Breeding and Evaluation of Seeded Cold-Tolerant Bermudagrass Varieties

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Goals:

- Assemble, evaluate, and maintain *Cynodon* germplasm with potential for contributing to the genetic improvement of the species for turf.
- Improve bermudagrass germplasm populations for seed production potential, cold tolerance, and other traits conditioning turf performance.
- Develop, evaluate, and release superior seed-propagated, cold-tolerant, fine-textured, turf bermudagrass varieties for the U.S. transition zone and similar climates.
- Develop, evaluate, and release improved vegetatively-propagated bermudagrass varieties with specific adaptations and uses in the southern U.S., e.g. varieties for golf course putting greens in the deep south.

Two bermudagrass, *Cynodon dactylon*, broad-base genetic populations have been developed using phenotypic recurrent selection. One population, $C_{3fer\text{-}2tex}$, was developed from cold tolerant germplasm subjected to selection for increased fertility (seed set) and finer texture. The second population, C_{1ct}, was more recently developed from germplasm with high seed yield potential but moderate cold tolerance. Selection was practiced within the population for increased cold tolerance and fine texture.

Synthetic varieties derived from selected parental plants of $C_{3fer\text{-}2tex}$ have demonstrated good cold tolerance and turf quality in comparison to control varieties.

Evaluation of more than 3,000 African bermudagrass, *C. transvaalensis*, progeny plants has demonstrated extensive variability for many characteristics. Wide variation exists for important turf performance traits such as response to high or low temperatures, low mowing tolerance, texture, color and sod density. The wide phenotypic variability indicates substantial genetic diversity within the species.

Hybrid populations have been developed to study the magnitudes of genetic variances and heritabilities of selected traits. African selections had finer texture, greater sod density, and greater cold tolerance than TIFGREEN or TIFDWARF. The African bermudagrasses tend to have lighter green color, more thatch, and greater susceptibility to scalping than conventional varieties.

Morphologically or cytologically variant TIFDWARF plants were found among progeny regenerated from tissue culture. Morphological

variants are either more or less dwarfed than TIFDWARF. Cytological variants have higher chromosome numbers (2n=45 or 2n=54) than the expected chromosome number of 2n=27.

Alterations in protein synthesis associated with cold acclimation was studied in MIDIRON and TIFGREEN bermudagrasses. Both varieties synthesized cold-regulated (COR) proteins of several size ranges, in association with cold acclimation. MIDIRON crowns synthesized COR proteins in greater numbers and amounts than TIFGREEN crowns.

Table III. 1993 Mean Turfgrass Quality Ratings of Seeded Bermudagrass Cultivars For Each Month Grown At Twenty-One Locations in the United States.

	Turfgrass Quality Ratings[1]											
Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
OKS 91-11	3.8	4.3	5.0	4.9	5.7	5.8	6.0	5.9	5.9	5.7	4.3	4.5
JACKPOT (J-912)	4.3	5.1	4.9	4.1	5.4	5.7	5.9	5.8	5.7	5.8	4.6	5.0
SULTAN (FMC 6-91)	4.4	4.9	4.8	4.3	5.4	5.6	5.8	5.7	5.8	5.7	4.9	5.0
J-27	4.0	4.7	5.0	4.6	5.8	5.8	6.0	5.8	5.7	5.4	4.3	4.9
MIRAGE (90173)	4.3	4.9	5.0	4.3	5.7	5.8	5.8	5.7	5.7	5.6	4.3	5.0
FMC 5-91	4.4	5.2	4.6	4.1	5.4	5.2	5.7	5.6	5.6	5.6	4.6	4.9
FMC 2-90	3.9	4.8	4.7	3.9	5.3	5.4	5.4	5.4	5.4	5.4	4.3	4.7
GUYMON	4.1	4.4	4.8	4.7	5.9	5.5	5.7	5.3	5.5	5.2	4.1	4.5
OKS 91-1	4.3	4.8	4.3	3.7	5.4	5.3	5.5	5.3	5.5	5.2	4.1	4.5
FMC 3-91	4.3	4.7	4.7	4.1	5.2	5.1	5.3	5.4	5.4	5.4	4.4	4.8
NuMex SAHARA	4.3	4.8	4.6	4.4	5.4	5.3	5.3	5.4	5.4	5.3	4.0	4.5
SUNDEVIL	4.4	4.6	4.4	4.1	5.1	5.2	5.3	5.2	5.5	5.5	4.2	4.4
SONESTA	4.3	4.7	4.7	4.0	4.9	5.2	5.3	5.2	5.4	5.3	4.1	4.6
PRIMAVERA (FMC 1-90)	4.2	4.7	4.2	3.7	4.8	4.9	5.1	5.3	5.2	5.0	4.1	4.5
CHEYENNE	4.1	4.3	4.3	3.9	4.7	4.7	5.0	5.2	5.2	5.2	4.1	4.2
Arizona Common	4.2	4.3	4.2	3.8	4.6	4.7	4.9	5.1	5.2	5.0	3.9	4.2
LSD Value[2]	0.6	0.9	0.9	1.4	0.7	0.7	0.5	0.5	0.4	0.4	0.9	0.9

[1] Turfgrass Quality, where 1 = poor and 9 = ideal turf.

[2] To determine statistical differences among entries, subtract one entry's mean from another entry's mean. Statistical differences occur when this value is equal to or larger than the corresponding LSD Value (LSD 0.05).