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NEW MEXICO STATE UNIVERSITY
AND COLORADO STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATIONS,
NEW MEXICO STATE HIGHWAY DEPARTMENT
AND
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NOTICE OF NAMING AND RELEASE OF 'EL VADO' SPIKE MUHLY FOR SOIL
STABILIZATION AND RANGE FORAGE

The Agricultural Experiment Stations of New Mexico State University and Colorado State University, the New Mexico State Highway Department, and the United States Department of Agriculture, Soil Conservation Service announce the naming and release of 'El Vado' spike muhly (Muhlenbergia wrightii Vasey).

Description:^{1/} Spike muhly is a warm-season, perennial, tufted bunchgrass found on plains, foothills, dry rocky ridges, open slopes, and sometimes wet areas at elevations of 3,800 to 9,000 feet in Colorado, Utah, New Mexico, Arizona, and northern Mexico. It is most common on semi-dry meadows, parks, and flats in upper pinyon-juniper and ponderosa pine zones. It grows on soils which are predominantly sandy or clay loams but is found on soils ranging from moist clay to gravelly or rocky. Muhlenbergia montana, Bouteloua curtipendula, Bouteloua gracilis, Andropogon scoparius, and Blepharoneuron tricholepsis are among its most common associates.

Spike muhly plants are light green with gray to blackish seedheads and purplish leaf sheaths near the stem joints.

Culms are mostly 20-50 cm. tall, leafy, somewhat spreading at the base, densely tufted, forming a rather hard crown. The leaf blades are narrow (1-2 mm. wide), fairly long (4-15 cm. long), flat, folded and involute, scabrous (especially below), and tend to be rough and wiry. Sheaths are glabrous or scabrous between nerves. Ligules are membranous. The spike-like seedhead looks similar to that of timothy (Phleum pratense) or wolf-tail (Lycurus phleoides) at a casual glance. The panicle is dense, more or less interrupted below, 4 to 15 cm. long and 8 mm. or less thick. Spikelets and lemmas are about 2 mm. long. The glumes are lanceolate or ovate and are awn tipped. The lemmas are glabrous, scabrous or puberulent and are acute or short awn tipped.

^{1/} Description is adapted from:

- a. USDA, FS. 1937. Range Plant Handbook. U. S. Gov't. Printing Office. p. G85.
- b. Gay, C. W. Jr., Dwyer, D. D., and Steger, R. E. 1970. New Mexico Range Plants. Coop. Ext. Ser. Cir. 374, N.M. State University, p. 39.

Origin: The original El Vado seed was collected October 9, 1958 from plants growing out of cracks on the exposed surface of a sandstone formation 10 miles west of Park View, New Mexico. The associated vegetation was ponderosa pine, blue grama, and little bluestem. The latter comprised about 95 percent of the herbaceous vegetation.

Testing: El Vado was tested cooperatively in plots as NM-199 and P-15618 at New Mexico State University Agricultural Experiment Stations located near Clovis, Las Cruces, and Los Lunas, New Mexico. It was field tested at five locations in New Mexico and two locations in Colorado. Selection pressure was not applied to seed increase plots or fields.

In the initial evaluation at Los Lunas, El Vado was compared with 9 other spike muhly accessions. It was rated equal to the more productive strains in herbage production. It was the best seed producer of the group.

El Vado is the only accession of the spike muhly tested at Los Lunas that was never known to be infested by seed head gall caused by wheat curl mite (*Aceria tulipae*). This insect resistance is its outstanding characteristic. The gall moderately reduced or totally eliminated seed production on all other accessions. El Vado was far superior to NM-216 spike muhly in seed production at Clovis. At Las Cruces, there was no statistically significant difference in seed yield among the three best strains; however, no infestations of gall-producing wheat curl mite were found on any accession.

The average seed yield for El Vado in field-size plantings at Los Lunas was 150 pounds of pure live seed (213 pounds bulk) per acre for four years and 116 pounds PLS for two years in another planting. The bulk seed yield of A-8604 was only 151 bulk pounds per acre for three years. NM-216 produced essentially only one seed crop in four years. A good characteristic of El Vado is that the seed is quite resistant to shattering.

The performance of El Vado in the field plantings was commendable. It was the superior entry in stand in one planting, equal to the best entry in one, was not the best nor the poorest performer in three, and failed in two plantings. It was compared with one other spike muhly (A-8604) in three of the six field plantings. El Vado was superior to A-8604 in the one planting where stands of both accessions were obtained.

The Comanche National Grassland planting containing 22 species demonstrates that spike muhly can be successfully established in seedings on some rather tough sites. After 16 years in this planting, A-8604 spike muhly was equaled in performance only by A-1407 yellow bluestem.

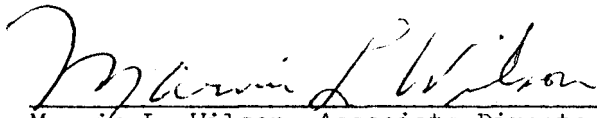
The U. S. Forest Service has made some successful plantings of spike muhly. More widespread use has been restricted because of a limited supply of seed.

Use: El Vado is being released as the first named variety of spike muhly. It will be used for soil stabilization and range revegetation in areas of the natural geographic range of the species such as the pinyon-juniper zone after mechanical brush removal or fires. The species is one of the most palatable members of its genus and is utilized by all classes of livestock.

The performance of EL Vado spike muhly in field tests plus its natural resistance to wheat curl mite make it worthy of release as a named variety. The soil stabilization and revegetation needs in the areas where spike muhly is adapted are presently not being met by available plant varieties. Release of El Vado will establish this variety in the seed trade and could prevent the loss of a known wheat curl mite resistant strain of spike muhly.


Seed Source: Breeder seed will be produced by the Plant Materials Center, Los Lunas, New Mexico. Limited quantities of seed will be available to growers through Crop Improvement Associations and Natural Resource Conservation Districts. Standards for all classes of seed will be included in the New Mexico Seed Certification Handbook and in the Colorado Grass Seed Certification Standards.

Approval signatures :



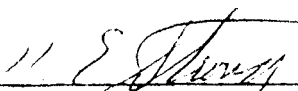
Marvin L. Wilson, Associate Director
New Mexico Agriculture Experiment Station
and Chairman, New Mexico Varietal Release Committee

11/20/73
Date



D. D. Johnson, Associate Director
Colorado Agricultural Experiment Station
Colorado State University

11/28/73
Date



Marion Strong, State Conservationist
USDA, Soil Conservation Service

12/12/73
Date

New Mexico State Highway Department

Date

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Table 1. Evaluations^{1/} made on spike muhly accessions in an initial evaluation nursery seeded April 21, 1960 in single row plots 20 feet long at PMC, Los Lunas, New Mexico.

Accession Number	Source	Sdlg. vigor 1960	Stand			Herbage production			Seed production ^{2/}		
			60	61	62	60	61	62	61	62	63
El Vado	Eutheron	3	3	3	3	3	3	3	1	2	3
A-8604	Cimarron	3	3	3	3	3	3	3	1	9	9
C-7	Kiowa	3	3	3	3	3	3	3	3	3	5
C-134	Trinidad	3	3	3	3	3	3	3	3	9	9
NM-33	Datil	3	3	3	3	4	4	4	5	9	9
NM-37	Jemez Mts.	3	3	3	3	4	3	3	5	9	9
NM-201	Tierra Amarilla	3	3	3	3	4	3	3	5	9	9
NM-215	Collins Park	3	3	3	3	3	3	3	5	9	9
NM-326	Nora	3	3	3	3	3	3	3	3	9	9
NM-343	Eagle Nest	3	3	3	3	4	3	4	5	9	9

^{1/} Key to ratings: 1 = best or most; 9 = poorest or least.

^{2/} 1961 ratings likely more nearly for number of seed heads. Other years definitely considered seed fill as part of the rating.

Narrative comments:

in 1961 El Vado was most outstanding accession in the group as to seed production and erectness. In 1962 this accession was nearly prostrate when mature. No gall damage found. This and C-27 were the only two that produced any seed. El Vado was still the outstanding accession in 1963. had no gall damage and was the most upright of the group. The performance of El Vado in 1964 was about the same as in 1963. In 1965 El Vado was still the outstanding accession. It was never infested with a seed head gall caused by wheat curl mite (*Aceria tulipae*) during this trial. All others were moderately or heavily damaged by the gall.

Table 2. Results^{1/} from plot studies of El Vado and NM-216 spike muhly seeded June 21, 1967 at Plains Branch Experiment Station, Clovis, New Mexico. Four plots of each accession were seeded. Plot size was 7 x 40 feet.

<u>1967 evaluations</u>				
<u>Strain</u>	<u>Stand</u>	<u>Vigor</u>	<u>Maximum ht. inches</u>	
El Vado	good+	good	6.6	
NM-216	good+	good	7.1	

<u>1968 observations</u>				
El Vado appeared to produce more seed but NM-216 looked slightly superior in forage production.				

<u>1969 evaluations</u>				
<u>Strain</u>	<u>Maximum ht. inches</u>	<u>Seed prod. rating</u>	<u>Seed yield in lbs/A</u>	
			<u>Bulk</u>	<u>PLS</u>
El Vado	17.5	3	06.0	50.2
NM-216	16.0	7	5.2	2.0

El Vado had many more seed heads than NM-216.

<u>1970 evaluations</u>				
<u>Strain</u>	<u>% headed 7-22-70</u>	<u>Max. head ht. inches 10-6-70</u>	<u>Seed prod. rating</u>	<u>Stand 10-6-70</u>
El Vado	80	22	2	1
NM-216	50	30	7	1

NM-216 badly lodged by 10-6-70. El Vado not lodged. No gall found on either accession. El Vado had larger and far more heads and was earlier maturing than NM-216.

<u>1971 evaluations</u>			
<u>Strain</u>	<u>Forage prod. rating</u>	<u>Number of seed heads rating</u>	<u>Seed head fill</u>
El Vado	5	1	1
NM-216	2	7	8

^{1/} Evaluations shown are averages of four plots for each strain.
Ratings: 1 = best or most; 9 = poorest or least.

Table 3. Performance of spike mully in a strain trial at Agronomy Farm, NMSU, Las Cruces, New Mexico.*

Accession	Rating ₁₉₆₈	Rating ₁₉₆₉	Rating ₁₉₇₀	Seed Yield lbs/A	Growth
El Vado	6.2 b ^{2/}	4.2 a	3.6 b	229 a	Intermediate
A-8604	3.0 a	3.4 a	2.6 a	204 a	Decumbent
C-7	5.0 b	3.4 a	4.0 b	247 a	Intermediate
W-216	5.8 b	7.4 b	4.0 b	30 b	Upright
Mean	5.0	4.6	3.6	178	
C.V., percent	16	18	16	9	

* Data for this table courtesy of Ferdinand A. Quinones, NMSU, Las Cruces, N.M.

^{1/} = best or most; 9 = poorest or least

^{2/} Within columns, values with the same letter are not significantly different (P = 5%) according to Duncan's multiple-range test.

Remarks: Design - randomized blocks with 5 replications

Plots - 10 feet long, 38 inches apart

Soil - medium heavy, irrigated 3 times in 1968 and 5 times in 1969

Planted - 9/15/66

Table 4. Seed production of spike muhly strains in field-size plantings at Los Lunas PMC.

Strain	Date planted	Acres	Harvest Year	Pounds per acre	
				Bulk	PLS
El Vaño	4-11-62	.42	1962	68	-
			1963	394	150
			1964	245	200
			1965	219	138
			1966	139	112
			Avg .	213	150*
El Vaño	8-9-66	.56	1967	221	124
			1968	245	107
			Avg .	233	116
A-8604	8-14-58	.88	1959	207	-
			1960	180	-
			1961	67	-
			Avg .	151	-
NM-216	5-12-61	.31	1962	no fill	-
			1963	193	147
			1964	32	-
			1965	no fill	-
			Avg .	112	-

* PLS average for last four seed production years.

Tables 1, 2 and 3 Colorado and 4, 5, 6, 7 and 8 New Mexico. The following eight pages are summaries of field planting results of spike muhly.

Key to ratings:

S = stand	0 or N = none
V = vigor	- - none or not observed
E = excellent	GE = between good and excellent
G = good	VG = very good
F = fair	FG = between fair and good
P = poor	PF = between poor and fair
T = trace	TG = trace to good

Planting 1 Colo.	Species	Year							
		1967		1968		1969		1970	
		S	V	S	V	S	V	S	V
	<u>Mix #1.</u>								
Briggsdale Grazing Assoc. Greeley, Colo.	Arriba Agropyron smithii	F	G	G	E	G	E	G	E
	Vaughn Bouteloua curtipendula	F	F	-	-	F	E	F	E
	Lovington Bouteloua gracilis	F	F	-	-	P	E	P	E
Soils: Loamy plains	C-127 Stipa viridula	G	G	F	E	F	G	F	G
Seeding date: 4/18/67 5,000 ft. elev.	<u>Mix #2.</u>								
	El Vado Muhlenbergia wrightii	G	G	E	G	E	G	E	G
	Comm. Agropyron smithii	F	F	F	G	G	G	G	G
Seeding method: Nesbitt drill in buffalo grass sod. Undercut with Hoble blade.	Vaughn Bouteloua curtipendula	F	F	-	-	P	E	P	E
	Lovington Bouteloua gracilis	F	F	-	-	P	E	P	E
	<u>Mix #3.</u>								
14 in. ppt.	A-1874 Agropyron desertorum	F	F	-	-	F	F	F	F
	C-27 Agropyron smithii	F	G	F	G	P	F	P	F
	C-47 Koeleria cristata	P	F	F	G	F	G	F	G
	<u>Single species seeding</u>								
	Luna Agropyron trichophorum	G	E	E	E	E	E	E	E
	A-1488 Agropyron trichophorum	G	F	E	G	G	F	G	F

Planting 2 Colo.	Species	Year					
		1964	1966	1967		1968	
				S	V	S	V
Arnold Harriman	El Vado Muhlenbergia wrightii	T	T	T	-	O	-
Fowler, Colo.	A-8604 Muhlenbergia wrightii	T	T	T	-	O	-
	Arriba Agropyron smithii	?	?	T	-	O	-
Soils: Alkaline plains	NM-487 Agropyron smithii	?	?	T	-	O	-
(saline)	A-1407 Andropogon ischaemum	T	PF	P	G	P	F
4500 ft. elev.	NM-155 Atriplex canescens	?	T	T	-	T	-
	Vaughn Bouteloua curtipendula	PF	F	P	G	F	G
Seeding date:	W-4 Bouteloua curtipendula	T	P	P	P	P	P
3/26/63	A-3730 Bouteloua eriopoda	T	T	T	-	P	P
	Lovington Bouteloua gracilis	T	P	P	G	P	P
Seeding method: Pitting	NM-38 Bouteloua gracilis	T	T	P	P	P	P
disc, broadcast	NM-373 Bouteloua gracilis	T	T	P	P	P	P
	RM-15 Oryzopsis hymenoides	T	PF	O	-	F	F
14 in. ppt.	C-14 Sporobolus airoides	O	O	O	-	P	G

Appendix B

Plots	V.	Species	Total		1965	1966	1967	1968
			U	V				
		<u>Single species planting</u>						
Black Mesa, BDA		A-13043 Agropyron desertorum	FG		F G	F G	F G	G G
Española, N.M.		A-10675 " sibiricum	T		P G	P G	P G	P G
		Winall Lymus junceus	T		O		P G	
Soils: Loamy WP-1		<u>Mix #1.</u>						
6500 ft. elev.		Arriba Agropyron smithii	G		F G	F G	F G	G G
Seeding date: 7/15/64		Lowinson Bouteloua gracilis	-*		G G*			-*
		MM-163 Cynzopsis hymenoides	TF		F G	F G	O	-
Seeding method: Rolling chopper and broadcast		<u>Mix #2.</u>						
20 acres		C-27 Agropyron smithii	TG		P F	P F	P F	F F
		A-13152 Bouteloua gracilis	GE*		G G*	G G*		-*
		MM-160 Lilaria Jamesii	GE*		P G	P G	O	-
11.5 in. ppt.		<u>Mix #3</u>						
		El Vado Muhlenbergia wrightii	T		O		P F	
		Arriba Agropyron smithii	C		P G	P G	P G	
		MM-118 Bouteloua gracilis	P*		F E	F E		-*
		<u>Mix #4.</u>						
		Arriba Agropyron smithii	G		F G	F G	G G	G G
		MM-155 Atriplex canescens	O		G G	G G	G G	G G

* Mostly native plants.

Planting 5 N.M.	Species	Year					
		1965	1966	1967		1968	
				S	V	S	V
Garcia Field	El Vedo Muhlenbergia wrightii	E	FG	G	G	F	F
Los Alamos, N.M.	Arriba Agropyron smithii	E	E	?	-	F	G
	C-119 Andropogon gerardi	G	FG	F	G	P	G
Soil: loam to silt loam	Pastura Andropogon scoparius	FG	FG	G	G	F	G
	NM-155 Agriplex canescens	E	E	-	-	-	-
	NM-368 Bouteloua curtipendula	G	T	F	G	P	G
7,200 ft. elev.	Lovington Bouteloua gracilis	G	G	G	G	G	G
	NM-715 Cercocarpus montanus	G	T	P	F	F	G
Seeding date: 6/29/65	Ladak medicago sativa	E	E	G	G	P	F
	NDL-54 Petalstemon purpureus	O	O	O	-	?	?
	NM-491 Purshia tridentata	?	T	P	F	F	F
Seeding method: resbitt drill	A-14173 Sanguisorba minor	F	F	F	G	G	F
	C-54 Sorghastrum nutans	E	G	G	G	F	G
	NM-104 Stipa scribneri	O	O	O	-	O	-
16 acres							
18 in. ppt.							

Planting 6 N.M.	Species	Year	
		1965	1966
		S	S
S. W. Sheep Lab	El Vado Muhlenbergia wrightii	T	O
10 miles east of	A-8604 Muhlenbergia wrightii	T	O
Fort Wingate, N.M.	Arriba Agropyron smithii	P	F
	NM-487 Agropyron smithii	P	PF
Soils: bottomland	NM-155 Atriplex canescens	T	T
WP-2	Lovington Bouteloua gracilis	P	T
6600 ft. elev.	A-13152 Bouteloua gracilis	T	T
	NM-373 Bouteloua gracilis	T	T
Seeding method: disc pitter	A-12413 Hilaria jamesii	T	-
and broadcast	NM-15 Oryzopsis hymenoides	T	P
	NM-168 Oryzopsis hymenoides	T	F
Seeding date:	A-13165 Panicum obtusum	-	-
6/14/63	C-14 Sporobolus airoides	O	O
	NM-184 Sporobolus airoides	T	O
20 acres			
12.5 in ppt.			

Planting 7 N.M.	Species	Year			
		1963	1964	1965	1966
		S	S	S	S
Fletcher Green	El Vado Muhlenbergia wrightii	G	GE	E	E
Quemado, N.M.	A-8604 Muhlenbergia wrightii	P	GE	G	G
	Arriba Agropyron smithii	FG	F	F	F
Soil: Loamy upland	C-20 Agropyron smithii	-	F	F	F
(old cultivated	A-1488 Agropyron trichophorum	F	F	P	P
field)	A-13252 Andropogon hallii	T	T	T	O
7600 ft. elev.	Pastura Andropogon scoparius	F	T	T	T
	NM-155 Atriplex canescens	O	O	O	-
Seeding date:	Vaughn Bouteloua curtipendula	PF	FG	F	T
6/11/63	Lovington Bouteloua gracilis	FG	GE	G	F
	A-13152 Bouteloua gracilis	FG	GE	G	G
Seeding method:	NDL-54 Petalostenon purpureus	G	T	T	O
Pitting disc &	2-54 Sorghastrum nutans	FG	PF	T	P
broadcast	NM-104 Stipa scribneri	T	O	PF	-
30 acres					
13.5 in ppt.					

Planting 8 N.M.	Species	Year	
		1972 S*	V
Jewett Gap Roadside, Quemado, New Mexico Soils: Mixed road cuts and fills - loam to shallow loam over granite.	El Vado Muhlenbergia wrightii	F	G
	Comm. kgropyron smithii	G	G
	Comm. Bouteloua curtipendula	P	F
	Comm. Bouteloua gracilis	P	F
	Redondo Festuca arizonica	G	G
	Bandera Penstemon strictus	G	E
Seeding date: 8/70 8,600 ft. elev.			
Seedbed: disced			
Seeding method: Flat areas drilled, cut slopes broadcast seeded with a hydroseeder; all areas fertilized and mulched w/hay mulch.			

* El Vado spike muhly and western wheatgrass made up a major portion of the stand on heavier loams and clay loams. Redondo Arizona fescue dominated the cut slope areas with soils being shallow, droughty, and infertile, or excessively well drained (steep or gravelly). Western wheatgrass dominated the ditch bottoms where overflow occurs.

Planting 8 N.M.	Species	Year	
		1972	
		S*	V
Jewett Gap Roadside, Quenado, New Mexico	El Vado Muhlenbergia wrightii	F	G
	Comm. Agropyron smithii	G	G
	Comm. Bouteloua curtipendula	P	F
Soils: Mixed road cuts and fills - loam to shallow loam over granite.	Comm. Bouteloua gracilis	P	F
	Redondo Festuca arizonica	G	G
	Bandera Penstemon strictus	G	E
Seeding date: 8/70 8,600 ft. elev.			
Seedbed: disced			
Seeding method: Flat areas drilled, cut slopes broadcast seeded with a hydroseeder; all areas fertilized and mulched w/hay mulch.			

* El Vado spike muhly and western wheatgrass made up a major portion of the stand on heavier loams and clay loams. Redondo Arizona fescue dominated the cut slope areas with soils being shallow, droughty, and infertile, or excessively well drained (steep or gravelly). Western wheatgrass dominated the ditch bottoms where overflow occurs.