

## TARC Report

# Occurrence of the Rice Gall Midge, *Orseolia oryzae* (Wood-Mason) in Wild Rice in Thailand

By TERUNOBU HIDAKA,\* VANICH YAKLAI\*\* and SAWANG KADKAO\*\*\*

\* First Research Division, Tropical Agriculture Research Center  
(Yatabe, Ibaraki, 305 Japan)

\*\* Entomology and Zoology Division, Department of Agriculture  
(Bangkhen, Bangkok, 10,900 Thailand)

\*\*\* Phan Rice Experiment Station  
(Chiengrai, Thailand)

### Introduction

The rice gall midge, *Orseolia oryzae* (Wood-Mason) belonging to the Family Cecidomyiidae (Diptera), is one of the most important insect pests of rice in tropical Asia. Although bionomics of the rice gall midge has been investigated in Thailand since 1968<sup>1)</sup>, there still remain many problems to be solved for control of the rice gall midge. In Thailand, more than 80% of the total area of paddy fields remain uncultivated in the dry season. In these areas, rice insect pests are known to attack wild host plants.

Although several kinds of wild host plants of the rice gall midge were recorded in tropical Asia, wild rice, *Oryza rufipogon*, is considered to be the most important host plant as the source of the insect occurrence in the dry season. As to the bionomics of the rice gall midge in the dry season, only fragmental information is available in tropical Asia. Investigation on insect occurrence and larval development in the wild rice is very important to establish a fundamental forecasting method of the insect occurrence in the wet season. In the present paper, studies on larval development and seasonal occurrence of the rice gall midge in the wild rice in Thailand are reported.

### Materials and methods

Wild rice, *Oryza rufipogon*, was collected at random in Phan Rice Experiment Station, and farmers' fields in Pasang and Ban Chong, Chiengrai Province of the northern part of Thailand for checking seasonal fluctuation and larval development. More than 100 tillers of the wild rice were collected in each locality once a month since 1979 and brought back to the Rice Insect Laboratory, Phan Rice Experiment Station. The growing points of the wild rice were dissected under the binocular microscope for identification of larval instar and natural enemies. Specimens collected were kept in 70% alcohol. Galls visible from outside were also dissected to check adult emergence, pupa, and developmental stages of the insect and its parasites.<sup>3)</sup>

### Results

Occurrence of the rice gall midge in the wild rice was observed throughout the year.

#### 1) Relationship between gall and larval occurrence

As given in Fig. 1, the number of galls which occurred was much more abundant in the wet season (June to September) than in the dry season, while the number of larvae

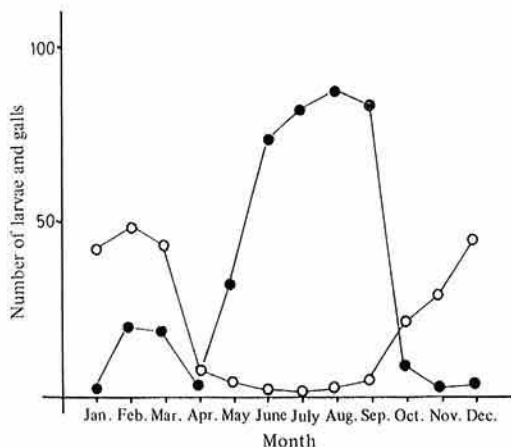


Fig. 1. Relationship between the number of rice gall midge larvae and that of galls in wild rice at Ban Chong in northern Thailand  
Solid circle: galls, Open circle: larvae

detected was comparatively more abundant in the dry season (October to March) than in the wet season.

### 2) Fluctuation of larval population in the wild rice

As shown in Fig. 2, a peak in the number of larvae was seen from December to February in three localities i.e. Phan, Pasang and Ban Chong. In this period, the minimum air temperature was between 7.8 to 14.0°C in northern Thailand. Number of larvae began to increase from October which corresponds to the harvesting season of rice, and it began to decrease from March. Thus, the larval population was much higher in the middle of the dry season than in the wet season.

### 3) Fluctuation of larval instar

As shown in Fig. 3, the number of the 1st instar larvae was found much greater in November to January than in the other months. A peak of the 1st instar larva population was recognized in November. The population of the 2nd instar larvae was lower than that of the 1st instar larvae and slightly higher than that of the 3rd instar larvae. The population of the 2nd or 3rd instar larvae showed two peaks, one in October and the other in

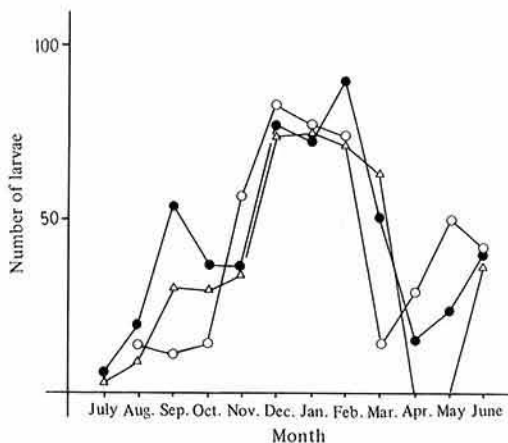


Fig. 2. Seasonal fluctuation of larval population of the rice gall midge in wild rice in northern Thailand  
Open circle: at Pasang, Solid circle: at Ban Chong, Triangle: at Phan Rice Experiment Station

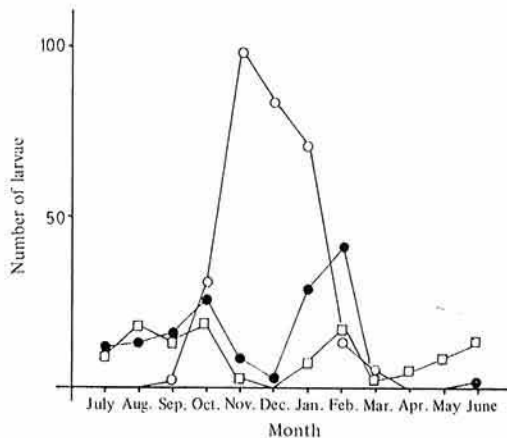


Fig. 3. Seasonal fluctuation in the number of 1st, 2nd, and 3rd instar larvae of the rice gall midge in wild rice at Ban Pasang, in northern Thailand  
Open circle: 1st instar, Solid circle: 2nd instar, Square: 3rd instar

February.

## Discussion

In Thailand, a total of 4 kinds of wild host plants of the rice gall midge were found.<sup>1)</sup> Of them, the wild rice, *Oryza rufipogon*, was found to be the most important host plant, followed by *Leersia hexandra* (Gramineae).<sup>2)</sup> The wild rice is distributed throughout the

country. It grows in field ditches into which water is supplied throughout the year. Flora of the wild rice is also seen on dykes of paddy fields, semi-dried areas near paddy fields and high ways. During the dry season, the growth of the wild rice in the semi-dried areas is inhibited, and remains stunted until the wet season starts. In northern Thailand, big floras of the wild rice are seen everywhere.

It is noteworthy that the amount of growing wild rice is usually sufficient to cause the occurrence of not only the rice gall midge but also other insects of rice i.e. the green rice leafhopper, the rice hispa, the rice leaf roller, etc.. It implies that the wild rice is important as a source of occurrence of the major insect pests of rice.

Judging from the results obtained in the present investigation, it can be said that growth of the 1st instar larvae is inhibited by the lower temperature and dry soils in the dry season which also affect growth of the wild rice. More than 86% of larvae were in the stage of the 1st instar during the mid-dry season. It is supposed that the 1st instar larvae are not in the condition of diapause, but the period of the 1st instar larvae seems to be prolonged to some extent.

During the mid-dry season, the minimum air temperatures in December and January at the Phan Rice Experiment Station were, on the average, 13.7 and 12.3°C, respectively. Precipitation is null in the period from November to March.

The growth of larvae of the rice gall midge is considered to be closely related to the growth of wild rice, because larval development is strongly affected by growth of the growing points of the wild rice. This is easily understood from the fact that the 1st instar larvae are very much abundant in the mid-dry season. The low minimum air temperature and the dry condition are also important factors inhibiting larval development and gall formation as well.

If a relationship of population density and developmental stages of the insect in the wild rice to the factors including meteorology which influence them is clarified, the former

can be estimated from the latter. As a result, the damage of rice plants in the wet season will also be predicted from the population density and developmental stages of the insect in the wild rice.

Although studies on forecasting of some insect pests occurrence have successfully been carried out in some countries, the forecasting method of the rice gall midge occurrence in relation to the wild host plants has not been investigated in tropical Asia. It is suggested that studies on the insect ecology in the dry season have to be carried out in order to clarify the origin of the insect occurrence in relation to the wild rice in Thailand, because the insects raised in the wild rice begin to attack rice plants of the wet season, after transplanting.

## Summary

Seasonal fluctuation in the occurrence, larval development, and gall formation of the rice gall midge in the wild rice (*Oryza rufipogon*) was examined throughout the year in northern Thailand. Larval population was much higher in the dry season than in the wet season. On the contrary, the number of galls was found to be more abundant in the wet season than in the dry season. A peak of larval population was recognized in the period from December to February with the minimum air temperature lower than 14°C. The 1st instar larvae were found to be very much abundant from November to January. The population of the 2nd or 3rd instar larvae showed two peaks, one in October and the other in February. Larval development is considered to be inhibited by low temperature and dry condition which also affect growth of the wild rice. It is evident that some of the rice gall midge can proceed from generation to generation in the wild rice throughout the year. Wild rice is the most important alternate host plant for the rice gall midge during the dry season.

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