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Studies on Varietal - cum - Manurial Responses on the Incidence of Paddy Stem - Borer (*Tryporyza incertulas* Wlk)

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The experiment on the relationship between paddy stem-borer incidence and different levels of nitrogen application on high yielding varieties of paddy demonstrated that the increase in the nitrogen level invariably resulted in increase in the stem-borer infestation. However, this corresponding increase of infestation did not counteract the yield potentials of the varieties, which, in fact, rose up with increase in the nitrogen level to 150 Kg N/ha. At 200 Kg N/ha, the yield did not increase and remained on par with that of 150 Kg N/ha. Amongst the varieties IR 20 and Vijaya recorded minimum infestation of paddy stem borer at all levels of nitrogen application while IR 8 was found to be the most susceptible strain.

According to Nair (1969) varieties containing higher p-methyl acetophenone (Oryzanone), which acts as an attractant for rice stem borer, were found to be more susceptible and *vice-versa*. The content of this compound remains higher in rice plants treated with excessive nitrogen and lower in that treated with silica. Vijaya and IR 20 amongst the new dwarf varieties, possess considerable tolerance to stem-borers (Chakrabarti *et al.*, 1971, Vevai, 1972) while IR 8 was reported to be highly susceptible (Roy *et al.*, 1969). Rice fields receiving higher doses of nitrogenous fertilizers are generally preferred by stem borer moths for oviposition and also suitable for larval growth (Richardson *et al.*, 1964; Varatharajan and Nagaraja Rao, 1965, Israel *et. al.*, 1965). According to Saha and Saharia (1970), the application of nitrogen increases the stem borer infestation, but this increased dose not counteract the yield potentials, but it improves with every higher dose of nitrogen up to 75 Kg N/ha.

MATERIALS AND METHODS

With a veiw to determine the effect of different levels of nitrogen application on the incidence of paddy stem-borer on a number of paddy varieties, an experiment in split plot design was laid out during *kharif*, 1971, at Bihar Agricultural College Sabour, with varieties in main plots and various levels of nitrogen in the sub-plots. The varieties included in this study were Jaya, Vijaya, IR 20 IR 22. IET 1039 and IR 8. There were five levels of nitrogen in the form of urea applied in two split doses, half as basal dressing and the other half as

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top dressing after 30 days of transplanting. The nitrogen levels in kg/ha. were 0 (N_0), 50 (N_1), 100 (N_2), 150 (N_3) and 200 (N_4). The basal dressing of 100 kg P_2O_5 and 50 kg K_2O/ha. was done at the time of preparation of the land. The size of each main plot was 18 M X 5.6 M and that of sub-plot 4,8 M X 3.2 M with a spacing of 0.6 M between two sub-plots and 0.8 M between two main plots as well as between the two replications.

After 45 days of transplanting infestation of paddy stem borer, in different treatments, was determined on the basis of appearance of 'dead hearts' by examining 20 hills selected at random from each sub-plot; diagonally, and by counting the healthy tillers as well as infested tillers. Later on, when the crop attained maturity infestation was noted on 'white earheads' formation basis on tillers selected at random from each sub-plot diagonally, by counting the 'white earheads' as well as the healthy panicles. Finally the crop yield was recorded.

RESULTS AND DISCUSSION

From the data, on the appearance of 'dead hearts' under various treatments, presented in Table I, it will appear that the varieties, nitrogen levels and their interactions produced significant effect on the paddy stem borer infestation.

TABLE I. Mean percentage of 'dead hearts' appearance under different treatments (parenthesis denotes transformed value)

Varieties	N_0 0 kg/ha	N_1 50 kg/ha	N^3 100 kg/ha	N_2 150 kg/ha	N_4 200 kg/ha	Mean
Jaya	10.8 (19.18)	12.3 (20.63)	12.7 (20.91)	24.7 (29.83)	30.5 (33.52)	18.22 (24.80)
Vijaya	6.4 (14.65)	9.7 (18.14)	11.8 (20.08)	12.1 (24.42)	19.5 (26.24)	11.91 (20.71)
IR 20	5.5 (13.50)	8.2 (16.64)	10.5 (18.90)	14.5 (22.38)	18.3 (25.32)	11.39 (19.35)
IR 22	1.07 (19.09)	13.7 (21.72)	17.6 (24.80)	22.44 (28.24)	29.6 (32.99)	18.82 (25.57)
IET 1039	9.7 (18.10)	13.0 (21.17)	17.3 (24.61)	22.6 (27.73)	29.2 (32.67)	18.17 (24.86)
IR 8	15.7 (23.30)	18.7 (25.65)	20.7 (27.10)	28.7 (32.36)	34.7 (35.88)	23.63 (28.86)
Mean	9.77 (17.97)	12.62 (20.64)	15.12 (22.74)	20.67 (27.50)	26.92 (31.10)	

	C. D. at 5%
Between varieties	0.45
Between nitrogen levels	0.41
Variety at the same level of N	1.01
Nitrogen for the same variety	1.09

Amonghst the different varieties, IR 8 recorded significantly more 'dead hearts' as compared to IR 22, IET 1039 Jaya, Vijaya and IR 20 in decending order. It will be further seen that with the increase in the levels of nitrogen, the percentage of 'dead hearts' also increases. This trend was maintained upto a level of 200 kg N/ha application. The maximum number of dead hearts, were recorded at 200 kg. N/ha followed by 150 kg N/ha, 100 kg N/ha, 50 kg N/ha and O kg N/ha (control) and in this order each being significantly superior to the preceeding levels, in respect of 'dead hearts' appearance.

The interaction between varieties and nitrogen application indicates that nitrogen had significant influence on the effect of varieties and *vice-versa*. It was further found that all the varieties were subjected to significantly higher percentage of 'dead hearts' at 200 kg N/ha, as compared to lower levels of nitrogen. As the levels of nitrogen decreased, different varieties showed a downward trend in respect of 'ded hearts' but each variety maintained its rank in its respective level of nitrogen.

The data on 'white earheads' formation, presented in Table II showed that the varieties, nitrogen as also their interaction produced significant effect. From the persual of the data on varietal effect, it may be seen that the highest percentage of white earheads was

TABLE II. Mean percentage of 'white earheads' formation under different treatments (Parenthesis denotes transformed value)

Varieties	N_0 0 kg/ha	N_1 50 kg/ha	N_2 100 kg/ha	N_3 150 kg/ha	N_4 200 kg/ha	Mean
Jaya	7.3 (15.73)	10.3 (18.72)	10.5 (18.91)	25.6 (30.43)	30.0 (33.21)	16.76 (23.40)
Vijaya	5.3 (13.31)	7.2 (15.61)	9.7 (18.14)	15.7 (23.34)	19.4 (26.13)	11.47 (19.31)
IR 20	4.2 (11.82)	7.9 (16.32)	8.7 (17.15)	12.2 (20.46)	17.2 (24.45)	10.05 (18.04)
IR 22	9.8 (18.24)	11.8 (20.06)	15.8 (23.42)	20.0 (26.56)	27.6 (31.69)	17.00 (24.00)
IET 1039	8.4 (16.89)	12.6 (20.81)	15.2 (22.99)	19.7 (26.34)	26.3 (30.89)	16.48 (23.59)
IR 8	12.1 (22.91)	17.6 (24.64)	20.2 (26.74)	25.5 (30.33)	31.7 (34.57)	22.05 (27.88)
Mean	8.38 (16.49)	12.26 (19.40)	13.37 (21.23)	19.80 (26.25)	25.38 (30.15)	

	C. D. at 5%
Between varieties	0.80
Between nitrogen levels	0.46
Variety at the same level of N	1.15
Nitrogen for the same variety	1.40

recorded in IR 8 which was significantly higher than those recorded in IR 22. There was no significant difference among IR 22, IET 1039 and Jaya. It was further observed that there was an increase in the number of white earheads with the increase in levels of nitrogen. The effect of interaction between nitrogen and varieties recorded that the varietal behaviour differed significantly with the change in the nitrogen levels. An increase in the level of nitrogen produced increased percentage of white earheads, irrespective of the variety. Similar results have been reported by Hussain and Rao (1967).

From the yield data presented in Table III, it would be seen that different levels of nitrogen produced significant effect on the yield of grain, while the effect of variety as also that of interaction between varieties and nitrogen had no effect.

Though the highest yield of 5371 kg. per hectare was recorded in 200 kg N/ha followed by 5107 kg /ha in 150 kg N/ha but these treatments were found at par statistically. The crop yields at 150 kg N/ha, 100 kg. N/ha, 50 kg N/ha and no nitrogen (control) differed significantly, being 5107 kg. 4645 kg, 3623 kg. and 1938 kg. per hectare respectively. Thus, it may be concluded that with increase in the levels of nitrogen, the yield also increases. This finding is in conformity with the finding of Saha and Saharia (1970).

Interaction of nitrogen and variety being non-significant indicates that varieties are independent of each other, not influenced by other in enhancing the yield and thus they maintained their separate identity altogether.

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TABLE III. Mean grain yield in kg/ha of different varietiey under different levels of nitrogen

Varieties	N_0 0 kg/ha	N_1 50 kg/ha	N_2 100 kg/ha	N_3 150 kg/ha	N_4 200 kg/ha	Mean
Jaya	1359	2422	4785	4912	5200	3736
Vijaya	2628	4305	4923	5727	6038	4724
IR 20	1912	2816	4368	5046	5387	3906
IR 22	1392	4053	4338	4313	4598	3739
IET 1039	2433	4043	4338	5473	5632	4388
IR 8	1904	4098	5119	5151	5372	4329
Mean	1938	3623	4645	5107	5371	

	C. D. at 5%
Between varieties	255 kg/ha
Between nitrogen levels	221 kg/ha
Variety at the same level of N	548 kg/ha
Nitrogen for the same variety	542 kg/ha

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