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Diversity of Insect Fauna Associated with Macrophyte in Fresh Water Wetlands of West Bengal

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Abstract

The paper deals with the diversity of insect fauna associated with the macrophyte during the period January 2002 to December 2004. The fresh water wetlands supports suitable growth of macrophytes and offers ample micro-niches to diverse insects groups. Qualitative study reveals the presence of four major orders of insect represented by a total of 89 species under 26 families and 65 genera. Order Hemiptera represented by 28 species under 8 families and order Coleptera represented by 31 species under 7 families are the two highest order of insect associated with macrophyte. The aquatic macrophyte species recorded during study period are listed. These macrophytes are represented by 49 species belonging to 28 plant families and 35 plant genera.
Key words : Wetland, Macrophyte, Insect fauna, Diversity.

The fresh water wetlands supports suitable growth of macrophytes and offers ample micro-niches to diverse insects groups. Macrophyte belonging to submerged, floating and emergent categories form am important element of the aquatic environment, universal in its significance for manufacturing food for aqutic insects communities. They also provide suitable surface area for shelter, site for ovipositor, development, resting and nesting ground in addition to ambient weather and hiding places for insects and other aquatic life. Many insects like to congregate in weedy areas for feeding and breeding. The macrophytic vegetation contributes to enrich the dissolved oxygen content of water during day time and harbors a wide variety of insect fauna. Besides, many insects spent part of their life cycle, which is obligatory to their life, without getting any support from macrohytes. In India limited number of works attempted to study the macrophyte-associated entomofauna (1—4). Rai and Sharma (5) indicated the role of aquatic insects as a bio-indicator of pollution. Rao and Jain (6), Roy et al. (7) and Srivastava (8) demonstrated use of macro-benthos and aquatic insects for water quality monitoring. Wetland entomofaunal community study in ponds of Gwalior (Madhya Pradesh) was made by Saxena et al. (9). Similar work was carried out by Sharma and Rai (10) in Bhagalpur, and Kumar and Roy (11) in Bihar. Mishra et al. (12) made a detailed account of insect association with *Euryaleferox salisbury* in five ponds of Darbhanga, North Bihar.

Such macrophyte associated Insect studies in West Bengal are almost meager (13) who listed the organisms associated with *Eichhornia crassipes* as initial attempt in this field. Further studies on macrophyte associated Insects were made by Nandi et al. (14), Julka (15), Bhattacharya and Gupta (16), Bhattacharya (17) and Pal et al. (18). Considering these, attempt was made to find out a comprehensive account of the insect community associated with the macrophytes of the fresh water wetlands of West Bengal with a view to provide a base line for future studies.

Methods

The materials for the study were collected during January 2002 to December 2004. Surveys were conducted in different wetland areas of West Bengal, particularly in the wetland areas of six districts viz. Kolkata , North-24 Parganas, Murshidabad, Bardhaman, Nadia, Medinipur (Purba and Paschim). Samples were collected following methods of random sampling from the selected wetlands using insect nets

Table 1. Systematic list of Insect Species Associated with macrophytes. Kol—Kolkata, 24 Pgs. (N)—24-Pargana (North), Nad—Nadia, Bar—Bardhaman, Mur—Murshidabad, Med—Medinipur (Purba & Pachim).

Insect Species	KOL	24 Pgs (N)	Nad	Bar	Mur	Mid
Order : Ephemeroptera (1 species)						
Family : Baetidae						
1. Cloeon Kimminsi Hubbard	+	+	+	+	+	+
Order : Odonata (20 species)						
Family : Libellulidae						
1. Brachythemis contaminata (Febricious)	+	+	+	+	+	+
2. Crocothemis servilia (Drury)	+	+	–	–	+	–
3. Diplacodes frivialis (Rambur)	–	–	+	+	+	–
4. Orthetrum sabina (Drury)	–	+	–	–	+	+
5. Potomarcha obscura (Rambur)	–	–	+	+	+	–
6. Plantala flavescens Fabricius	–	–	+	+	+	–
7. Trithemis pallidivervis Kirby	–	–	+	–	+	+
8. Tramea basilanis burmeisteri Kirby	–	–	+	+	+	–
Family : Coenagrionidae						
9. Agrioenemis pygmaea (Rambur)	+	+	–	–	+	+
10. Agrioenemis splandidissma Laidlow	+	+	+	+	+	+
11. Ceriagrion coromandelianum (Fabr.)	+	+	+	+	+	+
12. Coenagrion dyeri Fraser	–	–	+	+	+	–
13. Ceriagrion olivaceum Laidlow	–	–	+	–	+	+
14. Enallagma parvum Sylys	–	–	+	–	+	–
15. Enallagma cyathigerum Carpentier	–	–	+	+	+	–
16. Ischnura aurora Brauer	+	+	–	–	+	+
17. Ischnura senegalensis (Rambur)	+	+	–	–	+	+
18. Ischnura delicata Hagen	+	+	–	–	+	+
19. Pseudagrion microcephallum (Rambur)	+	+	+	+	+	+
Family : Gomphidae						
20. Ictinogamphus rapak	+	+	+	–	+	–
Order : Hemiptera (28 species)						
Family : Belostomidae						
1. Diplonychus annulatus (Fabricius)	+	+	+	+	+	+
2. Diplonychus rusticus (Fabricius)	+	+	+	–	+	–
3. Diplonychus molestus (Duf.)	+	–	+	+	+	–
4. Lethocerus indicus Lepct & Serv.	–	–	+	+	+	+
Family : Gerridae						
5. Gerris adeloidis Dohm	+	–	+	–	+	–
6. Gerris spinolae Lethierry and Severin	+	+	+	+	+	+
7. Limnogonus nitidus (Mayr)	+	+	+	+	+	–
8. Limnogonus parvulus (stal)	+	–	–	–	+	–
9. Limnogonus fossarum Fab.	–	–	+	–	+	–
10. Noboandelus signatus	–	–	+	+	–	+
11. Rhagadotarsus kraepelini	+	+	–	–	+	+
Family : Corixidae						
12. Corixa heiroglypha Duf.	–	–	+	+	+	+
13. Micronecta heliploides (Horvath)	+	+	+	+	+	+
14. Micronecta scutellaris (Stal)	–	+	–	–	+	+
Family : Hydrometridae						
15. Hydrometra greeni Kirkaldy	+	+	–	–	+	+
16. Hydrometra vittata	+	+	+	–	+	+
Family : Nepidae						
17. Laccotrephes ruber	–	–	+	+	+	+
18. Laccotrephes griseus (Guerin)	+	+	+	+	+	+
19. Ranatra sordidula Dohrn	+	+	+	–	+	+
20. Ranatra filiformis Fabricius	+	+	+	+	+	+
21. Nepa apiculata Uhler	–	–	+	+	–	+

Table 1. Continued.

Insect Species	Kol	24 Pgs (N)	Nad	Bar	Mur	Mid
Family : Notonectidae						
22. Anisops breddini Kirkaldy	+	+	+	+	–	+
23. Anisops bouvieri Kirkaldy	+	+	+	+	+	–
24. Anisops pieberi Kirkaldy	+	+	–	–	+	+
25. Anisops sardea Henrich & Shaffer	–	–	+	+	+	–
Family : Velidae						
26. Microvelia albomaculata Distant	–	–	–	–	+	+
27. Microvelia diluta Distant	–	–	–	–	+	+
Family : Pleidae						
28. Plea liturata (Fieber)	+	+	–	–	+	+
Order : Coleoptera (31 species)						
Family : Chrsomelidae						
1. Cassida sp.	+	+	–	–	–	–
2. Dicladispa armigera (Oliv)	–	+	+	+	+	–
Family : Dytiscidae						
3. Canthydrus laetabilis (walker)	+	+	+	+	+	+
4. Canthydrus luctuosus Mots.	+	–	+	+	+	+
5. Cybister canfusus Sharp.	–	+	+	+	+	–
6. Cybister limbatus	–	–	–	+	–	+
7. Erctes sticticus (Linn.)	–	–	+	–	+	–
8. Guignotus flammlatus	–	–	+	+	–	+
9. Hydrocoptus subvittulus Mots.	+	+	+	+	+	+
10. Hydaticus fabricii Macleay	+	+	+	+	+	+
11. Hyphidrus renardi Severin	+	+	–	–	+	+
12. Hydrovetus castaneus Motschulsky	+	–	–	–	+	+
13. Hypoporus bengabrusis Severin	–	–	+	+	+	+
14. Laceophilus parvulus Sharpi	+	+	+	+	+	+
15. Laceophilus sharpi Reg.	+	+	+	+	–	+
16. Uvarus quadrilineatus (Zimm)	+	+	–	–	+	+
Family : Halipdae						
17. Haliplus sp.	+	+	+	–	+	–
Family : Hydrophilidae						
18. Amphiops pedestris Sharp	+	+	–	–	+	–
19. Berosus indicus Mots.	+	+	+	+	+	+
20. Berosus putchellus (Maeley)	–	–	+	+	+	+
21. Enocrus sp.	+	+	–	–	+	–
22. Enocrus escuriens (Walker)	–	–	+	+	+	+
23. Helochares anchoralis Sharp	+	+	–	–	–	–
24. Hydrophilus olivaceus (Fabr.)	+	–	+	+	–	–
25. Regimbertia attenuata (Fabr.)	+	+	+	+	+	+
26. Stemolophus rufipes (Fabr.)	+	+	–	–	–	–
27. Uloma sp.	–	–	+	+	+	–
Family : Gyrinidae						
28. Dineutus unidentatus (Aube)	+	+	–	–	–	–
29. Dineutus spinosus (Fab)	–	–	+	+	+	+
Family : Chrysomelidae						
30. Cassida sp.	–	–	+	–	+	+
Family : Curculinoidae						
31. Bagous sp.	–	–	+	–	+	–
Total (89 species)	56 species	54 species	66 species	50 species	78 species	57 species

and hand collection. After collection, the insect and macrophyte specimens were brought to the laboratory. Adult specimens were made dry mount and the insect immature forms were preserved in 70% alcohol. Herbaria of macrophytes were also prepared as and when required for proper identification. Speci-

Table 2. Systematic list of macrophytes in wetlands. + Present, – absent.

Macrophyte species	Kol	24 Pgs (N)	Nad	Bar	Mur	Mid
(A) FREE FLOATING (12 species)						
Family : Araceae						
1. *Pistia stratiotes*	+	+	+	+	+	+
2. *Pistia sativa*	+	+	+	+	+	+
Family : Convolvulaceae						
3. *Ipomea aquatica*	+	+	+	+	+	+
Family : Gramineae						
4. *Coxi aquatica*	–	–	+	+	+	–
Family : Hydrocharitaceae						
5. *Hydrocharis cellulose*	–	–	+	+	+	+
Family : Lemnaceae						
6. *Lemna perpusilla*	–	–	+	+	+	+
7. *Lemna minor*	+	+	+	+	+	+
8. *Spirodella polyrrhiza*	+	+	+	+	+	+
9. *Wolffia arrhiza*	–	–	–	–	+	–
Family : Pontederiaceae						
10. *Eichhomia crassipes*	+	+	+	+	+	+
Family : Salviniaceae						
11. *Azolla pinnata*	–	–	–	–	+	+
12. *Azolla filiculoides*	+	+	+	+	+	+
(B) SUBMERGED (12 species)						
(a) Rooted to the bottom						
Family : Characeae						
1. *Chara branchypus*	–	–	+	–	–	–
Family : Hydrocharitaceae						
2. *Blyxa roxburghii*	–	–	+	+	–	+
3. *Blyxa octandra*	+	+	–	–	–	–
4. *Hydrilla dentate*	–	–	+	+	+	+
5. *Hydrilla verticillata*	+	+	+	+	+	+
6. *Otellia alismoides*	–	–	–	–	+	+
7. *Vallisneria spiralis*	+	+	+	+	+	+
Family : Naiadaceae						
8. *Potamogeton crispus*	–	–	–	+	–	–
Family : Najadaceae						
9. *Najas indica*	–	–	+	+	–	–
Family : Scrophularineae						
10. *Limnophila heterophylla*	–	–	+	–	–	–
(b) Not rooted to the bottom						
Family : Ceratophyllaceae						
11. *Ceratophyllum demersum*	+	–	–	–	+	+
Family : Lentibulariaceae						
12. *Utricularia stellaris*	–	–	–	–	+	+
(C) EMERGENT (16)						
Family : Alismataceae						
1. *Saggitaria sagittifolia*	+	+	+	+	+	+
Family : Amaranthaceae						
2. *Alternanthera philoxeroides*	+	–	+	–	–	+
3. *Alternanthera pronychioides*	+	+	+	+	+	+
4. *Alternanthera sessilis*	+	–	–	–	–	–
Family : Cyperaceae						
5. *Elocharis dulcis*	–	–	–	–	+	+
6. *Elocharis spiralis*	–	–	–	+	+	–
7. *Scirpus grossus*	–	–	+	–	–	+
8. *Scirpus articulatus*	–	–	+	–	+	–
Family : Leguminosae						
9. *Aeschynomene indica*	–	–	–	–	+	–

Table 2. Continued.

Macrophyte Species	Kol	24 Pgs (N)	Nad	Bar	Mur	Mid
Family : Nymphaceae						
10. *Nelumbium specipsum*	–	–	–	+	+	+
11. *Nelumbo nucifera*	+	–	+	+	+	+
12. *Nymphaea lotus*	–	–	–	–	+	+
13. *Nymphaea pubiscens*	+	–	+	–	–	–
Family : Onagraceae						
14. *Trapa bispinosa*	–	–	+	+	–	–
Family : Commelinaceae						
15. *Commelina benghalensis*	+	+	–	–	+	–
Family : Gramine						
16. *Penicum paspaloides*	+	+	+	–	–	–
(D) MARGINAL (9)						
Family : Cyperaceae						
1. *Cyperus exaltatus*	+	+	+	+	+	+
2. *Cyperus tegetiformis*	–	–	+	+	+	+
Family : Hydrophyllaceae						
3. *Hydrolea zeylania*	–	–	–	–	+	+
Family : Marsiliaceae						
4. *Marsilea quadrifoliata*	–	–	+	+	+	+
6. *Marsilea minuta*	+	+	+	+	+	+
Family : Onagraceae						
7. *Jussiaea repens*	+	+	+	+	+	+
Family : Polygonceae						
8. *Polygonum barbatum*	–	–	–	+	–	+
Family : Typhaceae						
9. *Typha angustata*	–	–	+	–	+	–
Total (49 Species)	22 species	17 species	32 species	28 species	35 species	32 species

mens were determined by the experts.

Results and Discussion

Insects Associated with Macrophytes in Wetland Areas of West Bengal

Qualitative study reveals the presence of four major orders represented by a total of 89 species under 26 families and 65 genera (Table 1). Order Ephemeroptera represented by 1 species belonging to 1 family. Order Odonata represented by 20 species under 3 families and 15 genera. Order Hemiptera represented by 28 species under 8 families. Order Coleptera represented by 31 species under 7 families. Among these four orders of insects Coleoptera ranks one of the major groups followed by Hemiptera.

As a whole Kolkata and 24 Parganas (North) are almost equally rich in insects species diversity, recording 56 and 54 species respecively. Nadia and Bardhaman, recorded 66 and 50 species, respectively, Murshidabad and Medinipur (Purba and Pachim), 78 and 57 species, respectively.

Systematic List of Macrophytes in Wetlands

The aquatic macrophyte species recorded during study period are listed in Table 2. These macrophytes are represented by 49 species belonging to 28 plant families and 35 plant genera. Macrophytes are broadly divided under four categories viz. free floating, submerged, emergent and marginal, each represented by 12, 12, 16 and 9 species respectively. Out of the total 49 species, 22 species were recorded from Kolkata whereas 17 species from 24-Parganas (North). Out of the total 49 species, 32 species were recorded from Nadia whereas 28 species from Bardhaman, and 35 species were recorded from Mursidabad and 32 species from Medinipur.

The Insects were found to occupy almost all parts of the macrophyte host. They were found on different parts such as leaf sheath petiole, stem and also roots. The members of the Hemiptera and Coleoptera were obtained in adult stage while members of the remaining orders were obtained only in imma-

ture forms. It appears that these insect species are associated with macrophyte to exploit the macrophyte in various ways. Majority of the species like *Diplonychus rusticus* (Fabricius), *Diplonychus molestus* (Duf.), *Lethocerus indicus* (Lepct. & Serv.), *Gerris adeloidis* (Dohm.), *Gerris spinolae* (Lethierry and Severin), *Limnogonus parvulus* (Stal.), *Limnogous fossarum* (Fab.), *Ranatra sordidula* (Dohrn.), *Ranatra filiformis* (Fabricius),*Nepa apiculata* (Uhler.) take their shelter for different biological need. The Coleoptera species like *Amphiops pedestris* (Sharp.), *Berosus indicus* (Mots.), *Berosus putchellus* (Maeley), *Enocrus* sp., *Enocrus escuriens* (Walker), *Helochares anchoralis* (Sharp.), *Hydrophilus olivaceus* (Fabr.), *Regimbertia attenuata* (Fabr.), *Stemolophus rufipes* (Fabr.) presumably use macrophytes as food. The members of the orders Odonata, Diptera and Ephemeroptera like *Brachythemis contaminate* (Febricious), *Crocothemis servilia* (Drury), *Diplacodes frivialis* (Rambur.), *Trithemis pallidivervis* (Kirby.), *Tramea basilanis burmeisteri* (Kirby.), *Ischnura senegalensis* (Rambur), *Ischnura delicata* (Hagen), *Pseudagrion microcephallum* (Rambur), *Ictinogamphus rapak* are supposed to be associated with these macrophytes to facilutate the emergence of their last instar larval stages into adult. All these insect species are always interacted with these macrophytes. Most of them partially complete their life cycle in association of these macrophyte. A few species like *Plea liturata* (Fiebe), *Cloeon kimminsi* (Hubbard) are supposed to be the casual visitor for the fulfillment of their biological activity.

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