PARKER, D. D. (1962). Decomposition in the field of buried and surface applied corn stalk residue. **Soil Sci. Soc. Am. Proc., 26:** 559-562

PUTNAM, R. (1983). Allelopathic chemicals-nature's herbicide in action, **Chem. Eng. News** April 4, 34-35 pp.

RICE, E.L. (1979). Allelopathy-an update. **Bot.Rev., 45:** 15-109.

RICHARDSON, D.R. and WILLIAMSON, G.B. (1988). Allelopathic effects of shrubs of the sand pine shrub on pine and grasses of the sand hill. **For.Sci., 34:** 592-605

SRINIVASAN, K., RAMASAMY, M. and SHANTHA, R. (1990). Tolerance of pulse crops to allelochemicals of tree species. **Indian J. Pulses Res., 3:** 40-44

STACHON, W.J. and ZINDAHL, R.L. (1978) Allelopathic activity of Canada Thistle *(Cirsium arvense)* in Colorodo. **Weed Sci., 26:** 83-84.

SURESH, K.K. and VINAYA RAI, R.S. (1987) Studies on the allelopathic effects of some agroforestry tree species. **Int. Tree Crops J., 4:** 109-115.

SWAMINATHAN, C., SIVAGNANAM, K. and SRIMATHI, P. (1993)Allepopathic proclivities of multipurpose trees **My Forest 29:** 147- 149

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GENETIC VARIABILITY, CORRELATION AND PATH COEFFICIENT ANALYSIS IN KODO MILLET

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ABSTRACT

Fifteen Kodo millet genotypes were evaluated for genetic parameters. High heritability estimate combined with genetic advance was observed for plant height indicating the governance by additive genes. Ear head length had high direct as well as indirect effects through other characters on grain yield. Simultaneous selection for ear head length and 1000 grain weight will be useful in bringing higher yields.

KEY WORDS: Kodo millet, Variability, Correlation, Path Coefficients

The grain yield of Kodo millet *Paspalum scrobiculatum L.* is low and unstable. The productivity of this important minor millet is to be stepped up by evolving high yielding varieties. Therefore, to bring about any improvement in this crop. the knowledge of association of yield with other characters will be of immense help. With this main objectives 15 diverse genotypes of kodo millet were subjected to detailed investigation on variability. heritability, genetic advance, correlation coefficients and path coefficients.

MATERIALS AND METHODS

Fifteen genotypes of kodo millet were grown at the Regional Research Station. Tamil Nadu Agricultural University. Kovilangulam during October. 1993 in a randomised block design with three replications. The seeds of each genotype were sown with the spacing of 45 cm between rows and 15 cm between plants. At maturity, five plants were chosen at random and observation were recorded on plant height, number of productive tillers, ear head length, 1000 grain weight and grain yield.

The phenotypic and genotypic variances and genetic advance were calculated according to Johnson *et al.* (1955). Phenotypic and genotypic coefficients of variability (Burton, 1952) heritability in broad sense (Lush, 1940) and path coefficient analysis for grain yield per plant (Dewey and Lu, 1959) were analysed.

RESULTS AND DISCUSSION

The variances due to genotypes for all the six traits were found to be significant. The range, phenotypic and genotypic variance, PCV and GCV, heritability and genetic advance are furnished in Table 1.

The present study revealed wide range of phenotypic variability for almost all the traits. The genotypic coefficient of variation ranged from 1.77 for ear head length to 14.45 for plant height. The difference between PCV and GCV was minimum

Table 1. Variability, heritability and genetic advance for different characters

Characters	Range	Genotypic variance	Phenotypic variance	GCV	PCV	PCV-GCV	Heritability	GA as % of mean
Days to 50% flowering	56.0-64.7	6.79	7.38	4.36	4.55	0.19	92.06	8.62
Plant height (cm)	43.1-50.9	58.50	75.82	14.45	17.03	2.59	77.25	27.05
Number of productive tillers	24.5-34.8	10.12	15.43	4.63	5.72	1.09	65.13	7.72
Ear head length (cm)	5.3-6.5	0.01	0.25	1.77	8.36	6.59	4.49	0.77
1000 grain weight (g)	0.171-0.444	0.24	0.40	3.08	5.00	0.92	59.18	4.88
Grain yield/ plant (g)	14.5-16.5	0.01	0.02	9.33	49.32	39.99	3.58	3.64

for days to 50 per cent flowering (0.19) suggesting that this trait was least affected by environment. This was also supported by very high value of heritability (92.06%) for this character. The grain yield per plant on the other hand, exhibited wide gap between PCV and GCV indicating high environmental influence. It was confirmed by the lowest heritable value of the first than the other characters.

The association of high heritability with high genetic advance was observed in plant height. This indicated the presence of additive gene effects and consequently a high genetic gain from phenotypic selection will be effective. High heritability with low genetic gain was observed for 1000 grain weight indicating that this character is controlled by non-additive gene action. This result was in agreement with the findings of Kandasamy *et al.* (1990)

The correlation among the seed yield and other traits is given in Table 2. The results indicated that the genotypic correlation coefficients were generally higher than their corresponding phenotypic and environmental correlation coefficients revealing the influence of environments (Pathak and Dixit, 1990)

At phenotypic level, grain yield per plant was significantly and positively correlated with ear head length, 1000 grain weight, plant height and number of productive tillers. Days to 50 percent flowering was significantly and negatively correlated with ear head length and 1000 grain weight while plant height was positively and significantly correlated with these two traits. Ear head length was also positively correlated with 1000 grain weight. At genotypic level also, grain yield had exhibited the same trend as in phenotypic level. Days to 50 per cent flowering had strong

Table 2. Correlation coefficients between different pairs of characters

Characters		Plant height	Number of productive tillers	Ear head length	1000 grain weight	Grain yield
Days to 50% flowering	P	-0.047	0.017	-0.352**	-0.127*	-0.327**
	G	-0.168**	0.019	-0.539**	0.284**	-0.523**
	E	0.032	0.029	-0.174**	-0.046	-0.138*
Plant height (cm)	P		-0.008	0.346**	0.130*	0.343**
	G		-0.166**	0.527**	0.155*	0.489**
	E		-0.046	0.062	0.127*	0.087
Number of productive tillers	P			0.021	0.061	0.315**
	G			0.054	0.504**	0.247**
	E			0.015	-0.052	0.531**
Ear head length (cm)	P				0.418**	0.643**
	G				0.741**	0.682**
	E				0.258**	0.526**
1000 grain weight (g)	P					0.487**
	G					0.725**
	E					0.292**

G - Genotypic P - Phenotypic E - Environmental

Table 3.- Path coefficient analysis showing the direct and indirect effects of the yield components

Characters	Days to 50% flowering	Plant height	Number of productive tillers	Ear head length	1000 grain weight	Correlation coefficient with grain yield
Days to 50% flowering	0.5271	0.2431	0.0058	-0.6321	-0.6672	-0.5233
Plant height	-0.2648	-0.4257	0.1264	0.6293	0.4239	0.4891
Number of productive tillers	-0.0154	0.1149	-0.2826	0.2693	0.1612	0.2474
Ear head length	-0.0285	-0.1609	0.2687	0.3612	0.2417	0.6822
1000 grain weight	-0.0135	0.0380	0.1923	0.7704	-0.2618	0.7254

Underlined figures denote the direct effect Residual effect = 0.3851

positive genotypic correlation with 1000 grain weight but very strong negative association with ear head length and plant height. Significant positive association was observed by plant height with ear lead length and 1000 grain weight but significant negative association with number of productive tillers. Number of productive tillers had strong positive association with 1000 grain weight.

The environmental correlations which are not strictly reflecting the correlation of environmental deviations, but the correlation of environmental deviations together with non-additive genetic deviations revealed that grain yield per plant had high and positive correlations with number of productive tillers, ear head length and 1000 grain weight. Plant height and ear head length had strong and positive correlation with 1000 grain weight. Days to 50% flowering exhibited significant negative association with ear head length.

The result on path coefficient analysis indicated that days to 50 per cent flowering had the highest positive direct effect followed by ear head length (Table 3). The positive direct effect of days to 50 per cent flowering was nullified by the high negative indirect effects through ear head length and 1000 grain weight which resulted in strong negative correlation with grain yield. It was interesting to note that the plant height, number of productive tillers and 1000 grain weight had direct negative effects but this direct negative effect was compensated mostly through the positive indirect effects through ear head length which ultimately resulted in the significant positive correlation of these three characters with grain yield.

A perusal of over all results obtained indicated that ear had length had high direct as well as indirect effects through other characters on grain yield and 1000 grain weight had negative direct effect but positive indirect effects through most of the characters. Thus it may finally be concluded that in breeding programmes, simultaneous selection for ear head length and 1000 grain weight will be useful in bringing higher yields.

REFERENCES

BURTON, G.W. (1952). Quantitative inheritance in grasses **Proc.Sixth. Int. Grassland Congr., 1:** 217-283

DEWEY, D.R. and LU, K.H. (1959) A correlation and path analysis of components of crested wheat grass seed production. **Agron.J., 51:** 399-433

JOHNSON, H.W., ROBINSON, H.P. and COMSTOCK, R.E (1955). Estimates of genetic and environmental variability in soybeans. **Agron. J.,** 314-318

KANDASAMY, G., RAMAMOORTHY, N. and MANOHARAN, V.(1990) Genetic variability in kodo millent *(Paspalum scrobiculatum L.)* **Madras Agric. J.. 77:** 9-12.

LUSH, J.L. (1940). Inter-sire correlation and regression of off-spring on dam as a method of estimating heritability of characters. **Proc. Amer. Soc. Animal. Prodn., 33:** 293-301

PATHAK, H.C. and DIXIT, S.K. (1990). Correlation and path coefficient analysis of components of seed yield in sunflower *(Helianthus annuus)* **Madras Agric. J., 77** 453-456

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