland of Kagoshima Prefecture ((Hymenoptera, Apoidea). Bull. Kagishima Womens's Junior College. 27:99-135. (in Japanese).
7. Inoue, T., M. Kato, T. Kakutani, T. Suka and T. Itino, (1990). Insect-flower relationship in the temperate deciduopus forests of Kibune, Kyoto: An over view of the flowering phenology and the seasonal pattern of insect visits. Contr. Biol. Lab. Kyoto Univ. 27: 377-463.
8. Kakutani, T., T. Inoue, M. Kato and H. Ichihashi, (1990). Insect-flower relationship at the campus of Kyoto University, Kyoto: An over view of the flowering phenology and the seasonal pattern of insect visits. Contr. Biol. Lab. Kyoto Univ. 27: 465-521.
9. Kato, M. and R. Miura, (1996). Flowering phenology and anthophilous insect community at a threatened natural lowland marsh at Nakaikemi in Tsuruga, Japan. Contr. Biol. Lab. Kyoto Univ. 29: 1-48. Pl.1.
10. Kato, M., T. Kakutani, T. Inoue and T. Itino, (1990). Insect-flower relationship in the primary beech forest of Ashu, Kyoto: An overview of the flowering phenology and seasonal pattern of insect visits. Contr. Biol. Lab. Kyoto Univ. 27: 309-375.
11. Kato, M., M. Matsumoto and T. Kato, (1993). Flowering phenology and anthophilous insect community in the cool-temperate subalpine forests and meadows t Mt. Kushigata in the central part of Japan. Contr. Biol. Lab. Kyoto Univ. 28:119-172.

12. Kato, M., S. Shibata, T. Tasui and H. Nagamasu, (1999). Impact of introduced honeybees, *Apis mellifera*, upon native bee communities in the Bonin (Ogasawara) Islands. *Res. Popul. Ecol.* 41: 217-228.
13. Matsuura, M., S.F. Sakagami and H. Fukuda, (1974). A wild bee survey in Kibi (Wakayama Pref.), Southern Japan. *J. Fac. Sci. Hokkaido Univ. Ser. VI, Zool.* 19:422-437.
14. Michener, C.D., (2000). *The Bees of the World*. John Hopkins University Press, Baltimore and London. XVI, 913 pp.
15. Procter, M., P. Yeo and A. Lack, (1996). *The natural history of pollination*. Harper Collins Publishers, Hampshire. 479 pp.
16. Sakagami, S.F. and H. Fukuda, (1973). Wild bee survey at the campus of Hokkaido University. *J. Fac. Sci. Hokkaido Univ. Ser. VI, Zool.* 19:190-250.
17. Takahashi, H., (1990). Wild bee survey in Hachijo-jima Is. Of the Izu Islands, Japan. *Bull. Biogeogr. Soc. Japan.* 46:171-178.
18. Yamazaki, K and M. Kato, (2003). *Flowering phenology and anthophilous insect community in a grassland ecosystem at Mt. Yufu, Western Japan. Contr. Biol. Lab. Kyoto Univ.* 29: 255-318, Pl.4-5.
19. Yumoto, T., (1986). The ecological Pollination syndromes of insect pollinated plants in an Alpine meadow. *Ecol. Res.* 1:85-95.
20. Yumoto, T., (1987). Pollination system in a warm temperate evergreen broad-leaved forest on Yaku Island. *Ecol. Res.* 2:133-146.
21. Yumoto, T., (1988). Pollination systems in the cool temperate mixed coniferous and broad-leaved forest zone of Yakushima Island. *Ecol. Res.* 3:117-130.

Table (1)
Flowering plants and flower-visiting insects collected in Baghiar-beel.

Visits	Flowering Plants	Flower-visiting Insects
1 st (19 December 1999)	<i>Brassica juncea</i> , <i>Brassica napus</i> , <i>Lathyrus sativus</i> , <i>Vigna mungo</i>	<i>A. dorsata</i> , <i>A. cerana</i> , <i>Xylocopa</i> sp., <i>Megachile</i> sp.
2 nd (23 January 2000)	<i>Brassica juncea</i> , <i>Brassica napus</i> , <i>Lablab purpureus</i> , <i>Lathyrus sativus</i> , <i>Vigna mungo</i>	<i>A. dorsata</i> , <i>A. cerana</i> , <i>Xylocopa</i> sp.
3 rd (5-6 March 2000)	<i>Guizotia abyssinica</i> , <i>Litchi chinensis</i> , <i>Mangifera indica</i> , <i>Musa</i> spp., <i>Phoenix</i> <i>sylvestris</i> (collected juice)	<i>A. dorsata</i> , <i>A. cerana</i> , <i>Xylocopa</i> sp., <i>Ceratina</i> sp., <i>Pithitis</i> sp., <i>Lasioglossum</i> sp.
4 th (4-5 April 2000)	<i>Calotropis procera</i> , <i>Ipomoea fistulosa</i>	<i>A. dorsata</i> , <i>A. cerana</i> , <i>Xylocopa</i> sp., <i>Pithitis</i> sp., <i>Nomia</i> sp., <i>Lasioglossum</i> sp., <i>Megachile</i> sp., <i>Nomada</i> sp., <i>Ptenonomia</i> sp., <i>Tetralonia</i> sp., <i>Amegilla</i> sp., Chrysididae, Sphecidae (<i>Chalybion</i> sp., <i>Tachytes</i> sp.) Pompilidae, Eumanidae (<i>Eumanis</i> sp.), <i>Philanthus</i> sp., *Flies and Other insects
5 th (1 May 2000)	<i>Sesamum indicum</i>	<i>A. dorsata</i> , <i>Xylocopa</i> sp., <i>X.</i> <i>iridipennis</i> , <i>X. bryarum</i> (Fab), <i>Pithitis</i> sp., <i>Tetralonia</i> sp., Scolidae (<i>Scolia</i> sp.), Eumanidae, Chrysididae (<i>Chrysis</i> sp.), <i>Philanthus</i> sp. <i>Cerceris</i> sp., <i>Stizus</i> <i>biclipeatus</i> (Christ), <i>Polistes</i> (<i>Gyrostoma</i>) sp., <i>Delta</i> <i>conica</i> (Fabricius)
6 th (12 June 2000)	<i>Acacia</i> sp., <i>Ipomoea fistulosa</i> , <i>Tamarindus indica</i>	*Flies and Other insects

* Flies and Other insects were not identified.

Table (2) : Insects collected during different visits from Baghiar-beel

Bee/ wasp Taxa	Visits					
	First 19 Dec. 99	Second 23 Jan.2000	Third 5-6 March 2000	Fourth 4-5 April 2000	Fifth 1 May 2000	Sixth 12 June 2000
Bees						
HALICTIDAE <i>Lasioglossum</i> sp.	×	×	✓	✓	×	×
HALICTIDAE <i>Lasioglossum</i> (<i>Ctenonomia</i>) sp.	×	×	×	✓	×	×
HALICTIDAE <i>Nomia</i> sp.	×	×		✓	×	×
MEGACHILIDAE <i>Megachile</i> sp.	✓	×	×	✓		×
ANTHOPHORIDAE <i>Nomada</i> sp.	×	×	×	✓	×	×
ANTHOPHORIDAE <i>Amegilla</i> sp.	×	×	×	✓	×	×
ANTHOPHORIDAE <i>Tetralonia</i> sp.	×	×	×	✓	✓	×
ANTHOPHORIDAE <i>Xylocopa iridipennis</i>	×	×	×	×	✓	×
ANTHOPHORIDAE <i>Xylocopa bryarum</i> (Fab)	×	×	×	×	✓	×
ANTHOPHORIDAE <i>Xylocopa</i> sp.	✓	✓	✓	✓	✓	×
ANTHOPHORIDAE <i>Ceratina</i> sp.	×	×	✓	×	×	×
ANTHOPHORIDAE <i>Pithitis</i> sp.	×	×	✓	✓	✓	×
APIDAE <i>A. dorsata</i>	✓	✓	✓	✓	✓	×
APIDAE <i>A. cerana</i>	✓	✓	✓	✓	×	×
Wasps						
CHRYSIDIDAE <i>Chrysis</i> sp.	×	×	×	✓	✓	×
POMPIDIDAE	×	×	×	✓	×	×
SCOLIIDAE <i>Scolia</i> sp.	×	×	×	×	✓	×
EUMENIDAE <i>Delta</i> <i>conica</i> (Fabricius)	×	×	×	×	✓	×
EUMENIDAE <i>Eumenes</i> sp.	×	×	×	✓	✓	×
VESPIDAE Polistinae <i>Polistes (Gyrostoma)</i> sp.	×	×	×	×	✓	×
SPHECIDAE <i>Chalybion</i> sp.	×	×	×	✓	×	×
SPHECIDAE <i>Tachytes</i> sp.	×	×	×	✓	×	×
NYSSONIDAE Stizinae <i>Stizus biclipeatus</i> (Christ)	×	×	×	✓	×	×
PHILANTHIDAE <i>Philanthus</i> sp.	×	×	×	✓	✓	×
PHILANTHIDAE <i>Cerceris</i> sp.	×	×	×	×	✓	×
Others						
Flies and Other insects	×	×	×	✓	×	✓

قائمة الحشرات الزائفة للورود التي جمعت في بايهيار - بيل في منطقة ماداربيور في بنغلاديش على بعض النباتات المزهرة

عبدالحنان

قسم الأحياء البيئية - جامعة غولف - غولف أوننتاريو - كندا

الملخص :

تقع بايهيار - بيل في نظام بيئي لسهل مسطح في الجزء الجنوبي من بنغلاديش، غني بالزهور والطيور بما فيها أنواع مختلفة من الحشرات الزائرة والملقحة للورود، جُمعت في الدراسة الحالية النواع التالية من المنطقة تحت الدراسة، والتي تشمل ما يلي : لاسيوجلوسيوم، ستينونوميا، نوميا، ميفاشيل، نومادا، اميفلا، تيترولونيا، خيلوكوبا، سيراتينا، بيثيتس، وآبيس. بالاضافة اليهذا، تم اياض جمع انواع من الدبابير مثل : كريسيس، سوليا، ديلتا، يومينر، بوليتس، كاليبيون، تاكيتس، سستيزور، فيلانتوس، وسيرسيريس، بالاضافة إلى انواع من الذباب والحشرات الأخرى من الورود.