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STUDIES ON COMBINING ABILITY FOR QUALITY TRAITS IN PEA *(PISUE SATIVUS L.)*

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Garden pea is an important pulse vegetable in India. It is gaining increasing popularity as compared to other pulses, even among vegetables because of their diverse bonanza to consumers and farmers and so the concern of the breeder to increase the productivity by evolving suitable high yielding superior quality cultivars. It is consumed as green peas, grain peas and even edible podded peas. They are rich in protein content and lysine the limiting amino acid in cereals.

The present investigation was undertaken to study the extent of combining ability in a diallel cross (excluding reciprocals) involving six diverse varieties of pea. The experimental materials comprised of six vareities (Bonneville, Lincoln, VL-3, Solan Nirog, Kinnauri and JP Afila) were crossed in all possible combinations, exlcuidng reciprocals. The seeds of parents and 15 F_1s were sown in October 1996 with a spacing of 60x7.5 cm in randomized block design with three replications at Vegetable Research Farm, VS Parmar University of Horticulture & Forestry, Nauni, Solan (H.P.). The gross plot size was 2.00 X 1.80 m. Recommended cultural practices were followed during crop growth and development period and observations were recorded on dry matter contexnt (%), protein content (%) and pod yield per plant (g) on the fresh weight basis. For the estimation of total protein content (%), nitrogen was determined by Micro-Kjeldahl method (AOAC, 1980) and it was multiplied by the factor 6.25. Total sugars were estimated by phenol sulphuric acid method. Analysis of variance was worked out following standard procedures.

The analysis of varience revealed significant differences among genotypes for all the traits under study, whichindicated presence of genetic diversity in the material (Table 1). The variance due to general and specific combining ability were also significant in all the cases, thereby suggesting the importance of both additive and non additive (dominance) genetic variances. However, the magnitude of .2s was more than that of .2g for all the characters studied, thus, indicating greater role of non-attitive gene action in all the characters studied. Similar results were observed by Singh and Singh (1989).

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General combining ability of various traits are presented in Table 2. The parents viz., Lincoln and Bonneville for dry matter content; Lincoln, Bonnevile and VL-3 for total sugars; JP Afila and Bonneville for protein content and Bonneville, Lincoln, VL-3 and Solan Nirog for pod yield per plant exhibited high positive general combining ability (gca) effects. Hybrids Lincoln x Kinnauri for dry matter content, Kinnauri x JP Afila for total sugars, Bonneville x VL-3 for protein content and Bonneville x Kinnauri revealed high specific combining ability (sca) performance. The data indicated that out of 15 hybrids 10 each for dry matter content and pod yield per plant, 9 each for protein content and 3 each for total sugars exhibited positive and significant specific combining ability (sca) effects (Table 3).

REFERENCES

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Table 1. Analysis of variance for combining ability in a diallel cross of garden pea in F_1's

Source of variance	d.f.	Pod yield per plant (g)	Dry matter content (%)	Total sugars (%)	Protein content (%)
gca	5	992.298*	3.320*	6.613*	16.071*
sca	15	602.379*	5.097*	2.289*	5.981*
Error	40	1.273	0.002	0.009	0.013
2g		123.960	0.415	0.826	2.007
2s		601.110	5.090	2.280	5.969
2g/2s		0.206	0.081	0.362	0.336

*Significant at 5 per cent level

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

Variety	Pod yield per plant (g)	Dry matter content (%)	Total sugars (%)	Protein content (%)
Banneville	8.548*	0.283*	0.102*	0.847*
lincoln	7.819*	0.202*	1.578*	-0.132*
VL-3	4.694*	0.066*	0.092*	-1.871*
Solan Nirog	5.319*	0.386*	-0.173*	-1.445*
Kinnauri	-6.555*	0.863*	-0.403*	0.889*
JP Afila	-19.826*	-1.027*	-1.196*	1.712*
SE (gi) ±	0.364	0.014	0.031	0.037

*Significant at 5 per cent level.

Table 3. Estimates of specific combining ability effecsof F_1 crosses for different characters in pea

Hybrids	Pod yield Per plant (g)	Node at wich first flower appear	Number of pods per plant	Number of grains per pod	Pod length (cm)	Pod girth (cm)	Shelling percentage (%)
Banneville x lincoln	2.997*	-0.002	2.324*	0.198*	-0.289*	0.328*	5.005*
Banneville x VL-3	-15.544*	-0.027	-1.405*	0.173*	-.067	-0.204*	2.039*
Bonneville x Solan Nirog	25.663*	0.006	12.330*	0.094	0.535*	0.140*	2.214*
Banneville x Kinnauri	35.872*	0.510*	5.199*	-0.168*	0.210*	-0.008	-0.863*
Banneville x JP Afila	-0.857	0.202*	-2.363*	0.148*	0.596*	-0.114*	0.977*
Lincoln x VL-3	16.351*	0.061	-0.425	0.127*	0.033	-0.162*	3.786*
Lincoln x Solan Nirog	43.059*	0.281*	4.032*	0.181*	0.254*	-0.054	-2.017*
Lincoln x Kinnauri	-7.400*	0.131	4.345*	0.886*	0.329*	0.080*	1.801*
Lincoln x JP Afila	-1.794*	-0.243*	2.116*	0.636*	0.514*	-0.098*	0.265
VL-3 x Solan Nirog	18.351*	-0.043	4.137*	-0.243*	0.542*	-0.370*	1.176*
VL-3 x Kinnauri	12.226*	0.534*	2.782*	-0.039	0.067	0.121*	-6.350*
VL-3 x JP Afila	3.663*	0.298*	2.553*	-0.289*	0.419*	-0.004	2.929*
Solan Nirog x Kinnauri	-1.400	0.560*	4.074*	-0.352*	0.212*	-0.088*	4.428*
Solan Nirog x JP Afila	3.205*	0.119	1.012*	0.565*	-0.380*	0.334*	-2.472*
Kinnauri x JP Afila	6.080*	0.169*	2.824*	0.169*	-0.152*	0.015	0.584
SE (Sig) 0.825	0.080	0.243	0.061	0.056	0.040	0.359	

* Significant at 5 per cent level