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Study of correlation and path analysis of elite finger millet germplasm (*Eleusine coracana* (L.) Gaertn)

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Abstract
In present study the associations among yield components and their direct and indirect influence on the grain yield of finger millet were investigated. For this purpose, fifty five finger millet (Eleusine coracana (L.) Gaertn.) genotypes were tested using an augmented randomized complete block experimental design. The correlation study revealed that flag leaf area, effective tiller per plant, ear per plant, days to maturity, biomass yield per plant, harvest index and 1000-seed weight recorded significant positive correlation with grain yield per plant while negative and significant correlation observed with leaf blast, neck blast and finger blast at phenotypic level. Phenotypic path analysis revealed that harvest index, biomass yield per plant, Ears per plant, days to 50% flowering, plant height, 1000-seed weight, fingers/plant, and flag leaf area to exert positive direct effects on grain yield, while finger blast, effective tillers per plant, leaf blast, finger length and days to maturity exhibited negative direct effects. Thus, the correlation analysis showed flag leaf area, effective tiller per plant, ear per plant, days to maturity, biomass yield per plant, harvest index and 1000-seed to be important yield components that can be used to improve the yield potential of finger millet genotypes.

Keywords: Finger millet, correlation & path coefficient analysis, yield related traits

Introduction
Finger millet (Eleusine coracana (L.) Gaertn.) sub species coracana belongs to family Graminae. The cultivated E. coracana is a tetraploid (2n = 36); Finger millet is an important food crop in Africa and South Asia. It is a hardy crop that can be grown in diverse environments from almost at sea level in South India to high lands of Himalayas. It has dual importance as a source of food grain as well as straw. Finger millet is very nutritious with good quality protein, minerals, dietary fibres, photochemical and vitamins.
Selection for yield on the basis of per se performance alone may not be as effective as that based on the component characters associated with it, which is biometrically determined by correlation coefficient and path analysis (Mahudeswaran and Murugesan, 1973).Character like yield is having complex in nature, so direct selection is not possible. Therefore, the knowledge of association is useful to the breeders for the improvement among the yield attributing characters considerably affect the methods of selection (Mishra *et al*., 1980). Unlike the correlation coefficient values which measure the extent of relationship, path coefficient analyses help in partitioning of the correlation coefficient into direct and indirect effects through other components (Wright, 1921). Correlation provide estimates of degree of association between characters whereas path analysis help to resolve these correlation in to direct and indirect contribution of different component characters towards yield. Present investigation was carried in this direction with the utilization of fifty germplasm of finger millet to assess the yield attributing characters towards the seed yield per plant by using correlation and path analysis studies.

Materials and Methods
A set of 50 germplasm with four checks and one filler germplasm of finger millet obtained from coordinating unit small millets, Bangluru, were evaluated in augmented randomized block design at Research Farm, Birsa Agricultural University, Kanke during Kharif 2015. Each germplasm was represented by a single row plot of 3 m length with inter and intra-row spacing of 22.5 cm and 10 cm, respectively. Crop was raised as per the recommended package of practices. Observations recorded for days to 50 per cent flowering, Flag leaf area (sq cm), Plant height (cm), Effective tillers per plant (number), Ears per plant (number), Fingers per ear (number), Finger length (cm) Days to maturity (days), Grain yield per plant, Grain yield per plot, Biomass yield per plant, Harvest index, 1000 seed weight, leaf blast, neck blast and finger blast

Results and Discussion

Association among yield and yield component characters the effect of each yield contributing characters on yield in finger millet was analyzed through character association studies. Correlation studies provide information on the nature and extent of association between any two pairs of metric characters. Hence it would be possible to bring genetic up gradation in one character by selection of related characters. Phenotypic correlation was worked out among 14 quantitative characters to know the nature of association existing among the characters. On the basis of Phenotypic correlation coefficient it was observed that flag leaf area(0.31), effective tillers per plant (0.38), ear per plant(0.40), days to maturity(0.24), biomass yield per plant(0.30), harvest index (0.65), 1000-seed weight(0.50) had highly positive and significant association with grain yield per plant(Table 1) Such correlation was also reported by Basavaraj and Sheriff (1991), Mahto *et al*., (2000), Gowda *et al*., (2007) and Sumathi *et al*. (2007). Anantharaju, P. and Meenakshiganesan, N. (2005). Whereas, days to 50% flowering, finger length,finger per ear, and finger length recorded positive but non-significant correlation with grain yield per plant, while negative and significant correlation observed between grain yield per plant and leaf blast, neck blast and finger blast at phenotypic level.

The direct and indirect effects of different characters on grain yield per plant were worked out using path coefficients analysis (Deway and Lu, 1959). The analysis takes into account the cause and effect relation between the variable and is unique in partitioning the association into direct and indirect effect through other independent variables. Highly correlated yield contributing characters were considered for path analysis. Path analysis revealed that harvest index had maximum positive direct contribution towards grain yield per plant followed by biomass yield per plant, Ears per plant, days to 50% flowering, plant height, 1000-seed weight, fingers per plant, and flag leaf area at phenotypic level. (Table-2). Thus, selection for these traits may lead to an overall increase in grain yield per plant. These results are in close conformity with the findings of Shanthakumar, G. (1988), Basavaraj and Sheriff, (1990) and Naik, (1991).On the contrary, the characters viz., effective tillers per plant, finger length, days to maturity, leaf blat, neck blast and finger blast showed high negative direct effect on grain yield per plant. Thus, path coefficient analysis revealed that importance of these characters such as harvest index, biomass yield per plant, ears per plant, days to 50% flowering, plant height, 1000-seed weight, fingers per plant, and flag leaf area in selection of superior genotypes for higher grain yield.

Table 1: Phenotypic correlations coefficient of different traits pairs and disease reaction of finger millet (Eleusine coracana (L.) Gaertn.)

Characters		**Days to 50% flowering**	**Flag leaf area (cm^2)**	**Plant height (cm)**	**Effective tillers/ plant**	**Ears/ plant**	**Finger/ ear**	**Finger length (cm)**	**Days to maturity**	**Biomass yield per plant(g)**	**Harvest index (%)**	**1000-seed weight(g)**	**Leaf blast**	**Neck blast**	**Finger blast**
Days to 50% flowering	P	1.00													
Flag leaf area (cm^2)	P	-0.12	1.00												
Plant height (cm)	P	0.04	0.04	1.00											
Effective tillers/ plant	P	-0.11	0.28*	0.04	1.00										
Ears/ plant	P	-0.11	0.29*	0.04	0.98***	1.00									
Finger/ear	P	0.00	-0.04	0.00	0.10	0.09	1.00								
Finger length (cm)	P	0.02	0.03	0.45***	0.03	0.03	0.20	1.00							
Days to maturity	P	0.87***	-0.01	0.08	0.03	0.03	-0.01	-0.01	1.00						
Biomass yield per plant(g)	P	-0.12	0.15	-0.04	0.22	0.23	0.10	0.17	-0.01	1.00					
Harvest index (%)	P	0.12	0.21	0.06	0.15	0.15	-0.03	-0.12	0.17	-0.44**	1.00				
1000-seed weight(g)	P	0.04	0.06	0.06	0.08	0.08	-0.10	0.16	0.21	0.19	0.04	1.00			
Leaf blast	P	0.01	-0.02	0.06	-0.05*	-0.26*	-0.07	-0.34**	-0.14	-0.43**	-0.05	-0.20	1.00		
Neck blast	P	0.01	-0.11	0.05	-0.26*	-0.30**	-0.11	-0.34**	-0.13	-0.41**	-0.09	-0.26*	0.85***	1.00	
Finger blast	P	0.02	-0.11	0.06	-0.26*	-0.31**	-0.12	-0.34**	-0.13	-0.41**	-0.09	-0.25*	0.85***	0.99***	1.00
Grain yield per plant (r)	P	0.07	0.31**	0.04	0.38**	0.40**	0.08	0.05	0.24*	0.30**	0.65***	0.24*	-0.50***	-0.55***	-0.55***

*, **, *** Significant at p=0.05, 0.01 & 0.0001 respectively

Table 2: Partitioning of correlations into direct and indirect effects by path analysis considering grain yield/plant of finger millet

Character	Days to 50% Flowering	Flag Leaf Area cm²	Plant Height cm	Effective Tillers/ Plant	Ears/ Plant	Fingers/ ear	Finger Length cm	Days to Maturity	Biomass Yield/ Plant	harvest Index	1000-seed Weight	Leaf Blast	Neck Blast (ASIN)	Finger Blast (ASIN)
Days to 50% Flowering	0.07	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.06	-0.01	0.01	0.00	0.00	0.00	0.00
Flag Leaf Area (cm²)	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plant Height (cm)	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Effective Tillers/ Plant	0.04	-0.10	-0.02	-0.34	-0.33	-0.04	-0.01	-0.01	-0.08	-0.05	-0.03	0.08	0.09	0.09
Ears/ Plant	-0.05	0.11	0.02	0.37	0.38	0.04	0.01	0.02	0.09	0.06	0.03	-0.10	-0.12	-0.12
Fingers/ ear	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Finger Length (cm)	0.00	0.00	-0.02	0.00	0.00	-0.01	-0.04	0.00	-0.01	0.00	-0.01	0.01	0.01	0.01
Days to Maturity	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
Biomass Yield/ Plant(g)	-0.08	0.09	-0.03	0.14	0.14	0.06	0.11	-0.01	0.61	-0.27	0.12	-0.26	-0.25	-0.25
Harvest Index(%)	0.11	0.19	0.05	0.13	0.14	-0.03	-0.11	0.16	-0.39	0.88	0.04	-0.05	-0.08	-0.09
1000-seed Weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.04	-0.01	-0.01	-0.01
Leaf Blast	0.00	0.00	-0.01	0.04	0.04	0.01	0.06	0.02	0.07	0.01	0.03	-0.16	-0.14	-0.14
Neck Blast (ASIN)	0.03	-0.18	0.09	-0.41	-0.49	-0.19	-0.55	-0.21	-0.65	-0.15	-0.41	1.34	-1.57	1.57
Finger Blast (ASIN)	-0.04	0.20	-0.11	0.47	0.55	0.22	0.61	0.23	0.72	0.17	0.45	-1.49	-1.75	-1.75
Grain Yield/ Plant (r)	0.07	0.31*	0.04	0.39**	0.40**	0.08	0.05	0.24**	0.31*	0.65**	0.24*	-0.51**	-0.55**	-0.55**

Phenotypic path residual effect= 0.151

References

1. Anantharaju P, Meenakshiganesan N. Studies on correlation and path coefficient analysis of yield and yield contributing characters in finger millet (Eleusine coracana (L.) Gaertn.). Crop. Res. Hisar. 2005; 30(2):227230.
2. Basavaraj GT, Sheriff RA. Correlation and path analysis in F2 and F3 populations of fingers millet (Eleusine coracana Gaertn.). Indian J Agric. Sci. 1991; 64:774-75.
3. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheat grass seed production. Agron. J. 1959; 51:515-18.
4. Gowda J, Rekha D, Bharati S, Krishnappa M. Methods of constructing core set using Agro-morphological traits in foxtail millet. J. Plant Genet. Resources. 2007; 20:38-42.
5. Johnson HW, Robinson HF, Comstock RF. Genotypic and phenotypic correlation in soybeans and their implication in selection. Agron J. 1955; 47:477-83.
6. Mahto RN, Mahto J, Ganguli DK. Correlation and path coefficient analysis in ragi (Eleusine coracana Gaertn.) under rain fed condition. J. Res. Birsa Agric. Univ. 2000; 12:81-83.
7. Mahudeswaran K, Murugesan M. Correlation and path analysis in *Eleusine coracana Gaertn.* Madras agric. J 1973; 60(9):1287-129.
8. Mishra HP, Patnaik MC, Naik PK. Variation in quantitative traits in finger millet. Indian J agric. Sci. 1980; 50(4):298-301.
9. Naik JB. Genetic diversity in relation to evaluation and domestication of finger millet (Eleusine coracana Gaertn.) in Africa and India. Ph. D. Thesis, Univ. Agric. Sci., Bangalore, 1991.
10. Shanthakumar G. Inheritance of plant pigmentation, grain color., character association, path analysis, heritability of yield and its components in finger millet (*Eleusine coracana Gaertn*). M.Sc. (Ag.) Thesis,University of Agriculture Sciences, Bangalore, 1988, 105.
11. Sumathi P, John Joel A, Muralidharan V. Genetic variability in the hybrids of finger millet (E. corcana. (L.) Gaertn), J Crop Res. 2007; 33:192-94.
12. Wright S. Correlation and causation. J agric. Res. 1921; 20:557-585.