..ien 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.

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

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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

Table 1. Analysis of variance for phenotypic stability for yield and its components in grain sorghum.

Source	d.f.	Days to 50% flowering	Plant height	Penicle length	Panicle breadth	No. of rachis	100 grain weight	Days to Maturity	Grain yield
Genotype	19	230.88**	9594.79**	158.77**	2.26**	416.07**	0.53**	228.60**	166.73**
Environment (linear)	1	228.32	18688.07	192.43	26.68	1698.16	0.02	4845.07	1009.43
Genotype x environment (linear)	19	380.01**	283.46**	7.46**	0.88**	65.07**	0.001	141.73**	56.31**
Pooled deviation	120	0.60@@	100.95@@	2.91@@	0.18@@	14.52@@	0.001	1.33@@	10.40@
Pooled error	152	0.34	28.81	0.84	0.066	8.21	0.001	0.12	6.35
Non-linear : linear ratio		1:633	1:2.81	1:2.56	1:4.88	1:4.88	1:1.04	1:106.56	1:5.41

** Significant at one per cent level
* Significant at five per cent level
@@ Significant at one per cent level against pooled error
@ Significant at five per cent level against pooled error

fertility condition was created by the application of N:P:K at the rate of 90:45:45:kg/ha and low fertility condition by the application of 45:22.5:22.5 kg/ha. The eight environments *Viz.*, E1,E2,E3,E4,E5,E6, E7 and E8 are detailed below:

E 1 Summer Season Vertisol High Fertility
E 2 Summer Season Vertisol Low Fertility
E 3 Summer Season Alfisol High Fertility
E 4 Summer Season Alfisol low Fertility
E 5 Monsoon Season Vertisol High Fertility
E 6 Monsoon season Vertisol Low Fertility
E 7 Monsoon Season Alfisol High Fertility
E 8 Monsoon Season Alfisol low Fertility

Table 2. Stability parameters for different traits in sorghum

Genotype	Days to 50% Bloom		-2 Sd	Plant height (cm)		-2 Sd	Panicle length (cm)		-2 Sd	Panicle breadth (cm)		-2 Sd
	Mean	b		Mean	b		Mean	b		Mean	b	
Co.21	65.9	0.621	-9.899	168.6	1.18	11.18	16.65	0.938	-0.476	5.58	1.695	0.1255*
Co.23	69.7	1.168	-9.545**	149.7	1.27	11.51**	17.28	1.066	0.212	5.00	-0.007	0.0003
Co.24	69.6	1.142	-9.473**	158.0	0.27	77.48**	17.76	0.877	0.444	5.28	01.025	0.2042**
Co.25	72.1	1.062	-10.417	200.4	1.33	2.40	20.16	1.921	2.575**	5.02	0.105	0.0376
K 4	57.4	0.053	-10.115	195.6	0.46	57.35**	9.89	0.413	-0.267	5.06	1.325	0.1610**
IS 3541	69.8	2.405	-9.020**	182.0	2.03	244.21**	17.64	1.525	3.259**	4.04	0.411	-0.0018
K 6	54.3	-0.005	-9.666	222.9	0.86	46.22**	17.53	0.486	0.609**	5.77	2.657	0.1630**
KS 6312	72.4	2.504	-8.856**	163.9	0.06	159.25**	23.15	1.972	9.120**	4.78	-0.188	0.0740
KS 7078	64.2	0.137	-9.264**	140.3	0.77	248.61**	21.04	0.993	0.319	5.77	1.806	0.4320**
CS 3541	64.2	0.402	-9.477**	129.4	0.26	103.86**	21.47	-0.858	3.939**	5.13	1.503	0.0440
SPV 544	68.6	0.904	-9.742	161.8	0.61	23.01	22.45	0.831	0.012	5.72	1.311	0.0910*
TNS 31	75.1	0.347	-10.258	136.9	0.29	-10.57	18.02	1.847	1.192**	4.70	-0.035	-0.0280
TNS 33	75.2	1.579	-8.869	171.2	1.42	42.06*	15.68	0.727	0.486	4.85	0.363	0.0072
SPV 475	65.9	0.195	-10.493	148.9	0.76	89.99**	24.22	2.111	3.857**	5.56	2.036	0.1090*
SPV 472	67.9	2.021	-8.587	190.8	0.89	112.70**	17.73	2.197	0.942*	4.91	0.105	0.1840**
CSH 1	59.4	0.539	-10.219	135.0	1.44	62.49**	2759	-0.170	10.969**	5.97	2.211	0.2260**
CSH 5	66.7	0.896	-9.905	175.8	1.05	-11.97	27.55	1.187	-0.398	4.85	0.600	0.0940*
CSH 9	65.2	1.146	-9.573	156.8	1.61	29.39	25.28	-0.123	1.055*	5.87	1.004	0.0480
OcH 3	65.2	0.922	-10.031	257.7	1.99	54.56*	24.91	2.033	2.590**	6.20	0.656	0.4240**
K.Tall	67.9	2.332	-6.501	235.6	1.29	117.80**	23.80	1.473	2.348**	5.27	0.467	0.0150
Mean	66.8			174.1			20.49			5.27		
SE	1.62			4.05			0.67			0.18		

b - Regression Co-efficient   Sd - Deviation from regression

Table 3. Stability parameters for different traits in sorghum

Genotype	Number of rechis			100 grain weight (g).			Days to Maturity			Grain yield (g).		
	Mean	b	-2Sd	Mean	b	-2Sd	Mean	b	-2Sd	Mean	b	-2Sd
Co.21	48.02	2.616	2.216**	2.23	0.575	0.00018	95.6	0.589	1.443**	17.48	1.483	2.404
Co.23	54.13	0.530	0.530	2.27	1.395	0.00039	99.8	1.175	1.336**	21.35	0.274	-1.432
Co.24	55.25	1.112	1.112**	2.06	0.746	0.00076	99.8	1.108	0.598**	19.40	1.447	-5.366
Co.25	47.98	1.910	1.910**	2.24	0.318	0.00116*	102.1	1.073	1.243**	16.11	0.283	-6.952
K 4	61.16	1.361	1.361**	1.99	0.416	0.00032	87.9	0.179	0.618**	21.05	-0.714	3.966
IS 3541	38.56	0.645	0.645	2.15	0.428	0.00032	100.0	2.408	1.513**	15.33	1.199	-4.077
K 6	58.15	2.082	2.082**	2.12	1.530	0.00052	84.4	-0.009	0.913*	17.56	-0.268	1.215
KS 6312	41.28	0.313	0.313	2.19	1.971	0.00031	102.4	2.372	3.928**	25.41	3.972	63.326**
KS 7078	43.16	1.321	1.321**	2.10	2.424	0.00004	95.4	0.083	0.918**	22.30	0.601	-0.557
CS 3541	32.95	-0.143	-0.143	1.99	1.457	0.00072	94.0	0.384	1.651**	20.27	0.576	-7.059
SPV 544	43.16	-0.327	-0.327	1.62	1.007	0.00053	98.2	0.870	1.108**	18.71	0.527	-4.888
TNS 31	46.18	-0.487	-0.487	2.15	0.563	0.00046	105.0	0372	0.605**	14.76	0.957	-7.926
TNS 33	39.75	1.324	1.324**	2.32	1.309	0.00044	105.4	1.560	0.946**	12.49	0.119	-5.782
SPV 475	45.55	-0.249	-0.249	2.06	1.334	0.00009	95.8	0.180	0.485**	16.95	0.026	5.923
SPV 472	44.23	0.337	0.337	2.87	0.232	0.00100*	98.1	1.957	1.805**	20.16	2.769	12.409
CSH 1	51.13	1.901	1.901**	2.53	3.096	0.00037	89.9	0.571	0.235**	28.88	1.920	-3.761
CSH 5	43.85	0.617	0.617	2.33	0.563	0.00013	96.3	0.831	0.651**	21.56	1.102	-4.727
CSH 9	56.61	1.803	1.803**	2.14	0.269	0.00016	95.4	1.137	0.783**	28.01	0.937	-4.738
OcH 3	53.30	1.758	1.758**	2.62	0.245	0.00024	94.8	0.826	1.466**	28.27	1.932	0.162
K.Tall	47.84	1.213	1.213**	2.20	0.881	0.00007	98.1	2.257	2.651**	21.71	2.312	-0.075
Mean	47.62			2.21			96.8			20.39		
SE	1.69			0.01			1.63			3.11		

- Regression Co-efficient -2Sd - Deviation from regression

The experiment was conducted in a randomised block design replicated twice in each environment. The experimental plots consisted of 4 rows of 3m length in each replication with a spacing of 45 cm between rows and 15cm between plants in the row. Measurement of days to 50 per cent flowering, plant height, panicle length, panicle breadth, number of rachis, 100 grain weight, days to maturity and grain yield on 10 random plants per genotype were recorded. The stability parameters of different genotypes were analysed on the basis of mean performance over all environments as per the model suggested by Eberhart and Russell (1966).

RESULTS AND DISCUSSION

The significance of genotypes in individual as well as pooled environments indicated that they differed among themselves for all the characters studied (Table1). The mean squares due to genotype- environment interaction (GXE) were also highly significant which revealed the differential response of genotypes in different environments. These results were in conformity with the earlier reports of Patel *et al.*,(1984), Murthy (1985) and Singh (1985) in sorghum. The mean squares due to regression (linear component) and pooled deviation (Non-linear component) were significant for all the characters except for 100 grain weight. The predominance of linear component noticed would help in predicting the performance of the genotypes across environments.

Mean performance over all environments and the two stability parameters Viz., regression Co-efficient (b) and deviation from regression (Sd^{-2})) for all the eight characters studied are furnished in Table 2. The relative ranking of the eight environments in the present study revealed that high fertile Vertisol during summer (E1) and monsoon (E5) were the most favourable environments for maximum phenotypic expression for most of the character.

Jatasara and Paroda (1980) emphasised that linear regression could be considered as a measure of stability, the genotype with the least deviaition around the regression being the most stable and vice versa. It was evident that no variety was stable for the expression of all the eight traits over environments. The trait-wise analysis showed that some genotypes were stable for any one trait only. Five high yielding genotypes Viz., KS 6312, CSH1, CSH 5, COH 3 and K Tall had more than unit regression suggesting that these would be suitable for growing under favourable environments. Six genotypes Viz., Co 23, Co 35, KS 7078, CS 3541, SPV 544 TNS 33 had less than unit regression and least deviation from regression and these two would be preferred for growing under unfavourable environments. They were more responsive to less favourable growing conditions as reflected by low 'b' values. They were also stable as they had low deviation from regression. Further, the exploitation of these genotypes noted for their stability would be thought of for use in the breeding programme for transferring the stability attribute and thereby improving the productivity of sorghum.

Among the genotypes under study, CSH 1 recorded the highest grain yield (Table 3). The regression co-efficient of this genotype was more than unity and this suggests that this genotype would perform well under favourable environments.

The entries KS 6312, and SPV 472 were found to be unstable as they recorded highly significant deviation from regression, CSH 9 was found to be the most stable genotype with the least mean square deviation $(Sd)^{-2}$, 'b' value nearer to unity and high grain yield.

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GENOTYPIC STABLITY FOR PANICLE CHARACTERS IN GRAIN SORGHUM (*Sorghum bicolor* (L) Moench)

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ABSTRACT

Twenty grain sorghum entries comprising fifteen varieties and five hybrids evaluated under eight environments showed significant genotypic environment interactions for all the panicle characters studied. Based on genotypic stability parameters all the entires were unstable for number of rachis per panicle. The entries CS 3541 and TNS 31 are studied for varying environments while Co 25 and TNS 33 are studied for favourable environments.

The stability of yield in different environments is considered important in crop breeding progra mmes. Panicle characters *viz.,* panicle length, panicle breadth, peduncle length, peduncle girth, number of rachis perpanicle and grain yield are the important component of yield. Various procedures have been employed to characterize the behaviour of individual genotypes for varying environmental conditions (Eberhart and Russell, 1966; Tai, 1971)

Earlier studies on stability in sorghum were mostly based on phnoytpic stability (Rao and Harinarayana, 1969; Singh and Nayeem 1980; Singh and Singh, 1980).Studies on genotypic stability are limited in grain sorghum. Hence, the present investigation was undertaken with a view to work out the genotypic stability for panicle characters in grain sorghum *Sirghum bicolor* (L) Moench).

MATERIALS AND METHODS

Twenty grain sorghum entries comprising of fifteen varieties and five hybrids were evaluated for