

## SEASONAL INCIDENCE OF RICE STINK BUG, *EUSCHISTUS TRISTIGMUS* AND *OEBALUS* SPP. UNDER UPLAND TRANSPLANTED RICE ECOSYSTEM AND THEIR CORRELATION WITH WEATHER PARAMETERS

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**Abstract:** The present study was conducted at research farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur during *kharif* season 2013-14 under upland transplanted rice ecosystems (UDS). The results of field experiments revealed that the maximum population of rice stink bug observed on 42 SMW in month of October with 18.75 nymph/adult/25 sweeps. The seasonal mean population of bug was 3.09 nymph/adult/25 sweeps. The rice stink bug showed non-significant positive correlation with sun shine hours and non-significant negative correlation with maximum, minimum and average temperature, morning, evening and Average relative humidity at 5 and 1 per cent level of significance.

**Key words:** Ecosystem, Rice stink bug, Upland, Wealth

### INTRODUCTION

Rice is the most important staple food grain in the global food grain production. India has the largest acreage under rice, about 44.6 m ha of land with a production of about 90 MT (Roy *et al.*, 2013). In modern agriculture, high yielding rice varieties are extensively grown with the use of fertilizers and manures. Such cultivation pattern of rice accidentally or inadvertently offers infestation of a large number of insect pests, which results in to severe loss in crop yields (Neeta, *et al.*, 2013). Insect damage affects the plant physiology leading to reduction in measurable yield, utility or economic return (Munira and Rasel, 2012). Rice dusky stink bug, *Euschistus tristigmus* and *Oebalus* spp. mostly present in different rice ecosystem of Raipur, Chhattisgarh. These bugs are also important rice pests in Asia, Africa, Latin America, and southern USA. The damage to the rice crop is caused by the feeding of nymphs and adult bugs on the endosperm of the developing grains. Growing rice bug nymphs are more active feeders than adults, but adults cause more damage because they feed for a longer period. Grains damaged during milk stage remain empty. In severe cases of infestation, most grains in a field are sucked empty and the straw has an off-flavor, which is unattractive to cattle. Damage during the dough stage causes discoloration of mature grain and causes weakness in the kernel. Such rice has lower milling quality or is pecky rice of inferior grade. Partially damaged grains also have an off-flavor even after cooking. Injury during the milk stage causes yield loss; damage during the dough stage impairs grain quality (Pathak and Khan, 1994). The aims of this study was to determine the seasonal incidence of rice stink bug under upland transplanted rice ecosystems between the developments stages of rice and their correlation

with weather parameter. It is hoped that the findings from the study can contribute to the more ecological precise ways in dealing with outbreaks and control of insect pests of rice.

### MATERIAL AND METHOD

The populations of rice dusky stink bug, *Euschistus tristigmus* and rice stink bug *Oebalus* spp. were recorded through sweeping net in upland transplanted rice ecosystems (UTP). Sampling was done randomly four places by 25 sweep of rice field in morning at weekly interval. The observations on occurrence of rice stink bug were recorded by taking total 4 samples from 4 locations in UTP. All samples were collected near the center of the ecosystem at least 5 meter from the edge in order to reduce edge effects, the method modified as according to Singh and Singh (2010) Garg, (2012), Zhang *et al.* (2013). Correlation analysis was carried out between field incidence of rice stink bug and weather parameters during *kharif* season 2013-14. Regression analysis was worked out as per method given by Gomez and Gomez, (1985).

### RESULT AND DISCUSSION

#### Seasonal incidence of rice stink bug *Euschistus tristigmus* and *Oebalus* spp.

Rice dusky stink bug, *Euschistus tristigmus* and rice stink bug *Oebalus* spp. is important species which present in upland rice ecosystem of Raipur. Perusal of data presented (Table 1) on the incidence of rice stink bug revealed that the pests population started with 0.25 nymph/adult/25 sweeps from 36 SMW of September and remain up to crop harvesting in the upland transplanted rice ecosystem (UTP). There was an increase in population in subsequent weeks and

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the highest rice bug population was recorded in third week (42 SMW) of October with a population of 18.75 nymph/adult/25 sweeps. The average population varied from 0.00 to 18.75 nymph/adult/25 sweeps during the rice cropping season. The present studies are corroborated with Zhimomi and Ao (2011) who reported that the seasonal abundance of major insect pests was high in lowland followed by foothill and upland. Zahirul *et al.*, (2012) reported that the aerobic rice system, invertebrate diversity will probably be lower as compared to irrigated rice.

**Correlation co-efficient between rice stink bug and weather parameter**

It was evident from the data (Table 2 ) that the rice stink bug showed significant positive correlation with sun shine hours (r= + 0.423) while non significant negative correlation with maximum

temperature (r = - 0.045), minimum temperature (r = - 0.463), average temperature (r = - 0.394), morning relative humidity (r = - 0.015), evening relative humidity (r = - 0.468) and average relative humidity (r = - 0.435) and average rainfall (r = - 0.434) respectively at 5 and 1 per cent level of significance. The coefficient of variation (%) showed that minimum temperature 21.395 per cent and evening relative humidity 21.873 per cent affect on pests' population. It may be concluded from the study that the seasonal incidence of rice stink bug under upland transplanted rice ecosystems and their correlation with weather parameter would be helpful in developing efficient pest management strategies against stink bug in rice crops for increasing production and profit, besides safety to the environment.

**Table 1.** Mean population of rice stink bug in upland transplanted rice ecosystem

Month	SMW	Mean population of rice stink bug in UTP	Weather parameters							
			Temperature (°C)			Rainfall (mm)	Relative humidity (%)			Sun shine (hours)
			Maxi. Temp.	Mini. Temp.	Avg. Temp.		Morn.	Even.	Avg.	
July	31	0	28.30	23.90	26.10	255.80	95.10	83.90	89.50	1.30
August	32	0	31.10	24.70	27.90	87.40	93.10	76.00	84.55	3.30
	33	0	31.30	24.40	27.85	177.00	94.70	79.60	87.15	3.30
	34	0	27.80	23.80	25.80	60.50	92.00	83.60	87.80	1.50
	35	0	29.30	24.50	26.90	120.80	94.90	78.10	86.50	3.10
September	36	0.5	31.10	24.80	27.95	54.80	92.60	75.70	84.15	4.20
	37	0.75	31.90	25.20	28.55	11.60	91.70	73.30	82.50	6.20
	38	1	29.90	24.10	27.00	92.60	93.40	76.90	85.15	2.50
	39	1.25	32.00	24.90	28.45	28.60	93.00	68.00	80.50	6.30
October	40	2.5	30.10	24.20	27.15	45.20	95.00	75.30	85.15	4.20
	41	2.25	30.20	23.30	26.75	8.60	83.70	71.10	77.40	3.50
	42	18.75	30.70	21.40	26.05	0.00	91.40	56.30	73.85	8.60
	43	12.5	28.80	22.60	25.70	32.60	95.90	73.10	84.50	2.10
	44	3.75	30.50	17.30	23.90	0.00	92.30	38.40	65.35	8.90
	**S.M.	3.09								

\*SMW = Standard meteorological week, \*\*S.M. = Seasonal mean, UTP= upland transplanted rice ecosystem

**Table 2.** Correlation co-efficient (r) between mean populations of rice stink bug, *Leptocorisa acuta* Thunberg and weather parameters

Rice insect	Correlation with		Correlation coefficient (r)	Coefficient of determination (r <sup>2</sup> )	Coefficient of variation (%)	Regression equation value
	Weather parameter					
Mean population of rice stink bug in upland transplanted rice ecosystem	Temperature (°C)	Maximum	-0.045	0.002	0.203	y = -0.010x + 30.24 R <sup>2</sup> = 0.002
		Minimum	-0.463	0.214	21.399	y = -0.170x + 24.0 R <sup>2</sup> = 0.214
		Average	-0.394	0.155	15.499	y = -0.090x + 27.14 R <sup>2</sup> = 0.155
	Rainfall (mm)		-0.434	0.188	18.801	y = -5.731x + 87.38 R <sup>2</sup> = 0.188
	Relative humidity (%)	Morning	-0.015	0.000	0.022	y = -0.007x + 92.79 R <sup>2</sup> = 0.000
		Evening	-0.468	0.219	21.873	y = -0.996x + 75.17 R <sup>2</sup> = 0.218
		Average	-0.435	0.189	18.884	y = -0.502x + 83.98 R <sup>2</sup> = 0.188
	Sun shine (hours)		0.423	0.179	17.891	y = 0.183x + 3.646 R <sup>2</sup> = 0.178

\*Significant at 5 % level (2.179), \*\*Significant at 1 % level (3.055)

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