Cold Tolerance, Seed Production & Seed Germination of a Forage Bermudagrass Core Collection

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Introduction

Bermudagrass is a preferred perennial forage for cattlemen and hay growers of the South due to potentially high yields and high forage quality. 'Tifton 44' and 'Midland 99' are vegetatively propagated bermudgrasses that have improved yield and cold tolerance over the traditional 'Coastal', while Wrangler and Cheyenne are the currently the most productive and cold tolerant of the seeded cultivars. However, improvements in seeded cold tolerant lines are needed. A forage bermudagrass core collection (Anderson, 2005) was assessed for cold tolerance, seed production and germination at Tifton, Georgia from 2006 to present.



Methods

Cold tolerance

A three replicate RCBD test of the 173 entry forage bermudagrass core collection (Anderson, 2007) was planted in the mountains of north Georgia (Blairsville station) in the spring of 2007. Emergence, plant height, and leaf coarseness were rated in 2008 and 2009. One square foot plots were harvested, dried and weighed in June of each year. In vitro dry matter digestibility (IVDMD) was determined for materials harvested in 2008.

Seed set and germination

A set of the bermudagrass core collection was allowed to mature to fluoresce and set open-pollinated seed in June, 2006 at Tifton, GA. Five seed heads were harvested, thrashed and seed counted. Seed were dried and tested for germination in the greenhouse.

Results

Due to the cold winters of 2008 and 2009, 31 entries did not survive. Of the remaining 142 entries 20 accessions had a higher average yield than Tifton 44. A few exhibited greater IVDMD than Tifton 44 including PI 290660. The core collection also exhibited a wide range of seed set and germination rates from open-pollination. Among the most cold tolerant lines from Blairsville, PI 225809 and PI 291724 might be used in breeding to improve seed set, germination and cold tolerance.

Entry/PI	Species	Origin	Emergence Rating	Column1	Plant height	Column2	Column3	Yield lb/acre	Column4	Column5	Leaf/stem	Column6	Percent	Percent7
			2008	2009	6/6/2008	8/5/2009	9/17/2009	2008	2009	2Y Avg	coarseness	IVDMD	Seed set	Germ
Tifton79-16			3.3	3.3	14.3	14.3	14.7	8787	9091	8939	Fine	56.1	2	0
293606	C. dactylon	Nakuru, Kenya	2.7	3.7	14.3	17.3	16.3	5818	10179	7999	Fine	56.5	15	0
290660	C. dactylon	Pretoria, S.A.	2.3	3	11.7	11.3	7.5	6785	8995	7890	Fine	65.0	0	
289917	C. dactylon	Johannesburg, S.A.	4.2	4.7	15.7	15.7	12.7	7796	7875	7835	Coarse	56.1	0	
289748	C. polevansii	Barberspan, S.A.	3.3	4.3	10.7	11.7	10	6985	8515	7750	Fine	56.8	0	
212293	C. dactylon	R.P.I. Afghanistan	3.8	4.3	13.7	15.7	13.7	5107	9923	7515	Medium	55.7	0	
206553	C. dactylon	R.P.J. Greece	3.7	3.3	13.7	13.7	13.3	6283	8259	7271	Fine	54.4	14	0
225809	C.species	Africa	1.7	2	13.3	12.7	14.3	6430	7843	7136	Fine	54.9	27	1
291575	C. bradleyi	Salisbury, Rhodesia	2	2.3	11.3	13.3	12.7	5883	8387	7135	Fine	54.0	47	0
292544	C. dactylon	Pakehong, Thailand	3.7	3.3	12.7	12.3	11.7	5541	8387	6964	Fine	56.2	0	
Tifton 77-59			3.7	3	14.7	21	22.3	6405	7426	6916	Coarse	59.9	0	
291584	C. dactylon	Salisbury, Rhodesia	2.2	2.3	14.7	13.3	10.7	6810	6786	6798	Medium	53.1	16	0
293641	C. dactylon	Kitale, Kenya	2	4	7.7	14	10.3	3149	10371	6760	Fine	60.1	5	0
290891	C. hirsutus	Pretoria, S.A.	4	2.7	15.3	16.7	16.3	8618	4610	6614	Medium	60.2	1	1
288217	C. coursii	Lake Alaotra, Malagasy	2	2.3	13.3	14	15	6482	6722	6602	Fine	57.8	6	0
289749	C. polevansii	Barberspan, S.A.	3	3.3	10.3	10.3	7	6395	6786	6591	Very fine	61.0	0	
291724	C. dactylon	Pretoria, S. Africa	1.8	2	13.3	14.7	13	5911	7234	6573	Fine	60.3	22	0
315904	C. dactylon	Hundszahangras, Berlin-Tegel	4.3	3.7	17.3	18	14	6897	5890	6393	Fine	58.7	1	0
225809	C.species	Africa	2.3	2.3	8.7	9	9.3	6648	6082	6365	Very coarse	56.8	0	
291965	C. dactylon	Kitale, Kenya	2.5	2.7	12.7	12	10.3	5052	7426	6239	Fine	52.9	0	
Tifton 44			3.2	5	15	18.7	14.3	4021	8451	6236	Medium	57.1	0	
291164	C. dactylon	Mooi River, S. Africa	1.8	1	7.3	9.5	8.5	9544	2881	6212	Fine	57.7	18	0
Callie			1.7	3	10	14	18	5500	6914	6207	Coarse	59.3	3	0
Tift Sandhill 7			3.8	5	16	19.3	14	5020	7362	6191	Fine	56.2	0	
224692	C. dactylon	South Africa	2.3	3	12	14.3	14.7	5791	6402	6096	Coarse	59.8	0	
Callie			3.8	3.3	15	13.3	12	5123	6978	6051	Medium	54.1	4	0
African Star			3.8	3.7	12.7	13.7	11.3	3580	8387	5984	Fine	57.0	0	
Coastal			2.6	3.7	11	15.8	14.7	3189	7587	5388	Medium	61.3		
Tifton 85			1.8	1.3	8.8	11.2	13.5	4220	4033	4127	Coarse	65.3		
		Min	0	0	1	1	2	116	165	190		46.3	0	0
		Max	5	5	21	22	25	9544	10371	8939		75.2	45	90
		Means	1.8	2.1	8.2	11.6	10.9	3465	4741	3902		58.7	3	4
		Std Deviation	1.4	1.6	5.1	3.7	3.6	477	2132	1974		4.5		

References

Anderson, W.F. 2005. Development of a forage bermudagrass (Cynodon sp.) core collection. Grassland Sci. 51:305-308.

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