

INHERITANCE OF GROWTH RATE AND NODE DEVELOPMENT IN A DIALLEL CROSS OF PEAS AND CORRELATIONS WITH OTHER TRAITS

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The vigorous early growth of plants is one of the prerequisites of a high pea yield, inasmuch as vigorous plants are better able to withstand many of the problems which commonly occur in the Middle European climate, e.g. drought, heat and leaf weevil. Although environmental and cultural conditions are important factors influencing seedling establishment, smooth-seeded peas usually show more rapid early growth than wrinkled-seeded types. There are, however, considerable differences among the wrinkled-seeded varieties themselves.

To study the inheritance of growth rate and node development in the first three weeks following emergence, six wrinkled-seeded varieties ('Skinado', 'Green Arrow', 'Jof', 'Puget', 'Wav. 18045' and 'Rapid') and their F1 hybrids (without reciprocals) were evaluated. Four plants of each parent or hybrid were grown in a 25-cm container replicated 3 times in a randomized block design. The experiment was carried out in a growth room under the following conditions: 23/18C day/night temperatures, a 16 hr photoperiod and at least 60% relative humidity. Shoot extension per week, node development (number of days required for the full development of a node), plant height at flowering, days to first flower, and first flowering node were determined. The statistical analysis of data was done by Griffing's Method 2, Model 11.

Only the specific combining ability (SCA) variance component was significant for rate of growth, indicating that non-additive effects are important for this trait (Table 1). In accordance with the insignificant s^2 , the narrow sense heritability value was low. Both GCA and SCA variance components were significant for node development and they were nearly of the same magnitude. The narrow sense heritability value (52.8) suggests that progress in node development could be achieved by breeding procedures that are able to increase the frequency of those genes that are primarily additive.

Table 1. Estimates of variance components, broad and narrow sense heritabilities.

Traits	s_g^2	s_s^2	s_e^2	H_b	H_n
Rate of growth	1.31**	10.51**	3.76	77.74	15.52
Node development	0.07**	0.10**	0.02	93.72	52.85

Table 2. Phenotypic and genotypic correlations in parental and F1 generations.

Traits		Rate of growth		Node development	
		P	F ₁	P	F ₁
Node of 1st flower	r	0.08	-0.23	-0.90**	-0.49
	r ^p _g	0.17	-0.28	-0.98	-0.50
Days to 1st flower	r	-0.24	-0.56*	-0.78**	-0.32
	r ^p _g	0.09	-0.51	-1.00	-0.45
Plant height at flowering	r	0.45	0.24	-0.92**	-0.49
	r ^p _g	0.26	0.15	-0.93	-0.49

Most of the significant phenotypic correlations (r_p) had negative signs (Table 2). The association was stronger in the parental population except rate of growth vs days to first flower. More rapid node development was associated with late flowering, flowering at higher nodes and taller plants. The behavior of rate of growth was different: an increased rate of growth was associated with early flowering. The associations noted in the r_p values were indicated again in the similar genotypic correlation coefficients (r_g).