

1991 EXECUTIVE SUMMARY

UNIVERSITY OF ARIZONA

Breeding and Development of Curly Mesquitegrass as a Desert Turf

1991 Research Grant: \$12,800

Dr. Charles F. Mancino
Principal Investigator

The primary objective of this project is to develop a seeded low-maintenance, low-water requiring turfgrass for the southwest. Curly mesquitegrass (Hilaria belangeri), a native to parts of Arizona, Texas, New Mexico and southern California, has many desirable turf traits including low stature, density, color, spread and prolific seed production.

Heritability studies concluded in 1991 have shown that significant genetic variation exists in many of the turfgrass characters mentioned above, such that selection and breeding can produce a population with improved turfgrass traits. In addition, the environment has been shown to have little or no influence on certain physical parameters (total germination, germination rate, seed weight, late season color, overall color, stature, leaf width, leaf length, and density) so that the genetic component for these traits is large and heritable.

Over three years of plant screening has resulted in the selection of over forty plant materials with desirable turf traits. These plants have been incorporated into a plant breeding program. Seed from these crossing blocks will be harvested, planted, and the progeny evaluated during 1992 and 1993 to further refine the population in turf and reproductive characteristics.

**1991 FINAL PROGRESS REPORT
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The cultural practices (CP) study was concluded after 2 years of exposing 2700 plants of curly mesquitegrass to different mowing heights and fertilization rates. The final responses were measured in early summer. Overall, plants responded best to the 10 cm height of cut and did poorest when left unmowed. Mowing promoted decumbent growth, and a perennial groundcover. Uncut plots resulted in complete groundcover, but the material was not rooted in the soil. These plots showed greater winter kill than did the mowed plots. Nitrogen fertilization did little to enhance plant color, but did slightly improve early groundcover in the plots. Plant color during the growing season is normally considered to be acceptable.

This area also allowed the screening of plants for response to mowing stress. Plants (n=40) forming and maintaining dense stands, plants more resistant to winter kill, and plants with early spring green up (Mar-Apr) were selected from the CP area for increase in Tucson and Safford for further evaluation, incorporation into crossing blocks, and progeny evaluation.

One other selection, originating as a seedling in the seeding rate x seeding date study conducted in Tucson in 1989, also has good turf characteristics. This selection, although coarser in nature than many of the other selections, is aggressive and has good spread. Two small plots (2.4 m²) of this selection were planted on 23 May with plugs (5cm) spaced on either 30 or 60 cm centers. Two more plots were planted by mid-June. The higher planting rate, as of October, has produced slightly more groundcover than the lower planting rate, 85% vs 75% groundcover.

Work was completed on the heritability study conducted by Andrew Ralowicz who completed the requirements for his Ph.D. on October 21, 1991. Broad sense heritability estimates were determined on four replications of curly mesquitegrass clones (n=15) grown in Safford (S) and Tucson (T) and are:

<u>Character</u>	<u>Safford</u>	<u>Tucson</u>
Leaf length	0.29	0.45
Stature	0.83	0.71
Density	0.69	0.47
Seed weight	0.97	0.94
Germinability	0.57	0.57
Hard seed	0.82	0.84
Flowers/spike	0.40	0.36
Number of spikes	0.81	0.79

Narrow sense heritability estimates were not affected by environment, and were determined from 15 maternal half-sibling families (n=20 progeny/clone/environment).

<u>Character</u>	<u>Heritability estimate</u>
Leaf length	0.31
Spread	0.51
Flowers/spike	0.06

This work indicates that significant genetic variation exists in many of these characters such that selection and breeding can produce a population with improved turfgrass traits. Environment had little or no influence on the physical parameters measured. In addition, many of the progeny produced during this study have exhibited good turf characteristics (a combination of good color, spread, stature, and density). This material will be isolated in crossing blocks for seed production and progeny evaluation.

In Safford, plant material (n=36) selected from the Tucson CP area and the Safford clones were planted in June as small pieces of sod. These are being allowed to increase and will be isolated in crossing blocks for seed production in 1992. In the same field are plants selected for the following traits, with some plants appearing in more than one category: total germination (n=7), germination rate (n=12), late season color (n=10), overall color (n=4), stature (n=1), leaf width (n=2), leaf length (n=4), seed weight (n=5), and density (n=1). These will be isolated in crossing blocks for seed production and progeny evaluation. As mentioned previously, many of the progeny also exhibit good color, stature, density, and spread.

Plant material was sent to Dr. James Beard and Mr. Sam Sifers for evaluation of root distribution and genetic rooting potential of curly mesquitegrass based upon plant stature. Plants sent were

clonal material of tall (12 - 15 cm), medium (6 - 10 cm), and short (5 cm) curly mesquitegrass. Sam Sifers reported in a recent phone conversation, that root distribution studies being conducted in mini-rhizotrons are proceeding well. The genetic rooting potential study is about to be initiated in greenhouse columns. Data from these studies will be available by November, 1992.