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Typhlocybine Leafhoppers (Hemiptera: Auchenorrhyncha: Cicadellidae) Associated with Horticultural Crops in Sri Lanka

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ABSTRACT. *Typhlocybine leafhoppers associated with horticultural crops were recorded in various ecological regions in Sri Lanka. Six species of four genera namely Motschulskyia (Togaritettix) serratus (Matsumura) 1931; Amrasca splendens Ghauri 1967; Amrasca biguttula biguttula (Ishida) 1913; Empoasca (Empoasca) triangularis Dworakowska 1994 and Empoasca sp. and Kamaza sadakorni Dworakowska 1993 were found to breed on the following horticultural crops: mango (Mangifera indica), rambuttan (Nephelium lappaceum L.), avocado (Persea americana Mill.), okra (Abelmoschus esculentus (L.), brinjal (Solanum melongena L.), bush beans (Phaseolus vulgaris L.), long bean (Vigna unguiculata sesquipedalis (L.) Verdc., carrot (Daucus carota L.), beetroot (Beta vulgaris L.) and wing bean (Psophocarpus tetragonolobus (L.) D.C). Diagnostic features of these leafhopper species along with the host plants and distribution data are given. Host records of E. (E.) triangularis is given for the first time and three out of the above six species namely M. (T.) serratus, K. sadakorni and Empoasca sp. are reported for the first time in Sri Lanka.*

INTRODUCTION

Typhlocybinae is the second largest subfamily under Cicadellidae next to Deltocephalinae. Typhlocybines are fragile, comparatively small leafhoppers with cosmopolitan distribution. They can be distinguished from other leafhoppers by the absence of cross veins in the basal area of the forewings and by the acutely produced hind basitarsus. Typhlocybinae is divided into six tribes and more than 2000 species have been recorded worldwide (Oman *et al.,* 1990). Several of these members are known pests of economically important crops as well as vectors of plant pathogens (Nielson, 1968). Of these, only one has been recorded as a pest of cocoa (Fernando,1959) and vegetables (Wijerathne, 1999) in Sri Lanka. Though Dworakowska (1994) reported the presence of *A. splendens*, in Sri Lanka , its host plant was not mentioned. It has been reported as a serious pest of mango in India (Ghauri,1967).

A taxonomic review of Sri Lankan typhlocybines has been furnished by Dworakowska (1994). Seventy six typhlocybine species have been reported so far from Sri Lanka

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(Motschulsky, 1863; Melichar, 1903; Distant, 1908; McAtee, 1934; Pruthi, 1940; Ghauri, 1967; Dworakowska and Viraktamath, 1979; Dworakowska, 1980a, 1980b and 1981).
The objective of the present study was to further explore this leafhopper community in horticultural crops in Sri Lanka together with host plants and distribution data.

MATERIALS AND METHODS

This study was conducted in the Department of Agricultural Biology, Faculty of Agriculture, University of Peradeniya from 2006 to 2008. Leafhoppers were collected periodically from selected sampling sites in the mid country wet zone (MCWZ), mid country intermediate zone (MCIZ), low country dry zone (LCDZ) and upcountry wet zone (UCWZ) of Sri Lanka on horticultural crops. Insect collections were made by using sweep-nets, aspirators, and light traps. The insects collected were transferred to an insect killing bottle for a few minutes and then transferred to temporary storing plastic bottles to transport the insects to the laboratory. They were then sorted out under a binocular stereomicroscope (x10). Leafhoppers were dried in an oven at 40-45 ^{0}C for 5-6 hrs and stored again. These specimens were further processed following the procedure advocated by Knight (1965) and were dissected under binocular stereomicroscope to study the structure of the body parts, especially male genitalia. Specimens were identified based on their morphology and the identity was confirmed after comparing with the original descriptions and illustrations (Ghauri, 1967; Dworakowska, 1980, 1981, 1993 and 1994; Sohi, and Mann, 1987). Illustrations and photographs were made by using camera Lucida and a digital camera attached to the stereomicroscope, respectively.

Identified specimens in the present work are deposited in the Insect Museum, Department of Agricultural Biology, University of Peradeniya, Peradeniya, Sri Lanka.

RESULTS AND DISCUSSION

Six species of typhlocybine leafhoppers belonging to two tribes, Dikraneurini and Empoascini, were identified from the samples collected from horticultural crops (Table 1). Of these, three species are recorded for the first time from Sri Lanka. *Amrasca biguttula biguttula* (Ishida) has already been reported in Sri Lanka from several places as a pest of vegetables (Wijeratne, 1999).

1. *Motschulskyia* (*Togaritettix*) *serratus* (Matsumura) (Plate 1a)

Togaritettix serratus Matsumura, 1931: 71.
Mahmoodiana acuta Ahmed & Waheed, 1971: 116.
Motschulskyia (*Togaritettix*) *serratus* Dworakowska, 1971: 519.

Distinguishing characters

Dorsal and ventral side of the body yellow, with a characteristic black mark along the body from the head to the wings; eyes black. Vertex produced, length and width of vertex more or less equal to those of pronotum. Fore wing: yellow with black mark, inner apical cell broad, longer than the second cell, third cell small, triangular and petiolate, outer (4th) apical cell broad, not reaching wing apex with obliquely angulate base. Hind wing: submarginal vein

extending around beyond apex of R+M, then along costal margin and joining in middle. Cu_1 separate, two closed apical cells. Cu_2 reaching submarginal vein in basal half. Abdomen: ventral apodeme short extends up to second sternite. Genitalia**:** genital plate elongate, lob like with 2-3 macrosetae on outer margin, and microsetae on ventral surface, pygofer with two pairs of spine like processes, short anal tube with out process. Aedeagus with a short preatrium, small poorly developed membranous dorsal apodeme at the base.

Distribution

China, Japan, India, Australia (Fletcher and Donaldson, 1992). This is a new record for Sri Lanka.

Measurements

Male 2.75 mm long; 0.58 mm wide across eyes. Female 2.91 mm long; 0.62 mm wide across eyes.

Materials examined

SRI LANKA: LCIZ: 3 males, 7 females, Ibbagamuwa, 30.xii.2007, on mango; MCWZ: 2 males, 2 females, Kegalle, 04.iv.2006, on mango; 6 males, 4 females, Peradeniya, 22.iv.2007, on mango and at light.
Collectors: U. G. L. T. Gunawardana and R. Gnaneswaran.

Host plants recorded

Plants of the family Rosaceae, berry fruit tree and mango.

Remarks

This species can be easily identified by the coloration and characteristic male genitalia. It has been reported on berry fruits of minor economic importance in Australia. Its feeding and oviposition injuries cause leaf mottling and occasional leaf drop when in high numbers (Fletcher and Donaldson, 1992). In this study, specimens were collected on mango and at light.

2. *Kamaza sadakorni* Dworakowska (Plate 1b)
Kamaza sadakorni Dworakowska 1993: 132.

Distinguishing characters

Very small, delicate, dorsoventrally depressed, dorsal side pale lemon yellow and ventral side very faded white; orange colour band on vertex, and pronotum. Vertex produced, triangular in shape. Fore wing: transparent, narrow, all three apical veins more or less parallel, cross veins and veins in basal part indistinct, two longitudinal lemon yellow bands parallel to clavus, with four small black spots, one spot on 1st apical cell, largest and most distinct, one on cross vein at costal margin, third one just below wax field, smallest (4th) indistinct in middle behind second apical cell; apical margin as brown. Hind wing: submarginal vein extending around beyond apex of R+M, then along costal margin and joining in middle. Cu_1 separate, two closed apical cells. Cu_2 reaching submarginal vein in basal half. Abdomen: ventral apodeme extends up to second sternite. Male genitalia: simple,

pygophore and anal collar without processes. Subgenital plate triangular with lateral row of three long setae. Style broad in the mid section, pre apical lobe well developed, apophysis slender curved laterally with truncate apex. Connective lamellate. Aedeagus broad at base and narrowing distally with a pair of slender long pre atrial processes not exceeding apex of shaft. Hind margin of seventh sternite of female slightly narrowly produced caudad and incised in middle.

Distribution

India, Thailand (Dworakowska 1993). This is a new record for Sri Lanka.

Table 1. Leafhopper species of the subfamily Typhlocybinae associated with horticultural crops in Sri Lanka

Species	Associated crop(s) in Sri Lanka	World Distribution
Tribe: Dikraneurini		
Motschulskyia (*Togaritettix*) *serratus* (Matsumura)	*Mangifera indica* L.(mango)	Japan, Korea, West Pakistan, Taiwan, Thailand, Australia, **Sri Lanka****
Kamaza sadakorni Dworakowska	**Psophocarpus tetragonolobus* (L.) D.C (wing bean)	India, Thailand, **Sri Lanka*****
Tribe Empoascini		
Amrasca splendens Ghauri	*Mangifera indica* L. (mango) **Polyalthia longifolia* sonn. (Ashoka	**Sri Lanka** India, Thailand,
Amrasca biguttula biguttula (Ishida)	*Abelmoschus esculentus* (L.) (okra) *Solanum melongena* L. (brinjal) *Momordica charantia* L. (bittergourd) *Solanum tuberosum* L. (potato) *Vigna unguiculata* (L.) (cowpea)	Widely distributed in Oriental region
Empoasca (Empoasca) triangularis Dworakowska	* *Vigna unguiculata sesquipedalis* (L.) Verdc. (long bean) * *Phaseolus vulgaris* L (bush bean), * *Solanum melongena* L. (brinjal) * *Daucus carota (*carrot) * *Beta vulgaris L.* (beet root) * *Sesbania grandiflora* (L) (agati)	**Sri Lanka,** India, Myanmar
Empoasca sp.	*Mangifera indica* L. (mango) *Nephelium lappaceum* L.(rambuttan) *Theobroma cacao* L. (cocoa)	**Sri Lanka****

* First report
** Species new to Sri Lanka
*** Genus and species new to Sri Lanka,

Measurements

Male 2.13 mm long; 0.42 mm wide across eyes. Female 2.17 mm long; 0.46 mm wide across eyes.

Materials examined

SRI LANKA: MCWZ: 11 males, 6 females, Pilimathalawa, 12.i.2007; 7 males, 12 females, Pilimathalawa, 06.iii.2008; MCIZ: 5 males, 3 females, Hanguranketha, 20.x.2007, on wing bean. Collectors: K.S. Hemachandra and R. Gnaneswaran.

Host plant recorded

Psophocarpus tetragonolobus (wing bean)

Remarks

This is the first record of this genus and species from Sri Lanka and also the host record. It was earlier recorded from Bangkok (Thailand) on *Erythrina fusca* and Manthal (Jammu and Kashmir, India) on *Ficus* sp. This species was found breeding extensively on wing bean at Pilimathalawa.

3. *Amrasca splendens* Ghauri (Plate 1c)
Amrasca splendens Ghauri 1967: 161

Distinguishing characters

Green with reddish brown marking on head, thorax, and forewings (Plate 1c). First and second apical veins of forewing arising from cell M and 3rd apical vein from cell R. Three black spots present in M, Cu, and 1st apical cells. Hind wing with one apical cell only. Genetalia: male subgenital plates with two rows of long setae at the base and a row of small setae on its outer margin.

Distribution

Originally this species was described from Kerala on mango (Ghauri, 1967) but now known to occur throughout India, Sri Lanka and Thailand.

Measurements

Male 2.24 mm long; 0.61 mm wide across eyes. Female 2.46 mm long; 0.66 mm wide across eyes.

Materials examined

SRI LANKA: LCDZ: 4 males, 2 females, Thirunelvely, 16.ii.2006; 1 male, 3 females, Manipay, 16.v.2008, on mango; LCIZ: 2 males, 2 females, Ibbagamuwa, 30.xii.2007, on mango; MCWZ: 4 males, 6 females, Peradeniya, 22.iv.2007, on mango; 1 male, 3 females, Peradeniya, 13.ii.2007, on *Polyalthiya longifolia;* MCIZ: 4 males, 7 females, Matale,

13.ii.2007, on mango; 2 males, 5 females, Kundasale, 10 iii.2007, on mango.
Collectors: U.G. L. T. Gunawardana and R. Gnaneswaran

Host plants recorded

Mango and *Polyalthia longifolia*.

Remarks

This species appears to be a phloem feeder and causes necrosis in the apical part of the leaves. It was also found to feed on Asoka tree (*Polyalthiya longifolia*) in Peradeniya, Sri Lanka in addition to breeding on mango.

4. ***Amrasca biguttula biguttula*** **(Ishida) (Plate 1d)**

Chlorita biguttula Ishida 1913:
Chlorita biguttula Shiraki 1913: 96
Chlorita bimaculata Matsumura 1916: 393, synonymised by Matsumura 1934: 5
Empoasca devastans Distant 1918: 93, synonymised by Dworakowska 1970: 712
Amrasca devastans (Distant), Ghauri 1967:
Sundapteryx biguttula biguttula (Ishida), Dworakowska 1970: 712
Amrasca devastans (Distant), Ghauri 1983: 100

Distinguishing characters

Green or light yellow with paired black spots on vertex and another pair on apical area of forewing. The forewing has a brownish tinge and the legs are green. Genetalia: Sub genital plate finger like with hair like setae.

Distribution

Widely distributed in the Indian subcontinent, covering Bangladesh, India, Nepal and Pakistan. It is also recorded in Afghanistan, Vietnam, Japan, China, Taiwan and in the Pacific island of Guam (Sohi and Dworakowska, 1983).

Measurements

Male: 2.75 mm long, 0.58 mm wide across eyes; Female: 2.95 mm long, 0.71 mm wide across eyes.

Materials examined

SRI LANKA: LCDZ: 11 males, 18 females, Thirunelvely, 16.ii.2006, on okra, brinjal; 4 males, 9 females, Atchuvely, 19.ii.2006, on brinjal; 7 males, 11 females, Maha Illupallama, 07.ii.2007, on brinjal; 2 males, 3 females, Ampara, 07.iv.2007, on bitter gourd; 2 males, 8 females, Vavuniya, 17.iv.2007, on cowpea; LCIZ: 6 males 11 females Ibbagamuwa, 30.xii.2007, on okra; MCWZ: 6 males, 12 females, Gampola, 19.ix.2006 on okra; 4 males, 6 females, Peradeniya, 12.ix.2006, on okra, brinjal; 12 males, 16 females, Kegalle, 17.x.1007, on brinjal; MCIZ: Matale, 20.ii.2007, on brinjal, okra, beans; 4 males, 3 females, Nalanda, 22. vi. 2007, on okra; 4 males, 6 females Hanguranketha, 20.x.2007, on okra, brinjal, potato and pumpkin.

Collectors: U. G. L. T. Gunawardana and R. Gnaneswaran.

Host plants record

Cocoa (Fernando, 1959), brinjal, okra, *Gossypius* sp., *Bischofia javanica, Althaea* sp., *Hibiscus* sp., *Epithrix* sp. (Malvaceae), sweet potato (Dworakowska, 1994).

Remarks

Reported as pest of egg plant, cotton, okra and sunflower in India, Pakistan, Philippines, Sri Lanka and Taiwan. The first Sri Lankan record was from Dumbara as pest of Cacao (Fernando, 1959), then from Anuradapura and Kundasale on *Hibiscus esculentus* and from Peradeniya on *Solanum melongena* (Dworakowska, 1994).

5. *Empoasca* (*Empoasca*) *triangularis* Dworakowska, (Plate 1e)

Empoasca (*Empoasca*) *triangularis* Dworakowska, 1994 , 4

Distinguishing characters

Body green and apical 1/3 of forewings fuscous. Head: anterior margin of head produced, vertex longer in middle than laterally. Ocelli on crown. Face green. Fore wing: transparent , 1/3 of the apical half fuscous. Only 1st apical vein arising from cell M. Genitalia**:** Male plate comparatively shorter and broader with a few tufts of long hair like setae. Pygophore with a pair of appendages, each appendage broad, only slightly curved dorsad, broadened before apex and serrated terminally on both dorsal and ventral margins.

Distribution

India, Myanmar, Sri Lanka.

Measurements

Male 2.7 mm long; 0.66 mm wide across eyes. Female 2.75 mm long; 0.66 mm wide across eyes.

Materials examined

SRI LANKA: MCWZ: 4 males, 6 females, Gannoruwa, 5.viii.2006, on long bean, bush bean and brinjal; 6 males, 11 females, Gampola, 14.ix.2006, on *Sesbania grandiflora*; 2 females, Peradeniya, 07.vi.2007 at light; UCWZ: 2 males, 3 females, Nuwara Eliya, 3.iv.2007 on carrot; 2 males on beetroot, 3 females on long bean and 4 males, 3 females on castor. Collecters: R. Gananeswaran and U. G. L. T. Gunawardana.

Remarks

This species was described from light trap samples collected from Sri Lanka (Anuradhapura) by Dworakowska (1994). No host records were reported until the present study.

6. Empoasca sp. (Plate 1f)

Distinguishing characters

Apple green with two black spots on anterior part of head, both dorsal and ventral sides of abdomen yellow, Forewing margin narrowly fuscous. Head: *A*nterior margin of head more or less parallel to the posterior margin. Vertex not produced. Frontal suture not complete. Fore wing: Transparent, distal 1/3 fuscous. All three apical veins arise from cell M. Inner apical cell broader at base and second apical cell long and narrow, 3rd apical cell sub triangular. Outer apical cell open basally. Hind wing: sub marginal vein extending around wing apex and reaching R+M. Cu_1 fused with M_{3+4} apically, only one apical cell. Cu_2 reaching submarginal vein in basal half of wing. Vennal veins fused at their basal half and separated apically.Male genetalia: genital plate long broader at base, gradually narrowing to an obtusely rounded apex, extending beyond pygofer. Long well developed macrosetae on ventral surface near lateral margin; an oblique row and apical margin. Smaller macro setae along lateral margin. Male pygophore with apex obtusely rounded on apical margin with a ventral long process and extending beyond apex of pygofer with acute apex. Aedeagus simple with long pre atrium, shaft with a basal triangular too-like process laterally on each side.

Measurements

Male 3.6 mm long; 0.85 mm wide across eyes. Female 3.9 mm long; 0.95 mm wide across eyes.

Materials examined

SRI LANKA LCDZ: 2 males, 2 female, Thirunelvely, 16.iv.2008, on mango; MCIZ: 4 males, 6 females, Kundasale, 10.iii.2007 on mango, rambuttan and cocoa; MCWZ: 2 males, 4 females, Peradeniya, 28.xi.2007, on mango; 2 females, Kegalle, 17.x.2007, on rambuttan; 3 males 2 females, Peradeniya, 07.vi.2007 at light.
Collectors: U. G. L.T. Gunawardana and R. Gnaneswaran.

Remarks

This species is tentatively assigned to the genus *Empoasca* Walsh till further studies. It can readily be recognized by the two black spots on vertex and general green colour intermixed with yellowish green.

CONCLUSIONS

Six species of Typhlocibines have found to breed on horticultural crops in Sri Lanka, three species, *Amrasca biguttula biguttula, Empoasca* (*Empoasca*) *triangularis,* and *Kamaza sadakorni* breed and survive on vegetable crops and the other three, *Motschulskyia* (*Togaritettix*) *serratus*, *Amrasca splendens*, and *Empoasca* sp. were found to breed on fruit crops. Existence of *M. (T.) serratus*, *K. sadakorni* and *Empoasca* sp. and the host plant records for *E (E) triangularis* are reported for the first time in Sri Lanka.

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REFERENCES

Distant, W. L. (1908). Rhynchota-Homoptera. The Fauna of British India including Ceylon and Burma. 4. Taylor and Francis Ltd. Lond.

Dworakowska, I. (1971). On some genera of the Tribe Dikraneurini (Auchenorrhyncha, Cicadellidae, Typhlocybinae). Bull. Acad. Pol. Sci.. Cl.II Ser. Sci. Biol.19: 579-586.

Dworakowska, I. (1980a). On some species of the genus *Empoascanara* Dist. (Homoptera, Auchenorrhyncha, Cicadellidae, Typhlocybinae). Reichenbachia. 18(26): 173-188.

Dworakowska, I. (1980b). Contribution to the taxonomy of the genus *Empoascanara* Dist. (Homoptera, Auchenorrhyncha, Cicadellidae, Typhlocybinae). Reichenbachia. 18(26): 189-197.

Dworakowska, I. (1981). On some Typhlocybinae from India, Sri Lanka and Nepal (Homoptera, Auchenorrhyncha, Cicadellidae). Entomol. Abh. Mus. Tierk. Dresden. 44(8): 152-202.

Dworakowska, I. (1993). *Fujiplata* Ahmed and some other Dikraneurini (Insecta, Auchenorrhyncha, Cicadellidae: Typhlocybinae). Entomol. Abh. Mus. Tierk. Dresden. 55(7): 97-139.

Dworakowska, I. (1994). Typhlocybinae (Auchenorrhyncha, Cicadellidae) known to occur in Sri Lanka. Ann. Zool. Bot. 216: 3-39.

Dworakowska, I., Viraktamath, C.A. (1979). On some Indian Erythroneurini (Auchenorrhyncha, Cicadellidae, Typhlocybinae). Bull. Acad. Polonaise Sci. (Biol.). 27(1): 49-59.

Fernando, H. E. (1959). Studies of *Empoasca devastans* Dist. (Fam. Jassidae, ord. Hemiptera), A new pest of cacao causing defoliation and its control. Trop. Agriculturalist. cxv 121-144.

Fletcher, M. J. and Donaldson, J. F. (1992). *Emopoasca* (*Empoasca*) *Smithi*, a new species of leafhopper damaging citrus in Queensland and notes on other Typhlocybinae from Australia (Hemiptera: Cicadellidae). J. Aust. Entomol. Soc. 31:183-186.

Ghauri, M. S. K. (1967). New mango leafhoppers from Oriental and Austro-oriental regions (Homoptera: Cicadelloidea) Proc. R. Entomol. Soc. Lond. (B) 36(11-12): 159-166.

Knight, W. J. (1965). Techniques for use in the identification of Leafhoppers (Homoptera: Cicadellidae) Entmol. Gazette 16: 129-136.

McAtee, W. L. (1934). Genera and subgenera of Eupteryginae (Homoptera: Jassidae). Proc. Zool. Soc. Lond. 31: 93-117.

Melichar, L. (1903). Homopteren-Fauna von Ceylon. Verlag von Felix L. Damer. Berlin .

Motschulsky,V. I. (1893). Eassai d'un Catalogue des insects de l'ile Ceylon. Soc. Nat. Moscou Bull. 36: 1-153.

Nielson, M. W. (1968). The leafhopper vectors of phytopathogenic viruses (Homoptera, Cicadellidae). Taxonomy, Biology, and Virus Transmission. USDA Tech. Bull.: 1382-1386

Oman, P. W., Knight, W. J. and Nielson, M. W. (1990). Leafhoppers (Cicadellidae): A Bibiliography, Generic Check-list and Index to the World Literature 1956-1985. CAB Int., Lond.

Pruthi, H. S. (1940). Description of some new species of *Empoasca* Walsh (Eupterygidae, Jassidae) from North India. Indian J. Entomol. 2 (1): 1-10.

Sohi, A. S. and Dworakowska, I. (1983). A review of the Indian Typhlocybinae (Homoptera: Cicadellidae) from India. Oriental Insects. 17: 159-213

Sohi, A. S. and Mann, J. S. (1987). Illustrated key for identification of Indian species of Empoascini (Cicadellidae: Typhlocybinae). Proc. 6th. Auchen. Meeting. Turin, Italy, 7-11 Sept.: 213-230.

Wijeratne, P. M. (1999). Insects feeding on plants in Sri Lanka, Department of Agriculture, Ministry of Agriculture and Lands, Peradeniya, Sri Lanka.

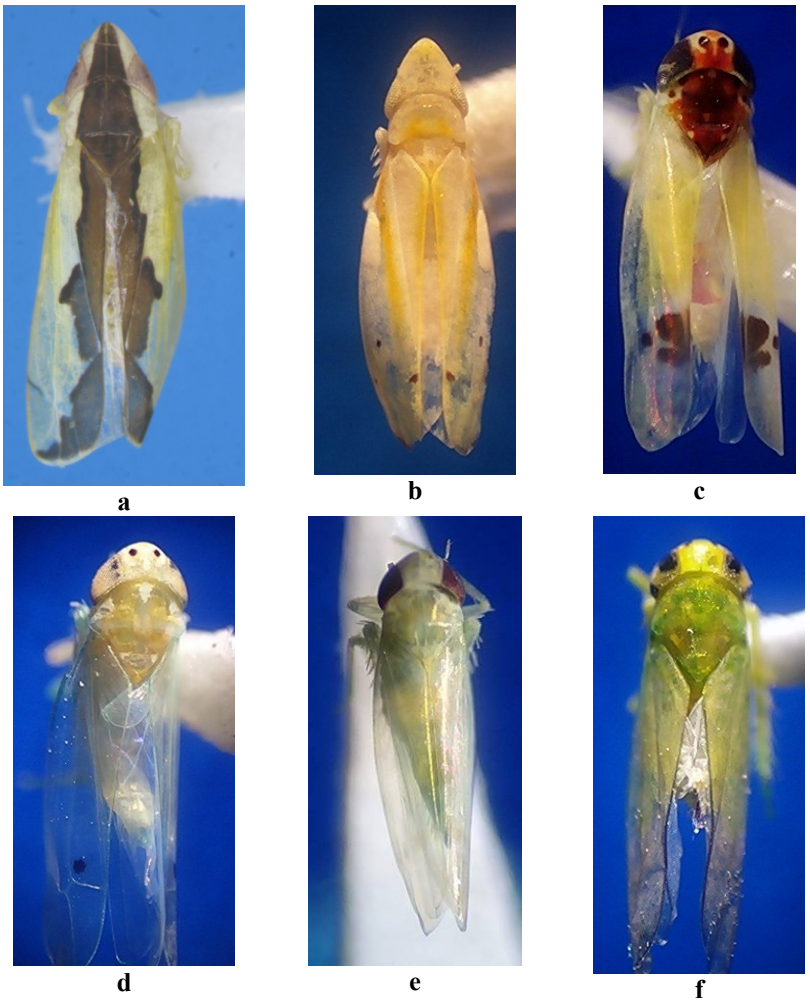

Plate 1. Typhlocybine leafhoppers associated with horticultural crops in Sri Lanka.

a. *Motschulskyia (Togaritettix) serratus (*Matsumura)

b. *Kamaza sadakorni* Dworakowska

c .*Amrasca splendens* Gauri

d. *Amrasca biguttula biguttula* (Ishida)

e. *Empoasca (E) triangularis* Dworakowska

f. *Empoasca* sp.