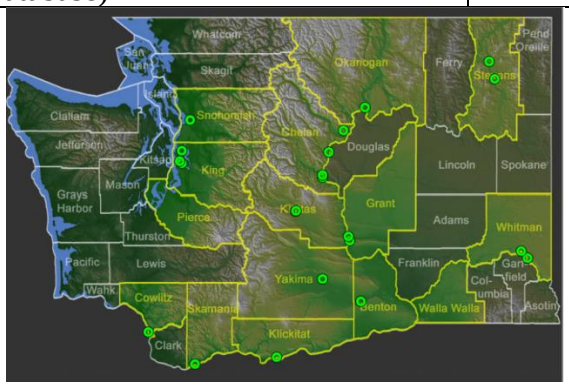
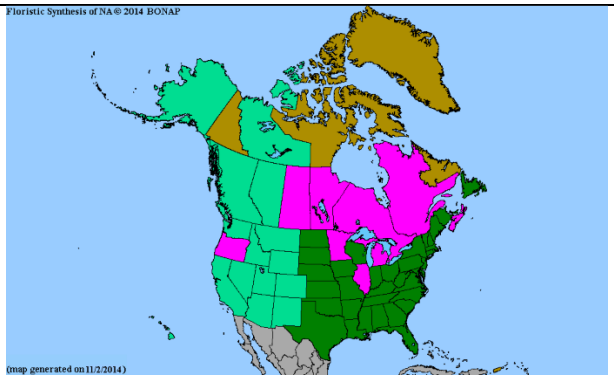
Plant Propagation Protocol for *Ambrosia artemisiifolia*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2023/AMAR2.pdf*

TAXONOMY	
Plant Family – Asteraceae	
Scientific Name	*Ambrosia artemisiifolia*
Common Name	Common ragweed
Species Scientific Name	
Scientific Name	*Ambrosia artemisiifolia* Linneaus
Varieties	*Ambrosia artemisiifolia* L. var. *artemisiifolia* (AMARA2) *Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourtils (AMARE) *Ambrosia artemisiifolia* L. var. *paniculata* (Minchx.) Blank. (AMARP)
Sub-species	*Ambrosia artemisiifolia* L. var. *artemisiifolia* *Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourtils *Ambrosia artemisiifolia* L. var. *paniculate* (Michx.) Blank.
Cultivar	*Ambrosia artemisiifolia*
Common Synonym(s)	*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourtilz *Ambrosia artemisiifolia* L. var. *paniculate* (Michx.) Blank. *Ambrosia elatior* L. *Ambrosia glandulosa* Scheele *Ambrosia monophylla* (Walter) Rydp.
Common Name(s)	Annual ragweed, common ragweed, bitterweed, blackweed, carrot weed, hayfever weed, hayweed, hogweed, low ragweed, Roman wormwood, short ragweed, small ragweed, stammer wort, wild tansy
Species Code (as per USDA Plants database)	AMAR2



Washington State Distribution [9]



North America Distribution [13]
(Dark green = species present in state and native, teal = species native but adventive in state, pink = species noxious)

GENERAL INFORMATION	
Geographical Range	*Ambrosia artemisiifolia* is native to Central and Northern America but is now widely distributed across the world. It has become a dominant non-native species in Italy, Lithuania, and Hungary [10]. *A. artemisiifolia* is found on both sides of the Cascades in Washington state, from Alaska to California down the west coast, and east across North America to the Atlantic coast [9]. It is not prominent in subtropical/tropical regions or areas with hot dry summers [10].
Ecological Distribution	Commonly found along roadsides, in fields, pastures, waste lots, and other dry, disturbed, open areas at low elevations [9]. It is naturally found along riverbanks and in grasslands and dry meadows [10].
Climate and Elevation range	*A. artemisiifolia* is susceptible to frost and is commonly found between 30-50º Fahrenheit at both north and south latitudes. It rarely grows above an altitude of 1000 meters. Cooler temperatures limit

	the production of flowers or seeds of *A. artemisiifolia* which means that it is possible that with climate change causing increased temperatures, the range of *A. artemisiifolia* may increase [10].
Local Habitat and Abundance	Experiments done by Vidotto et al. (2013) have shown that *Ambrosia artemisiifolia* inhibits the growth and germination of *Solanum lycopersicum* (tomato) by over 50%. These authors also showed a reduction in growth for *Brassica spp.* (lettuce). The season-long presence of dense populations of *Ambrosia artemisiifolia* in Illinois reduced corn yield by 74% in two years [10]. This is causing conflict within agricultural practices.
Plant Strategy Type / Successional Stage	*A. artemisiifolia* is a weedy, colonizing species. It is one of the earliest emerging summer annual weed species, germinating once soil temperatures reach 11-13º C. It also functions as a pioneer annual in temperate regions, rapidly succeeding in the first year in fields from buried seed [10].
Plant Characteristics	*Ambrosia artemisiifolia* is a fast-growing annual forb/herb that flowers from July to October in both native and non-native ranges. It has an achene fruit where the seeds are stored. Anthers will open with a rise in temperature and low relative humidity, with peak pollen production occurring from mid-August to mid-September. High daily temperatures promote pollination whereas rain, clouds, and humid weather reduce pollination. *A. artemisiifolia* is monoecious and is either self or cross-pollinated by the wind [10]. The seeds are shed in the fall and are dormant, they require several weeks of chilling at 41º Fahrenheit [12]. *A. artemisiifolia* has two growth stages, the flowering stage, and the fruiting stage. It can complete both growth cycles in 115-118 days. The flowering stage starts around 119 days after germination [10]. *A. artemisiifolia* is also quite drought-tolerant, and a strong mycorrhizal host [12].

PROPAGATION DETAILS – *Ambrosia artemisiifolia* is a common weed throughout North America and has no available propagation details. The propagation details below are propagation information for other species within the *Ambrosia* genus (*Ambrosia dumosa, Ambrosia eriocentra, Ambrosia chamissonis*)

Propagation protocol for production of Container (plug) *Ambrosia dumosa* (A. Gray) Payne Plants by Madena Asbell [5]	
Scientific Name	*Ambrosia dumosa*
Species Code	AMPDUM
Common Name	Burrobush, White bursage
General Distribution	Found in the creosote bush scrub community throughout the Mojave and Sonoran deserts of California, Nevada, Utah, Arizona, and Northern Baja California
Ecotype	Joshua Tree, CA
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	4” x 10” Anderson plant bands
Time to Grow	6 months
Target Specifications	N/A
Propagule Collection Instructions	The seeds were hand collected in May of the previous year.

Propagule Processing/Propagule Characteristics	Seeds are dried in paper bags and cleaned to remove male flowers and weed seeds. Seed is stored in airtight containers at 3º C.
Pre-Planting Propagule Treatments	Seeds were not treated prior to sowing. Seeds were sown directly into 17" x 17" x 2" seed flats with a media consisting of 3 parts coarse horticultural perlite, 1-part coarse vermiculite, and a small amount of Osmocote 14-14-14. Seeds were sown at a depth of ¼". Flats were hand water. There was 37% germination.
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds were started in a greenhouse in April. Greenhouse temperatures did not exceed 90º F (high) and 50º F (low). Maximum germination was reached within 3 weeks. At 6 weeks, seedlings were transplanted directly into 4" x 10" Anderson plant bands and moved outdoors into a shade house with 63% shade cover. Containers were hand watered.
Establishment Phase Details	N/A
Length of Establishment Phase	N/A
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	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	N/A
Propagation protocol for production of propagules (seeds) of *Ambrosia eriocentra* (A. Gray) Payne Seeds, author unknown [7]	
Scientific Name	*Ambrosia eriocentra*
Species Code	AMER
Common Name	Wooly fruit, bur ragweed
General Distribution	Native to California
Ecotype	BLM, Seeds of Success, Toronto National Forest, Horseshoe Dam area, 2.5 miles on Forest Service Road 19, Maricopa County, Arizona, Arizona: 2636 ft. elevation
Propagation Goal	Seeds
Propagation Method	Seed
Product Type	Propagules (seeds, cuttings, poles, etc.)
Stock Type	N/A
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	Very small lot, 1.5 pounds, hand collected into paper bags.
Propagule Processing/Propagule Characteristics	METHOD OF CLEANING: Seed cleaned using a Westrup Model LA-H laboratory brush machine, with a #40 mantel, at medium speed. Lot was then air-screened using an office Clipper, with a top screen: 18 round and a bottom screen: 5 1/2 round, medium speed, medium air. Number of Seeds per Pound: 58,900, Purity: 97%, X-Ray 100 Seeds: 83% Filled
Pre-Planting Propagule Treatments	N/A
Growing Area Preparation / Annual Practices for Perennial Crops	N/A
Establishment Phase Details	N/A
Length of Establishment Phase	N/A

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	STORAGE: Cold Storage, 33-38 Degrees Fahrenheit
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	N/A
Propagation protocol of Container (plug) of *Ambrosia dumosa* (Gray) Payne Plants by Jean Graham [5]	
Scientific Name	*Ambrosia dumosa*
Species Code	AMDU2
Common Name	Burrobush, White bursage
General Distribution	The Mojave and the western edge of the Colorado desert in Southern California and Arizona
Ecotype	Joshua Tree National Park, California
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	2-gallon PVC pipe containers
Time to Grow	0 weeks
Target Specifications	Height: N/A Caliper: N/A Root System: Firm Root Plugin container
Propagule Collection Instructions	Seeds are hand collected when achenes have fully matured.
Propagule Processing / Propagule Characteristics	Seeds are allowed to dry for 4-6 weeks in paper bags in a warm, dry room. After the seeds have been cleaned, they are stored under refrigeration in air-tight containers at 7C.
Pre-Planting Propagule Treatments	Seeds are soaked/leached in water for 10 to 24 hours to remove any inhibitors and allow full seeds to be imbibed before sowing. Seeds are directly sown in open flats using a growing medium of 2 parts sand, 1 part mulch, and 2 parts perlite. We have had 30% average germination on our ecotypes.
Growing Area Preparation / Annual Practices for Perennial Crops	The Joshua Tree Native Plant Nursery is in the Mojave Desert of southern California and has an average of 250 frost-free days per year and annual rainfall of 5 to 10 cm (2 to 4 in.) The facility is comprised of three greenhouses, mist propagation beds, and a shaded outdoor growing compound. All propagation environments are utilized at different stages of seedling growth to provide for the variance in temperature and shading requirements during the growing season.
Establishment Phase Details	Seedlings are germinated in a germination chamber or under mist. After seedlings are well established and have at least 2 true leaves, they are transplanted into newspaper cylinders wrapped with polyvinyl food wrap. The newspaper container is 29 cm (11.5 in) tall and 7.5 cm (3 in) in diameter. The newspaper pots are filled with a growing medium of 2:1:1 sand, mulch, and perlite.
Length of Establishment Phase	4 weeks
Active Growth Phase	Seedlings are ready for transplanting into larger containers at 8 to 12 weeks. The entire newspaper pot minus the plastic wrap is

	transplanted into the PVC tall containers using the same medium described for the newspaper containers. Osmocote time-release fertilizer (9 mo. release rate) (13 N:13P2O5:13K2O) is incorporated into the medium at the approximate rate of 22 g per 6l (2 gal) PVC containers. PVC containers are 37.5 cm tall(15 in) and are 15 cm (6 in)in diameter. Following transplanting, they are moved to the open growing compound that is covered with a 55% shade cloth during the summer months. During the months of intense summer heat, containers are irrigated by an automated drip system.
Length of Active Growth Phase	4 months
Hardening Phase	Irrigation frequency and duration is gradually reduced for 4 to 8 weeks prior to out-planting. The shade cloth is removed from the open growing compound in October when daytime temperatures begin to cool.
Length of Hardening Phase	4 weeks
Harvesting, Storage and Shipping	Containerized seedlings are overwintered directly in the open growing compound.
Length of Storage	Variable; depends on out planting date
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	N/A
INFORMATION SOURCES	
References	[1]"Ambrosia Artemisiifolia - Common Ragweed." *Native Plant Trust: Go Botany*, https://gobotany.nativeplanttrust.org/species/ambrosia/artemisiifolia/. [2] "Annual Ragweed Ambrosia Artemisiifolia Var. Elatior (L.) Descourtils." *Annual Ragweed, Ambrosia Artemisiifolia Var. Elatior Asterales: Asteraceae*, https://www.invasive.org/browse/subinfo.cfm?sub=5080. [3] "Ambrosia Artemisiifolia L." *USDA Plants Database*, https://plants.usda.gov/home/plantProfile?symbol=AMAR2. [4] "Asteraceae (Ambrosia) - Ambrosia Chamissonis." *RNGR Reforestation, Nurseries, & Genetic Resources*, https://npn.rngr.net/npn/propagation/protocols/asteraceae-ambrosia-549/?searchterm=ambrosia. [5] "Asteraceae (Ambrosia) - Ambrosia Dumosa." *RNGR Reforestation, Nurseries, & Genetic Resources*, https://npn.rngr.net/npn/propagation/protocols/ambrosia-dumosa-ambrosia/?searchterm=ambrosia. [6] "Asteraceae (Ambrosia) - Ambrosia Dumosa." *RNGR Reforestation, Nurseries, & Genetic Resources*, https://npn.rngr.net/npn/propagation/protocols/asteraceae-ambrosia-2544/?searchterm=Ambrosia.

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Other Sources Consulted	"Native American Ethnobotany Database." *BRIT*, http://naeb.brit.org/uses/search/?string=Ambrosia%2Bartemisiifolia. "Plant Database - Ambrosia Artemisiifolia." *Lady Bird Johnson Wildflower Center - The University of Texas at Austin*, 9 Nov. 2022, https://www.wildflower.org/plants/result.php?id_plant=amar2.
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