

Brown Plant Hoppers in Rice and Correlation Factors

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Abstract

Attempts are being made in the Gujarat state to increase the rice production by the high yielding varieties, adopting intensive cultivation including double cropping in a year. Such efforts in turn increased pest intensities and losses caused by pests remained an important constraint to achieve high rice yields. Similarly, lack of pest resistant varieties, poor water management and lack of suitable pest and disease management strategies are the major constraints in rice production.

Keywords: Seedlings; Green leafhopper; Evaluated varieties; Paddy crop; Agronomic practices; Rice crop

Introduction

A list of major, minor and sporadic pests attacking paddy crop in Gujarat is reported by Korat and Pathak. Rice hoppers complex infest all stages of the rice crop and both nymphs and adults suck the sap from the base of the tillers, resulting in yellowing and drying of the plants. The symptoms spread as patches of infestation from a point outwards within the field. This condition is known as 'hopper burn'. Outbreaks of plant hoppers recently have caused serious concern and in the last decade plant hoppers have rapidly spread to newer non-traditional areas [1]. The seedlings were transplanted when they were 25 days old with a spacing of 20 x 15 cm. All the post sowing recommended agronomic practices were followed and the experimental area was kept free from insecticidal spray throughout the crop season in order to record the observations on Green leaf hopper incidence. To know the incidence of green leaf hopper, *N. virescens* the observations were recorded by counting total number of nymph and adults on twenty randomly selected spots each comprising five hills at weekly interval. Similarly, to assess the damage intensity the observations were recorded by counting the total number of damaged and healthy hills from randomly selected twenty spots of one m² area. The spots were selected by walking fashion in the field. The damage intensity of paddy leaves due to green leaf hopper was counted by examining selected hills. Observations were recorded at weekly interval from randomly selected hills till harvest of paddy crop. The scale and reaction for resistance/susceptibility score was judged by using Standard Evaluation System for Rice for the insect pest. Out of the eighteen varieties evaluated against *N. virescens*, the results revealed that none of the variety was free from the attack of green leafhopper and the difference in hill damage in different varieties was found significant [2]. The pooled data on evaluation of 18 varieties against *N. virescens* revealed the significant difference in hill damage in varieties, where the variety GR-104 showed significantly low hill damage. In susceptibility order, GR-103, GR-102 and GR-101 were also recorded less susceptibility and found at par with each other. The next variety GNR-2 reported moderate 0.54 per cent hill infestation and was found at par with GAR-1, Narmada, while GR-7 showed significantly moderate hill damage.

Discussion

Significantly highest hill damage was found in variety Masuri, Gurjari and Jaya with 1.87, 2.28 and 2.81 per cent infestation, respectively. The interaction effect between varieties and two year was non-significant revealed consistent performance of varieties. On corrected mortality index basis, GR-101, GR-102, GR-103 and GR-104

grouped into resistant and recorded hill damage between 1 to 10 per cent. While, GNR-2, GAR-1, Narmada and GR-7 and were categories into moderately resistant with hill damage between 11 to 25 per cent. Other varieties viz., NAUR-1, GNR-3, GAR-2, IR-22 and GR-12 were found moderately susceptible reaction and showed hill damage between 26 to 50 per cent. The variety IR-28, GR-11 and Masuri were recorded susceptible with hill damage between 51 to 75 per cent, whereas, Gurjari and Jaya were grouped into the highly susceptible category and showed hill damage from 76 to 100 per cent [3]. The present was supported by the finding of Garg who reported the greatest population on the most susceptible variety TN1, followed by Ratna, Jaya, IR-20, Mudgo and Vijaya. Sekizawa and Ogawa studied on rice varieties resistant to green leaf hopper, *N. cincticeps* for nymphs and adults on rice seedlings were showed significant differences in their mortality and preference for different varieties. Varietal differences were also seen in the growth of the nymph and inhibition of plant elongation caused. Values for resistance to *N. impicticeps* were different from those for *N. cincticeps*, indicating that different resistance factors may be involved [4]. Almost all varieties resistant to *N. cincticeps*. The findings on per cent hill damaged due to green leaf hoppers indicated significant differences among evaluated varieties and on the basis of corrected mortality index basis, GR-101, GR-102, GR-103, and GR-104 found resistant and recorded per cent hill damage between 1 to 10 per cent. While, GNR-2, GAR-1, Narmada and GR-7 and were categories into moderately resistant with hill damage between 11 to 25 per cent. Other varieties viz., NAUR-1, GNR-3, GAR-2, IR-22 and GR-12 were found moderately susceptible showed hill damage between 26 to 50 per cent [5]. Variety IR-28, GR-11 and Masuri were recorded susceptible with hill damage between 51 to 75 per cent, whereas, Gurjari and Jaya were grouped into the highly susceptible category and showed hill damage from 76 to 100 per cent. Rice belongs to the family-Graminae, and it is one of the world largest cereal crops fulfil the caloric need for millions of people. Rice is considered appropriate crop for our country and play a significant role in our national food security. The total area under rice cultivation is 44 million ha with Production 117.94 million tonnes.

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Uttar Pradesh is the second largest producer of rice after West Bengal occupying 5.5 million ha area under rice with annual production of 15.3 million tonnes [6]. The major basmati rice producing states are Haryana, Punjab, Uttar Pradesh, Jammu & Kashmir, Uttarakhand, and Himachal Pradesh. Haryana is the major basmati rice cultivating state, producing more than 60 per cent of the total basmati rice produced in India, total area of basmati rice cultivation in India was 1555 million ha, and in U.P. is occupied 256.2 million ha. Rice is the staple food in developing countries. It is an important crop because it contains high nutritive value per 100 gm of rice is energy 1,527 KJ, carbohydrate 76.7 gm., fibre 0.6 gm., fat 1.0 gm., protein 7.5 gm., water 13.3 gm., vitamin B1 0.070 mg, vitamin B2 0.049 mg, vitamin B3 1.6 mg, vitamin B5 1.014 mg, calcium 10 mg, phosphorous 190 mg and iron 3.3 mg. Other edible use includes rice flakes, puffed rice, rice wafers and canned rice. It is also used in starch and beverage industries [7]. Rice environment attacked by 800 species of different insects around the world. Out of that, insects' pest considered as rice major pest, cause economic damage crop such as stem borer, plant hopper, grass hopper, defoliators and gall midge in China and South Asia having measure pest of rice like yellow stem borer, leaf folder, plant hopper and gall midge, and brown plant hopper. The Brown plant hopper is a monophagus insect and it measure about small brownish in colour and sucking insect, belonging to the suborder Homoptera and order hemiptera and it belong to family Delphacidae. Both nymph and adult of Rice brown plant hopper suck the cell sap of the plant directly and it is also a vector transmitting viral disease like grassy stunt and ragged stunt. Nilaparvata lugens, caused economic damage by sucking phloem sap which leads the circular patches in the field is termed as hopper burn symptoms and cause several yield losses. The estimated loss of rice crop yield due to brown plant hopper is about 10 to 30 per cent. About 50 per cent of Indian farmer use insecticides ranging from one to six applications per crop season on leaf folder, brown plant hopper and white backed plant hopper [8]. The present investigation was carried out during Kharif, 2019 in randomized block design with replicated thrice and have a plot size of 4x3 m². The seedlings transplanted in main field and the variety, Pusa Basmati-1 was selected for present investigation for population dynamics of Brown plant hopper population and the normal agronomic practices were follow in the crop grown under the prevailing condition at Crop Research Centre of Agriculture and Technology Meerut, and approximately same agricultural practices farmers were also adopted observations were taken by direct visual counting method. In this method, the random samplings of ten hills were carried out for the purpose of population fluctuation of the Brown plant hopper in basmati rice field [9]. Hills were tagged out from each plot of untreated control. These plants were observed regularly at weekly interval. The nymphal and adult population of Brown plant hopper were recorded per hill starting from the transplanting till the harvest of the crop. The meteorological data was also recorded throughout the crop season

[10]. The Brown plant hopper population was lowest suggesting that low rainfall and low humidity were at least partially responsible for the decrease population of Brown Plant Hoppers. Samy reported that the temperature increase above 34°C is detrimental to the development of Brown plant hopper. The present findings are supported by the findings Sarkar et al., the incidence of BPH in the beginning was very low and the population increased along with the growth of the crop.

Conclusion

The population was more during the vegetative growth stage of crop. The present findings are supported by the findings Kumar et al., who reported that the Brown plant hopper population was low from July to August where, as maximum population was recorded in mid-September.

Acknowledgement

None

Conflict of Interest

None

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