COMPETITIVE EFFECTS AMONG ISOGENIC LINES OF PEAS

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In order to study the effect of single genes or of the interaction of few genes on the competitive ability, eight isogenic lines of peas, provided by G. A. Marx, were utilized. They were a complete set of all combinations of the three genes, af (afila), st (reduced stipules) and tl (acacia), affecting the foliage morphology.

In 1980 a seed mixture of an equal number of seed from each genotype was sown at two different planting densities (100 plants/m^2 and 25 plants/m^2); in the two following years a sample of the bulk harvested seed was sown. Data concerning 1981, 1982, and 1983 are reported here.

The proportion of both the conventional (+++) and the "acacia" (+ + tl) types increased each year, reaching about 60% in the last year, whereas the other six genotypes contributed very little to the total yield of the mixtures (Fig. 1). The conventional and acacia plants had the highest seed yield per plant (Table 1) and consequently they were the majority of the plants in the mixture, as shown by Glover (1). In 1982 the eight lines were also grown in pure stand and the conventional and the acacia types showed the highest yield per plot (2); a positive relationship between agronomic value and competitive ability is suggested, as found by other authors in different species.

The eight genotypes were gathered on the basis of the presence or absence of one, two, or three genes, in order to study their effects on competitive ability.

The af genotypes and the st genotypes showed lower productivity than their corresponding dominant genotypes. In contrast, the acacia types had the same productivity as their corresponding dominant genotypes (Fig. 2). Therefore, the alleles af and st disappeared quickly in the mixture in comparison with their corresponding dominant alleles, whereas the tl allele was in equilibrium with its dominant allele (Fig. 3). This behavior presumably is related to the increased foliage area of the acacia types.

This experiment is being continued; in 1981, 1982 and 1983 three new similar experiments were begun.

1. Glover, T. J. 1980. PNL 12:12-14.
1. Gritton, E. T. 1972. PNL 4:11-12.

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Table 1. Seed yield (g) per plant of 8 genotypes present in the mixtures. Average of three years.

Af	St	Tl	100 plants/m^2	25 plants/m^2
+	+	+	14.0	26.8
af	+	+	9.5	17.5
+	st	+	10.9	26.4
+	+	tl	16.5	31.2
af	st	+	9.4	17.6
af	+	tl	9.1	21.9
+	st	tl	7.4	20.9
af	st	tl	6.7	12.8

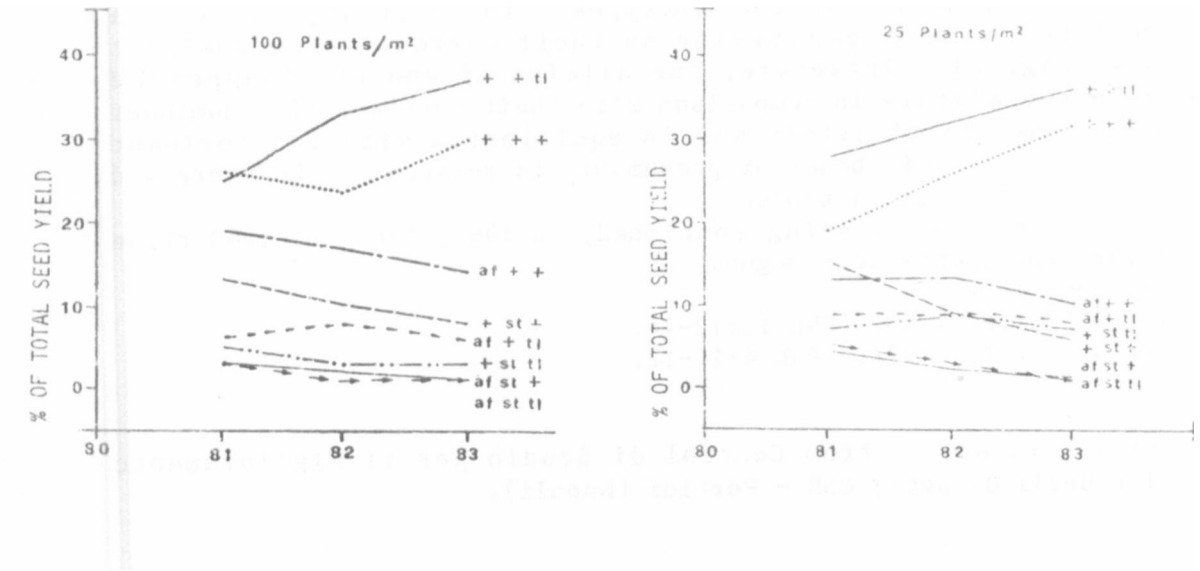

Fig. 1. Contribution of each genotype to the total seed yield of the mixture at two planting densities.

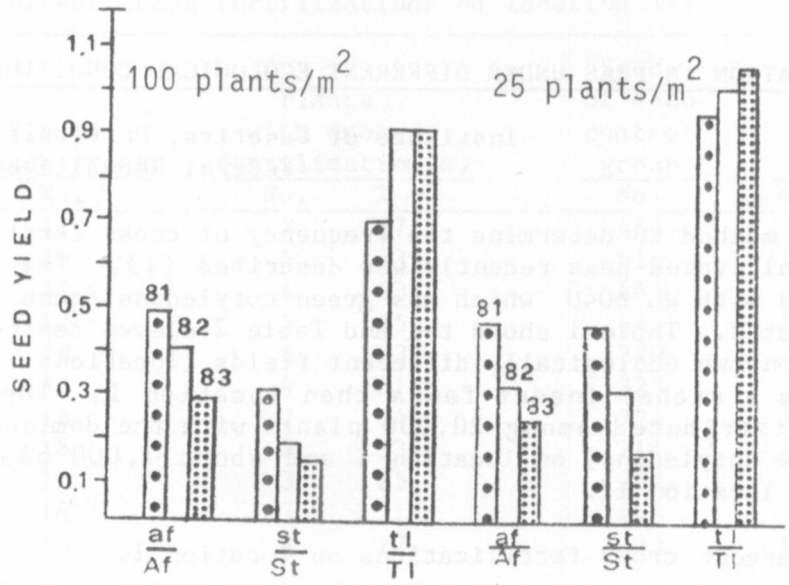

Fig. 2. Effects of dominant and recessive alleles of the three genes on seed yield.

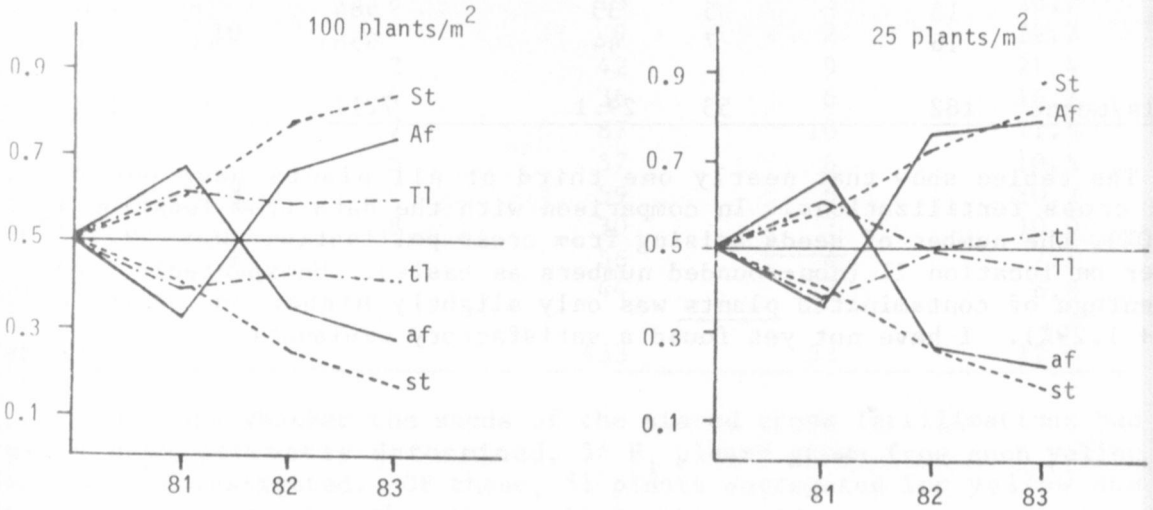

Fig. 3. Evolution of three allelic pairs under competition.