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# GENOTYPE X ENVIRONMENT INTERACTIONS IN BHINDI

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Genotype x environment interactions play a very important role in crop improvement programmes and such expected genetic advance could be predicted after eliminating all such influences. This gives meaningful and real estimates of Genetic advance under selection. The nature and magnitude of genotypex environmental interaction for two characters in bhindi *(Abelmoschus esculentus* L.) Moench) are presented in this paper,

## Materials and Methods

Six parents and fifteen one way hybrids of diallel crosses were grown at the college of Agriculture, Dharwar, during kharif 1973 and 1974 using randomised block design with a spacing of 45 x 30 cm. Parents $F_1$ and $F_2$ were grown simultaneously in 1974. The data on days to first flowering and plant height were collected on five randomly selected plants. The analysis was carried out as suggested by Kempthorne (1957).

## Results and Discussion

The individual analysis of variance revealed significant and non-significant differences during first and second years respectively (Table 1). The pooled analysis of variance showed highly significant variances for genotypes, years and interaction components. The contribution of years, genotypes and interaction components decreased in that order. There was greater magnitude of interaction between genotypes and years as its variance was also greater. This was clearly reflected in the unstability of the parents and hybrids over the seasons. The above facts are substantiated by the data on genetic parameters (Table 2). It is clear that different genetic parameters in the $F_1$ are very much tower in the second season than in the first. The influence of environmental interactions on the genotype is further clear from coefficients of variations. The difference between phenotypic and genotypic coefficient of variation which is a measure of the role of environment on the character was very low in the first season while there was wide difference between them in the second season showing the major role of environment. This is true in respect of their heritability value, genetic advance and expected genetic advance also. It is evident that the estimates of genetic parameters are much lower in the pooled data due to the elimination of Various interaction components, These values are precise, accurate and reliable as it takes into account only available heritable variation of the total variance. Hence it would be worth-while for plant

Table 1 Individual and pooled **analysis** in bhindi

| Source | DF | MSS | | | |
|---|---|---|---|---|---|
| | | Days to flower | | Plant height | |
| | | 1973 | 1974 | 1973 | 1974 |
| Genotypes | 20 | 10.42* | 8.11 | 1501.97** | 140.81 |
| Error | 40 | 4.S4 | 4.11 | 305.74 | 165.75 |
| | | *Pooled ANOVA* | | | |
| Genotypes | 20 | 4.09** | | | 315.15** |
| Years | 1 | 51.60** | | | 197649.82** |
| GxY interaction | 20 | 1.64** | | | 226.32** |
| Error | 80 | 0.11 | | | 7.01 |

* Significant 5% ** Significant 1%

**Table 2** Genetic parameters in different generations and **years**

| Parameters | $F_1$ | | | | | | $F_2$ | |
|---|---|---|---|---|---|---|---|---|
| | 1973 | | 1974 | | Pooled data | | | |
| | **Days** to flower | Plant **height** | **Days** to flower | Plant height | **Days** to flower | Plant height | **Days to** flower | **Plant height** |
| Phenotypic coefficient of variation. | 4.14 | 11.04 | 3.47 | 12.43 | 2.35 | 6.14 | 3.01 | 9.01 |
| Genotypiccoefficient of variation. | 3.02 | 9.49 | 2.35 | 8.20 | 1.50 | 2.88 | 2.41 | 6.19 |
| Heritability per cent (Broad sense) | 53.52 | 73.65 | 45.C7 | 43.45 | 41.73 | 21.98 | 63.60 | 29.00 |
| Genetic advance. | 2.06 | 33.97 | 1.55 | 8.68 | 9.20 | 3.71 | 1.30 | 5.97 |
| Expected genetic advance | 4.57 | 16.81 | 3.28 | 11.12 | 20.43 | 27.81 | 2.80 | 8.50 |

breeders to estimate the genetic variance precisely after removing such environmental influences. This supports the view of Nei (1960), Hanson *et al* (1956), Johnson *et al*. (1955) and Comstock and Robinson (1952).

The hybrid material was advanced to $F_2$ generation and the genetic parameters were also estimated for comparison and also with a view to checking the predicted mean of the character. The data showed close agreement of expected

and observed mean values of the characters in $F_2$ generation. Thus the prediction of mean was accurate and possible due to reliable estimates of genetic parameters. Such predictions will be more useful to breeders in practical plant breeding work.

The components of variance are given in Table 3. The variance due to genotypes and interactions between genotypes and environment are highly significant thereby suggesting the presence of considerable degree of first order interacions. This has to be kept in view while designing further breeding programmes. This falls in line with the earlier reports of Miller *et al.* (1962) and Rasmusson and Lambert (1961). It is therefore suggested to increase the locations rather than increasing the years so that considerable time is reduced in the final release of a crop variety. Because little would be gained by testing the material in the same location more than two years as also suggested by Kaltsikes and Larter (1969).

**Table 3** Components of variance

| Components | Variance | |
|---|---|---|
| | Days to flower | Plant height |
| Genotypes | 0.48* | 04. 80* |
| Genotype X Environment | 1.32** | 102.71** |
| Error | 0.11 | 7.01 |

* Significant at 5% ** Significant at 1%

## Summary

It is suggested from the study to increase the number of locations for testing of breeding material than increasing years of testing. This helps in early evaluation of a crop variety.

## സംഗ്രഹം

പുതിയ സങ്കര ഇനങ്ങളം പരീക്ഷിക്കുന്നതിനു് പല വർഷങ്ങളോളം പാനം നടത്തുന്നതിനെക്കാളം പല സ്ഥലങ്ങളിൽ ഒരുമിച്ചു പരീക്ഷിക്കുന്നതാണു് നല്ലതെന്നു കാണുകയുണ്ടായി.

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