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Line x tester analysis in pea (*Pisum sativum* L.)

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SUMMARY

The eight lines and four testers were mated in a line x tester fashion to produce 32 F_1's. The crosses and parents were grown in a randomized block design. KPSD1, PG 3 and HUVP 1 were the best general combiner for seed yield per plant; LMR 20, JP Batri Brown and KPSD 1 for pods per plant and HUVP 1, PG 3 and HUDP 15 for seeds per pod. A good agreement between SCA effect and *per se* performance was observed for most of the characters. Nineteen crosses showed significantly positive heterosis over better parent for seed yield per plant. Ten crosses showed more than fifty per cent heterosis over better parent, the highest by LMR 20 x JP Batri Brown (196.49% and HFP 4 X JP Batri Brown (169.78%) for seed yield per plant.

Key words : Pea, Heterosis, Combining ability analysis, Line x tester.

Pea (*Pisum sativum* L.) is predominantly a self-pollinated crop. Thus, its populations are characterized by 'homozygous balance'. Development of efficient pure line varieties through pedigree method and hybrid varieties through heterosis breeding requires an understanding of the nature and magnitude of gene effects and genetic variances contributing towards yield and yield contributing components. This would help in determining the most efficient breeding procedure. The concept of combining ability analysis has significant practical importance in plant breeding (Tyagi and Srivastava, 2001, and Ravinder Kaur *et al.*, 2003). The general combining ability reveals the presence of additive type of gene action, whereas specific combining ability reveals the presence of non-additive type of gene action. The present study was conducted to estimate the combining ability variances and effects and the nature and magnitude of heterosis in the different crosses for yield and yield traits for the possibility of their utilization in heterosis breeding.

MATERIALS AND METHODS

The experimental material comprised of twelve diverse (exotic and indigenous) lines of pea belonging to different height and maturity groups. The eight lines (5064, HFP 4, HUVP 1, KPSD 1, KFPD 3, PG 3, LMR 20, EC 328760) and four testers (FC 1, JP Batri brown, HUDP 15 and HUDP 16) were crossed in a Line x tester fashion. A total 44 entries comprising of 32 F_1, 8 lines and 4 testers were grown in randomized block design with two replications at the Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. The row length was 2.5 m while row to row and plant to plant distance was 45 cm and 10 cm, respectively. Recommended agronomic practices were fallowed to raise a good crop. Data were recorded on five competitive plants of each family for days to flowering, plant height, number of primary branches per plant, number of internodes bearing first pod, number of pods per plant, pod length, seeds per pod, seed weight and seed yield per plant. The mean values of each genotype were subjected to combining ability analysis by line x tester method by Kempthorne (1957) and Singh and Chaudhary (1979). The heterosis over better parent (HBP) was estimated following usual method.

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RESULTS AND DISCUSSION

The concept of combining ability has become indispensable for genetic studies in plant breeding because of its use in selecting the suitable parents based on early generation testing of lines in hybrid combinations. The general combining ability is the measure of fixable components of genetic variance and non-additive genetic effects are expressed by specific combining ability (Sprague, 1966).

In the present investigation, the parents HUVP 1, HUDP 15, PG 3 and 5064 were the best *per se* performers for seed yield per plant. However, for yield components, the best *per se* performers were KPSD 1, KFPD 3 and PG 3 for seed weight; HUVP 1, HUDP 16, FC 1 and HUDP 15 for seeds per pod; 5064, LMR 20 and HUVP 1 for pods per plant and LMR 20,5064 and HFP 4 for number of primary branches per plant. For early flowering, the best *per se* performers were EC 328760, PG 3 LMR 20, JP Batri brown and HUDP 16, while for