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OVIPOSITIONAL RESPONSE OF BROWN PLANTHOPPER, *NILAPARVATA LUGENS* (Stal.) TO RESISTANT RICE GENOTYPES

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ABSTRACT
The present investigation was carried out to study the ovipositional response of BPH in 12 resistant genotypes of rice in the glass house of Department of Entomology, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C. G.) during year 2014-15. The study revealed that all the resistant rice genotypes reduced the fecundity of *Nilaparvata lugens* (Stal.) as compared to susceptible check TN1. Decrease in average number of nymphs emerged was also recorded which ranged from 22.50-95.00, lowest being recorded with rice genotype IR 06N119 (22.50) followed by resistant check Ptb 33 (26.75). Average number of unhatched eggs ranged from 11.75-27.50, maximum being recorded with rice genotype Pokkali (27.50). Maximum percent reduction in hatching over susceptible genotype TN 1 was recorded with IR 06N119 (76.32) followed by resistant check Ptb 33 (71.84). IR 06N119 recorded the highest % of unhatched eggs (52.13) and the lowest number of fecundity (47.00).

KEY WORDS: Rice, BPH, Host plant resistant, Ovipositional.

INTRODUCTION
The brown plant hopper, *Nilaparvata lugens* (Stal.) (Hemiptera: Delphacidae) is a typical piercing-sucking insect pest of rice (*Oryza sativa* L.; Poaceae). In the past few years, the rate of BPH infestation has increased in India and caused severe yield losses in several states like Tamil Nadu, Andhra Pradesh, Orissa, Punjab, Haryana, Kerala, Chhattisgarh, Madhya Pradesh, etc. The nymphs and adult BPH cause heavy infestation causing complete drying and plant death, a condition known as "hopperburn". BPH also causes crop damage by transmitting serious virus diseases, such as grassy stunt (Rivera *et al*., 1966) and ragged stunt (Ling *et al*., 1978). The application of insecticides as means of *Nilaparvata lugens* management has not been a satisfactory tactic, because many of insecticides commonly used for rice insect pests management causes resurgence of *Nilaparvata lugens* and play a major role in BPH outbreaks. Moreover, the indiscriminate use of insecticides also has adverse effect on environment. The demands for insecticide free food further necessitate the development of alternative measure to control BPH. In this view, host plant resistance (HPR) presents one of the best choices to tackle this notorious pest. Host plant resistant is the collective heritable characteristics by which a plant species, race, clone or individual may reduce the possibility of successful utilization of that plant as a host by an insect species, race, biotype or individual. Host plant resistant is relatively staple, cheap, eco-friendly and generally compatible with other methods of pest management. It has been considered as a major control strategies against several pests. A character of resistant host plant is known to affect the orientation, settling, colonization, oviposition of insects and is called nonpreference or antixenosis (Kogan and Ortman, 1978). Oviposition which determines the population level of insects as well as hatching, development, survival and egg production is important factor in deciding the degree of infestation by pest (Saxena and Pathak, 1979). The present experiment was planned to study the ovipositional response of BPH in resistant rice genotypes.

MATERIALS & METHODS
Experiments were conducted in glasshouse, department of Entomology, IGKV, Raipur during 2014-15. Twelve rice genotypes resistant to BPH were tested for the ovipositional response of BPH. Ptb 33 and TN1, used as resistant and susceptible checks respectively were procured from department of Entomology, IGKV, Raipur, Chhattisgarh. Fifteen days old seedlings were transplanted in 500 ml earthen pots filled with fertilizer enriched puddled soil. Four replications were maintained for each variety. After 30 days, the plant was covered with Mylar tube with ventilating windows. One pair of adult i.e. one gravid female and male was introduced with the help of aspirator in the Mylar tube then the open end was closed with a muslin cloth and tied with a rubber band. After five days (120 hrs), the adults were removed from the cage. The total number of nymphs emerged was counted on 15^{th} day of removal of adults. This represented the number of viable eggs laid by the female during their lives. Thereafter, nymphs were removed and unhatched eggs were counted by dissecting the plant tissues and observity under a binocular microscope. Total fecundity and % unhatched eggs were calculated. The percent of unhatched eggs was calculated using the formula:

$$\text{Per cent of unhatched eggs} = \frac{\text{Number of unhatched eggs}}{\text{Number of nymphs emerged} + \text{Number of unhatched eggs}} \times 100$$

RESULTS & DISCUSSION

Host plant resistant is one of the most important and eco-friendly approach to control BPH. One of the mechanisms used by resistant plants to present attack by pests is to affect their oviposition pattern. The present experiment conducted to study the ovipositional response of resistant rice genotypes to BPH revealed that, all the rice genotypes exhibited lower fecundity of BPH as compared to the susceptible check TN 1. The fecundity of BPH ranged from 47.00-106.75 (Table. 1). Surprisingly, the resistant genotype IR 06N119 showed even lower fecundity (47.00) than the resistant check, Ptb 33 (52.25). The study further showed the effect of host resistance on hatching ability of eggs. This was recorded by counting the average number of nymphs emerged which ranged from 22.5-95.00.

TABLE 1: Ovipositional response of BPH on resistant rice genotypes

Designation	Average no. of nymph emerged	Average no. of unhatched eggs	Fecundity (No.)	% unhatched eggs	% reduction in hatching over TN1	% increase in unhatched eggs over TN1
IR 06M143	41.50	17.25	58.75	29.36	56.32	31.88
IR 10A110	36.75	19.25	56.00	34.38	61.32	38.96
IR 06N119	22.50	24.50	47.00	52.13	76.32	52.04
IR 06N234	45.75	17.00	62.75	27.09	51.84	30.88
Pokkali	31.00	27.50	58.50	47.01	67.37	57.27
IR 64	51.00	22.50	73.50	30.61	46.32	47.78
IR 03A159	48.50	17.00	65.50	25.95	48.95	30.88
Bong Cay	67.50	15.00	82.50	18.18	28.95	21.67
Syamjeera	79.25	16.75	96.00	17.45	16.58	29.85
KDML 105	63.75	18.75	82.50	22.73	32.89	37.33
Lua Nhe Den	57.75	21.50	79.25	27.13	39.21	45.35
Improved Pusa Basmati 1	68.75	18.25	87.00	20.98	27.63	35.62
Ptb 33	26.75	25.50	52.25	48.80	71.84	53.92
TN 1	95.00	11.75	106.75	11.01		
SEm±	7.397	-				
CD	21.19	NS				

Values represent average of four replications

Although all the resistant rice genotypes exhibited lesser number of average nymphs emerged, the lowest number of nymph emergence value was recorded with rice genotype IR 06N119 (22.50) followed by resistant check Ptb 33 (26.75) and Pokkali (31.00). However, when average number of unhatched eggs was counted which ranged from 11.75-27.50. Resistant rice genotype pokkali surpassed others and recorded maximum number of unhatched eggs (27.50). It has been reported that the chemical environment surrounding the developing eggs in the resistant plant affect the hatching ability by reducing the permeability of eggs and embryonic membrane (Maheshwari *et al*., 2006).

Similar results has been reported by Maheshwari *et al*. (2006) who studied mechanisms of resistance i.e. antixenosis and antibiosis against *Nilaparvata lugens* in 5 rice genotypes. Comparatively less fecundity and hatchability was recorded in all resistant genotypes than the susceptible TN1. The mean number of nymphs emerged was significantly high in susceptible TN1 (96.8), while very low nymphal population ranging from 38.0 to 41.1 were observed among resistant genotypes. The number of unhatched eggs varied from 50.6 to 54.2 among the resistant genotypes. The resistance in host plants in general reduced the hatching ability of eggs and when compared to susceptible variety, it was recorded that maximum percent reduction in hatching over TN 1 was recorded with IR 06N119 (76.32) followed by Ptb 33 (71.84). Similarly, percent increase in unhatched eggs over TN 1 was recorded and it was exhibited maximum by Pokkali (57.27) followed by TN 1 (53.92) and IR 06N119 (52.04). The reduction in hatching ability of plant hoppers in resistant genotypes may be attributed to antixenotic effect of plants which affect the proper orientation of insects. Maheswari *et al*. (2006) observed that in antixenotic plants, sometimes insects might come and contact but plants didn’t allow insects to damage. Sable *et al.* (2014) noted the strong non preference for oviposition on selected rice genotypes. They recorded lowest number of eggs laying on IR 64 (19.50/plant) and highest on TN1 (301.00/plant).

CONCLUSION

Oviposition of BPH was significantly high on susceptible check TN1 and low on resistant genotypes as well as on resistant check Ptb 33. All the resistant genotypes exerted adverse effect on the oviposition of BPH.

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