SHORT COMMUNICATION

Effect of Salinity on Growth and Yield of Sorghum Genotypes

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Sorghum is a crop of world-wide importance and is unique in its ability to produce under a wide array of harsh environmental condition (House, 1995). Among agricultural crops, sorghum is naturally drought and salt-tolerant crop that can produce high biomass yield with low input. In terms of salinity tolerance it also be known as a moderately tolerant crop with the almost salinity tolerance of 6.8 dSm^{-1} (Greenway & Munns, 1980). However, salinity is one of the major environmental stresses affecting plant growth and development results in severe agricultural losses (Ashraf and Wahed, 1993). In Bangladesh about 1.5 million hectares out of 2.85 million hectares of coastal and offshore area is affected by different degrees of salinity which is equivalent to that constitute about 53% of the cultivable area in 13 districts of the South-East part. Agricultural land uses in these areas are very poor and cropping intensity is very low (62% only) where the country average cropping intensity is 190% (MOA, 2007). Actually, this research work is the first attempt to evaluate salinity tolerance of different sorghum genotypes in Bangladesh. This study could provide useful information for commercializing sorghum production in Bangladesh, especially in the southern region. Taking all these considerations, the present research work aimed at evaluating the salt tolerance efficiency of some sorghum genotypes on growth, yield and yield contributing characters.

The experiment was conducted at Bangladesh Institute of Nuclear Agriculture (BINA), Mymensingh. It was a two factorial experiment. Factor one consisted of four levels of salinity *viz.* control (0.42dSm^{-1}), 6, 9 and 12 dSm^{-1} and factor two consisted of five genotypes of grain sorghum *viz.* Safal 999, Debudoy, Jamboo, Hybrid Sorgo and Hybrid Sudan. The experiment was laid out in a complete randomized design (CRD) with 4 replications. Total number of pots used in this study was 80 (4 salinity levels × 5 genotypes × 4 replication). PVC pots were used in this experiment. The required amount of salt was applied at 2 equal splits at weekly intervals with a view to gradually develop salinity in plastic pot soils. 0 g, 18.66 g, 27.99 g, 37.32 g of NaCl salt solution was added per 9 kg soil of pot to maintain control (0.42), 6, 9 and 12 dSm^{-1} salinity respectively. Data were collected at harvest stages (105 days after sowing). The collected data were

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analyzed statistically following the analysis of variance (ANOVA) technique and the mean differences were adjudged by Duncan's Multiple Range Test (DMRT) using the statistical computer package program, MSTAT-C (Gomez and Gomez, 1984).

Plant height

At harvest, plant height varied significantly due to the interaction effect of salinity stress and genotypes. The tallest one (303.25 cm) was recorded in Debudoy with control condition. The shortest (86.40 cm) was recorded in Safal 999 at 12 dSm^{-1} level of salinity which was statistically similar to 88.56 and 102.41 cm found in *Hybrid Sorgo* with the treatment combination of 12 dSm^{-1} and 9 dSm^{-1}, respectively and 97.25 cm found in *Safal 999* at 9 dSm^{-1} (Table 1).

Leaf area index (LAI)

The interaction effect between salinity levels and genotypes on LAI was also significant. At harvest the highest LAI (2.23) was recorded in Jamboo at contol and the lowest LAI (0.54) was recorded in Safal 999 at 12dSm^{-1} salinity level which was statistically similar to that of Debudoy (0.61), Hybrid Sorgo (0.63) and Jamboo (0.65) with 12dSm^{-1} salinity level (Table 1).

Total dry matter (TDM) plant^{-1}

The interaction effect between salinity levels and genotypes in relation to TDM plant^{-1} was also statistically significant at harvest. The highest TDM plant^{-1} was observed in Debudoy at control (99.69 g). The lowest TDM plant^{-1} was observed in Debudoy (15.33 g) with 12 dSm^{-1} which was statistically similar to 16.00, 17.00 and17.68 g found in Safal 999, *Hybrid Sorgo* and Jamboo respectively with the treatment combination of 12 dSm^{-1} (Table 1).

1000 grain weight

The interaction effect between salinity levels and genotypes for 1000-grain weight was statistically significant. The highest 1000-grain weight was observed in Jamboo (23.05 g) under control condition which was statistically similar to Safal 999 at control condition (22.85 g). The lowest 1000-grain weight (0.47 g) was observed in Jamboo at 12 dSm^{-1} salinity level (Table 1).

Grain yield plant^{-1}

The interaction effect between salinity levels and genotypes in relation to grain yield was statistically significant. The highest grain yield plant^{-1} was obtained in Hybrid Sorgo at control (47.84 g) and the lowest grain yield plant^{-1} (0.36 g) was observed in Safal 999 with 12 dSm^{-1} (Table 1).

Table 1. Combined effect of genotypes and salinity on plant height, LAI, TDM and 1000 grain weight in sorghum during harvest

Treatment Combination	Plant height (cm)	LAI	TDM plant^{-1} (g)	1000 grain weight (g)	Grain yield plant^{-1} (g)
Safal 999 × control	123.51gh	1.26e	73.46d	22.85a	22.05c
Safal 999 × 6ds/m	117.32hi	1.07g	35.09gh	2.00ef	2.68g
Safal 999 × 9ds/m	97.25j	0.72ij	26.08jk	0.99f	1.6g
Safal 999 × 12ds/m	86.40j	0.54k	16.00mn	0.74f	0.36g
Debudoy × control	303.25a	1.72c	99.69a	20.95b	42.08g
Debudoy × 6ds/m	203.75d	1.41d	59.90e	14.83d	10.81f
Debudoy × 9ds/m	152.13f	0.94h	23.08jkl	5.65e	3.35g
Debudoy × 12ds/m	115.38hi	0.61jk	15.33n	1.13f	4.25g
Jamboo × control	241.50b	2.23a	83.49c	23.05a	37.99b
Jamboo × 6ds/m	177.13e	1.42d	38.88g	14.43d	11.48f
Jamboo × 9ds/m	136.38fg	0.83hi	28.25ij	0.68f	0.93g
Jamboo × 12ds/m	124.50gh	0.65jk	17.68lmn	0.48 f	0.40g
Hybrid Sudan × control	225.38c	2.06b	91.40b	18.55bc	47.84a
Hybrid Sudan × 6ds/m	210.75cd	1.81c	88.13bc	18.8bc	37.66b
Hybrid Sudan × 9ds/m	176.38e	1.21ef	48.98f	18.03bc	15.63de
Hybrid Sudan × 12ds/m	127.65gh	0.87h	24.85jk	3.1ef	11.47ef
Hybrid Sorgo × control	138.88fg	1.48d	86.32bc	19.38bc	19.21cd
Hybrid Sorgo × 6ds/m	128.38gh	1.13fg	33.03hi	1.33f	1.73g
Hybrid Sorgo × 9ds/m	102.41ij	0.72ij	21.65klm	0.82f	1.11g
Hybrid Sorgo × 12ds/m	88.56j	0.63jk	17.00mn	0.83f	0.65g
SE±	15.64	0.01	14.49	2.02	12.74
LSD (0.05)	**	**	**	**	**

N.B.: SE±= Standard error of means; ** = Significant at 1% level

Treatments with different letters in a column differ significantly according to DMRT test at $p<0.01$

However, it may be concluded that, the genotype Hybrid Sudan showed better performance in respect of grain yield plant^{-1} than other genotypes at same salinity stress condition. Therefore, Hybrid Sudan was found more tolerant among the tested genotypes.

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