sponsored by the United States Golf Association and the Oklahoma Agricultural Experiment Station is the development of such varieties.

To-date, we have identified cold-tolerant bermudagrass plants with good fertility, incorporated them into breeding populations [germplasm pools], and completed two cycles of selection for increased basic fertility and growth characters. Significant response to selection has been documented. An additional cycle of selection will begin next spring.

Significant progress was made in recent months in tissue culture research with bermudagrass. Plants have been regenerated from very young inflorescence explants, and work underway with other explant tissues, including anthers, appears promising. Regeneration of plants from anthers would provide opportunity for development of haploid plants [plants containing half the normal chromosome number] which have several potentially significant benefits to breeding.

Preliminary research was initiated recently to characterize the self-incompatibility mechanism in bermudagrass. Bermudagrass plants typically are strongly self-incompatible, thus will not produce seed when self-pollinated. Although we know the mechanism exists, very little is known about how it works or about its genetic control.

Development of a reliable laboratory technique for measuring cold tolerance in bermudagrass would be of immense value in screening plants for the bermudagrass breeding program. The necessary equipment has been obtained and Dr. Jeff Anderson, stress physiologist in the Department of Horticulture and Landscape Architecture, has initiated experiments to develop the procedures. Development of a laboratory procedure would enable cold hardiness determinations without relying on the occurrence of test winters.

PENNSYLVANIA STATE UNIVERSITY - Dr. Joseph M. Duich
Principal Investigaror

Bentgrass Breeding

1986 Grant - $4000 [ongoing support since 1958]

I. Creeping Bentgrass

A. PENNLINKS creeping bentgrass [experimental designation PSU-126] was released and named by the Pennsylvania Agricultural Experiment Station Seed Committee on November 3, 1986. Application was made for Plant Variety Protection. Varietal features are upright growth habit, finer leaves than current varieties, minimal segregation after 8 years, seasonal turf quality and overall performance in a 17 state plus Canada evaluation. Limited quantities of seed are now commercially available.

B. Breeder Seed of Penneagle and Pennlinks were produced in 1986.

C. Approximately 500 creeping bent plants surviving Smiley's Cornell screening for two races each of Phialopbora graminicola and Leptosphaeria korrae were nursery established for 1987 seed increase for further screening.

D. Other experimental nursery plantings included northern and southern Penncross reselections, close-cut bent segregates under 2/32 and 3/32 cutting height for 5 years from Penncross and Penneagle, 100 French and Italian golf course selections made by Howard Kaerwer, Hawaiian and U.S. golf course selections, and early flowering selections.

E. Seed was selected from second generation salt tolerant lines for tolerance and turf testing.

F. Following Roundup renovation, Penncross, Penneagle, Pennlinks and Seaside bents were established into a Poa annua infested area. Triplex mowing was initiated with a clipping removal variable with chemical controls and growth regulators to be imposed in 1987.

II. Colonial Bentgrass

A. Selection for rhizomatous colonial bents continued on a large scale utilizing the selfing and open pollinated approach with approximately 30,000 plants in various generations including new selections.

B. Approximately 450 plants were field selfed [1 to 4 generations of inbreeding] in 1986 and are in the process of greenhouse screening along with their open pollinated counterparts. Over 2300 inbred progeny with emerged rhizomes were field planted for advanced inbreeding and selection in 1987.

C. Seeds of 277 open pollinated lines [lst to 3rd generation of sib families] was harvested for turf evaluation trials to be initiated in 1987.

D. Efforts to increase rhizomatous plant reproduction through seed propagation is proving to be a most difficult task after six years effort working with several hundred thousand plants. However, utilizing increased efficiency techniques we plan to continue our efforts to fruition.

III. Tissue Culture

A. This project was initiated with a worldwide computer reference search. LIterature review has been in progress for several months.

B. Our primary objective remains to be the development of haploid plants through microspore culture followed by colchicine chromosome

doubling. To meet this objectiye several secondary objectives are necessary; 1] study pollen development as it correlates with macroscopic inflorescence morphology, 2] development of sterilization technique for panicle treatment prior to culture, 3] induced greenhouse flowering, 4] testing pollen culture techniques already established for small grains and grasses, and 5] chromosome doubling of haploid plants.

/UNIVERSITY OF RHODE ISLAND - Dr. Richard Skogley
Principal Investigator

Selection and Breeding of
Superior Bentgrasses

1986 Grant $1500 [ongoing support since 1960]

During 1986, considerable effort was expended in trial evaluation of turfgrasses originating from collected materials. Among these grasses are:

1. Creeping and Velvet bentgrasses for putting green use. 81 selections. 49 plots seeded in 1982, and 32 in 1985.

2. Colonial bentgrasses. 95 selections. 50 plots seeded in 1984, and 45 seeded in 1986.

3. Lawn and general purpose grasses. These include Kentucky bluegrass, Canada bluegrass, fine fescues, tall fescues, Perennial ryegrass, sweet vernal and Timothy. 245 selections. 67 seeded in 1983, 100 in 1984 and 78 seeded in 1985

   All grass trials are maintained with less nutrients, water and pesticides than is normal.

The grasses collected are mostly from old, dry, low fertility stands throughout New England and the Canadian Maritime Provinces during the past four years. Several of the bentgrasses are older collections and are in second or third stage evaluation.

A collection of sweet vernal grass has also been assembled and is being evaluated for use in extremely infertile and dry conditions. This is a naturalized grass that is widely dispersed in North America. We have determined that the phenotypic diversity within the species is great. We note great differences in texture, color, growth habit, leafiness, and disease reaction. We are currently evaluating its performance under different cutting heights and fertility levels.

During the year we have constructed an automatic rain shelter which will enable us to better evaluate grasses for drought tolerances. We will be able to grow grasses in a natural, outdoor environment with only the water we supply.