Plant Propagation Protocol for *Artemisia tripartita*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2022*/*ARTR4* \


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TAXONOMY	
Plant Family	
Scientific Name	Asteraceae
Common Name	Aster family
Species Scientific Name	
Scientific Name	*Artemisia tripartita* Rydb. (Asteraceae) (10).
Varieties	NA
Sub-species	There are two subspecies of *A. tripartita*: 1. Tall threetip sagebrush (*Artemisia tripartita* subsp. *tripartita*) (12). 2. Wyoming threetip sagebrush (*Artemisia tripartita* subsp. *rupicola* Beetle) (12).
Cultivar	NA
Common Synonym(s)	NA
Common Name(s)	Threetip sagebrush, tall threetip sagebrush, Wyoming threetip sagebrush (12).
Species Code (as per USDA Plants database)	ARTR4
GENERAL INFORMATION	
Geographical range	East of the Cascade mountains south from British Columbia through Washington, Oregon, Idaho, and east to Idaho and Nevada (5). It also occurs in the Snake River valley in western Wyoming (12). Wyoming threetip sagebrush (*A. tripartita rupicola*) is found exclusively in central to southeastern Wyoming, while tall threetip sagebrush (*A. tripartita tripartita*) is

	found in the wider range and in western Wyoming (8). The subspecies are separated by the Continental Divide in Wyoming (12). Typically more geographically restricted than other *Artemesia* sp. (7).
Ecological distribution	Sagebrush steppe, sagebrush desert, and grasslands (5). Occurs in the Columbia Plateau, Upper Basin and Range, Northern and Middle Rocky Mountains, and in the Wyoming Basin (12).
Climate and elevation range	Threetip sagebrush occurs in sagebrush and grassland ecosystems, at elevations from 1100 - 2130 m (11). However, elevation is not critical to *A. tripartita* distribution or abundance (3). *A. tripartita* is generally found on steep slopes and rocky ridges, in areas with shallow soil that is sandy or loamy (12) and in well-drained areas (8). *A. tripartita rupicola* (Wyoming threetip sagebrush) is often found on rocky hills, while *A. tripartita tripartita* can be found in deeper soil depths (8).
Local habitat and abundance	Threetip sagebrush is commonly associated with grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), and big sagebrush (*Artemisia tridentata*) (13 and 11). Threetip sagebrush stands are often more uniform and dense than big sagebrush stands (12).
Plant strategy type / successional stage	Threetip sagebrush is a competitor in both disturbed and undisturbed plant communities (11). It is dominant in grazed landscapes due to being less palatable to livestock (10) and is common in late successional communities (12). However, it is not tolerant of fire and after fire disturbance becomes dominated by grasses and other forbs (1).
Plant characteristics	*Artemisia tripartita* is a medium-sized perennial shrub. It reaches between 3 to 6 feet in height and has silvery green leaves. The leaves are distinct, with three clefts and linear lobes (11). Plants are densely tomentose and aromatic (4).

	The subspecies Wyoming threetip sagebrush (*A. tripartita rupicola*) is a dwarf shrub that reaches less than 1 foot in height, with decumbent branches (12). Threetip sagebrush is a vigorous seed producer and spreads by wind dispersal (12). It is a slow-growing plant with a moderate lifespan and is drought tolerant, but shade and fire intolerant (13).
PROPAGATION DETAILS	
Ecotype	NA
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container
Stock Type	172 ml conetainers (extrapolated from propagation data of big sagebrush, *Artemisia tridentata*) (7).
Time to Grow	10 months (extrapolated from propagation data of big sagebrush, *Artemisia tridentata*) (7).
Target Specifications	Plants should be produced based on the climate, elevation, and soil type of the target outplanting location (11). Plants should be firm plugs in 172 ml containers and should be 5 to 8 inches tall (11).
Propagule Collection Instructions	Seed can be collected by shaking, beating or stripping the seed off the plants into containers (11).
Propagule Processing/Propagule Characteristics	*A. tripartita* averages about 2.2 million seeds per lb (11). Seeds are abundant (12). Though some sources report seed viability lasting up to 6 years in cold storage (12), others report that threetip sagebrush seeds are short-lived and fragile, only lasting 2 years in storage (7).
Pre-Planting Propagule Treatments	Seeds can be processed using a hammer mill or brush machine to dislodge seeds from flowers, then finished with air or screen cleaners (11). *A. tripartita* seeds must be preserved in sealed containers in cold storage (<38° F. and < 25% R.H) (7). If not storing, seeds may be processed by rolling flower heads to loosen the seeds and then mass planted shallowly in soil (2). No pre-treatments necessary (2), though stratification of 60 days has shown to increase germination (6).
Growing Area Preparation / Annual Practices for Perennial Crops	Growing media must be resistant to holding water and have high aeration. A commercial lite mix with extra perlite is adequate (2). Outdoor nursery conditions, seeds must be planted very shallowly (1/16th inch deep) (6). Seeds require light to germinate (2).

Establishment Phase Details	Seeds are sown directly in moist media (7). Germination is moderate to rapid, with greatest germination rates at 60º F (9).
Length of Establishment Phase	4 weeks (extrapolated from propagation data of big sagebrush, *Artemisia tridentata*) (7).
Active Growth Phase	Seedlings often display high root to shoot ratios, and require frequent feeding of a balanced fertilizer (2). Plants should have leaves and be 1-2 cm tall (7). Optimum growing temperatures are 72º F during the day and 58º F at night, with extended light to 14 hours a day to encourage growth (2).
Length of Active Growth Phase	12 weeks (extrapolated from propagation data of big sagebrush, *Artemisia tridentata*) (7).
Hardening Phase	Irrigation is gradually reduced in September and October. Plants are flushed with clear water and fertilized with 10-20-20 NPK liquid fertilizer at 200 ppm once before winterization (extrapolated from propagation data of big sagebrush, *Artemisia tridentata*) (7).
Length of Hardening Phase	4 weeks (extrapolated from propagation data of big sagebrush, *Artemisia tridentata*) (7).
Harvesting, Storage and Shipping	Seedlings can be harvested in September after 5 months growing period and variable stratification period (6 and 7). Storage in outdoor nursery under cover to protect from snow (7).
Length of Storage	5 months (7).
Guidelines for Outplanting / Performance on Typical Sites	Transplanting should occur in early spring when moisture levels are optimal, using 5 to 8-inch-tall stock that has been overwintered (11). Planting sites should be cleared of competing vegetation for optimal establishment (11).
Other Comments	When local conditions of outplanting sites contain ranges of elevation in excess of 458m, restrict seed transfer up 153 m or down 305 m from the origin collection area (8). Collect from at least 30 unrelated plants, separated by a minimum of 30 m in distance. Collect equal numbers of seeds from each plant. Each collection area should not exceed 0.5 km to optimize transfer capabilities (8). *Artemisia tripartita* may also be propagated by cutting and layering (12), but growing from seed is reported to be the most effective strategy (2).
INFORMATION SOURCES	

References	(1) Akensoji, A. 1988. Postfire vegetation dynamics in a sagebrush steppe in southeastern Idaho, USA. Vegetation 78: 151-155. (2) Borland, J. The Woody Artemisias: Their Species & Propagation. Colorado Native Plant Society. (3) Fisser, H. G. 1962. An ecological study of the Artemisia tripartita subsp. rupicola and related shrub communities in Wyoming. University of Wyoming. (4) Flora of North America Editorial Committee. 2006. Flora of North America North of Mexico. Vol. 19. Magnoliophyta: Asteridae, part 6: Asteraceae, part 1. Oxford Univ. Press, New York. xxiv + 579 pp. (5) Giblin, D. 2022. Artemisia tripartita. Burke Herbarium Image Collection, University of Washington. (6) Lambert, S. 2005. Guidebook to the Seeds of Native and Non-Native Grasses, Forbs and Shrubs of the Great Basin. United States Department of the Interior, Bureau of Land Management. (7) Luna, Tara; Evans, Jeff; Wick, Dale. 2008. Propagation protocol for production of Container (plug) Artemisia tridentata Nutt. plants 172 ml conetainers; USDI NPS - Glacier National Park West Glacier, Montana. In: Native Plant Network. (8) Mahalovich, M. and McArthur, E. D. 2004. Sagebrush (Artemesia sp.) Seed and Plant Transfer Guidelines. Native Plants Journal. (9) Marchand, Leonard Stephen. 1964. An ecological study of sagebrush in interior British Columbia. Moscow, ID: University of Idaho. 116 p. Thesis. (10) McArthur, E. D. 1999. Sagebrush Systematics and Distribution. Sagebrush Steppe Ecosystems Symposium, Boise State University. (11) Tilley, D and T. Pickett. 2019. Plant Guide for threetip sagebrush (Artemisia tripartita). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

	(12) Tirmenstein, D. 1999. Artemisia tripartita. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). (13) USDA NRCS National Plant Data Team. 2022. Artemisia tripartita. USDA Plants 5Database. (14) Winward, W. H. 1980. Taxonomy and Ecology of Sagebrush in Oregon. Oregon State University Agricultural Experiment Station.
Other Sources Consulted	
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