ıble 3. Mixed crop trial

Crop	Green fodder yield t/ha/yr	Dry matter yield t/ha/yr	Crude protein yield t/ha/yr	Percentage over Co.1	
				DMyd	Cpyd
ɔ.1 Blou buffel	40	11.20	1.01	-	-
ylosanthes scabra	32	10.59	1.79	-	72.2
ixed crop Co.1 + *scabra* 3:1	39.25 (30.97 + 8.28)	11.41 (8.67 + 2.74)	1.24 (0.78 + 0.46)	1.9	22.8

As the seeds have tightly covering husks, they ıve to be treated with concentrated sulphuric acid ı 3 min or boiling water for 5 min soaked in cold ıter for 24 h after decanting the acid and then wn. Shallow sowing to a depth of 1.25 cm has to done for good germination. The first harvest is ne at the time of first flowering which may be 75 ys after sowing. Subsequently, according to the wth, 4 or 5 cuttings are taken in an year. During mer, seed multiplication can be carried out en the plants are shaken to collect the falling ture seeds or the inflorescences can be hand ked and seeds separated by threshing. The self wing capacity of the species renders better ablishment of the crop during the second year wards. It comes up well in wide range of soils der rainfed conditions having an annual rainfall 500 to 900 mm. It is a highly drought tolerant tritious legume fodder species suitable for arid d semi arid regions producing highly palatable een fodder.

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ANALYSIS OF STABILITY PARAMETERS FOR RICE GROWN IN SODIC SOILS

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ABSTRACT

Twenty five salinity-alkalinity tolerant rice varieties tested under sodic soil conditions over four years indicated presence of considerable genetic variation among genotypes. None of the genotype showed stability for all the traits studied. Genotype 2107 showed stability for five traits and recorded low stable grain yield. Genotype 2114 (SSRC 92217)alone recorded stable grain yield of 3072 kg/ha with average response, suitable for all environments. The genotype 2122 (SSRC 91216) recorded 3086 kg/ha of grain yield with below average response and suitable for unfavourable environment. This entry recorded above average mean for all other parameters but were not stable.

KEY WORDS : Rice, Stability Parameters, Sodic Soils

Among the abiotic stresses, salinity and licity are very serious soil related constrains tricting the crop productivity of rice. The extent area affected by salinity and alkalinity in Tamil Nadu is over 0.30 million ha. The present investigation was undertaken to indentify stable genotypes to these areas.

Table 1. Analysis of variance for stability

Source	df	Plant height	Days to 50% flowering	Number of effective tillers	Grain yield	Straw yield	Dry matter production	Harvest index
Genotypes (G)	24	1159.58**	322.49**	2.82**	892100.69**	2.98**	20.05**	46.89
Environment (E)	3	4395.71**	1213.10**	51.90**	4509075.13**	25.84**	355.81**	1780.25*
G x E	72	114.20**	88.26**	4.25**	2702810.20**	3.61**	5.52**	99.72**
Environment + (G x E)	75	214.45**	77.20**	3.40**	2090263.94**	2.19**	6.65**	103.29*
G x E (Linear)	24	43.63**	70.43**	3.32**	310435.09	1.07	2.31	35.73
Environment (Linears)	1	13189.78**	3640.31**	153.65**	135270956.60**	73.05**	3540.90**	5333.48*
Pooled deviation	50	18.95**	9.19**	0.44	280967.94**	0.50**	1.80**	31.19**
Pooled error	200	1.25	1.12	0.37	17051.98	0.21	0.09	3.01

** Significant at 1 per cent level.

MATERIALS AND METHODS

The materials for the investigation comprised of 25 improved salinity alkalinity tolerant rice varieties *(Oryza sativa L)* developed at various research centres in India. These improved cultures were grown in a randomised block design with three replications at the Soil Salinity Research Centre, Trichy, Tamil Nadu. The experiment was conducted for four years, during second crop season of 1989-90 (E1), 1990-91 (E2), 1991-'92 (E3) and 1992- '93 (E4) in 8 m^2 plots, adopting 20 x 10 cm spacing and planted 2 to 3, 25-30 day-old-seedling per hill. Data were collected on five random plants for plant height, and number of effective tillers per hill, whereas, on per plot basis, for 50 per cent flowering, grain yield and straw yield. Grain yield was converted to kg/ha and straw yield and dry matter production were converted to tonnes /ha. Mean values were used for statistical analysis as proposed by Eberhart and Russell (1966).

RESULTS AND DISCUSSION

The soil analysis at the time of planting indicated that the experimental plots had pH, EC (mmho/cm) and exchangeable sodium per cent (ESP) between 8.5 and 8.9, 0.25 and 0.31 and 2: and 29.6 respectively. Rice can tolerate ESP upto : Venkateswaralu *et al.* (1970) reported that ri plant irrespective of variety could tolerate electri: conductivity with soil extract paste upto 3 mmho/cı

The environmental index indicated that E3 v found to be conducive for the optimum expressi of all traits and attaining 50 per cent floweri early by 5 days. The most unfavourable season v environment-1 (E1) in which the grain yield as w as other traits were low. There was also delay reaching 50 per cent flowering by 10 days (Table 2)

The analysis of variance for stability (Table showed significant differences among themsel for all the traits studied and revealed the presen of genetic variability among the genotypes. T significant mean squares due to environme suggested that all the traits were highly influenc by change in environments. Highly significa mean squares due to environment (linear) indicat the presence of considerable difference betwe environments and their influence on these trai The linear component of interaction *i.e.* G x (linear) for effective tillers was found to significant while non-linear (pooled deviatic

Table 2. Seasonal effects

Characters	Season					SE
	1989-90	1990-91	1991-92	1992-93	Mean	
Plant height	-13.7	-5.0	17.7	1.0	79.0	1.9
50% flowering	10.2	-5.4	-2.6	-2.2	87.5	1.1
Effective tillers/hill	-0.7	-1.1	2.1	-0.3	7.7	0.6
Grain yield	-1150.4	-418.4	1942.8	-373.6	2457.0	70.3
Straw yield	-1.3	-0.2	0.8	0.7	5.2	0.3
Dry matter production	-2.5	-0.6	2.7	0.4	7.6	0.8
Harvest Index	-6.1	-1.0	12.2	-5.1	30.6	1.9

All are significant at 1% level.

Table 3. Stability parameters of 25 rice varieties for plant height, 50 per cent flowering and number of effective tillers per hill

Genotype	Plant height			50% flowering			Number of effective tillers		
	Mean	bi	Sd	Mean	bi	Sd	Mean	bi	Sd
2101	69.2	1.18	24.39	75.6	0.62	12.99	7.5	0.94	-0.08
2102	65.8	0.87	4.00	88.1	1.18	2.70	7.6	1.20	0.34
2103	63.5	0.41	18.90	91.9	1.15	-0.40	6.8	0.47	-0.30
2104	64.4	0.90	11.87	85.4	1.07	12.16	8.2	0.52	0.41
2105	68.5	1.07	2.88	80.3	0.74	3.30	8.3	0.54	0.01
2106	100.0	1.17	23.33	106.2	0.03	-0.72	6.4	1.25	0.47
2107	98.6	1.56	-0.37	81.0	1.30	1.28	6.8	0.65	-0.19
2108	95.7	1.42	23.26	78.9	0.55	5.46	7.5	0.66	0.07
2109	78.2	0.98	0.65	89.3	-0.65	29.68	8.6	1.80	-0.27
2110	63.9	0.36	6.67	86.4	0.80	5.33	8.0	1.00	-0.23
2111	68.3	0.75	48.68	85.4	0.51	23.34	8.8	1.69	-0.27
2112	60.2	1.29	15.01	74.7	2.47	23.47	7.1	0.19	-0.24
2113	112.8	1.06	38.84	101.0	0.24	8.19	8.6	2.75	0.51
2114	99.9	1.46	10.94	87.4	1.61	12.50	6.9	0.72	-0.10
2115	84.5	1.32	61.25	85.4	1.93	0.30	6.7	0.66	0.18
2116	68.3	0.45	1.69	90.8	0.98	9.74	10.1	2.69	-0.37
2117	96.6	1.26	14.48	92.4	1.04	4.04	7.3	1.24	-0.34
2118	118.1	1.11	22.89	103.7	1.02	2.19	8.9	1.82	0.42
2119	87.5	1.78	12.57	82.8	1.35	0.77	7.6	1.03	0.12
2120	73.5	1.02	32.82	79.3	1.53	0.69	7.6	0.94	-0.26
2121	66.0	1.03	12.83	83.4	2.35	3.87	7.7	1.26	-0.05
2122	65.0	0.58	3.90	82.2	0.19	21.80	8.3	-0.13	1.21
Vikas	66.3	0.79	3.21	86.3	0.88	5.32	7.8	-0.33	0.39
Jaya	69.6	0.83	40.90	82.3	0.76	9.24	7.2	0.05	-0.15
Co 43	71.4	0.41	-0.85	108.3	1.61	3.70	7.2	0.98	0.40
Mean	79.0	1.00	-	87.5	1.00	-	7.7	1.00	-
SE	1.9	0.19	-	1.1	0.25	-	0.6	0.27	-
CD	5.4	-	-	3.0	-	-	1.8	-	-

nteraction was found to be non-significant which suggested the contribution of linear component to concerned trait. The precision of prediction for this rait will be more. On the contrary, the significant non-linear component and non-significant linear component for grain yield, straw, dry matter production and harvest index indicated the contribution of non-linear component to these raits. Hence prediction on these traits may not be made with great precision. Sinha and Biswas (1984) reported significant non-linear component o grain yield. Both linear and non-linear component were significant in respect of plant height and 50 per cent flowering and showed the nfluence of these two components on the expression of these traits. The precision of predication for these traits will be low. Kulkarni *et al.* (1988) reported significant linear component to plant height and 50 per cent flowering.

Of the 25 genotypes studied, entries 2107, 2109 and Co.43 showed non-significant unpredictable G x E interaction for plant height and was stable (Table 3). The linear component for 2109 was around unity and was found to be suitable for both favourable and unfavourable environments. The genotype 2107 showed above average response and Co.43 below average response and appears to be suitable for favourable and unfavourable environments respectively. The number of effective tillers produced per bill by different genotypes ranged from 6.4 (2106) to 10.1 (2116) (Table 3). The non- significant non-linear component of all the genotypes except 2122 indicated their stability in expressing this trait, some possessing average, some above average and some other below average response indicating their suitability to both favourable and unfavourable environments. The genotypes 2109, 2113, 2116 and 2118 produced

Table 4. Stability parameters of 25 rice varieties for grain yield, straw yield, dry matter production and harvest index

Genotype	Grain yield (kg/ha)			Straw yield (t/ha)			Dry matter production (t/ha)			Harvest Index		
	Mean	bi	Sd	Mean	bi	Sd	Mean	bi	Sd	Mean	bi	Sd
2101	1635	1.16	80799	4.6	1.94	1.01	6.20	1.62	0.88	22.9	1.02	5.51
2102	2264	1.00	502075	4.7	0.43	1.10	6.95	0.69	3.11	30.2	1.47	-0.06
2103	2639	0.84	385428	5.6	0.66	1.75	8.25	0.85	3.89	30.9	0.62	-2.35
2104	2406	1.22	543230	3.9	1.04	1.04	6.25	0.88	2.56	35.1	1.54	13.64
2105	2171	1.35	99777	4.5	0.41	3.56	6.63	1.35	0.65	30.3	1.44	32.25
2106	2945	1.11	617203	6.6	0.40	1.09	9.58	0.91	1.36	29.6	0.72	92.20
2107	2265	1.12	8476	5.3	1.01	1.19	7.55	1.11	0.01	27.7	1.15	9.86
2108	2493	0.90	14634	5.6	0.68	0.22	8.10	0.73	0.34	30.0	1.04	2.75
2109	2163	0.91	32211	5.5	0.52	0.10	7.60	0.71	0.08	26.8	1.12	10.66
2110	2626	0.90	30559	5.2	1.22	0.47	7.90	1.06	0.86	32.8	0.66	10.01
2111	2532	0.91	66126	5.2	1.39	0.18	7.73	1.18	0.13	31.7	0.68	15.43
2112	1526	0.75	451918	4.3	1.89	9.28	5.85	0.95	14.33	26.0	1.48	16.93
2113	2954	0.62	794600	6.2	0.83	0.15	9.10	0.70	1.64	31.6	0.53	33.61
2114	3072	0.89	10838	5.8	0.22	0.16	8.85	0.63	0.43	34.0	0.82	0.98
2115	2726	1.30	325862	4.8	1.15	0.17	7.68	1.12	0.18	34.8	0.90	2.52
2116	2713	0.91	269695	5.5	1.77	1.09	7.78	1.35	1.28	20.4	0.46	48.76
2117	3291	1.08	104369	5.9	0.50	1.43	9.15	0.69	1.22	35.0	0.76	78.52
2118	2870	0.53	423079	7.1	0.08	2.82	9.95	0.14	2.67	29.0	0.65	49.83
2119	2714	1.20	1408714	5.1	2.10	0.13	7.83	1.75	1.71	30.8	0.85	90.21
2120	1916	1.33	9801	4.1	1.79	3.09	6.05	1.53	0.17	26.7	1.58	50.36
2121	1690	1.45	26835	3.6	1.76	0.99	5.25	1.59	1.59	26.1	1.78	43.30
2122	3086	0.81	34322	5.2	0.57	0.18	8.23	0.70	0.18	36.7	0.67	0.47
Vikas	2545	0.99	80566	4.5	0.02	0.28	7.03	0.49	0.20	34.8	1.60	5.59
Jaya	1969	0.97	71280	4.3	1.87	0.10	6.30	1.40	0.35	29.5	0.98	20.59
Co 43	2855	0.62	187801	6.2	1.43	0.95	9.08	1.03	0.73	32.5	0.03	78.24
Mean	2457	1.00	-	5.2	1.02	-	7.6	1.00	-	30.6	1.00	-
SE	70	0.24	-	0.3	0.42	-	0.8	0.36	-	1.9	0.38	-
CD	195	-	-	0.7.	-	-	2.3	-	-	5.3	-	-

above eight tillers with above average response while 2122 also produced above eight tillers with below average response and was suitable for favour able and unfavourable environments respectively. Average response was observed in 2104 and 2105 and found to be suitable for all environments.

The mean grain yield among the environments ranged between 1306.5 kg/ha (E1) and 4399.2 kg/ha (E3) and environment 3 (E3) was found to be favourable (Table 2). The mean grain yield among the genotypes ranged between 1526 (2112) and 3291 kg/ha (2117). The non-linear component was not significant in genotypes 2107,2108 2114 and 2120 and were found to be stable. Among them 2114 (SSRC 92217) recorded 3072 kg/ha with average response and appears to be suitable for cultivation in all environments. The other three genotypes recorded low yield. The highest yield of 3291 kg/ha was registered by 2117. This was followed by genotype 2122 (SSRC 91216) which recorded 3086 kg/ha. These two genotypes showed average response, unstable and suitable for all environments.

The straw yield among the genotypes ranged from 3.6 to 7.1 t/ha, the lowest and highest regis tered by 2121 and 2118 respectively. All the geno types showed similar response under all environ ments and there were difference among them for stability (Table 4). The genotype 2113 produced 6.2 tonnes of straw yield per hectare with stability and suitable for all environments. Another geno type 2122 (SSRC 91216) produced 5.2 t/ha showed stability and suitable for unfavourable environments.

Five genotypes *viz.* 2106, 2113, 2117, 2118 and Co.43 produced above 9 t/ha of dry matter (Table 4). The genotypes 2107, 2109 and 2111 ecorded non-significant non-linear component and vere stable for this trait. All the three genotypes roduced above 7.5 t/ha and possessed average esponse and suitable for all environments. The enotype 2114 that produced higher stable grain ield, also produced higher dry matter which was ot stable with average response. The next best rain yielder 2122 also produced more than 8 t/ha f dry matter.

Higher harvest index was produced under nvironment - 3. The highest harvest index of 36.7 er cent was recorded by 2122 followed by 2104 35.1), 2117 (35.0), 2123 (34.8), 2115 (34.8) and 114 (34). (Table 4). All the genotypes had similar esponse except 2121 and Co. 43. The genotypes 102, 2103, 2108, 2114, 2115 and 2122 had non-ignificant, non-linear component and were stable. The genotype 2122 (SSRC 91216) produced 36.7 er cent harvest index, had average response, stable nd suitable for all environments. Two other geno ypes 2114 and 2115 also produced 34.0 and 24.8 er cent harvest index with average response and tability.

Simultaneous consideration of all the seven arameters for individual varieties showed that one had stability for all the traits. However, the enotype 2107 showed stability for all traits except traw yield and harvest index. Genotypes 2108, 109, 2114 and 2115 for four traits, and 2103, 111, 2119 and 2120 for three traits showed tability. The stable high grain yielder 2114 also ecorded high and stable mean values for effective illers, straw yield and harvest index. The next high rain yielder also recorded high stable mean values for straw yield and harvest index. Bhattacharyya (1976) and Ikehashi (1979) also identified some genotypes for problem soils.

Genotype SSRC 91216 (2122) had dwarf stature (65.0 cm) reaches 50 per cent flowering early (82 days) produced 8.3 effective tillers/hill, recorded average grain yield of 3086.3 kg/ha, produced 5.2 t/ha of straw, 8.23 tonnes/ha DMP and recorded 36.7 per cent harvest index. It showed stability for two traits viz straw yield and harvest index. Another culture SSRC 92217 (3072 kg/ha), straw yield (5.8 t/ha) and harvest index (3[4] per cent) These two genotypes possess the genes to alter the physiological basis of the yield contributing traits under stress conditions and has the ability to attain higher grain yield.

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RURAL INSTITUTION FOR IRRIGATION MANAGEMENT*

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ABSTRACT

Green Revolution was successfully accomplished in India wherever irrigation and drainage facilities are available. Irrigation is the single major input which decides stabilised and increased production in this country. In a tropical region like South India, where"the only normality in the rainfall distribution is abnormality and the only certainity in the rainfall distribution is uncertainty" irrigation management is important. In agricultural sector, many changes have taken place. Irrigation management in India aiming higher productivity and equity is a non-traditional approach since this society is static, stagnant and hierarchial in character.

India is considered to be a museum of societies s evidenced from the existence of pre-literate society (tribal groups), peasant society (village communities), pre-industrial society, (small

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