

# USGA Research Report

## Field Performance of Selected Mowed *Distichlis* Clones

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### ***Abstract***

*Twenty-one clonal selections of saltgrass (*Distichlis*) were evaluated in March and May for initial green-up, plot growth, unmowed canopy height, number of satellite plants emerging from rhizomes and floral expression. Accessions were statistically different for all variables measured.*

*Colorado's accessions (5 of 7) were upright in growth habit and had the greatest number of satellite plants at the surface in March. These plants also had the greatest percent plot coverage. Arizona's accessions had lower growth in height, were more compact in growth and were less sprawling. However, their plot coverage (grow-in) was not as great as the upright, rapid growing Colorado accessions. Of the twenty-one clones included, thirteen are males and eight are females, with expression ranging from 1 to more than 200 flowering culms per plot.*

### **Introduction**

This report includes turfgrass field data of twenty-one field accessions (clones) selected for evaluation for turf performance. Fourteen Arizona entries were selected based on turf-type growth habit from two greenhouse experiments. These tests included 3 x weekly mowings at 45-50 mm. Colorado accessions were included as selections based on flower stalk height as a harvest selection component (R. Quaney material).

The plots were flood irrigated three times from July to October 1998. Total rainfall from January 1, 1999 to March 22, 1999 was 1.5 inches. No irrigations took place in 1999 until April 14.

On March 22 plots were evaluated for the following field variables. Propagule canopy heights (90% of unmowed canopy blade heights in cm), propagule radius (two directions) in cm, summed over three propagules/plot to produce total plot coverage (cm<sup>2</sup>), and the number of satellite plants/plot. The sexual expression and number of flowering culms per plot (sum of all three propagules/plot) were counted on April 23, 1999. The percentage of the total existing foliage that was green (0-100) was scored on March 22, 1999 also.

Plants were mowed on April 12, April 23, May 10 and on May 27 at 3.25 inches with a 22" rotary mower. As soil heaving (from flood irrigation on a heavy texture soil) is diminished, plots will be lowered to 2.5 inches or less. The test site received 2.0 qts/acre of surflan and 1.0 lbs. AI/A of isoxaben for pre-emergence weed control on April 13. All plots were fertilized with 3.0 lbs. -N-/1000 ft<sup>2</sup> on April 13 and again with 0.75 lbs. -N-/1000 ft<sup>2</sup> on May 27. Plots were flood irrigated on April 13 and on May 11, 1999.

## Results

Preliminary results show a great variation among *distichlis* accessions (clonal selections) for growth responses under mowed field conditions. Basically, most of the Colorado accessions have a rapid vertical elongation (by field observation), greater numbers of satellite plants rising away from mother propagules, and a more sprawling habit than the Arizona selected clones. The Colorado accessions are more stemmy in appearance and touch (field observation only).

Entries C-92, C-66 and C-12 had the greatest cm<sup>2</sup> plant coverage by May 18. These same clones averaged 27%, 42% and 28% coverage, respectively. To date C-66 clones has the greatest plot coverage. The clones with the slowest spread include C-56 (3%), A-53 (8%) and A-119 (8%). All clones had 28% or less coverage in May, except for C-66 which is a tall growing expansive and robust plant. Average plot coverage for C-66 in May was 42%.

Interestingly, the number of satellite plants emerging in the spring (from last years growth) is not necessarily directly related to plant radius and visual estimates of percent plot cover in May. For example, C-11 had the largest number of satellite plants in March (N = 107) and 25% total plot coverage in May. Clone C-66 had nearly one-half the amount of satellite plants (N=61) and yet produced the greatest total plot coverage in May (42%). Similarly, plant coverage (cm<sup>2</sup>) in May shows that clones C-66 and C-92 do not have corresponding values of May percent plot total coverage versus plant coverage (15088 cm<sup>2</sup> and 42% plot coverage: 16,343 cm<sup>2</sup> and 27% plot coverage, respectfully).

This may be a function of either (1) different growth habits or growth rate responses from shoots arising from satellite rhizome tips, (2) inconsistency in measuring plant boundary points (due to variation in shoot densities) when determining plant areas of the “mother” transplant vegetative propagules and (3) or both. As a result, shoot densities will be assessed in the future as a reflection of growth habit under enhanced mowing stress.

For spring green-up, A-77, A-41 and C-12 had over 90% of the existing foliage green by March 22. The entries with the least amount of percent green foliage included A-48 (59%), A-119 (63%) and C-92 (66%). The mean of all entries was 78% green foliage.

The number of satellite plants (shoots arising distinctly away from the mother plant) ranged from 8 (A-138) to 107 (C-11). The average among all clones was 43 satellites/plot.

### Plant Sex and Culm Production

Of the twenty-one entries in this field test, there are 8 females and 13 males. Culm production has ranged from as few as 1 plant per plot C-92:male, C-56:male, C-11:female to 100 or more culms/plot A-41:male, N = 108, A-48:male, N = 210. The highest producing female clone for culms was C-10 (N = 90) a robust plant and A-138 (N = 71) a dense dwarf-type clone.

### Future Management and Plot Measurements

The plots will be continually monitored for plot establishment and fill in. Percent plot coverage estimates should be more meaningful than propagule measurements as the propagules intermingle and competition pushes growth away from the mother plants.

As the field soil subsides from repeated irrigations, the mowing heights will be progressively lowered with a target base height of 2.5 inches or 2.0 inches if possible. Mowing frequency will be increased to 1 x week.

Other components of turf cover plant dynamics can be assessed visually such as shoot density and leaf characteristics. This may prove to be important in long term plot performance of an accession than initial plot cover rate.

## Greenhouse Tests for Relative Salinity and Drought Tolerance

### *SUMMARY*

Twenty one saltgrass accessions were planted into flats for increase in the University of Arizona Plant Sciences greenhouses on August 1, 1998. These were the same 21 accessions which are being evaluated in the field for turfgrass quality, namely:

Arizona lines: A-40, A-41, A-48, A-51, A-53, A-55, A-61, A-65, A-72, A-77, A-86, A-119, A-137, A-138.  
Colorado lines: C-8, C-10, C-11, C-12, C-56, C-66, C-92.

Plugs of these 21 accessions were planted on March 22, 1999 into 2.5 inch diameter cups, consisting of coarse nylon screen bottoms, and filled with coarse silica sand. 'Midway' bermudagrass was also included in the experiment as a relative salinity standard. Initial growth occurred under mist, then cups were suspended over tubs containing 25 L of constantly aerated ½ strength Hoaglands #2 solution, modified with EDDHA chelate. There are four replications in a split plot, randomized block design.

Following complete establishment, roots were trimmed to cup bases, followed by initiation of salinity treatments on June 7, 1999. Throughout establishment and during experiments, saltgrasses are being trimmed at 3 inches, and Midway at 1.5 inches. Salinity is gradually being raised in treatment tubs by 40 mM per day (30 mM NaCl, 10 mM CaCl<sub>2</sub>). At each 200 mM level, tubs will be held for three days to allow plants to equilibrate, then data will be taken. Treatment levels will be at each 200 mM level, i.e. 200, 400, 600, 800, and 1000 mM. All measurements will be on a relative basis, being compared to control plants (nonsalinized tubs).

Data variables to be taken are as follows:

Total root length - every 200 mM.

Percent leaf firing - every 200 mM.

Clipping dry weight - every 200 mM.

Root dry weight - end of experiment.

Internal leaf osmolality (indication of saline ion concentration) - at 200 mM.

Leaf rinseate osmolality (indication of salt gland activity) - after 1 week of exposure to 200 mM.

All measurement variables will be compared to control plants, and reported on a relative basis ( $x_{\text{salinized}} / x_{\text{control}} \times 100$ ). The experiment will be repeated. Flats of the 21 accessions have already been planted for increase to furnish material for the drought tolerance experiments. In this experiment, high molecular weight polyethylene glycol will be utilized in solution culture to create drought stress. Identical response variables will be measured, with the exception of leaf rinseate osmolality.

Table 1. Field measurements of twenty-one mowed *Distichlis* clones, Spring 1999, University of Arizona.

Clone Number	Plant Area <sup>1</sup> cm <sup>2</sup> /plot March 99	Plant Area <sup>1</sup> cm <sup>2</sup> /plot May 99	Unmowed <sup>2</sup> Height cm <sup>2</sup> March 99	Unmowed <sup>3</sup> Height cm <sup>2</sup> May 99	Percent Green <sup>4</sup> Foliage March 99	No. Satellite <sup>5</sup> Plants March 99	Percent Plot <sup>6</sup> Cover May 99	No. Culms <sup>7</sup>	Plant Sex <sup>8</sup>
A-61	4309	5720	5.9	9.1	85	24	10	13	F
A-55	6057	9573	7.2	13.5	71	30	16	29	M
C-8	7000	6529	8.7	5.4	89	68	13	8	M
C-92	11957	16343	14.0	16.5	66	78	27	1	M
A-138	4138	5898	4.1	7.7	83	8	7	71	F
A-65	5833	6883	5.1	4.8	69	16	9	2	M
C-56	3275	3246	3.7	4.3	69	44	3	1	M
C-11	10158	8439	11.3	14.4	72	107	25	1	F
A-72	7695	7796	8.7	11.0	86	39	14	38	M
A-119	5877	6621	4.2	7.9	63	11	8	5	M
A-86	7001	8574	6.9	9.7	80	38	17	50	M
A-77	5979	7561	8.4	7.1	91	24	11	4	F
A-137	5614	6989	7.3	8.8	75	35	12	29	M
A-41	6755	8115	7.3	10.3	93	22	11	108	M
C-66	9027	15088	11.2	20.5	63	61	42	14	F
A-48	4840	5453	6.3	6.1	59	27	10	210	M
A-51	5536	11106	8.0	10.3	80	41	12	57	M
C-12	8710	9769	14.7	13.1	91	59	28	25	M
C-10	5879	8423	8.8	9.8	83	60	18	90	F
A-40	6480	7000	8.2	6.1	84	65	13	19	F
A-53	5805	5514	5.3	6.7	79	42	8	16	F
Total Mean	6580	8168	7.9	9.7	78	43	15	38	--
LSD Value	3496	4247	2.6	2.6	15	32	8	50	8F/13M

<sup>1</sup>Cm<sup>2</sup> of 3 propagules/plot, 3 plot replications.

<sup>2</sup>Unmowed height of 90% of foliage. Unmowed November 1998 to March 1999. Average of 3 propagules/plot, 3 plot replications.

<sup>3</sup>Unmowed height of 90% of foliage. Unmowed from April 23 to May 18, 1999. Average of 3 propagules plot, 3 plot replications.

<sup>4</sup>Percent of entire foliage which is green. Average of 3 propagules/plot, 3 plot replications.

<sup>5</sup>Number of satellite plants per plot. Average of 3 plot replications.

<sup>6</sup>Percent turf plot cover composed of turf (0-100%). Average of 3 plot replications.

<sup>7</sup>Number of flower culms/plot. Average of 3 plot replications.

<sup>8</sup>Plant sex (male or female) from flowering culms.