https://doi.org/10.29321/MAJ.10.A02630

Madras agric. J. 70, (6): 366 371 June 1983

CORRELATION AND PATH ANALYSIS IN SEGREGATING POPULATIONS OF FINGER MILLET *(Eleusine coracana Gaertn.)*

PRABHAKAR[1] and M. N. PRASAD[2]

In the study on three intervarietal crosses of ragi, the character, productive tillers showed high and positive association with grain yield, besides 1000 grain weight exhibiting positive association. The intercharacter correlation studies revealed that productive tillers had consistent and positive correlation with 1000 grain weight. Path analysis indicated that productive tillers was the major component for grain yield in ragi. However, 1000 grain weight also proved its importance towards yield.

The variability can be evidenced in the segregating populations through hybridisation. Grain yield is the summation of several complex interacting ir trinsic and extrinsic functions, each highly varying with environmental influence. The efficiency of selection mainly depends on the direction and magnitude of association between yield and its components, and also the relative importance of characters influencing the grain yield provides a knowledge for the crop improvement. Hence, the present study was undertaken to find out the change in the direction and magnitude of interrelations of characters and measure the relative importance of component characters in influencing the grain yield.

MATERIAL AND METHODS

The seeds of F_3 population of three crosses viz. PES 187 x IE 1022 (Cross A), Co 10 x IE 1006 (Cross B) and TNAU 9 x IE 1006 (Cross C) obtained from Millets Section, School of Genetics, Tamil Nadu Agricultural University, Coimbatore, formed the materials of study. The F_3 population was raised in *Kharif* season 1979 and F_4 population in Summer Season, 1980.

A total of 240 F_3 segregants from selected F_2 plants of each of the three crosses were raised in plots, each consisting 24 rows of ten hills with a spacing of 30 x 15 cms. One hundred and twenty F_3 segregants from each cross combination were randomly selected for advancing to F_3 generation The F_4 generation was raised in randomised block design replicated thrice. Each family was alloted a row. In F_4 observations were made on randomly selected five plants for each family. Observations on seven economic traits, namely, plant height, productive tillers, days to maturity, earhead length, finger number per earhead, 1000 grain weight and grain yield were made on populations.

*Part of M. Sc. (Ag) thesis submitted by the first author to TNAU, Coimbatore-3

1 and 2 : School of Genetics, TNAU, Coimbatore.

The estimates of inter component correlations were calculated in F_3 and F_4 generations as per the method suggested by Goulden (1952). Path-coefficient analysis as adopted by Dewey and Lu (1959) was used to partition the simple correlation coefficients into direct and indirect effects.

RESULTS AND DISCUSSION

The association between yield and its components in F_3 and F_4 generations are presented in Table 1.

The association differed from cross to cross and with reference to many traits. Among the characters, productive tillers was found to be strongly associated with grain yield. The 1000 grain weight showed positive association with yield in crosses A and C in both the generations. The inter correlation between productive tillers and 1000 grain weight was consistent and high in all the cases. The above findings are in agreement with the earlier reports of Patnaik (1968), Mahudeswaran and Murgesan (1973) and Appadurai *et al.*(1977). Dhagat *et al.* (1971) in Kodo millet observed positive association between productive tillers and 1000 grain weight. However, it was important to observe that productive tillers was strongly, positively and significantly associated with grain yield in all the cases.

From the observations, it is evident that selection based on productive tillers and 1000 grain weight can lead to effective improvement in the grain yield of ragi.

Path analysis furnishes, a method of partitioning the correlation coefficients into direct and indirect effects and measures the relative importance of characters in influencing the grain yield (Table 2).

In cross A, out of the six compoent characters studied only productive tillers exhibited positive direct effect on grain yield in F_3 generation. But in F_4, it was observed that plant height and earhead length contributed more towards yield with other characters showing high negative direct effects on grain yield. However, the indirect effects of the component charaters *via* plant height and earhead length were maximum and positive in F_4 generartion

In Cross B, productive tillers exhibited positive direct effect on grain yield in F_3 generation. In F_4, productive tillers and 1000 grain weight showed positive direct effects, with 1000 grain weight contributing more towards yield. All the other characters exhibited high negative direct effects on grain yield. The indirect effects of component characters *via* productive tillers and 1000 grain weight were high and positive. The similar trend observed in Cross B was also observed in Cross C in both the generations. The above results are in complete harmony with earlier reports of Mahudeswaran and Murugesan (1973), Dhagat *et al.* (1973) and Ranganathan *et al* (1977) in ragi.

From the foregoing discussion, it is evident that productive tillers and 1000 grain weight may be pointed as the most important characters with maximum influence on grain produc-

tion. Selection based for these two characters may perhaps simultaneously be effected to isolate superior lines with high genetic potentiality for grain production.

REFERENCES

APPADURAI, R., M. S. THANGAM, T. S. RAVINDRAN and U. S. NATARAJAN. 1977. "Genotypic association, heritability and path analysis in ragi (*Eleusine coracana* Gaertn.) *Madras agric. J., 64*: 18-24.

DEWEY, D. R. and K. H. LU, 1959. "A correlation and path analysis of components of crested wheat grass seed production. *Agron. J., 51* : 515-6.

DHAGAT, N. K., R. C. JOSHI and P. SHARMA. 1971. "Correlation and heritability in Kodo millet, *Paspalum scrobiculatum* L. *Indian J. agric. Sci., 41* : 682-4.

DHAGAT, N. K., G. L. PATIDAR, P. S. SHRIVASTAVA and R. C. JOSHI, 1973. Path analysis and selection indices studies in finger millet. *JNKVV Res. J., 7*: 212-5.

GOULDEN, C. H., 1952. *Methods of statistical analysis*. John Wiley and Sons, INC., New York.

MAHUDESWARAN, K. and MURUGESAN, 1973. Correlation and Path analysis in *Eleusine coracana* Gaertn. *Madras agric. J., 60*:1287-91.

PATNAIK, M. C., 1968. Variation and correlation in finger millets. *Indian J. Genet., 28*: 225-9.

RANGANATHAN, C. R., A. SUNDARAM and K. VASUDEVA MENON, 1977. Correlation and path coefficient analysis on yield components of ragi. *Madras agric. J., 64* 591-2.

May-1982 Issue will be sent to the subscribers separately.

Table 1 : Genotypic correlation coeffients between yield and yield components in F_3 and F_4 generations of finge rmillet

Character	Gross	Cene-ration	Plant height	Produc-tive tiller	Days to maturity	Earhead length	Finger Number	1000 grain weight
Grain yield	A	F_3	NS(+)	**(+)	**(—)	NS(—)	NS(—)	*(+)
		F_4	**(+)	**(+)	**(—)	**(—)	NS(+)	NS(+)
	B	F_3	NS (+)	**(+)	NS(—)	NS(+)	NS(—)	NS(—)
		F_4	NS(+)	**(+)	NS(—)	*(+)	**(+)	**(—)
	C	F_3	NS(—)	**(+)	*(—)	NS(+)	**(+)	*(+)
		F_4	NS(+)	**(+)	NS	**(—)	NS(+)	**(+)
Plant height	A	F_3		NS(+)	*(+)	NS(—)	NS(+)	NS(+)
		F_4		**(+)	**(+)	NS(—)	**(+)	**(+)
	B	F_3		NS(+)	NS(+)	**(+)	NS(—)	NS(+)
		F_4		**(+)	*(+)	**(+)	**(+)	**(+)
	C	F_3		NS(—)	NS(—)	NS(+)	**(—)	**(+)
		F_4		**(—)	**(—)	**(—)	**(—)	**(+)
Productive tillers	A	F_3			NS(—)	NS(—)	NS(+)	NS(+)
		F_4			**(—)	**(+)	**(+)	**(+)
	B	F_3			NS(—)	*(+)	*(—)	NS(—)
		F_4			NS(—)	**(+)	**(+)	**(+)
	C	F_3			**(—)	NS(+)	*(+)	NS(+)
		F_4			**(—)	**(—)	**(—)	NS(+)
Days to maturity	A	F_3				NS(+)	NS(—)	NS(+)
		F_4				**(+)	**(—)	**(+)
	B	F_3				NS(+)	NS(+)	NS(+)
		F_4				NS(+)	**(+)	**(+)
	C	F_3				**(+)	NS(+)	**(+)
		F_4				**(—)	**(+)	**(+)
Earhead length	A	F_3					**(+)	**(+)
		F_4					**(+)	**(+)
	B	F_3					NS(—)	NS(+)
		F_4					**(+)	**(+)
	C	F_3					**(+)	**(+)
		F_4					**(+)	**(—)
Finger number	A	F_3						NS(—)
		F_4						*(—)
	B	F_3						NS(—)
		F_4						**(+)
	C	F_3						*(+)
		F_4						**(+)

Table 2 : Path analysis in F_3 generation of three crosses or finger millat

	C. No	Plant height	Productive tillers	Days to maturing	Earhead length	Finger Number	1000 grain weight	Correlation with yield
Plant height	A	—0.035	0.099	—0.017	0.003	—	0.007	0.054
	B	*—0.045*	0.091	0.003	—0 004	—0.010	—0.012	0.023
	C	0.056	—0.071	—0.001	—0 010	—0.021	0 006	—0.032
Productive tillers	A	—0 004	0.816	0.003	0.001	—0 001	0.007	0.822*
	B	—0 005	0 889	—0.002	—0.002	—0.015	—0.015	0.851**
	C	—0 004	0.946	—0.003	—	0.009	0.003	0.952**
Days to maturing	A	—0.005	—0.018	*—0.124*	—0 001	—	0 002	—0.146**
	B	—0.003	—0.037	0.040	—0 001	0 003	—0 002	—0.001
	C	—0.002	—0 155	0.017	—0 004	0 002	0.007	—0.137*
Earhead length	A	—0.001	—0.049	—0 004	*—0 014*	—0.002	0.013	—0.055
	B	—0.014	0 134	0 003	—0.012	—0.008	—0 015	0.088
	C	0.004	0.015	0.004	—0 015	0.034	0.014	0 056
Finger Number	A	—	0.506	0.002	—0.003	*—0 009*	—0.003	0.038
	B	0 005	—0.131	0 0 1	0.00	0.102	0.007	—0.014
	C	—0 017	0 122	—	—0.007	0 073	0.005	0.177*
1000 grain weight	A	—0.004	0.091	—0.004	—0 003	0.001	0 062	0.143*
	B	—0.004	0.099	0 001	—0 013	—0 006	—0.133	0.045
	C	0 010	0.090	—0.003	—0 006	0.010	0.037	0.144*

Table : 3 Path Analysis in F_4 generation of three crosses of finger miller

	Cross	Plant height	Productive tillers	Days to maturity	Earhead length	Finger Number	1000 grain weight	Correlation with yield
Plant height	A	1.851	−0.073	−0.401	−0.086	−0.430	−0.375	0.485
	B	−1.522	0.769	−0.115	0.362	−0.080	1.349	0 040
	C	−0.363	−0.194	0.017	0.014	0.076	0.457	0 007
Productive tillers	A	0.285	−0.475	0.783	0.791	−0.370	−0.314	0.699**
	B	−0.734	1.596	0.030	−0.780	−0.058	0.675	0.728**
	C	0.130	0.541	0.040	0.035	0.027	0.023	0.795**
Days to maturity	A	0.425	0.212	−1.748	0.878	0.261	−0.136	−0.107**
	B	−0.122	−0.034	−1.432	−0.028	−0.075	1.681	−0.009
	C	0.008	−0.318	−0.069	0.029	−0.134	0.424	0 021
Earhead length	A	−0.096	−0.226	0.925	1.660	−0.278	−0.328	−0.194**
	B	−0.409	0.927	−0.030	−1.344	−0.049	0.976	0.071*
	C	0.128	−0.463	0.050	−0.040	−0.614	−0.376	−0.763**
Finger Number	A	0.627	−0.139	0.360	0.363	−1.269	0:059	0.001
	B	−0.667	0.510	−0.587	−0.359	−0.182	1.415	0:130**
	C	0.121	0.063	−0.040	−0.011	−0.229	0.268	0.046
1000 grain weight	A	0.736	−0.580	−0.004	0.578	0.079	−0.943	0.040
	B	−0.967	0.507	−1.133	−0.618	−0.121	2.124	−0.207*
	C	0.221	0.021	−0.053	0.026	−0.107	0.577	0.180*

Figures in diagorals are direct effects.