United States Department of Agriculture
Natural Resources Conservation Service
Los Lunas Plant Materials Center
and
New Mexico State University
Agricultural Science Center at Los Lunas, New Mexico
Notice of Release
'Windbreaker' big sacaton (*Sporobolus wrightii*)

The Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA) and New Mexico State University (NMSU) Agricultural Science Center at Los Lunas announce the naming and release of 'Windbreaker' big sacaton (*Sporobolus wrightii* Munro ex Scribn)., a native, warm-season grass for the southwestern United States. 'Windbreaker' produces on a per acre basis more than 8,000 lbs. of biomass, 200 bulk lbs. of seed, and can grow more than 3 meters in height. It has demonstrated in New Mexico and Arizona to be an excellent choice for use in wind strips protecting cropland from wind erosion. 'Windbreaker' was tested under the accession number 9066790.

Collection Site Information

'Windbreaker' is a synthetic cultivar composed of the ten most robust phenotypes from a collection of more than 700 plants of 37 accessions. NRCS field personnel (see Table 1) collected these accessions from native stands on bottom lands and alluvial fans subject to flooding from elevations of 3,800 – 6,000 ft. in New Mexico, Texas and Arizona. Some collections are from dry plains and hills.

Table 1: Collection Site Information for the 10 Selected Accessions of Big Sacaton

Accession Number	County and State	Elevation (Feet)	MLRA	Collector
9022264	Socorro, NM	4,200	42	R. Farmer
9022272	Sierra, NM	4,200	70	J.D. Allen
9022273	Dona Ana, NM	3,830	42	E.H. Fuchs
9022335	Guadalupe, NM	4,630	70	D. Abercrombie
9022339	Lincoln, NM	5,200	70	J. Anderson
PI 434453	Texas			Unknown
9022447	Lincoln, NM	6,000	39	J. Anderson
9022340	Socorro, NM	5,700	70	J. Anderson
9029401	Arizona			Unknown
9022352	De Baca, NM	4,000	70	R. Appel

Description

Big sacaton is a native, robust, perennial warm-season bunchgrass. The plant has coarse culms, is often more than 1 meter tall, and has flat-leafed blades approximately 3 to 8 millimeters wide that become involute when dried. Panicles are open with the branches spreading or ascending straight with spikelets approximately 2 millimeters long with the first glume about a third as long as the spikelet. Cross-pollination is the natural breeding system for this species. Livestock and wildlife readily consume the plant in spring and early summer.

Method of Breeding and/or Selection

Thirty seven accessions of big sacaton were planted into a non-replicated initial evaluation planting (IEP) in 1984 at the Los Lunas Plant Material Center. Each plot consisted of two rows of 10 plants spaced on 38-inch centers. By the end of the third growing season, the height of the leaf blades of mature plants averaged 1.17 meters and the width averaged 0.80 meters. The ten accessions with the most robust plants were identified in 1992 after several annual evaluations. From each of the ten accessions, the largest plant was selected. These 10 plants displayed an average leaf height of 1.28 meters and an average plant width of 0.75 meters. The selected plants averaged 9% taller than the average height of the plants in the IEP planting.

Clone transplants were produced from the root stock of the ten selected plants. These transplants were planted into a three-row, three-replicated hybrid cross planting to evaluate the general combining ability of the parents for F1 hybrids in 1996. The ten plant selections (considered female) occupied the center row with the two outside rows containing the Accession PI-434453, which was randomly selected as the male tester. Plants were spaced on 6-ft. centers. Seed was harvested by accession only from the center row by the second growing season in 1998. The half-sib seed of each accession was kept separate. F1 progeny seedlings were produced from this seed, and clonal transplants were produced from root cuttings in 1999.

In 1999, progeny seedlings and clonal transplants of the ten parent plants were planted in a semi-random complete block in eight replicated rows with parent and progeny plants alternating in position, but not paired by linage. This design gave a total of 160 plants which included 16 of each linage with 8 clonal parents and 8 progeny from seed. Plants were maintained with irrigation, fertilization, and weed control.

In 2005 and 2006, the plants were evaluated for hybrid effect and long term vigor based on leaf height and plant width. There was no significant difference (alpha .05) between parent (clones) and half-sib progeny (seedlings) or linage for each response variable tested. Leaf height of clonal and progeny plants averaged respectively 1.32 and 1.33 meters. The width of clonal and progeny plants averaged respectively 0.80 and 0.78. However, the failure of the F1-half-sib (hybrid) plants to show hybrid depression (less beneficial affects) indicates the ability to use parent plants to produce vigorous progeny from seed.

Ecological Considerations and Evaluation

‘Windbreaker’ big sacaton is a selection of naturally occurring native grass species. ‘Windbreaker’ did not meet the assessment of a plant which would become invasive, based on guidelines adopted by the USDA-NRCS Plant Materials Program.

Anticipated Conservation Use

The potential conservation use of 'Windbreaker' big sacaton includes:

- Erosion control
- Forage for livestock and wildlife.
- Wildlife cover
- Xeric landscape plant
- Hay mulch for critical area seedings

The field evaluation of 'Windbreaker' big sacaton began in 1999 by installing windstrip plantings to protect valuable cropland from wind erosion. Wind erosion control of cropland was identified as a critical need by New Mexico NRCS field offices in Deming, Tucumcari, Grants, Tatum, and Hobbs. These NRCS field offices arranged field planting locations on cooperators' farms and at local public facilities and assisted in the evaluations. Their assistance and interest in 'Windbreaker' has been paramount in the development of this release. 'Windbreaker' was also used successfully for noise barriers, and natural fencing.

Big sacaton forage quality is highest in the spring, but becomes coarse and tough at maturity (Gay and Dwyer, 1965). The crude protein content of new growth of big sacaton in South Texas in the spring averaged 12%; later in the summer fall or winter the crude protein drops below 10% (Haferkamp, Marshall, 1982). Therefore, areas where big sacaton dominates are best grazed in the spring. Gay and Dwyer conclude that unpalatable material is easily removed by burning every three or four years in early spring. However, hot early summer fires have killed big sacaton in southeastern Arizona (Bock and Bock 1978)

Big sacaton stands provide cover for wildlife and cattle in summer (Bock et al., 1978 and Cox et al., 1989). In Arizona, big sacaton provided cover for Botteri's sparrow and other passerines, collard peccaries, and many other rodents (Bock et al 1978, and Bock et al 1990). Botteri's sparrow reaches maximum densities in big sacaton grasslands (Bock et al 1990). Big sacaton windstrips are common roosting locations for ring neck pheasants at the USDA Plant Materials Center in Los Lunas, NM. Plantings have also been used successfully on the corners of pivot irrigation systems in eastern New Mexico to attract wildlife.

Big sacaton has been described by native landscapers "as spectacular when the stiff, towering seed stalks push up through the arching upright leaves in late summer". Big sacaton is xeric, but will grow most vigorously with bimonthly deep watering when rain is scarce (High Country Gardens, Albuquerque, NM). Plant nurseries generally recommend cutting the grass back hard to one foot in early spring.

Big sacaton hay provides for excellent soil surface mulch for summer dryland seedings of warm-season grasses in the arid southwest. The relatively thick, long leaves and stems easily crimp (anchored) into the soil surface generally without cutting which is common problem with grains and other short and medium height grass species. When the grass is cut in the crimping process, it becomes poorly anchored and generally becomes dislodged and is blown away by moderate winds. Also, leaves and stems of big sacaton degrade at a much slower rate than grain straw. Big sacaton has been the preferred hay mulch used for studies at the Los Lunas Plant Materials Center.

A biomass production study using 'Windbreaker' big sacaton was initiated in 2010. Three half-acre fields were established at the LLPMC using a spacing of 1-, 2-, and 3-feet between plants and 38 inches on center between the rows. These plantings were irrigated with 3 inches of surface-flooding water six times during the 220 day growing season. Forage samples have been clipped monthly to help determine if plant density affects forage production. Biomass production (oven dry) at the conclusion of the first growing season for the 1-, 2-, and 3-foot spaced plants averaged respectively 7668, 5034, and 5264 lbs. per acre (Figure 1). During the second growing season, the 3-ft. spacing had the highest yield of 16,133 lbs. per acre while the 2-ft. and 1- ft. spacing had yields of 6,795 and 4,870 lbs. per acre respectively.

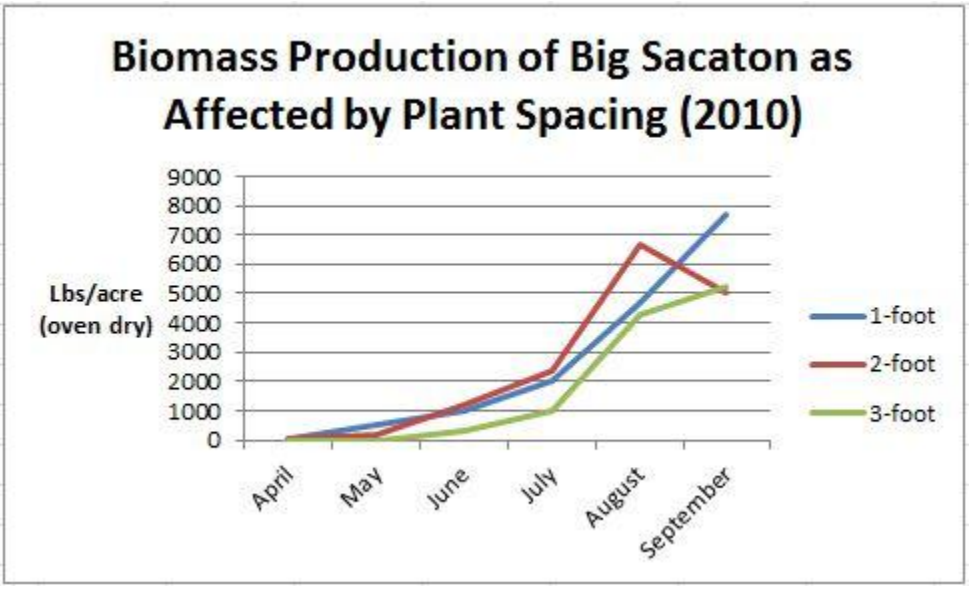

Figure 1: Biomass yield of 'Windbreaker' big sacaton as affected by in row plant spacings of 1, 2, and 3 feet during the first growing season at Los Lunas PMC.

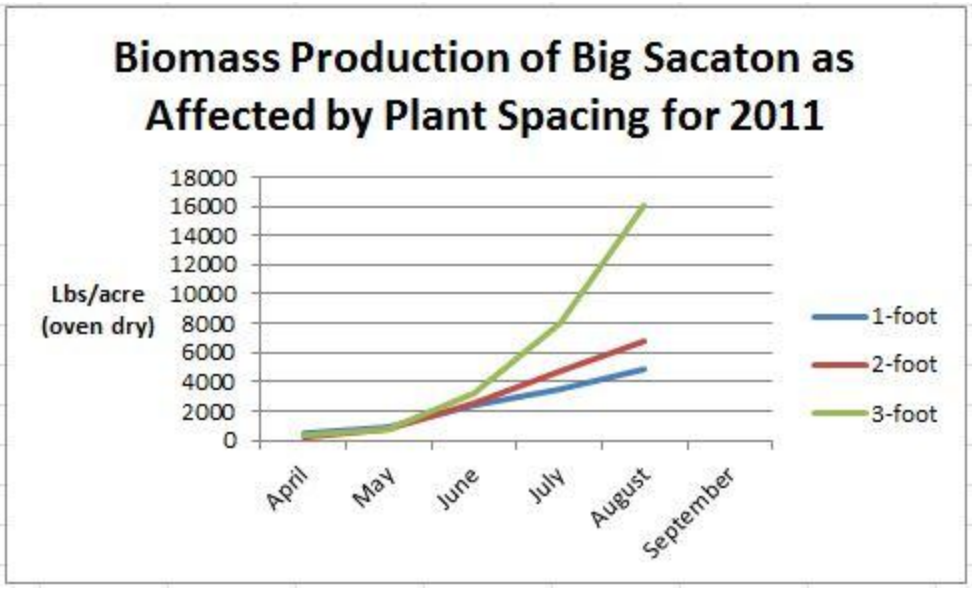

Figure 2: Biomass yield of 'Windbreaker' big sacaton as affected by in row plant spacings of 1, 2, and 3 feet during the second growing season at Los Lunas PMC.

Anticipated Area of Adaptation

Big sacaton is found growing throughout the southwestern United States and typically occurs on low, alluvial flats and flood plains. It can grow in sandy, loamy, and heavy soils, but they need to be drained. It also grows well in acid, neutral, and basic soils, and it also can grow in saline soils. However, big sacaton cannot grow in dense shade. 'Windbreaker' has been tested (see Attachment 1) and recommended for use in Major Land Resource Area 35, 36, 42, 51, 70 and 77 at elevations ranging from 3,600 to 6,800 ft.

When the plantings were irrigated, the survival rate of 'Windbreaker' averaged 95%. Biomass production is greatly reduced at higher elevation locations (above 6,800 ft.) because of shallow soils, a shorter growing season, and cooler temperatures. 'Windbreaker' may also frost kill at elevations above 6,800 ft.

The use of supplemental water is necessary to establish and maintain 'Windbreaker' wind-strip plantings for adequate plant growth to achieve performance. Seedling transplants are preferred over seeding for windstrip plantings. Individual plants need to be separated at a minimum of 3-foot on center to acquire maximum height. Non-irrigated plantings may be installed if supplemental irrigation is applied during the establishment period, the planting design allows for rainfall harvesting, and where there is a minimum of 14 inches of annual precipitation (pinyon pine vegetation zone).

Availability of Plant Materials

Breeder and/or foundation seed will be maintained at the Los Lunas Plant Materials Center. Second year seed production was 165 pure live seed lbs. per acre. Seed will be distributed to interested growers through the New Mexico State University Seed Certification Program.

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Signatures for the Release of

‘Windbreaker’ big sacaton (*Sporobolus wrightii* Munro ex Scribn.)

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United States Department of Agriculture
Natural Resource Conservation Service
Albuquerque, New Mexico

Tracey Carrillo, Director — Date
New Mexico State University Seed Certification
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David Thompson, Associate Dean/Director — Date
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Terrell Erickson, Ecological Sciences Division — Date
United States Department of Agriculture
Natural Resource Conservation Service
Washington, D.C.

Attachment 1: Field Evaluations of Big Sacaton 1999 – 2008

Year Planted	City/Location	Total Transplants	Irriga-tion	Spacing	Percent Survival Rate 2000–2008									Foliage Height/Width (Inches) 2002–2008							Elevation
					2000	2001	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008	
1999	Columbus, NM Rancho la Fontera	800	Yes	5 ft.	95%	95%	95%	95%	95%	95%	95%	95%		60”/ 36”					45”/ 42”		4,230 ft.
2000	Columbus, NM Rancho la Frontera	400	Yes	5 ft.	95%	95%	95%	95%	95%	95%	95%	95%		66”/ 36”					82”/ 42”		4,230 ft.
2001	Columbus, NM Rancho la Frontera	167	Yes	5 ft.			45%	Replanted				100%		48”/ 48”					42”/ 40”		4,230 ft.
2002	Deming, NM Keeler Property	460	Yes	5 ft.					N/A	95%	95%	95%	95%	10”						50”/ 44”	4,300 ft.
2002	Tucumcari, NM Tucumcari Elementary	250	No	3 ft.			100%					100%		25/” 15”					38”/ 32”		4,120 ft.
2002	Tatum, NM Tatum Memorial Cemetery	172	Yes	5 ft.			100%					95%			14”/ 8”				40”/ 35”		3,990 ft.
2003	Lovington, NM USDA Service Center	170	Yes	5 ft.				95%					95%		15”/ 8”					60”/ 50:	3,920 ft.
2003	Tatum, NM Tatum Town Park	300	Yes	5 ft.				100%				100%			10”/ 5”				46”/ 40”		3,990 ft.
2004	Isleta, NM Lujan Farm	38	Yes	5 ft.					100%				100%				40”/ 24”			56/” 44”	4,890 ft.
2004	McIntosh, NM Schwebach Farm	600	Yes	6 ft.					100%				85%			10”/ 6”				44”/ 34”	6,150 ft.
2004	Clayton, NM Dellinger Property	200	Yes	5 ft.					100%				100%				30”/ 10”			48”/ 40”	5,060 ft.

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					2000	2001	2002	2003	2004	2005	2006	2007	2008	2002	2003	2004	2005	2006	2007	2008	
2006	Jal, NM USDA Service Center	100	Yes	10 ft.							100%	100%	100%							43”\ 34”	3,700 ft.
2006	Deming, NM Diaz Property	750	No	2 ft.							100%	100%	100%							26”/ 18”	4,250 ft.
2006	Milan, NM South side of NM Hwy 122 near the State Hwy Building	1,400	Yes	5 ft.							95%		0%							0	6,520 ft.
2006	Espanola, NM County Rural Event Center	100	Yes	5 ft.							90%	90%	90%							34”/ 22”	5,900 ft.
2006	Gap, AZ Willie’s Property	230	Yes (First 2 years)	5 ft.																45”/ 30”	5,890 ft.
2007	Hobbs, NM Hobbs Landfill &Transfer Station	1,100	Yes (First year only)	3 ft. – 5 ft.								98%	90%							18”/ 9”	3,600 ft.
2008	Taos, NM Benson Property	250	Yes	3 ft.									100%							15”/ 7”	7,200 ft.
2008	Taos, NM Trujillo Property	150	Yes	5 ft.									98%							9”/ 4”	6,800 ft.
2008	Taos, NM Taos County Extension Office	36	Yes (First year only)	5 ft.									100%							12”/ 5”	6,900 ft.