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Original Research Article

Inter relationship and cause-effect analysis in Finger millet (*Eleusine coracana* (L.)Gaertn.) Genotypes

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A B S T R A C T

Keywords

Finger millet, Inter relationship, Cause-effect analysis

Inter relationship and cause-effect analysiswas carried out from the data of yield and yield attributes of 35 genotypes of finger millet. Seed yield plant^{-1} showed positive and significant genotypic inter relationship with days to maturity, plant height and days to 50% flowering suggesting that these are the major yield contributing traits. Days to maturity, plant height and days to 50% flowering had high positive direct effect followed by main ear length, fingers ear^{-1}. These traits deserve special emphasis in selection while selecting for improvement of seed yield in finger millet.

Introduction

Finger millet is the third most important millet grown in many states of India under diversified situations of soil, temperature and rainfall. Early maturity, low input requirements, freedom from major pests and diseases, rejuvenation capacity after alleviation of stress conditions have made this crop an ideal for dryland farming. Finger millet is the only millet which has been able to touch an average productivity level of more than 1.5 tonnes per hectare and serve as a sustainable and food security crop that is especially important for its nutritive and cultural values. Improvement in any crop usually involves exploiting the genetic variability in specific traits and associations among them. Simultaneous improvement of these traits depends on the nature and degree of association between traits (Mnyenyembe and Gupta, 1998).

To facilitate selection in breeding for high yield, therefore, it is logical to examine various components and give more attention to those having the greatest influence on yield. The ultimate expression of yield in crop plants is usually dependent upon the action and interaction of a number of important characters. Correlation, therefore, is helpful in determining the component characters of a complex trait, like yield. With more variables in correlation studies, indirect associations become more complex and important; consequently, a correlation study coupled with path analysis is more effective tool in the study of yield attributing characters.

Hence the present study was undertaken with the objectives of finding associations among traits and assessing the direct and indirect contribution of each trait to seed yield of finger millet.

Materials and Methods

The experimental material consisting of 35 genetically diverse genotypes were evaluated in a randomized block design with three replications at RARS,Chintapalli, A.P., during kharif 2011. Each genotype was represented by two rows of three meter length and spaced 30 cm apart. The recommended package of practices was followed to raise good and healthy crop. Five competitive plants were selected at random from each replication and observations were recorded on 7 quantitative traits viz., days to 50% flowering, plant height (cm), number of productive tillers, main ear length (cm), number of fingers ear^{-1}, days to maturity and seed yield plant^{-1} (g). Genotypic and phenotypic correlation coefficients for grain yield and its component traits were calculated as suggested by Johnson*et al.* (1955). The direct and indirect effects of yield related traits on seed yield plant^{-1} was worked out through path coefficient analysis. The analysis was done following the method suggested by Dewey and Lu (1959), which provides a means of untangling the complex correlations into direct and indirect contributions.

Results and Discussion

The high genotypic correlation coefficient values (Table 1) indicating strong inherent association between different traits and phenotypic selection would be effective as the association was mainly governed by genetic factors, while the phenotypic values were reduced by the significant interaction of the environment. Days to maturity, plant height, days to 50% flowering, main ear length and fingers ear^{-1}showed high positive and significant correlation with seed yield plant^{-1} both at genotypic and phenotypic levels. Thus, present results are in consonance with those of Bedis*et al.* (2006) Gowda*et al.* (2008), Kadam *et al.* (2009), Priyadharshini*et al.* (2011) and Shinde*et al.* (2010).

Path coefficient analysis is useful in determining the direct and indirect interrelations of various yield attributes. The direct and indirect effects of seven characters on seed yield are presented in Table 2. Path analysis revealed that days to maturity had the highest positive direct effect on seed yield plant^{-1} which was followed by plant height and days to 50% flowering. The genotypic association ofplant height and days to 50% flowering was significantly positive suggesting the true perfect association of these characters and also indicating its role in simultaneous selection, while selecting genotypes with high seed yield. Hence, direct selection for these traits would be rewarding for yield improvement, which will also reduce the undesirable effect of the component traits studied. Similar findings were reported by Bedis*et al.* (2006), Kadam *et al.* (2009), Andualem and Tadesse (2011), Priyadharshini*et al.* (2011).

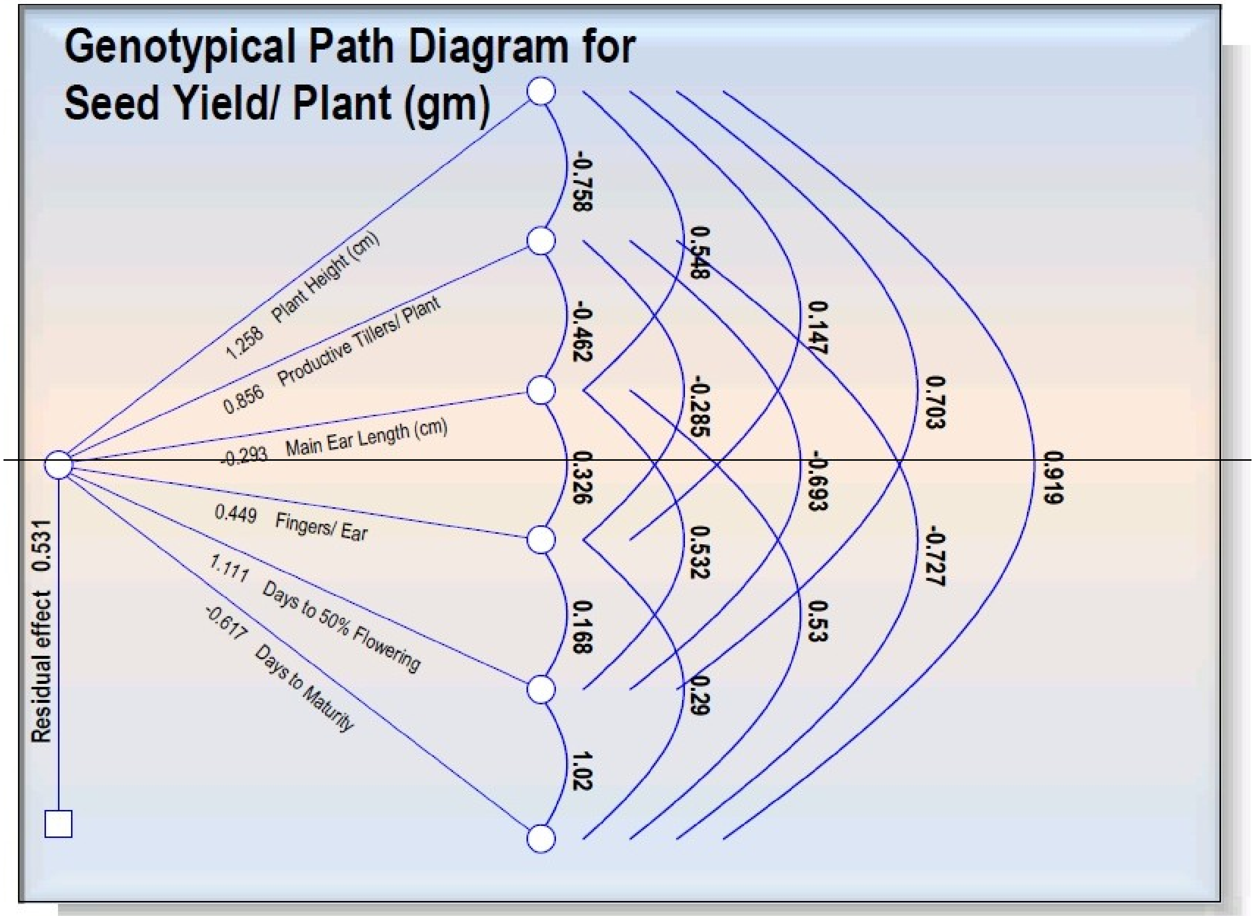
Table.1 Estimates of phenotypic (above diagonal) and genotypic (below diagonal) correlation coefficients for 7 characters in finger millet genotypes

Character	Plant height (cm)	Productive tillers plant^{-1}	Main ear length (cm)	Fingers ear^{-1}	Days to 50% Flowering	Days to Maturity	Seed yield plant^{-1} (gm)
Plant height (cm)	1	-0.4976**	0.4316**	0.1379	0.5042**	0.5098**	0.6337**
Productive tillers plant^{-1}	-0.7579**	1	-0.3847**	-0.2050*	-0.2610**	-0.1939*	-0.2473*
Main ear length (cm)	0.5483**	-0.4624**	1	0.2775**	0.3153**	0.2408*	0.3626**
Fingers ear^{-1}	0.1475	-0.2848**	0.3258**	1	0.0616	0.0652	0.1845
Days to 50% flowering	0.7032**	-0.6931**	0.5324**	0.1682	1	0.7324**	0.4395**
Days to maturity	0.9188**	-0.7266**	0.5299**	0.2898**	1.0198**	1	0.5740**
Seed yield plant^{-1} (gm)	0.7290**	-0.4115**	0.4115**	0.3034**	0.6927**	1.0247**	1

Table.2 Genotypic path coefficient analysis for 7 characters in finger millet

Character	Plant height (cm)	Productive tillers plant^{-1}	Main ear length (cm)	Fingers ear^{-1}	Days to 50% Flowering	Days to Maturity
Plant height (cm)	1.2577**	-0.9532**	0.6896**	0.1855	0.8844**	1.1557**
Productive tillers plant^{-1}	-0.6486**	0.8558**	-0.3958**	-0.2437*	-0.5932**	-0.6219**
Main ear length (cm)	-0.1608	0.1356	-0.2932**	-0.0955	-0.1561	-0.1554
Fingers ear^{-1}	0.0662	-0.1279	0.1463	0.4490**	0.0755	0.1301
Days to 50% flowering	0.7814**	-0.7701**	0.5916**	0.1869	1.1112**	1.1332**
Days to maturity	-0.5669**	0.4483**	-0.3269**	-0.1788	-0.6292**	-0.6170**
Seed yield plant^{-1} (gm)	0.7290**	-0.4115**	0.4115**	0.3034**	0.6927**	1.0247**

Fig.1 Genotypic Path diagram for 7 characters



Regarding the indirect effect of component traits on seed yield, days to maturity had high indirect effect through plant height and days to 50% flowering.

Hence, from the results, it could be inferred that the traits days to maturity, plant height and days to 50% floweringhave to be accounted for direct selection for yield improvement.

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