Indian J. Genet., **54** (2): 133–136 (1994)

STABILITY ANALYSIS IN SHORT DURATION CULTIVARS OF SWEET POTATO (*IPOMOEA BATATAS* L.)

U. B. APTE, A. R. KARNIK, B. B. JADHAV AND R. G. WAGH

Tuber Crops Scheme, Central Experiment Station
Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri 415712

(Received: August 7, 1992; accepted: December 21, 1993)

ABSTRACT

Eleven short duration cultivars of sweet potato (*Ipomoea batatas* L.), Kalmegh, 80/168, S 30, V 35, X 24, X 69, C 71, Cross 4, 76 OP/217, 76 OP/219 and H 268 were evaluated for marketable tuber yield and yield contributing characters on lateritic soil with 6.4 pH. The varieties exhibited significant differences in marketable tuber yield. Variety 76 OP/219 produced maximum mean marketable tuber yield (17.2 tonnes/ha) because of highest number of tubers/plant and minimum weevil infestation. The lowest marketable tuber yield was recorded in H 268 (2.1 tonnes/ha) due to lowest number of tubers/plant and minimum harvest index. Varieties 80/168, S 30, V 35, X 69 and Cross 4 gave comparable marketable tuber yield with each other. However, the varieties X 69 (14.4 tonnes/ha), V 35 (14.4 tonnes/ha) and Kalmegh (8.6 tonnes/ha) were stable for marketable tuber yield.

Key words: Stability, sweet potato.

In breeding programmes, greater the magnitude of genotype x environment interaction, lesser the chance of progress under selection. A desirable variety should have high stability of performance in terms of high yield. Information on stable yielding ability of early cultivars of sweet potato is not available. The present investigation has been undertaken to evaluate genotype x environment interaction of early varieties of sweet potato and identify high yielding stable genotypes.

MATERIALS AND METHODS

Eleven promising early genotypes collected from different regions of country were evaluated by planting 60 x 20 cm spacing in 3.60 x 1.20 m plots on lateritic soil, pH 6.4, in randomized block design with three replications. Basal fertilizer dose of 75 kg N, 50 kg P, 75 kg K/ha was applied at the time of planting. All recommended cultural practices were followed. On maturity, the data were recorded on marketable tuber yield and yield contributing characters. The stability of early genotypes for marketable tuber yield was

calculated [1]. In addition, correlations of tuber yield per plant with various traits were worked out [2].

RESULTS AND DISCUSSION

Analysis of variance revealed that the environmental effects were highly significant, indicating that different seasons influenced the performance of varieties (Table 1). The pooled analysis revealed significant differences among the varieties. Highly significant G x E interactions were obtained for marketable tuber yield, indicating that the genotypes had divergent linear response to environmental changes. At the same time nonsignificant pooled deviation indicated that the deviation from regression did not contribute to the differences in stability of genotypes. Thus, both predictable (linear) and unpredictable (nonlinear) components has no significant contribution in the stability of genotypes. However, the significant predictable and nonpredictable components indicate that the genotypes responded linearly to environmental change.

Table 1. Pooled ANOVA for marketable tuber yield in sweet potato

Source	d.f.	M.S.
Varieties	10	52.13**
Env. + (var. x Env.)	22	3.30**
Env. (linear)	1	22.75**
Var. x Env. (linear)	10	4.97**
Pooled deviation	11	0.01
Pooled error	66	2.64

**Significant at 1% level against pooled deviation.

Table 2. Mean tuber yield and stability parameters in sweet potato

Variety	Marketable tuber yield (tonnes/ha)	bi	S_d^2
80/168	14.1	1.34*	-2.64
Kalmegh	8.6	1.01	-2.53
S 30	13.0	0.89*	-2.64
V 35	14.4	1.12**	-2.64
X 24	11.9	2.37*	-2.64
X 69	14.4	1.13*	-2.64
C 71	9.7	0.69**	-2.64
Cross 4	16.1	1.94**	-2.64
76 OP/217	12.0	2.22**	-2.64
76 OP/219	17.2	1.67**	-2.64
H 268	2.1	-3.37	-2.63

*,**Significant at 5% and 1% levels, respectively.

The S_d^2 estimates for marketable tuber yield were nonsignificant for all the varieties. Thus, all the varieties are stable for marketable tuber yield (Table 2). Varieties X 69, V 35 and Kalmegh are most stable as they had regression coefficient near unity. Variety X 69 also produced highest tuber yield/plant, fresh weight and dry weight of vine/plant and average tuber weight (Table 3). The S_d^2 estimate nonsignificantly deviated from zero and means were near the general mean of the characters. Varieties X 24 and 76 OP/217 with higher means and regression coefficients more than unity are better suited to good management conditions. Variety 76 OP/219 gave maximum marketable tuber yield (17.2 tonnes/ha)

Table 3. Character means of sweet potato varieties averaged over three environments

Variety	Tuber yield per plant (g)	Fresh weight of vines per plant (g)	Dry weight of vines per plant (g)	No. of tubers per plant	Average tuber weight (g)	Harvest index (%)	Weevil infestation (%)
80/168	289.3	197.2*	30.8*	1.94	136.1	52.5**	9.5
Kalmagh	211.3	266.4	42.2	2.02	97.3	36.7	15.4
S 30	246.0	308.0	53.8	1.90	123.9	39.8	13.1
V 35	231.3	319.4	51.6	1.84	115.7	37.1	5.1
X 24	136.7	297.4	56.0	2.17	57.9	38.3	8.1
X 69	303.7**	374.4**	69.6**	1.99	144.0**	37.7	16.2**
C 71	168.0	322.6	64.4	1.70	96.4	33.6	15.7
Cross 4	200.0	362.8	36.4	1.86	106.2	38.1	6.5
76 OP/217	251.3	199.8	49.2	2.03	117.8	42.9	2.8*
76 OP/219	281.3	282.2	59.2	2.29**	106.6	43.3	5.2
H 268	56.0*	315.0	53.2	0.22*	37.7*	12.6*	3.8
G.M.	216.2	293.4	88.7	1.82	103.6	37.5	9.2
S.Em ±	37.3	18.4	4.2	0.07	22.7	2.2	1.9
C.D. 5%	110.0	51.0	12.4	0.19	65.6	6.4	5.3

*,** Minimum and maximum values of each character, respectively.

Table 4. Association of different characters with tuber yield in sweet potato

Character	Dry weight of vines per plant	No. of tubers per plant	Average tuber weight	Harvest index	Weevil infestation	Tuber yield per plant
Fresh weight of vines per plant	0.50	- 0.19	- 0.11	- 0.46	0.29	- 0.22
Dry weight of vines per plant		- 0.02	- 0.08	- 0.32	0.28	- 0.05
No. of tubers per plant			0.61*	0.87**	0.24	0.73**
Average tuber weight				0.74**	0.33	0.94**
Harvest index					0.12	0.82**
Weevil infestation						0.23

*,** Significant at 5% and 1% levels, respectively.

because of highest number of tubers/plant and minimum weevil infestation. The lowest marketable tuber yield of H 268 (2.1 tonnes/ha) was due to lowest yield and number of tubers/plant, average tuber weight and lowest harvest index. The average tuber weight over all the varieties tested was 103.4 g. Varieties C 71 and H 268 had lower regression coefficient ($b < 1$), thus both are suitable for poor management conditions.

Character association studies revealed that tuber yield/plant is positively associated with tuber number/plant, harvest index and average tuber weight. But its association was nonsignificantly negative with fresh weight and dry weight of vines/plant (Table 4). Average tuber weight was positively correlated with tuber number/plant. Harvest index is also positively associated with number of tubers/plant and average tuber weight.

REFERENCES

1. S. A. Eberhart and W. A. Russell. 1966. Stability parameters for comparing varieties. Crop Sci., **6**: 30–40.

2. D. S. Falconer. 1960. Introduction to Quantitative Genetics. Oliver and Boyd., Edinburgh.