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SURVEY OF TAIWANESE LITERATURE ON THE NATURAL ENEMIES OF RICE LEAFHOPPERS AND PLANTHOPPERS"

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Abstract

Literature on the natural enemies of rice leaf- and planthoppers published in Taiwan are investigated, and a list of the natural enemies of the pest hoppers is compiled. Scientific names of the green rice leafhoppers are also mentioned.

1. Scientific names of the green rice leafhoppers occurring in Taiwan

When Ishihara (1964) published the revision of the genus *Nephotettix*, he recognized three species from Taiwan (also three same species from Japan) and identified them as N. ***cincticeps*** (Uhler), N. *impicticeps* Ishihara and *N. apicalis* (Motschulsky). Since then, these names have been appeared in Taiwanese literatures. Seven years later, Ghauri (1971) published a world review of the same genus based on the type material. Ghauri recognized 8 species and 1 subspecies from the world. He divided them into two groups, the African (2 species only) and the Asian, based on the genitalic characters. According to Ghauri, the three species of Taiwan named by Ishihara, which belong to the Asian group (sensu Ghauri), are recognized as follows :

1. **Nephotettix cincticeps** (Uhler, 1896)
   =N. ***cincticeps*** (Uhler) sensu Ishihara, 1964
2. **Nephotettix virescens** (Distant, 1908)
   =N. *impicticeps* Ishihara, 1964
3. **Nephotettix nigropictus** (Stål, 1870)
   = N. *apicalis* (Motschulsky) sensu Ishihara, 1964

Although Ghauri did not see any specimens of *virescens* and *nigropictus* from

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Taiwan, it is very likely that these two species also occur in Taiwan. Entomologists should refer to the papers of Ishihara and Ghauri carefully to identify these difficult species.

M. H. Chen and Sōgawa (1969) and Chen (1972) dealt with the distribution and relative adundance of the three species in Taiwan.

Reference

Chen, C. C. (1972) The distribution of *Nephotettix* leafhoppers in Taiwan. *Plant Prot. Bull., Taipei,* 14(1): *41-45.* (In Chinese with English summary)

Chen, M. H. and K. Sōgawa (1969) Three different species of green rice leafhoppers in Taiwan. Plant Prot. Bull., 11 (3) : 109-114. (In Chinese with English summary)

Ghauri, M. S. K. (1971) Revision of the genus *Nephotettix* Matsumura (Homoptera: Cicadelloidea: Euscelidae) based on the type material. *Bull. ent. Res., 60: 481-512.*

Ishihara, T. (1964) Revision of the genus *Nephotettix* (Hemiptera: Deltocephalidae). *Trans. Shikoku ent. Soc.,* 8(2) : 39-44, 1 pl.

2. Chronological list of literature

(1) 福田 計 (1934) トビイロウンカに関する調査研究. 台湾総督府中央研究所農業部彙報, (99): 1-19.

(1a) 林珪瑞 (1967) 稲葉蟬及飛蝨之寄生昆虫. 台湾省水稲主要害虫学術討論会資料集 (農林庁), 38 pp.

(1b) 何火樹・陳慶忠 (1968) 黒尾浮塵子類之生態研究 (Ⅰ). 植物保護学会会刊, 10(1): 15-36.

(2) 陳慶忠 (1968) 黒尾浮塵子類両種寄生性天敵之初歩調査報告. 台湾農業, 4(4): 140-144.

(3) 厳奉琰・蔡友徳 (1970) 寄生偽黒尾浮塵子的一種虫生菌之研究. 植物保護学会会刊, 12(1): 15-20.

(4) 朱耀沂・王清澄 (1972) 六点狼蛛之研究. Ⅰ. 外部形態与生活習性. 植物保護学会会刊, 14(4): 169-174.

(5) ——・—— (1973) 六点狼蛛食性之研究. 植物保護学会会刊, 15(1): 13-20.

(6) 厳奉琰 (1973) 台湾害虫之天敵. 台湾大学昆虫研究室編. 106 pp.

(7) 林珪瑞 (1974) 台湾偽黒尾葉蟬及褐飛蝨之寄生天敵. 農業研究, 23(2): 91-115.

(8) 邱瑞珍・朱耀沂・龍艷華 (1974) 裂頭小盤蛛 (*Oedothorax insecticeps* Boes. et Str., Micryphantidae) 之外部形態与生活習性. 植物保護学会会刊, 16(3-4): 153-161.

(9) 邱瑞珍・龍艷華 (1975) 稲飛蝨与葉蟬之捕食性天敵——黒盲椿与緑盲椿 (1975年度植物保護学会講演要旨). 植物保護学会会刊, 17(4): 452.

(10) 邱瑞珍 (1978) 水稲偽黒尾葉蟬与褐飛蝨之天敵. 水稲病虫害: 生態学与流行学, pp. 47-82. 農復会刊行, 331 pp.

3. A list of the natural enemies of rice hoppers recorded in Taiwan

A list of the natural enemies of rice hoppers recorded in Taiwan, based on literature listed above, are given below. It is very probable that no authentic systematic study has been made on any group of these natural enemies. For example, 4 species of *Oligosita* can be detected in literature as the egg parasites of *Nephotettixcincticeps*, but nobody knows the accurate systematic relationships of them as yet. The same is true of the mymarid wasps (6 spp.) or the pipunculid flies (11 spp.) recorded as parasitic on the same hopper species.

Table 1. Natural enemies of rice hoppers recorded in Taiwan.

Hopper species	Egg parasites	Nymphal and adult parasites	Predators
Nephotettix ***cincticeps***	INSECTA Mymaridae ***Anagrus*** *flaveolus*, ***(6)*** ***Anagrus*** sp., ***(7)*** ***(10)*** ***Anaphes*** sp., ***(2)*** ***Gonatocerus*** sp., ***(6)*** ***Gonatocerus*** sp., ***(7)*** ***(10)*** *Mymar ? indica*, ***(7)*** (10) Trichogrammatidae ***Oligosita shibuyae, (6)*** ***Oligosita nephotetticum, (6)*** ***Oligosita*** sp. A, ***(7)*** ***(10)*** ***Oligosita*** sp. B, ***(7)*** ***(10)*** ***Paracentrobia (= Japania) andoi, (6) (7) (10)***	INSECTA Pipunculidae *Dorylomorpha* ***lini, (10)*** ***Pipunculus javanensis, (7) (10)*** ***P.*** *mutillatus*, ***(7)*** ***(10)*** ***P. orientalis, (6) (7) (10)*** ***P.*** *roralis*, ***(6)*** ***(7)*** ***(10)*** ***Pipunculus*** sp., ***(6)*** *Tomosvaryella* ***epichalca, (7) (10)*** ***T.*** *oryzaetora*, ***(6)*** ***(7)*** ***(10)*** ***T. subvirescens, (6) (7) (10)*** ***T.*** *sylvatica*, ***(6)*** *Eudorylas* ***cruciator, (6)*** NEMATODA ***Amphimeris zuimushi, (6)*** ***Epigonatopus sakaii, (6)*** FUNGI ***Entomophthora*** sp., ***(3)*** ***(6)*** ***(10)*** ***Beauveria*** sp., ***(6)***	INSECTA Formicidae ***Iridomyrmex*** sp., ***(6)*** (10) Miridae ***Cyrtorhinus Zividipennis, (9) (10)*** ***Tytthus*** *mundulus*, ***(9)*** ***(10)*** Veliidae *Microvelia douglasi*, ***(6)*** ***(10)*** ARACHNIDA Lycosidae ***Lycosa pseudoannulata, (10)*** Erigonidae (Micryphantidae) **Notioscopus pallidulus*, ***(6)*** ***(10)*** ***Oedothorax*** *insecticeps*, (10)
Nephotettix nigropictus	INSECTA Trichogrammatidae ***Paracentrobia (= Japania) andoi, (6)*** FUNGI ***Beauveria*** sp., ***(6)***	INSECTA Pipunculidae ***Pipunculus*** sp., ***(6)*** NEMATODA ***Epigonatopus sakaii, (6)*** ***Amphimeris zuimushi, (6)*** FUNGI ***Entomophthora*** sp., ***(6)***	INSECTA Formicidae *Iridomyrmex* sp., ***(6)*** Veliidae ***Microvelia douglasi, (6)*** ARACHNIDA Erigonidae (Micryphantidae) **Notioscopus* ***pallidulus, (6)***

Nepkotettix virescens

INSECTA
Trichogrammatidae
Paracentrobia (= *Japania*) *andoi, (6)*

INSECTA
Pipunculidae
Pipunculus sp., (6)
NEMATODA
Epigonatopus sakaii, (6)
*Ampkimeris **zuimushi**, (6)*
FUNGI
Entomopktkora sp., (6)
Beauveria sp., (6)

INSECTA
Formicidae
Iridomyrmex sp., (6)
Veliidae
Microvelia douglasi, (6)
ARACHNIDA
Erigonidae (Micryphantidae)
**Notioscopus pallidulus, (6)*

Inazuma dorsalis

INSECTA
Veliidae
Microvelia douglasi, (6)

*Nilaparvata **lugens***

INSECTA
Trichogrammatidae
Aphelinoidea sp., (1) (6) (10)
Oligosita skibuyae, (6)
Oligosita nepkotetticum, (6)
Oligosita sp., (6)
Oligosita sp. A, (7) (10)
Oligosita sp. B, (7) (10)
Paracentrobia (= *Japania*) *andoi*, (6) *(7) (10)*
Trickogramma sp., (1) (10)
Mymaridae
*Anagrus **flaveolus***, (6)
Anagrus sp., (7) (10)
Anapkes sp., (1)
Gonatocerus sp., (6)
Gonatocerus sp., (7) (10)
***Mymar indica**, (6) (7) (10)*

INSECTA
Dryinidae
Ecktkrodelpkax bicolor, (10)
Monogonatopus sp., (10)
*Pseudogonatopus **flavifemus**, (1) (10)*
Pseudogonatopus sp., *(10)*
Pipunculidae
***Pipunculus** javanensis,* (10)
*Tomosvaryella **oryzaetora**,* (10)
*T. **ephichalca**, (10)*
***T.** subvirescens,* (10)

INSECTA
Formicidae
Tetramorium guineense, (1) (10)
Carabidae
*Acupalpus **inornatus**, (10)*
*Bembidion **semilunium**,* (10)
Staphylinidae
*Paederus **fuscipes**, (10)*
*Stenue **cicindelloides**,* (10)
Miridae
***Cyrtorhinus** lividipennis,* (1) (10)
*Tyttkus **mundulus**, (9)* (10)
ARACHNIDA
Argiopidae
Araneus inustus, (10)
Lycosidae
Lycosa pseudoannulata, (4) (5) (10)
Erigonidae (Micryphantidae)
Oedotkorax insecticeps, (8) (10)

	Theridiidae
	Theridion octomaculatum, (10)
	Tetragnathidae
	Tetragnatha ***japonica, (10)***
	T. *mandibulata,* ***(10)***
	T. ***nititens, (10)***
	INSECTA
Sogatella *furcif* ***era***	Carabidae
	Ophonus sinicus, (6)
	Staphylinidae
	Paederus *fuscipes*, ***(6)***
	Veliidae
	Microvelia ***douglasi, (6)***

* According to Okuma (personal communication), this species cannot be fonud in any systematic literature. It is said to be named by Kishida.

Note : Papers written by 林珪瑞 (1967) and 何火樹•陳慶忠 (1968) are not referred to in the above list.