POPULATION PERFORMANCE AND GENETIC PARAMETERS OF SOME PROMISING PEA LINES

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After X-irradiation of 'Bonneville', many high protein mutants were isolated in the M3 generation (1). But these were very tall, late, and low yielding and with small, shrivelled, and deformed seeds. These mutants were intercrossed among themselves, back-crossed to the parental line, and crossed with other high yielding mutants. Recombinants with high grain yield, better seed protein content, and less shoot height were selected in F3 and selfed for 4 generations. Their performance was evaluated by growing them in a randomized block design with 4 replications per genotype. The protein values recorded are the lowest values obtained for the genotypes 1-14. But for the local line the values recorded are the average of 30 plants per season grown for 4 successive generations. Genotype No. 2 has been included because of its earliness. The average performance of the selected lines (Table 1) indicates that the lines 14, 13, 3, 5, and 6 are promising (in order of their superiority) and are better than the commonly cultivated local line in this region. Moreover, except for line 13, these lines are not tall, and their breeding value is thus very high.

The analysis of variance (F value, Table 2) reveals a highly significant variance in each phenotypic trait among the genotypes. Nevertheless, internode length appears to be of environmental origin. A high genotypic variance for the shoot height and seed number points to the possibility of a successful selection of short statured, high yielding plants among these genotypes. Furthermore, the genotypic coefficient of variation, indicating the extent of observed variation due to genetic factors, was high for seed yield and seeds per plant (Table 2). Nevertheless, the heritability values were very high for shoot height, nodes and seeds per plant, and seed yield. However, while heritability estimates are subject to genotype environment interaction, genetic advance expressed as the percentage of mean was highest for the traits seeds per plant and total seed yield and lowest for shoot height and nodes] per plant.

Thus, the traits seed yield and seeds per plant showed a high genetic coefficient of variation, heritability, and expected genetic advance, and they are highly and positively intercorrelated ($Y=2.59 + 0.16X$, $r=0.73$, $P< 0.01$). These results are encouraging from the standpoint of practical breeding and selection.

(1) Kaul, M. L. H. 1977. Proc. 3rd Sabroa Congress (Australia). 3c:36-41.

Table 1. Performance data of pea lines (Mean value of 30 X 4 plants per genotype.

Genotype	Plant height (cm)	Nodes/plant	Days to 50% fruiting	Pods/plant	Seeds/plant	1,000 seed weight (gm)	Yield/plant (gm)	Protein percent	Protein yield per plant
1	70.9	20.3	118	21.8	50.0	221.9	11.1	20.6	2.29
2	53.0	16.1	102	8.5	26.5	198.7	5.2	20.0	1.04
3	84.1	22.2	120	31.7	90.1	243.4	21.9	20.3	4.45
4	75.7	19.3	114	26.8	18.8	233.2	16.0	19.4	3.11
5	87.5	18.8	112	31.7	89.0	241.9	21.5	19.9	4.28
6	87.7	19.6	112	24.7	73.8	258.3	19.0	20.2	3.84
7	89.3	18.9	114	20.9	55.1	224.9	12.3	18.8	2.31
8	93.6	19.9	118	24.5	64.1	259.9	16.6	19.1	3.17
9	83.3	17.2	116	24.3	66.5	213.0	14.1	20.3	2.86
10	77.6	18.1	124	20.8	48.8	224.6	10.9	18.8	2.05
11	91.2	22.2	128	35.2	105.7	104.1	10.9	24.1	2.63
12	79.7	27.3	152	29.1	103.3	131.6	13.5	24.5	3.31
13	104.7	20.4	128	30.4	119.8	193.4	23.1	23.4	5.41
14	99.9	21.2	124	29.9	112.6	202.4	22.8	24.1	5.50
Local line	133.4	21.2	116	12.8	58.3	97.6	5.7	19.2	1.09

Table 2. Estimate of genetic parameters and the analysis of variance.

Phenotypic trait	Phenotypic variance	Genotypic variance	Genetic advance	Expected genetic advance	Heritability %	Phenotypic coefficient of variation	Genotypic coefficient of variation	F value Block	F value Treatment
Shoot height	150.4	139.1	23.4	27.8	92.5	14.6	14.0	37.97**	1.46
Nodes/plant	7.5	6.0	4.6	22.8	80.8	13.7	12.3	13.61**	0.23
Internode length	0.4	0.4	1.2	29.1	91.6	15.4	14.7	33.53**	4.23*
Pods/plant	49.2	38.6	11.4	45.3	78.6	28.0	24.8	11.99**	1.17
Seeds/pod	0.2	0.2	0.8	29.8	83.7	17.3	15.8	16.42**	1.73
Seeds/plant	793.2	659.1	48.2	65.0	83.1	28.0	34.6	15.73**	0.26
Seed yield	36.8	33.6	10.6	72.7	85.0	41.5	38.3	19.0 **	0.17

Blocks= genotypes; treatment=replications. * P=0.05; ** P=0.01.