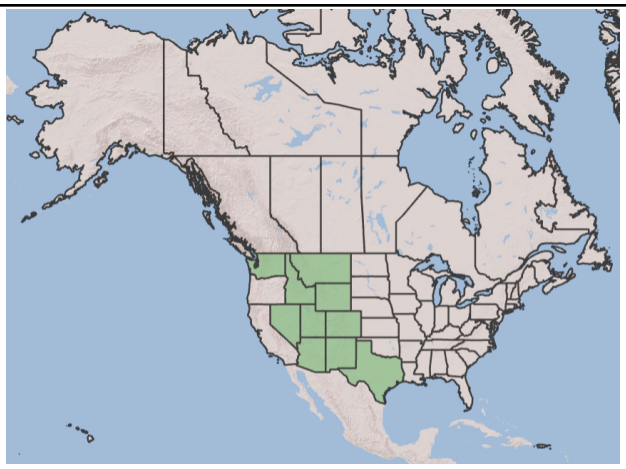
Plant Propagation Protocol for *Acer grandidentatum*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2023*/*ACGR3.pdf*

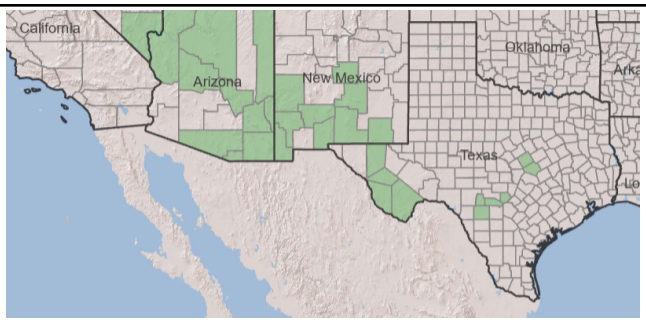
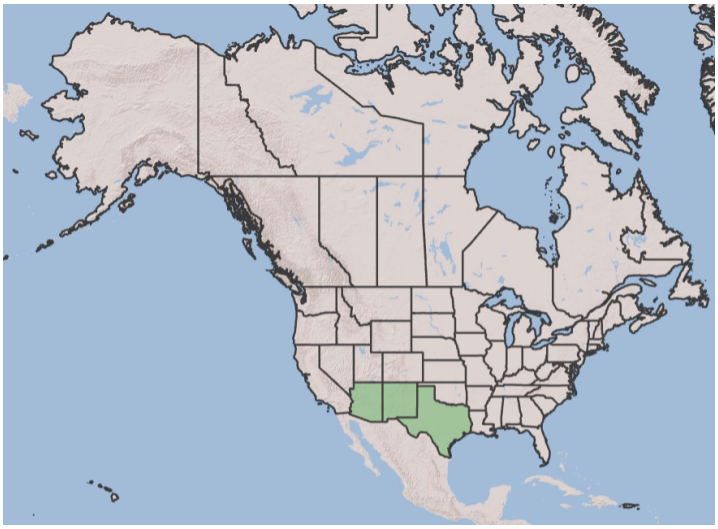
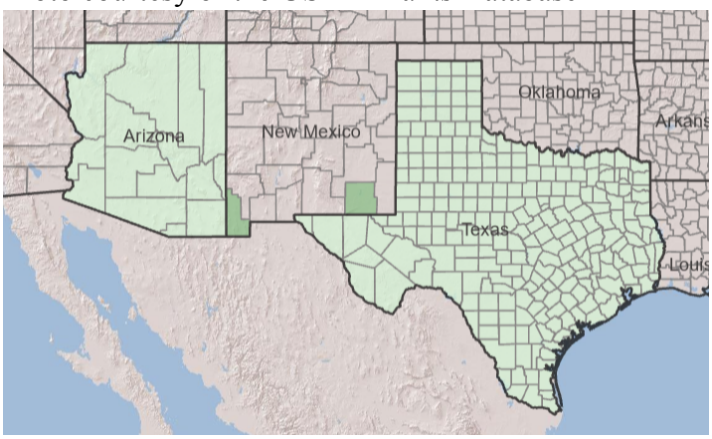
TAXONOMY	
Plant Family	
Scientific Name	Aceraceae Juss[1]
Common Name	Maple family[1,]
Species Scientific Name	
Genus	Genus: *Acer*[1] Species: *A. grandidentatum*[1] Species authority: L., Nutt.[1]
Variety	*Acer grandidentatum* var. *grandidentatum* Nutt.[2]
Variety	*Acer grandidentatum* var. *sinuosum* (Rehder) Little[2]
Sub-species	No Information Available
Cultivar	No Information Available
Common Synonym(s)	*Acer grandidentatum* var. *grandidentatum* Nutt.[2] *Acer grandidentatum* var. *sinuosum* (Rehder) Little[2]
Common Name(s)	sugar maple, canyon maple, Uvalde big-tooth maple, bigtooth maple[12]
Species Code (as per USDA Plants database)	ACGR3[1]
GENERAL INFORMATION	
Geographical range	The distribution of *Acer grandidentatum* var. *grandidentatum* is sporadic, being found primarily in mountainous regions of southeastern Idaho, south-central Montana, western Wyoming, and the Columbia Plateau in Washinton State.[2,6] It can also be found in the southern regions of Arizona, New Mexico, and south-central Texas, as well as in northern Mexico.[6,9] Some populations exist in locations such as the Virgin Mountains of Clark County, Nevada, along Lake Powell in Colorado, and in the Wichita Mountains of southwestern Oklahoma.[2,6] *Acer grandidentatum* var. *sinuosum* is present in Arizona, New Mexico, and Texas.[2,6]



USA distrubition of Acer grandidentatum var. grandidentatum Nutt.[1]
Photo courtesy of the USDA Plants Database[1]

Washington state distrubition of *Acer grandidentatum* var. *grandidentatum* Nutt.[1]
Photo courtesy of the USDA Plants Database[1]

Northwestern USA distrubition of *Acer grandidentatum* var. *grandidentatum* Nutt.[1]
Photo courtesy of the USDA Plants Database[1]

	 Southwestern USA distribution of *Acer grandidentatum* var. *grandidentatum* Nutt.[1] Photo courtesy of the USDA Plants Database[1]  USA distribution of *Acer grandidentatum* var. *sinuosum* (Rehder) Little[1] Photo courtesy of the USDA Plants Database[1]  Southwestern USA distribution of *Acer grandidentatum* var. *sinuosum* (Rehder) Little[1] Photo courtesy of the USDA Plants Database[1]
Ecological distribution	*Acer grandidentatum* prefers to grow in the moist soils of canyons, mountains, and plateaus, and it can also be found in woodlands.[8,9]

Climate and elevation range	*Acer grandidentatum* thrives in habitats situated at elevations ranging from 4,200 to 9,400 feet (1,280-2,870 m).[2,10] This species is able to withstand extremely low temperatures, as it remains cold hardy at temperatures as low as -31°F (-35 °C), and can endure high summer temperatures exceeding 100°F (38 °C).[2] Optimal growing conditions for *Acer grandidentatum* include regions with an annual precipitation range of 16 to 20 inches (40-50 cm).[2] Grows in hardiness zones 3 to 8.[4]
Local habitat and abundance	*Acer grandidentatum* shares its habitat with *Quercus gambelii* in certain regions of Utah and northern Arizona.[1,2] However, due to its earlier flowering and faster growth in stem and crown diameter, it tends to outcompete *Quercus gambelii* and gradually becomes the dominant canopy, sometimes even replacing it completely.[2] In other areas of its United States range, *Acer grandidentatum* often serves as an understory tree or shrub in habitats that include *Pseudotsuga menziesii, Abies concolor, and Abies lasiocarpa*.[2] In regions where it coexists with *Pseudotsuga menziesii*, it can establish a dense canopy after forest fires, but it ultimately is overtaken and reverts to an understory role.[2]
Plant strategy type / successional stage	*Acer grandidentatum* is able to survive periods of low precipitation due to its drought tolerance.[3] Since it tolerates temperatures above 100°F (38 °C) and around -31°F (-35 °C) it is considered both heat tolerant and cold tolerant.[2,3] It is an early to late successional species and is prevalent in late successional riparian communities in parts of Utah.[2] As a seedling, the species exhibits shade tolerance and is commonly found it growing beneath the mature canopy of *Artemisia tridentata* and *Quercus gambelii*.[2,3,8]
Plant characteristics	*Acer grandidentatum* is a deciduous tree or shrub that displays considerable variability in size and growth habits.[2] In areas such as canyon bottoms and stream banks, it grows as a tree, often with singular or multiple trunks that can attain heights of up to 50 feet (15 m) and a diameter of 1 foot (30 cm).[4] When growing on drier canyon slopes, it takes on a shrub-like form with two or more stems that reach up to 26 feet (8 m).[2] The leaves of *Acer grandidentatum* are palmately lobed, measuring between 1 and 4 inches (2.5-10 cm) in width.[2,8] Flowering typically occurs every 2 or 3 years and in early spring.[2,4] During the first growing season, the species develops a comprehensive root system, and as it matures lateral surface roots and a deep tap root form.[2] Its lifespan is difficult to determine.[10]
PROPAGATION DETAILS	
Ecotype	No Information Available
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug), Bareroot, Propagules
Stock Type	
Time to Grow	No Information Available

Target Specifications	No Information Available
Propagule Collection Instructions	In early Autumn, the fruit of this plant matures and consists of two pairs of winged samaras, which are typically about 2.5 cm long and often have a rose-colored appearance during mid-summer.[8,9] Seeds of *Acer grandidentatum* can be harvested in late autumn, once they have fully ripened. These seeds can remain on the trees until December, or until they are dislodged by winter storms.[10] It is advisable to choose seeds from healthy trees and to remove them by simply pulling them off the branches.[5,10] It is recommended to cut open a few seeds to verify the presence of an embryo, as a significant portion of the seed may be non-viable.[7] If the seed is viable, a 95% germination rate can typically be expected.[11]
Propagule Collection Instructions	Small wildings of this species can be relocated from approved locations to other areas.[10] For this, the trees should be dug up during autumn or early spring when the plants are inactive and have no leaves.
Propagule Collection Instructions	The species can be propagated through cuttings as well, which should be taken in January or early February to minimize sap bleeding from the tree.[5.10]
Propagule Processing/Propagule Characteristics	6350 seeds per pound.[1,6] No information on longevity, but viability is low.[2.6]
Pre-Planting Propagule Treatments	If adequately dried and kept in a sealed container at a temperature between 34-38° F and a moisture level of 15%, the seed can be stored for 1 to 2 years.[10]
Growing Area Preparation / Annual Practices for Perennial Crops	When growing seedlings in containers, it is important to plant them in a soilless medium with enough depth to encourage a deep root system to develop.[10] No information on container size.
Establishment Phase Details	For the seed to germinate, it needs to undergo a cold stratification treatment lasting between 8 to 16 weeks.[10] To accomplish this, the seed should be stored in a damp, aerated medium such as peat moss or vermiculite at temperatures ranging between 34-38° F.[10] Before stratification, the seed should be soaked for 24 hours.[10]
Establishment Phase Details	In the case of wildings transplanted to a nursery or landscape, it is important to provide irrigation until the root system can fully reestablish itself.[10]
Establishment Phase Details	When taking cuttings, they should be inserted into a pre-moistened medium and placed in a greenhouse with a 60% shaded area and an intermittent mist system to maintain moisture levels.[10] Temperatures need to remain cool with day/night temperatures of 65/60° F. Bottom heat of 75-80° F has been shown to assist in promoting root formation.[10]
Length of Establishment Phase	The seeds of *Acer grandidentatum* can be sown outside during autumn to allow for natural stratification throughout the winter.[10] The following spring these seeds will germinate, and can be nurtured

	throughout the summer before being transplanted as dormant plants in the autumn.[10] The process of germination is not always quick, sometimes taking up to two years.[11]
Active Growth Phase	Seedling growth for *Acer grandidentatum* is slow, especially during the initial few growing seasons.[2] In a greenhouse trial, seedlings had an average height of 5 inches (13 cm) after a period of 4 months.[2]
Length of Active Growth Phase	No Information Available
Hardening Phase	*Acer grandidentatum* should be hardened and adapted to the environment at the nursery before outplanting, which usually occurs in early spring after the last winter freeze and before hotter summer weather.[4]
Length of Hardening Phase	It grows about 12-36 inches a year depending on its access to water and light.[3] No Other Information Available
Harvesting, Storage and Shipping	Seedlings can be transplanted to larger containers or to the field or landscape at any time, provided they have undergone sufficient hardening.[10] In the case of field-grown seedlings, they can be relocated by digging up the plants while they are dormant, and ensuring that the roots are kept bare.[10]
Length of Storage	No Information Available
Guidelines for Outplanting / Performance on Typical Sites	No Information Available
Other Comments	Collecting wildings should be monitored and done on approved lands. If done improperly it can damage the landscape.[10] Soil types it does well in; Moist soils, Limestone-based, Sandy, Sandy Loam, Medium Loam, Clay Loam, Clay, Calcareous[9] Although *Acer grandidentatum* has been found to propagate through layering, this technique has not been widely utilized by nurseries that prefer to propagate it through the use of seeds.[5]

INFORMATION SOURCES

References	1. *Acer grandidentatum* Nutt. (bigtooth maple). USDA plants database. https://plants.usda.gov/home/plantProfile?symbol=ACGR3. Accessed May 3, 2023. 2. *Acer grandidentatum*. Fire Effects Information System (FEIS). https://www.fs.usda.gov/database/feis/plants/tree/acegra/all.html#COMMON%20NAMES. Accessed May 3, 2023.

	3. Bigtooth Maple, *Acer grandidentatum* . UC Davis Arboretum and Public Garden. https://arboretum.ucdavis.edu/tree-database/bigtooth-maple-acer-grandidentatum. Accessed May 3, 2023. 4. Bigtooth Maple, *Acer grandidentatum*. Conservation Garden Park - Bigtooth Maple. https://conservationgardenpark.org/plants/257/bigtooth-maple. Accessed May 3, 2023. 5. Bowen-O'Connor CA, Hubstenberger J, Killough C, VanLeeuwen DM, St. Hilaire R. In vitro propagation of *Acer grandidentatum* nutt. In Vitro Cellular & Developmental Biology - Plant. 2007;43(1):40-50. doi:10.1007/s11627-006-9005-6 6. Dickinson TL, Auken OWV. Survival, growth, and recruitment of bigtooth maple (*acer grandidentatum*) in Central Texas relict communities. Natural Areas Journal. 2016;36(2):174-180. doi:10.3375/043.036.0209 7. Dirr M, Heuser CW. *The Reference Manual of Woody Plant Propagation*. Athens, Ga: Varsity Press; 1987. 8. Landscape plants, *Acer grandidentatum*. Oregon State University - College of Agricultural Sciences - Department of Horticulture. https://landscapeplants.oregonstate.edu/plants/acer-grandidentatum. Accessed May 3, 2023. 9. Plant database. Lady Bird Johnson Wildflower Center. https://www.wildflower.org/plants/result.php?id_plant=acgr3. Published September 5, 2022. Accessed May 3, 2023. 10. Propagating Bigtooth Maple. USU - Center for Water-Efficient Landscaping. https://extension.usu.edu/cwel/research/propagating-bigtooth-maple. Published November 15, 2021. Accessed May 3, 2023. 11. The Plantsman. Vol. 5. 1983 - 1984. Royal Horticultural Society; 1983.
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