
Serious Incidence of the Rice Gall Midge in the Central Plain of Thailand¹

Terunobu Hidaka

Tropical Agriculture Research Center, Tsukuba, Ibaraki 300-21, Japan

Vanich Ya-Klai, Narong Chantaraphrapha

and Suchin Chantarasa-Art

Entomology and Zoology Division, Department of Agriculture,
Bangkhen, Bangkok, Thailand

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In June 1977, the rice gall midge, Orseolia oryzae (Wood-Mason), seriously attacked the second crop of rice in Bangkhanag village, Bangnampriew district, Chachengsao province near Bangkok. Such an insect outbreak has not been previously recorded in the central rice-growing areas of Thailand. The high yielding RD hybrid was directly sown in 480 ha between February and April. The percentage of damaged tillers and hills was 48.3 and 95.3, respectively, and the number of galls per hills was 3.3, ranging from 1 to 11 galls. During May and June, adult emergence reached more than 70% of the galls collected, but less larvae and pupae were found in the galls. The parasite, Neamastatus grallarius, was dominant, parasitism reaching 11 to 35%. Insecticidal application by the farmers using Furadan 3% G and Monocrotophos 50% EC was ineffective because of its late application. The severe outbreak can be considered as follows, a) the village is adjacent to Prachinburi province where the insect has occurred at a low level, b) a highly susceptible variety was widely planted at a high density by direct sowing, c) a large amount of fertilizer was applied, d) a suitable environment for reproduction of the gall midge was provided by the irrigation throughout the year, and e) wild rice, which is the most important host plant of the rice gall midge, was in evidence in the area.

INTRODUCTION

The rice gall midge, Orseolia oryzae (Wood-Mason), is one of the important insect pests of tropical Asia. In Thailand, the insects is distributed in the North, Northeast, East and some parts of the Central Plain (Hidaka et al., 1974).

The rice gall midge had not previously been recorded in Chachengsao province which is located 80 km east of Bangkok. In June 1977, however, serious damage caused by the insect occurred at Bangkhanag village, Bangnampriew district, Chachengsao province. Studies on the serious occurrence of the rice gall midge in the second crop of rice were carried out at the village between May and July, 1977.

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MATERIALS AND METHODS

Surveillance of insect damage and its occurrence was carried out once a week between June and July. Two localities in Bangkhanag village were selected for checking the insect infestation in paddy fields. Fifty hills per plot for checking damaged tillers were sampled at random with 3 replications. Galls occurring in rice plants were collected and brought back to the Rice Insect Branch, Entomology and Zoology Division at Bangkhen, Bangkok, for investigation of the growing stages of the insect and its parasite activity. The rice yield per 4 m² was also determined with 3 replications. The authors questioned farmers about rice cultivation techniques, control measures and weather conditions. Precipitation data was obtained from the Agricultural Extension Section of the City Hall at Chchensao province.

The total area of the second crop of rice at the village is estimated at 480 ha which is irrigated throughout the year. The rice variety used was RD hybrid, one of the varieties highly susceptible to the rice gall midge and this was directly sown between February and April, 1977. The second crop of rice in the village was initiated in 1976, the fertilizer (N:P:K = 16:20:0) being applied at the rate of 625 kg per hectare. Two kinds of insecticide, Furadan 3% G and Monocrotophos 50% E C, were also applied 45 and 60 days after germination for control of the rice gall midge.

RESULTS

Damage caused by the rice gall midge

The results obtained from the survey are given in Table 1. The percentage of damaged hills and tillers was 95.3 and 48.3, respectively, the damaged tillers varying from 39.5 to 55.9%. The number of tillers per hill was 6.2, and the number of panicles per hill was 3.3. The rice gall midge was recognized as occurring in all of the paddy fields. However, serious damage was found to occur in more than 14 hectares. It can be said that infestation by the rice gall midge was exceptionally high in the second crop of rice in Bangkhanag village.

Table 1. The Infested Tillers by the Rice Gall Midge at Bangkhanag Village

<table>
<thead>
<tr>
<th>Sampling site</th>
<th>No. of healthy tillers</th>
<th>No. of galls</th>
<th>Total no. of tillers</th>
<th>Infested tillers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>173</td>
<td>220</td>
<td>393</td>
<td>56</td>
</tr>
<tr>
<td>B</td>
<td>202</td>
<td>132</td>
<td>334</td>
<td>40</td>
</tr>
<tr>
<td>C</td>
<td>166</td>
<td>154</td>
<td>320</td>
<td>48</td>
</tr>
<tr>
<td>Average</td>
<td>180</td>
<td>187</td>
<td>349</td>
<td>48</td>
</tr>
</tbody>
</table>

Developmental stages of the rice gall midge

The results are given in Table 2. At the time of the first sampling of galls on May 2nd, all of the larvae collected were found to be at the first to the third instar stage, the second instar stage being more abundant than that of the other instars from May to June. The third instar was slightly more abundant than the second instar on July 1st. The number of prepupae was clearly less than the other developmental stages. During May and June, adult emergence reached more than 70% in the galls collected,
in contrast to 40% in the galls collected on July 1st. The number of adults was more abundant than that of pupae, the percentage of the pupal stage reaching about 28 between May and July.

Parasitism by the hymenopterous parasites fluctuated from 11 to 35%. The parasite, Neanastathus grallarius being more dominant than Platygaster oryzae (Platygastridae). A predator, Ophionia indica (Thunberg) (Carabidae), had a lower population throughout the season.

**Damaged rice plants**

Rice plants infested by the rice gall midge were up to 50 cm tall. The number of normal tillers per hill averaged 3.6 and the number of panicles per hill ranged from nil to 3. In Bangkhanag village, direct sowing is carried out by farmers throughout the wet and dry seasons, resulting in much closer planting intervals than with transplant ed rice plants. The closer planting results in high humidity, which in turn results in a high population of the rice gall midge.

The rice yield was determined in two localities. Average yield of paddy rice reached 4.6 tonnes per hectare where the damage was low. However, the yield obtained was only 416.2 kg per hectare in the paddy fields where incidence was heavy.

**DISCUSSION**

It is of great interest that the rice gall midge occurred seriously in Chachengsao province in the Central Plain of Thailand during the dry season (Chantaraprapha et al., 1977), and it is also exceptional that serious infestation by the insect occurred with direct sowing of rice.

Examination of rice plants by the writers in northern Thailand showed that the rice gall midge did not cause serious damage to rice plants in the dry season. The incidence was particularly lower in the second crop of rice (Hidaka et al., 1974).

Heavy incidence of the rice gall midge in the second crop of rice was seen at Cuttack in India in 1970 (Prakasa Rao, 1972), and it was concluded that this resulted from heavy rainfall during the dry season. In Chachengsao province, the precipitation in March, April and May reached 5.5 mm, 54.7 mm and 121 mm, respectively, these amounts being seen every year. The farmers have stated that the weather was fine during the transplanting period from February to April, and that the number of rainy days in March and April was 1 and 2 days, respectively. The serious occurrence of the rice gall midge in Chachengsao province is not related to rainfall, but other factors

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**Table 2. Individual Number of the Developmental Stages of the Rice Gall Midge and Its Parasites at Bangkhanag Village, Chachengsao Province, Thailand, 1977**

<table>
<thead>
<tr>
<th>Sampling site</th>
<th>Checking date</th>
<th>No. of hills</th>
<th>No. of tillers</th>
<th>No. of galls</th>
<th>Larvae 1</th>
<th>Larvae 2</th>
<th>Larvae 3</th>
<th>Pre-pupa</th>
<th>Pupae</th>
<th>Adults</th>
<th>Parasites*</th>
<th>Predatorb</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>May 2</td>
<td>28</td>
<td>275</td>
<td>172</td>
<td>5</td>
<td>16</td>
<td>8</td>
<td>4</td>
<td>46</td>
<td>121</td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>June 10</td>
<td>43</td>
<td>297</td>
<td>171</td>
<td>0</td>
<td>17</td>
<td>6</td>
<td>3</td>
<td>49</td>
<td>104</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>June 17</td>
<td>40</td>
<td>356</td>
<td>197</td>
<td>0</td>
<td>14</td>
<td>8</td>
<td>2</td>
<td>57</td>
<td>124</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>D</td>
<td>July 1</td>
<td>29</td>
<td>243</td>
<td>103</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>6</td>
<td>31</td>
<td>43</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>140</td>
<td>1171</td>
<td>643</td>
<td>5</td>
<td>50</td>
<td>29</td>
<td>15</td>
<td>183</td>
<td>392</td>
<td>97</td>
<td>8</td>
</tr>
</tbody>
</table>

* Neanastathus grallarius and Platygaster oryzae.

b Ophionia indica (Carabidae).
Rice Gall Midge in Thailand

in relation to the outbreak of the insect are considered to be more important. Initially, the closer planting of rice plants plays an important role in the rapid propagation of the insect (PRAKASA RAo, 1974) due to the resulting high humidity which affects the longevity of the adults, egg laying and egg hatching (HIDAKA et al., 1974). The RD hybrid, which is a highly susceptible variety, was planted widely in the village, so susceptibility can be said to be one of the important factors which increase the population density of the rice gall midge (HIDAKA et al., 1974). It can be said that serious infestation by the insect took place as a result of using a susceptible variety with closer planting spaces.

In this village, management of rice cultivation has been modernized, fertilizers and insecticides were applied at a high rate according to the recommendations of the Department of Extension, Ministry of Agriculture and Cooperatives. The insecticidal control by Furadan and Monocrotrophos, however, was not effective due to their late application. For control of the rice gall midge, application must be done 28 and 42 days after germination (HIDAKA et al., 1974).

It is also important to note that wild rice, one of the wild host plants of the insect, grows in the ditches in paddy fields throughout the year. The rice gall midge can maintain her population on wild rice and this is considered to be the origin of insect occurrence during periods of non-cultivation of rice.

Different growing stages of rice plants are seen in the village due to the different sowing dates between February and April. The population density of the insect is increased in the vegetative growing stages of rice plants. Serious damage caused by the insect was seen on rice plants sown in March. The damage was not serious on rice plants sown in February and April. The percentage of damaged tillers was shown to be different according to the sowing dates.

The parasites, Neanastathus grallarius and Platygaster oryzae, were not effective for control of the rice gall midge under serious infestation. A predator, Ophionia indica, also showed a lower population so far as the present experiment is concerned.

The outbreak of the rice gall midge in the Central Plain of Thailand is thought to be a serious problem and studies on forecasting techniques for occurrence of the insect are needed to prevent serious infestation by the rice gall midge.

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REFERENCES


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