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# Stability analysis for grain yield in finger millet (*Eleusine Coracana* G.)

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**ABSTRACT**
Stability of seed yield is an important consideration in finger millet, which is highly influenced by agro-climatic conditions. The present study was conducted to determine stability for grain yield in twenty finger millet (*Eleusine Coracana G.*) genotypes. The pooled analysis of variance showed differential behavior of genotypes over environment. None of the genotypes was stable for all the characters evaluated. The genotype EC 138375 and AKP 1 possessed the high mean performance. The regression coefficient greater than one suggests utility of these genotypes for favorable environmental conditions, where as the genotype Mudua was found to be suitable for unfavourable environments. The genotypes RPSP 742, AKP 1 and EC 138375 could be stable under favorable enviroment for days to 50 % flowering, while the genotypes RPSP 742, EC 138375 and RPSP 732 were early maturing with average stability of genotype. The entries EC 138375, AKP 1 and Mudua with high mean grain yield could be utilized for developing high yielding stable finger millet genotypes.

**Key words :** Stability, Regression and Favorable environments

## INTRODUCTION

Finger millet (*Eleusine coracana G.*) is the third most important millet crop of India. It is the stable food of rural and working people. Stability of seed yield is an important consideration in finger millet, which is highly influenced by agro-climatic condition. Introduction of genotype is the basic requirement to a plant breeder for successful crop improvement. Hence, the present study was undertaken to evaluate homogeneity production stability of some finger millet genotype.

## MATERIAL AND METHODS

Twenty genotypes were evaluated in three different environments. The enviroments were created by using different sowing dates *i.e.* difference of three meteorological weeks in each of the sowing i.e. 26$^{th}$ met. week ($E_1$), 29$^{th}$ met. week ($E_2$) and 33$^{rd}$ met. week ($E_3$) under rainfed condition, at the Botany farm, College of agriculture, Pune, Maharashtra. The materials was grown in randomize block design with three replications. The recommended spacing of 30x10 cm. between and within rows was followed. Each entry was represented by two rows of 4.5 m length. The observation on days to 50 per cent flowering, days to maturity, plant height(cm), number of productive tillers, number of heads per plant, number of fingers per head, finger length (cm), Test weight (g) and grain yield per plant (g) were recorded. Stability analysis was carried out using the Eberhart and Russell (1966) model.

## RESULTS AND DISCUSSION

Analysis of variance (Table 1) showed significant genotype difference for almost all the characters, except test weight. Environment variance was significant for all the character except finger length and test weight. Liner components of G x E introduction will significant for a day to 50 percent flowering, days to maturity, plant height and

Table 1 : Analysis of variance for stability in four characters of finger millet

| Source | D.F. | Days to 50% flowering | Day to Maturity | Productive Tillers (no.) | Grain yield per plant (g) |
|---|---|---|---|---|---|
| Genotype (G) | 19 | 338.878** | 483.937** | 4.546** | 54.089** |
| Environment | 2 | 219.695 | 90.235 | 10.17 | 166.959 |
| (GxE) | 38 | 15.895$$ | 16.351$$ | 0.713 | 11.323$$ |
| E+ (GxE) | 40 | 26.084 | 20.047 | 1.213 | 19.105 |
| E (Linear) | 1 | 439.391** | 180.47** | 20.42** | 133.919 |
| GxE (linear) | 19 | 16.376** | 19.719** | 0.756 | 10.504** |
| Pooled deviation | 20 | 14.642$ | 12.337$$ | 0.637 | 11.535$$ |
| Pooled error | 114 | 20.616 | 55.389 | 1.636 | 62.597 |

Where,
* and * * significant at P = 0.05 and 0.01 respectively against pooled deviation.
$ and $$ significant at P = 0.05 and 0.01 respectively against pooled error.


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Table 2 : Stability parameter for four important contributing character in finger millet

| S.No | Genotype | Days to 50% Flowering | | | Days to Maturity | | | Productive tillers (no,) | | | Grain yield per plant (g) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | bi | $S^2di$ | X | Bi | $S^2Di$ | X | bi | $S^2Di$ | X | bi | $S^2Di$ |
| 1 | IE 1 | 61.55 | 1.32 | -5.29 | 106.00 | -2.82 | -18.44 | 4.22 | 1.46 | -0.49 | 19.97 | 1.31 | -15.51 |
| 2 | IE 6 | 66.44 | 1.26 | -5.33 | 102.11 | 0.68* | -0.40 | 3.77 | 1.73 | -0.42 | 23.71 | 2.14 | -10.42 |
| 3 | MADUA | 72.11 | 1.60 | 1.73 | 110.11 | 1.55 | -2.42 | 5.82 | -0.54 | 1.49* | 26.62 | 0.61 | -11.42 |
| 4 | AKP 1 | 62.55 | 1.40 | -4.58 | 97.55 | -0.16 | -3.95 | 5.77 | 0.54 | -0.53 | 27.76 | 1.78 | -16.38 |
| 5 | FAO 49597 | 69.11 | 2.65 | -4.4 | 100.88 | 4.16 | -16.77 | 5.53 | 2.82 | -0.51 | 25.64 | 1.91 | -13.09 |
| 6 | FAO 49599 | 68.00 | 1.14 | -6.40 | 100.66 | 2.00 | -11.31 | 4.91 | 0.64 | -0.52 | 17.91 | 0.33 | -14.67 |
| 7 | SAD 173 | 86.88 | 1.46 | 14.22** | 125.77 | 2.46* | -7.53 | 6.24 | -0.10 | -0.36 | 24.58 | 0.77 | -3.84 |
| 8 | EC 140182 | 84.88 | 0.32 | 0.72* | 122.88 | 0.92* | -7.06 | 5.31 | 1.32 | 0.24 | 18.82 | 0.53 | -17.67 |
| 9 | EC 140203 | 98.55 | -0.85 | 78.47** | 135.11 | -0.72 | -15.08 | 4.82 | 0.73 | 0.48 | 24.31 | 1.79 | -11.36 |
| 10 | SAD 819 | 81.33 | 0.29* | 20.80** | 125.11 | 1.95 | -17.04 | 7.73 | 1.22* | 1.73* | 17.84 | 1.19 | -20.46 |
| 11 | SAD 515 | 84.66 | 0.94 | 30.97** | 122.00 | 0.49 | 109.97** | 3.73 | 0.54 | 0.13 | 23.84 | 1.03 | -17.46 |
| 12 | RPSP 732 | 63.66 | -1.06 | -5.46 | 95.11 | -0.15 | -17.26 | 4.71 | 0.91 | -0.54 | 23.74 | 1.22 | -16.83 |
| 13 | RPSP 742 | 60.86 | 1.03 | -6.37 | 88.77 | 1.52 | -18.43 | 5.04 | 1.66 | -0.15 | 21.92 | 1.61 | -20.66 |
| 14 | EC 153163 | 71.66 | 2.01 | -6.85 | 107.44 | 2.51 | -10.32 | 4.17 | 0.91 | -0.54 | 21.73 | -0.26 | 4.41* |
| 15 | EC 164259 | 71.33 | 1.39 | -1.75 | 100.00 | 1.11 | -15.66 | 4.08 | 0.41* | 0.65 | 26.01 | 0.06* | 37.50** |
| 16 | UM 147 | 71.33 | 0.58 | 2.01* | 97.22 | 1.28 | -15.14 | 5.35 | 0.72 | 0.16 | 18.11 | 0.10 | -16.09 |
| 17 | EC 146385 | 79.55 | 1.36 | 9.71** | 107.00 | 1.13 | -9.94 | 4.37 | 1.63 | -0.53 | 19.38 | 2.26 | -16.97 |
| 18 | EC 138362 | 79.33 | 0.74 | -4.05 | 105.55 | 1.21 | -14.81 | 7.24 | 1.99 | -0.16 | 26.60 | -0.03 | -20.12 |
| 19 | EC 138375 | 62.66 | 0.89 | 10.24** | 98.00 | -0.71 | -18.44 | 6.66 | 1.97* | 1.68* | 35.10 | 1.55* | 8.51** |
| 20 | VRR 602 | 87.22 | 1.46 | -4.40 | 109.44 | 2.30 | -12.41 | 2.75 | -0.23 | 0.04 | 21.16 | 0.05 | 5.98** |

Where, * and ** significant at 5 and 1 per cent level, respectively.

grain yield per plant revealed the differential reaction of genotype tested to environments for all the characters studied.

The phenotypic stability of genotype was measured by three parameters, viz., Mean performance over three environments (x), the linear regression (bi) and deviation from regression ($s^2di$) as per Eberhart and Russell (1966). Nine genotypes exhibited high grain yield than the grand mean of 23.06 (g/plant). Out of these nine genotypes EC 138375 recorded highest grain yield (35.10 g/plant) followed by AKP 1 and Madua. (Table 2).

Looking to the data on mean grain yield, regression coefficient and $s^2di$ values the genotype EC 138375 recorded the highest grain yield per plant (35.19) however the regression coefficient was high and the $s^2di$ was also significant indicating the below average stability of the genotype and can be recommended for favorable environments only. AKP 1 was the other genotype with high mean performance regression grater than unity and minimum $s^2di$ values suggested its adaptation to favorable environments with possibility of predicting the performance. Likewise, Madua was the another genotype producing high mean grain yield (26.65 g) with regression coefficient less than unity and comparatively minimum deviation indicating to recommend such genotype to poor environments with possibility of predicting the performance. Solanki *et al*., (2000) reported similar results in finger millets.

For days to 50% flowering RPSP 742, AKP 1 and EC 138375 were early to flower, the genotype RPSP 742 was stable in earliness as it produced early flowering, regression coefficient close to unit and minimum deviation, however, the AKP 1 produced early flowering and regression coefficient grater than one with minimum deviation suggesting its recommendation for there favorable environments, conforming the finding of Shanthukumar (2000).

The genotye RPSP 742 mature earlier followd by EC 138375 and RPSP 732. However, the genotype EC 164259 took minimum days to maturity, unit regression coefficient with minimum deviation indicating average stability of genotype. The other genotype viz., AKP 1 and EC 138375 appeared suitable for unfavorable environment as they recorded regression less than unity and minimum deviation with early maturity confirming the finding of Motowao (1992).

For number of productive tillers genotypes AKP 1 and UM 147 regression coefficient was less than unity, high mean and non-significant $s^2di$ showed above average stability. None of the genotype was stable for there characters. For plant height genotype FAO 49599 full fill all the requirement necessary for average stability i.e. high mean, also unity and minimum deviation from regression. For character number of head per plant, entries EC 140182 and RPSP 742 show average stability and confirm the earlier finding of Prusti *et al*.,(1998).

Based on these results, its can be concluded that the none of the genotype was stable for grain yield as well as yield contributing characters. The genotypes exhibited differential reaction for stability and irrespective of the differential performance of the varieties EC 138375 and AKP 1 showed, recommended for favorable and Madua for unfavorable environmental condition, as they have stability for the respective environment for yield as well as component characters.

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