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PHENOTYPIC STABILITY OF HYBRIDS AND THEIR PARENTS FOR FRUIT YIELD IN OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

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ABSTRACT

The phenotypic stability of 45 genotypes of okra (36 hybrids and 9 parents) grown over three environments was studied for fruit yield per plant. Variance due to genotypes, environments, G x E (linear) component was highly significant for this character. However, non-linear component of G x E interactions was greater in magnitude. In general, hybrids showed greatest production and stability.

Key words: Phenotypic stability, okra, *Abelmoschus esculentus.*

A breeding programme, aimed at developing phenotypically stable varieties, needs information on the extent of genotype x environment interaction for yield and associated quantitative characters. With the statistical and biometrical techniques developed to estimate stability parameters, it would be possible to determine the genotypic response for wide adaptability in a range of environments. Considerable work on this aspect has been reported in the cereals and other field crops, whereas little work has been done in case of okra. The present study, therefore, is an attempt to identify stable genotypes amongst 36 hybrids and nine parents for fruit yield and fruit characters in okra.

MATERIALS AND METHODS

The present experiment consisted of nine diverse genotypes of okra viz. Parbhani Kranti, Pusa Sawani, Gujarat Okra-1, Punjab Padmini, Perkins Long Green, White Velvet, Ankur, Padra 18-6 and Line No. 51. These were crossed in a diallel fashion excluding reciprocals in summer 1990 at College Farm, N.M. College of Agriculture, Navsari. The 36 hybrids and their nine parents were planted in randomized block design with three replications during kharif, 1990, at College Farm, College of Agriculture, Navsari (E_1),

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Junagadh (E_2) and during summer 1991 at Navsari (E_3). Each entry was represented by a single-row plot of ten plants, spaced at 45 x 30 cm. The data were analysed for stability parameters using the model proposed by Eberhart and Russell [1] for fruit yield per plant.

RESULTS AND DISCUSSION

The analysis of variance for genotype x environment interaction is presented in Table 1. Mean squares for genotypes were highly significant, indicating the presence of variability among the genotypes. The mean squares for G x E interactions were highly significant for yield, indicating that the genotypes showed differential response in different environments. The magnitude of G x E interaction variance was smaller as compared to genotype and environmental variances. Similar observation was reported by Desai [2].

Table 1. Analysis of variance for phenotypic stability in okra

Source	d.f.	Fruit yield/ plant
Genotype (G)	44	1082.599^{**++}
Environments (E)	2	49689.000^{**++}
Genotype x Environment (G x E)	88	304.975^{**++}
Environments (Linear)	12	99378.000^{**++}
G x E (Linear)	44	244.427**
Pooled deviation	45	357.411**
Pooled error	264	24.461

**Significant at 1% level against pooled error.
$^{++}$Significant at 1% level against pooled deviation.

It is obvious from the Table 1 that the component of G x E (linear) had important contribution for yield per plant indicating significant differences among the genotypes for their regression on environmental indices. Pooled deviation (non-linear component) variances were, however, significant suggesting importance of both linear and non-linear components. These findings agreed with the earlier reports [2 – 4].

Table 2. Distribution of parents and F_1 hybrids on the basis of individual G x E interaction components for fruit yield in okra

Parameter	Parents	Hybrids
Predictable		
G x E absent (both b and S_d^2 non-significant	3	9
G x E present		
(Only b significant) Unpredictable (G x E present)	2	4
Both b and S_d^2 significant	1	3
Only S_d^2 significant	3	16

Distribution of parents and F_1 hybrids on the basis of individual G x E interaction components for fruit yield has been given in Table 2. The data revealed that only in two parents and four hybrids regression mean squares were significant. This showed that linear regression alone accounted for almost entire G x E interactions in these genotypes. However, three parents and 16 hybrids showed significant remainder mean squares only which makes their performance unpredictable. The remaining

genotypes, i.e. one parent and three hybrids displayed significant regression mean squares as well as remainder mean square, indicating the presence of both linear as well as non-linear portion of G x E interactions. A genotype having high mean, unit regression and least deviation from regression is considered as stable. The analysis revealed that five hybrids, viz., Parbhani Kranti x Line no. 51, Pusa Sawani x Ankur, Gujarat Okra-1 x Ankur, Gujarat Okra-1 x Line No. 51, and Punjab Padmini x White Velvet were stable for yield.

None of the parents or hybrids, except the hybrid Parbhani Kranti x Line No. 51, exhibited average stability. Thus, any generalization regarding stability of a genotype for all the characters is too difficult since the genotype may not simultaneously exhibit uniform responsiveness and stability patterns for all the characters (5). Ariya (6) also could not find any stable genotype with respect to fruit yield and for most of other characters in okra.

One parent, Gujarat Okra-1, and two hybrids, viz., Parbhani Kranti x Padra 18-6 and Gujarat Okra-1 x Perkins Long Green exhibited above average stability for yield which indicated that these were suitable for unfavourable environmental conditions.

The present study outstandingly mentioned that advantage of F_1 populations may not only be in the area of increased yield, but also for greater stability in production across environments. Hybrids as a whole exhibited slightly higher mean values and regression coefficients were slightly higher than unity which indicated that the parameters for stability for yield lead to the interpretation of the greater production and stability of hybrids.

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