much by environment (Donald and Hamblin, 1976). In the present study also, selection for grain yield through harvest index is reliable since HI is positively correlated with yield along with high GCV, heritability and genetic advance.

REFERENCES

ADAMS,M.V. (1967). Basis of yield component compensation in crop plants with special reference to field bean (*Phaseolus vulgaris*). **Crop Sci.,7** : 505.

DONALD,C.M. and HAMBLIN,J. (1976). The biological yield and harvest index of cereals as agronomic and plant breeding criteria. **Adv. Agron., 28** : 361-405.

MILLER,P.A., WILLIAM,J.C., ROBINSON,M.E. and COMSTOCK,R.E. (1958). Estimates of genotypic and environmental variances and covariances in upland cotton and their implications in selection. **Agron.J.,50** : 126-131

PANSE,V.G. (1957). Genetics of quantitative characters in relation to plant breeding. **Indian J. Genet. Pl. Breed., 17** : 318-328.

PANSE,V.G. and SUKHATME,P.V. (1957). **Statistical Methods for Agricultural Workers**. Indian Council of Agricultural Research, New Delhi.

RANGASWAMI AYYANGAR,G.N. and KRISHNA RAO,P. (1938). Studies in the millet *Panicum miliaceum* Linn. **Madras Agric.J. 26** : 195-196.

ROBINSON,H.F., COMSTOCK,R.E. and HARVEY,P.H. (1949). Estimates of heritability and degree of dominance in corn. **Agron J., 41** : 353-359

ROSIELLE,A.A. and FREY,K.J. (1975). Estimates of selection parameters associated with harvest index in oat lines derived from a bulk population. **Euphytica 24** : 121-131

Madras Agric. J., 82(1): 15-18 January, 1995
https://doi.org/10.29321/MAJ.10.A01110

RELATIVE PERFORMANCE OF COTTON GENOTYPES UNDER DIFFERENT LEVELS OF SALINITY IN IRRIGATION WATERS

M.S.UMA, D.P.VISWANATH and M.R.GURURAJA RAO.
Scheme on Management of Salt Affected Soils and Saline Water Use in Agriculture
A.R.S. Gangavati 583 227 (Karnataka).

ABSTRACT

Seven genotypes of cotton were screened for tolerance to different levels of salinity in irrigation water for four years. The genotypes showed significant variation in respect of mean kapas yield in all the four years. Further, the mean kapas yield decreased with increased salinity levels of irrigation water. The slope of regression line was found to be inversely related to kapas yield, and, therefore, it offered a better criterion for appraisal of salinity tolerance. Based on mean salinity index, tolerance index value and the slope of regression line, MESR-17 and JK125-2-5 were identified as fairly tolerant genotypes to salinity.

Cotton is one of the most important commercial fibre crops in India. In the arid and semiarid regions of the world, the salinity problems become accute with the advent of irrigation followed by indiscriminate use of water and also use of saline ground waters for irrigating the crops. Ground water accounts for 28 per cent of the net irrigated area in Karnataka State (Anon.,1989). However, the plants differ significantly in their tolerance to salinity and cotton is recognised as one of the most salt tolerant among field crops (Richards, 1954). Crop failure in saline environment is due to the accumulation of salts which results in the reduction of plant growth followed by kapas yield. Hence, the present investigation was undertaken to determine the effect of different levels of salinity in irrigation water on kapas yield of some of the genotypes of cotton.

MATERIALS AND METHODS

During the *kharif* season of 1984 and from 1986 to 88, 11 field experiments were conducted on medium black soil (vertisol) predominant in clay (52%) and silt (28%), possessing the following chemical properties: pH_2 - 8.2; ECe 0.83 to 4.84 dS/m, organic carbon -0.68% and $CaCO_3$ - 3.0%. Seven genotypes of cotton *viz.*, MESR-16, MESR-17, MESR-23, MESR-27, JK-125-2-5, JK-97 MB and Laxmi (local check) were sown in plots separated by a polythene sheet to a depth of a m to avoid lateral movement of salts. A split-plot design was adopted, with salinity levels (Good Water: GW-1, 4, 6, 8, 12 and 18 dS/m) of irrigation waters as the main treatments and the genotypes as sub-treatments being replicated thrice. The same plots received the same main treatments (saline waters) throughout the study. Each genotype sown in single row of 2.7 m length, maint

Table 4. Effect of saline water application on soil reaction and EC (dS/m) after harvest of cotton crop during 1984, 1986, 1987 and 1988.

	Salinity levels (dS/m)											
	1		4		6		8		12		18	
Year	pH_2	ECe	pH_2	ECe	pH_2	ECe	pH_2	ECe	pH_2	ECe	pH_2	ECe
1984	8.1	0.83	-	-	7.9	2.61	-	-	7.9	4.84	7.9	6.69
1986	7.8	0.79	8.2	1.37	-	-	8.4	2.39	8.4	3.90	-	-
1987	8.1	0.59	8.1	1.71	-	-	8.1	2.51	8.1	5.99	-	-
1988	7.7	0.83	7.9	2.25	-	-	8.2	4.02	8.2	5.44	-	-
Mean	7.9	0.76	8.1	1.8	7.9	2.61	8.2	2.97	8.2	5.04	7.9	6.69

RESULTS AND DISCUSSION

Data on kapas yield of cotton for all the four years indicated a linear reduction in yield with increased salinity levels in irrigation waters. Similar result has been reported by Janardhan *et al.*, (1979). The combined analysis of variance over years revealed significant differences amongst genotypes tested but the interaction component was found non-significant indicating the absence of differential response of cotton genotypes to different levels of salinity (Table 1). During the second year (1986), there was significant differences amongst salinity levels and genotypes tested (Table 2).

Among the genotypes screened, MESR-16 ranked first in mean kapas yield (14.37 q/ha) followed by MESR-17 (12.57 q/ha) and Laxmi (12.51 q/ha), which were statistically on par. The kapas yield averaged over all the salinity levels in per cent of the control, expressed as MSI was

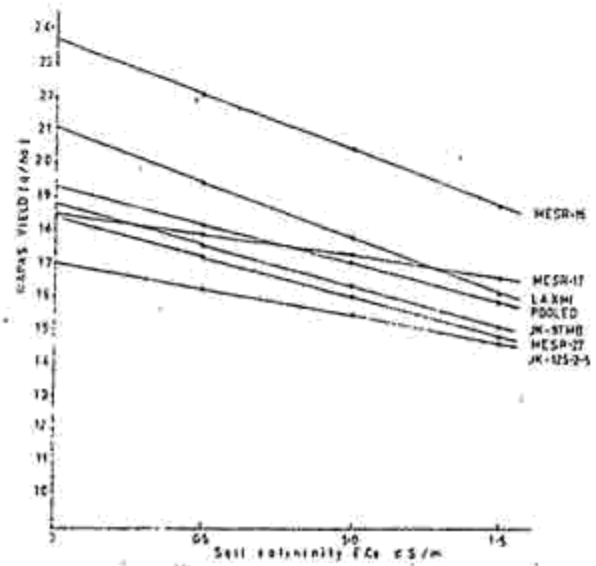

Fig.1. Relation between Cotton yield and soil salinity

higher in genotypes JK-125-2-5 and MESR-17. Similarly these genotypes showed higher TIV depicting their greater tolerances compared to other genotypes.

The linear regression equations of yield (Y) as against soil salinity levels (X) (Table 3), showed that the slops of the regression lines varied for different genotypes. Further, the variation of slopes showed a highly significant inverse relationship with the experimentally recorded kapas yield at the highest level of salinity (Fig.1). It could thus be a good criterion for appraisal of salinity tolerance obviously because the regression line takes into consideration the entire spectrum of response. On the basis of this, it is observed that the variety MESR-17 (b=12.47) had lowest value of slope followed by JK-125-2-5 (b=15.33) and were therefore comparatively more tolerant, a fact which was broughtout experimentally also. It may be mentioned that earlier investigators (Richards, 1954) used salinity levels (ECe) that would be expected to give a 50 per cent decrease in yield as the basis of rating relative salt tolerance of crop/varieties. This criterion was later (Allison, 1964) revised to 10 per cent decrement in yield.

The mean kapas yield of genotypes was found to be negatively and significantly correlated with soil salinity levels (r= -0.33** and b= 23.06). The idealised curves of salinity response of different genotypes investigated were presented in Fig.1. In MESR-16 and Laxmi, the reduction in kapas yield was almost a direct function of salinity levels. The variety MESR-17 with lowest slope and non-significant correlation value with soil ECe, appeared to be the most tolerant to salinity. The varieties JK-97 MB and MESR-27, which lies below the slope of regression line and indicated

...ven less tolerance to salinity. Although the slop is the least in JK- 125-2-5, but its yield levels were the lowest under salinity when compared to other genotypes. The variety MESR-17 can be recommended for areas wherein the ground water are saline (upto 10 dS/m) in nature. It may also be inferred that JK-125-2-5 as a donor parent for tolerance in breeding programme.

Soil analytical data after the crop (Table 4) indicated a gradual increase in soil ECe with increase in salinity of water irrigated. The reduction in yield may be ascribed to gradual increase in soil salinity as indicated by increase in ECe of soil from 0.76 to 6.69 dS/m under GW-1 and 18 dS/m respectively. The soil pH increased from 7.9 to 8.2 under treatments receiving GW and a saline water of 12 dS/m respectively. The present findings supported the earlier observations that there are varietal differences in salinity tolerance in cotton. The variability can be utilised not only for selecting varieties from the existing ones but also for initiating specific breeding programmes for saline environment *i.e.* salt affected soils.

ACKNOWLEDGEMENT

The authors are thankful to the Indian Council of Agricultural Research, New Delhi for the financial assistance and the University of Agricultural Sciences, Dharwad for providing necessary facilities during the course of investigation. The authors are grateful to Dr.I.P. Abrol, D.D.G., ICAR, Delhi (then Project Co-ordinator, CSSRI, Karnal) and Dr.S.N. Kadapa, Director of Research, UAS, Dharwad for their encouragement and supply of seeds for evaluation.

REFERENCES

ALLISON, L.E. (1964). Salinity in relation to irrigation. **Adv.Agron., 16.:** 139-180

ANONYMOUS (1989). Irrigation and crop management with brackish water. **Better Farming In Salt Affected Soils.** Indian Council of Agricultural Research, New Delhi.

JANARDHAN,K.V. VISWANATH, D.P., PARASHIVA MURTHY, A.S. and YADAV J.S.P. (1979). Influence of saline water irrigation on kapas yield and on accumulation in coton cultivars at different growth stages.**Curr.Agric.,** 3:21-29

RICHARDS, L.A. (ed.) (1954) Diagnosis and improvement of saline and alkali soils **USDA Hand book 60**

Madras Agric. J., 82(1): 18-21 January, 1995

PHENOTYPIC STABILITY FOR YIELD AND ITS COMPONENTS IN GRAIN SORGHUM (*Sorghum bicolor* (L.) MOENCH)

N.MUPPIDATHI, N.SUBBARAMAN, P.MUTHUVEL and S.RAJARATHINAM

Agricultural Research Station, Tamil Nadu Agricultural University, Kovilpatti 627 701

ABSTRACT

An evaluation of twenty grain sorghum entries comprising fifteen varieties and five hybrids, in eight different evironments, showed significant genotype x environment interactions for all the eight characters studied. Both linear and non-linear components of G X E were significant. KS 6312, CSH 1, CSH5, COH 3 and KT were identified as suitable genotypes for favourable environments. CSH 9 was found to be the most stable genotype with the least mean square deviation, 'b' value nearer to unity and high grain yield.

Identification of stable genotypes which would be adaptable over a wide range of agroclimatic conditions is of major significance in crop improvement. Genotypes vary greatly in their phenotypic response to a range of environments. The study of genotype X environment interaction provides good information on the stability of genotypes over environments. In the present investigation, some varieties and hybrids of sorghum were evaluated for identifying the stable genotypes.

MATERIALS AND METHODS

Twenty grain sorghum entries comprising fifteen varieties and five hybrids were evaluated for stability of grain yield and seven other characters under eight environments at the Agricultural Research Station Tamil Nadu Agricultural University, Kovilpatti. The eight environments were created by conducting the trials in a single location in two different soils *viz.*, Vertisol and Alfisol; two different fertility levels -high and low and two seasons *Viz.*, summer and monsoon. High