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EFFECT OF NITROGEN AND PLANT SPACING ON BACTERIAL LEAF BLIGHT OF RICE*

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The effects of three doses (0, 60 and 100 kg N/ha) of Nitrogen in the form of Urea and four plant spacings on the bacterial leaf blight (*Xanthomonas campestris* PV. *oryzae*) severity of five rice varieties/mutants (BR 4, Nizersail, Mut NS 1, Mut NS 2 and Mut NS 3) were determined under natural field conditions at the Institute of Nuclear Agricultural farm, Mymensingh during cropping season of 1982. The results indicated that there was no significant increase of bacterial leaf blight severity at all doses of nitrogen used. Closest plant spacing showed significant increase of disease severity than wider plant spacings. The interaction effect of the nitrogen doses applied and plant spacing was significant. The variety BR 4 showed significantly lowest disease severity followed by mutant NS 5, NS 2, NS 1 and Nizersail.

High nitrogen application and wider spacing between plants have been reported to increase the incidence and severity of bacterial leaf blight (BLB) of rice (Reddy *et al* 1979, Have and Kauffman, 1972). These authors together with others have expressed their opinion that the problem is severe with

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nitrogen responsive dwarf rice cultivars i.e. high yielding varieties (HYV) (Oh 1973; D badath and Padmanaban, 1971). In Bangladesh, BLB has recently become a major disease of rice. Scientists and researchers have expressed the same opinion as stated above.

The present investigation was taken to see the influence of the application of nitrogen fertilizer and plant spacing on the severity of BLB of five rice varieties / mutants.

MATERIALS AND METHODS

Five rice varieties / mutants were used in this study (Table 1). The mutants NS 1, NS 2 and NS 5 were mutation derivative of the variety Nizersail. The variety BR 4 has been developed by Bangladesh rice Research Institute (Anonymous, 1976).

Table 1. Effect of three doses of N-fertilizer and four plant spacings of bacterial leaf blight of five varieties/mutants of rice. (figures having common letter do not differ significantly)

Treatments	Bacterial leaf blight severity (mean)
Varieties	
Mut NS 1	3.47 b
Mut NS 2	3.15 bc
Mut NS 5	2.82 c
Nizersail	3.97 a
BR 4	2.48 d
N fertilizers (kg ha)	
0	3.11 a
60	3.08 a
100	3.34 a
Plant spacings	
10 cm x 20	3.31 a
15 cm x 20	3.16 ab
20 cm x 20	3 15 b
25 cm x 20	3.09 b

The experiment was conducted at the Institute of Nuclear Agriculture Farm, Mymensingh during cropping season of 1982 in a split-split plot design with N fertilizers in the main plot, varieties in the sub plots and spacings in sub-sub plot (unit plot). Three rates of nitrogen in the form of urea and four plant spacings were maintained as stated below :

Rates of N : 0, 60 and 100 kg N/ha

Spacings : 10, 15, 20 and 25 cm between plants with 20 cm between rows;

There were altogether 60 treatments each replicated thrice.

The Unit plot size was 3 x 2.4 m². Sixty percent of Urea and a blanket dose of TSP (80 kg P_2O_5/ha) and MP (60 kg K_2O/ha) were applied at transplanting while the rest of urea was applied at primodial initiation (P1) state of plant growth.

Symptoms of the disease was studied in situ. The pathogen was isolated following tissue maceration method and identified.

The plants were allowed to grow so that the incidence and severity of BLB takes its own course. Under natural field conditions disease severity was estimated on the upper three leaves of each of 15 plants randomly selected in each unit plot at booting stage by using the disease severity scale 0 to 8 (Nakai and Goto, 1977).

The results were subjected to analysis of variance and treatment effects were compared to each other by Duncan's New Multiple Range Test.

RESULTS AND DISCUSSION

The disease appeared with typical symptoms of bacterial leaf blight. Water-soaked lesions appeared on the tip or edge of the leaves. These enlarged and proceeded downwards along the margin. With progress of the disease the affected leaf parts got blighted and finally dried up showing with green and infected portions. Affected rice leaves were collected and macerated. The Pathogen was isolated on peptone-sucrose agar and identified as *Xanthomonas campestries* pv. *oryzae* on the basis of its morphological and cultural properties and other confirmatory tests.

The average disease severity of BLB as scored on five rice varieties/mutants in response to three rates of nitrogen and four plant spacings is given in Table 1.

It is evident from the table that the rice variety Nizersail showd significant higher disease severity than all other varieties / mutants tested. The variety BR 4 carried the least disease among all the varieties / mutants and the remaining three mutants were graded intermediate. Among the mutants NS 5 had better resistance to BLB than its mother variety Nizersail and the other two mutants. The response of the mutants NS 1 and NS 2 to BLB severity was not found statistically different.

The differences in the mean BLB severity due to application of three rates of N was not statistically significant. Bacterial leaf blight severity was found to increase significantly with narrowest spacing.

The interaction effects of nitrogen doses and varieties / mutants (N x V) (Table 2) were significant indicating that nitogen dose increase had no influence on BLB severity. The interaction effects of nitrogen doses and spacings (N x S) were significant indicating that both the factors acted together in increase of BLB severity. However, the interaction effects of varieties/mutants and spacing (V x S) were significant indicating that the two factors acted independently. On the otherhand, interaction effects of three factors

Table 2. Mean sum of squares for bacterial leaf blight severity of five rice varieties/mutant in response to nitrogen and plant spacing.

Source of variation	Degree of freedom	Disease severity
Replication	2	2.03
N-fertilizer (N)	2	1.24
Error (a)	4	1.00
Variety (V)	4	11.86**
N x V	8	0.54
Error (b)	24	0.28
Spacing (s)	3	0.38*
V x S	12	0.06
N x S	6	0.40*
N x V x S	24	0.11
Error (c)	90	0.11

* : Significant at 0.05 level of probability
** : Significant at 0 01 level of probability

(N x V x S) were statistically insignificant indicating that the effect of one or more factors was not significant.

In the present study, it was found that application of N-fertilizer in its higher rate (100 kg/ha) did not increase BLB severity significantly It is a general conception that heavy nitrogenous manuring increase the proneness of rice plant to blast and bacterial leaf blight of rice (Krishnaswami. 1952 ; Ganguly *et al.*, 1954 ; Haygood *et al.* 1982). Have and Kauffinan (1972) and Reddy *etal.* (1979) have demonstrated that N levels above 160 and 100kg/ha respectively did increase BLB severity and reduced yield. Thus; the results of the present study do not differ with these two reports.

Spacings between plants influenced significantly the level of disease incidence. Plants in narrower spacings were severely affected by BLB. Spacing of plant populations affects tiller number and plant height, and these in turn affect the micro-climate around the plant leaves. Under low to moderate levels of nitrogen, Have and Kauffman (1972) have observed that the rice variety IR 8 showed more disease symptoms at wider spacings but with very high level of N (above 100 kg/ha) the differences in BLB severity for differences in spacings were not significant. In the present study with fairly high level of N (100 kg/ha), the disease increased at narrower spacings.

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ASSOCIATIVE EFFECTS OF POTATO VIRUS Y AND FUNGAL DISEASES IN CHILLI (*Capsicum annuum* L)

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Potato virus Y infection in Chilli did not influence the germination of *Colletotrichum capsici* (Syd.) Butler and Bisby but the spore germination of *Leveillula taurica* (Lev.) Arn. was less in the extract from PVY - infected chilli leaves when compared to that of sap from healthy leaves. Prior infection of PVY increased the susceptibility of Chilli plants to *C. capsici*.

In nature, plant pathogens seldom occur in isolation yet, relatively little work has been done on interaction between two or more pathogens capable of infecting a single host. In the present study the effect of potato virus Y infection on two fungal disease was studied.

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