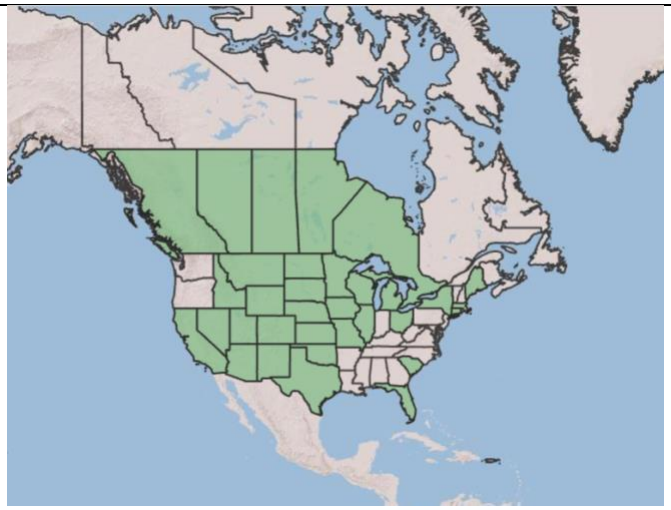
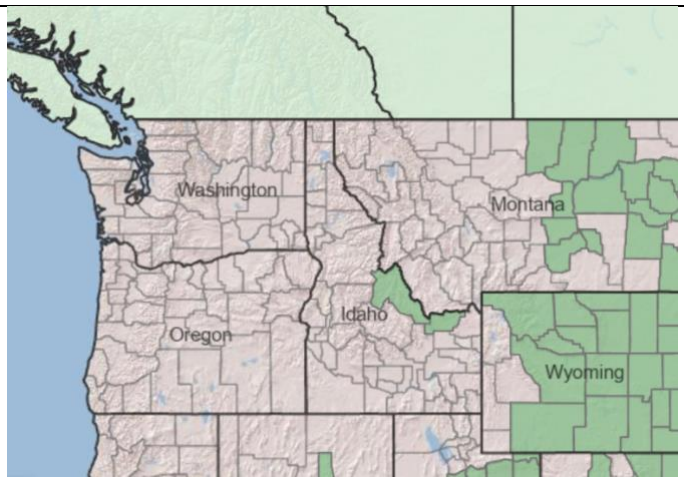
Plant Propagation Protocol for *Bouteloua gracilis*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/2024/BOGR2.pdf

Photo: Larry Allain, USDA, NRCS

TAXONOMY	
Plant Family	
Scientific Name	Poaceae[1]
Common Name	Grass family[1]
Species Scientific Name	
Scientific Name	*Bouteloua gracilis* (Willd. Ex Kunth) Lag. Ex Griffiths[2]
Varieties	No varieties found.
Sub-species	No sub-species found.

Cultivar	In 1963, 'Lovington' was released as a cultivar by New Mexico AES and Los Lunas Plant Materials Center. The original source of the material was field harvested in 1944.[3] 'Hachita' is a cooperative release in 1980. Source material was collected in 1957 south of Hachita, New Mexico.[3] 'Alma' is another cooperative cultivar released with USDA Agriculture Research Service, Los Lunas New Mexico PMC, and the Colorado and New Mexico AES's in 1992.[3]
Common Synonym(s)	*Chondrosum gracile* Willd. Ex Kunth[1,4] *Bouteloua gracilis* var *stricta*[4] *Bouteloua oligostachya*[4] *Chondrosum oligostachya*[4]
Common Name(s)	Blue grama, Mosquito grass[5]
Species Code (as per USDA Plants database)	BOGR2[2,3,4]
GENERAL INFORMATION	
Geographical range	 (USDA 2014) https://plants.usda.gov/home/plantProfile?symbol=BOGRS

	 (USDA 2014) https://plants.usda.gov/home/plantProfile?symbol=BOGRS *Bouteloua gracilis* occurs from Alberta east to Ontario and south through Rocky Mountains, Great Plains, and Midwest States to Mexico, besides Indiana and Kentucky.[2] The range also extends east to New York, Massachusetts, Connecticut, and Maine and south to South Carolina and Florida.[2]
Ecological distribution	*Bouteloua gracilis* is native to dry grasslands in North America. It is both heat and drought tolerant which allow them to live in the High Plains and Rocky Mountain areas. *Bouteloua gracilis* also tolerates sunny, arid, alkaline conditions which are also essential in living in the High Plains and Rocky Mountain regions.[5] Aspen parklands, riparian cottonwood forests, sagebrush steppe, salt-desert shrub communities, evergreen oak woodlands of the southwest, Ponderosa pine communities, pinyon-juniper communities, Great Plains, and semi-desert grasslands of the Southwest.[2] Grows in both low-lying areas and on uplands. In Northeastern United States and in Canada, *Bouteloua gracilia* occurs on dry prairies and sandhills.[2]
Climate and elevation range	Occurs in hot and arid areas where there is full Sun.[5] Generally, requires 8 to 15 inches of annual precipitation.[2] Found at elevational range from 985-9,850 feet, but the range is different depending on the state.[2]
Local habitat and abundance	*Bouteloua gracilis* occurs in grasslands where the soil is dry.[2] In grassland communities, *Bouteloua gracilis* is often found co-dominating with buffalo grass, needle-and-thread grass, prairies Junegrass, little bluestem, plains muhly, bluebunch wheatgrass, western wheatgrassm alkali sacaton, saltgrass, galleta, Kentucky bluegrass, threadleaf sedge, and sun sedge.[2]

Plant strategy type / successional stage	*Bouteloua gracilis* is cold and drought tolerant. By being drought tolerant and adapted to xeric conditions, it can inhabit dry areas. It is also tolerant of alkaline soils and moderately tolerant of salt.[2] *Bouteloua gracilis* is a late seral to climax grass species.[2]
Plant characteristics	Perennial grass; 1.5-2 ft high; 1-foot wide; leaves are flat and taper; solid-stemmed; flowerings stems grow 7 to 18 inches tall; inflorescence usually has 2 branches that extend at sharp angles from main stem; has dense and shallow roots; roots are typically 12 to 18 inches.[2]
PROPAGATION DETAILS: FROM SEED	
Ecotype	Butler obtained seeds from MPCG, Beaver Meadow Picnic, Beaver Meadow Trailhead, Moraine Park.[6] All of these places are in north Colorado within Rocky Mountain National Park.[10]
Propagation Goal	Seeds[6]
Propagation Method	Seeds[6]
Product Type	Propagules (seeds)[6]
Stock Type	Recommended 3-inch pots or any small pot as it allowed for easy division later on in the propagation process.[6] Can also be planted in seed flats.[6]
Time to Grow	Reaches maturity within 2 months.[2]
Target Specifications	No target specifications mentioned.
Propagule Collection Instructions	Butler collected in September and October by removing seeds from the plant.[6]
Propagule Processing/Propagule Characteristics	Seed yields of 100 to 180 pounds per acre.[2] In a tall grass prairie in Kansas and Nebraska, it was found the germination rates ranged from 3 to 31% over a four-year period.[7] Knipe achieved 94% germination at constant temperatures ranging from 60 to 100°F.[8]
Pre-Planting Propagule Treatments	Cleaning included removing the seed from the plant by hand or by using rasp and sandpaper.[6] Establishment, survival, and growth are highest when seedlings are isolated from neighboring adult plants as mature plants exploit water stored in the soil.[2] Also suggested a firm seedbed, but not solid and cultivation to kill the roots of cool-season grasses. Planting can be done by drilling or broadcasting. Seed should be sown no more than ¼ to ½ inches deep at a rate of 1-to-3-pound PLS/acre.[3]
Growing Area Preparation / Annual Practices for Perennial Crops	Germination media: Fafard Germinating Mix (superfine)[6] Growing media: Fafard Growing Mix 2[6] Size of container: 3-inch pots[6] Seeds stored in greenhouse.[6]
Establishment Phase Details	Manually sowed seeds- used a lot of seeds; left them uncovered.[6] Put in a greenhouse; 65-70°F days/ 55°F nights; propagated under tent with misters set from 8am to 8 pm with 10 sec/15-minute watering intervals.[6]

	Consistent establishment requires average soil temperature of above 59°F, 2 space 2-to 4-day periods with a continuously moist surface, and a soil water potential of -0.3 bars. Also requires development and extension of roots due to having a single seminal root that is short-lived.[2] Increasing opening size results in greater survival rates.[9]
Length of Establishment Phase	6 days[6]
Active Growth Phase	One week after germination seedlings moved to mister area without tent.[6] Need to develop adventitious roots which requires a period where soil remains moist for 2 to 4 days. This will allow the root to grow very near the soil surface.[9]
Length of Active Growth Phase	Reaches full maturity after two months of being sown.[2] Develops adventitious roots within 6 to 10 weeks after germination.[9]
Hardening Phase	Keep *Bouteloua gracilis* in the greenhouse with average soil temperature above 59 °F.[9]
Length of Hardening Phase	No duration found.
Harvesting, Storage and Shipping	No information found.
Length of Storage	No length of storage found.
Guidelines for Outplanting / Performance on Typical Sites	Suitable planting dates are from April to mid-May.[3] Takes approximately 21 days before tilling can occur and 2 months for flowering to start. [2]
Other Comments	Collection restrictions in most of the protocols found were testing for specific adaptations and therefore had methods unique to the study. Seed production of *Bouteloua gracilis* is typically low.[2]
INFORMATION SOURCES	
References	1. *Bouteloua gracilis*. Missouri Botanical Garden. (n.d.). https://missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=242377 2. Anderson, Michelle D. 2003. Bouteloua gracilis. In: In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.usda.gov/database/feis/plants/graminoid/bougra/all.html 3. Blue Grama Plant Guide. USDA NRCS Plant Materials Program. 2002. https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg_bogr2.pdf

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Other Sources Consulted	1. Sims, P. L., Lang'at, R. K., & Hyder, D. N. (1973). Developmental morphology of blue grama and sand bluestem. Journal of Range Management, 26(5), 340-344. 2. Lauenroth, W.K., Sala, O.E., Coffin, D.P. and Kirchner, T.B. (1994), The Importance of Soil Water in the Recruitment of Bouteloua Gracilis in the Shortgrass Steppe. Ecological Applications, 4: 741-749. https://doi.org/10.2307/1942004 3. Wilson, A. M.; Briske, D. D. 1979. Seminal and adventitious root growth of blue grama seedlings on the Central Plains. Journal of Range Management. 32(3): 209-213.
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