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Correlation and Path Coefficient Analysis in Ragi (*Eleusine coracana* Gaertn.)

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ABSTRACT: The present study was undertaken with fifteen genotypes of Ragi (*Eleusine coracane* Gaertn.) with a view to assess the association between yield and yield attributing traits. The genotypes were collected from different Ragi growing states of our country. The genotypes were grown on three different dated at fifteen days interval in Randomized Block Design during summer season. Correlation studies showed that grain yield per plant was positively and significantly correlated with weight of ear per plant in all the three environments while its associations with days to 50 per cent flowering and days to maturity were negative and significant on all the three dates of sowing. Days to 50 per cent flowering showed strong positive association with days to maturity on all the sowing dates and significant positive correlation with number of effective tillers in second sowing date only. The associations between days to 50 per cent flowering and days to maturity on the one hand and weight of ear per plant in E_2 and E_3 environments on the other hand were significant and negative. From the path analysis it was, evident that ears per plant had maximum direct positive effect on grain yield in all the environments. Days to 50 per cent flowering had direct negative effect in E_3 while direct positive effect in E_1 and E_2. Days to maturity had direct negative effect in E_1 and E_2 whereas direct positive effect in E_2. The indirect effects of days to flowering and maturity via weight of ear per plant were considerable.

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INTRODUCTION

Ragi (Eleusine coracana Gaertn) popularly known as Marua is an important millet crop. In Bihar Ragi ranks first among the millet crops, both in terms of productivity as well as area under this crop. It is normally grown in the intervening period after the harvest of Rabi and before the sowing of Kharif crops, as a summer crop. Thus, the vacant field is utilized by growing this crop after the harvest of Rabi crops, such as, pea, rapeseed, mustard, late potato, Rabi pulses, barley and early wheat etc. during this period. The importance of marua leaves a vast scope for its improvement both in space and in time, but significant breakthrough in production of this crop is still awaited. One of the vital constraints in this context is non-availability of suitable genotype that can be grown successfully in varying agro-ecological situations. Keeping this in view, the genotypes were grown on three different dated at fifteen days interval in Randomized Block Design during summer season at the farm of Tirhut College of Agriculture, Dholi, Muzaffarpur, Bihar. The influence of varying environments on 15 genotypes was recorded and analysed to find out the variation and per se performance of various quantitative characters. Correlation and path analysis between yield and its component characters

MATERIALS AND METHOD

The present study was undertaken with fifteen genotypes of Ragi (*Eleusine coracane* Gaertn.) with a view to assess the association between yield and yield attributing traits. The genotypes were collected from different Ragi growing states of our country. The genotypes were grown on three different dated at fifteen days interval in Randomized Block Design during summer season at the farm of Tirhut College of Agriculture, Dholi, Muzaffarpur, Bihar. Normal agriculture practices were followed to raise the crops. Each experiment represented one environment making a total three environments. The net plot size per entry was 3.0 m x 1.8m with row to row distance 22.5cm and plant to plant distance as 7.5cm. observations were recorded on days to 50 per cent flowering, days to maturity, plant height, length of the main ear, no. of fingers in the main ear, no. of basal tillers, no. of nodal tillers, no. of effective

tillers,1000- grain weight, weight of ear per plant, grain yield per plant and grain yield quintal per hectare. Particulars of genotypes are furnished in table 1.

Table 1: Genotypes and their source.

S.N.	Genotypes	Sourse
1	C1	Madhunani
2	C8	Madhubani
3	C9	Madhubani
4	C10	Sitamarhi
5	C13	Darbhanga
6	RAU 3	Muzaffarpur
7	RAU 8	Muzaffarpur
8	RAU 12	Muzaffarpur
9	RAU 13	Muzaffarpur
10	Rajendra Marua-3	Muzaffarpur
11	A 404	Ranchi
12	PR 202	Andhra Pradesh
13	Rajendra Marua -4	Muzaffarpur
14	HR 374	Karnataka
15	BR 407	Muzaffarpur

RESULTS AND DISCUSSION

The mean sum of squares due to genotypes were found to be highly significant for the characters, like, days to 50 per cent flowering, days to maturity, 1000-grain weight and grain yield per plant, and significant for the characters length of the main ear and weight of ear per plant ; whereas, for characters namely plant height, number of fingers in the main ear, number of basal tillers, number of nodal tillers, number of effective tillers and grain yield (q/ha), mean sum of square due to genotypes were found to be non-significant (table 2).

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Phenotypic Correlation Coefficient

On the basis of phenotypic correlation coefficient, grain yield per plant had positive and significant correlation with weight of ear per plant in all the three environments (Table 3). Such correlation was also reported by Priyadharshani *et. al*. (2011), John et a1. (2006), Sonnad *et. al* (2008) and Ganapathy *et.al*. (2011). Grain yield per plant had negative and significant correlation with days to 50 per cent flowering and days to maturity on each dates of sowing. Wolie *et.al.* (2011) and Bisht *et.al*. (2009) also reported significant negative correlation grain yield with flowering and maturity dates. Such correlation coefficient gives indication of developing high yielding and early maturing genotypes. The correlation of days to 50% flowering and days to maturity was also significant and negative in E_2 and E_3 environments with weight of ear per plant. Days to 50 per cent flowering exhibited strong correlation with days to maturity. Therefore, if we take any of these two characters we can have earliness both in flowering and maturity. If selection is made for heavier ear per plant one can get genotypes with high yield and earliness in flowering. Non significant association between most of the component characters with grin yield is indicating their separate genetic control.

Path Coefficient Analysis

The concept of path coefficient was given by Misra (1992) and Dewey and Lu (1959) presented a detailed account of both basic and applied aspect of path coefficient analysis. Maximum direct positive effect of weight of ear per plant on grain yield per plant was found in all the environments (Table 4). This result is also in accordance with the findings of Misra *et al* (2008), Pathe *et al.* (2001). Days to 50 per cent flowering had direct positive effect on grain yield in two environment namely, E_1 and E_2, whereas, it was negative in E_3. Days to maturity had direct positive effect in E_3 and negative effect in E_1 and E_2 on grain yield. The indirect effect of days to flowering and maturity via weight of ear per plant were considerable. The findings of Kebere *et al.* (2006) and Mokhtarpour *et. al*. (2006) corroborate well with present findings. Correlation and path coefficient analysis clearly indicate

importance of weight of ear per plant, days to 50 per cent flowering and maturity. Therefore these characters should be given importance in selection programme.

Correlation studies showed that grain yield per plant was positively and significantly correlated with weight of ear per plant in all the three environments while its associations with days to 50 per cent flowering and days to maturity were negative and significant on all the three dates of sowing. Days to 50 per cent flowering showed strong positive association with days to maturity on all the sowing dates and significant positive correlation with number of effective tillers in second sowing date only. The associations between days to 50 per cent flowering and days to maturity on the one hand and weight of ear per plant in E_2 and E_3 environments on the other hand were significant and negative.

From the path analysis it was, evident that ears per plant had maximum direct positive effect on grain yield in all the environments. Days to 50 per cent flowering had direct negative effect in E_3 while direct positive effect in E_1 and E_2. Days to maturity had direct negative effect in E_1 and E_2 whereas direct positive effect in E_2. The indirect effects of days to flowering and maturity via weight of ear per plant were considerable.

REFERENCES

1. Priyadharshani C, Nirmalkumari A, John Joel A, Raveendran A. Genetic Variability and Trait Relationships in Finger Millet (Eleusine coracana L.) Hybrids. Madras Agricultural Journal. 2011; 98:18-21.
2. John K. Variability and Correlation Studies in Quantitative traits of Finger Millet (Eleusine coracana Gaertn). Agricultural Science Digest. 2006; 26(3):166-169.
3. Sonnad SK, Shanthakumar G, Salimath PM. Genetic variability and character association studies in white ragi (Eleusine coracana Gaertn). Karnataka Journal of Agricultural Sciences. 2008; 21(4):572-575.
4. Ganapathy S, Nirmalakumari A, Muthiah AR. Genetic variability and interrealationship analysis for economic traits in finger millet germplasm. World J. of Agrilc. Sci. 2011; 7(2):185-188.

5. Wolie A, Dessalegn T. Correlation and path coefficient analysis of some yield related traits in finger millet (Eleusine coracana L. Gaertn). Germplasms in northwest Ethiopia, African J. Agril. Res. 2011; 6(22):5099-5105.
6. Bisht, B. S. and Singh, D. P. (2009). Agriculture in uttarakhand hills. Directorate of experimental station, G. B. Pant univ. of agri. and technology, Pantnagar. Pp 11-17.
7. Misra, R. C., Sahu, P. K., Pradhan, B., Das, S. and Mishra, C. H. P. (2008). Character association, path-coefficient and selection indices in Finger millet (Eleusine coracana). Enviro. and Eco, 26(1): 166-170.
8. Pathe, U. V. and Bhave, S. G. (2001). Correlation and path analysis in finger millet (Eleusine coracana (L.) Gaertn) genotypes. J. Soils. Crops, 10(30): 180-185.
9. Kebere, B., Sripichitt, P., Wohgyai, W. and Hongtrakul, V. (2006). Genetic variation, heritability and path analysis in Ethiopian finger millet (Eleusine coracana (L.) Gaertn) landraces. Kasetsart J. (Natual Sci), 40:322-334.
10. Mokhtarpour, H., Teh, B. S. C. Saleh, G. Selamat, A. B. Asadi and M.A. Kamkar, B. 2010. Non destructive estimation of maize leaf area, fresh weight, and dry weight using leaf length and leaf width. Communications in Biometry and Crop Science. 5(1):19-26

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Table 2. Pooled analysis of variance over environments.

Source of variance	d. f.	Mean square											
		Days to 50% flowering	**Days to maturity**	**Plant height (cm)**	**Length of the main ear (cm)**	**No. of fingers in the main ear**	**No. of basal till-ers**	**No. of nodal till-ers**	**No. of effect-tive till-ers**	**1000-grain weight (g)**	**Weight of ear per plant (g)**	**Grain yield per plant (g)**	**Grain yield (q/ha)**
Environment (E)	2	56.64	50.84	37.05**	0.93**	1.01**	0.14	0.98**	1.29**	0.03	0.04*	2.53*	3.23
Genotype (G)	14	1790.44**	1844.17**	3.11	0.12*	0.05	0.13	0.04	0.14	0.03**	2.18*	1.96**	7.06
G x E	28	50.84**	60.34**	6.10*	0.15	0.06	0.09**	0.12	0.20**	0.01**	0.79	0.47	3.55**
Polled error	84	2.66	1.13	3.99	0.12	0.06	0.05	0.10	0.09	0.00	0.68	0.44	0.23

*,**: Significant at 5 and 1 per cent, respectively.

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Table 3. phenotypic correlation coefficients of grain yield and its components in regi in three environments (E_1. E_2 & E_3).

Characters	Environ-ments	Days to maturity	Length of the main ear (cm)	No. of fingers in the main ear	No. of effective tillers	1000-qrain weight (g)	Weight of ear/plant (g)	Grain yield per plant (g)
Days to 50% flowering	E_1 E_2 E_3	0.99** 0.99** 0.99**	-0.28 -0.11 -0.30	-0.10 -0.03 -0.16	0.29 0.52* -0.27	0.29 -0.35 0.09	-0.27 -0.54* -0.56*	-0.51* -0.58* -0.58*
Days to maturity	E_1 E_2 E_3		-0.28 -0.14 -0.31	-0.09 -0.03 -0.16	-0.28 0.51 -5.29	0.28 -0.38 0.09	-0.28 -0.57* -0.58*	-0.51*- -0.59* -0.57*
Length of the main ear (cm)	E_1 E_2 E_3			0.16 0.20 0.05	0.37 0.19 0.13	-0.12 -0.03 0.22	0.17 0.08 0.16	0.18 0.12 0.17
No. of fingers in the main ear	E_1 E_2 E_3				0.21 0.50 0.06	-0.11 -0.08 0.13	0.09 -0.23 0.17	0.09 -0.17 -0.14
No. of effective tillers	E_1 E_2 E_3					0.05 -0.32 -0.08	0.18 -0.27 0.30	0.26 -0.32 0.33
1000-grain weight (g)	E_1 E_2 E_3						-0.26 0.30 0.10	-0.35 0.24 0.07
Weight of ear per plant (g)	E_1 E_2 E_3							0.88** 0.85** 0.85**

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Table 4. Direct (diagonal) and indirect phenotypic effect of different character towards grain yield per plant in different environments.

Characters	**Days to 50% flower-ing**	**Days to matur-ity**	**Length of the main ear (cm)**	**No. of fingers in the main ear**	**No. of effect-tive tillers**	**1000-grain weight (g)**	**Weight of ear per plant (g)**	**Correlation with grain yield per plant**
E_1								
Days to 50% flowering	0.53	-0.80	0.02	0.01	-0.02	-0.03	-0.21	-0.51*
Days to maturity	0.53	-0.80	0.02	-0.01	-0.02	-0.03	-0.21	-0.52*
Length of the main ear (cm)	-0.15	0.23	-0.07	-0.01	0.03	0.01	0.13	0.18
No. of fingers in the main ear	-0.05	0.08	-0.01	-0.02	0.02	0.01	0.07	0.09
No. of effective tillers	-0.15	0.23	-0.02	-0.01	0.08	-0.01	0.14	0.24
1000-grain weight (g)	0.15	-0.22	0.01	0.01	0.01	-0.09	-0.20	-0.35
Weight of ear per plant (g)	-0.14	0.22	-0.01	-0.01	0.01	0.02	0.78	0.88**
E_2								
Days to 50% flowering	2.49	-2.61	0.01	-0.01	-0.08	0.06	-0.45	-0.58*
Days to maturity	2.48	-2.62	0.01	-0.01	-0.08	0.06	-0.44	-0.59*
Length of the main ear (cm)	-2.28	0.37	-0.03	0.01	-0.02	0.01	0.06	0.12
No. of fingers in the main ear	-0.06	0.08	-0.01	0.06	-0.07	0.01	-0.19	-0.17
No. of effective tillers	1.31	-1.33	-0.01	0.03	-0.15	0.05	-0.22	-0.32
1000-grain weight (g)	-0.87	0.99	0.01	-0.01	0.05	-0.16	0.25	0.24
Weight of ear per plant (g)	-1.35	1.41	-0.01	-0.01	0.04	-0.05	0.82	0.85**
E_3								
Days to 50% flowering	-1.86	1.75	-0.01	0.01	-0.02	-0.01	-0.45	-0.58*
Days to maturity	-1.84	1.77	-0.01	0.00	-0.03	-0.01	-0.47	-0.57*
Length of the main ear (cm)	0.56	-0.56	0.03	-0.01	0.01	-0.01	0.13	0.17
No. of fingers in the main ear	0.30	-0.28	0.01	-0.02	0.01	-0.01	0.14	0.14
No. of effective tillers	0.50	-0.52	0.01	-0.01	0.09	0.01	0.24	0.33
1000-grain weight (g)	-0.17	0.17	0.01	-0.01	0.01	-0.01	0.08	0.07
Weight of ear per plant (g)	1.04	-1.03	0.01	-0.01	0.03	-0.01	0.81	0.85**

