

Walid A. Khayrallah

Department of Plant Science, Macdonald Campus of McGill University,
Ste. Anne de Bellevue, Quebec H9X 1C0

Abstract of Ph.D. Thesis

SELECTION FOR SEEDLING VIGOR AND A QUANTITATIVE
GENETIC ANALYSIS OF AGRONOMIC CHARACTERS IN
DIALLEL CROSSES WITHIN AND BETWEEN TWO CULTIVARS
OF BIRDSFOOT TREFOIL (*LOTUS CORNICULATUS* L.)

Two birdsfoot trefoil (*Lotus corniculatus* L.) cultivars, Mirabel and Leo, were evaluated for seedling vigor and seedling and plant characteristics under growth cabinet, greenhouse, and field conditions. When the advantages of large seeds over small seeds were established, a depth of seeding technique for selection within large-seeded lines was devised and evaluated. Results indicated the possibility of increasing seedling vigor by further selection within large-seeded lines.

The breeding behaviour of field seedling vigor forage productivity and other characters was evaluated in the F_1 and F_2 generations through a 15-clone half-diallel cross. Results indicated that variation due to general combining ability was significant for all characters studied, while variation due to specific combining ability was not. Comparisons of the relative importance of additive, non additive, and environmental variance indicated the general superiority of additive variance for growth habit and pod setting, and the equal importance of other variances for all other characters. Superior clones were selected based on heritability estimates, general and specific combining ability effects and variance components associated with each clone. Phenotypic correlations among characters were mostly positive and for most characters meant the possibility of mutual improvement through selection.

Three selection methods were compared. The greatest efficiency resulted through identification of superior clones for synthetic cultivars, based on diallel crossing and genetic evaluation of these clones.