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CLOVER BREEDING AND GENETICS

Gerald R. Smith

The general goal of the Clover Breeding and Genetics program is to improve the reliability of forage legumes in Texas forage-animal production systems. Forage legumes have the potential to provide high quality grazing and hay with no input of nitrogen fertilizer. Clovers and other forage legumes are often not used to their full potential because of: susceptibility to insect, nematode and disease pests; low persistence of perennials in adverse environments; poor reseeding of annuals; narrow soil type or soil pH adaptation; antiquality (toxic) compounds; nodulation problems; low forage production; poor cold tolerance; and low seedling vigor.

Major areas of research include:

- **Arrowleaf Clover Virus Resistance.** Organized under Regional Project S-228, Forage Legume Viruses; Cooperative with M. R. McLaughlin, USDA-ARS, Mississippi; reported inheritance of BYMV-induced lethal wilt of arrowleaf clover; developed BYMV tolerant arrowleaf clover population.
- **Arrowleaf Clover Iron Deficiency Chlorosis Resistance.** Cooperative with Bill Ocumpaugh, Beeville; developed arrowleaf populations with increased levels of resistance to iron deficiency chlorosis. This breeding effort will increase the range of arrowleaf clover to include alkaline, blackland-type soils.
- **Subterranean Clover Reseeding.** Cooperative with Gerald Evers; defined environmental and genetic components of sub clover reseeding; evaluation of USDA PI collection of sub clover for hard seed and reseeding potential initiated Oct. 1990.
- **Plant Toxins.** Cooperative with Ron Randel; developed sampling, seedling assay, and HPLC quantitative methods for measurement of isoflavones in annual clovers; evaluated the U.S. plant introduction collections of sub and rose clover for isoflavone phytoestrogens.
- **New Clover Breeding Methods.** Cooperative with David Ow, USDA-ARS, Plant Gene Expression Center, Albany, CA; have adapted known tissue culture and plant regeneration techniques to annual clovers; research in progress continues to develop and adapt procedures for gene transfer using *Agrobacterium*.
- **Rose Clover Breeding.** Cooperative with many Texas forage researchers; developed late-maturing, productive rose clover germplasm; 'Overton R18' rose clover released by TAES in 1991 in cooperation with SCS; forage production of Overton R18 rose clover averaged 65 percent more than Kondinin rose clover in 14 location-year environments.

- **Berseem Clover Breeding.** Developed population of berseem clover with improved hard seed production and reduced rate of seed softening; improved population maintained 27% hard seed after 90 days of summer conditions compared to 7% hard seed in 'Bigbee' berseem; determined role of seedcoat cuticle in hard seed mechanism.
- **Enhancement of Annual Clover Stand Establishment.** Cooperative with V. Haby; determined that soil boron deficiency adversely affects annual clover stand establishment; studies have shown that correction of soil boron deficiency is critical for annual clover seedling establishment, growth, and survival.
- **Forage Legume Germplasm.** Cooperative with many U.S. and international scientists; collected arrowleaf, rose, and other clover germplasm in Bulgaria in 1990; current major emphasis is evaluation and enhancement of rose clover germplasm.
- **Alyceclover Breeding.** Cooperative with D. Wofford, University of Florida, and Jim Starr, Department of Plant Pathology and Microbiology, Texas A&M University; evaluated alyceclover germplasm for resistance to root-knot nematodes; current emphasis is on development of new alyceclover variety with improved resistance to nematodes and high forage production.