Turfgrass Evaluations of Curly Mesquitegrass, Hilaria belangeri

A.E. Ralowicz, C.F. Mancino, A. Maricic, D. Nelson, and D.M. Kopec.

ABSTRACT

Curly mesquitegrass, Hilaria belangeri, is being evaluated for utilization as a desert turf. Experiments were conducted on plant material collected throughout Arizona to: (a) quantify the natural variation in turfgrass qualities in this species; (b) evaluate the field performance of selected plant material to fertilizing and mowing practices; and (c) assess the effects of planting date and seeding rate on seedling establishment.

Thirty-four percent of the rated plant material displayed low growing height while 26.9 % of the plant material had short leaf length. Thirty-five and 23.5 % of the rated plant material had acceptable or better than acceptable color ratings and fine leaf width, respectively. In another experiment, nitrogen had no significant effect on plant color, however, increasing nitrogen increased percent ground cover. Percent ground cover also increased as the height of cut increased. Substantial variation was observed in the number of stolons per plant, and high stolon numbers were not associated with high nitrogen levels. Planting time had a significant influence on seedling establishment. Seeding rates also differed significantly in the number of seedlings established per m^2.

INTRODUCTION

There is increasing interest in the turfgrass industry for the use of grasses that have lower water and management needs than grasses presently in use. Many native grass species demonstrate promise for utilization as minimum input turfs in areas such as roadsides, cemeteries, golf course roughs, and home lawns. Curly mesquitegrass, a native Sonoran Desert grass species, possesses suitable variation in many attributes deemed desirable in a turfgrass and is currently under evaluation as a desert turf. The focus of this paper is to report on: (a) the natural variation in turfgrass qualities (growing height, color, leaf length, leaf width, and stolon production); (b) the field performance of selected plant material to typical cultural practices; and (c) the effects of planting date and seeding rate on seedling establishment in curly mesquitegrass.

MATERIALS AND METHODS

Variation in Turfgrass Qualities. Plant material was collected throughout Arizona in 1988 and planted into 1.5 m^2 plots in the Germplasm Nursery (GPN) at the Campus Agricultural Center (CAC) on a sandy loam soil (Typic Torrifluvent). On 15 July 1989, 85 sources (accessions) of curly mesquitegrass in the GPN were rated for growing height (short, medium, and high), leaf length (short, medium, and long), leaf width (fine, medium, and coarse), and color (1-10).

Evaluation of Cultural Practices. During 1988 five accessions of curly mesquitegrass growing in the GPN were visually identified as possessing turfgrass qualities with respect to density, color, and leaf width. These five accessions were recollected on 27 and 28 March 1989 from the exact locations originally collected. Propagules of each accession were transplanted bare-rooted on 15 cm spacings at the CAC into a split-split plot randomized complete block design with four replications on 29 and 30 March 1989. Objectives were to evaluate responses to three levels of nitrogen (0, 48, and 96 kg N ha^{-1} yr^{-1}), and three cutting heights (5 cm, 10 cm, and no cut) administered every two weeks. Alleys between subplots were maintained regularly to keep stolons within nitrogen treatments. Plots were rated for propagule survival on 11 May 1989, and for percent ground cover and color on 5 July and again on 16 Aug 1989. Analysis of variance and correlations were performed on the aforementioned variables. On 20 July 1989, 100 propagules in the experiment were randomly selected and the number of stolons counted on each individual. Stolon data were correlated with nitrogen treatments.

Evaluation of Planting Time and Seeding Rate on Seedling Establishment. Seed harvested from the GPN in 1988 was bulked for use in 1989. Plots were raked and leveled prior to seeding. Seeds were planted at rates of 1 and 2 gm into 1 m^2 plots at the CAC on 1 June, 1 July, and 1 Aug 1989. Seeded plots were rolled, watered, and then sprayed with Terremec (4 oz 1000 ft^{-2}) for *Pythium* sp. control immediately after planting. Seeding rates and planting times were replicated three times in a randomized complete block design. Watering regimes were identical for each planting time. Seedling counts for each rate were performed on 1 July, 1 Aug, and 1 Sept for the June, July, and August planting times, respectively. Analysis of variance was performed on the complete experiment.

RESULTS AND DISCUSSION

Results of the GPN July rating for growing height, leaf length, leaf width, and color are presented in Tables 1 - 4, respectively. In Tables 1 - 3, without exception, the medium class of each characteristic contained the majority of individuals. In addition, only 35 % of the accessions were rated as having acceptable or better than acceptable color for home lawns (Table 4). Tables 1 - 4 illustrate the natural variation within the population with respect to these traits, and moreover, indicate that through selection and breeding of the minority a new population can be constructed manifesting low height, short leaves, fine leaf width, and acceptable color. Six accessions had low growing height, short leaves, and fine leaf width, and are being vegetatively increased.

In the Cultural Practices Experiment the average propagule survival for the five accessions after transplanting ranged from 39 to 66 %. One accession had a significantly ($P \leq 0.05$) lower survival rate than the other four accessions. The accession with the poorest survival was transplanted dormant. One other accession was transplanted in a dormant condition and had relatively good survival. Plant materials that were actively growing when collected survived transplanting well.

No differences existed among accessions for the color ratings, and nitrogen rate had no influence on color for the July or the August rating (Table 5). Increasing nitrogen increased percent ground cover for both the July and August ratings (Table 5). Increasing cutting height also increased percent ground cover (Table 5). Fewer stolons were removed from the 10 cm height of cut than from the 5 cm cutting height. Additionally, increased cutting height lowered the color rating for both rating times (Table 5) because the no-cut treatment accrued dead plant tissue.

The number of stolons per plant ranged from 10 to 94 and averaged 35 ± 16. No correlation existed between high nitrogen rate and high stolon number indicating that stolon production has a significant genetic component. Selection for high stolon number is important in developing a dense uniform turfgrass. Thirty-five individuals were identified as having 40 or more stolons. Stolons were harvested from these 35 plants and were propagated in the greenhouse. Currently, stolons from 14 of the 35 plants have survived, and eight have been planted into the field.

The analysis of variance for the planting date seeding rate experiment indicated that the June planting date produced a significantly ($P \leq 0.05$) lower average number of seedlings per m^2 than did the July or August planting times (Table 6). Table 6 also shows that the higher seeding rate established a significantly ($P \leq 0.05$) greater number of seedlings per m^2 than the lower seeding rate. Seedlings of curly mesquitegrass were recognizable 11 days after planting for each planting time and seeding rate. This is in sharp contrast to germination experiments conducted in a controlled environment chamber where the majority of germination occurred within 48 hr after the seeds were placed in the chamber. Finally, seeds did not display staggered or delayed germination into the following months. After six weeks it was difficult to recognize original individual seedlings because of prolific stolon production.

The work presented here demonstrates that curly mesquitegrass has the potential to become an arid-region turf. These ratings and experiments must be performed for a number of years to evaluate properly this species performance as a turfgrass. Breeding efforts are being directed toward improving both germination and turfgrass characteristics. Future research also should include water-use studies to provide insight as to the minimum quantity of water needed to produce an acceptable turf.

Table 1. Growing height of 85 curly mesquitegrass accessions rated on 15 July 1989.

Growing height	No. of accessions	Percent
Low	29	34.1
Medium	49	57.6
High	7	8.2

Table 2. Leaf length of 85 curly mesquitegrass accessions rated on 15 July 1989.

Leaf length	No. of accessions	Percent
Short	22	25.9
Medium	44	51.8
Long	19	22.4

Table 3. Leaf width of 85 curly mesquitegrass accessions rated on 15 July 1989.

Leaf width	No. of accessions	Percent
Fine	20	23.5
Medium	64	75.3
Coarse	1	1.2

Table 4. Color ratings of 85 curly mesquitegrass accessions rated on 15 July 1989.

Color rating[1]	No. of accessions	Percent
5.0	34	40.0
5.5	21	24.7
6.0	16	18.8
6.5	9	10.6
7.0	5	5.9

[1] Rating of 6.0 or better = acceptable for home lawns.

Table 5. Correlation analysis of factors in the Cultural Practices Experiment in 1989.

Factor	% Ground cover (July)	Color (July)	% Ground cover (August)	Color (August)
accession	4.8 ns[1]	1.3 ns	10.0 ns	2.0 ns
nitrogen	19.8 **[2]	9.7 ns	17.9**	11.3 ns
cutting height	17.7**	-17.4*	43.6**	-43.5**

1 not significant at $P \leq 0.05$.

2 *, ** denote significance at the $P \leq 0.05$ and $P \leq 0.01$ levels of probability, respectively.

Table 6. Influence of planting date and seeding rate on seedling establishment in curly mesquitegrass in 1989.

Factor	Average No. of seedling m^{-2}	P < F	LSD (05)
Planting date		0.046	17.3
June 1	7.7 a		
July 1	27.3 b		
August 1 . .	26.8 b		
Seeding rate		0.016	14.1
1 gm m^{-2}	11.6 a		
2 gm m^{-2}	29.7 b		