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Research article

COMBINING ABILITY STUDIES IN GREENGRAM (*VIGNA RADIATA* (L.) WILCZEK

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ABSTRACT: Combining ability studies indicated predominant role of non-additive gene action for the inheritance of the characters viz., plant height, clusters per plant, pods per plant, pods per cluster, pod length, seeds per pod, 100 seed weight, protein content and grain yield per plant. However, additive gene action was found to be playing a major role in respect of days of 50 per cent flowering and days to maturity. Overall examination of gca and sca effects showed Pusa-105, RMG-275, LGG-460 and ML-267 as the best general combiners and the crosses COGG-2 x LGG 410, RMG 275 x LGG 410, LGG 460 x LGG 410 and Pusa 105 x PDM 89-221 as the best cross combinations for some of the characters studied. Hence, it is suggested that these crosses are to be carried for further generations for the improvement of grain yield in greengram.

INTRODUCTION

Greengram also known as mungbean is an important pulse crop in India, grown principally for its protein rich edible seeds. It forms an important constituent of Indian diet by providing less expensive source of vegetable dietary protein which is comparatively rich in lysine, an aminoacid deficient in cereal grains. To meet the minimum protein requirement of the population of our country, it poses a challenge on the part of breeders in developing high yielding, short duration, bold grained and disease resistant varieties. Choice of parents and information on the nature of gene action involved in the expression of quantitative traits of economic importance are essential pre-requisites in the development of improved cultivars through hybridization programme. Combining ability provides the necessary information on the nature of gene action governing a character and helps in identifying the promising parents with high general combining ability and the cross combinations showing high specific combining ability.

MATERIALS AND METHODS

The present investigation was undertaken at the wet land farm of Sri Venkateswara Agricultural College, Tirupati to assess the nature and magnitude of gene action based on gca and sca and to identify promising parents and crosses, respectively,. The experimental material consisted of 7 parents (CoGG 2, ML-267, Pusa 105, RMG 275, PDM 89-221, LGG 460 and LGG 410) and their 21F3 progenies derived from a 7 x 7 diallel analysis except reciprocals. The experiment was laid out in a RBD with three replications. Each plot consisted of 3 rows of 5m length. A uniform spacing of 30 cm between the rows and 15 cm within the row was adopted. Ten plants in parents and 30 plants in F3 were tagged randomly in each entry for recording the observations.

RESULTS AND DISCUSSION

Combining ability analysis indicated predominant role of non-additive gene action for plant height, clusters per plant, pods per plant, pod length, seeds per pod, 100 seed weight, protein content and grain yield per plant while additive gene action was noticed for days to 50 per cent flowering and days to maturity. Similar results were reported by Raghuram Reddy, 1980 and Wilson et al., 1985.

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Based on the study of per se performance of parents and estimates of gca effects, Pusa 105 was the best combiner for grain yield per plant, early flowering, early maturity, plant height, clusters per plant, pods per plant and protein content; RMG 275 for early flowering, early maturity and 100 seed weight; LGG 460 for pods per plant, pods per cluster and protein content and ML 267 for early flowering, early maturity and protein content. Since high gca effects are due to additive and additive x additive gene action they can be readily exploited in breeding programme (Griffing, 1956). The study of sca effects and per se performance of crosses in F3 generation revealed that the crosses CoGG 2 x LGG 410, RMG 275 x LGG 410, LGG 460 X LGG 410 and Pusa 105 x PDM 89-221 were the best specific crosses for yield and its components. These crosses are to be carried onto further generations for the improvement of grain yield in greengram. Estimates of the variances due to gca and sca provide an apt diagnosis of the predominant role of additive and non-additive gene effects respectively. The gca and sca effects help to locate the parents and crosses that are responsible for bringing about a particular type of gene action. For the improvement of self pollinated crops like greengram, high sca effects of a particular cross combination will be useful if it is accompanied by high gca effects of the respective parents, unlike cross pollinated crops where predominant sca effects are of primary consideration (Raghavaiah and Joshi, 1986).

Table:1 General Combining ability effects of seven parents of green gram

Parents	Days to 50% flowering (No)	Days to maturity (No)	Plant height (cm)	Clusters per plant (No)	Pods per plant (No)	Pods per cluster (No)	Pod length (cm)	Seeds per pod (No)	100 seed weight (gm)	Protein content %	Grain yeild per plant (gm)
CoGG -2	0.62**	2.18**	0.68	0.14	1.07	0.10	-0.02	0.07	-0.01	0.40**	0.26
ML 267	-0.51**	-1.22**	0.42	0.03	-1.33	-0.36**	-0.01	-.46**	0.04	0.80	-0.74**
Pusa 105	-0.29*	-0.70**	3.56**	0.41**	2.87**	0.23	0.05	.18	-0.08**	1.00**	0.77**
RMG 275	-1.66**	-6.59*	-2.60**	-0.36**	-4.06**	-041**	0.05	-.45**	0.15**	-1.02**	-1.30**
PDM 89-221	0.55**	1.77**	-2.01**	0.22	-0.58	-0.37**	-0.07	0.52**	-0.01	-0.95**	0.43
LGG 460	0.74**	2.40**	-0.41	-0.31**	2.62**	0.73**	.01	-0.20	-0.05*	0.72**	0.32
LGG 410	0.55**	2.14**	0.35	-0.12	-0.58	0.07	-0.03	0.33	-0.02	-0.95**	0.24
SE(gi)	0.11	0.15	0.35	0.11	0.86	0.13	0.04	0.14	0.02	0.07	0.22

* significant at P = 0.05 ** significant at P = 0.01

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