TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

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PLANT MATERIALS TECHNICAL NOTE NO. 73

'Windbreaker' Big Sacaton (*Sporobolus Wrightii*) for Use in Herbaceous Barriers and as Vegetative Mulch[1]

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There is a conservation need in the Southwest region of the United States to protect the land during the peak windy season. The wind in this area of the United States can cause substantial erosion and property damage to many types of land uses, including cropland, rangeland, urban areas, critical land resource areas and homesteads. In 1999, the Natural Resources Conservation Service (NRCS) Los Lunas Plant Materials Center (LLPMC) began a study to evaluate the use of vegetative wind barriers to help prevent or reduce the amount of damage being caused by these wind events.

Big Sacaton Evaluations

In 1980, the Los Lunas Plant Materials Center (LLPMC) began evaluations of big sacaton (*Sporobolus wrightii*), a native, warm-season perennial bunchgrass, for use in irrigated, warm-season, permanent grazing pastures. The LLPMC recognized this grass species had good potential for use in wind protection plantings, especially on cropland. The NRCS conservation practice of wind barriers or strips was already using grass species such as tall wheatgrass for wind protection, and big sacaton seemed to be an ideal choice for this conservation practice.

Big sacaton is a native, robust, perennial, warm-season bunchgrass and is found growing throughout the southwestern U.S. It typically occurs on low, alluvial flats and flood plains. In New Mexico its occurrence is widespread on dry plains and hills, with flowering taking place from June to August. Big sacaton is useful for hay, and it also is good forage for grazing when green foliage is young and healthy.

Big sacaton can grow in sandy, loamy, and heavy soils, but the soils need to be well drained. Big sacaton also grows well in acid, neutral, basic, and saline soils; however it cannot grow in dense shade. It has the potential to be used in several conservation practices including erosion control, forage for livestock and wildlife, wildlife cover, a xeric landscape plant, and hay mulch for critical area seeding.

Evaluation of the initial 1980 collections (that were made in 37 distinct locations in Arizona, New Mexico, and Texas and subsequent advanced plantings and field trials), enabled the LLPMC to develop the named variety 'Windbreaker' (see Table 1). The 'Windbreaker' varietal release exhibits an average leaf height of 1.28 m and an average plant width of 0.75 m. The leaf height and plant width, coupled with an erect growth form and very limited lodging of forage even in residue of older plant parts, make it an excellent plant for wind protection type plantings.

[1] **The *Natural Resources Conservation Service Field Office Technical Guide, Section IV Conservation Practices,* applicable to this technical note include, but may not be limited to: Hedgerow Planting (Code 442), Herbaceous Wind Barriers (Code 603), Filter Strip (Code 393), Field Border (386), Cross Wind Traps Strips (Code 589C), Mulching (484).**

Table 1: Collection Site Information for the Ten 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

Big sacaton evaluation planting at the LLPMC

Off-center field evaluations began in 1999 with the installation of herbaceous barrier or strip plantings to protect valuable cropland from wind erosion. During the period of 1999 through 2009 the LLPMC conducted trials using big sacaton in various wind protection plantings throughout New Mexico and Arizona (Figure 1). These plantings were carried out to provide the necessary evaluation of big sacaton for inclusion to the list of species being used in herbaceous wind barriers or strips in the LLPMC service area (Attachment 1).

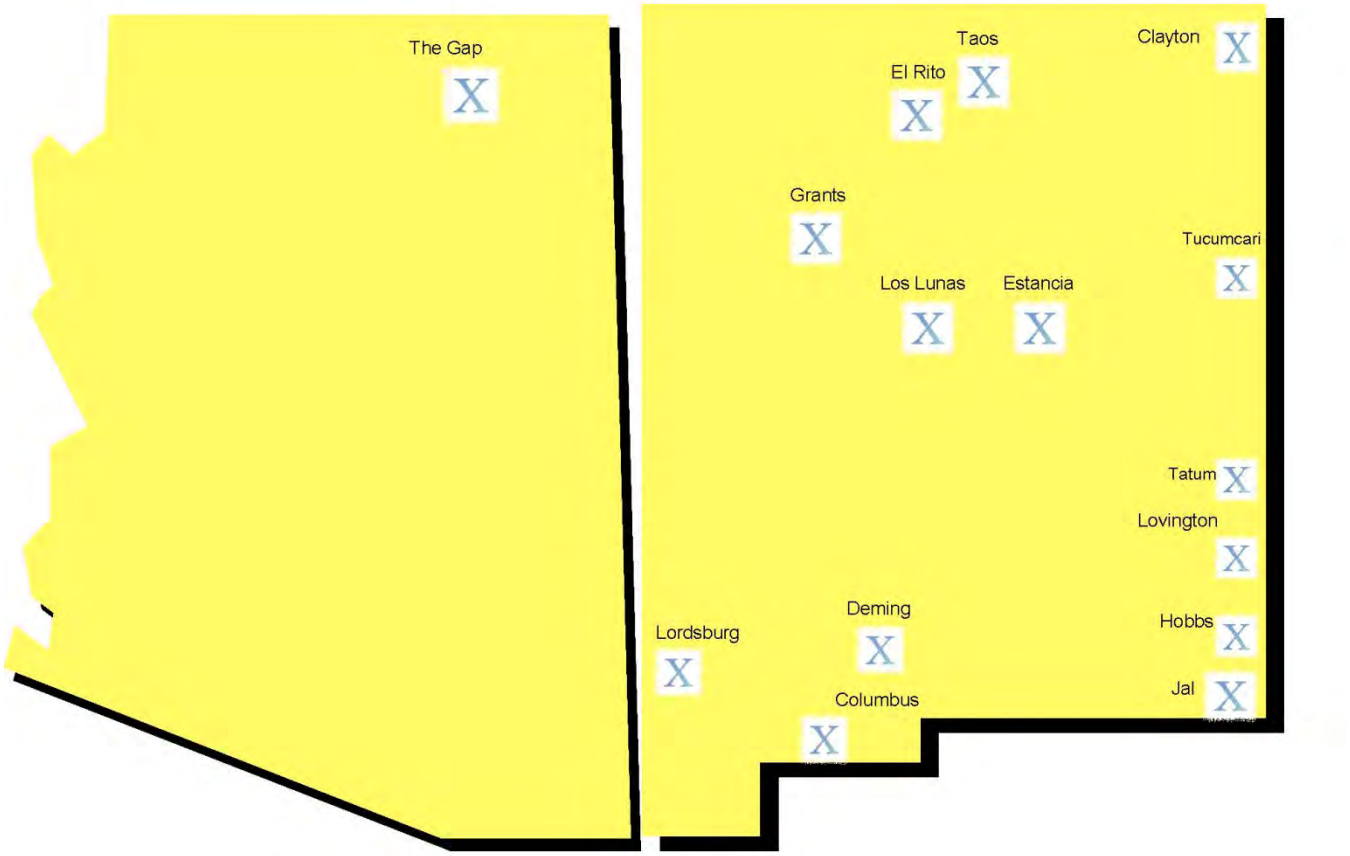


Figure 1: Big Sacaton Trial Planting Sites

Seed from big sacaton grown by the LLPMC was used to produce small transplants which were then planted at the various evaluation sites. The plantings consisted of a staggered two-row design with the plants being placed at 5-foot intervals in and between the rows. Except for two, all plantings of the big sacaton, included supplemental drip irrigation to provide adequate moisture for optimum growth. The two sites without drip irrigation included a trial planting near Deming in southern New Mexico and The Gap on the Navajo reservation northern Arizona. The Deming planting used rainfall and the runoff from a nearby paved road to water the planting. The Arizona planting site was irrigated by hand during its first growing season and will rely on rainfall after the first year for survival. Data for survival and growth of all of the plantings was taken yearly following establishment. The plants were measured for total height and width, and visual checks were made for such things as pest damage, drought symptoms, overwatering, cold climate survival, and for any seedling regeneration near the planting.

Big sacaton herbaceous windstrip planting with drip irrigation near Milan, New Mexico

Big sacaton dryland herbaceous windstrip planting near Deming, New Mexico

Big sacaton dryland herbaceous windstrip planting near The Gap, Arizona

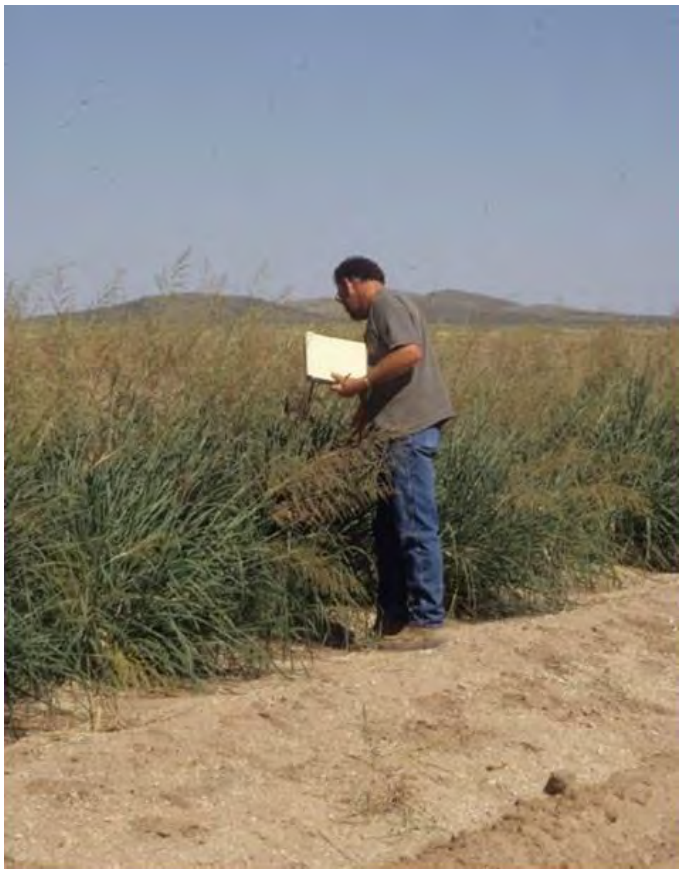
The sites selected during the evaluation of big sacaton provided evidence of the area of adaptation for this species in wind barrier or strip plantings. Higher elevation plantings (over 6,800 feet) caused a noticeable reduction in forage production. Big sacaton will survive at higher altitudes, but optimum protection against erosive wind events will be diminished.

Using the data gathered during this evaluation period, the LLPMC determined that when used in wind barrier or windstrip plantings, big sacaton can be a significant contributor to the prevention of wind erosion damage. In 2010, using data gathered from the evaluations of big sacaton at the LLPMC and in the numerous field planting sites, enabled the LLPMC to make a varietal release of big sacaton named ‘Windbreaker’.

'Windbreaker' big sacaton (*Sporobolus wrightii*)
growing at the Los Lunas Plant Materials Center.

Planting and Maintenance

The evaluation period from 1999 to 2010 provided data for recommendations during the installation and maintenance of this type of conservation planting. From the data collected, the LLPMC recommends that the planting of big sacaton, when placed in a vegetative type of wind barrier or strip, be a minimum of two rows perpendicular to the prevailing wind. The plants and the rows themselves should be at least 5 feet apart to promote adequate growing conditions. The rows need to be installed using a staggered type of planting design which allows for good canopy closure as the plants mature.



Big sacaton herbaceous windstrip evaluation in Columbus, New Mexico

Application of supplemental water is recommended for wind barrier or strip plantings of big sacaton during establishment, or at least for the first growing season. Depending on the amount of precipitation at the planting site, supplemental water should continue each year after establishment to promote optimum growing conditions for the established plants. Water applications after the establishment period should be completed by following the soil moisture conditions found at the site.

Big sacaton plantings should be mowed to a minimum plant height of 10 inches and should be done annually. This mowing will remove old growth from the planting, and will promote vigorous new growth of the plants during the growing season. The LLPMC recommends mowing to take place after the windy season has ended, but no later than June 15th for most sites found the in the southwestern United States. If the planting is not being used for wind protection, mowing can take place any time after the plants have reached dormancy. If the planting is being used for wildlife enhancement, mowing should be completed at a time that has the least effect on the animal species using the site.

Maintenance requires taking the necessary steps to control competition in the planting, particularly from aggressive weed species. An integrated pest program should to be in place to treat and remove any pest before it has an adverse effect on the planting, especially during the establishment period.

Conservation Uses

The evaluation plantings on cropland sites provided evidence that the big sacaton species has the capability to limit the damage done during the windy season. The ability of the species to help alleviate this damage means a greater economic return to the landowner. Loss or damage to the cropland plants, especially high-value cash crops, only increases the chance for reduced production per acre which leads to a reduction of revenue for the producer. A well placed, herbaceous wind barrier or strip of big sacaton can provide protection to cropland, and because it is a native perennial plant, can provide that protection for many years.

Big sacaton herbaceous windstrip installed to protect cropland in Columbus, New Mexico

Big sacaton herbaceous windstrip installed to protect cropland in Lordsburg, New Mexico

Big sacaton herbaceous winstrip installed to protect cropland in Deming, New Mexico

The evaluation plantings of big sacaton made by the LLPMC provided evidence that this species is also very useful for other conservation practices including, removal of soil particulates, increased food and cover for wildlife, pollinator habitat, enhanced snow deposition, and visual and noise screens.

Big sacaton herbaceous plantings have high potential for use in wind and snow protection for farmstead buildings, feedlots, and farm livestock production facilities. It may provide a vegetative barrier to provide for odor reduction near production facilities, such as poultry barns. The use of this native grass will provide much needed cover and food for many species of birds and small animals.

The use of big sacaton may be included in the NRCS Conservation Practice Code 380 *Windbreak/Shelterbelt Establishment*. The potential for quick establishment and fast growth may provide the needed protection of newly planted tree or shrub species from heavy winds or accumulating soil and/or snow which can cause damage to young plants. Big sacaton's vegetative above and below ground biomass production will enhance the storage of carbon in the soil environment.

Summary

'Windbreaker' big sacaton (*Sporobolus wrightii*) should be considered for many types of conservation practices in the southwest region of the United States. In arid regions, this species has proven to be a significant factor in protecting our natural resources. It not only provides ecological benefits, but also economic benefits to landowners. Where applicable, big sacaton should be a part of any conservation management plan. The evaluation of using big sacaton to solve conservation issues and to protect our natural resources is still an ongoing process. Additional evaluations could lead to an even greater role for big sacaton in the future.

Big sacaton herbaceous windstrip landscape planting installed for noise reduction and as a visual barrier in Lovington, New Mexico

Big sacaton wind erosion and visual barrier planting in Tatum Memorial Park in Tatum, New Mexico

Big sacaton dust protection and visual barrier planting along a state highway in Clayton, New Mexico

Big sacaton farmstead erosion protection and wildlife enhancement planting in Isleta, New Mexico

Appendix 1

'Windbreaker' Big Sacaton Survival Rates

Year Planted	City/Location	Total Transplants	Irrigation	Spacing	Percent Survival Rate 2000–2008								
					2000	2001	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%	
2000	Columbus, NM Rancho la Frontera	400	Yes	5 ft.	95%	95%	95%	95%	95%	95%	95%	95%	
2001	Columbus, NM Rancho la Fontera	167	Yes	5 ft.			45%	Replanted				100%	
2002	Deming, NM Keeler Property	460	Yes	5 ft.					N/A	95%	95%	95%	95%
2002	Tucumcari, NM Tucumcari Elementary	250	No	3 ft.			100%					100%	
2002	Tatum, NM Tatum Memorial Cemetery	172	Yes	5 ft.			100%					95%	
2003	Lovington, NM USDA Service Center	170	Yes	5 ft.				95%					95%
2003	Tatum, NM Tatum Town Park	300	Yes	5 ft.				100%				100%	
2004	Isleta, NM Lujan Farm	38	Yes	5 ft.					100%				100%
2004	McIntosh, NM Schwebach Farm	600	Yes	6 ft.					100%				85%
2004	Clayton, NM Dellinger Property	200	Yes	5 ft.					100%				100%
2006	Jal, NM USDA Service Center	100	Yes	10 ft.							100%	100%	100%
2006	Deming, NM Diaz Property	750	No	2 ft.							100%	100%	100%
2006	Milan, NM South side of NM Hwy 122	1,400	Yes	5 ft.							95%		0%

Year Planted	City/Location	Total Transplants	Irrigation	Spacing	Percent Survival Rate 2000–2008								
					2000	2001	2002	2003	2004	2005	2006	2007	2008
	near the State Hwy Building												
2006	Espanola, NM County Rural Event Center	100	Yes	5 ft.									
2006	Gap, AZ Willie's Property	230	Yes (First 2 years)	5 ft.									
2007	Hobbs, NM Hobbs Landfill &Transfer Station	1,100	Yes (First year only)	3 ft. – 5 ft.								98%	90%
2008	Taos, NM Benson Property	250	Yes	3 ft.									100%
2008	Taos, NM Trujillo Property	150	Yes	5 ft.									98%
2008	Taos, NM Taos County Extension Office	36	Yes (1st year only)	5 ft.									100%

'Windbreaker' Big Sacaton Growth Rates

Year Planted	City/Location	Total Transplants	Irrigation	Spacing	Foliage Height/Width (Inches) 2002–2008							Elevation
					2002	2003	2004	2005	2006	2007	2008	
1999	Columbus, NM, Rancho la Fontera	800	Yes	5 ft.	60"/36"					45"/42"		4,230 ft.
2000	Columbus, NM Rancho la Frontera	400	Yes	5 ft.	66"/36"					82"/42"		4,230 ft.
2001	Columbus, NM Rancho la Fontera	167	Yes	5 ft.	48"/48"					42"/40"		4,230 ft.
2002	Deming, NM Keeler Property	460	Yes	5 ft.	10"						50"/44"	4,300 ft.
2002	Tucumcari, NM Tucumcari Elementary	250	No	3 ft.	25/"15"					38"/32"		4,120 ft.
2002	Tatum, NM Tatum Memorial Cemetary	172	Yes	5 ft.		14"/8"				40"/35"		3,990 ft.

Year Planted	City/Location	Total Transplants	Irrigation	Spacing	Foliage Height/Width (Inches) 2002–2008							Elevation
					2002	2003	2004	2005	2006	2007	2008	
2003	Lovington, NM USDA Service Center	170	Yes	5 ft.		15”/8”					60”/50:	3,920 ft.
2003	Tatum, NM Tatum Town Park	300	Yes	5 ft.		10”/5”				46”/40”		3,990 ft.
2004	Isleta, NM Lujan Farm	38	Yes	5 ft.				40”/24”			56/”44”	4,890 ft.
2004	McIntosh, NM Schwebach Farm	600	Yes	6 ft.			10”/6”				44”/34”	6,150 ft.
2004	Clayton, NM Dellinger Property	200	Yes	5 ft.				30”/10”			48”/40”	5,060 ft.
2006	Jal, NM USDA Service Center	100	Yes	10 ft.							43”\34”	3,700 ft.
2006	Deming, NM Diaz Property	750	No	2 ft.							26”/18”	4,250 ft.
2006	Milan, NM South side of NM Hwy 122 near the State Hwy Building	1,400	Yes	5 ft.							0	6,520 ft.
2006	Espanola, NM County Rural Event Center	100	Yes	5 ft.							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.							18”/9”	3,600 ft.
2008	Taos, NM Benson Property	250	Yes	3 ft.							15”/7”	7,200 ft.
2008	Taos, NM Trujillo Property	150	Yes	5 ft.							9”/4”	6,800 ft.
2008	Taos, NM Taos County Extension Office	36	Yes (1st year only)	5 ft.							12”/5”	6,900 ft.

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