Incidence of Brown Planthopper (BPH) Nilaparvata lugens Stal. (Delphacidae:Hemiptera) in relation to age of the Rice Crop

Article · August 2012

CITATION
1

READS
72

2 authors:

Prashant Mangalgikar
University of Horticultural Sciences
15 PUBLICATIONS **2** CITATIONS
SEE PROFILE

Mallikarjun Harsur
National Research Centre On Pomegranate
11 PUBLICATIONS **1** CITATION
SEE PROFILE

Int. J. Agril. Sci. Vol. III (3rd Issue) pp. 197-200, 2012 ISSN NO. 0976-450X

Incidence of Brown Planthopper (BPH) *Nilaparvata lugens* Stal. (Delphacidae:Hemiptera) in relation to age of the Rice Crop

Prashant, Shivshankar, T*, Chandrashekharaiah, Naveena, N. L. and Mallikarjun
Department of Agricultural Entomology, U.A.S, G.K.V.K, Bangalore, Karnataka, India
*Department of Entomology, College of Agriculture, V. C. Farm, Mandya, Karnataka, India
E mail: nlnaveena@gmail.com
(Received on dated: 06.08.2012; Accepted for publication)

ABSTRACT

Incidence of brown planthopper (BPH) Nilaparvata lugens Stal. (Delphacidae: Hemiptera) in relation to age of the rice crop was studied in Cauvery Command Area of Karnataka, India. For this study, destructive samples were collected from different aged plants from different locations of Mandya, Mysore and Chamarajnagar districts of Karnataka. The 100-140 days old aged rice plant recorded higher number of BPH/hill compared to 80-90 days old crop. In laboratory choice test, the results from both sets clearly indicates that preference of BPH on older aged plants of 70, 100-120 days old rice plants. The maximum incidence of BPH was recorded on the 100-140 days old crop as compared to less than 100 days old crop.

No. of Pages: 5 **No. of Tables: 2** **References: 9**

Keywords: Brown planthopper, Rice, Predators of BPH.

Introduction

Rice is a most important staple food crop in world as well as in India. It is on record that rice grains were found in India as far back as 2300 B. C. (Ghose, 1961). Rice serves as a major source of calories for about 60 per cent of the world population and it provides 32.59 and 25-44 per cent of the dietary energy and protein, respectively. India has the largest area, under rice (43.81 mha), among the rice growing countries of the world, but ranks second in total production (93.36 mt) Anonymous (2008). The average yield per hectare in India is considerably low (2131 kg/ ha.) compared to that of China.

The brown planthopper (BPH), Nilaparvata lugens Stal. (Delphacidae: Homoptera), is a key pest of rice in major paddy growing belts of Asia (Dyck and Thomas, 1979). In the northern rice-growing regions, the BPH cannot survive the harsh winters, and macropterous adults from tropical and subtropical Asia migrate northwards with tropical storms in late June or early July (Kuno, 1979). Once the BPH is infested, it establishes as colonies and produces symptom as a patchy burnt up appearance in the entire field. It completes 3 to 4 generations before harvest in early fall. They can cause serious damage to rice plants directly by their feeding activity or indirectly by serving as vectors for plant pathogens that cause diseases in rice (Mochida and Okada, 1971).

Material and methods.

Surveys were conducted in Mandya, Mysore and Chamarajnagar districts of Karnataka to know the status of BHC population across the different age

group of rice plants. For this study, infested rice fields with different aged groups were selected in each place and samples were collected during the last week of November and first week of December 2009. A total of from 157 samples were collected in three locations. The data collected were grouped into six categories viz., 81-90, 91-100, 101-110, 111-120, 121-130 and 131-140 days old plants. Destructive samples were made in each field and sampled materials were kept in the polyethylene bag of 65x70cm in size. During sampling, entire rice hill was selected for destructive sampling and adjacent rice hills were pushed aside without disturbing the selected plant hill. Later the polythene bag was pulled from top to the bottom on the hill with a sudden jerk. After covering the entire hill, holding the base of the hill was cut using sickle. Immediately after cutting, the polythene bag was reversed by holding tightly in hand. The bag was shaken rigorously, so that the fauna would settle at the bottom. Care was taken to avoid escape of any fauna by way of shaking the bag downwards. Subsequently cotton wad immersed in ethyl acetate was placed into these bags. The bag was closed using a rubber band. From each location 3 destructive samplings were collected and thus collected samples were taken to the laboratory for further observations. In the laboratory, the fauna was separated with plant parts and other dirts. Later observations on counts of BPH and natural enemies were recorded using stereobinocular microscope. The fauna collected were identified.

Choice of BPH to different aged rice plants in Laboratory

Choice experiments were conducted to know the preference of BPH to different aged rice plants. For this study, two sets of experiments were conducted, one with 25, 35, 45 and 60 days old plants and second set with 30, 40, 80, 100 and 120 days old rice plants were selected. For each treatment four and five rice plants were planted at equal distance in the pot. Five replications were maintained for each set of treatment. The experiments were conducted two days after transplantation and the plants were raised in the pots were caged in a fine tubular Mylar cages with muslin cloth window. For each pot, 20 adult BPH were released at the centre and allowed for 24 hr to settle of their choice. Observations were made on the number of hoppers present on different aged plants was recorded at 9 am for three days. The data obtained was statistically analysed by using chi-square test.

Results and discussion

Observations recorded were revealed that the number of BPH/hill varied significantly. At Maddur a 100 % hopperburnt patches were observed 0.5 ha. The crop was 140 days old and the variety was Thanu. The destructive samples showed very few adults (6.00±1.14) but the plot was completely hopperburnt. The adjacent rice plots were green and were of 95 and 105 days old crop of MTU-1001, BR-2655, respectively. No hopperburn spots were observed from these plots. The destructive samples from these plots recorded 33.16±6.61and 15.25±2.67 BPH in MTU-1001 and BR-2655, respectively. A similar situation was observed at Dasanpur in 130 days old in Ankur Sonam variety. This entire field (of 1 ha) had 100% hopperburn symptom. The neighboring plots had 90 days aged crop. Both side of the Ankur sonam variety had no hopperburn symptom. The destructive sampling of IR 64 variety had 5.00±1.15 to 8.25±2.14 BPH/hill (Table 1). Similarly at Shettihalli of 135 days old MTU 1001 variety had 100 % hopperburn in 0.5ha. The destructive samples from this plot recorded the BPH population of 149±40.17/hill. The neighboring plots of aged 95 and 105 days old same variety MTU-1001 recorded (3.00±1.29 and 5.00±1.15, respectively). No hopperburnt symptoms were seen till the harvest of these plots.

Present study confirmed that 100-140 days old aged rice plant recorded highest number of BPH/hill compared to 80-90 days old crop. In comparisons with findings of Sarma, (1978), BPH population was recorded on 70-90 days old plants than any other age group of plants. Similar findings were reported by Hinckley, (1963), Bae and Pathak, (1966) and several others. From his studies it is evident that specific age of the plant (between heading to harvest) encouraged the buildup of the pest, while the pest sustained itself on all stages of plants. This finding is in full agreement with the observations of Hinckley (1963b), Bae and Pathak (1966). Irrespective of the variety under study that among the five sets of plantings August 1st planted set attracted the pest to a significant level, at a time

when the age of the plants was 70 days after transplanting and starts built up and became sever at the later stage. Studies made at IRRI during 1974 showed that the specific age groups of plants 70 to 90 days were more suitable for multiplication of the brown planthopper. Sarma (1978) has recorded BPH multiplication was maximum when 50 DAT plants compared to 70 or 30 DAT. These results also indicate interestingly the results also shows that no lateral movement of the BPH from the centre affected plot to neighbor plot. Earlier studies in elsewhere also indicates that BPH is migratory during specific time Dyck (1977). The variation in observed results in our study is due to, may be effect of place or season or changes in variety. In Mandya and surrounding rice growing belt, the populations was became sever as the age of the crop advance and more number of hoppers per hill was observed in crop with 100-140 days. This is very crucial for the formers to select the proper management practice including chemical for sustainable management of the pest.

A further confirmation was made by conducting choice test for prefernce of BPH to different age group of plants under laboratory (Table 2 and 3). The result from both set clearly indicated that higher preference of BPH to older aged plants of 70 and 100-120 days old rice plants. The maximum incidence of BPH was recorded on the 100-140 days old crop as compared to less than 100 days old crop. The present findings are in agreement with the study of Sarma (1978) on different age groups of rice plants. Indicate a maximum rate of multiplication of BPH was noticed on 50 DAT plants followed by 70 and 30 DAT. It is obvious that higher the initial population higher is the rate of multiplication. From his study it can be seen that rate of multiplication of BPH at 30 DAT plants was low, but the infestation for a period of 10 days resulted in cent per cent hopperburn, while the infestation with BPH on 70 DAT plants for 21 days resulted in varying degrees of hopperburn 30, 40 and 60 %, respectively. It was further noted that though there was maximum population growth of BPH on 50 DAT the hopperburn was nil, 20 % and 60% with single, three and five pairs of BPH, respectively. The results are agreement with the findings of Sogawa and Cheng (1977) in Japan.

Table 1: Incidence of BPH across different age groups of rice plants

Different aged plants	Total fields visited	Mean±S.D			
		BPH	Spiders	mirid bug	Carabids
81-90	24	7.30±2.71	1.42±0.52	0.40±0.53	0.00±0.00
91-100	15	5.08±1.12	1.10±1.01	0.55±0.51	0.11±0.19
101-110	29	17.91±6.09	1.67±0.58	0.37±0.23	0.06±0.10
111-120	39	21.09±6.00	0.73±0.46	0.18±0.31	0.04±0.08
121-130	32	20.07±3.00	0.37±0.55	0.21±0.36	0.05±0.08
131-140	18	19.72±5.60	1.05±1.08	0.28±0.25	0.05±0.09

Table 2 : Choice of BPH to four different aged plants

Observed at	No. of BPH released	No. of BPH/Age of the plants				Chi. sq. value	P
		70	45	35	25		
24hrs	100	40(40.00)	39(39.00)	13(13.00)	8(8.00)	34.16	P>0.01
48hrs	95	52(54.73)	25(26.31)	14(14.73)	7(7.36)	49.48	P>0.01
72hrs	91	45(49.45)	15(16.48)	24(26.37)	7(7.69)	35.36	P>0.01

Note: Figures in the parenthesis indicates the per cent of BPH recorded on the different aged plants

Table 3: Choice of BPH to five different aged plants

Observed at	No. of BPH released	No. of BPH/Age of the plants					Chi. sq. value	P
		120	100	80	40	30		
24hrs	80	28(35.00)	23(28.75)	10(12.5)	10(12.5)	9(11.25)	19.62	P>0.01
48hrs	80	19(23.75)	19(22.75)	12(15.00)	15(18.75)	15(18.75)	2.24	P<0.05
72hrs	67	20(29.85)	18(26.85)	11(16.41)	9(13.4)	9(13.43)	8.14	P>0.01

Note: Figures in the parenthesis indicates the per cent of BPH recorded on the different

References

1. **Bae, S. H.** and **Pathak, M. D.** (1969) Common leafhopper-planthopper populations and incidence of tungro virus in diazinon - treated and untreated rice plots. *Journal of Economic Entomology* 50: 450.
2. **Dyck, V. A.** (1977) The brown planthopper problem. Paper presented at the International Rice Research Confernce on" Brown Planthopper Symposium" April 18-22, 1977 at IRRI, Los Banos, Philippines, pp. 24.
3. **Dyck, V. A.** and **Thomas, B.** (1979) The brown planthopper problem, in Brown Planthopper: Threat to Rice Production in Asia. International Rice Research Inst itute, Los Banos, Laguna, the Philippines, pp. 1.
4. **Hinckley, A. D.** (1963b) Insect pests of Rice in Figi, FAO, PL. *Pro.bull.*, 11(2): 31.
5. **Hirao. J.** (1977) Forecasting brown planthopper outbreaks in Japan, paper presented at International rice research conference on BPH symposium. April 18-22, IRRI, Los Bonus, Philiphines, Pp 7.
6. **Kuno, E.** (1979) Ecology of the brown planthopper in temperate regions, in Brown Planthopper: Threat to Rice Production in Asia. International Rice Research Inst itute, Los Banos, Laguna, the Philippines, pp. 45.
7. **Mochida, O.** and **Okada, T.** (1971) A list of the Delphacidae (Homoptera) in Japan with special reference to host plants, transmission of plant diseases, and natural enemies. *Bulletin of the Kyushu Agricultural Experiment Station* 15: 737.
8. **Sarma, P. A.** (1978) Studies on ecology of rice BPH, Ph.D thesis, UAS, GKVK, Bangalore. pp. 61.
9. **Sogawa, K.** and **Cheng, C. H.** (1977) Economic thresholds, nature of damage and losses caused by brown planthopper. Paper presented at the International Rice Research Conference on "Brown planthopper symposium" April 18-22, 1977 at IRRI. Los Banos, Philippines, pp. 25.

#####