

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
BISMARCK, NORTH DAKOTA

MINNESOTA
AGRICULTURAL EXPERIMENT STATION

NORTH DAKOTA
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SOUTH DAKOTA
AGRICULTURAL EXPERIMENT STATION

NOTICE OF RELEASE OF BOUNTY GERmplasm BIG BLUESTEM

The US Department of Agriculture; Natural Resources Conservation Service; Minnesota Agricultural Experiment Station; North Dakota Agricultural Experiment Station; and the South Dakota Agricultural Experiment Station announce the naming and release of a seed propagated selected class germplasm of big bluestem, *Andropogon gerardii* (Vitman). This selected class pre-varietal release will be known as Bounty Germplasm big bluestem.

Bounty Germplasm big bluestem has been developed from an original composite of 82 vegetatively selected plants from 40 different counties in Minnesota, and 9 counties in eastern South Dakota (Figure 1, Table 1). NRCS accession number 9063122 was assigned to this selection. Bounty Germplasm big bluestem will fill the need for a more genetically diverse improved release that is broadly adapted to Minnesota and the surrounding region. This release is expected to perform well wherever big bluestem is recommended in Minnesota, the eastern Dakotas, and surrounding regions in the Northern Great Plains and Upper Midwest.

Bounty Germplasm big bluestem is released for conservation use in native plantings with the primary objective of ecological revegetation, wildlife habitat, and forage production. Variation in maturity, plant size, leafiness, color, and potential seed production were documented in the breeder seed field. Bounty Germplasm has a high level of species diversity and forage quality, and is expected to perform well over a broad area throughout Minnesota, the eastern Dakotas, and bordering states. Seed sources within the composite are local to specific planting sites. Plants originating greater distances from the planting site add genetic diversity within the species, for improved long-term stability and broader area of adaptation (Harris et al 2006). Generation 0 (breeder) seed was harvested from the clonally propagated progeny of selected plants that had promise of genetic superiority. Individual seed maturity differences may range two to three weeks.

Collection Site Information: Vegetative collections of 326 accessions of naturally occurring big bluestem were made by NRCS field personnel in Minnesota, and in eastern South Dakota in the fall of 1985. This area covers parts of three land resource regions including (F) Northern Plains Spring Wheat Region, (K) Northern Lake States Forest and Forage Region, and the (M) Central Feed Grains and Livestock Region. Average annual rainfall ranges from approximately 20-34 inches with a freeze-free period ranging from 95 days in northern Minnesota to 150 days near the Iowa border (USDA 2006).

Accession numbers were assigned to each collection and the vegetative crown pieces were divided and potted into small containers in the spring of 1986.

Description: Big bluestem is a tall, stout, perennial, warm-season, native grass with stiff, erect culms. Leaf blades have prominent midribs, flattened and keeled sheaths, and fringed membranous ligules below the collar. Rachis internodes are thinly to rather densely hairy (Sedivec and Barker, no date). It is often called “turkeyfoot” because the seed heads usually have 3 spikelets. Bounty varies in height from 4 to 6 feet tall, and is shorter in more northern climates. The abundant forage is one of the most palatable grasses. Its deep, spreading root system makes it an excellent erosion control plant. It can form a sod, and has short, scaly rhizomes. It performs best on fertile, well drained soils, but is also adapted to sites with shallow depth, low pH, and low fertility. Big bluestem is the dominant grass species of the Midwestern tall grass prairie. It provides excellent wildlife habitat and food sources. It is native to most of the United States and Canada except for the far western areas (USDA 2011). Big bluestem is a host plant to many butterflies and other pollinator species (Tallamy 2009). It is becoming more popular as a landscaping plant.

Method of Selection: The evaluation nursery was located at the USDA-Agricultural Research Service, Northern Great Plains Research Laboratory at Mandan, North Dakota. More than 4,000 plants were established in the nursery from May 27 to June 13, 1986 (USDA 1990-1991). The experimental design was a randomized complete block with four replications. Individual subplots of three cloned big bluestem plants were randomly planted within each block. Individual blocks contained 1,071 plants or 357 three-plant subplots. Six different varieties of big bluestem were included in the nursery as standards of comparison, including Champ, Pawnee, Rountree, Bonilla, Bison, and Sunnyview.

Data collected from 1987-1990 included survival, vigor, disease, size, leafiness, and forage quality. These plants displayed 97 percent survival the first year. Approximately 41 percent of those surviving plants were rated as having low vigor, and 2 percent as very high vigor. A majority of the plants were rated as having good vigor. The most vigorous plants had a broader crown and were larger than plants having low vigor. Disease problems consisted mostly of leaf and stem rust.

Evaluations in 1989 and 1990 included gridding the nursery into 4 x 6 plant plots. Two superior plants were selected in each 24 plant grid. Each was representative of an early and a late-maturing population. Selection factors included leafiness, disease resistance, seed production potential, and vigor. In 1990, selected plants were rated for phenology and separated into early and late-maturing populations. Based primarily on forage quality parameters, 94 out of 177 (53%) of the early-maturing accessions were selected for further study. Generally, these plants had finer leaf and stem material, and were smaller and less robust than the later-maturing population. The selected plants were vegetatively established into a polycross block in 1991. Additional evaluation and some roguing were completed prior to seed harvest. Leaf, stem, and culm samples were collected from the remaining 82 plants at first flowering. These samples were analyzed for crude protein, acid detergent fiber, neutral detergent fiber, and relative feed value by the Northern Great Plains Research Laboratory at Mandan, North Dakota. Crude protein ranged from 6 to 10 percent and Relative Feed Values varied from 62 to 77 percent (Table 2). The standards of comparison were also sampled for forage quality. The most northern origin big bluestem, Bison averaged 7% crude protein compared to Rountree (IA) which averaged 4% (Figure 2).

The selected big bluestem plants comprising Bounty Germplasm averaged slightly more than 7% crude protein, higher than the population average of 6%. The average relative feed value increased from 67% for the base population to 9% for the selected plants (Figure 4). Seed harvested from the selected early-maturing population was seeded in the increase field at the Bismarck Plant Materials Center in June 2010. This seed (Bounty Germplasm) from 82 superior plants contains a broad representation originating from 40 Minnesota and 9 South Dakota counties (Figure 1).

Field Measurements: On July 26, 2011, data was collected from the foundation field that was planted in 2010. To document the diversity within the population, the field was divided into 5 representative sample areas. Ten plants were systematically flagged for sampling in each of the 5 sample areas. Data from those samples indicated that individual plant height varied from 3.75 to 6 feet. Sample means were more uniform from 4.9 to 5.45 feet. Width was less variable and most of the two-year-old plants were nearly a half foot wide. Most plants rated best for leafiness, and none of the sample means rated more than 1.4 (1=best; 3=poor). Phenology varied up to three weeks from medium boot (12%) to medium flower (2%). Most of the plants were late boot (44%) to early flower (42%), (Table 3).

Ecological Considerations: Big bluestem is relatively easy to establish and competes well with other species. It has been known to establish from seed in smooth bromegrass stands over time, especially if the bromegrass is mowed or grazed during critical periods, allowing the big bluestem to gain a foothold. Big bluestem is a native species with many desirable traits. Encroachment off site would not generally be considered negative. Seed is spread by birds and other animals, as well as natural events such as flooding and wind storms. Vegetative spread is minimal. Big bluestem is considered non-invasive and is easy to control as a landscape plant.

Conservation Use: The conservation uses of Bounty Germplasm big bluestem are many, and include conservation cover, erosion control, pasture and hayland, wildlife habitat, prairie revegetation, rangeland seeding, and landscaping.

Potential Area of Adaptation: Bounty Germplasm big bluestem is expected to perform well throughout Minnesota and the eastern Dakotas. It has not been tested in the surrounding regions of the Northern Great Plains and Upper Midwest, but should perform well in those areas.

Availability of Plant Materials: Breeder seed (Generation 0) will be maintained by the Bismarck Plant Materials Center. Foundation seed will be grown by the Bismarck PMC, and distributed through North Dakota State University Foundation Seed Stocks as a selected class (green tag) germplasm.

References:

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USDA NRCS. 2011. The PLANTS database. URL <http://www.plants.usda.gov> (accessed 1 Apr 2011). Greensboro (NC): National Plant Data Center.

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Approvals for the release of Bounty Germplasm big bluestem, *Andropogon gerardii* (Vitman):

for

Director, Ecological Sciences Division
United States Department of Agriculture
Natural Resources Conservation Service
Washington, D.C.

9-28-2012
Date

State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
Saint Paul, Minnesota

5-14-12
Date

State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
Bismarck, North Dakota

April 25, 2012
Date

State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
Huron, South Dakota

June 7, 2012
Date



Director
University of Minnesota
Agricultural Experiment Station
St. Paul, Minnesota

5/14/12
Date



Director
North Dakota State University
Agricultural Experiment Station
Fargo, North Dakota

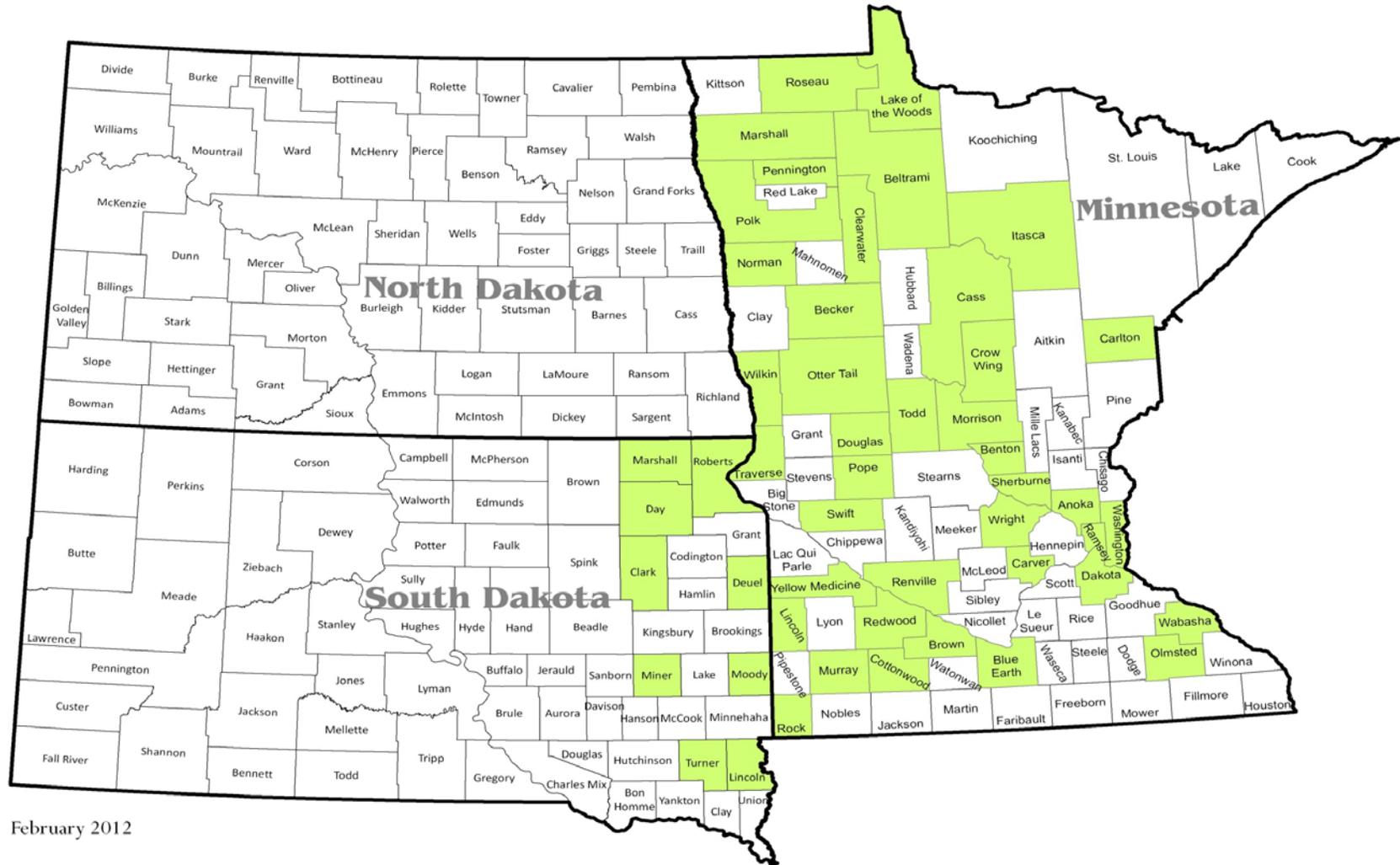
7/5/12
Date



Director
South Dakota State University
Agricultural Experiment Station
Brookings, South Dakota

6/25/12
Date

Bounty Germplasm Big Bluestem Collection Sites



February 2012

Table 1. Collection site information for 82 selected (early maturing) plants from Minnesota and South Dakota.

Accession No.	State	County	Site	Collector	Accession No.	State	County	Site	Collector
9053432	MN	Anoka	SA	T.R. Fredbo	9053260	MN	Polk	SA	R.L. Parent
9053342	MN	Becker	N/A	L. R. Johnson	9053261	MN	Polk	Si	R.L. Parent
9053342	MN	Becker	N/A	L. R. Johnson	9053261	MN	Polk	Si	R.L. Parent
9053241	MN	Beltrami	N/A	R.E. Rundell	9053263	MN	Polk	N/A	M.W.Nienaber
9053257	MN	Beltrami	Non-pastured	D. K. Krystosek	9053383	MN	Pope	0	D.L. Copeland
9053329	MN	Benton	N/A	K.E. Adelman	9053430	MN	Ramsey	SA	T.R. Fredbo
9053331	MN	Benton	N/A	K.E. Adelman	9053468	MN	Redwood	N/A	C.M. Bower
9053408	MN	Blue Earth	N/A	M.G. Oja	9053371	MN	Renville	N/A	D.G. Bidinger
9053471	MN	Brown	N/A	L.H. Schmidt	9053373	MN	Renville	N/A	D.G. Bidinger
9053290	MN	Carlton	N/A	D.Benrud	9053499	MN	Rock	Overflow	D.L. Briggs
9053419	MN	Carver	10 D	S.P. Wendland	9053245	MN	Roseau	N/A	D.A. Johnson
9053296	MN	Cass	N/A	W.R. Pehling	9053322	MN	Sherburne	N/A	W.O. Harju
9053300	MN	Cass	N/A	W.R. Pehling	9053374	MN	Swift	Subirrigated	L.L.Popma
9053265	MN	Clearwater	N/A	I.L. Johnson	9053375	MN	Swift	Wetland	L.L. Popma
9053461	MN	Cottonwood	Wetland	G.D.Moreau	9053375	MN	Swift	Wetland	L.L.Popma
9053294	MN	Crow Wing	N/A	M.J. Reetz	9053336	MN	Todd	N/A	R.E.Krause
9053332	MN	Douglas	N/A	C.W.Emmert	9053337	MN	Todd	N/A	R.E. Krause
9053479	MN	Filmore	N/A	K.R. Rismeyer	9053361	MN	Traverse	Si	G.D. Berg
9053278	MN	Itasca	N/A	T.J. Weber	9053449	MN	Wabasha	N/A	L.J. Svien
9053251	MN	Lake of the Woods	20%	J.E. Berg	9053449	MN	Wabasha	N/A	L.J. Svien
9053475	MN	Lincoln	Overflow	J.N. Behnke	9053426	MN	Washington	N/A	G.L. Brown
9053239	MN	Marshall	CY	T.J.Steger	9053338	MN	Wilkin	SB	G.J. Kusnierek
9053304	MN	Morrison	N/A	S.G. Wilson	9053326	MN	Wright	25 D	J.M. Wiltsey
9053304	MN	Morrison	N/A	S.G. Wilson	9053327	MN	Wright	25 D	J.M.Wiltsey
9053485	MN	Murray	Si	P.C. Weikle	9053327	MN	Wright	25 D	J.M.Wiltsey
9053485	MN	Murray	Si	P.C. Weikle	9053328	MN	Wright	25 D	J.M.Wiltsey
9053231	MN	Norman	Sb	F.J. Kollmann	9053366	MN	Yellow Medicine	Silty	A.H.Lynne
9053232	MN	Norman	Sa	F.J. Kollmann	9053512	SD	Clark	Si	E. Henderson
9053232	MN	Norman	Sa	F.J. Kollmann	9053545	SD	Day	Silty	L.P. Noeske
9053232	MN	Norman	Sa	F.J.Kollmann	9053545	SD	Day	Silty	L.P. Noeske
9005673	MN	Olmsted	N/A	N/A	9053556	SD	Deuel	Si	H.L.Minnick
9005674	MN	Olmsted	Lime Rock	N/A	9053556	SD	Deuel	Si	H.L.Minnick
9053347	MN	Ottertail	Si	J.A.Schmidt	9053537	SD	Lincoln	Thin Upland	R.W. Lehman
9053352	MN	Ottertail	Sy	C.J.Neseth, JR.	9053519	SD	Marshall	Overflow	L.P. Duerre
9053234	MN	Pennington	SA	J.E. Schmid	9053519	SD	Marshall	Overflow	L.P. Duerre
9053234	MN	Pennington	SA	J.E. Schmid	9053520	SD	Marshall	Silty	L.P. Duerre
ND-755	MN	Polk	Ditch	R.J.Feldt	9053552	SD	Miner	Sb	C.D. Welbon
ND-755	MN	Polk	Ditch	R.J.Feldt	9053554	SD	Moody	Subirrigated	D.J. Larson
ND-755	MN	Polk	Ditch	R.J.Feldt	9053554	SD	Moody	Subirrigated	D.J. Larson
9053259	MN	Polk	SB	R.L. Parent	9053523	SD	Roberts	Limy Sub.	S.C. Caruana
9053260	MN	Polk	SA	R.L. Parent	9053521	SD	Turner	Si	J.W. Rezek

Figure 2

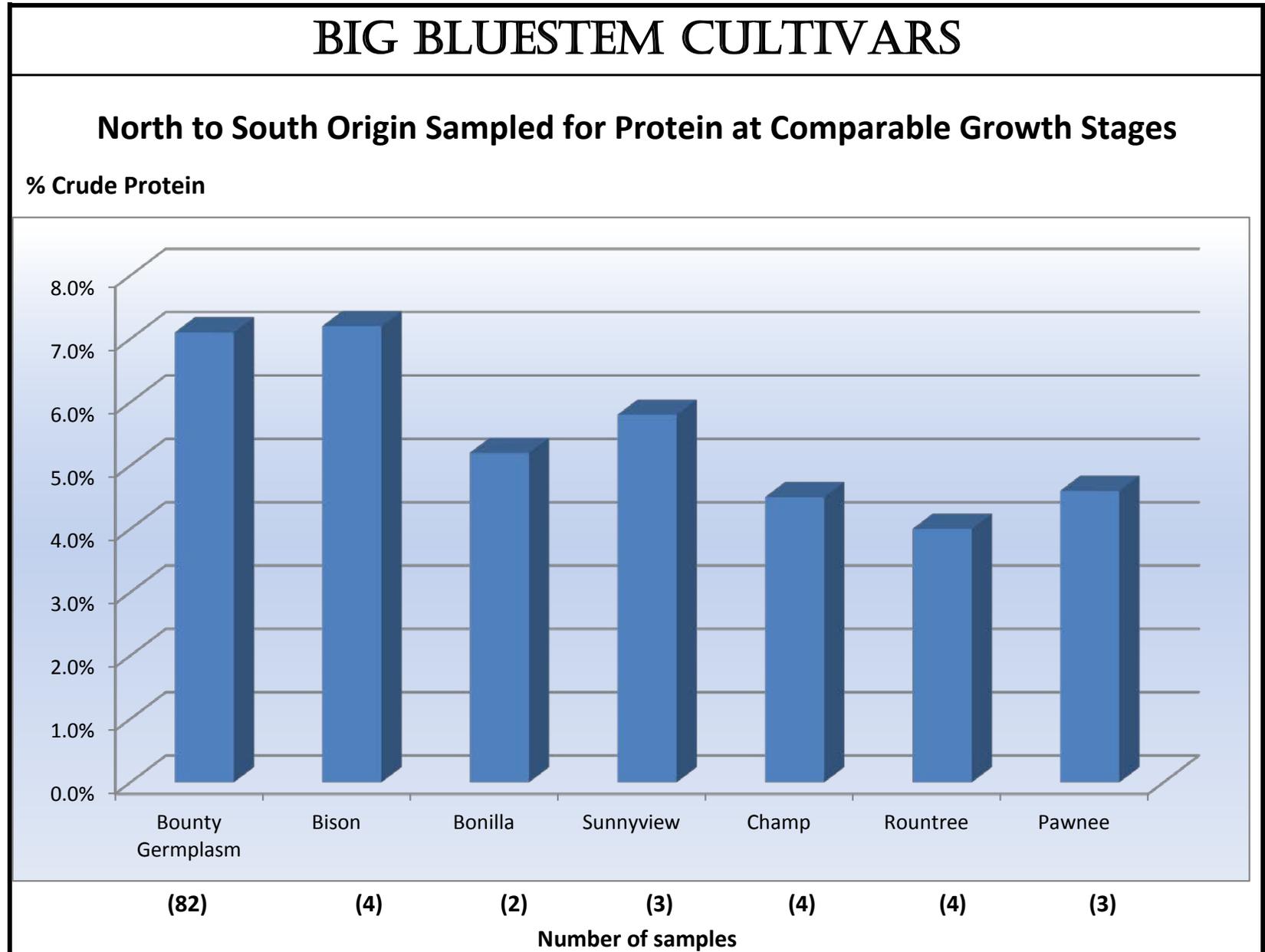


Table 2. Forage quality measurements of 82 selected plants

Accession No.	% Dry Matter	% Crude Protein	% Acid Detergent Fiber	% Neutral Detergent Fiber	Relative Feed Value	Accession No.	% Dry Matter	% Crude Protein	% Acid Detergent Fiber	% Neutral Detergent Fiber	Relative Feed Value
9053432	96.43	6.56	43.96	73.31	69	9053260	97.07	7.03	45.84	73.08	68
9053342	96.68	7.37	44.62	73.75	68	9053261	96.48	7.48	46.21	73.69	67
9053342	96.46	7.06	46.2	74.9	66	9053261	96.86	6.15	45.04	72.89	69
9053241	96.79	7.23	43.63	72.21	71	9053263	97.19	7.23	44.79	73.05	69
9053257	96.59	8.46	44.91	72.86	69	9053383	96.61	6.91	43.39	73.06	70
9053329	96.14	7.99	44.07	72.97	70	9053430	96.55	7.14	47.98	75.65	63
9053331	96.61	6.54	43.57	73.05	70	9053468	96.82	7.52	43.56	72.26	71
9053408	97.22	6.09	45.99	74.39	66	9053371	96.71	6.24	44.9	74.78	67
9053471	96.46	5.8	43.2	73.69	70	9053373	96.75	5.96	45.71	73.85	67
9053290	96.44	6.89	45.71	74.62	66	9053499	96.6	6.41	44.58	73.44	69
9053419	96.94	7.18	43.05	71.84	72	9053245	96.68	7.94	43.45	71.01	72
9053296	96.69	8.63	44.66	73.37	69	9053322	96.65	7.33	40.13	69.27	77
9053300	96.63	9.59	43.09	70.74	73	9053374	96.68	7.65	44.58	72.12	70
9053265	96.93	7.35	48.32	74.69	64	9053375	96.49	7.54	45.47	73.83	67
9053461	96.13	6.58	43.71	73.24	70	9053375	96.74	7.71	43.15	70.82	73
9053294	96.49	6.64	44.69	73.64	68	9053336	96.76	6.28	48.31	75.29	63
9053332	96.58	6.74	44.78	71.88	70	9053337	96.4	8.64	42.55	71.64	72
9053479	96.79	6.03	48.1	75.19	64	9053361	96.5	8.03	42.5	72.7	71
9053278	96.81	8.37	46.46	72.64	67	9053449	96.24	5.9	45.65	75.29	66
9053251	96.52	8.31	45.47	74.12	67	9053449	96.86	7	44.35	73.17	69
9053475	96.33	6.25	45.76	74.35	67	9053426	96.49	8.98	43.18	71.08	72
9053239	96.72	8.35	43.94	71.72	71	9053338	96.43	7.16	43.99	73.03	70
9053304	96.44	7.17	44.68	73.36	69	9053326	97.04	7.91	43.54	71.71	71
9053304	96.46	6.53	46.14	74.53	66	9053327	96.38	6.54	45.53	74.07	67
9053485	96.32	7.68	42.76	71.81	72	9053327	96.51	5.71	46.47	74.79	66
9053485	96.66	8.18	44.74	74.01	68	9053328	97.35	6.19	43.95	70.59	72
9053231	96.72	7.31	46.48	74.84	65	9053366	96.73	6.03	49.19	76.14	62
9053232	96.87	8.37	44.85	72.61	69	9053512	96.26	6.56	44.33	73.7	69
9053232	96.41	6.02	45.49	74.65	67	9053545	96.72	7.62	46.06	73.22	67
9053232	96.65	8.12	43.74	72.28	71	9053545	96.91	5.94	45.7	75.32	66
9005673	96.41	7.46	44.46	73.1	69	9053556	96.82	6.02	45.42	73.68	68
9005674	96.44	5.87	44.75	73.79	68	9053556	96.25	6.15	45.91	74.52	66
9053347	96.73	7.1	45.95	74.6	66	9053537	96.26	6.3	46.72	75.23	65
9053352	96.43	6.85	47.47	75.22	64	9053519	96.94	7.74	43.94	72.78	70
9053234	96.49	7.54	43.04	71.85	72	9053519	96.31	6.66	44.36	74.47	68
9053234	96.61	8.42	42.03	70.55	74	9053520	97.24	8.38	42.04	69.38	75
ND-755	96.74	7.97	43.7	71.4	71	9053552	96.22	6.59	43.08	73.51	70
ND-755	96.55	6.89	47.97	75.7	64	9053554	96.56	5.86	45.15	74.61	67
ND-755	96.58	6.8	45.43	72.5	69	9053554	96.93	6.18	43.82	72.17	71
9053259	96.53	8.25	43.04	73.09	70	9053523	96.73	7.4	44.76	73.87	68
9053260	96.61	6.02	45.41	75.92	66	9053521	96.49	6.59	42.59	71.97	72
Averages for all 82 plants---->							96.62	7.11	44.78	73.29	68.6

Table 3.

Sample Location	Averages			Percent of plants			
	Plant Height (feet)	Plant Width (feet)	Leafiness (1=best; 3=poor)	medium boot	late boot	early flower	medium flower
1	4.900	0.635	1.4		20	70	10
2	5.450	0.550	1.2		60	40	
3	5.100	0.525	1.3	20	20	60	
4	5.250	0.500	1.3	30	50	20	
5	5.025	0.500	1.4	10	70	20	
Total Ave.	5.145	0.542	1.32	12	44	42	2

Five samples of ten plants each were collected throughout the foundation field planting of Bounty Germplasm big bluestem, on June 26, 2011. These were evaluated for plant height, width, leafiness, and phenology.

Feed quality of the selected of 82 plants (Bounty Germplasm) as compared to the early maturing population (177 plants) of big bluestem.

Figure 3

Average Percent Crude Protein

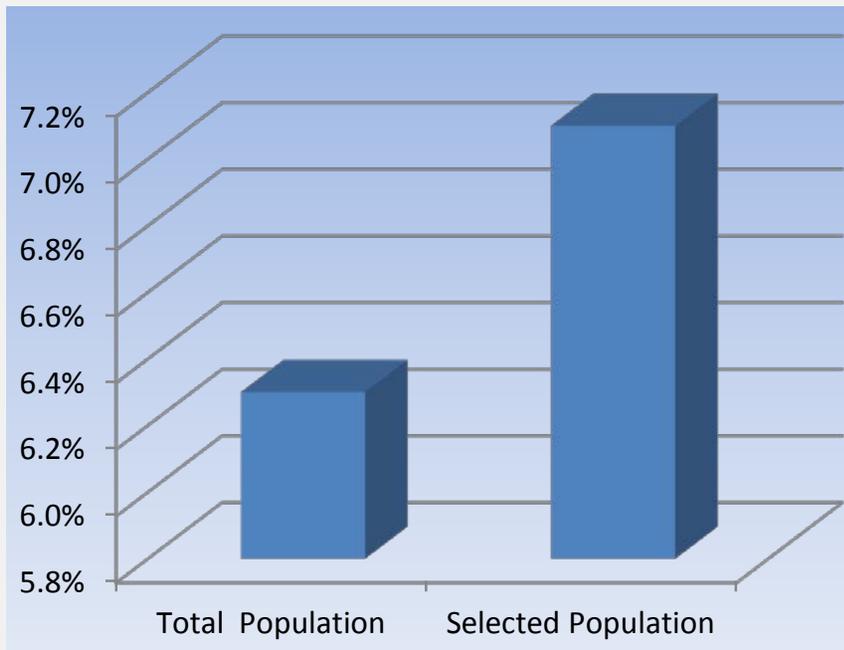


Figure 4

Average Percent Relative Feed Value

