

AN IMPORTANT RICE PEST *THAIA ORYZIVORA* GHAURI (TYPHLOCYBINAE:HOMOPTERA) AND SOME REMARKS ON ITS POPULATION IN EAST PAKISTAN*

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Abstract. *Thaia oryzivora* Ghauri⁵ was collected on paddy from Thailand. Ahmed¹ reported it from East Pakistan. Later observations on the bioecology of this leaf-hopper have revealed high economic value of *Thaia oryzivora* in East Pakistan. The species surpasses all other insects in number, during periods of its peak breeding. The local varieties of rice are much more susceptible to the attack of this species, and hold much heavier population of the species than the IRRI-Pak variety of paddy. The species freely breeds during February-March and October-November. The present account contains a description of the taxonomical morphology of *Thaia oryzivora* Ghauri as well as some preliminary remarks on its population. The species although of high economic significance had not been reported by Alam.^{2,3}

Ghauri⁵ described the new genus and species *Thaia oryzivora* on the basis of specimens collected from Bangkok, Thailand. He considered the species of some economic importance as pest of paddy (*Oryza sativa*). Later on the senior author¹ collected several thousands specimens of the species on rice in East Pakistan and realised the high economic significance of this leaf-hopper. In most of the typical rice growing areas the leaf-hopper in its peak population times surpassed all other insect pests in number. In the later half of 1970 study of the bioecology of this species was started. Standardised uniform samples of the species were collected from all the rice growing areas of East Pakistan, throughout the year, so as to assess their relative population concentration, as well as fluctuation in their population in different seasons of the year. The authors have recorded two economically important typhlocybinae species on rice of which one, i.e. the *Thaia oryzivora* is being discussed in the present account. Both the species in spite of being so prevalent throughout East Pakistan, had remained unrecorded. Alam^{2,3} while listing the insects of paddy recorded in East Pakistan did not make any reference of these species.

Description of *Thaia oryzivora* Ghauri

External Features. Length of male 3.10–3.60 mm, female 3.40–3.70 mm; head broad, convex in front; ocelli absent; median length of crown .25 mm, of pronotum .50 mm, of scutellum .45 mm, length of forewing 2.50 mm–3.00 mm, interocular width of crown 0.60 mm, transocular width of head .80 mm, transverse width of pronotum .80 mm, length of abdomen 1.40 mm; anteclypeus broad in middle, narrowed anteriorly, frontoclypeus broadening posteriorly; face bright brown, with extreme lateral margins of genae and below eyes yellowish brown, a small area posteromedian to eyes also yellowish brown; eyes mostly black; crown with epicranial

suture conspicuous up to about midlength of crown. The measurements of male and female specimens as well as of the various parts of their body differ slightly from those of Thailand specimens given by Ghauri.⁵ Crown mostly brown, testaceous, yellowish brown adjacent to eyes; pronotum with anterior and anterolateral margins yellowish brown, rest of it dark brown, with a longitudinal median 'ridge' providing a common base for two lateral triangles formed by similar 'ridges'; posterolateral margins of pronotum smoothly rounded, posterior margin concave; scutellum brownish anteriorly, yellowish brown posteriorly; forewing appearing dull fuscous; clavus in mounted specimens darker as compared to rest of wing; forewing, when studied on a prepared slide, mostly whitish, basal half with greenish yellow to brownish yellow tinge, more on margins than in middle; costal plaque present, deeply tinged with greenish yellow; veins slightly brownish; abdomen in male mostly blackish brown all over dorsal surface, posterior margin of each tergite black, pale on lateral margins, pale brown ventrally; female tergites blackish brown, with posterior margins pale whitish like a broad band, most of ventral surface of abdomen yellowish pale; sixth sternum testaceous brown, band like; seventh sternum pale brown, tip of ovipositor black.

Wings. Forewing much longer than abdomen, with most of the longitudinal veins reaching base; with first apical cell having oblique base; second apical cell with base angulate, broadened at apex; third apical cell quadrilateral in shape; fourth apical cell longer than broad; costal margin of wing more sclerotized than posterior margin; the two fuscous stripes observed by Ghauri⁵ in specimens of the type series collected from Thailand are not apparent in specimens collected from East Pakistan. Hindwings typically with Erythroneurine venation.

Male Genitalia. Male plate less sclerotized as compared to pygofer and anal tube; exceeding the pygofer posteriorly, curved dorsad in apical part, lateral margin of plate folded mesad most of its length, folded part closely applied to dorsal surface of plate, giving rise to a pointed tooth like outgrowth in distal half, microsetae numerous, macrosetae arranged in a

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row of 4-5 on ventral surface, an oblique row of microsetae on ventral surface at apex, with a stout process present in between the connection of lateral basal angle of male plate and ventral pygofer margin, the process itself being massive, narrow at base, broad distally, and finally giving rise to a stout spur, directed

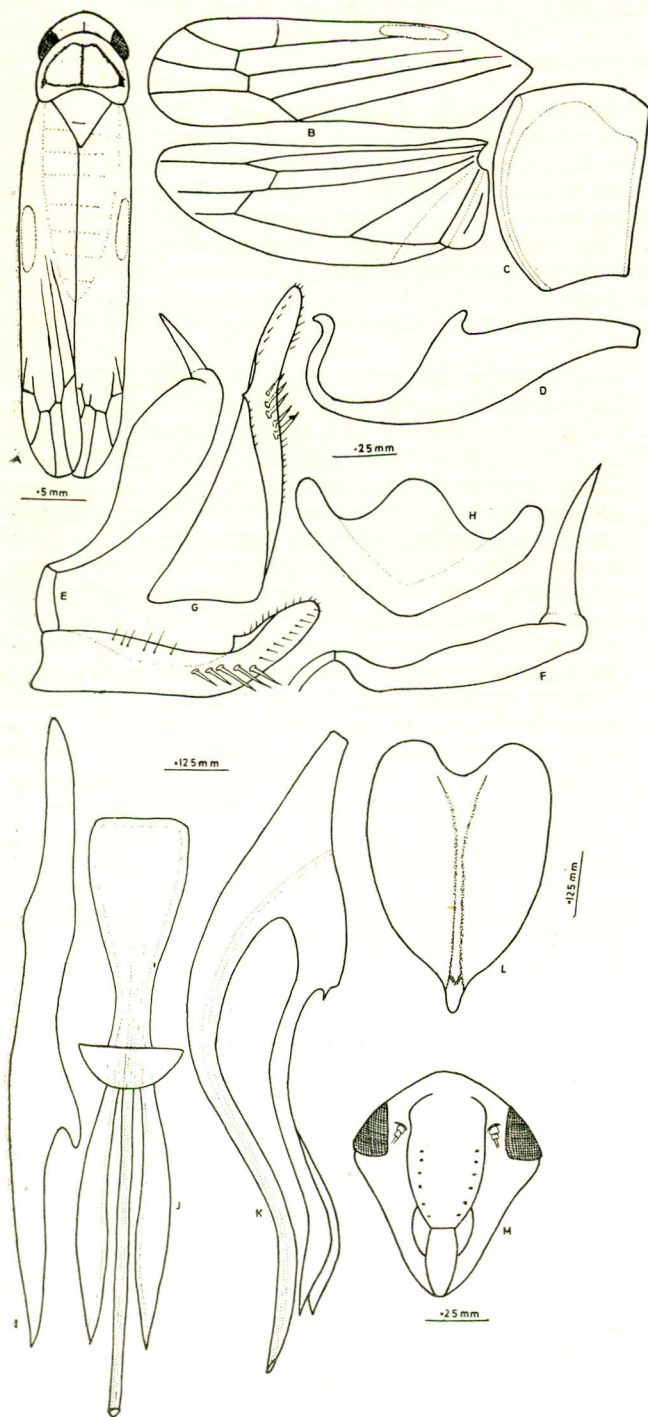


Fig. 1. *Thaia oryzivora* Ghauri, a, Adult male; b, fore and hind wing; c, pygofer, lateral view; d, anal hook; e, male plate, lateral view, with process; f, process of male plate, lateral view; g, male plate, dorsal view; h, connective, dorsal view; i, style, dorsal view; j, aedeagus, dorsal view; k, aedeagus, lateral view; l, female seventh sternum; m, face of adult.

mesad, the spurs of both sides intercross in middle. Ghauri⁵ considers the process arising from male plate, whereas Mahmood⁶ and Dworakowska⁴ regard it as a ventral pygofer process, pygofer devoid of macrosetae, anal tube sclerotized, with stout anal hooks, broadly curved mesad; style, typically in contrast with the style in *Zygina* species or *Erythroneura* species, possesses neither a typical preapical lobe nor a truncate apex, but instead style with a lateral 'flange' and the extreme posterior apex narrowed to a pointed tip, directed caudo-ventrad. The 'flange' has been regarded as a preapical lobe by Mahmood⁶ and Dworakowska.⁴ Style in the genus *Thaia* is almost identical to the style in the genus *Andrabia* Ahmed, although the two genera differ in a number of other important characters. Connective V-shaped, with a broad membranous median lobe; aedeagus with a short preatrium, narrow in lateral view, broad in dorsal view; dorsal apodeme triangular, shaft narrow, long, curved and finally directed caudad, with a pair of lateral atrial processes, apical part of processes broadened conspicuously; gonopore terminal.

Female seventh sternum more or less leaf-shaped, its median length much more than its transverse width, lateral margins smooth, posteromedian area projected to a narrow tubular extension, sternum provided with a median ridge, with its margins diverging broadly at their anterior extremity.

Discussion

Recently Dworakowska⁴ described four additional species of the genus on the basis of material collected from Ceylon, Java and China, and gave a revised description of *Thaia*. She⁴ illustrated the aedeagus of *Thaia subrufa* (Motschulsky) which appears in clear contradiction to the illustrations and descriptions of Ghauri.⁵ Dworakowska⁴ has shown in *T. subrufa* the processes of aedeagus broadened distally, but also regards this difference as one of the most important characters of differentiating the two species. It is, however, not clear from the accounts of both the authors whether any of them has studied the holotype of *T. subrufa*. Till any evidence on the contrary is available the species existing in East Pakistan should be regarded as *T. oryzivora* on the basis of Ghauri's⁵ work. The present authors have not come across any specimens of *T. subrufa* in their survey in East Pakistan.

The species was reported by Ghauri⁵ on the basis of specimens collected from Bangkok, Thailand, which are presently deposited in British Museum (N.H.) London. The present worker¹ reported the species from various districts of East Pakistan. Recently, however, a few specimens of *T. oryzivora* were also collected from Karachi, West Pakistan on grass and paddy.

Populations of *Thaia oryzivora*

The survey of the species *Thaia oryzivora* Ghauri was carried out in 13 districts of East Pakistan during December, 1970 through February, 1971. 121 field samples were collected with an ordinary insect hand net, by moving across a paddy field continuously

sweeping over the crop. Each sample consisted of insects collected in 25 sweeps, made over a distance of approximately 60 ft of crop. The samples were made over seed beds of both the IRRI variety of paddy, and local variety of Boro paddy. A few samples were, however, collected from the almost ripen paddy (Barisal District), which was near harvestation. The population of the species on mature paddy was equally heavy. Some of the unusually low yield of insects on seed beds can be attributed to the very young stage, when the plants are unable to hold any larger population of the species and are not suitable for breeding of the leaf-hopper. A paddy seedling about 1 ft high or more can hold a very high population and regular breeding starts at this stage. Usually, however, during these months breeding is at its lowest rate, as very few nymphs could be collected. During previous years the species was observed intensely breeding during the months October and November and most of the leaves had their undersurfaces covered with various stages of nymphal instars.

The species affects all the varieties of paddy growing in East Pakistan, as well as wheat and a number of other wild and cultivated plant species. The species, however, occurs in much heavier proportion on local variety of Boro crop as compared to IRRI variety. The alternate host or food plants are the grass, kachoo pata, wheat, bean leaves, tobacco and grams. The average, and highest number of leaf-hoppers collected per 25 sweeps in a number of districts of East Pakistan has been given in Table 1.

The nature of injury caused to the plant is of the type generally witnessed in other typhlocybine leaf-hoppers. The leaf-hopper usually feeds on the under surface, and wherever it punctures the mesophyll with the help of its stylets, and sucks the tissue fluid, it renders dead a few cells in the vicinity of the puncture. The cells dry up, and die off leaving a whitish scar or

spot visible on the upper surface. The damage due to adults and nymphs is similar. During the months of February and March, and October and November that the species is actively breeding, its population goes so high that hundreds of individuals occur on the same plant. The leaves exhibit large scale stippling betraying the presence of typhlocybine species. The species can, however, be easily seen jumping among the leaves due to dark brown colour of its crown, face, pronotum, and scutellum. The nymphs are however pale yellow and not as mobile as the adult. The damage caused to the plant solely by *Thaia oryzivora* is difficult to assess by field observations, as another typhlocybine hopper *Erythroneura* sp. also occurs on the paddy in quite large number and also renders similar damage to the crop. It is, however, not investigated, whether *Thaia oryzivora* Ghauri has any role to play in the transmission of viral diseases of rice.

Thaia oryzivora emerges as the most dominant leaf-hopper species on paddy in East Pakistan. As is evident from Table 1, the concentration of this leaf-hopper was usually high both on Boro as well as on IRRI variety of rice. As paddy remains in the field in East Pakistan, in one district or the other, almost throughout the year and the leaf-hopper is capable to survive on a number of other plants including grass, the rapid build up of population in the young seedling stages of paddy is not surprising at all. The leaf-hopper, however, appears in large numbers from October onwards up to February and March. On Boro paddy the population (Table 1) was high in the districts Sylhet, Tangail, Dacca, and Rangpur, where the average number of insects collected per 25 sweeps were 352, 268, 173 and 112 respectively. The seedlings were 1-1.5 ft high and the population usually increased with age of the plant and started declining only when the paddy plant neared maturity. The

TABLE 1. POPULATION OF *Thaia oryzivora* ON PADDY IN EAST PAKISTAN.

(Each sample: 25 sweeps)

| Locality | Date of collection | Sample collected | Variety of crop | Highest no. per sample | Average no. per sample |
|------------|---------------------------|------------------|-----------------|------------------------|------------------------|
| Barisal | 22-23 December 1970 | 7 | IRRI | 101 | 45 |
| Chittagong | 25-29 December 1970 | 7 | " | 41 | 33 |
| Noakhali | 30 December 1970-1 Jan 71 | 8 | " | 70 | 37 |
| Sylhet | 2-4 January 1971 | 7 | Boro | 509 | 352 |
| Dacca | 11-20 January 1971 | 9 | IRRI | 678 | 210 |
| | | 4 | Boro | 321 | 173 |
| Tangail | 25-28 January 1971 | 7 | IRRI | 171 | 76 |
| | | 4 | Boro | 300 | 268 |
| Bogra | 4 February 1971 | 2 | IRRI | 23 | 18 |
| Rangpur | 8-10 February 1971 | 3 | " | 26 | 16 |
| | | 16 | Boro | 184 | 112 |
| Dinajpur | 11 February 1971 | 7 | IRRI | 10 | 7 |
| Rajshahi | 12-13 February 1971 | 9 | " | 34 | 22 |
| | | 9 | Boro | 97 | 44 |
| Pabna | 14-15 February 1971 | 9 | Boro | 23 | 15 |
| Jessore | 16-17 February 1971 | 8 | IRRI | 21 | 10 |
| Khulna | 18 February 1971 | 2 | " | 2 | 2 |

TABLE 2. SEX RATIO OF *Thaia oryzivora* IN EAST PAKISTAN (DURING DECEMBER-FEBRUARY 1970-71).

| Locality | Total number in one sample | Males | Females |
|------------|----------------------------|-------|---------|
| Chittagong | 40 | 18 | 22 |
| Noakhali | 22 | 6 | 16 |
| Sylhet | 356 | 138 | 218 |
| | 314 | 132 | 182 |
| Dacca | 184 | 81 | 103 |
| Tangail | 53 | 13 | 40 |
| Bogra | 23 | 15 | 8 |
| Rangpur | 85 | 41 | 44 |
| Jessore | 11 | 6 | 5 |
| Khulna | 2 | 2 | 0 |
| | | 41.5% | 58.6% |

records of population in Mymensingh and Comilla were unfortunately wasted during transit, but the infestation was equally high as seen in Dacca and Tangail districts. Of the IRRI variety of paddy the infestation of *Thaia oryzivora* was highest in Dacca district, where the average population was 210 leafhoppers per 25 sweeps. Similar figures for districts

Tangail and Barisal were 76 and 44 respectively. The population in Chittagong, Rajshahi, Khulna, Jessore and Dinajpur was relatively low. The periods of sowing paddy for seedlings vary in different districts of East Pakistan, and consequently the low populations of *Thaia oryzivora* in these districts should not be regarded as indicating their low economic significance.

The male and female ratio (Table 2) of representative samples was studied in order to assess the potentialities of breeding activity. The nymphs were collected in very small numbers indicating very low rate of breeding. The female were usually higher in number as compared to males, and the population appeared potentially capable to expand in subsequent days.

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