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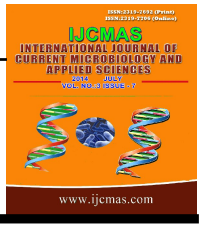

Original Research Article

Seasonal abundance of brown plant hopper *Nilaparvata lugens* in Varanasi region, India

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Keywords

Brown planthopper (BPH), Seasonal abundance, *Nilaparvata lugens*

A B S T R A C T

An experiment was conducted during the *kharif* season of 2011-12, at the Agricultural Research Farm, BHU Varanasi to evaluate the seasonal abundance of brown plant hopper. It is evident that BPH appeared on the crop after 40-50 days after transplanting *i.e.,* around last week of August. The incidence of BPH in the beginning was very low. As soon as the rain stopped in last week of September then the population increased with the vegetative stage of crop and reached highest in third week of October. The incidence of the pest was severe in the last September to last October. The population of BPH was positively correlated to temperature and relative humidity where as a negative correlation was found to rainfall.

Introduction

Rice is staple food crop in India, Which is attacked by many insect in which plant hopper one of them. The planthoppers constitute a large group of phytophagous insects in the Order: Hemiptera, which is distributed worldwide.All members of this group are plant-feeders considered as pests. Many regard the BPH as the number-one insect pest of rice in Asia today, primarily because of the unpredictability of the infestation and the dramatically severe damage it causes. The pest feeds directly on the growing plant, reducing its yield potential. If the pest density is high, the plant dies and a condition resulted to hopperburn. The grassy stunt disease is transmit by BPH, which can further reduce yield. Epidemics of grassy stunt have followed major pest outbreaks in India, Indonesia, and the Philippines, whoever in Asia, BPH, *Nilaparvata lugens* (Stål), is economic important pest. They damage plants directly by sucking the plant sap and by ovipositing in plant tissues, causing plant wilting or hopper burn (Turner *et al* 1999). Damage to the rice crop is caused directly by feeding on the phloem (Sogawa, 1982) and indirectly by transmitting plant viral diseases like grassy stunt and wilted stunt viruses (Powell *et al*., 1995).Brown planthopper, *Nilaparvata lugens* had caused serious outbreaks in several countries like China, Bangladesh, Nepal, Pakistan, Taiwan andVietnam (Gyawali, 1983). In India also, the serious outbreak of this pest has been reported from paddy growing area. The

present investigation are found the abundance of BPH population in relation to abiotic factors and summarizes the few scattered reports of crop damage and losscaused by the BPH, primarily in tropical countries. Also to give perspective to the importance of the insect, an attempt is made to estimate the monetary value of the pest problem and relation to management of BPH as abiotic factors.

Materials and Methods

The geographic situation ofVaranasi lies between 24° 56' N to 25° 35' N Latitude and 82° 14' E to 83° 24' E Longitude and the elevation ranges from 167.7 to 220.5m above the mean sea level, almost in the centre of Indo-gangetic belt. It possesses sub-tropical climate and experiences mean annual rainfall ranging 75 to 100 cm (approx.), most of which is received during *kharif* season. Mean maximum temperature experienced during the experiment was 35.3 during 2nd week of June and the mean minimum temperature was 16.0 C during 1st week of November. The maximum rainfall experienced was 296.20 mm during 3rd week of September.

The present course of investigation was made on agriculture main farm, Banaras Hindu University, Varanasi and different farmer fields inRamna, Tikri and adjoining village of Varanasi during kharif season 2011-12 and the data were recorded to BPH *Nilaparvata lugens*(Stål)of rice, *oryzae sativa,* under prevailing weather conditions. The crop was transplanted on July 09 in 2011 and the variety,NaatiMansoori was selectd for present investigation for seasonal abundance of BPH population and the normal agronomic practices were follow in the crop grown under the prevailing condition at agriculture Farm, Banaras Hindu University, Varanasi and approximately same agricultural practicesfarmers were also adopted. The Observations were made at weekly intervals throughout the crop season, number of brown plant hopper per 5 hills were recorded. The meteorological data Rainfall, Temperature and Relative Humidity were collected from Agro-meteorological Observatory, Department of Agronomy, Institute of Agricultural Sciences, BHU for *Kharif* season 2011-12.During the course of investigation the weather parameters viz., maximum andminimum temperatures, rainfall and relative humidity were recorded and the population of BPH was correlated with the abiotic factors.

Results and Discussion

The record of BPH population during present investigation indicated that abiotic factors (i.e. rainfall, temperature, relative humidity) play important role to oscillating the BPH population in rice ecosystem during *kharif* season.

In the present study, BPH appeared in rice crop during last week of August (i.e. 40 days after transplanting). The peak population of BPH was observed during second week of October (i.e. standard week was-42). The population of BPH decreased as the crop reached the harvesting stage around first week of November. Similar findings have been reported by Sachan*et al.,* (2006).

The rainfall and relative humidity were negatively correlated to the population of BPH whereas temperature was positively correlated to the population of BPH. Krishnaiah*et al*., (2006) also reported a positive correlation with temperature. Present findings are also on the line with Jeyarani (2004) who reported the occurrence of the pest peaked during September, October and there is a negative correlation between the incidence of the pest and rainfall which is similar to our findings.

Table.1 Influence of abiotic factor on seasonal incidence of BPH during Kharif 2011

Month/ year	Standard weeks	Crop phenology (week of transplanting)	No. ofBPH /hill	Mean temp. (□C)	Mean R.H. (%)	Total rainfall (mm)
August	31	3				
	32	4				
	33	5				
	34	6				
	35	7	5.62	28.15	72.1	1.2
September -	36	8	7.26	30.2	75.3	42.8
	37	9	6.38	29.95	60.69	28.6
	38	10	6.84	29.1	69.1	168.8
	39	11	8.84	28.4	73.0	6.4
	40	12	10.23	29.85	69.5	0
October -	41	13	11.64	27.15	66.0	0
	42	14	12.94	27.45	61.0	0.6
	43	15	10.45	28.3	70.0	0
	44	16	8.23	26.05	72.0	0
November -	45	17	4.23	25.75	60.0	0
	46	18	3.21	23.4	65.5	0

Table 2 . Relation of weather parameter with BPH population

Pest	Correlation coefficient values(r)			R^2
	Mean temp. (^oC)	Mean R.H. (%)	Total rainfall (mm)	
	X_1	X_2	X_3	
Brown plant hopper	0.351	0.053	-0.167	0.22

Temperature was positively correlated with the abundance of BPH. Khan and Misra (2003) showed a similar relation with these parameter.

Correlation between abundance and abiotic factors

It is evident from table-2 that abundance of number ofbrown plant hopper(BPH) population in terms of per hill and Correlation coefficient between different weather parameters and population of brown plant hopper revealed that, the mean temperature recorded significant positive correlation with population of brown plant hopper with a correlation coefficient(r = 0. 351 in 2011**)**and the Mean relative humidity was also positive correlation with population of brown plant hopper (r = 0. 053 in 2011**)**while the Negative correlation was observed between total rainfall and population of brown plant hopper (r = -0. 167 in 2011).

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