THE OCCURRENCE AND SOMATIC CHROMOSOME NUMBER OF TWIN FORMS IN PISUM SATIVUM

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Pea haploids have not been described in the literature. Because of technical limitations, only a few practicable methods can be used to induce and select for haploids. The use of marker genes to select haploids by parthenogenetical induction is not attractive because the pea is a self-fertilizing species with a low seed set per fruit. However, anther culture and selection of parthenogenetical twins are practicable methods.

Selection for haploids by the twin seed method has been practiced in different crops, such as wheat, rice, and potato. For leguminous crops, haploids have been selected in this way in yellow lupine (5) and soybean (1, 2). Since the method of twin seeds has not been mentioned in literature for pea, we have decided to investigate its potential.

Twenty-three varieties and breeding lines have been studied for the ability to produce twins. Two thousand or more seeds per line were germinated in sterile vermiculite. After 4-5 days the seedlings were screened. Screening was carried out using different criteria. The number of cotyledons served as a reliable criterion for lupine (5), whereas the number of roots per germinated seed was suitable for potato (4). Pea cultivars 'Diktrom' and 'Poloma' very infrequently showed the presence of seeds with three cotyledons of non-uniform size (Table 1); one diploid shoot always appeared.

Table 1. Lines tested for twin formation showing 3 cotyledons or two primary roots.

	Number tested	20 primary root	3 cotyledons
Diktrom	2,746	-	3
St 50 - 74	1,000	5	-
St 430 - 75	3,000	14	-
Poloma	3,200	-	3
Stehgolt (1978*)	10,000	82	-
Stehgolt (1976*)	5,000		

* Seeds harvested

It was evident after germination that breeding lines St 50-74, St 430-75, and cv.'Stehgolt' contained seeds with 2 primary roots. Two different types of twins were observed: twins with 2 normal-sized shoots and twins with one large- and one small-sized shoot.

Chromosome numbers of both twin forms have been studied according to a procedure described by Tjio and Levan(6). Forty-six twins have been studied in detail and 43 twins have been studied in part. All plantlets contained the diploid somatic chromosome number. Most twins were fully separated; possibly all were identical twins.

Because of the relatively high frequency of twin forms in seed of cv. Stehgolt this variety was studied more intensively. The year of origin proved to be a very important factor influencing twin frequency. Among 5,000 germinated seeds harvested in 1976 not a single twin was detected, whereas among 10,000 seeds harvested in 1978, 82 twin seeds were found. Investigations on wheat suggested that polyembryo formation can be caused by herbicides used at a critical developmental stage (4). For this reason it is not clear whether the observed variation between varieties in twin formation is based mainly on genetical differences or on environmental conditions.

The twin method for selection of haploids has been without any success after examining 76,342 seedlings and investigating 89 twins cytologically.

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GENETIC VARIABILITY AND CORRELATIONS AMONG METRIC TRAITS OF SOME HIGH PROTEIN PEA LINES

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Most of the 19 high pea protein lines tested (PNL 10: 27-28) proved to be low yielders. Grain yield of 16 such genotypes was also low (Fig. 1) but most of them possessed considerable genetic variation for various yield components, the maximum being in grain yield and the minimum in seed protein content (Table 1). Since selection was directed towards higher seed protein

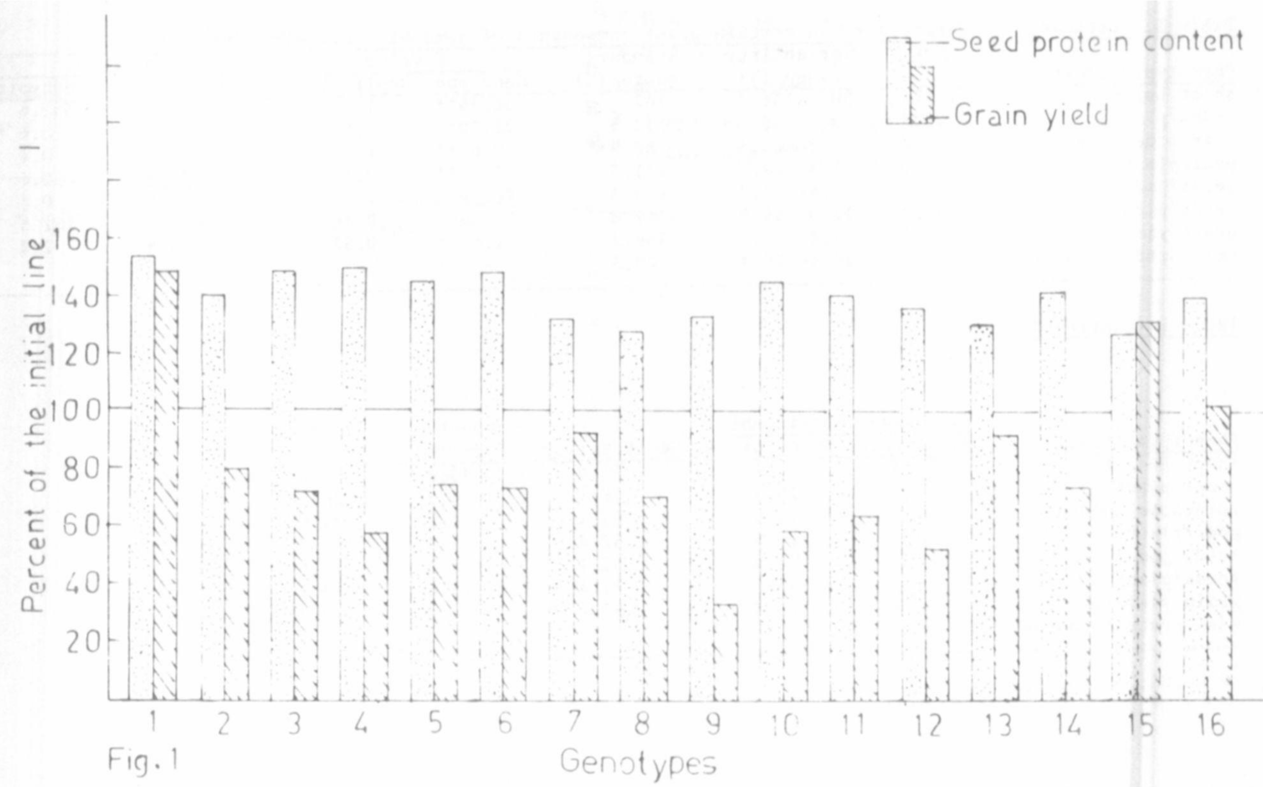

Fig. 1. Seed protein content and grain yield of 16(1-16) high protein pea genotyp