YIELD COMPONENTS AND THEIR INFLUENCE ON YIELD IN A BASIC COLLECTION FOR DRIED PEA BREEDING

Jaiser, H. Inst, fur Angewandte Genetik, Freie Universitat, Berlin, FRG

During the last three years about 2000 lines from several gene banks have been evaluated for about 55 morphological and yield characters. The aim of the project was to select useful parents for crosses in a breeding program of dried peas. About 100 lines have been chosen for standing ability, disease resistance, and varying components of yield after two consecutive steps of selection. Among these lines were about 22 semi-leafless genotypes with different genetical backgrounds, 8 "rabbit-eared" rogue types (1), and some primitive lines.

The selected lines were planted in 1987 at four sites in observation plots of $7.5m^2$ size. At one location 20 plants per plot were pulled from the center of the plot to score various yield characters. The following measurements were taken: number of seeds per pod, number of pods per main stem, number of flowering nodes, flowers per node, number of seeds and pods on branches, seed weight, and single plant yield. Fertility was estimated by dividing the number of seeds per pod by the number of ovules and pod set was determined by dividing the number of pods by the number of possible pods. The. influence of different plant types and of variation in yield components on seed yield is reported.

Bad weather in summer 1987 caused environmental stress. Thus abortion of seeds, flowers, and pods was relatively high. Table 1 shows the mean values of the yield characters studied for different plant ideotypes. The reduction of pods is extreme in rogue types, corroborating earlier observations that they react to stress with pod dropping (2). Fertility in the pod was also reduced. Semi-leafless lines produced more pods than conventional types but had a slightly lower fertility.

Lines with more than two flowers per node had a lower pod number than the normal two-flowered types. Whereas 82.2% of the possible pods were formed in lines with one flower per node and 55.0% in the normal lines, the multi-podded genotypes realized only 32.5% of the possible pods. Higher within-plant competition also led to a reduction in seed set.

There was no increase in the number of pods in lines with a higher number of flowering nodes. Six to nine flowering nodes seemed optimal to give the highest seed yields.

Genotypes with a higher ovule number were able to produce more seeds under the unfavorable conditions of this growing season (Table 2). This confirms experiments of Snoad and Arthur (3) with six vining pea varieties in different environments. According to their results abortion of flowers and pods is greater than in ovules and seeds. The use of parents with a higher ovule number and a medium seed weight (200-250) in crosses should result in a more stable improvement of yield.

1. Gent, G. P. and R. F. Knight. 1978. PNL 10:105-106.
2. Snoad, B. 1985. In: The Pea Crop. P. D. Hebblethwaite, M. C. Heath, and T.C.K. Dawkins, eds., Butterworths, London, p. 31-41

3. Snoad, B. and A. E. Arthur. 1974. Theor. appl. Genet. 44:222-231.

Table 1. Mean values of yield characters for conventional, semi-leafless, and rogue types.

Character	Conventional	Rogue	Semi-leafless
Seeds/pod	3.8	3.4	3.6
Ovule number	8.7	8.6	8.6
Fertility (%)	43.7	39.3	41.5
Pods/main stem	7.8	5.1	8.5
Flowering nodes	7.7	8.9	7.5
Potential pod no.	15.4	17.9	16.3
Pod set (%)	54.1	31.1	56.5
Seeds/main stem	29.5	17.4	30.5
Seeds/plant	33.5	20.6	32.4
TSW	201.5	239.1	187.9
Plant yield (g)	6.6	5.0	6.0

Table 2. Influence of increasing ovule number on yield characters (excluding rogue types).

Character	Ovule number 5.8-7.1	7.2-8.5	8.6-9.9	10.0-11.4
Seeds/pod	3.1	3.5	3.9	4.2
Fertility (%)	49.4	43.8	42.4	40.3
Pods/main stem	6.0	8.1	8.0	8.2
Flowering nodes	6.2	7.5	7.6	8.4
Potential pod no.	10.2	14.9	16.5	18.0
Pod set (%)	70.2	60.0	50.1	48.7
Seeds/main stem	17.6	28.7	31.4	33.6
Seeds/plant	23.7	32.8	34.0	37.3
TSW	182.3	203.8	193.8	191.2
Plant yield (g)	4.0	6.5	6.5	7.1