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CORRELATION AND PATH ANALYSIS IN SWEET PEARL MILLET

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ABSTRACT

Four male sterile lines were crossed with 19 testers and the resultant 76 hybrids were utilised for correlation and path analysis. The correlation studies showed yield having a strong positive association with earhead weight and plant height. Path analysis revealed earhead weight exerting the highest positive direct effect on grain yield.

KEY WORDS : Correlation, Path Analysis, Pearl Millet

Pearl Millet *(Pennisetum glaucum* (L.) R.Br.) is one of the most important staple food crops in Asia and Africa. It ranks next to sorghum in its importance in the arid zone. So, knowledge of correlation between yield and other plant characters is helpful in the selection of a suitable plant type. When more characters are included in correlation study, the indirect association becomes complex. In such situations the path coefficient analysis provides an effective means of partitioning the correlation coefficients into direct and indirect effects of the component characters. Selection on the basis of direct and indirect effects is much more useful than selection for yield *per se.*

MATERIALS AND METHODS

The parental material for the investigation comprised 19 restorer genotypes of sweet stalked pearl millet and 4 male sterile lines selected from the germ plasm collection maintained at the Millet Breeding Station, Tamil Nadu Agricultural University, Coimbatore. Each of the four male sterile lines was crossed with the 19 male parents in a line x tester design, so as to obtain 76 hybrids. The hybrids obtained, their parents and a check were raised in randomised block design with three replications during *Kharif* 93. Genotypic correlation coefficients (rg) between the different metric traits studied were computed (Johanson *et al.,* 1955). The path co-efficient analysis was worked out (Dewey and Lu 1959) to partition the genotypic correlation co-efficient into measures of direct and indirect effects.

RESULTS AND DISCUSSION

Genotypic correlation coefficient between different pairs of characters was estimated to understand the relative importance of the characters so that the information can be further utilised in selection programmes. In the study, grain yield exhibited a strong positive association with earhead weight, plant height, total soluble solids and straw yield per plant. This indicates that these characters positively influence the grain yield to a large extent. Grain yield also showed a weak positive association with juice yield per plant. Bhamre and Harinarayana (1992) also observed that grain yield had positive genotypic correlation with plant height, earhead weight and straw yield.

Path analysis in the present study revealed that earhead weight exerted the highest positive direct effect on grain yield, and this positive direct effect of earhead weight was also influenced by the positive indirect effects through plant height, straw yield per plant, leaf length and juice yield per plant. Earhead length, earhead girth, earhead weight, 1000 grain weight, straw yield per plant, total soluble solids at maturity and juice yield per plant exerted positive indirect effects on grain yield through plant height (Table 1).

Earhead length also had a positive direct effect on grain yield. This is in conformity with the finding of Raveendran and Appadurai (1984). The positive direct effect of straw yield per plant on grain yield was found to be influenced by the positive indirect effects through earhead weight, plant height, earhead length and juice yield per plant. Earhead girth had a positive direct effect on grain yield due to the positive indirect effect of days to 50 per cent flowering, plant height, number of productive tillers, earhead length, straw yield per plant and juice yield per plant. Juice yield per plant and total soluble solids also recorded a positive

Table 1. Path analysis

	Days to 50% flowering	Plant height	Number of productive tillers	Leaf number	Leaf length	Earhead length	Earhead girth	Earhead weight	1000 Grain weight	Straw yield per plant	Leaf Stem ratio	Total souble solids at maturity	Juice yield per plant	Genotypic correlation coefficient
Days to 50% flowering	**-0.2745**	0.0303	0.0010	-0.0234	-0.0103	0.0105	-0.0143	0.2138	0.0297	0.0207	-0.0043	0.0030	-0.0007	-0.0186
Plant height	-0.0520	**0.1601**	-0.0012	-0.0292	-0.0167	0.0277	0.0075	0.3815	0.0066	0.0187	-0.0009	0.0048	0.0213	0.533**
Number of productive tillers	0.0115	0.0081	**-0.0229**	0.0102	0.0035	-0.1563	-0.0028	0.0948	-0.0102	-0.0064	0.0006	0.0081	0.0021	0.0845
Leaf number	-0.0887	0.0644	0.0032	**-0.0725**	-0.0288	0.0292	0.0009	0.0177	0.0310	0.0225	-0.0029	0.0078	0.0108	-0.0544
Leaf length	-0.0508	0.0480	0.0015	-0.0376	**-0.0556**	0.0376	0.0129	-0.0543	0.0289	0.0138	0.0002	0.0088	0.0228	-0.0238
Earhead length	-0.0506	0.0642	0.0006	-0.0373	-0.0369	**0.0567**	0.0099	-0.0097	0.0332	0.0152	0.0002	0.0056	0.0203	0.0714
Earhead girth	0.0797	0.0244	0.0013	-0.0013	-0.0145	0.0114	**0.0493**	0.0007	-0.0119	0.0109	0.0016	-0.0001	0.0186	0.1701
Earhead weight	-0.0763	0.0794	-0.0283	-0.0017	0.0039	-0.0007	0.001	**0.7697**	-0.0059	0.0204	-0.0017	0.0021	0.0070	0.7935**
1000 Grain weight	0.1271	-0.0165	-0.0037	0.0350	0.0250	-0.0294	0.0091	0.0705	**-0.0641**	-0.0105	0.0003	0.0056	-0.0095	0.1279
Straw yield per plant	-0.0865	0.0456	0.0022	-0.0248	-0.0117	0.0131	0.0082	0.2384	0.0103	**0.0657**	-0.0033	0.0019	0.0235	0.2826**
Leaf Stem ratio	-0.1186	0.0150	0.0013	-0.0210	0.0009	-0.0010	-0.0077	0.13113	0.0020	0.0218	**-0.0100**	0.0010	-0.0058	0.0096
Total soluble solids at maturity	-0.0428	0.0405	-0.0019	-0.0295	-0.0257	0.0167	-0.0002	0.0860	0.0189	0.0065	-0.005	**0.0191**	0.0109	0.5233**
Juice yield per plant	0.0031	0.0567	-0.0008	-0.0130	-0.0130	0.0192	0.0153	0.0898	0.0101	0.0258	0.0010	0.0035	**0.0600**	0.2495*

* p = 0.05, ** p = 0.001 Residual effect = 0.51

direct effect on grain yield. A similar trend was observed by Clark (1981) in sweet sorghum. Days to 50 per cent flowering had a negative direct effect on grain yield which was reported by Khairwal *et al,* (1990) earlier. Number of productive tillers had the highest positive indirect effect on grain yield through earhead weight, days to 50 per cent flowering and leaf number. Leaf number had a negative direct effect on grain yield. The negative direct effect of 1000 grain weight on grain yield was influenced by the negative indirect effects of earhead length, plant height and straw yield. Singh *et al* (1980) reported that hundred grain weight had a negative direct effect on grain yield.

Grain yield exhibited a strong positive significant genotypic correlation with plant height and earhead weight. Similarly straw yield per plant recorded positive and highly significant correlation with leaf-stem ratio and juice yield per plant. This indicated the possibility of utilising these desirable characters for a good quality fodder sweet pearl millet. Path analysis showed that earhead weight exerted the highest positive direct effect towards grain yield. As the causal basis of the relationship between earhead weight and grain yield was found to be maximum, this character can be highly relied upon as a selection criteria for the grain yield improvement in sweet pearl millet.

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VARIETAL SUSCEPTIBILITY TO SUGARCANE SMUT IN RELATION TO BUD CHARACTERS

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ABSTRACT

A strong positive correlation was observed between incidence of smut and bud sprouting in standing canes. The position of the germpore is subapical in most of the resistant entries and apical in the susceptible genomes. Sprouting of side buds is promoted by the attack of internode borer. Correlations were found between smut incidence, bud size and internode borer incidence.

KEY-WORDS : Sugarcane Smut, Varieties, Susceptibility, Bud characters

Smut *Ustilago scitaminea* Sydow is recorded in many promising sugarcane varieties. Infection by this fungus is mainly through the buds and physical properties of buds are associated with response of resistant varieties (Fawcett, 1946). Singh and Budhraja (1964) reported that the bud scales appear to regulate resistance to smut infection. In this study, 10 susceptible and 10 resistant varieties were examined for their size, shape, position of germpore and sprouting characters and the relationship of these factors were examined for three years and reported here.

MATERIALS AND METHODS

Ten susceptible and 10 reported resistant varieties (Table 1) were chosen and examined in 10 months old annual crop. About 100 canes were