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PATH ANALYSIS FOR GRAIN YIELD IN BARNYARD MILLET (*ECHINOCHLOA FRUMENTACEA* (ROXB.) LINK)

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Abstract

Path coefficient analysis was studied in 65 genotypes of barnyard millet to find out the association studies of characters and their direct and indirect effects on grain yield/plant. Results exhibited that single earhead weight had maximum direct effects on grain yield/plant followed by straw yield/plant, earhead length and plant height.

Small millets are gaining importance because of their nutritional value and adaptability to drought and varied soil conditions. Realizing the nutraceutical values of small millets, they are now considered as "nutri-cereals". Barnyard millet is one among the small millets which is the fastest growing of all millets and produces a crop in six weeks. It is cultivated mainly for the nutritious grains and the straw has a good fodder value (Gopalan *et al*. 2002). It has a fair source of protein, which is highly digestible and is an excellent source of dietary fibre with good amounts of soluble and insoluble fractions. The carbohydrate content is low and slowly digestible, which makes the barnyard millet a nature's gift for the modern mankind who is engaged in sedentary activities. Grain yield is a complex polygenic character and is strongly influenced by environmental factors. A detailed knowledge of association between quantitative traits is essential for formulating an effective breeding programme in any crop. Path coefficient analysis permits the separation of the direct effects from the indirect effects through other related characters by partitioning the genotypic correlation coefficients, providing a clear picture of the characters that can be relied upon in a selection programme for improvement of grain yield. So far very limited work has been done for the improvement of barnyard millet crop. Therefore, an attempt has been made in the present study to estimate correlation among the component characters and their direct and indirect contributions through path coefficient analysis.

The trial consisted of 65 indigenous and exotic barnyard millet germplasm accessions were obtained from ICRISAT, Hyderabad and Department of Millets, CPBG, Tamil Nadu Agricultural University, Coimbatore and Department of Plant Breeding and Genetics, Agricultural College and Research Institute, Madurai. The accessions were raised in RBD with three replications at Agricultural College and Research Institute, TNAU, Madurai (Latitude 9°54'N, Longitude 78°54' E and with an annual average rainfall of 856 mm) of Tamil Nadu State during *rabi*, 2012. Each plot consisted of a single row of 3 m long and 30 cm wide. Plant to plant spacing was maintained at about 10 cm by thinning when the seedlings were 20 days old. Fertilizer was applied at the rate of 40 : 20 : 0 kg/ha and all the intercultural operations were adopted as per the package of practices recommended by the Tamil Nadu Agricultural University, Coimbatore. By using barnyard millet descriptors (IPGRI 1983) the data were recorded on five randomly selected plants of each entry of each replication for thirteen yield and yield contributing traits *viz.*, days to 50%

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Table 1. Path coefficients of yield components on grain yield per plant in barnyard millet

Traits	DFF	PH	NBT	FLL	FLW	PL	EL	EW	NR	SEW	1000 GW	SY/P	Genotypic correlation with grain yield/plant
DFF	***–0.169***	0.136	–0.006	0.017	–0.075	0.060	–0.010	0.003	0.007	0.031	0.019	0.005	0.015
PH	–0.081	***0.281***	–0.006	0.040	–0.242	0.038	0.170	–0.170	–0.066	0.410	–0.025	0.299	0.647**
NBT	0.068	–0.111	***0.015***	–0.001	0.176	–0.097	–0.004	–0.063	0.035	-0.126	0.004	–0.129	–0.236
FLL	–0.035	0.137	–0.003	***0.081***	–0.231	0.003	0.137	–0.134	–0.026	0.354	–0.018	0.247	0.515**
FLW	–0.035	0.189	–0.007	0.052	***–0.360***	0.063	0.241	–0.183	–0.075	0.435	–0.024	0.338	0.634**
PL	0.050	–0.052	0.007	–0.001	0.111	***–0.203***	–0.013	–0.034	0.077	–0.067	–0.022	–0.090	–0.236
EL	0.004	0.100	–0.001	0.023	–0.182	0.005	***0.477***	–0.384	–0.132	0.401	–0.041	0.281	0.553**
EW	0.001	0.108	0.002	0.025	–0.148	–0.015	0.412	***–0.444***	–0.065	0.407	–0.033	0.252	0.502**
NR	0.005	0.081	–0.002	0.009	–0.119	0.068	0.277	–0.126	***–0.228***	0.212	–0.008	0.204	0.373**
SEW	–0.008	0.180	–0.003	0.045	–0.244	0.021	0.298	–0.282	–0.075	***0.641***	–0.057	0.467	0.983**
1000 GW	0.033	0.074	–0.001	0.015	–0.089	–0.047	0.205	–0.154	–0.019	0.376	***–0.096***	0.289	0.585**
SY/P	–0.005	0.169	–0.004	0.040	–0.244	0.037	0.270	–0.225	–0.093	0.603	–0.056	***0.497***	0.993**

Residual effect = 0.248, *Significant at 5% level, ** Significant at 1% level.

DFF : Days to 50% flowering
PH : Plant height (cm)
NBT : Number of basal tillers
FLL : Flag leaf length (cm)
FLW : Flag leaf width (cm)
PL : Peduncle length (cm)
EL : Earhead length (cm)
EW : Earhead width (cm)
NR : Number of racemes
SEW : Single earhead weight (g)
1000 GW : 1000 grain weight (g)
SY/P : Straw yield/plant (g)

GY/P: Grain yield/plant (g)

flowering, plant height (cm), no. of basal tillers (no.), flag leaf length (cm), flag leaf width (cm), peduncle length (cm), earhead length (cm), earhead width (cm), no. of racemes, single earhead weight (g), 1000 grain weight (g), straw yield per plant (g) and grain yield per plant (g). Path analysis was determined using genotypic correlations following the technique suggested by Dewey and Lu (1959).

The results on path coefficient analysis are given in Table 1. As observed from correlation study, grain yield per plant was highly significant and positively correlated with straw yield per plant, single earhead weight, plant height, flag leaf width, 1000 grain weight, earhead length, flag leaf length and earhead width. This is in agreement with the reports by Channappagoudar *et al*. (2008), Arun Gupta *et al*. (2009), Nirmalakumari and Vetriventhan (2010), Ganesamoorthi (2012) and Prasanna *et al.* (2013). Results exhibited that single earhead weight had maximum direct effects on grain yield per plant followed by straw yield/plant, earhead length and plant height as also reported by Mohan *et al.* (2006) and Significant and positive correlation of single earhead weight with grain yield was mainly due to its direct and indirect effects via plant height, earhead length and straw yield/plant. While straw yield per plant exhibited strong positive correlation with grain yield which was mainly due to direct and indirect effects via plant height, earhead length and single earhead weight. Significant and positive correlation of earhead length with grain yield was mainly due to its direct and indirect effects via plant height, single earhead weight and straw yield per plant. The traits plant height had significant and positive correlation with grain yield was mainly due to its direct and indirect effects via earhead length, single earhead weight and straw yield per plant.

Therefore, for the improvement of grain yield in barnyard millet characters like, single earhead weight, straw yield per plant, earhead length and plant height appeared to be the most promising and could be gainfully utilized.

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