

## Species of *Nephotettix* Matsumura (Hemiptera: Auchenorrhyncha: Cicadellidae) in Sri Lanka

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**ABSTRACT.** Green leafhoppers, the genus *Nephotettix* Matsumura (Cicadellidae: Deltocephalinae), are one of the important groups of insects due to their pest status and ability of transmitting viral diseases in rice. Structure of green leafhopper community in rice ecosystem is an unresolved research question which is important in managing these insects. The leafhoppers were generally considered as two species but some other working groups suggest it includes more than two. Our study revealed that green leafhopper community in Sri Lanka includes five members. They are *N. virescens* (Distant), *N. nigropictus* (Stal), *N. malayanus* Ishihara & Kawase, *N. parvus* Ishihara & Kawase, and *N. sympatricus* Ghauri. Morphological characteristics and structure of the male genitalia were used to identify the species.

### INTRODUCTION

The green rice leafhoppers of the genus *Nephotettix* Matsumura (Cicadellidae: Deltocephalinae) are very common in paddy fields and irrigated wetland ecosystems in Sri Lanka. These hoppers can be distinguished from other leafhoppers by their green colour with the characteristic black markings on various parts of the body and show very little discrimination. Eight species and one subspecies of *Nephotettix* Matsumura, have been reported so far. (Ghauri, 1971). They are *N. virescens* (Distant), *N. nigropictus* (Stal), *N. cincticeps* (Uhler), *N. modulatus* Melichar, *N. malayanus* Ishihara & Kawase, *N. parvus* Ishihara & Kawase, *N. afer* Ghauri, *N. sympatricus* Ghauri and *N. nigropictus* (Stal) s.sp. *yapicola* (Linnavuori).

Some species of *Nephotettix* are serious pests to the rice cultivations, cause either direct damage to the rice plant by sucking the sap or by transmitting several viral diseases. *N. virescens* and *N. nigropictus*, are important vectors of the Rice Tungro virus. *N. malayanus* has also been reported as a vector of tungro disease in a laboratory experiment in Philippines, but *N. parvus* has not been reported as a vector so far. These two species are very rare and do not infest paddy fields, but inhabit gramineous weeds. However *N. cincticeps*, is reported

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as serious pests of cultivated rice in temperate regions of East Asia. In Sri Lanka Wijerathna, (1999) reported the existence of five species out of the above nine, as feeding on paddy but references for study materials or research publications were not given. Four species except *N. malayanus* were recorded from irrigated agro-ecosystem by Bambaradeniya *et al.* (2004). Studies on the biology, pest status and management were carried out only for *N. virescens* and *N. nigropictus* (Nugaliyadde, 1985, Nugaliyadde and Tennakoon, 1987, Nugaliyadde and Kudagamage, 1988). This may be due to their insignificant abundance or misidentification. Correct identification of fauna and flora in any agro ecosystem is a fundamental requirement to develop integrated pest management strategies. Therefore, this study was conducted with the objectives of collection, identification and documentation of existing leafhopper species and the species of *Nephotettix* in paddy ecosystems are focused here.

## MATERIALS AND METHODS

This study was carried out at the Department of Agricultural Biology, University of Peradeniya, Sri Lanka during 2006-2008. Leafhoppers were collected from paddy ecosystems in selected places of Mid country wet zone and Low country dry zone of Sri Lanka, by net sweeping and light traps, and the specimens of *Nephotettix* spp. were sorted out by examining their morphological characters (Ghauri, 1971) under a binocular stereoscopic microscope (x10). They were mounted singly on card points and the abdomen was dissected to study the genitalia (Knight, 1965). Species of *Nephotettix* were identified by consulting published taxonomic keys in literature (Ghauri, 1971; Ramakrishnan and Ghauri, 1979; Wilson and Claridge, 1991).

## RESULTS AND DISCUSSION

The *Nephotettix* Matsumura can be easily distinguished from other Deltocephaline by the following characters – the vertex, flat with transverse discal furrow not sharply ridged where it meet face. Five species *N. virescens* (Distant), *N. nigropictus* (Stal), *N. parvus* Ishihara & Kawase, *N. malayanus* Ishihara and Kawase, and *N. sympatricus* Ghauri were collected and identified. These five species were separated from each other by the structure and the colouration of the vertex and tegmina. The structure of the male genitalia was used to confirm the identification. A taxonomic key based on the morphological variations was prepared and displayed. Identities of the specimens were confirmed by Dr. C. A. Viraktamath, Insect Systematic Unit, University of Agricultural Sciences, Bangalore, India.

## CONCLUSIONS

Green leafhopper community in the paddy ecosystems in Sri Lanka includes five species. An illustrated taxonomic key given in this paper based on the external morphological characteristics for all five species of *Nephotettix* Matsumura, existing in Sri Lanka, is useful for researchers who are working on leafhoppers.

**Key to the Sri Lankan species of *Nephotettix* Matsumura**

Opaque green leafhoppers with black markings on head face pronotum, tegmen and other body parts. Vertex sharply ridged. *Nephotettix* Matsumura

<b>1</b>	Male	<b>2</b>
	Female	<b>8</b>
<b>2 (1)</b>	Vertex distinctly pointed. (length in mid line: next to eye is >1.35:1)	<b>3</b>
	Vertex rounded ( length in mid line: next to eye is < 1.35:1)	<b>6</b>
<b>3(2)</b>	No marks on vertex	<i>N. virescens</i>
	Sub marginal black marking on head	<b>4</b>
<b>4 (3)</b>	Continuous submarginal black band	<i>N. parvas</i>
	Submarginal band separated in the middle	<b>5</b>
<b>5 (4)</b>	Adeagus spines 4-5 pairs Pygofer spines two groups, spine I large, 4-5 small spines as a group.	<i>N. virescens</i>
	Adeagus spines, 3-4 pairs, Pygofer spine two , spine I large, spine II small	<i>N. sympatricus</i>
<b>6 (1)</b>	Anterior margin of pronotum and scutellum black. Forewing black mark touches claval suture , submarginal band complete , 2 groups of pygofer spines	<i>N. nigropictus</i>
	Adeagus spine 8-9 pairs- Submarginal band reduced to posterior to ocelli; One large black pygofer spine	<i>N. malayanus</i>
<b>7(1)</b>	Vertex pointed	<b>8</b>
	Vertex rounded	<b>10</b>
<b>8(7)</b>	No marks on vertex, forewing usually no marks. Submarginal band present, either complete or separate at the middle.	<i>N. virescens</i>
		<b>9</b>
<b>9(8)</b>	Complete submarginal band , apical third of forewing is black , and occasionally with black spot	<i>N. parvus</i>
	Submarginal band separate at the middle. Forewing entirely green , face with transverse black marks	<i>N. sympatricus</i>
<b>10(7)</b>	No Submarginal black band, forewing entirely green	<i>N. malayanus</i>
	Submarginal band distinct. Anterior margin of pronotum, scutellum black usually apical third of forewing is black	<i>N. nigropictus</i>

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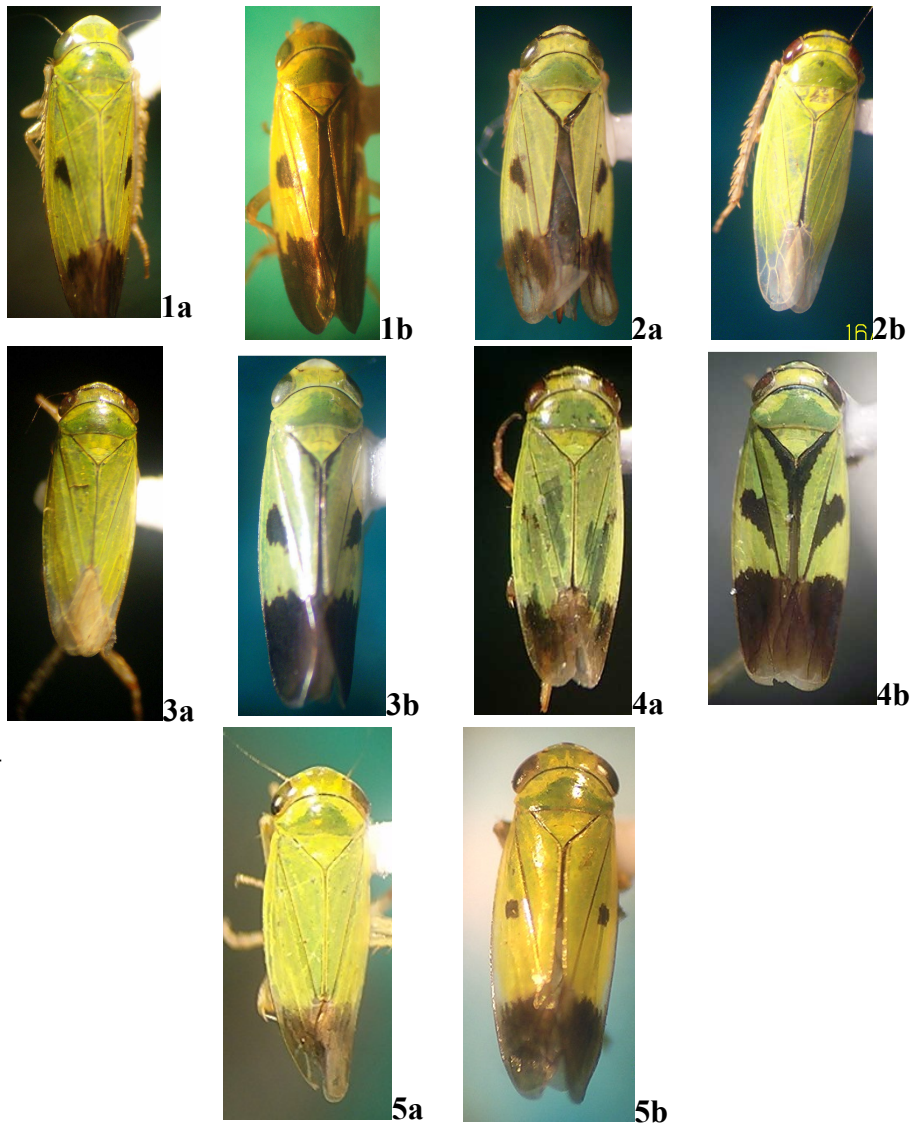


Plate 1. Species of *Nephotettix* Matsumura, in Sri Lanka.

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|--------------------------|--------------------------|
| 1. <i>N. virescens</i>   | 4. <i>N. nigropictus</i> |
| 2. <i>N. parvus</i>      | 5. <i>N. malayanus</i>   |
| 3. <i>N. sympatricus</i> | ( a: female; b: male)    |