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YIELD PERFORMANCE OF WHEAT GENOTYPES IN DIFFERENT SALINE ENVIRONMENTS

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ABSTRACT

Ten promising wheat genotypes were evaluated for their stability for grain yield in three different saline environments. The genotype x environment interaction was non significant for grain yield. In general, the crop performed better under low to medium saline environments. The genotypes, DWR-39, DWR-162 and Raj-1972 were found to be stable with high mean yield and average responses to the changes in the environmental conditions. Hence their exploitation in breeding programme will help in improving the productivity of the crop.

KEY WORDS : Wheat, Stability, Genotype x Environment interaction.

Wheat (*Triticum aestivum* L.) is one of the important cereal crops of India and is cultivated in all soil types. Wheat has been reported to be fairly tolerant to saline conditions (Richards, 1954). Though several improved varieties of wheat have been developed, most of them show inconsistant performance under varied salinity conditions due to genotype environment interactions. The stable performance of the varieties under different environments with regard to the economic characters like grain yield is of considerable significance for any varietal improvement programme. The information of genotype x environment (GXE) interactions and the stability of varieties under saline conditions is scanty in the case of wheat. In the present study, the important genotypes of wheat have been evaluated for G x E interactions for identifying high yielding stable genotypes for cultivating under saline conditions and also for use in breeding programme.

MATERIALS AND METHODS

The experimental materials consisting of ten genotypes were sown in a randomised block design with four replications at the Agricultural Research Station, Gangavati during *rabi* 1991 and 1992 under irrigated conditions, in plots (1.5 m^2) (single row of 5m length) of each genotype. The inter and intra row distances were kept at 30 cm and 10 cm respectively in all the environments. There were three different environments *i.e.* (ECe 4.2 dS/m), medium (7.5 dS/m) and high (ECe 13.0 dS/m) saline conditions of the soil. The crop received the recommended doses of fertiliser and plant protection measures. The data on seed yield per plot was recorded and stability parameters were computed. (Eberhart and Russell, 1966).

RESULTS AND DISCUSSION

Pooled analysis of variance revealed the existance of significant genetic differences among the genotypes with respect to grain yield (Table 1). The environments also appeared to differ significantly from one another as the mean square component due to environment varied significantly. A significant value of environment, (Genotype x Environment) interaction suggested the genotypic interaction with different saline environments. A highly significant value of M.S. due to environment (linear) gave the evidence of the influence of environment on yield. However, a non-significant G x E (linear) component indicated unpredictable component contributed to G x E interaction.Similar non-significant interactions were reported for

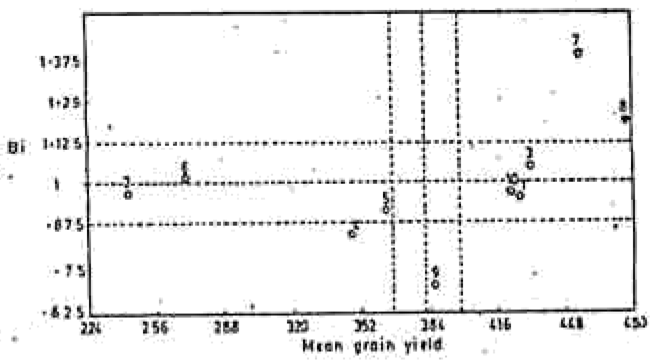

FIG. 1 Distribution of wheat varieties by their means

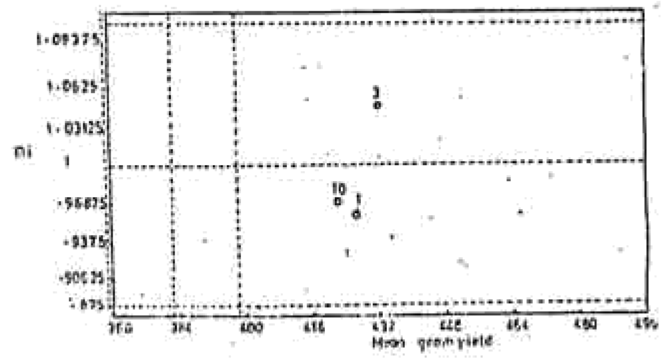

FIG.2 **Varieties with higher yield than the mean value and 'bi' not significant from mean**

Table 1. Pooled analysis of variance for genotype x environmental interactions for grain yield in wheat

Source of variation	df	Mean sum of squares
Genotype	9	17893.54**
Env. + (Geno x Env.)	20	19171.85**
Environments (non-linear)	2	183762.97**
Geno x Env. (non-linear)	18	883.95
Environments (linear)	1	367525.95**
Geno x Env. (linear)	9	1216.96
Pooled deviation	10	495.85
Pooled error	90	2081.00
Total	29	18775.14

** Significant at 0.01 per cent level (against pooled deviation)
Env : Environment; Geno : Genotype.

component characters in bengal gram (Bahl *et al.*, 1980).

Eberhart and Russell (1966) suggested that an ideal genotype with stable performance for cultivation should have higher mean yield, linear regression and least deviation from regression (s^2d).However, Bilbro and Ray (1976) pointed out the unit value of regression coefficient (bi) as the indicator of the adoption of the genotype to the environment while, high coefficient of determination (r^2)indicates stability. Thus the stability of a given genotype was on the basis of both S^2d and r^2 (Table 2).

The results on mean grain yield (g/plot) regression co-efficient (bi), deviation from regression (S^2d) and coefficient of determination (r^2) computed for 10 genotypes are given in Table 2 (Fig. 1). The environmental index was negative in E_3 and considered as unsuitable environment. The genotypes DWR - 39, DWR-162 and Raj- 1972 were the most stable ones as deviation from the regression was low and regression coefficiant remaining close to unity. These genotypes registered higher coefficient of determination and also had a higher mean yield against population yield (Fig. 2) and confirmed to the views of Eberhart and Russell (1966) and Bilbro and Ray (1976). However, the genotypes KRL-1-4 and K-65 recorded higher yield, higher r^2 with lower deviation from regression and higher 'bi' value were found to perform better under favourable growing conditions. The high yielding WH-157 with lower bi value, found responsive only under

Table 2. Mean grain yield and stability parameters of wheat genotypes grown under different saline environments

Genotypes	E_1	E_2	E_3	Mean grain yield g/plot	bi	S^2d	r^2
DWR-39	530.50	468.75	280.75	426.67	0.96	-2062.28	0.99
Raj-3077	344.50	293.00	93.50	243.67	0.97	-1920.25	0.99
DWR-162	520.50	512.50	263.75	432.25	1.05	244.16	0.95
SW-36	437.50	389.50	217.25	348.08	0.85	-2001.62	0.99
SW-37	470.75	396.00	226.25	364.33	0.92	-2031.37	0.99
SW-2560	409.75	275.50	126.50	270.58	1.02	12.77	0.95
KRL-1-4	616.50	499.75	251.00	455.75	1.38	-1871.28	0.99
K-65	608.25	524.50	298.75	477.16	1.18	-2080.89	1.00
WH-165	465.50	411.50	281.50	386.17	0.69	-2068.58	0.99
Raj-1972	531.75	459.25	276.50	422.50	0.97	-2072.08	1.00
Environmental index	110.83	40.30	-151.14				
Population mean	382.71						

E_1 = 4.2 dS/m E_2 = 7.5 dS/m E_3 = 13.0 dS/m low to medium saline conditions. The genotypes such as Raj-3077, SW-37 and SW-2560 were appeared to be stable as regression remained close to unity but their lower mean grain yield than population mean made unsuitable for saline soils. Similarly the genotype SW-36 was a low yielder which was further coupled with lower 'bi' value and also considered as unsuitable for saline environment.

From the present study it revealed that the genotypes DWR-39, DWR- 162 and Raj-1972 were found stable and their response to the changes in environmental conditions was better as indicated by higher mean grain yield. The genotypes such as KRL-1-4 and K-65 although found to have higher yield potential and their performance under saline environments can be improved by crossing with the above genotypes so that higher productivity under stress is achieved.

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FERTILISER APPLICATION TO GROUNDNUT BASED ON SOIL TEST CROP RESPONSE EQUATIONS

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ABSTRACT

Soil test crop response studies were conducted in red lateritic soil of the Regional Research Station, Vridhachalam. Fertility gradients were created and different levels of NPK were applied. VRI I groundnut was raised as test crop. Based on yield of pod and haulm, available nutrient contents in soil at harvest stage and uptake of principal plant nutrient elements crop response equations were developed. Test verification of these equations for their applicability revealed that these fertiliser prescription equations hold good at lower levels of targeted yield upto 20 q/ha beyond which there is deminished response to the applied nutrients.

KEY WORDS : Groundnut, Fertiliser Prescription, Crop Response

Soil fertility holds key to productivity of crops. In these days of increasing cost of fertiliser, there is urgent need to find ways and means to economise the schedule of nutrients to be applied to crops without sacrificing the yield potential and monetary return to the farmers. The approach of initial soil fertility based fertiliser application will be very useful in this context where the crop is supplied with the required level of nutrients to obtain economic optimum yield. With this objective, field experiments were conducted at the Regional Research Station, Vridhachalam to find out the response of groundnut to applied nutrients and develop crop response equations which could be used for determining the fertiliser schedule for the said crop under irrigated conditions.

MATERIALS AND METHODS

Field experiments were conducted in the red lateritic soil of the Regional Research Station, Vridhachalam. The soil had the following chemical and physio-chemical properties.

Available nitrogen (Alkaline permangenate method) = 145 kg/ha (low)

Available phosphorus (Olson's P) = 40 kg/ha (high)