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REFERENCES

Burton, G. W. 1951. Quantitative inheritance in Pearl Millet *(Pennissetum glaucum) Agron. J.*, **43**:409–17.

———. 1952. Quantiative inheritance in grasses *Proc. 6th Internattonal Grass land Cong.*, **1**: 277–83.

Johnson, H. W., H. P. Robinson and R. E. Comstock. 1955. Estimate of gentic and environmental variability in Soyabeans. *Agron. J.*, **47**: 314–18.

Rao, D. V. N. and K. D. Rachie. 1964. Correlation and Heritability of morphological characters in grain sorghums *Madras agric. J.*, **51**: 156–61.

Sikka, S. M. and K. B. L. Jain. 1958. Correlation studies and the application of discriminant function in aestivum wheats for varietal selection under rainfed conditions. *Indian J. Genet.*, **18**: 178–86.

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Studies on Genetic Variability in Ragi-II. Phenotypic, Genotypic and Environmental Correlations between Important Characters and their Implications in Selection

by

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Introduction: Several plant breeders have attempted to assess the relationship of different plant characters to yield in different crops and the correlations will fall under the category of environmental correlations. But such information in fingermillet ragi *(Eleusine coracana)* is very meagre. There is no information on phenotypic, genotypic and environmental correlations in ragi· In this paper an attempt has been made to study these three types of correlations in some important quantitative characters contributing to yield and their importance in selection work in plant breeding.

Materials and Methods: The materials for the present investigations comprise fourteen ragi varieties which differ widely for many charecters. The varieties were studied in a randomised block design with three replications

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in winter season of 1962. Each variety was planted in twenty rows of ten feet length and six inch spacing. Five plants were selected at random in each replication to record observations. The six characters chosen for study were plant height, leaf number, tiller number, number of fingers on main earhead and length of panicle and grain yield. The different types of correlations were worked out utilising different data obtained in the analysis of variance. The general formula for obtaining correlation is given below:

$$r_{xy} : = \frac{\text{Covariance of xy}}{(\text{Variance of x})\ (\text{Variance of y})}$$

The genotypic, phenotypic and error variances and co-variances were utilised for calculating the genotypic, phenotypic and environmental correlation co-efficients respectivcly. The sum of squares and sum of products at error and varietal levels were adopted as error and phenotypic vrriances and co-variances respectively. Genotypic variances and co-variance were obtained by deducting the values of sum of squares and sum of products for error from the respective values at varietal level.

Results: The genotypic, phenotypic and error variances and covariances were estimated and the values utilised for estimating the correlation co-efficients. The three types of correlation co-efficients between different characters are presented in Table 1.

TABLE 1. *Phenotypic (P), Genotypic (G) and Environmental (E) Correlation Co-efficients between Different Pairs of Characters in Ragi*

Character		Plant Height	Leaf Number	Tiller Number	Finger Number	Length of Panicle
Grain Yield	P	0.126	0.612**	0.694**	0.541**	0.153
	G	0.130	0.876**	0.674**	0.624**	0.291
	E	0.143	-0.193	0.848**	0.863**	-0.459*
Plant Height	P		0.298	0.236	-0.359	0.403*
	G		0.319	0.265	-0.351	0.388*
	E		0.292	0.079	-0 541**	0 684**
Leaf Number	P			0.211	0.303	0.973**
	G			0 458*	0.460*	0.477*
	E			-0.305	-0.320	-0.477*
Tiller Number	P				0.396*	0.131
	G				0.333	0.188
	E				0.714**	0.138
Fingers Number per Ear	P					-0.139
	G					-0.343
	E					-0.641**

* Significant @ 5% level. ** Significant @ 1% level.

The relationship of the five important characters to grain yield was studied. The genotypic and phenotypic correlation co-efficients indicated that grain yield is positively and significantly related to leaf number, number of tillers and number of fingers but negatively correlated with length of panicle at environmental level. There was no relationship between height of plant and grain yield. The relationship of these six characters within themselves indicated that plant height is significantly and positively correlated with the length of panicle at all the three levels. Similarly leaf number is positively correlated with finger number which in its turn is negatively correlated with length of panicle.

Discussion : A general feature on the results obtained in these investigations is that genotypic correlation co-efficients are higher than phenotypic and environmental co-efficients. This means that there is a strong inherent relationship between the characters under study but their expression is impeded by the influence of environmental factors Johnson *et al.* (1955) also obtained higher values of genotypic correlation co-efficients than phenotypic correlations between different pairs of characters in soyabeans. Ayyangar *et al.* (1938) reported simple correlations between different pairs of characters in finger millets. They obtained a positive correlation between yields and leaf number on main axis, plant height, finger number and length and breadth of flag leaf etc.

In the present investivation also a significant and positive correlation was obtained between grain yield and number of leaves on main axis of number of tillers and number of fingers on main earhead at genotypic and phenotypic levels but negatively correlated with length of panicle. Thus the results are in agreement with these of Mahadevappa and Ponnaiah (1963). This negative correlation of yield and panicle length is quite possible since most of the high yielding varieties in the trial are having incurved panicles which are generally shorter while the varieties with open panicles, which are generally longer are also shy-bearers. In ragi the grain yield is mostly dependant upon the number of tillers produced by a plant and productivity is related by the vegetative growth of the plant and highly significant and positive correlation of these two characters namely, number of tillers and leaf number to grain yield is quite natural. Plant height in ragi does not seem to have any impact on the grain production. There was significant relationship between leaf number and other characters, *viz.*, tiller number, finger number and length of panicle. In plant breeding high yielding ragi types can be evolved if selection is based on leaf number, tiller number and finger number and these three characters as the studies indicated will be of considerable importance for a plant breeder.

Summary: An attempt has been made for the first time to study and to gather information in ragi on correlations at phenotypic, genotypic and environmental levels in fourteen varieties. The results indicated that phenotypic and genotypic correlation co-efficients between grain yield on one hand and leaf number, tiller number, and finger number on the other hand, were positive and significant. However, grain yield was negatively correlated with length of earhead at environmental level only. Leaf number is related to number of tillers and number of fingers and these characters are inherently associated with grain yield, as seen from the high genetic correlation co-efficients.

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REFERENCES

Ayyangar G. N. R., U. AchyuthaWariar and D. S. Rajabhooshanam. 1928. The response of ragi - *Eleusine coracana* (Gaertn) the finger millet to sowings in the different seasons of the year *Madras agric. J.*, **26** : 279–84.

Johnson, H. W., H. F. Robinson and R. E. Costock. 1955. Genotypic and Phenotypic correlations in soyabeans and their implications in selections. *Agron. J.*, **47** : 477–82.

Mahadevappa, M. and B. W. X. Ponnaiyya. 1963. Selection index for yield in *Eleusine coracana* (ragi) *Madras agric. J.*, **50** : 85.