



CHECKLIST AND TAXONOMIC KEYS TO THE LEAFHOPPER AND PLANTHOPPER OF RICE BASED AGROECOSYSTEM IN BANGLADESH

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Received: 28 March 2026; Accepted: 23 April 2026

ABSTRACT

Leafhopper and Planthopper (Family Cicadellidae and Delphacidae) are very important sucking insect pests of Bangladesh. Many authors indiscriminately have listed these species under different names and hosts without conducting scientific studies. The authors aware that there is no national checklist of insect fauna in Bangladesh. This study was conducted in Department of Entomology, Gazipur Agricultural University during November 2023 to October 2024 to list and describe the available leafhoppers and planthoppers species in Bangladesh. The objective of the study was to conduct an extensive survey in the major rice growing regions of Bangladesh for collecting leafhoppers and planthoppers for their identification, description and preparation checklist. In this survey, the author records a total of 10 species of leafhoppers and 5 species of planthoppers in Bangladesh. The leafhopper species are *Cofana spectra* (Distant 1908), *Exitianus indicus* (Distant 1908); *Hecalus porectus* (Walker 1908), *Maiestas dorsalis* (Motschulsky 1859), *Nephotettix cincticeps* (Uhler 1896), *Nephotettix malayanus* Ishihara & Kawase 1968, *Nephotettix nigropictus* (Stål 1870), *Nephotettix virescens* (Distant 1908), *Orosius orientalis* (Matsumura 1914) and *Thaia oryzivora* Ghauri 1962 as well as planthopper species are *Laodelphax striatellus* (Fallen 1826), *Nilaparvata lugens* (Stål 1854), *Nisia nervosa* (Motschulsky 1863) *Sardia rostrate* Wilson & Claridge 1991 and *Sogatella furcifera* (Horváth 1899). Checklist and taxonomic key for the identification of available leafhopper and planthopper species in Bangladesh are provided here. Additionally, first time the authors have described *Laodelphax striatellus*, (Fallen 1826) from Bangladesh.

Keywords: Taxonomy, Identification, Leafhoppers, Planthoppers, Cicadellidae, Delphacidae, Sucking pests

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INTRODUCTION

The species of leafhopper and planthopper are of a great concern to agriculture and considered the most destructive rice pest and can result in a 44% yield reduction in rice (Ali *et al.* 2021). Hafizal and Idris (2014) reported that Delphacidae (planthopper) and Cicadellidae (leafhopper) population are main insect pests of rice plants as they suck sap from rice plant. They have piercing-sucking mouthparts that cause direct damage to plants by feeding in mesophyll cells or on xylem and/or phloem sap, and indirect damage by transmitting pathogens viz. vectors of bacteria, phytoplasma, or viral pathogens.

Leafhoppers belong to the order Hemiptera and sub order Auchenorrhyncha. Auchenorrhyncha includes three super families: Cicadoidea, Cercopoidea and Membracoidea (Dietrich 2005). Leafhoppers are under the family Cicadellidae of superfamily Membracoidea and is the largest family of Hemiptera. They are called as leafhoppers, because of their habit of hopping on leaves of vegetation, when disturbed. Recent estimates of the leafhopper species from the world range between 35,000- 45,000 species though little over 22,600 species are now described (Dietrich 2004). These differ from other members of the Auchenorrhyncha by the presence of two or more rows of spines on hind tibiae and pronotum not extending back over abdomen (Viraktamath 2007).

The planthoppers are a cosmopolitan group of insects placed in the infraorder Fulgoromorpha (superfamily Fulgoroides), which includes approximately 12,400 described species under 2,200 genera in 21 families, widely distributed all over the zoogeographical regions of the world (Bourgoin 2012). But they are treating many species wrongly with many more misidentifications due to lack of proper taxonomic knowledge and keys to family, genus and species of such insects. Dupo and Barrion (2009) found that sixty-five species of planthoppers representing three subfamilies Astracinae (4 species), Stenocracinae (4 species), and Delphacinae (57 species)-all associated with rice agroecosystems in tropical Asia are taxonomically treated. Of the total, three genera of Delphacinae, *Nilaparvata* Distant 1906, *Laodelphax* Fennah 1963, and *Sogatella* Fennah 1964 are economically important.

Correct identification of pest species is very important for their documentation and proper management (Amin *et al.* 2013). Their presence on crops should be properly monitored to avoid economic loss in future. Regular monitoring and proper identification of leafhopper and planthopper are essential in agro-ecosystems in order to forecast their attack and develop strategies for proper management. Construction of a taxonomic key will be useful for correct identification of the species, which is a prerequisite for easy monitoring and manipulation of this group of insects.

MATERIALS AND METHODS

The present taxonomic study was conducted at Department of Entomology, Gazipur Agricultural University (GAU) during November 2023 to October 2024, based on specimens of leafhopper and planthopper species collected from various regions of Bangladesh are deposited at the Insect Museum, Department of Entomology, GAU, Gazipur. The leafhopper and planthopper specimens were collected from rice fields by extensive field survey in major rice growing areas of Bangladesh like Brahmanbaria, Naogaon, Natore, Kishoreganj, Gazipur, Netrokona and from rice fields of Gazipur Agricultural University (Fig. 1).

The leafhopper and planthopper were collected with a sweep net bearing a very deep net bag which was slowly opened and collected with an aspirator as they crawl toward the opening. Then the specimen was stored in a falcon tube containing cotton balls soaked in ethyl acetate. Morphological terminology that used in the study follows Dietrich (2005). Curating, preparation of specimens and dissections of male genitalia was followed after Kwon's method (Kwon 1988). Taxonomic characters were examined under either stereo or optical microscopes, attached with a digital camera for photography. Images were produced using the software Helicon Focus 5.1 and were imported from Adobe Photoshop CS6 for labeling and plate composition. Measurements of the overall body length (expressed in millimeters) were made with the aid of an ocular micrometer. Dichotomous key was constructed using the characters for easy identification of the species studied.

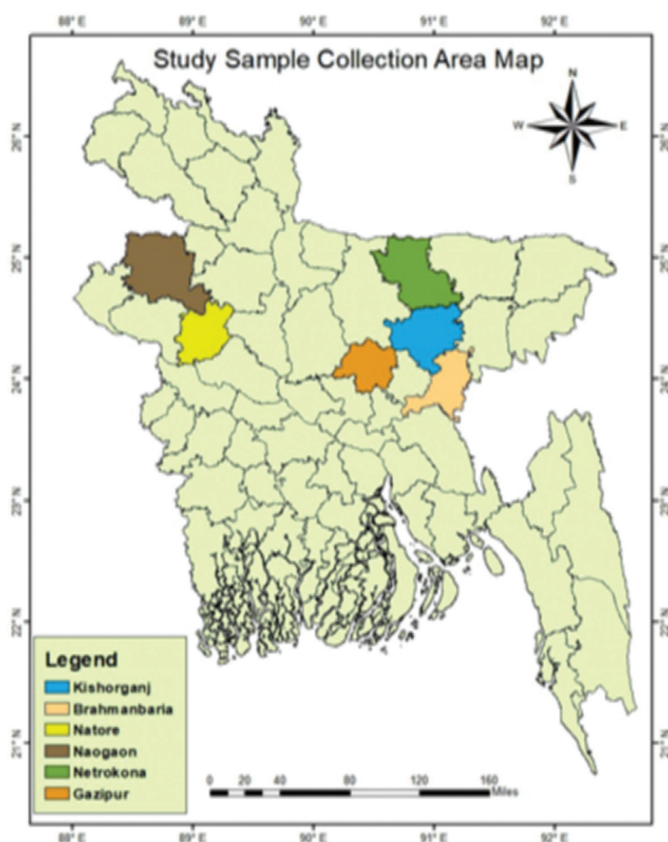


Fig. 1. Map of Bangladesh showing the collecting areas of leafhoppers and planthoppers.

RESULTS AND DISCUSSION

Taxonomic accounts of leafhopper species in Bangladesh

Genus *Cofana* Distant, 1908

Type species: *Tettigoniella spectra* Distant 1908

Type locality: India

Cofana spectra (Distant 1908)

Tettigoniella spectra Distant 1908: 1-501 (Original description).

Cofana spectra, Islam *et al.* 2003, 13(2): 1-25 (Bangladesh).

Cofana spectra, Islam & Cattling 2012, 422p (Bangladesh).

Cofana spectra, Faruq *et al.* 2017, 2(1): 25-32 (Bangladesh).

Cofana spectra, Hasan *et al.* 2023, 8(2): 26-27 (Bangladesh).

Materials examined of *Cofana spectra* (Distant 1908) in current study: Examined 6 males & 4 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024, M.S. Hossain examined 13 males from Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024, M.S. Hossain examined 6 males & 5 females at Brahmanbaria, Bangladesh, in rice on 22.10.2023, M.S. Hossain again examined 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024, M.S. Hossain examined 7 males & 5 females at Netrokona, Bangladesh, in rice, 05.02.2024, M.S. Hossain examined 12 males & 9 females, at Naogaon, Bangladesh, in rice on 1-2.12.2023, M.S. Hossain examined 15 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024, M.S. Hossain examined 14 males & 12 females at Gazipur, Bangladesh, in rice, 20.08.2024.

Genus *Exitianus* Ball 1929

Type species: *Jassus* (*Thamnotettix*) *obscurinervis* Stål 1859

Type locality: USA.

***Exitianus indicus* (Distant 1908)**

Atysanus indicus Distant 1908: 344 (Original description).

Exitianus indicus, Catling & Islam 2013, 17(1&2): 79-108 (Bangladesh).

Materials examined of *Exitianus indicus* (Distant 1908) in current study: 12 males & 9 females, Naogaon, Bangladesh, in rice on 3-4.01.2024 by M.S. Hossain, 15 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 by M.S. Hossain, 14 males & 12 females at Gazipur, Bangladesh, in rice on 20.08.2024 again by M.S. Hossain.

Genus *Hecalus* Stål 1864

Type species: *Hecalus paykulli* Stål 1864.

Type locality: Senegal.

***Hecalus porrectus* (Walker 1908)**

Thomosoniella porecta (Walker), Distant 1908, 172 (Bangladesh).

Hecalus porrectus (Walker), Catling & Islam 2013, 17(1&2): 79-108 (Bangladesh).

Materials examined of *Hecalus porrectus* (Walker 1908) in current study: 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain also 12 males & 9 females at Naogaon, Bangladesh, in rice on 3-4.01.2024 by M.S. Hossain.

Genus *Maiestas* Distant 1917

Type species: *Maiestas illustris* Distant 1917.

Type locality: Seychelles Islands, Silhouette Island, Mahe Island.

***Maiestas dorsalis* (Motschulsky 1859)**

Deltocephalus dorsalis Motschulsky 1859, Etud. Entomol. 8: 25-118: 114 (Original description).

Recilia dorsalis, Alam 1977, 79-90 (Bangladesh).

Maiestas dorsalis, Hasan *et al.* 2023, 8(2): 26–27 (Bangladesh).

Materials examined of *Maiestas dorsalis* (Motschulsky 1859) in current study: 10 males & 2 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossain. 5 males & 2 females at Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024 by M.S. Hossain. 6 males & 5 females at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 also by M.S. Hossain. 7 males & 8 females, 9 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 by M.S. Hossain.

Genus *Nephotettix* Matsumura 1902

Type species. *Selenocephalus cincticeps* Uhler 1896.

Type locality. Japan.

***Nephotettix cincticeps* (Uhler 1896)**

Selenocephalus cincticeps Uhler 1896, Proc. U.S. Nat. Mus. 19: 292 (Original description).

Nephotettix cincticeps, Ahmed & Amin 2007 (Bangladesh).

Nephotettix cincticeps, BRRI 1977: 131p (Bangladesh).

Nephotettix cincticeps, Islam & Cattling 2012: 422p (Bangladesh).

Nephotettix cincticeps, Islam *et. al.* 2003, 13(2): 1-25 (Bangladesh).

Nephotettix cincticeps, Islam *et. al.* 2009, 20(1): 37-43 (Bangladesh).

Nephotettix cincticeps, Faruq *et al.* 2017, 2(1): 25–32 (Bangladesh).

Nephotettix cincticeps, Hasan *et al.* 2023, 8(2): 26–27 (Bangladesh).

Materials examined of *Nephotettix cincticeps* (Uhler 1896) in current study:

10 males & 4 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossai. 13 males, Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024 by M.S. Hossain. 6 males & 5 females at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 7 males & 5 females at Netrokona, Bangladesh, in rice on 05.02.2024 by M.S. Hossain. 12 males & 9 females at Naogaon, Bangladesh, in rice on 1-2.12.2023 by M.S. Hossain. 15 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 by M.S. Hossai. 14 males & 12 females at Gazipur, Bangladesh, in rice on 20.08.2024 also by M.S. Hossain.

***Nephotettix malayanus* Ishihara & Kawase 1968**

Nephotettix malayanus Ishihara & Kawase 1968: 119-123 (Original description).

Nephotettix malayanus, Islam *et. al.* 2003, 20(1): 37-43 (Bangladesh).

Nephotettix malayanus, Faruq *et. al.* 2017, 2(1): 25-32 (Bangladesh).

Materials examined of *Nephotettix malayanus* Ishihara & Kawase 1968 in current study:

10 males & 4 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossain. 13 males at Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024 by M.S. Hossain. 6 males & 5 females

aat Bhramonbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 7 males & 5 females at Netrokona, Bangladesh, in rice on 05.02.2024 by M.S. Hossain; 12 males & 9 females at Naogaon, Bangladesh, in rice on 1-2.12.2023 by M.S. Hossain. 15 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 by M.S. Hossain. 14 males & 12 females at Gazipur, Bangladesh, in rice on 20.08.2024 also by M.S. Hossain.

***Nephotettix nigropictus* (Stål 1870)**

Thamnotettix nigropictus Stål 1870, 740: (Original description).

Nephotettix nigropictus, Alam *et al.* 1964: 272p (Bangladesh).

Nephotettix nigropictus, BRRI 1977: 131p (Bangladesh).

Nephotettix nigropictus, Islam *et al.* 2003, 13(2): 1-25 (Bangladesh).

Nephotettix nigropictus, Ahmed & Amin 2007 (Bangladesh).

Nephotettix nigropictus, Islam *et al.* 2009, 20(1): 37-43 (Bangladesh).

Nephotettix nigropictus, Islam & Cattling 2012: 422p (Bangladesh).

Nephotettix nigropictus, Faruq *et al.* 2017, 2(1): 25-32 (Bangladesh).

Nephotettix nigropictus, Hasan *et al.* 2023, 8(2): 26-27 (Bangladesh).

Materials examined of *Nephotettix nigropictus* (Stål 1870) in current study:

12 males & 6 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossain. 9 males at Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024 by M.S. Hossain. 6 males at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 12 males & 5 females at Naogaon, Bangladesh, in rice on 3-4.01.2024 by M.S. Hossain. 15 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 also by M.S. Hossain.

***Nephotettix virescens* (Distant 1908)**

Selenocephalus virescens Distant 1908, 290-291: 359-360 (Original description).

Nephotettix virescens, Alam *et al.* 1964: 272p (Bangladesh).

Nephotettix virescens, BRRI 1977: 131p (Bangladesh).

Nephotettix virescens, Islam *et. al.* 2003, **13**(2): 1-25 (Bangladesh).

Nephotettix virescens, Ahmed & Amin 2007 (Bangladesh).

Nephotettix virescens, Islam *et. al.* 2009, **20**(1): 37-43 (Bangladesh).

Nephotettix virescens, Islam & Cattling 2012: 422p (Bangladesh).

Nephotettix virescens, Faruq *et. al.* 2017, **2**(1): 25-32 (Bangladesh).

Nephotettix virescens, Hasan *et al.* 2023, **8**(2): 26-27 (Bangladesh).

Materials examined of *Nephotettix virescens* (Distant 1908) in current study:

10 males & 4 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossain. 13 males at Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024 by M.S. Hossain. 6 males & 5 females at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 3 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 7 males & 5 females at Netrokona, Bangladesh, in rice on 05.02.2024 by M.S. Hossain. 12 males & 9 females at Naogaon, Bangladesh, in rice on 19-20.10.2023 by M.S. Hossain. 15 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 again by M.S. Hossain. 14 males & 12 females at Gazipur, Bangladesh, in rice on 20.08.2024 also by M.S. Hossain.

Genus *Orosius* Distant 1918

Type species: *Orosius albicinctus* Distant 1918.

Type locality: South India.

Nesaloha Oman 1943, Panp. Ent. **19**: 33.

Type species: *Nesaloha cantonis* Oman 1943.

Type locality: Canton Island.

***Orosius orientalis* (Matsumura 1914)**

Eutettix orientalis Matsumura 1914, Journ. Coll. Agr. Tohoku Imp. Univ. **5**: 192 (Original description).

Orosius orientalis, Faruq *et al.* 2017, **2**(1): 25-32 (Bangladesh).

Materials examined of *Orosius orientalis* (Matsumura 1914) in current study:

10 males & 7 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossain. 6 males & 3 females at Brahmanbaria, Bangladesh,

in rice on 22.10.2023 by M.S. Hossain. 7 males & 10 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 12 males & 13 females at Netrokona, Bangladesh, in rice on 05.02.2024 also by M.S. Hossain.

Genus *Thaia* Ghauri 1962

Type species: *Thaia oryzivora* Ghauri 1962.

Type locality: Pakistan.

***Thaia oryzivora* Ghauri 1962**

Thaia oryzivora Ghauri 1962, An. Mag. Nat. His. (Ser. 13), 5, 253–256 (Original description).

Thaia oryzivora, Islam *et al.* 2003, 13(2): 1-25 (Bangladesh).

Thaia oryzivora, Islam & Catling 2012 (Bangladesh).

Materials examined of *Thaia oryzivora* Ghauri 1962 in current study: 6 males & 2 females, at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 10 females at Kishoreganj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 2 males & 1 female at Netrokona, Bangladesh, in rice on 05.02.2024 by M.S. Hossain. 5 males & 1 female at Naogaon, Bangladesh, in rice on 19-20.11.2023 by M.S. Hossain. 14 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 also by M.S. Hossain.

Taxonomic accounts of planthopper species in Bangladesh (Fig. 2)

Genus *Laodelphax* Fennah 1963

Type species: *Delphax striatellus* Fallen 1826

Type locality: Europe (original locality of *Delphax striatellus*)

***Laodelphax striatellus* (Fallen 1826)**

Delphax striatella Fallén 1826 (Original description).

Laodelphax spp., Faruq *et.al* 2018, 28(1): 31-42 (Bangladesh).

First description from Bangladesh

Length: Male 3.4-3.6 mm, female 3.6-3.8 mm.

Coloration: The shiny black mesonotum of the male, the pterostigma of the forewing and the male genitalia are diagnostic for the species.

Head and thorax: The overall body coloration of the male ranges from stramineous (pale yellow) to white and black, with contrasting markings. The vertex stramineous, while the face (frons) fuscous, marked by white carinae. The compound eyes, mesonotum, and abdominal tergites are distinctly darker than the rest of the body, giving a two-toned appearance. The prothorax creamy white with dark brown fasciae located just below the posterior margins of the compound eyes. The mesothorax predominantly dark brown, except for the hind margin of the scutellum, which remains lighter. The tegulae diagnostic creamy white. The forewing hyaline (transparent) and feature a prominent dark claval pterostigma. Beyond the clavus, present light brown suffusion, enhancing wing pattern visibility. Morphometric details show that the head including eyes approximately $0.8\times$ the width of the pronotum in dorsal view. The anterior portion of the head obliquely rounded, and the crown (vertex) $0.2\times$ the width across the eyes. The frontoclypeus broad, and the frontal suture extends up onto the vertex. The median carina of the vertex forked just before reaching the frons. The frons uniform in width throughout, bearing a conspicuous median carina with a white suffusion that splits at the level just below the compound eyes. The pronotum $0.2\times$ longer than wide and $0.3\times$ the length of the scutellum, which gives compact thoracic appearance.

Male genitalia: Male terminalia taxonomically diagnostic and well developed. Pygofer $1.2\times$ longer than wide, slightly elongate and narrowed posteriorly. Tenth abdominal segment short and bears distinct processes, contributing to species-level recognition. Aedeagus broadly attached to the connective at its base, indicating firm structural integration. It measures approximately $4\times$ longer than wide. Structurally, the aedeagus broad at the base, ventrally bent, and features a tube-like process that extends from the mid-length region to the gonopore. Distally, has an elongate process with an acute tip, giving the genitalia a distinctive shape. The style divergent apically and $2.2\times$ longer than wide. Each style duck-head shaped at the apex and shows fine serration on the lateral margins near the apex — a key trait for differentiating from other *Delphacidae*.

Materials examined: 1 male & 2 females at Gazipur, Bangladesh, in rice on 20.08.2024 by M.S. Hossain; 2 males & 2 females at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain.

Host plants: Rice (*Oryza sativa*), wheat (*Triticum aestivum*, *T. durum*), maize (*Zea mays*), Oats (*Avena sativa*), barley (*Hordeum vulgare*), millet species (*Setaria* spp.), a wide array of wild grasses and other plants, including orchard grass, bent grass, Bermuda grass, beet, garlic.

Distribution: Widely distributed in the Palaearctic, from the UK where it is rare, to Japan (and Soviet Maritime Territory). Appears also to be found at higher altitudes in tropical Asia (e.g., Northern Philippines, North Sumatra) where it may be found on upland rice.

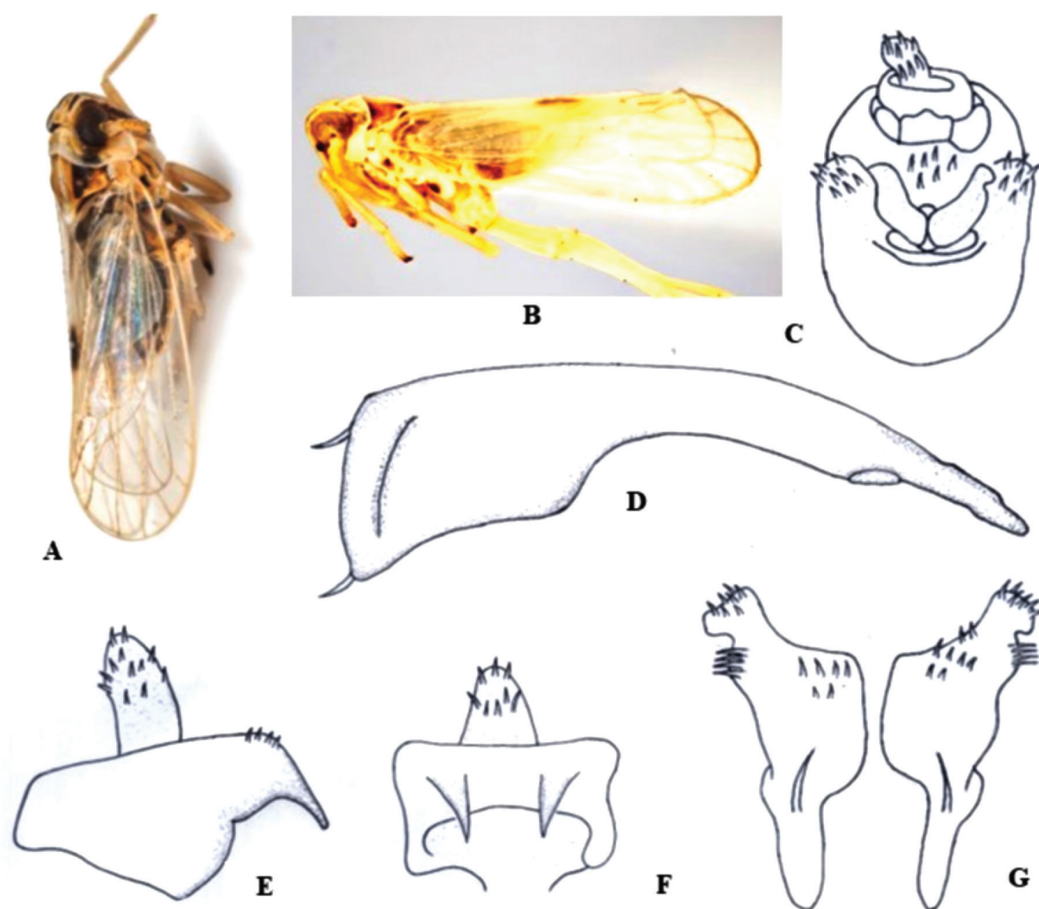


Fig. 2. A-G. *Laodelphax striatellus* (Fallen 1826): A. Dorsal habitus; B. Lateral habitus; C. Male genitalia; D. Aedeagus (lateral view); E. Anal segment (lateral view); F. Anal segment (ventral view); G. Style.

Genus *Nilaparvata* Distant 1906

Type species: *Delphax lugens* Stål 1854

Type locality: Sri Lanka.

***Nilaparvata lugens* (Stål 1854)**

Delphax lugens Stål 1854: 246 (Original description).

Nilaparvata lugens, Alam *et. al.* 1977, 79-90 (Bangladesh).

Nilaparvata lugens, Ahmed & Amin 2007 (Bangladesh).

Nilaparvata lugens, BRRI 1977: 131p (Bangladesh).

Nilaparvata lugens, Islam & Cattling 2012: 422p (Bangladesh).

Nilaparvata lugens, Islam *et. al.* 2003, 13(2): 1-25 (Bangladesh).

Nilaparvata lugens, Islam *et. al.* 2009, 20(1): 37-43 (Bangladesh).

Nilaparvata lugens, Hasan *et al.* 2023, 8(2): 26-27 (Bangladesh).

Materials examined of *Nilaparvata lugens* (Stål 1854) in current study: 10 males & 7 females at Gazipur Agricultural University, Bangladesh, in rice on 15-16.06.2024 by M.S. Hossain. 13 males & 11 females, at Bangladesh Rice Research Institute, Bangladesh, in rice on 20.07.2024 by M.S. Hossain. 6 males & 11 females at Brahmanbaria, Bangladesh, in rice on 22.10.2023 by M.S. Hossain. 7 males & 10 females, at Kishoreganj, Bangladesh, in rice, on 04.02.2024 by M.S. Hossain; 12 males & 13 females at Netrokona, Bangladesh, in rice on 05.02.2024 also by M.S. Hossain. 12 males & 9 females at Naogaon, Bangladesh, in rice on 19-20.11.2023 again by M.S. Hossain; 14 males & 12 females at Natore, Bangladesh, in rice on 22-23.08.2024 again by M.S. Hossain.

Genus *Nisia* Melichar 1903

Type species: *Livilla nervosa* Motschulsky (= *Meenoplus atrovenosa* Lethierry 1888) 1863.

Type locality: Sri Lanka (Ceylon)

***Nisia nervosa* (Motschulsky 1863)**

Livilla nervosa Motschulsky 1863: 1-153 (Original description).

Nisia atrovenosa, Catling & Islam 2013, 17(1&2): 79-108 (Bangladesh).

Nisia nervosa, Faruq *et. al.* 2018: 28(1), 31-42 (Bangladesh).

Materials examined of *Nisia nervosa* (Motschulsky 1863) in current study: 2 males & 2 females at Natore, Bangladesh, in rice on 23.08.2024 by M.S. Hossain; 5 males at Noagaon, Bangladesh, in rice on 01-02.12.2023 by M.S. Hossain.

Genus *Sardia* Melichar 1903

Type Species: *Sardia rostrata* Wilson & Claridge 1991

Type Locality: Karachi, Pakistan.

***Sardia rostrata* Wilson & Claridge 1991**

Sardia rosatrata Melichar 1903: 96 (Original description).

Sardia rostrata, Faruq *et.al.* 2018, 28(1): 31-42 (Bangladesh).

Materials examined of *Sardia rostrata* Wilson & Claridge 1991 in current study: 3 males & 2 females at Netrokona, Bangladesh, in rice on 05.02.2024 by M.S. Hossain. 1 male and 1 female at Gazipur, Bangladesh, in rice on 20.08.2024 by M.S. Hossain.

Genus *Sogatella* Fennah 1956

Type species: *Delphax furcifer* Horvath 1899

Type locality: Taiwan.

***Sogatella furcifer* (Horváth 1899)**

Delphax furcifer Horváth 1899 (Original description).

Sogatella furcifer, Alam *et. al.* 1964: 272p (Bangladesh).

Sogatella furcifer, Ahmed & Amin 2007 (Bangladesh).

Sogatella furcifer, Islam & Cattling 2012: 422p (Bangladesh).

Sogatella furcifer, Islam *et. al.* 2003, 13(2): 1-25 (Bangladesh).

Sogatella furcifer, Islam *et. al.* 2009, 20(1): 37-43 (Bangladesh).

Sogatella furcifer, Faruq *et.al.* 2018, 28(1): 31-42 (Bangladesh).

Sogatella furcifer, Hasan *et al.* 2023, 8(2): 26-27 (Bangladesh).

Materials examined of *Sogatella furcifer* (Horváth 1899) in current study: 6 males at Bangladesh Rice Research Institute, Bangladesh, in rice on 19.08.2024 by

M.S. Hossain. 2 males & 2 females at Noagoan, Bangladesh, in rice on 3-4.01.2024 by M.S. Hossain. 3 males & 4 females at Kishorgonj, Bangladesh, in rice on 04.02.2024 by M.S. Hossain. 3 males at Natore, Bangladesh, in rice on 22.08.2024 also by M.S. Hossain.

Checklist of the recorded leafhopper and planthopper species in Bangladesh

Leafhopper species

Genus *Cofana* Distant 1908

1. *Cofana spectra* (Distant 1908)

Genus *Exitianus* Ball 1929

2. *Exitianus indicus* (Distant 1908)

Genus *Hecalus* Stål 1864

3. *Hecalus porrectus* (Walker 1908)

Genus *Maiestas* Distant 1917

4. *Maiestas dorsalis* (Motschulsky 1859)

Genus *Nephotettix* Matsumura 1902

5. *Nephotettix cincticeps* (Uhler 1896)
6. *Nephotettix malayanus* Ishihara & Kawase 1968
7. *Nephotettix nigropictus* (Stål 1870)
8. *Nephotettix virescens* (Distant 1908)

Genus *Orosius* Distant 1918

9. *Orosius orientalis* (Matsumura 1914)

Genus *Thaia* Ghauri 1962

10. *Thaia oryzivora* Ghauri 1962

Planthopper species

Genus *Laodelphax* Fennah 1963

1. *Laodelphax striatellus* (Fallen 1826)

Genus *Nilaparvata*, Distant 1906

2. *Nilaparvata lugens* (Stål 1854)

Genus *Nisia* Melichar 1903

3. *Nisia nervosa* (Motschulsky 1863)

Genus *Sardia* Melichar 1903

4. *Sardia rostrata* Wilson & Claridge 1991

Genus *Sogatella*, Fennah 1956

5. *Sogatella furcifera* (Horváth 1899)

Key to the leafhopper species in Bangladesh

1. Forewings without oblique vittae or with oblique vittae usually forming continuous zigzag pattern *Maistas dorsalis*
- Forewings not forming continuous zigzag pattern 2
2. Typhlocybinae leafhopper, lack of ocelli..... *Thaia oryzivora*
- *Deltocephaline* leafhopper, ocelli present 3
3. General body color creamy white color with brown spots *Orosius orientalis*
- General body color green color with or without brown spots 4
4. Aedeagus lacking paraphyses and basal aedeagal processes..... *Cofana spectra*
- Aedeagus with paraphyses and with or without basal aedeagal processes..... 5
6. Aedeagus symmetrical, tubular, with processes at apex *Hecalus porrectus*
- Aedeagus not truly symmetrical with or without processes at apex 7
7. Dorsal side of aedeagus shaft without spines *Exitianus indicus*
- Dorsal side of aedeagus shaft with spines 8
8. Aedeagus bearing 8 pairs of spines on the shaft *Nephotettix nigropictus*
- Aedeagus bearing less than 8 pairs of spines on the shaft 9

9. with 4 pairs of separated spines located in middle *N. malayanus*
 - with 5 pairs of spines located in middle of aedeagal shaft 10
 10. Lateral parts of tegmina with dark brown spot *N. virescens*
 - Lateral parts of tegmina without dark brown spot *N. cincticeps*

Key to the planthopper species in Bangladesh

1. Each style duck-head shaped at the apex and shows fine serration on the lateral margins near the apex *Laodelphax striatellus*
 - Style not duck-head shaped at the apex 2
 2. Style large, inner margin roundly emarginate at middle, inner angle strongly projected, apex pointed, viewed caudolaterally..... *Nilaparvata lugens*
 - Style inner margin not roundly emarginate at middle 3
 3. Style angulately curved at middle, dorsad, with two lobes near base, inner lobe trifurcate apically, outer lobe with numerous teeth-like process at apex and hairy *Nisia nervosa*
 - Style inner lobe not trifurcate apically 4
 4. Style subparallel, rounded upper area, inner margin slightly concave, basal angle obtuse laterocaudally *Sardia rostrata*
 - Style divergent, each with outer angle widely formed, inner angle formed as long as outer one, apically acute *Sogatella furcifera*

CONCLUSION

The present study recorded a total 15 species of hoppers comprising 10 species of leafhoppers (Cicadellidae) under 7 genera and 5 species of planthoppers (Delphacidae) under 5 genera, from different agro-ecological zones of Bangladesh. As an outcome of this research, a checklist of available leafhopper and planthopper species in Bangladesh has been developed along with the taxonomic key for their correct identification. This provides a valuable baseline for further taxonomic,

ecological, and pest management studies. Further extensive surveys, including in the hilly regions of Bangladesh, should be conducted, and molecular identification tools should be incorporated for more detailed research.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the University Grants Commission (UGC) of Bangladesh for funding the research work.

REFERENCES

- AHMED, A. & AMIN, M. S. 2007. *Crop pest management*. Panjeree Publications Ltd.
- ALAM, M. Z. 1977. Checklist of rice insect pests of Bangladesh. In: Literature review of insect pests and diseases of Bangladesh. Bangladesh Rice Research Institute. BRRI, Gazipur. 79-90.
- ALAM, M. Z., AHMED, A., ALAM, S. & ISLAM, M. A. 1964. *A review of research, Division of Entomology (1947–64)*. Agriculture Information Service, East Pakistan Agricultural Research Institute, Department of Agriculture. pp. 272.
- ALI, M. P., NESSA, B., KHATUN, M. T., SALAM, M. U. & KABIR, M. S. 2021. A way forward to combat insect pest in rice. *Bangladesh Rice Journal*. **25**(1): 1-22.
- AMIN, M. R., AZAD, H. M. S., HOSSAIN, S. M. A. & TITHI, D. A. 2013. Pest, predator and pollinator abundance in the cotton field of Bangladesh: A climate change country. In: Climate Change and Environment. Edited by Sundaresan J., Sreekesh S., Ramanathan A. L., Sonnenschein L. and Boojh R. Scientific Publishers (India). pp. 100-106.
- BOURGOIN, T. 2012. *FLOW: Fulgoromorpha Lists on the Web, 1997-2012* (Version 7, updated February 17, 2012).
- BRRI (Bangladesh Rice Research Institute). 2009. Proceedings of the BRRI Annual Research Review for 2007-2008, held on 15-18 March 2009, Gazipur, Bangladesh.

- CATLING, D. & ISLAM, Z. 2013. Diversity and seasonal fluctuations of arthropod fauna in Bangladesh deepwater rice. *Bang. R. J.* **17**(1-2): 75-104.
- DIETRICH, C. H. 2004. Phylogeny of the leafhopper subfamily *Evacanthinae* with review of Neotropical species and notes on related groups (Hemiptera: Membracoidea: Cicadellidae). *System. Entom.* **29**(4): 455-487.
- DIETRICH, C.H. 2005. Keys to the families of Cicadomorpha and subfamilies and tribes of Cicadellidea (Hemiptera: Auchenorrhyncha). *Flor. Ento.* **88**(4): 502-517.
- DISTANT, W. L. 1908. Rhynchota. IV. Homoptera and appendix (Pt.). *The fauna of British India, including Ceylon and Burma*. London: Taylor & Francis. XV+501 pp.
- DUPO, A. L. B. & BARRION, A. T. 2009. Taxonomy and general biology of delphacid planthoppers in rice agroecosystems. International Rice Research Institute. pp. 3–156
- FARUQ, M. O., KHAN, M. M. H. & RAHMAN, M. A. 2018. New records of delphacid planthoppers (Hemiptera: Delphacidae) known from Bangladesh in coastal rice ecosystem. *Bangladesh J. of Ento.* **28**(1): 31-42.
- GHAURI, M. S. K. 1962. A new typhlocybid genus and species (Cicadelloidea: Homoptera) feeding on rice in Thailand. *Annals and Magazine of Natural History*. (Ser. **13**). 5: 253-256.
- HAFIZAL, M. M. & IDRIS, A. B. 2014. Temporal population abundance of leafhopper (Homoptera: Cicadellidae) and planthopper (Homoptera: Delphacidae) as affected by temperature, humidity and rice growth stages. *Aca. J. of Ento.* **7**(1): 1-6.
- HASAN, R., SHAMS, S. N. U., RUBEL, M. H. & JHAN, P. K. 2023. Reporting of two planthoppers and six leafhopper species in Feni and Noakhali district of Bangladesh. *Inter. J. of Innov. Res.* **8**(2): 26-27.
- ISHIHARA, T. & KAWASE, E. 1968. Two new Malayan species of the genus *Nephotettix* (Hemiptera: Cicadellidae). *Appl. Ento. and Zool.* **3**(3): 119-123.

- ISLAM, Z. & CATLING, D. 2012. Rice pests of Bangladesh: Their ecology and management. The University Press Limited, Dhaka, Bangladesh. 422 pp.
- ISLAM, Z., CATLING, D., HASAN, M., HAQUE, S. S., BEGUM, M. A. & HAQ, M. 2009. Influence of the green revolution on the insect pests of rice with particular reference to Bangladesh. *Out. on Pest Manag.* **20**(1): 37-43.
- ISLAM, Z., RAHMAN, M. A., BARRION, A. T., POLASZEK, A., CHANCELLOR, T., HEONG, K. L., AHMED, N., HUQ, M. & KAMAL, N. Q. 2003. Diversity of arthropods in irrigated rice in Bangladesh. *Bangladesh J. of Ento.* **13**(2): 1-25.
- KWON, Y. J. 1988. Taxonomic revision of the leafhopper genus *Macrosteles* Fieber of the World (Homoptera: Cicadellidae). Ph.D. Thesis, University of Wales, Cardiff, UK. 557 pp.
- VIRAKTAMATH, C. A. 2007. Biodiversity of leafhoppers (Hemiptera: Cicadellidae) of the Indian subcontinent. In *Entomology: Novel Approaches*. pp. 477-497.