Annals of Arid Zone 32(1) : 65–66 1993

Tolerance of Some Sorghum Varieties to Salt Stress in Marwar Tract

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Sorghum (*Sorghum bicolor* (Linn) Moench), one of the main crop of the region, is relatively tolerant to salinity (Totawat & Mehta 1985). However, this being a *kharif* crop, rainfall may be one of the factor for its tolerance. Information on relative tolerance of different sorghum varieties to salt stress is meagre and thus attempted.

In order to evaluate the productivity of different sorghum varieties under saline water irrigation, a varietal trial was conducted at CAZRI, Regional Station, Pali-Marwar, during *kharif* 1989 in split plot design with three replications. Irrigation waters having salinity levels of 8, 12 and 15 dS m^{-1} alongwith control (4.0 dS m^{-1}) were randomly assigned to the main plots. The varieties were sown in 2.5 m long rows in each main plot. Three rows of each variety were sown, forming the sub plots. Counted seeds of each variety were sown.

Waters of 8, 12 and 15 dSm^{-1} EC were prepared by dissolving N_aCl, M_gCl_2 and $Na_2 SO_4$ salts in tube well water (4.0 dSm^{-1}). Sorghum varieties (Table 1) obtained from AICRP on Sorghum, Hyderabad, were sown on 28 June 1989. In all, three irrigation of 6 cm each was given. Total rainfall were 280.8 mm during crop stand.

Using yield data and mean salinity of irrigation waters, simple linear regression analysis of the type $Y = a + m$ EC was calculated. Yield reduction per unit increase in salinity beyond threshold was calculated following Mass & Hoffman (1977).

Among the cultivars, variety SPV-678 followed by SPV-669 were found superior to other varieties in respect of seed yield of the varieties tested for salt tolerance. SPV-669 exhibited least yield decline (69.56%) at the highest salinity over control, appreciably maintained highest value of Mean

Table 1 *Relative salt tolerance, Ym, and regression equation of yield with salinity of sorghum varieties based on grain yields.*

Varieties	Mean grain* yield	% reduction at 15 dS m^{-1} over control	MSI**	Expected salinity level (dS m^{-1})***	Ym^1	Slope $(s)^2$	Regression of yield
SPV 462	121.2	100.0	9.4	6.9	378.3	–.27	–103.16x + 479.4
SPV 475	127.3	100.0	56.0	9.1	190.0	–.30	– 57.77x + 322.3
SPV 669	280.0	69.6	61.7	13.8	393.0	–.15	– 60.47x + 498.9
SOV 678	392.0	85.2	60.5	9.4	557.0	–.26	–147.57x + 900.3
SPV 741	210.9	90.9	59.1	9.5	301.0	–.25	– 77.2x + 484.5
SPV 742	233.2	87.0	20.0	8.4	583.0	–.20	–120.8x + 668.1
CSV 10	163.7	91.8	21.2	7.9	400.0	–.25	–100.7x + 514.4
CSV 11	196.2	94.9	27.5	7.9	430.0	–.25	–109.9x + 586.5
SPV 96	43.1	100.0	4.0	6.5	154.3	–.27	– 41.50x +193.3

* Yield g 2.5 m^{-1} row length across the salinity levels

** Mean salinity index (MSI) = $\frac{\text{Mean yield at Eciw 8.12 and 15 dS m}^{-1} \times 100}{\text{BAW yield (control)}}$

*** Expected water salinity levels for 50% yield decline values obtained following regression

1. Ym – Average yield with BAW for each cultivar (g 2.5 m^{-1})
2. Slope – Yield reduction with unit increase in salinity beyond threshold value.

Salinity Index (61.66%) and 50% yield decline was also associated with the highest salinity (ECiw 13.82 dSm^{-1}) as compared to other varities (Table 1).

The salt tolerance for each variety was obtained by calculating linear regression equation for the yield. Yield reduction per unit increase in the salinity beyond threshold was also lowest (- 0.15) for variety SPV-669 (Table 1).

Therefore, SPV-669 could be considered tolerant among the cultivars tested because, a variety with least yield decline under increasing salinity and higher salinity level for 50% yield decline is characterised as salt tolerant. Further this also meets the US criterion of tolerance of variety which is also based on 50% yield decline.

(Received November 1990 Accepted January 1993)

References

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