

Hymenopterous Parasitoids of the Rice Gall Midge, *Orseolia oryzae* (Wood-Mason) in the Early Maha Season in Sri Lanka

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Abstract

Hymenopterous parasitoid species and their parasitism were investigated on ratoon rice plants in paddy fields in the period of early to middle October 1990, immediately before the Maha rainy season in Sri Lanka. The following five species were observed in the galls of the rice gall midge, *Orseolia oryzae* (Wood-Mason) on secondary tillers from rice stubbles; *Eurytoma* sp. (Eurytomidae), *Neanastatus cinctiventris* Girault (Eupelmidae), *Obtusiclava oryzae* Subba Rao (Pteromalidae), *Platygaster oryzae* (Cameron) (Platygastriidae), and *P. foersteri* (Gahan). The species, *Eurytoma* sp. may possibly be the first record in Sri Lanka, although one specimen of a pupa of *Eurytoma* sp. was collected at Gampaha District in 1989. *P. oryzae* and *N. Cinctiventris* were most abundant among these species. The highest percentage parasitism of *P. oryzae*, i.e. 68.2%, was recorded as a sampling site in Mawatura, Nuwara Eliya District. The highest incidence of *N. Cinctiventris* took place at sampling sites in Mawanella and Hingula in Kegalla District and percentage parasitism by this parasitoid of the host pupae was 52.1% in this District. From these results, it is concluded that these parasitoids pass through the season, even though rice plants are not cultivated, mainly in the galls on secondary tillers which sprout from rice stubbles.

Discipline: Insect pest

Additional key words: *Eurytoma* sp., *Neanastatus cinctiventris*, *Obtusiclava oryzae*, *Platygaster foersteri*, *Platygaster oryzae*

Introduction

In Sri Lanka, rice is cultivated during the following two monsoon periods: the Maha season from September to February and the Yala season from March to August. In Kandy District, for example, rice varieties that mature in 3.0-3.5 months are sown or transplanted in March and harvested in the period June to July in the Yala season. They are further transplanted in October and harvested in the period

January to February in the Maha season. In between these two rice seasons, i.e. from July to October, a majority of the paddy fields contain rice ratoon-tillers sprouting from stubbles.

In the Yala season in 1989, the first survey on natural enemies in paddy fields was undertaken in five districts in the wet zone and in a district in the intermediate zone³⁾. During the second survey, investigations were made with special emphasis placed on Hymenopterous parasitoids in the galls on rice ratoons with an objective of identifying how and

where the parasitoids pass through the period intervening between the two rice cropping seasons.

This paper presents some results of the survey which was conducted in October 1990, immediately before the Maha rainy season to identify the Hymenopterous parasitoids on rice ratoons in Sri Lanka.

Materials and methods

Galls of the rice gall midge, *Orseolia oryzae* were collected at twelve sites randomly sampled in the following seven districts: Gampaha, Kalutara, Kandy, Kegalla, Matale, Nuwara Eliya and Galle in the wet zone, from 4 to 16 October 1990 (Table 1). At the two sites in Gampaha and Galle Districts, galls

were collected from rice plants in the vegetative growth stage since galls could not be found on rice ratoons of young stage at that time in these districts. The galls collected during the survey were split lengthwise with a sharply pointed forceps and carefully examined under a binocular microscope regarding the parasitoid pupae and their larvae parasitizing the rice gall midge pupae. Both of the parasitoid larvae present on the host pupae and the parasitoid pupae were carefully isolated in glass vials (15 × 40 mm) to be reared until their adult stage.

The parasitism rates by *Platygaster oryzae* and *P. foersteri* of the rice gall midge were expressed by the ratios of galls containing mummies to the total number of galls sampled, as shown in Kobayashi et al. (1990)³.

Results and discussion

All the five species of Hymenopterous parasitoids were found in galls on the secondary tillers from rice stubbles in the early Maha season. The species identified were as follows: *Platygaster oryzae* (Cameron), *P. foersteri* (Gahan) (Platygastridae), *Obtusiclava oryzae* Subba Rao (Pteromalidae), *Neanastatus cinctiventris* Girault (Eupelmidae), and *Eurytoma* sp. (Eurytomidae) (Table 2). Five species of the same parasitoids were also found in the paddy fields in the Yala season, 1989.

Two hundred and thirty mummies containing *P. oryzae* pupae were obtained from 1,256 galls collected at the twelve sampling sites in seven districts. The proportion of galls containing mummies

Table 1. Locations where galls of rice gall midge were collected

District	Location Village/town	Sampling date (October, 1990)
Gampaha	Kelaniya	8
Kalutara	Kahatapitiya	10
	Bombuwela	10, 11
Kandy	Tambeligala	5
	Kaduganawa	16
Kegalla	Mawanella	16
	Hingula (2 sites)	16
	Kurudupana	16
	Puwakdeniya	16
Matale	Yatavara	4
Nuwara Eliya	Mawatura	15
Galle	Bentota	11

Table 2. Hymenopterous parasitoids of rice gall midge, *Orseolia oryzae* observed in the early Maha season 1990 in Sri Lanka

Parasitoids	Distribution (District) ^{a)}							No. of samples collected ^{b)}			
	Ga	Kl	Ka	Ke	Ma	Nu	Gl	L	P	A	M
<i>Platygaster oryzae</i> (Cameron)	+	+	+	+	+	+	+	0	0	0	230
<i>Platygaster foersteri</i> (Gahan)	+					+		0	0	0	2
<i>Neanastatus cinctiventris</i> G.		+	+	+		+	+	45	22	6	-
<i>Obtusiclava oryzae</i> S. Rao		+	+			+	+	2	3	0	-
<i>Eurytoma</i> sp. (A)		+						0	1	0	-
(B)				+				0	1	0	-
(A or B)							+	0	1	0	-
Chalcidoidea sp.		+		+				1	2	0	-

a): Ga; Gampaha, Kl; Kalutara, Ka; Kandy, Ke; Kegalla, Ma; Matale, Nu; Nuwara Eliya, Gl; Galle.
b): L: Larva, P: Pupa, A: Adult, M: Mummy.

Table 3. Proportion of galls containing mummies formed by the parasitoids, *P. oryzae* and *P. foersteri* collected on rice ratoons in the early Maha season 1990 in Sri Lanka

District	No. of sampling sites	No. of galls observed	Percentage of galls containing mummies formed by					
			<i>P. oryzae</i>			<i>P. foersteri</i>		
			Max.	Min.	Mean	Max.	Min.	Mean
Kalutara	2	238	5.2	3.9	4.6	0	0	0
Kandy	2	206	38.6	9.1	23.9	0	0	0
Kegalla	4	377	19.0	4.2	10.9	0	0	0
Matale	1	61	26.2	26.2	26.2	0	0	0
Nuwara Eliya	1	110	68.2	68.2	68.2	0.9	0.9	0.9

formed by the parasitoid was 18.3%, which was not significantly different from the rate of 13.5% in the paddy fields in the Yala season, 1989. Mean parasitism on rice ratoons, i.e. 16.4% in four districts except in Nuwara Eliya, was also of almost the same level as 19.3%, which was the average rate in the four districts in the Yala season. The highest incidence of 68.2% was recorded at the sampling site in Mawatura, Nuwara Eliya District, while the highest rate in the Kandy District in the Yala season 1989 was 56% (Table 3).

Only two mummies formed by *P. foersteri* were collected: one was from rice plants in the vegetative growth stage at the site in Kiribathgoda, Kelaniya, Gampaha District; and the other was from the secondary tillers (variety: BG 90-1) in Mawatura, Nuwara Eliya District, although the mummies were only observed at the four sampling sites in Kandy and Matale Districts, 1989.

In the survey in the early Maha season, five samples of larvae or pupae of *Obtusiclava oryzae* were collected at four districts: namely, one larva at Mawatura in Nuwara Eliya District; one pupa each at Kaduganawa in Kandy District and Bombuwela in Kalutara District; and one larva and one pupa each at Bentota in Galle District, although only one pupa had been obtained in six districts in the Yala season, 1989 (Tables 2 & 5).

Among those samples, only one larva was recognized to parasitize a mummy containing *P. oryzae* pupae as the secondary parasitoid collected in Nuwara Eliya District. In that area only one healthy host pupa was observed, whereas 74 mummies formed by *P. oryzae* were found in 110 galls. Consequently, *O. oryzae* could not deposit its eggs due to the lack of healthy host pupae. Such a kind of facultative parasitization was observed in Thailand²⁾.

Table 4. Parasitism by *N. cinctiventris* of the rice gall midge pupae on rice ratoons in the early Maha season 1990 in Sri Lanka

District	No. of sampling sites	No. of galls dissected	No. of host pupae observed ^{a)}	Percentage of <i>N. cinctiventris</i>
Kalutara	2	238	68	26.5
Kandy	2	206	22	4.5
Kegalla	4	377	96	52.1
Matale	1	61	8	0

a): Numbers of pupae which died by parasitization of ectoparasitoids are also included.

Neanastatus cinctiventris were observed at the sampling sites in the five districts under survey. Forty-five larvae were found to parasitize the rice gall midge pupae, and 22 pupae and 6 adults were also found in the galls. The highest incidence took place at the sampling sites in Mawanela and Hingula in Kegalla District; that is, 27 samples were collected from 117 galls and the parasitism ratio by this parasitoid of the host pupae was 52.1% in this district (Table 4). The highest rate was also recorded in this district in the Yala season, 1989.

Three pupae of *Eurytoma* sp. were also collected, and two adults successfully emerged from the pupae. They are tentatively called *Eurytoma* sp. (A) and (B). One of the pupae died in the glass vial, which was collected at Galle District on 11 October 1990.

Eurytoma sp. (A): One pupa was found in a gall collected from the secondary tillers at the Bombuwela Regional Agricultural Research Center in Kalutara District on 11 October and a female adult (2.6 mm in length) emerged from the pupa in the glass vial on 13 October.

Eurytoma sp. (B): One pupa was found in a gall

Table 5. Parasitism by *Obtusiclava oryzae* and *Eurytoma* sp. (A) and (B) of rice gall midge pupae in the early Maha season 1990 in Sri Lanka

District	Field condition ^{a)}	No. of galls dissected	No. of individuals of <i>O. oryzae</i>			No. of parasitoids, <i>Eurytoma</i> sp. pupa		
			Larva	Pupa	Total	(A)	(B)	(A or B)
Gampaha	V	172	0	0	0	0	0	0
Kalutara	R	238	0	1	1	1	0	0
Kandy	R	206	0	1	1	0	0	0
Kegalla	R	377	0	0	0	0	1	0
Matale	R	61	0	0	0	0	0	0
Nuwara Eliya	R	110	1	0	1	0	0	0
Galle	V	92	1	1	2	0	0	1

a): R; Ratoon crop, V; Rice plants in vegetative growth stage.

collected from the secondary tillers (variety: BG 94-1) at Mawanella and Hingula in Kegalla District on 16 October and a male adult (1.7 mm in length) emerged on 20 October (Tables 2 & 5).

These two *Eurytoma* specimens need to be more specifically identified. It is recognized that both of them are different morphologically in their antennae and hind legs from *Eurytoma setitibia* Gahan, which is distributed in Indonesia¹⁾ as a parasitoid of the rice gall midge. *Eurytoma* sp. (A) and (B) are possibly the first record in Sri Lanka, although one specimen of a pupa of *Eurytoma* sp. was collected at Gampaha District in 1989.

In addition to the above species, one larva and two pupae of Chalcidoid species were collected at Bombuwela in Kalutara District and Puwakdeniya in Kegalla District. Unfortunately, however, they could not be reared until the adult stage for identification (Table 2).

From the results obtained from the above surveys, it may be concluded that these parasitoids can survive during the off-season of rice cultivation mainly in the galls on secondary tillers which sprout from rice stubbles. *P. oryzae* and *P. foersteri* pass through the off-season in the form of pupae in the mummies of the rice gall midge, while other species survive in the form of larvae or pupae. It is presumed that *P. oryzae* and *N. cinctiventris* may probably be

the dominant species in paddy fields in the following monsoon period, i.e. the Maha season, because these species were observed in plenty in the galls from secondary tillers in a wide range of districts.

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