SEMI-ANNUAL PROGRESS REPORT

CONCERNING

DEVELOPING SALT, DROUGHT, AND HEAT RESISTANT TURFGRASSES FOR MINIMAL MAINTENANCE

SUBMITTED BY:

DR. GARALD L. HORST
TURFGRASS STRESS PHYSIOLOGIST
TEXAS AGRICULTURAL EXPERIMENT STATION - EL PASO
TEXAS A&M UNIVERSITY SYSTEM

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SEMI-ANNUAL PROGRESS REPORT FALL 1987
USGA SUPPORTED RESEARCH PROGRAM
DEVELOPING SALT, DROUGHT, AND HEAT RESISTANT TURFGRASSES FOR MINIMAL MAINTENANCE

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EXECUTIVE SUMMARY

1987 Fall Semi-Annual Progress Report
concerning
Developing Salt, Drought, and Heat Resistant
Turfgrasses for Minimal Maintenance

Principle Investigator: Dr. Garald Horst
Turfgrass Stress Physiologist

RESEARCH PERIOD OF THIS REPORT: November 1, 1986 to October 30, 1987

I. Research Accomplished:

1. Late in 1986, Texas A&M University completed a major research facilities expansion program at the El Paso Research Center. The turfgrass salt resistance program moved into a new controlled environment glass greenhouse with high intensity lighting (Figures 1 and 2, May 1987 Report). This new facility has reduced the time necessary for each salt resistance evaluation run by 10 to 15 percent.

2. Unexpected results of buffalograss salt resistance research is differences in germ plasm susceptibility to Pythium spp. in the vegetative establishment phase of development. About 15 percent of the entries evaluated appear to be susceptible.

3. Additional evaluation runs on the current buffalograss germ plasm base indicate a low potential of rapidly obtaining salt resistant cultivars.

4. Initial salt resistance evaluation of 29 zoysiagrass selections from a diverse germ plasm base indicate high potential of obtaining salt resistant cultivars. Seventeen percent of the selections were able to maintain significant growth at salt levels half of that found in sea water.

5. Selections from the buffalograss improvement program under the direction of Dr. Terrance P. Riordan, in Nebraska recently arrived. This is the germ plasm base which will make up the synthetic scheduled for future release.

6. Salt resistance evaluation of three current turfgrass types have now been completed or are well under way. Salt resistance ranking of these turfgrass is of the following order from least to most salt resistant. Buffalograss, St. Augustinegrass, and Zoysiagrass.

II. Current Research:

Vegetative material of 29 buffalograss and zoysiagrass germ plasm entries are being evaluated for salt resistance.

III. Research Planned 1987/1988:

1. Complete evaluation of current buffalograss germ plasm (Dec. 1987). Begin evaluation of the Nebraska buffalograss synthetic germ plasm in summer 1988.

2. Complete evaluation of Zoysiagrass germ plasm (1988 to 1989).

4. Receive and increase bentgrass and bermudagrass germ plasm. Thirty-two advanced bentgrass selections are scheduled from the Texas improvement program, under the direction of Dr. M. C. Engelke. Evaluation for salt resistance may begin by late spring to summer 1988.

USGA SUPPORTED SALT RESISTANCE PROGRAM

USGA SUPPORTED TURFGRASS SALT TOLERANCE PROGRAM

I. INTRODUCTION

This Semi-annual report as required in the contract is for the period November 1, 1986 to October 30, 1987. Ms. Jo Ann Treat, Executive Vice President, Texas Research Foundation, and Mr. Charles Smith, Director, Administration and Services for United States Golf Association, signed the original contract agreement effective April 1, 1985. The research contract is established through the Texas A&M Research Foundation.

The following report represents the research accomplishments and research direction for the period November 1, 1986 to October 30, 1987.

II. IMPLEMENTATION

Previous studies involving salt resistance of several turf type grasses have been completed and reported. Continuation of salt resistance evaluations on zoysiagrass and buffalograss are currently under way in the improved greenhouse facility. Areas of past and present research are identified and briefly discussed in the following sections.

A. BUFFALOGRASS GERM PLASM SALT RESISTANCE.

OBJECTIVE: To evaluate the available gene pool for salt resistance in Buffalograss (Buchloe dactyloides (Nutt.) Engelm.) germ plasm.

PROGRESS: Salt resistance evaluation of buffalograss has not been completed at this time. An experiment run was completed on October 19, 1987 and another experiment run is scheduled to be planted on November 2, 1987. Data on additional growth and survivial measurements and conclusions on salt resistance potential will not be reported until completion of the current germ plasm base evaluation in late 1988. However, initial data on buffalograss growth and development in salinized growth media has been presented in several previous reports.

B. EVALUATING ZOYSIAGRASSES FOR SALT RESISTANCE

OBJECTIVE: Evaluate currently available and advanced breeder selections of Zoysiagrass (Zoysia Willd.) germ plasm for salt resistance.

PROGRESS: Procedures and methods for selecting and pre-rooting of zoysiagrass nodes have been determined. The first and second zoysiagrass salt resistance evaluation runs of twenty-nine entries have been completed (Fig. 1). Five of the 29 selections in the initial evaluation runs exhibit significant potential for salt resistance. These five selections had less than 50 percent reduction in total plant dry matter accumulation when grown in salt levels half that of sea water (Table 1.) Thirty eight percent of the selections had less than 50 percent reduction of dry matter accumulation when grown in salt levels one-third that of sea water.

Results from the zoysiagrass salt resistance evaluations are encouraging from the standpoint that some of the selections seem to grow functional verdure as well as additional roots under salt stress (Tables 2 and 3). The usual growth response to salt stress is for increased root growth over top growth. However, the results to date with the reported selections is for continued growth of both root and above ground portions of the zoysiagrass plant. Results from these zoysiagrass salt resistance evaluations to date are being coordinated with the zoysiagrass improvement program under the direction of Dr. M. C. Engelke at Dallas.

Evaluation scheduling for the current zoysiagrass germ plasm base has been projected to extend into summer of 1988 because of the generally reduced growth rates of the zoysiagrass selections. Evaluation of the current set of zoysiagrass selections should be completed by mid-1988. The second and more advanced set of germ plasm selections will then start evaluation in late summer 1988.

III. LIST OF FIGURES AND TABLES

Figure 1. Zoysiagrass germ plasm entries at the end of a salinity resistance evaluation experiment.

Table 1. Total plant dry weight of surviving zoysiagrass germ plasm entries as salt stress was increased.

Table 2. Top growth dry weight of surviving zoysiagrass germ plasm entries as salt stress was increased.

Table 3. Root growth dry weight of surviving zoysiagrass germ plasm entries as salt stress was increased.

Table 1. Total plant dry weight of surviving zoysiagrass germ plasm entries as salt stress was increased.

Entry	ppm Salts 5,000	10,000	15,000
KLS02	247*	189	158
KLS07	116	116	122
KLS17	172	160	106
DALZ 8508	159	82	73
52-22-6 (5)	55	61	61

*Values are percent of no salt stress growth.

Figure 1. Zoysiagrass germ plasm entries at the end of a salinity resistance evaluation experiment.

Table 2. Top growth dry weight of surviving zoysiagrass germ plasm entries as salt stress was increased.

Entry	ppm Salts 5,000	10,000	15,000
KLS02	249*	187	154
KLS07	115	109	121
KLS17	145	160	102
DALZ 8508	154	78	73
52-22-6 (5)	55	61	51

*Values are percent of no salt stress growth.

Table 3. Root growth dry weight of surviving zoysiagrass germ plasm entries as salt stress was increased.

Entry	ppm Salts 5,000	10,000	15,000
KLS02	217*	220	211
KLS07	123	183	125
KLS17	305	167	161
DALZ 8508	225	134	83
52-22-6 (5)	65	55	185

*Values are percent of no salt stress growth.