

RHIZOMATOUS BIRDSFOOT TREFOIL:
AN EVALUATION OF ITS POTENTIAL IN MISSOURI

by

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Birdsfoot Trefoil (*Lotus corniculatus* L.) is a perennial legume that has the potential for good yields on some of the marginally productive soils common to Missouri pastures.

In the summer of 1989, Dr. P. R. Beuselinck conducted a germplasm collection in Morocco, of *Lotus*, many of which exhibited rhizomatous growth characteristics. Two particular accessions, 5758 and 5797 were noted as having $2n=4x=24$ chromosomes, and exhibited potential in a breeding program that would select for rhizomatous growth habit. Rhizomatous growth habit is of interest to plant breeders because it may increase stand density and persistence. However, the edaphic conditions where these accessions were collected are different from those in Missouri. Soil pH was notably high in these areas of Morocco (pH 8.5) while in Missouri many soils, especially those in pasture regimes, are in the range of pH 4.5 to 6.5. Thus, an evaluation of this rhizomatous germplasm over the pH ranges found in Missouri should be conducted to determine if the rhizomatous accessions will grow in Missouri. Many studies have been conducted with birdsfoot trefoil and its growth response to acid soil conditions (Smith, 1975; Alison and Hoveland, 1989). In general, these studies have shown that while birdsfoot trefoil is more tolerant of acid soil conditions than many other legumes, significant variability exists between cultivars in growth response to low pH levels. This study will compare the growth of progeny of a reciprocal cross of 5758 and 5797 with "A.U.Dewey" and "Norcen" at different pH levels. This data will be used to make some estimation of the tolerance of the Moroccan accessions to low pH levels commonly found in Missouri.

Thirty-eight collections of *Lotus* rhizobia, from 17 *Lotus* species were made in Morocco. *Lotus* rhizobia strains vary in their effectiveness in producing nodules on birdsfoot trefoil (Erdman and Means, 1949). Because the nodules of birdsfoot trefoil senesce after each harvest, a new population of nodules must be reformed as new growth occurs (Vance et al., 1982). Also, the efficiency of *Lotus* rhizobia is questioned by many due to its relatively low nitrogen fixation rate as compared to other legumes (Vance, et. al., 1982). An evaluation of these different rhizobia collections is needed to evaluate their effectiveness of infection and efficiency in nitrogen production. Numerous studies have been conducted with different strains of rhizobia and their efficiency on legumes (Mahler, 1984; Somasegaran et al., 1988; Munns, et al., 1977).

An experiment will be conducted to evaluate the effectiveness of rhizobia infection by determining the number of nodules on the plant, the weight of the nodules formed, and the nitrogen content of the forage. This data will be used to determine if the rhizobia from the Moroccan accessions are better suited than commercial strains of rhizobia on the composite Moroccan accession.

REFERENCES

- Alison, M.W. and C.S. Hoveland. 1989. Root and herbage growth response of birdsfoot trefoil entries to subsoil acidity. *Agron. J.* 81:677-680.
- Erdman, L.W. and U.M. Means. 1949. Strains of rhizobium effective on the trefoils, *Lotus corniculatus* and *Lotus uliginosus*. *Soil Sci. Soc. Proc.*, 14:170-175.
- Mahler, R.L. 1984. Greenhouse evaluation of growth parameters related to birdsfoot trefoil and red and white clover production on an andic mission silt loam. *Comm. Soil Sci. Plant Anal.* 15:969-983.
- Munns, D.N., R.L. Fox and B.L. Koch. 1977. Effects of lime on nitrogen fixation in tropical and temperate legumes. *Plant and Soil.* 46:591-601.
- Smith, D. 1975. p. 117-124. In D. Smith (ed.) *Forage management in the north.* Kendall-Hunt Publishing Company, Dubuque, IA.
- Somasegaran, P., H. J. Hoben and V. Gurgun. 1988. Effects of inoculation rate rhizobial strain competition and nitrogen fixation in chickpea. *Agron. J.* 80:68-73.
- Vance, C.P., L.E.B. Johnson, S. Stadel, and R.G. Groat. 1982. Birdsfoot trefoil (*Lotus corniculatus*) root nodules: morphogenesis and the effect of forage harvest on structure and function. *Can. J. Bot.* 60:505-518.