

TEXAS A&M UNIVERSITY [COLLEGE STATION] - Dr. J. Beard, Principal Investigator

Plant Stress Mechanisms

1984 Grant - \$87,000 (started April, 1983)

This study nears the completion of its second year. It is concerned with physiological investigations of grass plant stress mechanisms. The points of progress to-date include:

1. Water use rates are distinctly different from drought resistance.
2. A low water use rate can be a factor in drought avoidance which is one component of drought resistance.
3. Rooting depth can be a factor in both water use rate of irrigated turfs and the drought resistance of non-irrigated turfs.
4. Turf canopy resistance to evapotranspiration seems a better determination of water use rates than stomatal density.
5. The components of canopy resistance are determined by shoot density and leaf orientation.
6. Stomatal density, measured by degree of leaf folding, rolling effect and rate of closure as well as numbers of stomata, has been determined for zoysia, St. Augustine, Centipede, Bahiagrass, Penncross, Tall Fescue, and Kentucky Bluegrass.
7. Vertical leaf extension rates are, along with shoot density and leaf orientation, the primary candidates for "plant markers" (used in breeding) as the best characterizations of water use rate by the grass species in the breeding program.
8. A study is now in progress to describe the root systems of the major cool and warm season turfgrasses. The components include root depth, number, verticle distribution, extension rate, longevity, and root hair zone. This type of information has not been determined before and the study is well ahead of schedule.
9. Drought resistance investigations are just underway. For perennial turfgrasses, the major components will include; avoidance (dormancy rooting), Xeromorphis features (stomatal characteristics, leaf cuticle, leaf rolling/folding) and tolerance/hardness (osmo-regulation cell size, protoplasmic plasticity).