UNIVERSITY OF MINNESOTA - Dr. D. White, Principal Investigator

Poa annua Breeding

1984 Grant - $11,600 (started July, 1984)

This project has already shown signs of real breakthroughs and progress! A high degree of "selfing" in Poa annua has been found and no apomixis observed, i.e., the development of a plant without the union of sexual cells. In the flowering of Poa annua, the female stigma develops and appears before the male stamens, an important consideration for the plant breeder.

Two techniques of plant breeding are being followed. The standard one is utilization of known crossings, back crossing and line breeding techniques. The second involves tissue culture techniques and the results to-date are substantial and impressive. Several replicated lab tests of cloned plants have already been made. The odds seem better than 50/50 that superior Poa annua cultivars will be obtained from this project.

A nationwide collection of promising Poa annua selections will be made with the assistance of the Green Section staff. After the selections are accumulated, breeding and development of improved varieties will intensify. A study of genetic characteristics represents Dr. White's long term goal in this project.

MISSISSIPPI STATE UNIVERSITY - Dr. J. V. Krans, Principal Investigator

Tissue Culture Selection for Heat Tolerance in Creeping Bentgrass

1984 Grant - $2500 (completed with this grant)

The research using tissue culture techniques resulted in the isolation and recovery of 80+ heat and salt tolerant variants of creeping bentgrass. Some of these variants were planted in the field in the fall of 1982 with the majority of these planted in the fall of 1983. As of today, approximately 70 variants are surviving with 15-20 showing exceptional vigor after this summer. Because of these signs of excellent field survival, Dr. Krans will now be looking at the heritability of these tolerant variants. Progeny will be tested using procedures described in prior reports. A plant breeder, Dr. Howard Potts, at Mississippi State University will be assisting in the continuation of this research. The combined efforts will be focused on evaluation of seed production and viability, cytogenetic features and re-evaluation of these most promising variants in larger field plots. Based on the findings of this past summer, there is optimism about the future.

In addition, plans are made to continue tissue culture efforts in creeping bentgrass in order to isolate selected disease resistant variants. Toxins associated with the fungus diseases phythium (Phythium aphanidermatum (Edson)

Fitzpatrick) and dollar spot (Sclerotina homoeocarpa) F. T. Bennett) will be used as selection pressures to isolate genotypes with resistance to these pathogen. Later sexual incorporation of these genotypes into present germplasm will be made to broaden the current germplasm base.

PENNSYLVANIA STATE UNIVERSITY - Dr. J. M. Duich & E. K. Nelson Principal Investigators

Bentgrass Breeding

1984 Grant - $4000 (ongoing)

All bentgrass breeding projects were continued during 1984 but major weather constraints were encountered in early August during the maturity and harvest period. Rain totaling 6.15 inches from August 1-14 caused lodging, vegetative growth and seed shattering and researchers a major problem.

In creeping bentgrasses, the initial harvest of 14 salt tolerant creeping bent types was very poor with five lines failing to flower. Seed from the experimental PSU-126 has been distributed to 126 cooperators in 30 states, Canada and South Africa. Forty acres were established in Oregon for additional commercial growing experience. Pending field testing results, a release of PSU-126 is projected in 1986.

Colonial bentgrasses are continuing to be selected for rhizomatous growth habit into the first to third open pollinated generation, and into the second self-pollinated generation. In the greenhouse, approximately 28,000 plants were grown from seed for five months. They were screened for deep and shallow rhizomes and for plant vigor

The majority of 1984 screening was involved with first and second generation self-pollinated material totaling 18,663 progeny. These results confirm that rhizomatous bent parental selections are very heterozygous for the rhizome character and no clue is in evidence as to the number of genes, other than multiple-genic, responsible for rhizomes. The problem is compounded by the majority of material, 97 of 102 parents examined, being hexaploid: 42 chromosomes. No literature has ever been published regarding genetic control of rhizomes in grasses.

Approximately 8500 greenhouse selected rhizomatous progeny were field space-planted in June, 1984 for further selecting. Eric Nelson is tentatively planning on continuing research toward a Ph.D. utilizing tissue culture to produce haploid plants. This technique could conceivably cut down years of selection work to produce near homozygous types of colonial bentgrass.