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COMBINING ABILITY FOR SOME METRIC TRAITS IN RICE

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ABSTRACT

Combining ability and genetic variance were estimated through the use of 10 x 10 diallel cross of rice (*Oryza sativa* L.) for yield, maturity and plant characters. Both additive and non additive gene effects were important for the expression of the traits. Parents IR 54 and UPRM 500 were the best general combiners for grain yield in F_1 as well as in F_2 generations. The best two crosses IET 4141 x IET 6288 and UPRM 500 x IET 6288 which showed high sca effects for grain yield and other important traits involved both the parents having good gca effects.

KEY WORDS : Combining Ability, Rice, Metric Traits

A sound breeding methodology rests on a correct understanding of the gene effects involved among the different methods to assess the combining ability of parents. The method proposed by Griffing (1956) provides information on the performance of genotype in hybrid combinations and on the nature and magnitude of gene action involved for the different traits under question. Diallel analysis in rice has been reported by many workers (Mohanty and Mahapatra, 1973; Singh and Nanda, 1976; Singh, 1977). The present study of diallel cross (excluding reciprocals) aims at estimating the combining ability effects and variances for grain yield and yield contributing traits in 10 genotypes of rice and their hybrids.

MATERIALS AND METHODS

Ten parents and their 45 F_1 and F_2 progenies were grown in compact family block design in two replications at J.V. College Baraut (Meerut) during 1986-1987 *kharif* season. The inter row and inter plant distance were kept 20 cm and 15 cm, respectively. Observations on grain yield, maturity and plant characteristics were recorded on a total of 10 plants of parents and 50 plants of F_1 and F_2 respectively. Statistical analysis was done on the basis of plot means following model I method 2 of Griffing (1956).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters. Significant mean squares for general combining ability (GCA) and specific combining ability (SCA) indicated that both additive and non additive gene effects were involved in the expression of all the characters (Table 1). Consistantly larger magnitude of GCA mean squares than the respective SCA suggested the preponderance of additive gene effects for all the characters.

The estimates of GCA effects revealed that parents IR 54 and UPRM 500 were the best general

Table 1. Analysis of variance for combining ability

Source		df	Flowering (days)	Plant height (cm)	Flag leaf length	Width of flag leaf	Angle of flag leaf	Panicle length (cm)	Panicle/ plant (No)	1000 grain weight (g)	Grain yield/ plant (g)	Grain yield/ panicle (No)	Biological yield (g)	Harvest index (%)
General combining ability	F_1	9	70.79**	169.20*	29.70	8.82	4.71	15.56*	29.27	272.11	162.43	121.20	0.09	62.52
	F_2		84.82*	465.11**	48.15	0.10	144.70	12.61	9.09	18.93*	20.89	761.53*	58.00	126.88
Specific combining ability	F_1	45	1592.43	177294**	24161**	98.21	37.92	88.28**	131.79	2573.17**	569.03**	36146**	0.32	362.22**
	F_2		164146**	186586**	29756**	0.32	319.84	88.62**	33.63*	85.04**	65.22**	192401**	238.71**	373.53**
Error (Me)	F_1	54	28.28	59.28	16.76	5.43	18.34	8.85	104.72	173.46	62.47	63.84	3.91	80.59
	F_2		24.22	36.12	33.01	3.14	136.48	12.01	12.01	5.32	15.57	228.09	52.73	60.68
gca/sca ratio	F_1		0.04	0.00	0.12	0.08	0.12	0.17	0.22	0.10	0.28	0.33	0.28	0.17
	F_2		0.05	0.24	0.16	0.33	0.45	0.14	0.27	0.22	0.31	0.39	0.03	0.33

* $P \leq 0.05$, ** $P \leq 0.01$.

Table 2. Estimates of general combining ability effects of the parents for different characters

Parents	Days to 50% flowering		Plant heigt (cm)		Length of flag leaf (cm)		Width of flag leaf (cm)		Angle of flag leaf (°)		Panicle length (cm)	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
Govind	4.92**	6.82**	1.69**	2.16**	3.11**	3.37**	2.02**	0.24**	1.30**	8.42**	2.48**	2.66**
Saket 4	-3.17**	-2.60**	-5.77**	-0.93**	-1.06**	-3.13**	-0.82**	-0.04	0.51**	2.08**	-1.10**	-0.80
Prasad	-1.21**	-1.85**	-2.43**	-3.68**	-1.56**	-1.34**	0.68**	-0.05	-0.37*	-0.92	-0.27*	0.08
Pant Dhan 4	0.17	-0.52*	2.11**	4.66**	0.44*	-2.3**	-0.48**	-0.06	-0.66**	2.38**	-1.48**	0.49**
UPRM 500	-0.25	0.07	-4.98**	-8.84**	-0.14	-0.55**	0.10	0.05	0.59**	-1.38*	-0.43**	1.60**
IR 54	1.63**	0.53*	2.73**	-0.59*	0.85**	-0.42**	-0.60**	-0.02	-0.24	2.54**	0.44**	0.16
UPR 79-169	-2.58**	-1.18**	0.61	3.24**	-1.76**	0.85**	0.18	0.01	-0.70**	-2.83**	-0.23	-0.55**
UPRB 30	-0.79**	-0.39	6.86**	13.08**	1.85**	-0.24	-0.32**	-0.07	0.01	-1.38*	-0.35*	-0.23*
IET 4141	-1.17**	-1.93**	0.67*	-6.38**	0.76**	-1.45**	-0.78**	-0.01	-0.12	-2.71**	-0.26*	-0.47**
IET 6288	2.46**	1.07**	-0.89*	-2.72**	-0.97**	2.24**	0.31**	-0.09	-0.33	-1.13*	1.19**	-0.63**
g_i	±0.20	±0.18	±0.29	±0.22	±0.15	±0.21	±0.09	±0.06	±0.16	±0.43	±0.11	±0.09
g_i-g_j	±0.30	±0.27	±0.18	±0.11	±0.23	±0.32	±0.13	±0.09	±0.24	±0.64	±0.17	±0.13

* $P \leq 0.05$; ** $P \leq 0.01$

combiners for higher seed yield in both generations; their effects, however were lower in F_2 generation. The GCA effects of the IET 4141 and F_1 and Govind in F_2 were also positive and significant. UPRM 500 was also the best general combiner for panicle numbers/plant and grain/panicle in F1 and good general combiner for character in F2. The potentiality of a strain to be used as a parent in hybridisation or in a cross to be used as commercial hybrid is judged based on the *per se* performance of the parent, the value of the F1 hybrid and the F2 performance. IR 54 and UPRM 500 had high GCA effects for seed yield and positive and significant GCA effects for other yield components. The parent Prasad, UPR 79-169 although one of the two top general combiners for grain/panicle (F_1 and F_2) was not a promising general combiner for seed yield, which may be because of its poor combining ability with parents contributing other major yield components such as grain per panicle and 1000 grain weight. Therefore, the choice of parents should not be based only on the combining ability effect of the main component alone rather its merit in cross combinations for other important components should also be considered. As regards SCA effects (Table 3, 4) the cross IET 4141 x IET 6288 (39.94) was the best specific combination for grain yield in F_1 and it was followed by UPRM 500 x IET 4141. A bird eye view of the table 2 revealed that the crosses with high sca effects involved at least one parent of high gca effect.

The sca effects represented dominance and epistatic interactions which can be related with heterosis. In self pollinated crops, however, the additive x additive type of interaction component is fixable in later generations. Among the crosses showing high sca effects for grain yield, IET 4141 x IET 6288 and UPRM 500 x IET 6288 involved both the parents having good gca effects and can be exploited by conventional breeding methods. Another cross UPRB 30 x UPR 79-169 was not expected to express good segregants as both the parents involved were poor general combiners for seed yield. Similarly the best combinations for 1000 grain weight (UPR 79-169 x IET 4141) involved at least one parents that had high gca effect and could produce good segregants only if the additive genetic systems are present in the good general combiner and the complementary epistatic effects in the other act in the same direction to maximise the desirable plant attributes. In the autogamous crops like rice the practice has been to develop pure lines by the use of pedigree method of breeding. This approach would however, as well as by Somal and Banerjee (1986) have revealed the importance of both additive and non additive components of genetic variances for grain yield and other characters. Therefore, breeding technique which involves a short of intermating in segregating generations may be practiced to isolate high yielding pure lines in the later generations.

Table 3. Estimates of specfic combining ability effects for different characters

Parents	Days to 50% flowering		Plant height		Flag leaf length		Width of flag leaf		Angle of flag leaf	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
Govind x Saket 4	3.11	5.58	-10.38	-6.10	0.43	-0.37	0.31	-0.01	-3.98	10.36**
Govind x Prasad	-7.34	4.33	0.81	-7.35	0.43	-1.17	0.31	-0.05	4.39	-6.63
Govind x Pant Dhan 4	1.78	5.50	-4.72	-5.18	3.93	0.28	0.48	0.04	-3.81	-6.42
Govind x UPRM 500	3.19	-0.58	-8.14	5.81	-2.48	-5.96*	1.40	-0.16	-1.56	19.32**
Govind x IR 54	9.82*	6.95	13.14	2.56	0.51	-4.58	0.10	-0.03	6.76**	14.48**
Govind x UPR 79-169	-0.46	1.66	-0.22	9.22	4.14	1.03	0.10	-0.11	2.22	-16.71**
Govind x UPRB 30	5.32	2.87	-15.47*	-6.10	7.01	4.74	-1.18	0.31	2.01	-3.17
Govind x IET 4141	1.11	3.41	33.31**	13.35*	1.14	24.03**	3.27	0.39	2.14	5.15
Govind x IET 6288	-3.51	-6.08	6.27	13.18*	1.65	0.74	1.19	0.12	0.35	8.57*
Saket 4 x Prasad	18.23**	17.75**	21.27**	29.12**	2.59	10.82*	2.65	0.37	-1.81	11.69**
Saket 4 x Pant Dhan 4	19.86**	25.41**	36.73**	23.89**	5.09	13.78**	3.31	0.02	2.97	4.90
Saket 4 x UPRM 500	10.78	29.83**	19.31**	13.39*	4.68	3.03	7.73**	0.36	2.22	8.65*
Saket 4 x IR 54	13.40**	14.37**	17.60*	22.14**	10.18**	6.91	5.44*	0.54	0.06	9.32**
Saket 4 x UPR 79-169	24.61**	11.08	37.23**	47.31**	2.80	8.53	4.94*	0.36	4.51*	5.61
Saket 4 x UPRB 30	20.31**	20.29**	4.48	18.97**	9.68*	4.24	2.65	0.19	11.31**	3.15
Saket 4 x IET 4141	12.69**	11.83**	5.27	-1.06	8.80*	0.53	2.60	0.27	2.93	6.98
Saket 4 x IET 6288	24.57**	16.83**	8.23	14.26**	13.51**	6.24	7.02**	-0.04	5.14*	16.90**
Prasad x Pant Dhan 4	24.90**	17.66**	1.89	9.64	12.59**	8.99	6.31**	-0.05	6.35**	16.40**
Prasad x UPRM 500	20.32**	17.58**	19.98**	28.14**	9.48*	8.74	5.37**	0.17	2.60	7.65
Prasad x IR 54	20.44**	24.62**	11.77	14.89**	7.18	9.12	4.94*	0.15	2.43	4.82
Prasad x UPR 79-169	21.65**	23.33**	16.39**	10.06	3.80	1.24	3.44	0.47	2.89	4.61
Prasad x UPRB 30	23.36**	18.04**	40.64**	24.22**	6.18	7.95	6.65**	0.15	-0.31	6.65
Prasad x IET 4141	12.23*	9.08	18.43**	25.18**	11.30**	9.74	4.10	0.18	0.81	7.48
Prasad x IET 6288	21.61**	23.08**	21.89**	17.01**	2.01	5.45	8.52**	0.61	2.51	12.90
Pant Dhan 4 x UPRM 500	12.94**	11.75**	21.43**	18.8**	7.68	5.20	2.40	0.53	-0.10	2.36
Pant Dhan 4 x IR 54	20.57**	15.29**	24.73**	39.06**	5.68	2.07	7.60**	0.62	0.22	12.53**
Pant Dhan 4 x IET 6288	13.78**	18.00**	32.35**	24.72**	5.80	6.70	6.60**	0.32	4.89*	8.32*
Pant Dhan 4 x UPRB 30	27.48**	29.20**	20.60**	49.89**	15.68**	7.41	4.31*	0.60	4.47	15.36**
Pant Dhan 4 x IET 4141	16.86**	17.75**	23.89**	11.85*	2.80	7.70	5.27**	0.08	5.10	13.69**
Pant Dhan 4 x IET 6288	22.73**	20.75**	14.35**	11.68*	4.51	4.91	1.69	0.59	-0.68	11.61**
UPRM 500 x IR 54	31.48**	22.70**	7.81	15.56**	14.76**	14.82**	5.52**	0.37	-1.52	-5.21
UPRM 500 x UPR 79-169	22.69**	28.41**	14.93*	9.72	4.39	22.45**	4.02	0.46	1.93	15.07**
UPRM 500 x UPRB 30	7.40	11.12	34.18**	22.89**	6.28	8.16	3.23	0.14	2.22	6.44**
UPRM 500 x IET 4141	26.78**	19.16**	15.48*	11.35*	4.39	0.45	2.69	0.17	10.85**	6.44**
UPRM 500 x IET 6288	23.65**	23.66**	17.19*	4.68	12.09**	7.16	7.60**	0.15	7.06*	5.36*
IR 54 x UPR 79-169	15.82**	18.95	15.23*	7.97	5.89	5.82	3.37	0.19	4.26	6.73**
IR 54 x UPRB 30	22.03**	23.16**	42.48**	30.64**	6.26	3.03	6.44**	0.74	3.56	5.28*
IR 54 x IET 4141	16.90**	19.70**	22.77**	18.10**	7.89*	6.82	2.40	0.55	-0.31	9.11**
IR 54 x IET 6288	16.28**	19.70**	18.23**	12.43*	7.09*	20.53**	1.31	0.18	4.89	2.03
UPR 79-169 x UPRB 30	21.23**	28.37**	9.10	2.31	6.39	4.16	6.44**	0.09	2.01	15.07**
UPR 79-169 x IET 4141	15.61**	15.41**	6.39	21.76**	12.01**	4.95	4.90**	0.32	-2.35	9.90**
UPR 79-169 x IET 6288	14.98**	13.41	33.85**	45.60**	9.72**	13.16*	4.31*	0.15	-1.14	9.32**
UPRB 30 x IET 4141	16.82**	15.62**	26.64**	39.43**	5.89	14.16**	5.60**	0.14	-2.06	9.44**
UPRB 30 x IET 6288	13.19**	12.62**	27.60**	35.76**	6.09	13.37*	4.52*	0.23	-1.85	7.86**
IET 4141 x IET 6288	36.57**	43.66**	10.89	0.22	4.72	3.66	4.98	0.11	3.76	-9.80**
Sij	4.89	4.53	7.09	5.53	3.77	5.29	2.14	10.76	3.94	2.32
Sij - Sik	7.20	6.66	10.42	8.13	5.54	7.77	3.15	15.81	5.79	3.41
Sij - Skl	6.86	6.35	9.94	7.75	5.29	7.41	3.00	15.08	5.52	3.25

* $P \leq 0.05$; ** $P \leq 0.01$.

Table 4. Estimates of specific combining ability effects for different characters

Cross	Panicle length (cm)		Panicle / plant (No.)		1000 grain weight (gm)		Grain yield/ plant (gm)		Grain / panicle (No.)		Biological yield (gm)		Harvest index (%)	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
Govind x Saket 4	-0.99	2.13	-4.96	-0.64	1.35	2.75	-5.63	1.08	-2.85	-8.15	-0.05	0.55	0.43	-3.00
Govind x Prasad	2.17	0.26	6.82	-1.23	11.85	2.17	15.03*	-3.28	0.018	-0.82	-0.09	-2.47	7.55	-0.41
Govind x Pant Dhan 4	2.88	0.84	-4.01	-1.85	3.19	1.46	-4.55	0.29	-1.52	-8.53	0.32	-3.18	4.76	6.04
Govind x UPRM 500	1.34	2.04	-7.42	1.14	-16.43	-1.11	-11.46	-3.16	-5.14	7.13	-0.17	-3.22	13.30	3.29
Govind x IR 54	0.46	0.17	4.53	3.93	-21.64	2.04	10.28	1.79	1.35	24.63	-0.11	3.02	17.98*	6.29
Govind x UPR 79-169	2.13	3.38	4.86	9.93**	-9.39	1.46	7.23	16.08**	7.93	29.34*	0.25	8.98	-5.73	19.18**
Govind x UPRB 30	0.75	-0.45	-2.63	-0.60	22.73	1.09	-0.92	1.62	-3.48	8.59	0.26	4.85	7.30	3.95
Govind x IET 4141	-0.82	-0.20	11.53	-2.68	16.35	-1.78	11.69	-1.12	6.26	12.63	-0.10	-0.18	0.84	-3.25
Govind x IET 6288	1.21	0.46	0.57	-0.10	-3.01	3.88	-0.05	-0.57	3.97	-12.15	0.10	2.48	14.64	3.20
Saket 4 x Prasad	-0.24	4.21	2.98	2.06	-16.26	5.42*	2.69	7.67*	13.43	44.84**	0.44	6.93	8.55	16.58*
Saket 4 x Pant Dhan 4	1.46	4.79*	3.15	0.93	0.56	2.21	6.11	4.25	9.89	4.13	0.11	9.23	12.76	5.04
Saket 4 x UPRM 500	8.42**	0.50	1.73	0.43	61.44**	0.63	-0.80	-1.70	14.26	25.79	0.22	5.68	13.80	-0.70
Saket 4 x IR 54	5.54*	8.13**	0.19	1.72	54.75**	3.29	-1.05	6.75	3.26	23.29	0.62	9.43	13.51	15.79*
Saket 4 x UPR 79-169	4.21	2.84	14.53	2.72	35.48**	3.21	28.40**	6.04	12.35	52.50**	0.49	14.39*	5.26	9.87
Saket 4 x UPRB 30	5.34*	-1.49	7.03	5.18	-3.89	1.84	16.73*	2.58	8.93	2.75	0.85	8.77	9.30	6.45
Saket 4 x IET 4141	2.75	7.75**	2.19	6.10	15.23	4.46*	7.86	-3.66	5.18	37.79**	0.29	-1.76	5.84	0.25
Saket 4 x IET 6288	6.29*	5.92*	3.73	4.18	40.85**	8.13**	9.61	1.87	9.39	42.00**	0.14	4.89	7.64	18.70**
Prasad x Pant Dhan 4	8.13**	3.92	2.44	6.85*	26.06*	6.13**	8.28	1.87	5.26	49.96**	0.22	7.39	6.89	14.62*
Prasad x UPRM 500	5.09	6.13**	7.33	3.35	14.94	5.54**	5.86	2.42	17.14*	16.13	0.23	-3.64	14.93	12.87
Prasad x IR 54	0.71	2.25	3.48	3.64	42.23**	1.71	13.11	3.37	17.64*	15.13	0.09	10.10	3.64	5.87
Prasad x UPR 79-169	6.38*	4.46	0.82	5.14	25.98*	1.13	7.07	0.17	3.22	-8.65	0.46	2.56	2.39	3.45
Prasad x UPRB 30	2.00	6.13**	0.32	2.10	49.10**	3.25	4.90	3.71	4.31	25.59	0.56	8.43	-2.56	6.04
Prasad x IET 4141	2.42	6.88**	-0.51	-0.98	24.23*	5.38*	1.03	5.46	4.56	-2.36	0.10	13.89	9.47	8.33
Prasad x IET 6288	9.46**	4.04	5.53	-1.89	35.35**	3.54	7.28	1.00	12.76	27.84*	0.25	4.56	11.76	9.29
Pant Dhan 4 x UPRM 500	-6.20*	4.21	-6.80	0.72	-15.72	3.84	2.28	6.50	-7.89	1.92	0.19	13.14*	4.14	5.33
Pant Dhan 4 x IR 54	9.42**	5.84*	10.65	1.01	-9.93	5.00*	16.53*	2.46	11.10	10.92	0.35	3.39	16.84*	12.33
Pant Dhan 4 x UPR 79-169	2.09	3.04	16.48	3.51	33.81**	8.92**	27.98**	0.25	15.18*	30.13*	-0.02	1.85	22.09*	8.91
Pant Dhan 4 x UPRB 30	1.71	7.71**	13.48	-0.02	80.44**	8.54**	15.82*	5.29	18.76*	46.88**	0.18	10.23	8.64	8.00
Pant Dhan 4 x IET 4141	3.63	4.46	5.15	-1.60	37.06**	1.67	12.44	-1.45	16.01*	19.42	0.27	-1.81	5.68	9.79
Pant Dhan 4 x IET 6288	2.17	5.13*	0.19	7.97*	44.69**	3.34	-1.30	6.58	11.72	11.63	0.17	14.35**	-10.02	8.75
UPRM 500 x IR 54	0.88	2.54	1.23	3.01	61.44**	4.42*	5.11	12.00**	9.47	38.09**	0.16	20.85**	8.39	13.58
UPRM 500 x UPR 79-169	8.04**	5.75*	5.57	-0.98	51.19**	3.84	7.01	0.79	12.56	5.79	0.23	5.81	7.14	5.66
UPRM 500 x UPRB 30	5.67*	7.42**	10.07	4.97	-7.68	6.96**	17.90**	7.33*	14.64*	16.04	0.64	15.68**	1.18	12.75
UPRM 500 x IET 4141	4.09	2.17	15.73	4.89	-16.94	5.09*	35.53**	3.58	8.39	25.09	0.27	4.64	12.22	14.54*
UPRM 500 x IET 6288	2.13	4.34	14.78	1.97	6.56	4.25*	37.78**	2.12	5.60	15.79	0.38	7.81	-5.48	4.50
IR 54 x UPR 79-169	5.17	2.38	2.53	-0.18	-3.01	5.00*	-2.17	-4.24	7.56	6.29	0.14	-3.43	14.34	0.66
IR 54 x UPRB 30	5.79*	7.54**	12.53	1.76	8.60	2.13	30.65**	4.29	6.14	10.54	0.29	9.43	10.39	8.25
IR 54 x IET 4141	8.71**	3.29	2.69	-0.81	32.23**	7.75**	8.78	1.04	15.39*	31.09*	0.28	2.39	13.43	10.04
IR 54 x IET 6288	2.25	6.46**	10.73	0.26	4.85	5.42*	19.03**	4.58	11.10	15.79	0.44	8.56	10.22	5.00
UPR 79-169 x UPRB 30	1.96	3.75	5.86	1.26	16.85	9.04**	15.11*	3.58	10.72	12.79	0.27	11.89	7.14	19.83**
UPR 79-169 x IET 4141	0.88	6.50**	-7.96	0.68	-0.51	5.67**	-12.26	9.33**	2.47	-1.20	0.25	14.35**	7.66	8.62
UPR 79-169 x IET 6288	5.42*	3.67	-9.42	0.26	24.10*	-1.15	-16.01*	-5.12	2.68	18.00	0.11	-4.47	17.47*	-3.41
UPRB 30 x IET 4141	7.00	3.17	-8.96	2.64	19.10	-0.20	-18.42*	-4.12	4.06	15.04	0.11	-4.76	16.22*	-1.29
UPRB 30 x IET 6288	5.54*	3.34	-8.42	1.22	16.73	-0.03	-16.67*	-3.57	4.26	15.75	0.06	-6.10	18.01*	-0.83
IET 4141 x IET 6288	7.46**	2.09	16.73	10.64**	-5.14	8.09**	39.94**	16.67**	5.01	6.29	0.40	21.85**	-9.94	24.95**
Sij	2.74	2.32	9.42	3.19	12.13	2.12	7.28	3.63	7.36	13.91	1.82	6.68	8.26	7.17
Siji - Sik	4.03	3.41	13.85	4.69	17.83	3.12	10.72	5.54	10.81	20.44	2.67	9.83	12.15	10.54
Sij - Skl	3.84	3.25	13.21	4.47	17.00	2.97	10.20	5.09	10.31	19.49	2.55	9.37	11.58	10.05

* $P \leq 0.05$; ** $P \leq 0.01$.

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CHARACTER ASSOCIATION AND PATH ANALYSIS IN SORGHUM (*Sorghum bicolor*)

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ABSTRACT

Sixty sorghum hybrids along with sixteen parents were studied in summer for genotypic correlation and path analyses. Grain yield exhibited a strong positive association with seedling vigour and 100 grain weight but a weak positive association with panicle length at genotypic level. The path analysis revealed that maximum direct effect on grain yield was exerted by panicle length followed by seedling vigour, 100 grain weight, number of leaves per plant and L/B ratio.

KEY WORDS : Sorghum, Correlation, Path analysis

The expression of complex characters such as grain yield depends upon the interplay of a number of component attributes. Knowledge of correlation between yield and other plant characters is helpful in selection of suitable plant type. When more characters are included in correlation study, the indirect association become complex. In such situations, the path co-efficient analysis is helpful. Selection on the basis of direct and indirect effects is much more useful than selection for yield *per se*. Hence, study was undertaken with diverse cytoplasmic hybrids to study the correlation and path co-efficients among yield and its components.

MATERIALS AND METHODS

Sixty hybrids were obtained from crossing ten diverse cytosteriles with six testers in line x tester mating design. The sixty hybrids along with sixteen parents were grown in a randomised block design with three replications in summer 1991. Observations were recorded on five random competitive plants in each of the parents the F_1's in each replication. Correlation co-efficient (Johnson *et al.*, 1955) and path co-efficient analysis (Dewey and Lu, 1959) were carried out.

Table 1. Genotypic correlation co-effecients between different pairs of characters

	Yield	Seedling vigour	Days to 50 per cent flowering	Plant height	Panicle length	Number of leaves per plant	L/B ratio	100 grain weight
Yield	1	0.4939**	0.0807	0.2085	0.2739*	0.2127	0.0335	0.4242**
Seedling vigour		1	-0.2063	0.1501	-0.2169	-0.1284	0.1167	0.5851**
Days to 50 per cent flowering			1	0.0626	0.3529**	0.8499**	-0.1040	-0.1079
Plant height				1	0.4373**	0.2245	0.2889*	0.3129**
Panicle length					1	0.5332**	-0.0992	-0.2172
Number of leaves per plant						1	-0.1686	-0.0497
L/B ratio							1	0.0387
100 grain weight								1

* P = 0.05 **P = 0.01