Conditionally
APPROVED

A map depicting the areas of the excavation that are less than 3' bgs, including actual depths, must be provided with the closure report.
If the liner becomes exposed in the future the site will need to be readdressed, including verifying integrity of the liner. Should integrity fail then vertical delineation will be required to verify if contamination has migrated downward.

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TALON LPE

Work Plan, Revegetation and Noxious Weed Management Plan
Lime Rock Resources II-A, L.P.:

North Vacuum Abo North Unit (NVANU) #1 Battery
REVISION III

August 22, 2016

Prepared By:

Kimberly M. Wilson
TALON/LPE
408 W. Texas Avenue
Artesia, New Mexico 88210

Prepared For:

Lime Rock Resources II-A, L.P.

Mr. Jamie Keyes
NMOCD District 1
1625 N. French Dr.
Hobbs, NM 88240

Subject: **Soil Assessment and Remediation Work Plan**
Lime Rock Resources II-A, L.P.
North Vacuum Abo North Unit (NVANU) #1 Battery
API # 30-025-24220|1RP-4251|

Dear Mr. Keyes,

Lime Rock Resources (Lime Rock) has contracted Talon/LPE (Talon) to perform soil assessment and remediation services at the above referenced location. The results of our soil assessment and proposed remediation activities consist of the following.

Site Information

The NVANU #1 Battery is located approximately fifteen (15) miles west of Lovington, New Mexico. The legal location for this release is Unit Letter N, Section 2, Township 17 South and Range 34 East in Lea County, New Mexico. More specifically the latitude and longitude for the release are 32.8586617 North and -103.533493 West. A site plan is presented in Appendix I.

According to the soil survey provided by the United States Department of Agriculture National Resources Conservation Service (NRCS), the soil in this area is made up of Kimbrough-Lea land complex. Per the New Mexico Bureau of Geology and Mineral Resources, the local surface and shallow geology is comprised of calcareous-loamy alluvium and calcareous-loamy eolian sands which includes silty soils under lain by sedimentary rock and hard caliche. Drainage courses in this area are normally dry.

Ground Water and Site Ranking

The New Mexico State Engineer web site indicates the nearest ground water data to be in S10-T17S-R34E. The ground water in Section **10** is reported to be at depth of 92' below ground surface (BGS). See Appendix II for the referenced groundwater data.

Therefore the ranking for this site is a **10** based on the following:

Depth to ground water	50'–100'
Wellhead Protection Area	>1000'
Distance to surface water body	>1000'

Based upon the site ranking of **10**, NMOCD Recommended Remedial Action Levels (RRAL) are 50 mg/kg for BTEX, 10 mg/kg for Benzene, 1,000 mg/kg for TPH and 500 mg/kg for total chlorides.

Incident Description and Initial Remedial Actions

On March 15, 2016 Talon personnel met with Amber Groves from the New Mexico State Land Office (NMSLO) and Eddie Elliott with Lime Rock Resources at the NVANU #1 Battery to discuss the concerns of the State Land Office. See initial C-141 in Appendix III.

A site assessment and soil sampling activities for the construction of a work plan was performed. Grab soil samples were collected utilizing a hand auger to a depth of 1.5-feet BGS where refusal was encountered.

An air rotary drill rig was then mobilized for further vertical delineation of the impacted area. Vertical delineation sampling was carried out at sample location S-4(B-1) on April 12, 2016. The results from this sampling event were sent to NMOCD and NMSLO. At that time NMOCD requested further vertical and horizontal delineation of chlorides in this area. On June 15, 2016, Talon personnel returned to the location to obtain additional samples utilizing an excavator to a depth of between 2-feet and 10-feet BGS where refusal was encountered.

On July 12, 2016 Talon re-mobilized an air rotary drill rig to further delineate the chloride impacts following a site meeting with the NMOCD and the NMSLO. Boreholes were advanced inside of the impacted area at sample locations S-5(B-2), S-6(B-3), and S-9(B-4). Horizontal delineation samples were also taken on the periphery of the impacted area at sample locations B-6 through B-11 as directed by the NMOCD. The results of the sampling events at this location are summarized in the data tables below.

Laboratory Results

A summary of all the analytical data collected for this project is presented in the data tables below. Full copies of the lab reports were previously present to the OCD.

March 24, 2016

Sample ID	Depth (feet)	BTEX (mg/kg)	Chlorides (mg/kg)	TPH (mg/kg) GRO	TPH (mg/kg) DRO
S-4	0’	<0.300	3200	<10	<10
S-4	1’	<0.300	6240	<10	<10
S-4 Refusal	1.5’	<0.300	7280	<10	<10

April 21, 2015

Sample ID	Depth (feet)	BTEX (mg/kg)	Chlorides (mg/kg)	TPH (mg/kg) GRO	TPH (mg/kg) DRO
B-1 / S-4	5’	--	736	--	--
B-1 / S-4	10’	--	1380	--	--
B-1 / S-4	15’	--	688	--	--
B-1 / S-4	20’	--	320	--	--
B-1 / S-4	25’	--	16	--	--
B-1 / S-4	30’	--	<16	--	--

	6/15/16	6/23/16	7/6/16		
Sample ID	**Depth (feet)**	**Field Titration Chlorides (mg/kg)**	**Cardinal Lab Chlorides (mg/kg)**	**Xenco Lab Chlorides (mg/kg)**
S-5	0'	2245	2840	--
S-5	1'	1973	2600	--
S-5 Refusal	2'	292	640	--
S-6	0'	70	<16	--
S-6	1'	70	<16	--
S-6	2'	70	16	--
S-6	3'	121	192	--
S-6	4'	355	1230	945
S-6	5'	497	800	645
S-6	6'	425	672	488
S-6	7'	292	528	515
S-6	8'	355	480	308
S-6	10'	292	432	320
S-7	0'	2836	3840	--
S-7	1'	3191	3640	--
S-7 Refusal	2'	493	592	--

		6/15/16	6/23/16	7/6/16
Sample ID	**Depth (feet)**	**Field Titration Chlorides (mg/kg)**	**Cardinal Lab Chlorides (mg/kg)**	**Xenco Lab Chlorides (mg/kg)**
S-8	0'	70	96	31.7
S-8	1'	2552	3040	2440
S-8	2'	3048	3720	3140
S-8	3'	1985	2320	1740
S-8	4'	--	1260	1190
S-8	5'	567	864	668
S-8	6'	425	768	672
S-8	7'	425	528	520
S-8	9'	212	336	236
S-9	0'	425	784	--
S-9	1'	993	1300	--
S-9	2'	922	2040	--
S-9 Refusal	2.5'	922	1680	--

July 12, 2016

Sample ID	Depth (feet)	Chlorides (mg/kg)
B-2/S-5	5	249
B-3/S-6	15	733
B-3/S-6	20	717
B-3/S-6	30	248
B-4/S-7	5	41.5
B-5/S-9	5	1880
B-5/S-9	10	1350
B-5/S-9	15	859
B-5/S-9	20	314
B-5/S-9	25	210
B-6	0	41.6
B-6	5	21.0
B-7	0	ND
B-7	5	15.6
B-8	0	ND
B-8	5	ND
B-9	0	ND
B-9	5	ND
B-10	0	ND
B-10	5	77.5
B-11	0	ND
B-11	5	ND

Published Soil Information

Attached in Appendix IV is the NRCS published information for the Kimbrough-Lea complex, the soil type in the project area. The Kimbrough soil profile consists of 0-6 inches of gravely loam underlain by cemented material (caliche). The depth to restrictive feature is listed as 4-20 inches to petrocalcic (cemented or hard caliche). The Kimbrough land capability classification (non-irrigated) is 7s.

The Lea soil profile is comprised of 0-10 inches of loam followed by 10-26 inches of calcic loam underlain by cemented material. The depth to restrictive feature is described as 20-40 inches to petrocalcic. The land capability classification (non-irrigated) is 4s.

The land classification "subclass letter 's' shows that the soil has limitations within the root zone, such as shallowness of the root zone, high content of stones, a low available water capacity, low fertility and excessive salinity or sodicity." *Source reference: National Soil Survey Handbook, Part 622 (00-Exhibit 1), USDA, NRCS.* The NCRS land classification descriptions are also attached in Appendix IV.

The NRCS Plants Database was also consulted for the root zone information per NMOCD request. Attached (Appendix V) please find the published specifications for BLM seed mixtures No. 3 and No. 4 proposed for this project. As shown, the root zone requirements for all species range from 12-20 inches in depth with an average of 16-inches required. The existing root zone of the native species at this location was determined to be approximately 8-12 inches deep only.

Proposed Remedial actions

- The impacted areas will be excavated to a depth of 3-feet deep or the maximum extent possible or where refusal with an excavator is encountered at top of rock. A 20 mil liner will be installed within the entire excavated area per NMOCD direction.

- All of the excavated material will be hauled to Lea Land LLC, a NMOCD approved disposal facility.

- The backfilled area will be contoured to match the surrounding terrain and left in a "rough" condition to approximate natural surface deviations, control erosion, and promote revegetation.

- An erosion control berm will be constructed up-gradient of the backfilled area to prevent storm water runoff/washout.

- Immediately following preparation of the site, a Culti-Pack Seed Drill will be utilized to plant 1 acre of a 50% blend of BLM No. 3 & No. 4 seed mixture for shallow/rocky environments following manufacture recommended application rates. Fertilizer and water will be applied immediately following seeding to facilitate revegetation.

- In order to prevent wind erosion, locally obtained straw or hay will be laid over the freshly seeded area and will be reapplied as needed until revegetation process has begun.

- The site will be monitored by Lime Rock Resources personnel to insure proper revegetation is achieved. The NMSLO policy states the goal is to obtain native plant cover and diversity levels that are equal to or exceeding natural potential levels. Should revegetation to NMSLO standards not take place, then further amendments will be applied.

- During Talon's site assessment no obvious noxious or undesirable weeds such as African rue, Russian thistle, etc. were noted. All equipment to be used at this location will be washed prior to mobilization to prevent potential spread of noxious weeds to this site. Should invasive or noxious weeds develop during the revegetation process, NMSLO will be notified and a strategy for weed removal will be developed (herbicide, mechanical removal, etc.) depending on the plant type and extent of infestation.

- A final closure report documenting all remedial actions, sidewall confirmation analytical results, a final C-141 and seeding labels will be provided to the NMOCD District I Hobbs Office and NMSLO along with the Revegetation Forms.

Should you have any questions or if further information is required, please do not hesitate to contact our office at (575)-746-8768

Respectfully submitted,

TALON/LPE

Kimberly M. Wilson
Project Manager

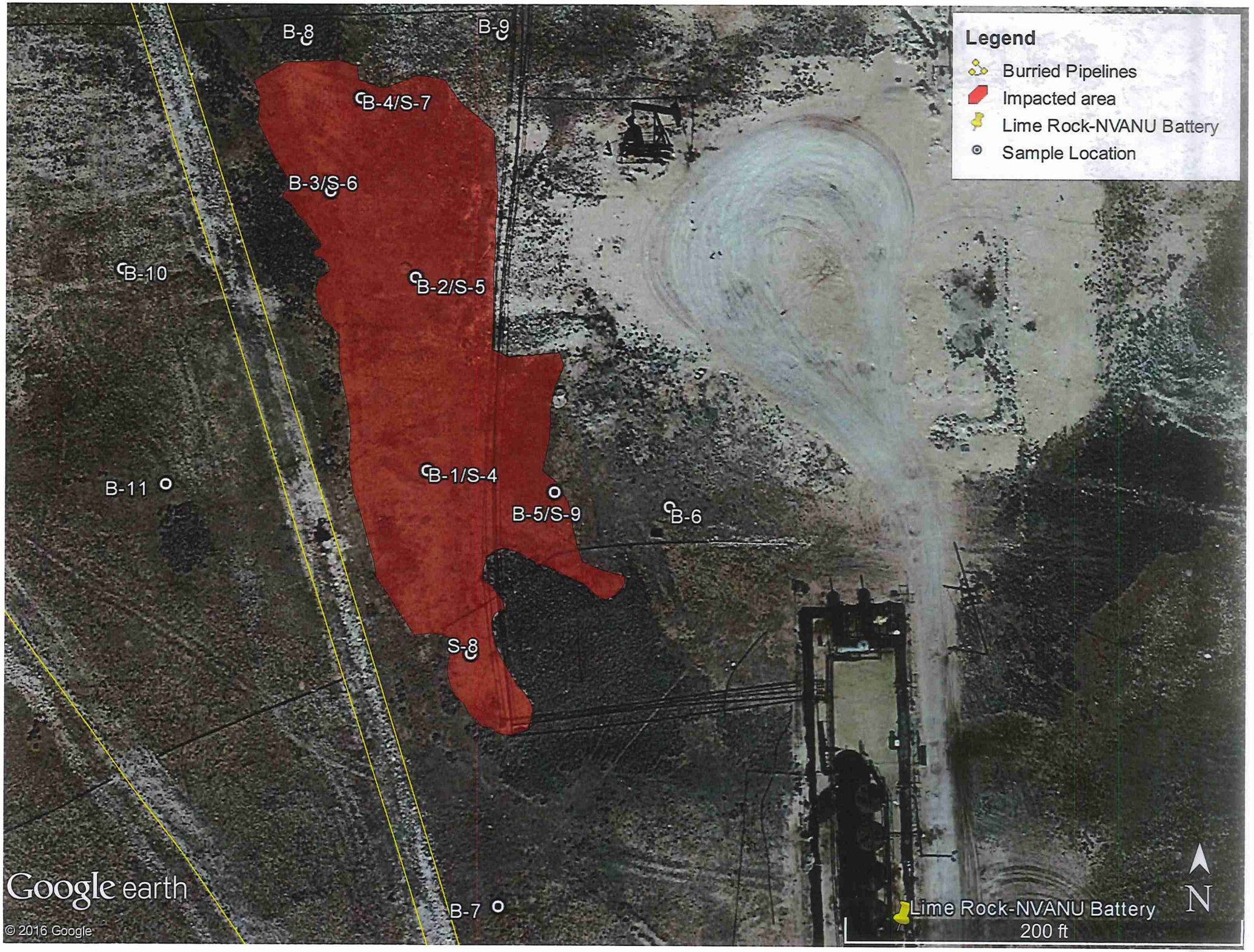
David J. Adkins
District Manager

Attachments:

Appendix I	Site Plan
Appendix II	Groundwater Data
Appendix III	Initial C-141
Appendix IV	NRCS Published Soil Information
Appendix V	BLM Seed Mixtures No. 3 and 4

APPENDIX I

SITE PLAN


Legend
Burried Pipelines
Impacted area
Lime Rock-NVANU Battery
Sample Location
B-8
B-9
B-4/S-7
B-3/S-6
B-10
B-2/S-5
B-11
B-1/S-4
B-5/S-9
B-6
S-8
B-7
Google earth
© 2016 Google
Lime Rock-NVANU Battery
200 ft
N

APPENDIX II

GROUNDWATER DATA

New Mexico Office of the State Engineer
Water Column/Average Depth to Water

(A CLW###### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-basin Code	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
L 03241	L	LE		2	2	10	17S	34E	636425	3636145*	0	122	92	30
L 06134	L	LE		2	4	03	17S	34E	636411	3636949*	804	175	95	80
L 06894	L	LE	1	4	1	10	17S	34E	635524	3635825*	956	175	103	72

Average Depth to Water: **96 feet**

Minimum Depth: **92 feet**

Maximum Depth: **103 feet**

Record Count: 3

Basin/County Search:

County: Lea

UTMNAD83 Radius Search (in meters):

Easting (X): 636425 **Northing (Y):** 3636145 **Radius:** 1000

***UTM location was derived from PLSS - see Help**

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

APPENDIX III

INITIAL C-141

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company : **LIME ROCK RESOURCES II-A, LP**	Contact : **Mike Barrett**
Address : **1111 Bagby Street Suite 4600, Houston ,TX 77002**	Telephone No. : **575-365-9724**
Facility Name : **North Vacuum Abo North Unit #1**	Facility Type: **Battery**

Surface Owner : **State**	Mineral Owner:	Lease No. **30-025-24220**

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County Eddy
N	2	17S	34E					

Latitude 32.8586617 N **Longitude** -103.533493 W

NATURE OF RELEASE

Type of Release : **Unknown**	Volume of Release : **Unknown**	Volume Recovered: **Unknown**
Source of Release : **Unknown**	Date and Hour of Occurrence: **Unknown**	Date and Hour of Discovery:
Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required	If YES, To Whom?	
By Whom? **Amber Groves**	Date and Hour:	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* **Amber Groves with the NM State Land Office and the NMOCD required the bare spot to the west behind the battery be delineated to determine the extent of the vertical contamination.**

Describe Area Affected and Cleanup Action Taken.* **Lime Rock Resources contacted Talon/LPE to perform initial site assessment and sampling activities in order to generate a work plan.**

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Michael Barrett	OIL CONSERVATION DIVISION	
Printed Name: **Michael Barrett**	Approved by District Supervisor:	
Title: **Production Superintendent**	Approval Date:	Expiration Date:
E-mail Address: **mbarrett@limerockresources.com**	Conditions of Approval:	Attached ☐
Date: **4/18/2016** Phone: **575-365-9724**		

* Attach Additional Sheets If Necessary

APPENDIX IV

NRCS PUBLISHED SOIL INFORMATION


0
200 ft

Lea County, New Mexico

KU—Kimbrough-Lea complex

Map Unit Setting

National map unit symbol: dmq0
Elevation: 3,600 to 4,400 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Kimbrough and similar soils: 50 percent
Lea and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kimbrough

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous alluvium and/or calcareous eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 6 inches: gravelly loam
Bkm - 6 to 16 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Very Shallow 16-21" PZ (R077CY037TX)
Hydric soil rating: No

Description of Lea

Setting

Landform: Plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from sedimentary rock

Typical profile

A - 0 to 10 inches: loam
Bk - 10 to 26 inches: loam
Bkm - 26 to 36 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Ecological site: Limy Upland 16-21" PZ (R077CY028TX)
Hydric soil rating: No

Minor Components

Stegall

Percent of map unit: 5 percent
Ecological site: Limy Upland 16-21" PZ (R077CY028TX)
Hydric soil rating: No

Slaughter

Percent of map unit: 5 percent
Ecological site: Limy Upland 16-21" PZ (R077CY028TX)
Hydric soil rating: No

Sharvana

Percent of map unit: 5 percent
Ecological site: Sandy 16-21" PZ (R077CY035TX)
Hydric soil rating: No

Arvana

Percent of map unit: 4 percent
Ecological site: Sandy 16-21" PZ (R077CY035TX)
Hydric soil rating: No

Playas

Percent of map unit: 1 percent
Landform: Playa floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Lea County, New Mexico
Survey Area Data: Version 12, Sep 29, 2015

All Uses

Cropland

Land capability classification

Determinations of land capability involve consideration of the risks of land damage from erosion and other causes and the difficulties in land use resulting from physical land characteristics and from climate. Land capability, as used in the USA, is an expression of the effect of physical land characteristics and climate on the suitability of soils for crops that require regular tillage, for grazing, for woodland, and for wildlife habitat.

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, forestland, or engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. Capability classes are determined for both irrigated and nonirrigated land. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no

erosion. These soils have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation. The significance of each subclass letter is described as follows:

Subclass letter e shows that the main problem is the hazard of erosion unless close-growing plant cover is maintained. The susceptibility to erosion and past erosion damage are the major soil-related factors affecting the soils that are assigned this subclass letter.

Subclass letter w shows that water in or on the soil interferes with plant growth or cultivation. In some soils the wetness can be partly corrected by artificial drainage. Ponding, a high water table, and/or flooding affect the soils that are assigned this subclass letter.

Subclass letter s shows that the soil has limitations within the root zone, such as shallowness of the root zone, a high content of stones, a low available water capacity, low fertility, and excessive salinity or sodicity. Overcoming these limitations is difficult.

Subclass letter c shows that the chief hazard or limitation is climate that is very cold or very dry. This subclass letter is used only in some parts of the United States.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. The use of this category of the land capability classification is a state option. This category of the system is not stored in the soil survey database. For information about capability units, please contact the local NRCS State Soil Scientist. For locations of the offices of the State Soil Scientists, click on the State Contacts link in the upper portion of this window.

Reference:
"National Soil Survey Handbook," Part 622 (00-Exhibit 1), USDA, NRCS

APPENDIX V

BLM SEED MIXTURES # 3 AND # 4

BLM #3

USDA United States Department of Agriculture
Natural Resources Conservation Service

NRCS | PLANTS Database

Characteristics

Conservation Plant Characteristics

***Bouteloua curtipendula* (Michx.) Torr.**
sideoats grama
BOCU

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.5
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.5
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	Medium	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12

Fire Tolerance	Low	Salinity Tolerance	Low
Frost Free Days, Minimum	90	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Mid Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Medium
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Butte

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0

Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.5
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.8
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	120	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-33

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No

Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: El Reno

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.5
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	Medium	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	20
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	Medium	Salinity Tolerance	Low

Frost Free Days, Minimum	150	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-28

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Haskell

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No

Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.5
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.8
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	180	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	7

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Moderate

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium

Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Killdeer

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.5
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.8
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	110	Shade Tolerance	Intolerant

Hedge Tolerance	None	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Low	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Medium
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Niner

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No

Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.3
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.8
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	145	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No

Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Premier

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.3
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.8
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	160	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-23

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Trailway

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate

Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.3
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.9
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	120	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-23

Reproduction

Bloom Period	Mid Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Medium
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Uvalde

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.5
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.9
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	175	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	7

Reproduction

Bloom Period	Mid Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua curtipendula (Michx.) Torr.
sideoats grama
BOCU
Cultivar: Vaughn

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), HI (I), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Rhizomatous
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes

Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	5.3
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.8
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	Medium	Precipitation, Maximum	25
Fertility Requirement	Medium	Root Depth, Minimum	12
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	165	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	159200
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

USDA United States Department of Agriculture
Natural Resources Conservation Service

NRCS | PLANTS Database

Characteristics

Conservation Plant Characteristics

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths
blue grama
BOGR2

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer and Fall	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Rapid	Growth Form	Bunch
Bloat	None	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	1.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Gray-Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.4
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	Medium	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	8
Drought Tolerance	High	Precipitation, Maximum	22
Fertility Requirement	Low	Root Depth, Minimum	16
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	142	Shade Tolerance	Intolerant

Hedge Tolerance	None	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Early Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	724400
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Low
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths
blue grama
BOGR2
Cultivar: Alma

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer and Fall	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	1.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No

Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Porous	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.4
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	7
Drought Tolerance	High	Precipitation, Maximum	22
Fertility Requirement	Low	Root Depth, Minimum	16
Fire Tolerance	Medium	Salinity Tolerance	Medium
Frost Free Days, Minimum	130	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-23

Reproduction

Bloom Period	Early Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	724400
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Low
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths
blue grama
BOGR2
Cultivar: Bad River

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer and Fall	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	1.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Gray-Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.4
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	Medium	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	8
Drought Tolerance	High	Precipitation, Maximum	22
Fertility Requirement	Low	Root Depth, Minimum	14
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	142	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Early Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	825000
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Low
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths
blue grama
BOGR2
Cultivar: Hachita

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer and Fall	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	1.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None

Foliage Porosity Summer	Porous	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.4
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	7
Drought Tolerance	High	Precipitation, Maximum	22
Fertility Requirement	Low	Root Depth, Minimum	16
Fire Tolerance	Medium	Salinity Tolerance	Medium
Frost Free Days, Minimum	165	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-23

Reproduction

Bloom Period	Early Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	724400
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Low
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths
blue grama

BOGR2
Cultivar: Lovington

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer and Fall	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	1.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Porous	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.4
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	7
Drought Tolerance	High	Precipitation, Maximum	22
Fertility Requirement	Low	Root Depth, Minimum	16
Fire Tolerance	Medium	Salinity Tolerance	Medium
Frost Free Days, Minimum	145	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Early Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No

Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	724400
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths
blue grama
BOGR2
Cultivar: WW-65

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Rapid	Growth Form	Colonizing
Bloat	None	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	0.5
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	Yes	Leaf Retention	No
Flower Color		Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	Yes
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Porous	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Decumbent
Foliage Texture	Fine	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	No	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	Yes	pH, Maximum	7.2
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	Medium	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	8
Drought Tolerance	High	Precipitation, Maximum	40
Fertility Requirement	Low	Root Depth, Minimum	16
Fire Tolerance	High	Salinity Tolerance	Medium
Frost Free Days, Minimum	142	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	825000
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Low
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Moderate

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

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Characteristics

Conservation Plant Characteristics

Leptochloa dubia (Kunth) Nees
green sprangletop
LEDU

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Short
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Coarse	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.0
Anaerobic Tolerance	Low	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	12
Drought Tolerance	High	Precipitation, Maximum	24
Fertility Requirement	Medium	Root Depth, Minimum	14
Fire Tolerance	High	Salinity Tolerance	Low
Frost Free Days, Minimum	210	Shade Tolerance	Intolerant

Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Mid Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Spring	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	538000
Propagated By Bare Root	No	Seed Spread Rate	Rapid
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Leptochloa dubia (Kunth) Nees
green sprangletop
LEDU
Cultivar: Marfa

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No

Flower Color	Yellow	Lifespan	Short
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Coarse	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.0
Anaerobic Tolerance	Low	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	12
Drought Tolerance	High	Precipitation, Maximum	24
Fertility Requirement	Medium	Root Depth, Minimum	14
Fire Tolerance	High	Salinity Tolerance	Low
Frost Free Days, Minimum	210	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Mid Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Spring	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	538000
Propagated By Bare Root	No	Seed Spread Rate	Rapid
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Leptochloa dubia (Kunth) Nees
green sprangletop
LEDU
Cultivar: Van Horn

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Short
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	Yes	pH, Maximum	8.0
Anaerobic Tolerance	Low	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	12
Drought Tolerance	High	Precipitation, Maximum	24
Fertility Requirement	Medium	Root Depth, Minimum	14
Fire Tolerance	High	Salinity Tolerance	Low
Frost Free Days, Minimum	210	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Mid Spring	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	High	Propagated By Sod	No
Fruit/Seed Period Begin	Spring	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	538000
Propagated By Bare Root	No	Seed Spread Rate	Rapid
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

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Characteristics

Conservation Plant Characteristics

***Setaria vulpiseta* (Lam.) Roem. & Schult.**
plains bristlegrass
SEVU2

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), PR (I)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Medium	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	No	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	No	pH, Maximum	8.0
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	Medium	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	12
Drought Tolerance	Medium	Precipitation, Maximum	24
Fertility Requirement	Medium	Root Depth, Minimum	18
Fire Tolerance	Medium	Salinity Tolerance	None
Frost Free Days, Minimum	180	Shade Tolerance	Intermediate

Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Early Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	290000
Propagated By Bare Root	No	Seed Spread Rate	Moderate
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Medium
Christmas Tree Product	No	Palatable Graze Animal	High
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

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Characteristics

Conservation Plant Characteristics

***Sporobolus airoides* (Torr.) Torr.**
alkali sacaton
SPAI

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Fine	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.0
Anaerobic Tolerance	Medium	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	5
Drought Tolerance	High	Precipitation, Maximum	13
Fertility Requirement	Medium	Root Depth, Minimum	16
Fire Tolerance	Medium	Salinity Tolerance	High
Frost Free Days, Minimum	136	Shade Tolerance	Intolerant

Hedge Tolerance	None	Temperature, Minimum (°F)	-38

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	1750000
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Low
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Low
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Low
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Sporobolus airoides (Torr.) Torr.
alkali sacaton
SPAI
Cultivar: Salado

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No

Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Fine	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.0
Anaerobic Tolerance	Low	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	5
Drought Tolerance	High	Precipitation, Maximum	13
Fertility Requirement	Medium	Root Depth, Minimum	16
Fire Tolerance	Medium	Salinity Tolerance	High
Frost Free Days, Minimum	150	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-23

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	1750000
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Medium
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Low
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Low
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

BLM #4

Sporobolus airoides (Torr.) Torr.
alkali sacaton
SPAI
Cultivar: Saltalk

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Graminoid	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	No
After Harvest Regrowth Rate	Moderate	Growth Form	Bunch
Bloat	None	Growth Rate	Moderate
C:N Ratio	Medium	Height at Base Age, Maximum	
Coppice Potential	No	Height at Maturity	3.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	No
Foliage Porosity Winter	Porous	Shape and Orientation	Erect
Foliage Texture	Fine	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.0
Anaerobic Tolerance	Low	Planting Density Per Acre, Minimum	
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	
Cold Stratification Required	No	Precipitation, Minimum	5
Drought Tolerance	High	Precipitation, Maximum	13
Fertility Requirement	Medium	Root Depth, Minimum	16
Fire Tolerance	Medium	Salinity Tolerance	High
Frost Free Days, Minimum	180	Shade Tolerance	Intolerant
Hedge Tolerance	None	Temperature, Minimum (°F)	-13

Reproduction

Bloom Period	Mid Summer	Propagated By Cuttings	No
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	No	Seed Per Pound	1750000
Propagated By Bare Root	No	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	Medium
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	Low
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	Yes	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Low
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

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Characteristics

Conservation Plant Characteristics

Atriplex canescens (Pursh) Nutt.
fourwing saltbush
ATCA2

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Shrub	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	Yes
After Harvest Regrowth Rate		Growth Form	Multiple Stem
Bloat	Low	Growth Rate	Slow
C:N Ratio	Medium	Height at Base Age, Maximum	4
Coppice Potential	No	Height at Maturity	4.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None
Foliage Porosity Summer	Moderate	Resprout Ability	Yes
Foliage Porosity Winter	Moderate	Shape and Orientation	Semi-Erect
Foliage Texture	Coarse	Toxicity	None
Fruit/Seed Color	Green		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.5
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.5
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	640
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	2700
Cold Stratification Required	No	Precipitation, Minimum	5
Drought Tolerance	High	Precipitation, Maximum	18
Fertility Requirement	Low	Root Depth, Minimum	20
Fire Tolerance	Low	Salinity Tolerance	High
Frost Free Days, Minimum	115	Shade Tolerance	Intolerant

Hedge Tolerance	Medium	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Late Spring	Propagated By Cuttings	Yes
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	44203
Propagated By Bare Root	Yes	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitability/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	No	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Atriplex canescens (Pursh) Nutt.
fourwing saltbush
ATCA2
Cultivar: Marana

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Shrub	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	Yes
After Harvest Regrowth Rate		Growth Form	Multiple Stem
Bloat	Low	Growth Rate	Slow
C:N Ratio	High	Height at Base Age, Maximum	5
Coppice Potential	No	Height at Maturity	9.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No

Flower Color	Yellow	Lifespan	Long
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	White-Gray	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	Yes
Foliage Porosity Winter	Moderate	Shape and Orientation	Erect
Foliage Texture	Coarse	Toxicity	Slight
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.0
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	300
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	1700
Cold Stratification Required	No	Precipitation, Minimum	7
Drought Tolerance	High	Precipitation, Maximum	18
Fertility Requirement	Medium	Root Depth, Minimum	20
Fire Tolerance	High	Salinity Tolerance	High
Frost Free Days, Minimum	185	Shade Tolerance	Intermediate
Hedge Tolerance	High	Temperature, Minimum (°F)	-8

Reproduction

Bloom Period	Late Summer	Propagated By Cuttings	Yes
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	52000
Propagated By Bare Root	Yes	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	No	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Atriplex canescens (Pursh) Nutt.
fourwing saltbush
ATCA2
Cultivar: Rincon

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Shrub	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	Yes
After Harvest Regrowth Rate		Growth Form	Multiple Stem
Bloat	Low	Growth Rate	Slow
C:N Ratio	Medium	Height at Base Age, Maximum	6
Coppice Potential	No	Height at Maturity	6.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Long
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Gray-Green	Nitrogen Fixation	None
Foliage Porosity Summer	Dense	Resprout Ability	Yes
Foliage Porosity Winter	Moderate	Shape and Orientation	Erect
Foliage Texture	Coarse	Toxicity	None
Fruit/Seed Color	Brown		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Low
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.6
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.0
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	300
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	1700
Cold Stratification Required	No	Precipitation, Minimum	7
Drought Tolerance	High	Precipitation, Maximum	20
Fertility Requirement	Low	Root Depth, Minimum	20
Fire Tolerance	High	Salinity Tolerance	High
Frost Free Days, Minimum	120	Shade Tolerance	Intermediate
Hedge Tolerance	High	Temperature, Minimum (°F)	-43

Reproduction

Bloom Period	Late Summer	Propagated By Cuttings	Yes
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Summer	Propagated By Sprigs	No
Fruit/Seed Period End	Fall	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	52000
Propagated By Bare Root	Yes	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	None

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	No	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

Atriplex canescens (Pursh) Nutt.
fourwing saltbush
ATCA2
Cultivar: Santa Rita

Summary

Duration	Perennial	Federal T/E Status	
Growth Habit	Shrub	National Wetland Indicator	
Native Status	L48 (N), CAN (N)		

Morphology/Physiology

Active Growth Period	Spring and Summer	Fruit/Seed Conspicuous	Yes
After Harvest Regrowth Rate		Growth Form	Multiple Stem
Bloat	Low	Growth Rate	Rapid
C:N Ratio	Medium	Height at Base Age, Maximum	8
Coppice Potential	No	Height at Maturity	8.0
Fall Conspicuous	No	Known Allelopath	No
Fire Resistant	No	Leaf Retention	No
Flower Color	Yellow	Lifespan	Moderate
Flower Conspicuous	No	Low Growing Grass	No
Foliage Color	Green	Nitrogen Fixation	None

Foliage Porosity Summer	Moderate	Resprout Ability	Yes
Foliage Porosity Winter	Porous	Shape and Orientation	Semi-Erect
Foliage Texture	Coarse	Toxicity	None
Fruit/Seed Color	White		

Growth Requirements

Adapted To Coarse Textured Soils	Yes	Moisture Use	Medium
Adapted To Medium Textured Soils	Yes	pH, Minimum	6.0
Adapted To Fine Textured Soils	Yes	pH, Maximum	9.0
Anaerobic Tolerance	None	Planting Density Per Acre, Minimum	680
CaCO3 Tolerance	High	Planting Density Per Acre, Maximum	2800
Cold Stratification Required	No	Precipitation, Minimum	6
Drought Tolerance	High	Precipitation, Maximum	18
Fertility Requirement	Low	Root Depth, Minimum	20
Fire Tolerance	Low	Salinity Tolerance	High
Frost Free Days, Minimum	240	Shade Tolerance	Intolerant
Hedge Tolerance	Medium	Temperature, Minimum (°F)	7

Reproduction

Bloom Period	Late Spring	Propagated By Cuttings	Yes
Commercial Availability	Routinely Available	Propagated By Seed	Yes
Fruit/Seed Abundance	Medium	Propagated By Sod	No
Fruit/Seed Period Begin	Spring	Propagated By Sprigs	No
Fruit/Seed Period End	Summer	Propagated By Tubers	No
Fruit/Seed Persistence	Yes	Seed Per Pound	60000
Propagated By Bare Root	Yes	Seed Spread Rate	Slow
Propagated By Bulbs	No	Seedling Vigor	High
Propagated By Container	No	Small Grain	No
Propagated By Corms	No	Vegetative Spread Rate	Slow

Suitibility/Use

Berry/Nut/Seed Product	No	Palatable Browse Animal	High
Christmas Tree Product	No	Palatable Graze Animal	Medium
Fodder Product	No	Palatable Human	No
Fuelwood Product		Post Product	No
Lumber Product	No	Protein Potential	Medium
Naval Store Product	No	Pulpwood Product	No
Nursery Stock Product	No	Veneer Product	No

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