

Rice Stemborers in Indonesia

By ISOKO HATTORI* and SRI SUHARNI SIWI**

* Department of Environmental Biology, National Institute of Agro-Environmental Sciences
(Yatabe, Ibaraki, 305 Japan)

** Plant Pests and Diseases Division, Central Research Institute for Food Crops
(Jl. Merdeka 99, Bogor, Indonesia)

Introduction

Lepidopterous stemborers are one of the most important groups of rice pests in the tropic Asia including Indonesia. Collection and identification of rice stemborers were carried out during the period of 5 months (March-May, 1977 and April-May, 1978). The specimens were collected from various places in Java, South Sumatera (Lampung), Bali, South Sulawesi and South Kalimantan. These specimens were used for identification and to know the major species and their distribution. The preserved and identified specimens, more than 10,000 individuals are kept in Plant Pests and Diseases Division, Central Research Institute for Food Crops, Bogor, Indonesia, and the duplicate specimens in Department of Environmental Biology, National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

Distribution of rice stemborers in Indonesia

Fig. 1 shows the distribution of rice stemborers in Indonesia based on the results of our study. Major features in the distribution are as follows:

1) Java: As regards the specimens collected, *Scirpophaga incertulas* and *Sesamia inferens* were most abundant and widely distributed followed by *Chilo suppressalis*. *Chilo suppressalis* was more abundant in the mountainous region or upland plain (800-1,000 m from the sea level) rather than in the lowland.

Population density of *Chilo polychrysus* in Java seems to be much lower than *Scirpophaga incertulas*, *Chilo suppressalis* and *Sesamia inferens*. *Chilo auricilius* was well known as a sugarcane pest in Southeast Asia and also reported as feeding on rice. In Indonesia, it was found for the first time by the

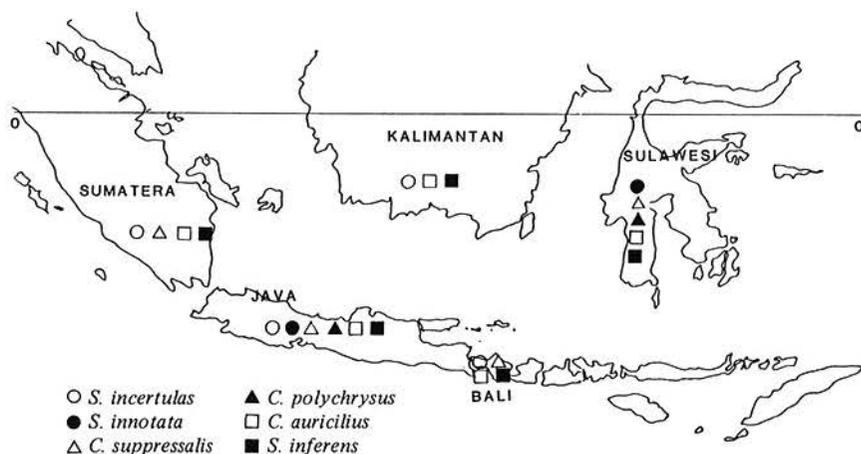
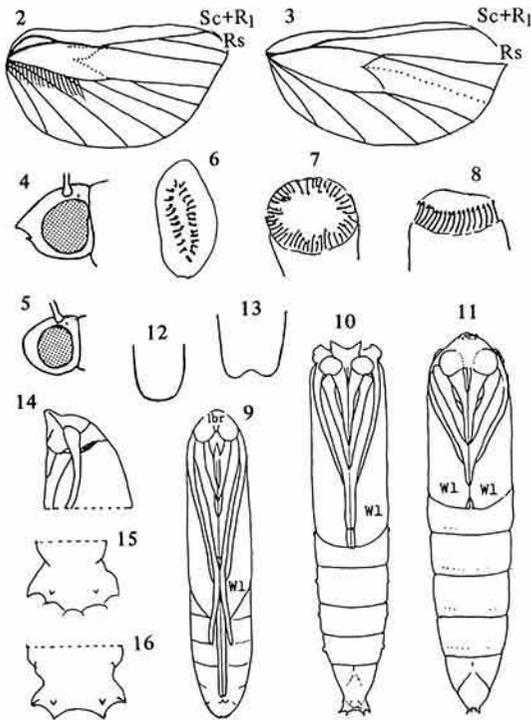


Fig. 1. Distribution of the rice stemborers in Indonesia, based on the data obtained in March-May, 1977 and April-May, 1978



- Fig. 2. *Chilo suppressalis*, adult, hind wing
 Fig. 3. *Sesamia inferens*, adult, hind wing
 Fig. 4. *Chilo suppressalis*, adult, head, lateral view
 Fig. 5. *Chilo auricilius*, adult, head, lateral view
 Fig. 6. *Scirpophaga incertulas*, larva, crochets of proleg
 Fig. 7. *Chilo suppressalis*, larva, crochets of proleg
 Fig. 8. *Sesamia inferens*, larva, crochets of proleg
 Fig. 9. *Scirpophaga incertulas*, pupa, ventral view
 Fig. 10. *Chilo polychrysus*, pupa, ventral view
 Fig. 11. *Sesamia inferens*, pupa, ventral view
 Fig. 12. *Scirpophaga innotata*, pupa, labrum
 Fig. 13. *Scirpophaga incertulas*, pupa, labrum
 Fig. 14. *Chilo suppressalis*, pupa, head, lateral view
 Fig. 15. *Chilo suppressalis*, pupa, cremaster, dorsal view
 Fig. 16. *Chilo polychrysus*, pupa, cremaster, dorsal view

present study that this species attacks rice.

In the rainy season, 1977 and '78, *Scirpophaga innotata* showed high population in Indramayu (W. Java) and Gresik (E. Java).

2) South Sumatera (Lampung), *Scirpophaga incertulas* was found most abundant followed by *Sesamia inferens* and *Chilo suppressalis*. Only a few larvae of *Chilo auricilius* and *Chilo polychrysus* were

found in some places.

3) Bali: The distribution of the rice stemborers indicated that *Scirpophaga incertulas* and *Sesamia inferens* were the major species and *Chilo suppressalis* was found in small number.

4) South Sulawesi: *Scirpophaga innotata* showed fairly high population, on the other hand *S. incertulas* was not found. *Chilo suppressalis* was major species at some places and *C. auricilius* found on upland rice.

5) South Kalimantan: *S. incertulas* was also found widely distributed and seemed to be the major species attacking lowland rice. Population of *Chilo auricilius* on upland rice was rather high in some places. *S. inferens* was found in small number.

No larvae of *C. polychrysus* and *C. suppressalis* were found in the rice field probably due to a very low population density of both species in South Kalimantan.

Morphological characteristics for the identification of rice stem-borers

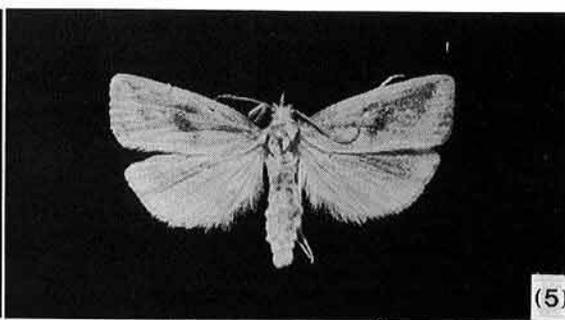
The 6 species, *Scirpophaga incertulas* (Walker) (Plate 1 (1), (2)), *Scirpophaga innotata* (Walker) (plate 1 (3)), *Chilo suppressalis* (Walker) (Plate 1 (4)), *Chilo polychrysus* (Meyrick) (Plate 1 (5)), *Chilo auricilius* Dudgeon (Plate 1 (6)), and *Sesamia inferens* (Walker) (Plate 1 (7)), were recognized as the pests attacking rice plants in paddy fields.

Externally *Chilo auricilius* is very close to *Chilo polychrysus* in the larval and pupal stages. Some characteristics are different between these 2 species but the differences are very small and variable (** in Tables 2 and 3). But, the adult moth of *C. auricilius* is separable from *C. polychrysus* by genitalia. Judging by larval and pupal characters, *Scirpophaga innotata* is very similar to *S. incertulas* (* in Tables 2 and 3).

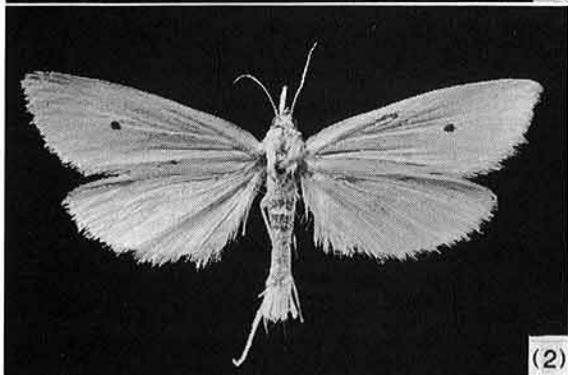
The tabular keys for adult, larva and pupa are shown in Tables 1, 2, and 3.



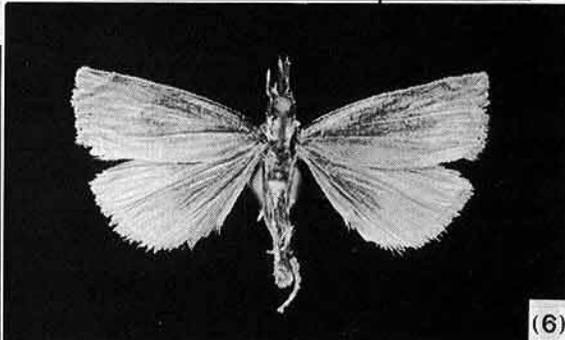
(1)



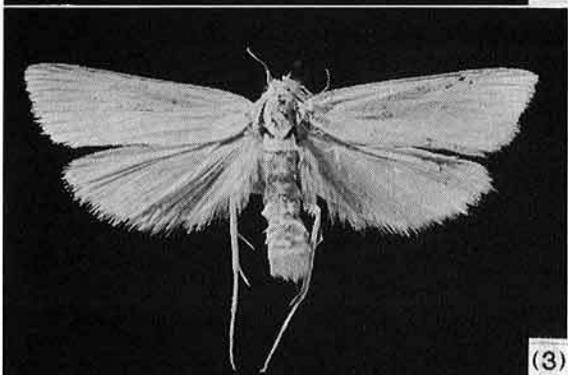
(5)



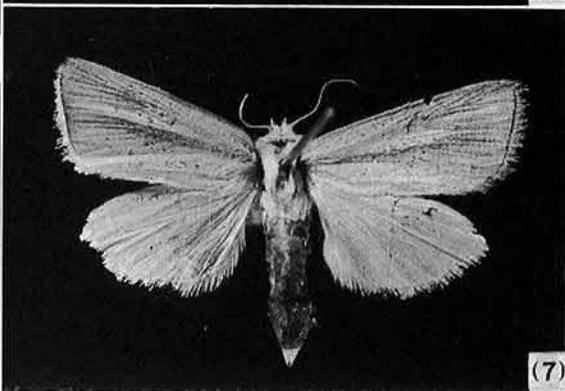
(2)



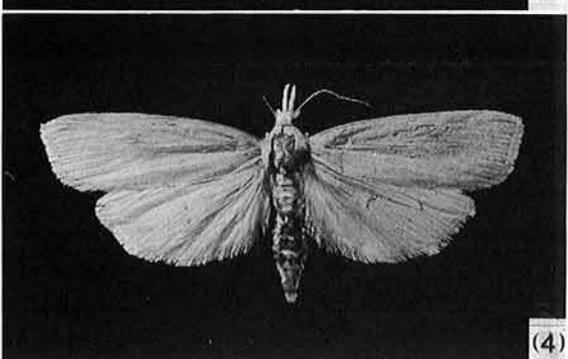
(6)



(3)



(7)



(4)

Plate 1.

- (1) *Scirpophaga incertulas* (Walker) ♂
 (2) *Scirpophaga incertulas* (Walker) ♀
 (3) *Scirpophaga innotata* (Walker) ♀
 (4) *Chilo suppressalis* (Walker) ♀
 (5) *Chilo polychrysus* (Meyrick) ♂
 (6) *Chilo auricilius* Dudgeon ♀
 (7) *Sesamia inferens* (Walker) ♀

Table 1. Field key for the adult moth

Species	Length of fore wing	Fore wing	Hind wing		Frons
<i>Scirpophaga incertulas</i> (Pyralidae) (Plate 1 (1) (2))	♂: 8-9 mm ♀: 11-13 mm	♂: Ochreous brown, with a dark oblique streak and a black spot ♀: Orange yellow, with a black spot	Vein Sc + R ₁ and Rs closely approximate or fuse, beyond end of cell (Fig. 2)	♂: Ochreous white ♀: Yellowish white	Not produced
<i>Scirpophaga innotata</i> (Pyralidae) (Plate 1 (3))	♂: 7-9 mm ♀: 11-13 mm	♂: Dull ochreous white ♀: Dull white		Dull white	
<i>Chilo suppressalis</i> (Pyralidae) (Plate 1 (4))	♂: 11-13 mm ♀: 13-15 mm	Varying from dirty yellow to yellowish brown, sometimes sprinkled with grey brown scales; terminal series of black spots rather distinct; without silvery scales	Vein Sc + R ₁ and Rs closely approximate or fuse, beyond end of cell with pecten of hairs on lower margin of cell (Fig. 2)	♂: Ochreous white ♀: White	Projecting forward and conical with a point (Fig. 4)
<i>Chilo polychrysus</i> (Pyralidae) (Plate 1 (5))	♂: 7-9 mm ♀: 10-11 mm	Yellow, suffused with ochreous brown and orange; silvery scales distinct; terminal black spots indefinite		White to dirty cream	Produced but without a corneous point (Fig. 5)
<i>Chilo auricilius</i> (Pyralidae) (Plate 1 (6))	♂: 7-9 mm ♀: 10-12 mm	Dirty yellow variability irolated with brown; with silvery scales; terminal series of black spots distinct		Dirty cream to pale yellow brown	
<i>Sesamia inferens</i> (Noctuidae) (Plate 1 (7))	12-16 mm	Testaceous grey with dark brown suffusion along median nerve and veins Cu ₁ -M ₁	Vein Sc + R ₁ shortly fused with vein Rs before middle of cell (Fig. 3)	White	Not produced; scales rather rough

Table 2. Field key for the larva

Species	Head	Body	Prothoracic shield	Crochets of proleg	Host plants
<i>Scirpophaga incertulas</i>	Yellowish brown (*)	Creamy yellow 20-25 mm (*) 1st inster: dull olive grey; 1st abdominal segment white	Yellowish brown (*)	Biordinal, sometimes almost uniordinal; arranged in an ellipse (Fig. 6)	Rice plant (lowland & upland)
<i>Scirpophaga innotata</i>		Creamy yellow 20-25 mm (*)	Yellowish brown, anterior margin tinged with dark color (*)		Rice plant (lowland)

(Continued Table 2)

<i>Chilo suppressalis</i>	Ochreous brown	Ochre, with 7 longitudinal stripes, but subspiracular stripe discontinuous 22-28 mm	Ochreous brown	Almost triordinal, arranged in a circle (Fig. 7)	Rice plant (lowland & upland)
<i>Chilo polychrysus</i>	Black to blackish brown (**)	Dull white tinged with pink grey, with 5 longitudinal stripes 17-22 mm (**)	Black to blackish brown (**)		Rice plant (lowland)
<i>Chilo auricilius</i>					Rice plant (usually upland), sugarcane
<i>Sesamia inferens</i>	Reddish brown	Milky white, tinged with pink or purple 30-35 mm	Brown	Uniordinal, arranged in a longitudinal band (Fig. 8)	Rice plant (lowland & upland), maize, sugarcane, wheat, etc.

Table 3. Field key for the pupa

Species	Body	Head	Abdominal segments	Cremaster	
<i>Scirpophaga incertulas</i>		♂: length 12-15 mm width 2-2.5 mm	Smooth	Without cremaster; rounded (Fig. 9)	
<i>Scirpophaga innotata</i>		♀: length 15-18 mm width 2.5-3 mm			
<i>Chilo suppressalis</i>	Fore wing (W1) separated by legs (Figs. 9, 10)	Yellowish brown length 13-21 mm width 2.5-3 mm	5th to 7th segments somewhat granulated on dorsocephalic part	With flat and short cremaster which has 4-5 incisions; with 2 and 2 minute setae and 2 small dorsal prominences (Fig. 15)	
<i>Chilo polychrysus</i>		Yellowish brown length 10-15 mm width 2-2.3 mm	5th to 7th segments with spines forming a transverse row on dorsocephalic part	With 4 acute and flat dorsal projections and 2 ventral projections; with a pair small dorsal prominences (Fig. 16)	
<i>Chilo auricilius</i>		Yellowish brown length 10-13 mm width 2-2.3 mm	Frons not producing ventrally; with 2 projections; prothoracic spiracles protruded conspicuously (Fig. 10) (**)		With 6 acute, short dorsal projections; without setae and dorsal minute prominences
<i>Sesamia inferens</i>	Fore wing (W1) in contact with for short distance each other (Fig. 11)	Reddish brown, with white bloom length 16-22 mm width 3-3.5 mm	Vertex with fine sculptures and produced forward	1st to 8th segments with numerous pits excepting caudal margin	With 4 acute, short projections

References

- 1) Bleszynski, S.: Crambinae. *In*: Microlepidoptera Palaearctica, I. XLVII 553 with Tafelband (1965).
- 2) Bleszynski, S.: A revision of the world species of *Chilo zincken* (Lepidoptera : Pyralidae), *Bull. British Mus. Nat. Hist. (Ent.)*, **25**, 101-195 (1970).
- 3) Common, I.F.B.: A revision of the Australian stem-borers hitherto referred to *Schoenobius* and *Scirpophaga* (Lepidoptera : Pyralidae, Schoenobiinae), *Aust. J. Zool.*, **8**, 307-347 (1960).
- 4) Dammerman, K.W.: The agricultural zoology of the Malay Archipelago, Amsterdam-J.H. de Bussy Ltd, 1929, p-65 (1929).
- 5) Gupta, B.D.: Identification of the striped moth borers of sugarcane in India, *Ind. Inst. Sugarcane Res. Tech. Bull.*, No. 1, 1-10 (1960).
- 6) Hattori, I.: Stem-borers of gramineous crops in South-east Asia, Proc. Symposium Rice Insect, TARC., 1971, 145-153 (1972).
- 7) Kalshoven, L.G.E.: De plagen van de cultuurgewassen in Indonesia. I. 406-429 (1950).
- 8) Lewvanich, A.: A revision of the old world species of *Scirpophaga* (Lepidoptera : Pyralidae). *Bull. British Mus. Nat. Hist. (Ent.)*, **42**, 185-298 (1981).
- 9) Nishida, T. & Torii, T.: A hand book of field methods for research on rice stem-borers and their natural enemies, International Biological Programme, No. 14, 1970, 56-59 (1970).
- 10) Rao, V.P. & Nagaraja, H.: A comparative study of the four species of paddy stem-borers belonging to the genera *Chilo* and *Chilo* in Asia (Lepidoptera : Pyralidae : Crambinae), *Proc. Indian Acad. Sci.*, **63**, 175-217 (1966).
- 11) Rothschild, G.H.L.: Descriptions of larval and pupal stages of four Lepidopterous rice borers in Malaysian Borneo (Sarawak), *Bull. Ent. Res.*, **57**, 343-352 (1967).
- 12) Soehardjan, M., Leewangh, J. & Houten, A.T.: Notes on the occurrence of rice stem-borer, gallmidge, Leafhoppers and planthoppers in Java during the 1970 dry season, Contr. No. 6, CRIA, Bogor, 22pp. (1973).

(Received for publication, october 18, 1985)