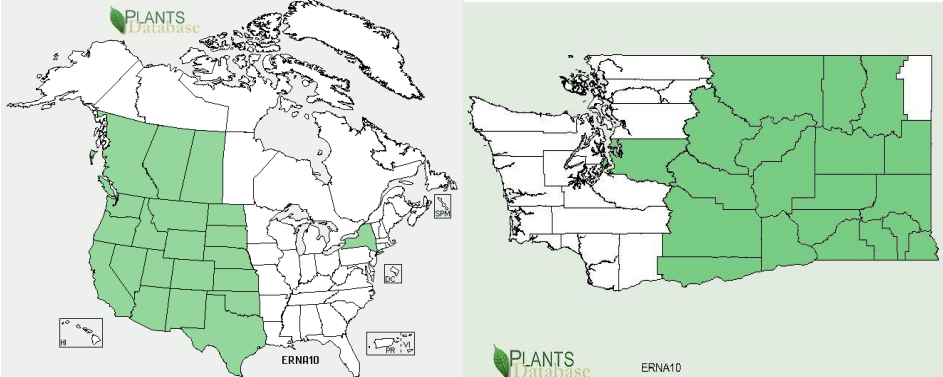


**Plant Propagation Protocol for *Ericameria nauseosa***  
 ESRM 412 – Native Plant Production  
<http://courses.washington.edu/esrm412/protocols/ERNA10.pdf>

<b>TAXONOMY</b>	
<b>Plant Family</b>	
Scientific Name	Asteraceae
Common Name	Aster family
<b>Species</b>	
Scientific Name	
Scientific Name	<i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird
Varieties	<i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>arta</i> (A. Nelson) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>bernardina</i> (H. M. Hall) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>ceruminosa</i> (Durand & Hilg.) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>hololeuca</i> (A. Gray) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>leiosperma</i> (A. Gray) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>mohavensis</i> (Greene) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>oreophila</i> (A. Nelson) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>speciosa</i> (Nutt.) G. L. Nesom & G. I. Baird <i>Ericameria nauseosa</i> (Pall. ex Pursh) G. L. Nesom & G. I. Baird var. <i>washoensis</i> (L. C. Anderson) G. L. Nesom & G. I. Baird (3)
Sub-species	<i>Ericameria nauseosa</i> spp. <i>consimilis</i> <i>Ericameria nauseosa</i> spp. <i>nauseosa</i> (6)
Cultivar	
Common Synonym(s)	<i>Chrysothamnus nauseosus</i> (Pallas ex Pursh) Britt. <i>Nauseosus</i> (6) <i>Bigelovia nauseosa</i> Gray
Common Name(s)	Gray rabbitbrush, grey rabbitbrush, rubber rabbitbrush, golden rabbitbrush, camiso blanco, common rabbitbrush, chamisa rabbitbrush, stinking rabbitbrush, fetid rayless goldenrod (3)
Species Code	ERNA10
<b>GENERAL INFORMATION</b>	

Geographical range	
Ecological distribution	Gray rabbitbrush inhabits dry, open areas on plains, valley bottoms, foothills and mountains. It is associated with many habitat types. (6)
Climate and elevation range	Dry open areas from the plains to moderate elevations in the mountains. In Arizona, it is found between 900 and 2,700 meters. In California, specimens are recorded from about 600 meters to about 2,800 meters. (3) (4)
Local habitat and abundance	Can be plant communities ranging from arid rangelands to montane openings. Dense stands are often found on degraded rangelands, along roadsides, and in abandoned agricultural fields. (8)
Plant strategy type / successional stage	Early colonizer following disturbance (5)
Plant characteristics	<p>A perennial shrub reaching 12 to 90 inches in height with a rounded crown and several erect stems from the base. It flowers June to September, and reproduces from seeds and root sprouts. The inflorescences and bracts of the seeds often persist well into the next year.</p> <p>Inflorescence: Yellowish green flower, tubular, 0.25 to 0.4 inch long, arranged in terminal, rounded clusters</p> <p>Leaves: 0.75 to 2.75 inches long, 0.02 to 0.12 inches wide, alternate, linear to spatula shaped blades with entire margins. The leaves are 1 to 3 nerved.</p> <p>Stems: Twigs are erect, flexible (rubbery), yellowish-green, and covered with a dense felt-like covering. The trunk is gray-brown with small cracks. The bark is fibrous. (4) (6)</p>
<b>PROPAGATION DETAILS</b>	
Ecotype	
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plant)
Stock Type	
Time to Grow	1 year (7)
Target Specifications	

Propagule Collection Instructions	Seeds are wild collected during fall months and are kept separated according to site, elevation and source. Seeds can be harvested by shaking or stripping the heads from the branches. (6) (7)
Propagule Processing/Propagule Characteristics	Processing in a hammer mill followed by a screen fanning mill effectively cleans the seeds prior to sowing. (6)  Seed is cleaned using a Westrup Model LA-H laboratory brush machine with a #40 mantel at a speed of 3 to remove seed from flower heads. Lot is then air-screened to remove nonviable seed and inert material using an office Clipper with a #9 triangle top screen and a blank bottom screen, followed by a second run with a #5 triangle top screen and blank bottom screen, both on low speed with medium to high air (1)  Seed density variously reported as 986,000 per pound (1) and 693,000 per pound (6)
Pre-Planting Propagule Treatments	None; Seed dormancy in gray rabbitbrush varies widely among seed sources. With increasing elevation and latitude, seeds tend to require a greater length of stratification for germination at low temperatures. At warm temperatures untreated seeds from most sources germinate well (2)
Growing Area Preparation / Annual Practices for Perennial Crops	Ray Leach SC10 Super Cells. Growing media is a 2:1:1 peat-perlite-vermiculite mixture. Seed is sown in early May. The top of the media is dibbled between 2 and 4 mm and seed is placed in the dibble hole. A 2 to 5 mm layer of fine chicken grit is placed on the top. (2)
Establishment Phase Details	Containers are irrigated four to eight times daily to keep the surface of the media moist. Greenhouse night and day temperatures range from 18 to 26 degrees C and no supplemental light is provided. Thinning of germinants to one seedling per cell begins after 14 days. Consolidation of containers containing germinants begins after 14 days. (2)
Length of Establishment Phase	About 1 month after emergence (2) (7)
Active Growth Phase	The first four or five weeks of the active growth phase are performed in the greenhouse. The remaining eight to 10 weeks are performed in a shade house. Containers are irrigated approximately once every four to five days for the first several weeks, then once every two to three days through the remainder of the active growth period. All irrigations are done early in the morning to allow foliage to dry before nightfall. Seedlings are fertigated every other irrigation with a liquid fertilizer (20-10-10; N-P-K) at a rate of 50 ppm N until they attain a target shoot height of 15 to 18 cm. Daytime greenhouse temperatures are 21 to 26 degrees C and nighttime temperatures are 18 to 22 degrees C. If space is available, containers are spaced to every other slot in racks when transferred to the shadehouse to improve air flow and reduce the likelihood of foliar disease problems. Growing tips are pinched back at this time to promote branching and

	prevent leggy growth. (2)
Length of Active Growth Phase	About three months (2) (7)
Hardening Phase	Begins in late summer to early fall as soon as seedlings attain target shoot height. Containers are leached with a heavy irrigation and a series of incrementally increasing water stresses is applied to restrict any further height growth. Seedlings are fertigated every third irrigation with a liquid fertilizer (10-30-20; N-P-K) at a rate of 25 ppm N. (2)
Length of Hardening Phase	4 to 6 weeks (2)
Harvesting, Storage and Shipping	<p>Seedlings kept in shadehouse through winter and are shipped in late February to early March. Irrigation intervals are extended during this period and fertilizer is provided every fourth irrigation (2)</p> <p>For field-grown plants, lifting window is during mid November when seedlings are completely dormant. Seedlings are hand lifted after the seedling beds have been undercut at a depth of 10 inches using a lifter. Fall lifted seedlings are heeled in in sandy soils after being graded and bundled in bundles of 25. They are lifted in spring before they break dormancy then stored in a cooler on stacked pallets at between 2 to 5 degrees C and at a relative humidity of 92 to 98 percent with good air circulation. (7)</p>
Length of Storage	5 months (2)
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	
<b>INFORMATION SOURCES</b>	
References	<ol style="list-style-type: none"> <li>1. Barner, Jim 2009. Propagation protocol for production of <i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom &amp; Baird <i>consimilis</i> (Greene) G.L. Nesom &amp; Baird var. <i>oreophila</i> (A. Nelson) G.L. Nesom &amp; Baird seeds; USDA FS - R6 Bend Seed Extractory, Bend, Oregon. In: Native Plant Network. URL: <a href="http://www.nativeplantnetwork.org">http://www.nativeplantnetwork.org</a> (accessed 19 May 2014). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.</li> <li>2. Harrington, John T.; Rosner, Lee S. 2007. Propagation protocol for production of container <i>Ericameria nauseosa</i> (Pallas ex Pursh) Nesom &amp; Baird plants (164 ml conetainer); New Mexico State University-Mora Research Center, Mora, New Mexico. In: Native Plant Network. URL: <a href="http://www.nativeplantnetwork.org">http://www.nativeplantnetwork.org</a> (accessed 19 May 2014). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.</li> <li>3. Jepson Herbarium, UC Berkeley. (2013). Consortium of California Herbaria. URL: <a href="http://ucjeps.berkeley.edu/cgi-bin/get_consort.pl?county=&amp;source=All&amp;taxon_name=Ericameria%2">http://ucjeps.berkeley.edu/cgi-bin/get_consort.pl?county=&amp;source=All&amp;taxon_name=Ericameria%2</a></li> </ol>

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Other Sources Consulted	<ul style="list-style-type: none"> <li>• Benard, R. B., &amp; Toft, C. A. (September 01, 2007). Effect of seed size on seedling performance in a long-lived desert perennial shrub (<i>Ericameria nauseosa: asteraceae</i>). <i>International Journal of Plant Sciences</i>, 168, 7.)</li> <li>• Donovan, L. A., Grise, D. J., West, J. B., Pappert, R. A., Alder, N. N., &amp; Richards, J. H. (January 01, 1999). Predawn disequilibrium between plant and soil water potentials in two cold-desert shrubs. <i>Oecologia</i>, 120, 2, 209-217.</li> <li>• Enloe, S. F., Kniss, A., Ferrell, M., Lafantasie, J., &amp; Aagard, S. D. (July 01, 2009). Black Greasewood ( <i>Sarcobatus vermiculatus</i> ), Gray Rabbitbrush ( <i>Ericameria nauseosa</i> ), and Perennial Grass Response to Chlorsulfuron and Metsulfuron. <i>Invasive Plant Science and Management</i>, 2, 3, 247-252.</li> <li>• Toft, C. A. (1995). A 10-year demographic study of rabbitbrush (<i>Chrysothamnus nauseosus</i>): growth, survival and water limitation. <i>Oecologia</i>, 101(1), 1-12.</li> </ul>
Protocol Author	Ben Antonius
Date Protocol Created or Updated	Protocol updated 05/17/2014

## **Appendix: Original protocol**

### **Plant Data Sheet**



#### **Species (common name, Latin name)**

rubber rabbit-brush, *Ericameria nauseosa*

#### **Range**

Chiefly east of the Cascades, British Columbia to Oregon, east to Montana.

#### **Climate, elevation**

Dry, open areas from the plains to moderate elevations in the mountains. In Arizona it is found between 3,000-9,00ft.

#### **Local occurrence (where, how common)**

All over Eastern Washington.

#### **Habitat preferences**

It grows in dry plains, dry mountain sides, grasslands, open woodlands and roadsides

#### **Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)**

It is cold hardy, and tolerant of both moisture and salt stress.

## **Associated species**

*Chrysothamnus parryi* (Parry rabbit-brush) is less shrubby, has larger leaves and smaller, paler flowers. *Chrysothamnus viscidiflorus* (Douglas rabbit-brush) and *Chrysothamnus depressus* (Dwarf rabbit-brush) are also similar to *C. nauseosus* and found west of the Rockies.

## **May be collected as: (seed, layered, divisions, etc.)**

Propagated by seeds and cuttings.

## **Collection restrictions or guidelines**

Pollen may cause allergic reaction. Best to collect in Autumn.

## **Seed germination (needs dormancy breaking?)**

A stratification period is not necessary for rubber rabbit-rush but may speed germination. Stratification period may extend to 120 days. Without stratification, germination begins within 5 to 20 days after planting. In laboratory tests, germination rates are highest at 58 to 86 degrees Fahrenheit (20-30o C) and lowest at 50 degrees Fahrenheit (10o C). A specific light regime is not required, but germination can be inhibited by high saline concentrations

## **Seed life (can be stored, short shelf-life, long shelf-life)**

Up to 3 year's storage under ordinary warehouse storage conditions.

## **Recommended seed storage conditions**

Germination in rubber rabbit-brush is quite high, and seed viability remains relatively high (65 percent) for up to 3 year's storage under ordinary warehouse storage conditions.

## **Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)**

Can plant as seeds or container grown. Seedlings sensitive to frost and drought.

## **Soil or medium requirements (inoculum necessary?)**

6.6 to 7.5 (neutral), 7.6 to 7.8 (mildly alkaline), 7.9 to 8.5 (alkaline) and sandy soil. Grows on a wide range of soils. Soils tend to be medium to coarse-textured and somewhat basic, but may range from moderately acidic to strongly alkaline. This shrub commonly grows on dry, sandy, gravelly or heavy clay, and is somewhat salt tolerant.

## **Installation form (form, potential for successful outcomes, cost)**

Container plants grown from seed or cutting.

## **Recommended planting density**

It is fast growing and invades and occupies areas at high densities. Allow adequate space for rapid spread.

## **Care requirements after installed (water weekly, water once etc.)**

Prefers full sun and well-drained, infertile soils. Fully cold-hardy. Drought hardy (i.e., needs no supplemental water after establishment on the Wasatch Front), and intolerant of overwatering.

## **Normal rate of growth or spread; lifespan**

Spacing is 24-36 in. (60-90 cm). Grows up to seven feet in height, but is often much shorter, depending on the growing conditions. The nauseosus has branches which are permanently felted with white or greenish-white hairs. The leaves are usually three-fourths to two and three-fourths inches long. Plants may be full grown within 4 years.

## **Sources cited**

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## **Data compiled by (student name and date)**

Steven Campbell 4-12-06