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Research Notes

Inter trait association and path coefficient analysis in irrigated finger millet (*Eleusine coracana (L) Gaertn)*

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Finger millet (*Eleusine coracana* (L) *Gaertn)* plays a vital role in providing quality nutrition to human of South Asia and Africa. Many kinds of traditional and processed foods are produced from finger millet. It is one of the important small millets, which is very well adapted to marginal lands, hilly regions and shallow soils. In any breeding programme, selection based on the knowledge and direction of association between different yield attributes and yield is very useful. The present investigation was undertaken to determine the associations between yield and yield components in hybrids and parents of finger millet.

The experimental material for the present study comprised of eight parents which were selected on the basis of desirable agronomic, morphological characters including five female parents (CO 9, CO 10, CO 11, CO 12, CO 13) and three pollen parents (TNAU 946, GPU 28 and DPI 2011), and these were crossed in line x tester fashion during *kharif* 2002. The resulting 15 hybrids along with eight parents were evaluated in a RBD with three replications by adopting a spacing of 22 x 10 cm at the field of Department of Millets, TNAU, Coimbatore during *rabi* 2002-2003. Observations were recorded on five

Table 1. Genotypic (G) and Phenotypic (P) Correlation Co-efficients between different characters

S.No	Characters		Days to 50% flowering	Days to maturity	Plant heigt (cm)	Numbers of tillers per plant	Numbers of fingers per ear	Finger length (cm)	1000 Seed weight (g)	Grain yield (g)
1.	Days to 50% flowering	G	1.000	0.880**	0.462*	0.020	-0.304	0.477*	-0.166	0.024
		P	1.000	0.739**	0.389	0.015	-0.268	0.421*	-0.128	0.028
2.	Days to maturity	G		1.000	0.427*	0.132	-0.308	0.486*	-0.134	-0.214
		P		1.000	0.406	0.064	-0.293	0.413*	-0.104	-0.155
3.	Plant height (cm)	G			1.000	0.309	-0.248	0.154	0.057	-0.022
		P			1.000	0.246	-0.231	0.165	0.059	-0.024
4.	Number of tillers per plant	G				1.000	-0.053	-0.240	-0.413*	0.149
		P				1.000	0.005	-0.13	-0.316	0.093
5.	Number of fingers per ear	G					1.000	0.018	0.090	0.414*
		P					1.000	0.082	0.049	0.351
6.	Finger length (cm)	G						1.000	0.111	0.132
		P						1.000	0.079	0.135
7.	1000 seed weight (g)	G							1.000	-0.070
		P							1.000	-0.070
8.	Grain yield (g)	G								1.000
		P								1.000

* Significance at P = 0.05, ** Significant at P = 0.01

randomly selected plants for eight characters *viz.*, days to 50 per cent flowering, days to maturity, plant height, number of tillers per plant, number of fingers per ear finger length (cm), 1000 seed weight (g) and grain yield (g). Correlation coefficients for yield and yield components were evaluated utilizing the formula suggested by Al-jibouri *et al.*, (1958). Further partitioning of correlations into direct and indirect effects by path coefficient analysis was estimated by using the procedure suggested by Dewey and Lu (1959).

Correlation coefficients at genotypic and phenotypic level were computed per pair of all the eight characters and presented in Table 1. In general the values of genotypic correlation were higher than their phenotypic correlation coefficient values indicating that the strong association between the traits was mainly governed by genetic factors. This might be due to the effect of environment in modifying the expression of the genotype and thus altering the phenotypic expression as reported by Rai *et al.* (1997). The grain yield was observed to be significantly and positively associated with number of fingers per ear at genotypic level. The observations made by Ravikumar, (1998), Harinarayana, (1989) Ravindran, *et al.* (1996), and Bandyopadhyay, (1998) were also similar. However, the traits, days to 50 per cent flowering, number of tillers per plant and finger length were found to be positive but non-significant. Positive association between productive tiller and grain yield was reported by several workers. Hence, selection for these characters would lead to simultaneous improvement in yield.

Regarding the inter correlation between yield attributes, days to 50 per cent flowering had significant and positive association with days to maturity, plant height and finger length.

Table 2. Direct and indirect effects of different characters towards grain yield at genotypic level in finger millet.

Characters	Days to 50% flowering	Days to maturity	Plant height (cm)	Numbers of tillers per plant	Numbers of fingers per ear	Finger length (cm)	1000 seed weight (g)	Grain yield (g)
Days to 50% flowering	**1.182**	-1.14	-0.059	0.009	-0.102	0.150	-0.015	0.024
Days to maturity	1.039	**-1.298**	-0.054	0.061	-0.103	0.153	-0.012	-0.214
Plant height (cm)	0.546	-0.554	**-0.127**	0.143	-0.083	0.048	0.005	-0.022
Numbers of tillers per plant	0.024	-0.171	-0.039	**0.465**	-0.018	-0.076	-0.036	0.149
Numbers of fingers per ear	-0.349	0.406	0.032	-0.025	**0.336**	0.006	0.008	0.414*
Finger length (cm)	0.563	-0.630	-0.019	-0.112	0.006	**0.315**	0.009	0.132
1000 seed weight (g)	-0.197	0.173	-0.007	-0.192	0.030	0.035	**0.088**	-0.070

Residual effect = 0.673 ; Bold figures are direct effects.

Anantharaju and Meenakshiganesan (2005) reported positive association between days to 50% flowering and plant height. It was also observed that the traits days to maturity, plant height and finger length were significantly correlated with each other.

Correlation coefficients of yield per plant with other quantitative characters were partitioned into their direct and indirect effects (Table 2) through path coefficient analysis. The results indicated that positive association of grain yield with number of fingers per ear was mainly through their positive direct effect on yield per plant. Days to 50 per cent flowering showed the highest positive direct effect on grain yield per plant (1.182) followed by number of tillers per plant (0.465), number of fingers per ear (0.336) and finger length (0.315). Though the direct effect of number of tillers per plant and finger length had high positive direct effects, its correlation with grain yield was nonsignificant. This might be due to low indirect effect through all the characaters. The positive direct effect of tillers per plant and number of fingers per ear was supported by Ravindran *et al.* (1996). A high negative direct effect (-1.298) of days to maturity and plant height (-0.127) on grain yield per plant was also noticed. The direct effect of 1000 seed weight on yield was the lowest (0.088).

Considering the direct and indirect effects, it may be concluded that the characters number of tillers per plant, number of fingers per plant, and finger length may be taken as the selection criteria during any selection programme for improvement of grain yield in finger millet under irrigated condition.

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Research Notes

Influence of nitrogen levels and its time of application on yield and quality parameters of hybrid cotton

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Cotton or 'White gold' is a premier cash crop and one of the prominent industrial crops of India generating sizeable employment. Cotton accounts for around 70 percent of total fibre consumption in the textile sector, which account for nearly 20 percent of India's industrial production. Nearly one third of the foreign exchange is earned by cotton and textile exports. The price of cotton is governed by its fibre quality, fibre length, fineness and bundle strength along with higher ginning out turn are the most important quality parameters. At present hybrids are contributing 50 percent of the country's total production. The growth rate of long and extra long staple was 6-7 percent due to predominant role of hybrids (Basu and Paroda, 1995). The information pertaining to nitrogen levels and its time of application on quality of cotton is meagre. Therefore, the present investigation was undertaken to find out the optimum nitrogen levels and its time of application on the quality of hybrid cotton TCHB 213.

A field experiment was conducted during the winter season of 1998-'99 at Tamil Nadu Agricultural University, Coimbatore to know the effect of different levels and time of nitrogen application on yield and quality of hybrid cotton TCHB 213 under irrigated condition. The treatments included three levels of nitrogen (80, 120 and 160 kg N ha^{-1}), different times of application *viz.,* two equal splits at basal and 45 DAS, three equal splits at basal, 45 DAS and 65 DAS, four equal splits at basal, 45 DAS, 65 DAS and 85 DAS and control (no nitrogen). The experiment was laid out in factorial randomized