

## Relative abundance of different stem borer species in *Ahu* and *Sali* rice in Jorhat, Assam

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### ABSTRACT

Stem borer complex of rice at the Instructional-Cum-Research Farm, Assam Agricultural University (AAU), Jorhat, Assam, during 2005, comprised of five species of lepidopteran borers viz., the pyralids, *Scirpophaga innotata* (Walker), *S. incertulas* (Walker), *Chilo suppressalis* (Walker), *C. polychrysus* (Meyrick) and the noctuid *Sesamia inferens* (Walker). *S. innotata* was the predominant species followed by *S. incertulas* while *S. inferens* was the least abundant species of the borer complex. Larval population of *S. innotata* was 43.39, 41.96 and 35.43 per cent of the total borer population at tillering, maximum tillering and at heading stages of the crop, respectively during the *Ahu* season, while in *Sali* season the corresponding percentage was 44.73, 41.48 and 37.50. The population of *S. innotata* as hibernating larvae was 34.4 per cent. Moth population of *S. innotata* constituted 73.71 and 72.84 per cent of the total borer complex during *Ahu* and *Sali* seasons, respectively. Pink borer, *S. inferens* was the least abundant species during both the *Ahu* and *Sali* seasons.

**Key words:** *Scirpophaga innotata*, *S. incertulas*, *Chilo suppressalis*, *C. polychrysus*, *Sesamia inferens*, rice, relative abundance, Assam

Rice is cultivated in Assam mainly as winter or *Sali* rice (June-July to November-December). It is also grown as autumn or *Ahu* (March-April to June-July) and as summer or *Boro* rice (November-December to May-June). There are several important factors affecting the level of production of rice crop of which the insect pest problem is a major factor.

The stem borers are among the major pests that attack the rice crop from seedling stage at nursery to maturity in the field and cause significant economic loss. They are chronic pests and attack the *Ahu*, *Sali*, *Bao* (deep water rice) and *Boro* crops. Though research on borer complex of rice has already been done by different workers from different parts of India and abroad, information from North-East India, is very much scanty. From earlier report, it is seen that yellow stem borer, *Scirpophaga incertulas* Walker is the predominant species of the borer complex of rice in Assam (Bora, 1993). But, in recent times, it has been observed that white stem borer, *S. innotata* Walker is becoming more and more abundant and constitutes a major proportion of the total borer complex of rice. Hence, the present study was undertaken to work out

the borer complex of rice and the relative abundance of different species.

### MATERIALS AND METHODS

The study on the relative abundance of rice stem borer was undertaken in the Instructional-Cum-Research Farm, Assam Agricultural University (AAU), Jorhat, Assam during 2005. *Ahu* (variety- Gopinath) and *Sali* (variety- Ranjit) rice was separately grown in two areas of 5000 m<sup>2</sup> each, out of which 2000m<sup>2</sup> plots from each variety were selected for the study. During *Ahu* 25 days old seedlings were transplanted on 10<sup>th</sup> April, 2005 while in *Sali* 30 days old seedlings were transplanted on 25<sup>th</sup> July, 2005 by following recommended package of practices (AAU, 2004-05). No insecticide was applied during the entire crop season.

The larval population was observed at tillering, maximum tillering and heading stages. During each observation, tillers of 100 infested hills (dead hearts or white ear heads) were randomly selected, dissected and observation on different species of borer present was recorded. Hibernating borer larvae were also studied during December to January after harvest of

*Sali* crop. For this observation, 560 hills of rice stubbles were randomly selected. The stubbles were brought to the laboratory and dissected to examine the presence of hibernating borer. Species composition of stem borer moths was also studied weekly from one week after transplanting till harvest of the crop. During each observation the number of moths of different borer species was recorded by walking diagonally across the fields. The relative abundance of each species was worked out on the basis of percentage of each species in the total borer complex. The moths and larvae collected in the field were brought to the laboratory for further taxonomic studies. The moths were preserved in clean test tubes plugged with cotton and the larvae were preserved in vials containing 70 per cent alcohol. The collected borer specimens were identified following the keys given by Nishida and Torii (1970) and Khan *et al.* (1991).

## RESULTS AND DISCUSSION

The present study revealed that the rice stem borer complex at Jorhat, Assam comprised of five species of lepidopteran borers *viz.*, the pyralids *S. innotata*, *S. incertulas*, *Chilo suppressalis* (Walker), *C. polychrysus* (Meyrick) and the noctuid *Sesamia inferens* (Walker). Bora (1993) and Anonymous (2004-

05) also reported similar observation from Assam. Moreover, the white stem borer, *S. innotata* was found to be the predominant species followed by yellow stem borer, *S. incertulas* while the pink stem borer, *S. inferens* was the least abundant species.

Larval population of *S. innotata* was 43.39, 41.96 and 35.43 per cent at tillering, maximum tillering and at heading stages, respectively during the *Ahu* season (Table 1), whereas in *Sali* season the population was 44.73, 41.48 and 37.50 per cent corresponding to tillering, maximum tillering and heading stages of the crop (Table 2). The population of the borer as hibernating larvae was 34.4 per cent (Table 3). Moth population of *S. innotata* constituted 73.71 and 72.84 per cent of the total borer complex during *Ahu* and *Sali* seasons, respectively (Table 4). Similar observations have also been recorded from Titabar, Assam (Anonymous, 2004-2005). This is, however, in contrast to earlier observation of Bora (1993) who reported *S. incertulas* as the predominant species that constituted more than 70 per cent of the stem borer complex.

Larval population of *S. incertulas* was 25.47, 27.67 and 31.50 per cent during the *Ahu* season (Table 1) and 24.56, 20.00 and 30.83 per cent during the *Sali* season corresponding to tillering, maximum tillering and

**Table 1.** Larval population of rice stem borers during *Ahu*, 2005

Crop stage	*Number of tillers examined	Number of infested tiller (DH/WE)	Number of borer larva	Per cent population				
				<i>S. incertulas</i>	<i>S. innotata</i>	<i>C. suppressalis</i>	<i>C. polychrysus</i>	<i>S. inferens</i>
Tillering	752	128	106	25.47	43.39	15.09	13.20	2.83
Maximum tillering	945	130	112	27.67	41.96	13.39	11.60	5.35
Heading	1080	134	127	31.50	35.43	12.60	14.96	5.50

\* 100 infested hills were examined during each observation  
DH = Dead Heart                      WE = White Ear head

**Table 2.** Larval population of rice stem borers during *Sali*, 2005

Crop stage	*Number of tillers examined	Number of infested tiller (DH/WE)	Number of borer larva	Per cent population				
				<i>S. incertulas</i>	<i>S. innotata</i>	<i>C. suppressalis</i>	<i>C. polychrysus</i>	<i>S. inferens</i>
Tillering	739	116	114	24.56	44.73	14.03	12.28	4.38
Maximum tillering	943	137	135	20.00	41.48	14.07	17.78	6.66
Heading	1075	120	120	30.83	37.50	11.66	14.16	5.83

\* 100 infested hills were examined during each observation  
DH = Dead Heart                      WE = White Ear head

**Table 3. Relative abundance of hibernating stem borer larvae in *Sali* rice stubbles**

Total number of hills examined	Total number of borer	Per cent population				
		<i>S. incertulas</i>	<i>S. innotata</i>	<i>C. suppressalis</i>	<i>C. polychrysus</i>	<i>S. inferens</i>
560	125	25.60	34.40	17.60	13.60	8.80

**Table 4. Relative abundance of rice stem borer moths in *Ahu* and *Sali*, 2005**

Species	Population of each species (%) during <i>Ahu</i>	Population of each species (%) during <i>Sali</i>
<i>Scirpophaga incertulas</i>	22.43	23.84
<i>Scirpophaga innotata</i>	73.71	72.84
<i>Chilo suppressalis</i>	1.92	1.98
<i>Chilo polychrysus</i>	1.28	0.66
<i>Sesamia inferens</i>	0.64	0.66

heading stages of the crop (Table 2). The population of the borer as hibernating larvae was 25.60 per cent (Table 3). Moth population of *S. incertulas* constituted 22.43 and 23.84 per cent of the total borer complex during *Ahu* and *Sali* seasons, respectively (Table 4).

Data presented in Table 1 revealed that, in the *Ahu* season larval population of *C. suppressalis* was higher than that of *C. polychrysus* during tillering (15.09 and 13.20 %, respectively) and maximum tillering stages (13.39 and 11.60 %, respectively), while at heading stage *C. polychrysus* population (14.96 %) was higher than that of *C. suppressalis* (12.60 %). However, in the *Sali* season, population of *C. polychrysus* was higher than that of *C. suppressalis* during the maximum tillering (17.78 and 14.07 %, respectively) and heading stages (14.16 and 11.66 %, respectively) of the crop (Table 2).

The pink stem borer, *S. inferens* was the least abundant species of the borer complex at Jorhat, Assam. The larval population was 2.83, 5.35 and 5.50 per cent during the *Ahu* season (Table 1), whereas in the *Sali* season the population was 4.38, 6.66 and 5.83 per cent corresponding to tillering, maximum tillering and heading stages of the crop (Table 2). The population of the borer as hibernating larvae was 8.80 per cent (Table 3) and moth population of *S. inferens* constituted 0.64 and 0.66 per cent of the total borer complex during *Ahu* and *Sali* seasons, respectively (Table 4).

Thus it was clear that *S. innotata* was the predominant species followed by *S. incertulus* while *S. inferens* was the least abundant species. Although the reason for the predominance of *S. innotata* over other species during recent times is not clearly understood, several

factors might have contributed to it. Analysis of 15 years annual rainfall data (Fig. 1) of Jorhat, Assam (collected from Department of Agricultural Meteorology, AAU, Jorhat), depicted that distribution of annual rainfall and total rainfall for both the crop season (March to November) decreased over the years, which might be the reason for the dominance of *S. innotata* as it occurs in regions with distinct dry and wet seasons (Otanen and Sison, 1952). The dominance of white stem borer has also been reported from Malaysia (Rothschild, 1971) and Philippines (Lumaban and Litsinger, 1980). *S. inferens* being a polyphagous pest and least adapted to the aquatic conditions prevailing in the region was expected to be least abundant species (Catling *et al.*, 1984). Similar observations have also been recorded by Panda *et al.*, (1977) from Orissa, Panktey and Sachan (1983) from Nagaland and Ahmed and Shahjahan (1981) from Bangladesh.

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