Indian J. Genet., **58**(1): 121-123 (1998)

Short Communication

GENOTYPE X ENVIRONMENT INTERACTION IN SWEET POTATO

B. VIMALA AND K. R. LAKSHMI

Central Tuber Crops Research Institute, Trivandrum 695 017

(Recieved : June 5, 1995; accepted: November 21, 1997)

Key words: Sweet potato, stability, genotype × environment interaction

Sweet potato (*Ipomoea batatas* (L.) Lam.) is an important food crop grown in many parts of the tropics and sub-tropics. It is grown over a wide range of environments and environmental conditions are known to have significant influence on tuber yield[3-4]. Recently the Central Tuber Crops Research Institute, Trivandrum has identified a few high yielding hybrids and germplasm selections of sweet potato for advanced trials. The objective of present study is to find out the stability of sweet potato genotypes for tuber yield in different environments within Kerala State.

The materials included in the study comprised of seven hybrids developed from the breeding programme of sweet potato (X-108-1, X-108-2, X-109-1, X-109-2, X-110-1, X-110-2, X-80/168), two germplasm selections S-783 (variety introduced from Puerto Rico), S-1010 (a seedling selection of the true seed introduced from IITA, Nigeria); and two checks Sree Vardhini and Sree Nandini. The experiment was laid out in randomized block design with 3 replications, the spacings between and within the rows were 60 and 20 cm respectively. The net plot size was 3.0 × 1.8 m consisting of 3 rows accommodating 45 plants. The experiments were conducted in the District Agricultural Farms of Kerala State Agricultural Departments at 4 locations viz., Peringamala, Anchal, Kozha and Chokkad for a period of 3 years from 1989-92. The trials were planted in June-July season and raised as a rainfed crop. Standard cultural operations were carried out in all the trials. At Chokkad the trials were repeated in the Sept-October to December-January season also. Stability analysis for tuber yield was carried out as per Eberhart and Russel [1].

The pooled ANOVA [Table 1] revealed significant differences among the genotypes, environments and genotype × environment interaction indicating variable response of genotypes to changing environment. Since the mean squares due to genotype × environment interaction was significant, it was further partitioned into components (i) G × E (linear) and (ii) deviation from linearity of response of the genotypes on the environmental index.

Table 1. Pooled analysis of variance for tuber yield in sweet potato

Source	df	mean sum sq
Genotype (G)	10	145.56*
Environment (E)	14	155.31*
G × E	140	5.27*
E (linear)	1	2174.40*
G × E (linear)	10	11.47*
Pooled deviations	143	4.35*
Pooled error	300	1.37

*Significant at P = 0.05

The G × E (linear) mean squares in ANOVA was significant indicating that all the regression coefficients are not statistically at par. Ibrahim and George [3] indicated that G × E interaction for tuber yield was due to both linear and non-linear components. Kamalam *et al.* [4] reported that the major differences in stability was due to the linear regression since the pooled deviations were not significant.

Table 2. Stability parameters of genotypes

Genotypes	Mean yield (t/ha)	b_i	S_{di2}
X-108-1	14.32	1.35 ± 0.078	0.15
X-108-2	15.33	1.06 ± 0.070	0.38
X-109-1	9.84	0.82 ± 0.061	3.61*
X-109-2	11.07	1.05 ± 0.069	6.37*
X-110-1	9.85	0.69 ± 0.056	4.41*
X-110-2	15.32	1.33 ± 0.078	2.05*
X-80/168	12.61	1.09 ± 0.070	0.95
S-783	7.69	0.95 ± 0.066	9.60*
S-1010	16.38	1.20 ± 0.074	7.15*
Sree Nandini	8.34	0.80 ± 0.060	1.13
Sree Vardhini	8.06	0.65 ± 0.054	2.56*

*Significant at P = 0.01

The stability parameters are presented in Table 2. The genotypes having high mean yield were S-1010, X-108-2, X-110-2 and X-108-1. Finlay and Wilkinson [2]

stated that the regression coefficient indicates response index. The deviation from regression mean square is an index of stability. Genotypes with unit regression and low S_{dt2} when associated with high mean performance are known to have general adaptability. The regression coefficient on environmental index for X-108-1 was significantly higher than unity where as the deviations from regression was non-significant. This genotype had also recorded high mean yield (14-32 t/ha), indicating thereby the potential to give better yield under favourable conditions.

The hybrids X-109-1, X-109-2 and X-110-2 are not stable. The studies of Kamalam *et al.* [4] showed that none of the sweet potato cultivar was stable for tuber yield. However, in the present study the hybrids X-108-2 and X-80/168 had unit regression and non-significant deviations from regression suggesting that these high yielding hybrids are having wider adaptability.

Among the eleven genotypes tested, two hybrids, viz X-108-2 and X- 80/168 showed above average performance and stability for tuber yield. The released varieties Sree Nandini and Sree Vardhini recorded low mean tuber yield. However, Sree Nandini had non- significant S^2 suggesting that this variety is more or less a stable one. The stable genotypes identified in the present study can be used in breeding superior genotypes for high tuber yield with stable performance over a wide range of environmental conditions.

REFERENCES

1. S. A. Eberhart and W. A. Russel. 1966. Stability parameters for comparing varieties. Crop Sci., **6**: 36-40.
2. K. W. Finlay and G. M. Wilkinson. 1963. The analysis of adaptation in a plant breeding programme. Aust. J. Agric. Res., **14**: 742-754.
3. K. Ibrahim and M. K. George. 1985. Stability parameters association in sweet potato (*Ipomoea batatas* (L.) Lam.) and their implication in breeding strategies. South Ind. Horticulture., **33**: 83-90.
4. P. Kamalam, R. S. Biradar and N. Hrishi. 1978. Stability parameters in sweet potato (*Ipomoea batatas* (L.) (Lam.)). J. Root Crops., **4**: 35-39.