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Short Communication

Inter Correlation and Path Coefficient Studies for Grain Yield and its Components in Pearl millet *(Pennisetum glaucum* (L.) R.Br.)

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Pearl millet (*Pennisetum glaucum* (L.) R.Br) is an important food and feed crop of Tamil Nadu. It's low productivity invites attention for systematic and concerted efforts to develop cultivars having high yield potential. Though correlation studies help in determining the component characters of complex entity, the extent of contribution of a particular character to any dependent variable may not be judged from the genetic variation and correlation. Where as, path coefficient analysis of yield components brings out the relative importance of their direct and indirect effects and gives a clear understanding of their association with seed yield. Selection on the basis of direct and indirect effects is much more useful than selection for yield *per se.*

The present investigation was conducted with five cytoplasmic genic male sterile lines viz., ICMA 91666, ICMA 92333, ICMA 92777, ICMA 93111 and ICMA 99666 and eleven testers viz., PT 5591, PT 6010, PT 6017, PT 6037, PT 6063, PT 6064, PT 6065, PT 6243, PT 6251, PT 6252 and PT 6254 and their fifty five hybrids. The fifty five hybrids along with their sixteen parents were grown in a randomized block design with three replications during kharif 2010. Observations were recorded for five randomly selected plants from each entry and from each replication on days to 50% flowering, plant height (cm), number of productive tillers per plant, number of leaves per plant, earhead length (cm), earhead girth (cm), earhead weight (g), grain yield per earhead (g), 1000-grain weight (g), stover yield per plant (g) and grain yield per plant (g). The data were subjected to statistical analysis as per the method suggested by Johnson *et al*. (1955) for correlation and Dewey and Lu (1959) for path coefficient analysis.

Correlation between yield and yield contributing characters in pearl millet, consisting of fifty five hybrids and sixteen parents are given in Table 1. Grain yield per plant had high positive and significant genotypic correlation with plant height, number of leaves per plant, number of productive tillers per plant, earhead length, earhead girth, earhead weight, grain yield per earhead and stover yield per plant. Days to 50% flowering exhibited highly significant positive association with plant height, number of leaves per plant and stover yield per plant. This indicates that late flowering is important for increased stover yield per plant as reported by Vidyadhar *et al.* (2006) for stover yield per plant and Govindaraj *et al.* (2009) for plant height. Earhead length and earhead girth showed highly significant and positive correlation with earhead weight, grain yield per earhead, 1000-grain weight, stover yield per plant indicating that earhead traits are highly influencing the grain yield per plant. Hence, selection against the earhead traits shall be of great use in improving grain yield per plant.

Path analysis in the present study revealed that grain yield per earhead recorded the highest positive direct effect on grain yield per plant followed by number of productive tillers per plant, stover yield per plant, earhead girth and number of leaves per plant (Table 2). The negative direct effect was recorded for days to 50% flowering, plant height, earhead length, earhead weight and 1000-grain weight indicating their relationship and selection based on these traits will be highly desirable. Earhead length, earhead girth, earhead weight, 1000-grain weight and stover yield per plant expressed high positive indirect effect on grain yield per plant via, grain yield per earhead. Indirect effect of earhead weight through grain yield per earhead was found to be high among indirect effects, which indicate indirect selection could also be made through earhead weight. The results were in conformity with the findings of Vagadiya *et al.* (2010).

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Table 1. Genotypic correlation coefficients among grain yield components of pearl millet

Characters	Days to 50% flowering	Plant height	No. of leaves per plant	No. of productive tillers	Earhead length	Earhead girth	Earhead weight	Grain yield per earhead	1000-grain weight	Stover yield per plant	Grain yield per plant
Days to 50% flowering	1	0.344**	0.327**	0.210	0.286**	0.191	0.168	0.180	0.009	0.419**	0.225*
Plant height		1	0.216	-0.003	0.630**	0.427**	0.619**	0.677**	0.239*	0.579**	0.589**
No. of leaves per plant			1	0.854**	0.122	0.019	0.051	0.038	-0.203	0.369**	0.431**
No. of productive tillers				1	-0.121	-0.086	-0.096	-0.124	-0.272*	0.218	0.356**
Earhead length					1	0.382**	0.517**	0.556**	0.144	0.455**	0.410**
Earhead girth						1	0.785**	0.788**	0.244*	0.575**	0.690**
Earhead weight							1	0.965**	0.254*	0.697**	0.838**
Grain yield per earhead								1	0.297*	0.715**	0.852**
1000-grain weight									1	0.142	0.134
Stover yield per plant										1	0.770**
Grain yield per plant											1

* Significant at 5%, ** Significant at 1%.

Table 2. Direct (diagonal) and indirect effects of 10 yield contibuting characters on grain yield of pearl millet

Characters	Days to 50% flowering	Plant height	No. of leaves per plant	No. of productive tillers	Earhead length	Earhead girth	Earhead weight	Grain yield per earhead	1000-grain weight	Stover yield per plant	Grain yield per plant
Days to 50% flowering	-0.0559	-0.0013	0.0075	0.0913	-0.0131	0.0092	0.0000	0.1589	-0.0001	0.0288	0.2254*
Plant height	-0.0192	-0.0038	0.0050	-0.0011	-0.0289	0.0206	-0.0002	0.5785	-0.0015	0.0399	0.5893**
No. of leaves per plant	-0.0183	-0.0008	0.0230	0.3717	-0.0056	0.0009	0.0000	0.0337	0.0012	0.0254	0.4312**
No. of productive tillers	-0.0117	0.0000	0.0196	0.4351	0.0056	-0.0041	0.0000	-0.1050	0.0017	0.0150	0.3561**
Earhead length	-0.0160	-0.0024	0.0028	-0.0528	-0.0458	0.0184	-0.0001	0.4756	-0.0009	0.0314	0.4103**
Earhead girth	-0.0107	-0.0016	0.0004	-0.0373	-0.0175	0.0482	-0.0002	0.6705	-0.0015	0.0396	0.6899**
Earhead weight	-0.0097	-0.0023	0.0012	-0.0414	-0.0236	0.0375	-0.0003	0.8258	-0.0015	0.0484	0.8340**
Grain yield per earhead	-0.0104	-0.0026	0.0009	-0.0534	-0.0254	0.0378	-0.0003	0.8557	-0.0018	0.0497	0.8503**
1000-grain weight	-0.0005	-0.0009	-0.0047	-0.1183	-0.0066	0.0118	-0.0001	0.2499	-0.0061	0.0098	0.1343
Stover yield per plant	-0.0234	-0.0022	0.0085	0.0949	-0.0208	0.0277	-0.0002	0.6178	-0.0009	0.0689	0.7702**

* Significant at 5%, ** Significant at 1%, Residual effect = 0.2364.

The studies on correlation coefficients and path analysis indicated that the characters viz., grain yield per earhead, number of productive tillers per plant, stover yield per plant and plant height were the yield contributing characters in pearl millet. The effect of residual factors over grain yield indicated that 23.64% of variability was uncounted and there might be a few more componential characters other than those studied in the present investigation, which might have been responsible for influencing the grain yield of pearl millet.

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