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COMBINING ABILITY IN FODDER LABLAB

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ABSTRACT

Combining ability analysis was done in six genotypes of fodder lab lab for 12 traits *viz* plant height, primary branches per plant, secondary branches per plant, number of leaves, specific leaf weight, green fodder yield, dry weight of leaf, dry weight of stem, leaf:stem ratio, dry matter yield, crude protein and phosphorus content. Based on *gca* effects among the parents, MS 9495, CO 1, CO 2 and DL 3196 were found to be good combiners. Predominance of GCA variance was observed in all the traits indicating preponderance of additive gene action.

KEY WORDS : Fodder lab lab, Combining ability

The combining ability analysis helps in identifying the superior parents and the cross combinations likely to yield better progenies. The present study reports the combining ability for green fodder yield and related quantitative traits and quality traits such as crude protein and phosphorus content in fodder lab lab.

MATERIALS AND METHODS

Six genotypes *viz.*, CO 9, CO 2, CO 1, DPI 1281, DL 3196 and MS 9495 were crossed in all possible combinations n(n-1) resulting with 30 hybrids. The 30 cross combinations were raised during March, 1994 along with their 6 parents in a randomised block design with three replications at the Agricultural College and Research Institute, Killikulam. The hybrids were grown in a single row of five metre length under irrigation with a spacing of 45 x 30 cm. Observations were recorded in randomly selected five plants. The combining ability analysis was done following Griffing's (1965) method I model I.

RESULTS AND DISCUSSION

The analysis of variance for combining ability revealed significant differences among parents and hybrids indicating an appreciable amount of differences in the genetic contribution of the parents and genetic interation in hybrids.

General combining ability effects

The *gca* effect is considered as the inherent genetic value of the parents for a trait which is due to additive gene effect and it is fixable in nature (Simmonds, 1979). The selection of parents based on *gca* effects could be useful for producing superior hybrids by hybridisation. Among the parents, MS 9495 showed significant *gca* effect for plant height, primary branches per plant, specific leaf weight, dry weight of leaf, dry weight of stem, leaf:stem ratio and crude protein content. The

Table 1. General combining ability effects of parents

Parent	Plant height	Primary branches per plant	Secondary branches per plant	Number of leaf	Specific leaf weight	Green fooder yield	Dry weight of leaf	Dry weight of stem	Leaf stem ratio	Dry matter yield	Crude protein	Phosphorus content
CO9	2.02**	-0.02	0.37**	-13.60**	-0.01	-89.42**	-2.70**	1.00**	-0.06**	1.87**	1.03**	-1.01**
CO2	-2.11**	0.06**	-0.05**	1.09**	0.00	37.47**	1.40**	0.69**	0.02**	3.83**	-0.39**	0.01**
CO1	2.21**	-0.01	0.37**	6.02**	0.00	51.18**	2.85**	3.35**	0.02**	6.32**	-0.09*	0.02**
DPI 1281	-15.43**	-0.13**	-0.93**	-5.28**	-0.01	-92.11**	-7.56**	-12.01**	-0.03**	-20.00**	-1.50**	0.00
DL 3196	0.58**	0.00	0.07**	4.87**	0.00	48.12**	2.91**	3.35**	0.02**	3.43**	-0.38**	-0.02**
MS 9495	12.73**	0.10**	0.18**	6.91**	-0.01	44.76**	3.10**	3.61**	0.03**	4.55**	1.38**	0.00
SE(gi)	0.060	0.087	0.031	0.089	0.0001	0.169	0.056	0.057	0.002	0.072	0.043	0.0004

* Significant at 5 per cent level ; ** Significant at 1 per cent level

Table 2. Specific combining ability effects of direct crosses

Cross	Plant height	Primary branches per plant	Secondary branches per plant	Number of leaf	Specific leaf weight	Green fooder yield	Dry weight of leaf	Dry weight of stem	Leaf stem ratio	Dry matter yield	Crude protein	Phosphorus content
P1xP2	-0.01	-0.11*	-0.25**	3.96**	-0.01**	9.73**	2.28**	0.54**	0.00	4.65**	-0.53**	-0.01**
P1xP3	0.13	-0.18**	-0.05	-3.28**	0.00	-25.73**	-0.17	0.20	0.04**	-1.79**	0.16	0.01**
P1xP4	1.48**	-0.03	0.09	3.26**	0.01**	52.28**	2.12**	0.39**	-0.02**	5.75**	-0.05	0.04**
P1xP5	0.25	-0.02	-0.27**	3.66**	0.01**	3.07**	-1.47**	-0.29**	-0.06**	-2.02**	0.40**	-0.01**
P1xP6	-3.06**	0.01	-0.08	-3.80**	-0.01	-56.31**	-3.72**	-1.16**	0.01*	-9.40**	-0.38**	-0.02**
P2xP3	-1.88**	0.01	-0.17*	-3.70**	-0.01**	-9.24**	-0.14	-1.75**	0.01*	-2.04**	0.49**	0.00
P2xP4	-2.41**	-0.07	-0.06	0.69**	0.00	-14.35**	0.45**	0.73**	-0.02**	-0.74**	0.49**	0.02**
P2xP5	-2.32**	0.10*	-0.25**	0.78**	0.00	0.30	-0.05	2.40**	-0.04**	-0.26**	0.22*	0.00
P2xP6	5.23**	0.04	-0.21**	-4.06**	0.01**	17.56**	-3.19**	-2.72**	-0.01*	-3.56**	0.21*	0.01
P3xP4	-1.43**	0.13**	-0.21**	2.00**	0.01**	23.18**	-1.36**	-1.07**	0.00	-5.45**	-0.43**	0.01
P3xP5	1.01**	0.00	0.14	0.80**	-0.01**	-14.79**	0.65**	0.49**	-0.01*	0.82**	0.16	-0.01
P3xP6	3.96**	-0.13**	-0.43**	8.64**	0.01**	66.86**	2.71**	5.84**	-0.02**	11.67**	-0.05	-0.02**
P4xP5	-5.93**	0.11**	-0.04	-1.14**	0.00	-16.41**	-2.61	-1.85**	0.07**	0.41*	-0.54**	0.00
P4xP6	2.62**	-0.08	0.02	-3.97**	0.01**	-56.94**	1.50**	-2.00**	0.03**	-9.58**	0.27**	0.00
P5xP6	3.49**	-0.07	0.29**	10.56**	-0.01**	54.56**	4.71**	-0.35**	0.09*	1.75**	0.55**	0.03**
SE(Sij)	0.137	0.043	0.071	0.204	0.0002	0.387	0.128	0.130	0.004	0.165	0.097	0.0010

* Significant at 5 per cent level ; ** Significant at 1 per cent level
P1 : CO9 ; P2 : CO2 ; P3 : CO1 ; P4 : DPI 1281 ; P5 : DL 3196 ; P6 : MS 9495

parent CO 1 recorded significant *gca* effects for green fodder yield and dry matter yield and parents CO 9 and CO 2 showed significant *gca* effects for secondary branches per plant and phosphorus content (Table 1).

Specific combining ability effect

The *sca* effect is an important criterion for the evaluation of hybrids. Highest *sca* effects were exhibited by the hybrids CO 2 x MS 9495 for plant height; CO 1 x DPI 1281 for primary branches per plant; DL 3196 x MS 9495 for secondary branches per plant, number of leaves, specific leaf weight, dry weight of leaf, leaf:stem ratio and crude protein; CO 1 x MS 9495 for green fodder yield, dry weight of stem and dry matter yield and CO 9 x DPI 1281 for phosphorus content (Table 2). Superior performance of the hybrids for a trait might be attributed to the high degree of expression of either one or both the parents concerned for the corresponding trait. None of the hybrids exhibited *sca* effect for all the characters. The crosses showing significant *sca* effects involved one good and other poor combiners or even with both parents as poor combiners. The superior performance of hybrids was obtained with atleast one parent showing high *gca* effect. These findings are in accordance with Dasgupta and Das (1991). Thus the choice of parents would be more advantageous if based on their general combining ability.

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