CHANGE IN PROPORTION OF PEA FOLIAGE TYPES AFTER ONE SEASON OF GROWTH AS A MIXTURE

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Some mixtures of pea foliage types are superior to the normal type for a number of important agronomic characteristics (Wehner, T.C. PhD thesis, University of Wisconsin, Madison, WI. 83 p. 1979). Our objective in this study was to determine whether these mixtures of foliage types changed significantly from the original 1:1 composition after one season of growth.

Four foliage types near-isogenic for the genes af, t1, and st were developed in each of seven genetic backgrounds. The four foliage types were afaf T1T1 StSt (afila) where the leaflets are replaced by extra tendrils, AfAf tltl StSt (acacia) where the tendrils are replaced by extra leaflets, AfAf T1T1 stst (reduced stipule) where the stipules are reduced to small strap-shaped structures, and AfAf tltlstst where there are both extra leaflets and reduced stipules. These foliage types will be referred to using only the gene(s) in homozygous recessive condition—af, tl, st, and sttl. The seven lines used were 'Alsweet', 'Sprite', 'New Season', 'New Line Early Perfection' (NLEP), 'Dark Skin Perfection' (DSP), and two experimentals, Line-1 and Line-2, from G. A. Marx, Geneva, New York. Three mixtures were tested—af+st, af+sttl, and tl+st—and were produced by mixing equal weights of seed of the two foliage types. Plots were grown at Arlington, Wisconsin, in 1977 as part of a larger experiment. Dry seed harvested from each mixture was planted in 1978 in low density rows, and each foliage type was counted. Data were compared to the 1:1 expected ratio using Chi-square analysis.

Of the three foliage type mixtures, only af+sttl remained unchanged from the original 1:1 composition (Table 1.) The af foliage type increased to 53.6% of the af+st mixture, and the tl type increased to 62.9% [63.1?-Ed.] of the tl+st mixture. The exceptions to this were that the foliage type mixtures in the cultivars Sprite and New Season remained unchanged in composition after one season of growth. We concluded that it would be necessary to remake the foliage type mixtures each year for the af+st and tl+st mixtures but not for af+sttl.

Table 1. Percent of plants represented by two foliage types one generation after planting a plot with 50% of each.

Foliage type mixture	Cultivar	First foliage type	Second foliage type	Number of plants	χ^2
		%	%		
af+st	Line-1	49.5	50.5	505	.05
	Alsweet	59.7	40.3	533	19.90**
	Sprite	43.4	56.6	182	3.16
	New Season	53.1	46.9	461	1.82
	NLEP	56.1	43.9	369	5.49**
	total	53.6	46.4	2050	10.68**
af+sttl	Line-1	48.5	51.5	487	.46
	Sprite	47.1	52.9	278	.92
	NLEP	48.3	51.7	482	.53
	total	48.1	51.9	1247	1.77
tl+st	Line-1	68.5	31.5	593	80.88**
	Line-2	62.9	37.1	475	31.85**
	Alsweet	65.8	34.2	549	54.52**
	Sprite†	57.1	42.9	177	3.53
	New Season	49.3	50.7	432	.08
	NLEP	67.5	32.5	459	56.47**
	DSP	63.9	36.1	385	29.74**
	total	63.1	36.9	3070	209.51**

*,**Significant at the 5% and 1% level of testing, respectively.
† May have been mixed at a 1:1.07 (tl:st) composition rather than a 1:1, due to differences in seed wt.