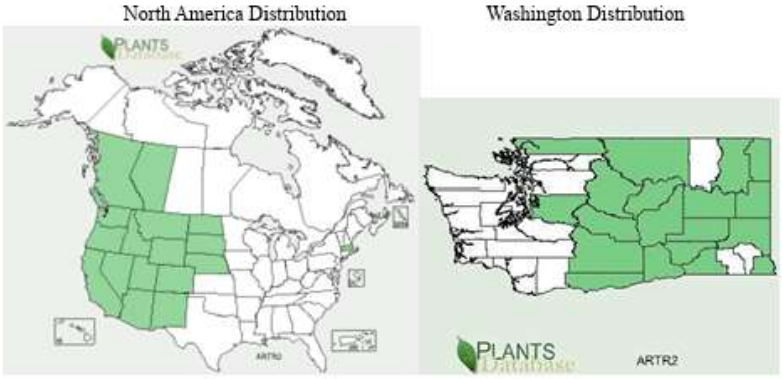
Plant Propagation Protocol for *Artemisia tridentata*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols/*[year]*/*[USDASpeciesCode.pdf]*

Spring 2025



Source: USDA plants database

TAXONOMY	
Plant Family	
Scientific Name	Asteraceae
Common Name	Aster family
Species Scientific Name	
Scientific Name	Artemisia tridentata
Varieties	The USDA Plants database recognizes six subspecies of Big Sagebrush (Artemisia tridentata): basin (ssp. tridentata), Wyoming (ssp. wyomingensis Beetle & Young), mountain (ssp. vaseyana [Rydb.] Beetle), subalpine (ssp. spiciformis [Ousterhout] Kartesz & Gandhi), xeric (ssp. xericensis Winward ex R. Rosentreter & R. Kelsey), and Parish's (ssp. parishii [Gray] Hall & Clements).
Sub-species	The USDA Plants Database recognizes six subspecies of Big Sagebrush (Artemisia tridentata). These are: basin (ssp. tridentata), Wyoming (ssp. wyomingensis), mountain (ssp. vaseyana), subalpine (ssp. spiciformis), xeric (ssp. xericensis), and Parish's (ssp. parishii)
Cultivar	
Common Synonym(s)	Artemisia tridentata Nutt. ssp. parishii (A. Gray) H.M. Hall & Clem. Artemisia tridentata Nutt. ssp. spiciformis (Osterh.) Kartesz & Gandhi Artemisia tridentata Nutt. ssp. tridentata Artemisia tridentata Nutt. ssp. vaseyana (Rydb.) Beetle Artemisia tridentata Nutt. ssp. wyomingensis Beetle & Young Artemisia tridentata Nutt. ssp. xericensis Winward ex R. Rosentreter & R. Washington Distribution Artemisia tridentata Nutt. ssp. parishii (A. Gray) H.M. Hall & Clem. Artemisia tridentata Nutt. ssp. spiciformis (Osterh.) Kartesz & Gandhi Artemisia tridentata Nutt. ssp. wyomingensis Beetle & Young R. Rosentreter & R. Kelsey
Common Name(s)	Big sagebrush; Big sage-brush; Big sage brush; Big sagebush; Big sage; Big western sagebrush; Big western sage; Big-leaf sagebrush; Bigleaf sagebrush; Tall western

	sagebrush; Tall western sage; Big mountain sagebrush; Common sagebrush; Common sage-brush; Common sage bush; Three-toothed sagebrush; Three-toothed sage-brush; Three-tooth sagebrush; Three-toothed sage; Three-tooth sage; Three tooth sage
Species Code (as per USDA Plants database)	ARTR2
GENERAL INFORMATION	
Geographical range	See above maps for North America and Washington distribution
Ecological distribution	Arid, desert and semi-desert conditions. It is primarily vegetation across vast areas of the Great Basin Desert. Some varieties can grow in areas up to 18 in precipitation per year, but most occur in more xeric conditions
Climate and elevation range	Elevation ranges are variable: 4,800-5-800 feet in Arizona, 100-7000 ft in Oregon, 2001-7019 ft in northeastern Utah
Local habitat and abundance	Prefers deep, well drained soils. Dominates much of the dry interior of eastern Washington. Occurs with the following SAF cover types: 220 Rocky Mountain Juniper 237 Interior ponderosa pine And the following Kuchler Plant associations: K022 Great Basin pine forest K023 Juniper-pinyon woodland K024 Juniper steppe woodland K037 Mountain mahogany-oak scrub K038 Great Basin sagebrush K039 Blackbrush K040 Saltbush-greasewood K041 Creosotebush K051 Wheatgrass-bluegrass K055 Sagebrush steppe K056 Wheatgrass-needlegrass shrubsteppe K057 Galleta-three-awn shrubsteppe K064 Grama-needlegrass-wheatgrass K066 Wheatgrass-needlegrass Particularly in Washington, it dominates communities characterized by steppe vegetation. It commonly grows conjunction with: Pinus ponderosa, Artemisia tripartita, Agropyron spicatum, Elymus cinereus, Stipa thurberiana, Purshia tridentata, Phlox longifolia, Balsamorhiza careyana, Bromus tectorum, Pseudoroegneria spicata, Achnatherum thurberianum, Hesperostipa comata, Festuca idahoensis, and Poa secunda
Plant strategy type / successional stage	Every subspecies of Big sagebrush is well adapted for extracting moisture from all parts of the soil profile. This allows them to be highly competitive with surrounding grasses and forbs. Also an effective colonizer immediately following disturbance
Plant characteristics	This shrub is nitrogen-fixing shrub that grows fairly slowly, usually living 40 to 50 years of age, some can exceed 100. Plants are longer lived, more hardy and more

	aromatic when they are grown in a poor, dry soil. Established plants are very drought tolerant, and susceptible to root rot if too wet.
PROPAGATION DETAILS: FROM SEED	
Ecotype	Idaho fescue grassland, Big Prairie, Glacier National Park, Flathead Co., MT
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container(plug)
Stock Type	172ml containers
Time to Grow	10 months
Target Specifications	Height: 6 to 10 true leaves, 6cm tall Caliper: 1.7mm Root System: Firm plug in 172ml container
Propagule Collection Instructions	Seeds must be collected in October with careful timing, as soon as the seeds have fully ripened. The seeds will turn brown and become easy to pull from the established plant. Collection at the improper time results in non-viable seed. Seed must then be kept well ventilated and spread evenly to dry for 3 to 5 days before cleaning. Seeds may germinate in fall and winter in the southern part of big sagebrush's range, but most seeds germinate in the spring, as early as April
Propagule Processing/Propagule Characteristics	Seed is short-lived unless stored at low moisture content ((6 to 8%) at temperatures less than 10 °C, in which case it can be stored for 5 years or longer. There are roughly 5,500,000 seeds per kilogram.
Pre-Planting Propagule Treatments	Seed should be hand cleaned using screens. Dormancy classification is "Non deep physiological dormancy," and can be broken through a 2 week cold-moist stratification. Different subspecies germinate optimally at different temperatures, but all seem to germinate best when the seeds are exposed to slightly fluctuating temperatures, and sown on the surface (need light to germinate).
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds should be grown outdoors, and sowed directly on to a growing medium of milled sphagnum peat, perlite, and vermiculite with Osmocote controlled release fertilizer (13N:13P2O5:13K2O) and Micromax fertilizer (12%S, 0.1%B,0.5%Cu,12%Fe, 2.5%Mn, 0.05%Mo, 1%Zn) at the rate of 1 gram of Osmocite and 0.20 gram of Micromax per 172 ml container
Establishment Phase Details	Medium should be kept slightly moist during germination. Germinates will appear after 2 weeks of temperatures above 22°C in spring. After 3 weeks of germination, 2 to 4 true leaves should be evident. Watering should be done in the early morning so the seedlings can dry during the day.
Length of Establishment Phase	4 weeks
Active Growth Phase	Both roots and shoots will grow rapidly after germination. Plants can be fertilized with a 20-20-20 NPK liquid fertilizer solution at 100 ppm during the growing season. Plants will be fully root tight 12 weeks after germination, roughly 2.5 cm in height, and with 10 to 12 true leaves

Length of Active Growth Phase	12 weeks
Hardening Phase	Watering should be gradually reduced during September and October. In preparation for winter, the plants should be fertilized with 10-20-20 NPK liquid fertilizer at 200ppm one time
Length of Hardening Phase	4 weeks
Harvesting, Storage and Shipping	Plants should be harvested in September, and stored during the winter in an outdoor nursery, preferably insulated by foam and snow.
Length of Storage	5 months
Guidelines for Outplanting / Performance on Typical Sites	Do not plant A. Tridentata outside of an elevation range 500 feet up or 1000 feet down from the area the seed was originally collected. Also, be sure the target planting site is not more than 300 miles away from the original collection site, and within the native distribution. This will minimize the risk of planting maladapted stock, increasing the survival and reproductive success. Also, avoid alkaline soils and opt for well drained soils with lots of light.
Other Comments	Commonly used in restoration projects in the western US. Elk, muledeer, antelope, sheep, rodents, squirrels, and grouse all utilize the plant as a food source. The species name, tridentata, refers to the 3-toothed leaves.
PROPAGATION DETAILS: VEGETATIVE	
Ecotype	Utah
Propagation Goal	Rooted cuttings
Propagation Method	Vegetative
Product Type	Propagules(cuttings)
Stock Type	n/a
Time to Grow	Usually less than 5 months
Target Specifications	Adjusted based on planting site and its specific condition
Propagule Collection Instructions (how, when, etc.)	Hand clippers to take terminal and lateral twigs with intact terminal buds, cut from the base of the previous season's growth. Cuttings should range in length from 8 to 12 cm and be treated and planted within 36 hours. Cuttings obtained during in winter show typically show greater rooting activity than those collected from actively growing plants. It is highly crucial to identify plant sources that will give inherent height rootability.
Propagule Processing/Propagule Characteristics	One protocol calls for a perlite/vermiculite growing media in a greenhouse.
Pre-Planting Propagule Treatments	Multiple protocols have called for use of rooting hormone, one naming specifically a synthetic auxin treatment, talc-based indolebutyric acid IBA mixture. The basal portion of each cutting was inserted into a peat pellet previously expanded with water.
Growing Area Preparation / Annual	Both protocols called for spray irrigation. Specific conditions suggested were a greenhouse temperature kept at 65-73ºF during the day and 55-59ºF at night.

Practices for Perennial Crops	Suggested durations and intervals for spray irrigation were 10 seconds every 15 minutes for 12 hours of the day. One protocol also employed uniform heating under the growing bed.
Establishment Phase Details	This species has been noted to have very variable rootability attributed to genetic diversity. Each cutting will vary in its ability to root and the degree to which it does produce roots.
Length of Establishment Phase	Rooting phase will last from 40-52 days.
Active Growth Phase	n/a
Length of Active Growth Phase	n/a
Hardening Phase	n/a
Length of Hardening Phase	n/a
Harvesting, Storage and Shipping	Can be stored briefly before outplanting. Cuttings should be taken from actively growing plants and treated with rooting hormones to enhance root development.
Length of Storage	Limited storage is recommended to maintain viability.
Guidelines for Outplanting / Performance on Typical Sites	Sagebrush thrives in arid, well-drained soils. Survival rates depend on site conditions, but proper stratification and planting techniques improve establishment.
Other Comments	One source mentions that current and previous research is not clear with regard to procedures for vegetative sagebrush propagation.
INFORMATION SOURCES	
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Other Sources Consulted	12."Artemisia Tridentata Nutt." Tropicos.org. Missouri Botanical Garden, 2010. Web. 20 Apr. 2010.
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