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Short Communication

Gene action for yield and its components in three crosses of pea (*Pisum sativum* L.)

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Eight diverse cultivars/lines of garden pea *viz.*, Arkel, GP17, GP207, GP4, GP128, GP447, GP468 and GP 471 were intercrossed in a diallel fashion and six basic populations obtained. All the six generations were grown during *rabi* season 1999-2000 in a randomised block design. Observations were recorded on five important characters such as plant height, number of pods per plant, number of seeds per pod, pod length and pod yield per plant.

Mather's scaling tests were applied in all the crosses to judge the adequacy of the additive-dominance model. The crosses, where the additive-dominance model was found inadequate were subjected to genetic analysis following Hayman [1] six-parameters model.

Three crosses each for plant height, number of pod per plant, number of seeds per pod, pod length and pod yield per plant showed inadequacy of additive-dominance model and thus, presence of epistasis in these crosses was indicated. The estimates of epistatic interaction(s) along with additive and dominance gene effects for these interacting crosses, for five characters (Table 1) showed that additive (d) gene effects were significantly positive in two crosses each for plant height, number of pods per plant, number

Table 1. Estimates of gene effects following six-parameter model for five characters in garden pea

Cross	m	d	h	i	j	l	Interaction
			Plant height				
Arkel × GP 17	84.15**	4.89**	35.54**	24.63**	1.92	−84.84**	Duplicate
Arkel × GP 207	54.59**	7.84**	66.06**	−11.31**	−11.31**	−178.83**	Duplicate
Arkel × GP 4	88.09**	−5.20**	74.94**	72.48**	4.92**	−156.74**	Duplicate
			Number of pods/plant				
Arkel × GP 468	34.60**	−7.28**	43.89**	34.45**	2.25	−64.83**	Duplicate
Arkel × GP 471	32.97**	5.72**	−26.17**	−30.75**	33.66**	72.55**	Duplicate
GP 17 × GP 4	22.46**	2.63**	43.82**	26.89**	−2.19	−32.80**	Duplicate
			Number of seeds/pod				
Arkel × GP 4	7.08**	1.04**	9.35**	7.94**	−1.66**	−13.74**	Duplicate
Arkel × GP 468	8.16**	−1.60**	3.96**	2.96**	−1.05**	−3.99**	Duplicate
GP 17 × GP 471	7.80**	1.42**	1.86**	5.57**	−0.18	−6.20**	Duplicate
			Pod length				
Arkel × GP 207	1.19**	−0.10**	0.51**	0.38**	−0.60**	−0.42**	Duplicate
GP 17 × GP 4	1.25**	−0.26**	0.89**	0.64**	−0.39**	−8.82**	Duplicate
GP 207 × GP 471	1.40**	0.06*	1.35**	1.00**	−0.02	−1.72**	Duplicate
			Pod yield/plant				
Arkel × GP 447	113.76**	−13.06**	90.30**	52.19**	5.41*	−13.03**	Duplicate
GP 17 × GP 4	81.08**	8.07**	79.40**	56.11**	−13.08**	−96.96**	Duplicate
GP 17 × GP 471	131.04**	4.94**	44.10**	74.40**	31.54**	−29.22**	Duplicate

*, ** Significant at 5% and 1% level, respectively.

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of seed and pod yield per plant. In general, almost all the F_1 crosses had positive dominance gene effects for plant height, number of pods per plant (except Arkel × GP 471), number of seeds per pod, pod length and pod yield per plant and their magnitude was also higher than that of additive gene effects. The significance of only duplicate type of epistasis for these characters further confirms the prevalence of dominance effects. These results are in agreement with the earlier studies in pea for number of pods per plant [2], for pod yield/plant [3, 4] and for both the traits [5].

The dominance effect (h) showed positive significance for all crosses except in the cross (Arkel × GP 471 which showed negative significance). However, the dominance × dominance (l) gene interaction exhibited negative significance for all the traits in all the crosses.

All three types of digenic interactions were observed for all the traits. In the present study. Higher estimates of (h) for almost all the traits were associated with significant epistatic interaction(s) in the respective crosses.

Comparing the magnitude of the main effects (d) and (h) along with their digenic epistatic interactions (i, j and l), the (1) interaction was usually higher. However the sign of (l) interaction was mostly negative indicating their reducing effect in the expression of almost all the characters.

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