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Evaluation of Geno-Phenotypic Recurrent Selection in Birdsfoot Trefoil (Lotus corniculatus cultivar Leo)

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Improvement of birdsfoot trefoil (Lotus corniculatus cultivar Leo) at the University of Guelph has been through a geno-phenotypic recurrent selection method (a selection method in which phenotypically desirable plants are selected from the best progenies). Two most widely used methods for evaluating populations in forages are the S_1 and polycross testing methods. However there has been no report of the simultaneous use of these two methods in the evaluation of trefoil populations.

Fifteen genotypes of a population of Leo birdsfoot trefoil, selected at random from a Certified seed lot, and 45 clones from a Leo population in the fourth cycle of a recurrent selection program for seedling vigor, forage and seed yield, were randomly obtained from row plot nursery and evaluated for self and polycross fertility. Self and polycross progenies were then evaluated for seedling vigor in the growth room, by taking dry weight of the seedling growth harvested at five weeks.

Self and cross fertility (seeds/floret) were significantly higher in the selected Leo population than in the unselected population. Clones produced more seeds per floret when crossed than when selfed. Also pods resulting from selfing were smaller and contained fewer seeds than those resulting from crossing.

Progenies (polycross and S_1) of the selected Leo population were significantly more vigorous than the progenies of the unselected population. In each population, the polycross progenies were more vigorous than the S_1 progenies. Variability for fertility and seedling vigor was greater in the selected Leo population. Estimates of genetic components and expected gains from selection for S_1 and polycross progenies for seedling vigor in both populations (Table 1), indicated that there was sufficient genetic variability in the selected population and because of this, additional gains can be expected in the population from the geno-phenotypic selection. Theoretical postulations indicated that the geno-phenotypic selection would give better results than either phenotypic or genotypic (family selection), selection methods (Lemer, 1958). This method not only improved seedling vigor after four cycles of selection, but also maintained the genetic variability of the trefoil population under selection.

Table 1. Estimates of genetic components for seedling vigor.

	Genetic variances	Genetic CV	H^2 broad sense	EG (S)	% Mean
Unselected population					
Polycross progenies	.08	.23	27	.48	44.40
S_1 progenies	.11	.45	51	.51	69.86
Selected population					
Polycross progenies	.97	.30	48	1.96	119.51
S_1 progenies	.10	.29	26	.44	36.67