International Scholars Journals

African Journal of Agronomy ISSN 2375-1185 Vol. 4 (4), pp. 245-246, April, 2016. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Short Communication

Salt tolerance of rice varieties under salt-affected soil at Zaidi Farm

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Accepted 6 March, 2016

An experiment was conducted to investigate salt tolerance of eight rice varieties viz; K-282, Shaheen Bas, Bas-370, PB-95, IR-6, COM-2004, Basmati-370 and IR-9. Under salt-affected soil having (EC=7.5 dsm^{-1}, pH=8.3, SAR=47and texture silty clay loam) at Zaidi Farm, Kakar Gill, Sheikhupura. This study was operated to determine the number of productive tillers, panicle length, straw and paddy yield for salt tolerance. IR-6 had higher straw yield while paddy yield was maximum in case of COM-2004 showing better salt tolerance. As IR-9 failed to produce paddy yield under salt-affected conditions, therefore, it was placed at the lowest position. However, on the basis of this study I R-9, Bas-370 and Bas-385 could easily be ranked on the salt sensitive rice line.

Keywords: Salt tolerance, panicle length, mass screening, paddy and straw ratio

INTRODUCTION

Rice (*Orzya sativa L.*) is the most important staple food for more than half of the world's population Average yield of rice in world is about 3500 kg ha^{-1} more than wheat (2310 kg ha^{-1}) and corn 3200 kg ha^{-1} (Fageria *et al*., 1997). It is cultivated on an area of 1358 thousand hectares in Punjab with the production of 2081 thousand tones (NFDC, 2002). It earns the highest foreign exchange contribution about 20% of the total export of the country. But under extreme saline conditions growth and yield of both Basmati rice and coarse rice varieties is much lower as compared to be obtained from productive lands which may be due to cultivation of rice susceptible to salinity. Successful rice crop production with good grain quality on salt-affected soils demands the suitable variety selection particularly with better salt tolerance. Naturally salt-affected fields are extremely variable in their horizontal and vertical salt distribution. Moreover, under field conditions different stresses such as heat, cold, drought, nutrient imbalance, insects and pest attack, etc. affect plants to varying degrees in addition to salinity. Screening under field conditions is therefore difficult, time consuming and requires more space etc. Nevertheless, the salt tolerant cultivars must produce satisfactory results in the field before any recommendation could be made for their general cultivation in salt-affected lands.

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MATERIALS AND METHODS

A research protocol was conducted in salt-affected soil (EC=7.5 dsm^{-1}, pH=8.3, SAR=47and texture silty clay) at Zaidi farm Kakar Gill. Sheikhupura to see the level of salt tolerance of eight rice lines. These rice lines/varieties were: KS-282, Bas-370, Bas-385 .COM-2004, Shaheen Bas, IR-9, IR-6 and .PB-95

Thirty-day old seedlings of three lines/varieties were transplanted in a puddle field with 2 numbers of seedlings hill^{-1}. Experiment was laid out in completely randomized block design with four replications. A basal dose of NPK and Zn as urea, SSP, SOP and $ZnSO_4$ was applied. All the PK, Zn and half N at the transplanting time and remaining half N at the time of panicle initiation. The data of number of tillers per hill, productive tillers per hill, panicle length (Cm) straw yield (t. ha.), paddy yield (t.

Table 1. Salt tolerance of rice lines for their salt tolerance in a salt-affected field. (Average of Four Replications)

Varieties	Av. Tillers (hill^{-1})	Productive Tillers (hill^{-1})	Panicle Length (cm)	Straw Yield (tha-1)	Paddy Yield (tha^{-1})	1000 Paddy weight (g)	Paddy: Straw Ratio
Shaheen Bas	11.01 cd	13.65 bc	20.55 bc	2.34N.S	0.803 bc	13.15 ab	0.34 a
KS-282	25.05 a	13.51 bc	16.30 c	3.43	0.848 b	11.50c	0.25 b
IR-6	10.70 e	7.45 d	16.20 c	5.40	0.535 d	13.68 a	0.10
COM-2004	22.55 ab	17.30 a	16.95 c	3.15	1.004a	13.51 a	0.32 ab
PB-95	13.30 c	10.15 c	28.85 a	4.68	0.5794e	6.50 e	0.16 c
Bas-385	19.45	10.36c	29.40a	5.37	0.596de	7.20de	0.16c
IR-9	7.70d	_	_	4.57	_	_	_
Bas-370	18.70bc	14.10b	23.00b	2.37	0.790c	12.401a	0.33a
LSD	5.60	3.20	6.40	NS	0.156	1.02	.09

Values followed by same letter(s) are statistically similar at P=0.05 level of significance. The means were separated by using least significance differences (LSD).

ha), 1000- grain weight and paddy straw ratio were recorded at the time of harvesting for the evaluation of salt tolerance.

The data were subjected to ANOVA and treatment means were compared by Fisher's Least Significant Difference (LSD) test and alpha 0.05 (Steel et al., 1997).

RESULTS AND DISCUSSIONS

Data regarding the number of productive tillers, panicle length, straw and paddy yield obtained under salt-affected field conditions given in Table1. Maximum average number of productive tillers hill^{-1} was produced in KS-282 followed by COM-2004, while this number was minimum in case of IR-9. But the maximum number of productive tillers hill^{-1} were found in the case of COM-2004 followed by Shaheen Basmati and KS-282.The maximum panicle length was attained by Bas-385 which was statistically at par with PB-95. The minimum panicle length was in COM-2004.The highest straw yield was obtained from IR-6 and Bas-385, whereas COM-2004 produced the maximum paddy yield a compared to rest of the lines/varieties included in this study. KS-282 and Shaheen Bas produced about the same paddy yield and were next to COM-2004 on the basis of absolute paddy yield. These varieties were exceptionally sensitive to salinity at panicle initiation stage due to which reduction in grain yield occurred (Giriaj et al., 1976; Verma and Nene, 1984; Aslam et. al., 1994; Naeem et. al., 1996). 1000-grain paddy weight was the maximum in the case of COM-2004 and was very close to Shaheen Bas. Paddy: straw was the highest in Shaheen Basmati followed by Bas-370 and Bas-385. IR-9 failed to produce any paddy crops grown on saline soils invariably suffer serious yield reductions (Qadar, 1995). Similar results have been documented by (Sinha, 1983; Munns, 1993) and (Aslam et al., 1995).

Overall, IR-6 had higher straw yield while paddy yield was maximum in case of NIAB-6 showing better salt tolerance. As IR-9 failed to produce paddy yield under salt-affected field conditions, therefore, it was placed at the lowest position. However, on the basis of this study IR-9, Bas-370 and Bas-385 could easily be ranked as salt sensitive rice lines.

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