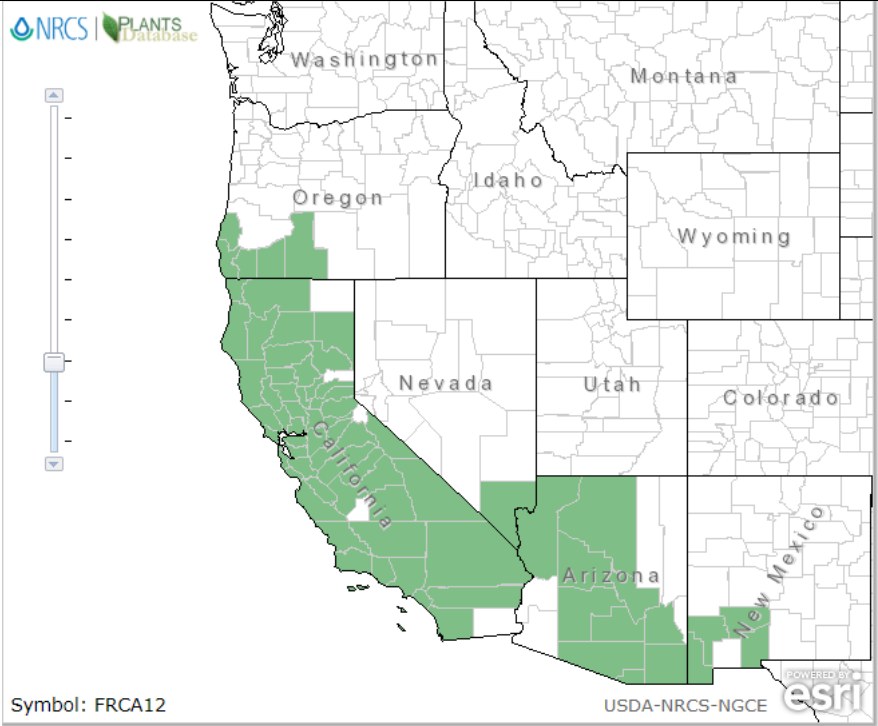


**Plant Propagation Protocol for *Frangula californica***

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/FRCA12.pdf>

<b>TAXONOMY</b>	
<b>Plant Family</b>	
Scientific Name	Rhamnaceae
Common Name	Buckthorn Family
<b>Species Scientific Name</b>	
Scientific Name	<i>Frangula californica</i> (Eschsch.) A. Gray
Varieties	N/A
Sub-species	<i>Frangula californica</i> (Eschsch.) A. Gray ssp. <i>californica</i> <i>Frangula californica</i> (Eschsch.) A. Gray ssp. <i>crassifolia</i> (Jeps.) Kartesz & Gandhi <i>Frangula californica</i> (Eschsch.) A. Gray ssp. <i>cuspidata</i> (Greene) Kartesz & Gandhi <i>Frangula californica</i> (Eschsch.) A. Gray ssp. <i>occidentalis</i> (Howell) Kartesz & Gandhi <i>Frangula californica</i> (Eschsch.) A. Gray ssp. <i>tomentella</i> (Benth.) Kartesz & Gandhi <i>Frangula californica</i> (Eschsch.) A. Gray ssp. <i>ursina</i> (Greene) Kartesz & Gandhi
Cultivar	N/A
Common Synonym(s)	<i>Rhamnus californica</i> Eschsch. <i>Rhamnus californica</i> Eschsch. ssp. <i>californica</i> <i>Rhamnus californica</i> Eschsch. ssp. <i>crassifolia</i> (Jeps.) C.B. Wolf <i>Rhamnus californica</i> Eschsch. ssp. <i>cuspidata</i> (Greene) C.B. Wolf <i>Rhamnus californica</i> Eschsch. ssp. <i>occidentalis</i> (Howell) C.B. Wolf <i>Rhamnus californica</i> Eschsch. var. <i>occidentalis</i> (Howell) C.B. Wolf <i>Rhamnus californica</i> Eschsch. ssp. <i>tomentella</i> (Benth.) C.B. Wolf <i>Rhamnus californica</i> Eschsch. ssp. <i>ursina</i> (Greene) C.B. Wolf <i>Rhamnus californica</i> Eschsch. var. <i>ursina</i> (Greene) McMinn <i>Rhamnus tomentella</i> Benth. <i>Rhamnus tomentella</i> Benth. ssp. <i>crassifolia</i> (Jeps.) J.O. Sawyer <i>Rhamnus tomentella</i> Benth. ssp. <i>cuspidata</i> (Greene) J.O. Sawyer <i>Rhamnus tomentella</i> Benth. ssp. <i>tomentella</i> <i>Rhamnus tomentella</i> Benth. ssp. <i>ursina</i> (Greene) J.O. Sawyer
Common Name(s)	California buckthorn, California coffeeberry, California false buckthorn, coast coffeeberry, hoary coffeeberry (Tutka, 2016)(U.S. Department of Agriculture, Forest Service, 1974, p. 771)
Species Code (as per USDA Plants database)	FRCA12
<b>GENERAL INFORMATION</b>	

Geographical range	 <p>Symbol: FRCA12</p> <p>USDA-NRCS-NGCE</p> <p> <span style="display: inline-block; width: 10px; height: 10px; background-color: #4CAF50; border: 1px solid black; margin-right: 5px;"></span> Native  <span style="display: inline-block; width: 10px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></span> Introduced  <span style="display: inline-block; width: 10px; height: 10px; background-color: #D2B48C; border: 1px solid black; margin-right: 5px;"></span> Both  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Absent/Unreported  <span style="display: inline-block; width: 10px; height: 10px; background-color: #C8E6C9; border: 1px solid black; margin-right: 5px;"></span> Native, No County Data  <span style="display: inline-block; width: 10px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></span> Introduced, No County Data  <span style="display: inline-block; width: 10px; height: 10px; background-color: #D2B48C; border: 1px solid black; margin-right: 5px;"></span> Both, No County Data </p> <p>(USDA NRCS NGCE, n.d.)</p>
Ecological distribution	<p><i>F. californica</i> occurs in many ecosystems, depending on subspecies, “including chaparral, coastal sage scrub, northern sage scrub, coastal strand, and mixed-evergreen forest, redwood forest, and central oak woodland plant communities” (Tutka, 2016).</p>
Climate and elevation range	<p><i>F. californica</i> grows up to 9,000 feet, depending on subspecies, usually in sunny, dry areas (Schmidt, 1980, p. 248)(Tutka, 2016).</p>
Local habitat and abundance	<p><i>F. californica</i> can grow in a range of soil textures: although coarse, dry soils are common, it can grow even in areas that flood sometimes (Tutka, 2016).</p>
Plant strategy type / successional stage	<p><i>F. californica</i> can be weedy in some habitats, such as Hawaii, where it is invasive. It is adapted to tolerate the stresses of chaparral landscapes, able to regenerate if coppiced or (Tutka, 2016).</p>
Plant characteristics	<p>Shrub or tree (Tutka, 2016).</p>
<b>PROPAGATION DETAILS</b>	
Ecotype	Marin County, California – for information from (Young, 2001b).
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	Deepot 16 (Young, 2001b)
Time to Grow	2 years (Young, 2001b)
Target	When ready, plants should be firmly rooted (Young, 2001b).

Specifications	
Propagule Collection Instructions	<i>F. californica</i> fruit should be picked when it ripens to black between July and November, or two weeks before full ripening to prevent birds from getting them all (U.S. Department of Agriculture, Forest Service, 1974, p. 706)(Young & Young, 1992, p. 296).
Propagule Processing/Propagule Characteristics	<i>F. californica</i> has about 4,992 seeds per pound, which live less than nine months if dried “to room conditions” (Bonner & Karrfalt, 2008, p. 532).
Pre-Planting Propagule Treatments	<p>Seeds in the genus <i>Frangula</i> can be separated from fruit by putting them through a macerator with water in it and then decanting, or by crushing with hand or tool and washing through a sieve (Bonner &amp; Karrfalt, 2008, p. 532)(Young, 2001b)</p> <p>While germination treatments are not necessary, germination may be increased by simulating fire; in one series of tests “germination increased 90% when seeds were incubated with an initial heat treatment of 100 C for 5 minutes and then placed on soil containing 0.5 g powdered charred wood (charate) of the chaparral shrub chamise – <i>Adenostoma fasciculatum</i> Hook. &amp; Arn.” (Bonner &amp; Karrfalt, 2008, p. 532-533).</p> <p>In addition, if the seeds used are not fresh they may benefit from stratification (Emery, 1988, p. 88). Betty Young recommends to “Soak seeds in fresh water for 24 hours. Place seeds in a plastic ziplock bag with an equal amount of barely moistened perlite. Stratify for 2 to 3 months in a refrigerator. Check every 2 weeks for moisture content and mold development” (Young, 2001b).</p>
Growing Area Preparation / Annual Practices for Perennial Crops	After germination, plant each seed with a minimum radicle length of ¼” in standard potting mix – Betty Young uses a potting soil mixture of “peat moss, fir bark, perlite, and sand” and gets 85% germination (Young 2001b).
Establishment Phase Details	N/A
Length of Establishment Phase	45 days (Young, 2001b)
Active Growth Phase	45 days after germination, transplant each seedling to a 2”x7” Deepot 16 filled with standard potting mix. Survival is usually 90%, but Betty Young recommends fertilizing “with Nutricote NPK (13-13-13) 3 months after transplanting (Young, 2001b).
Length of Active Growth Phase	“Keep in greenhouse until 2 to 3 months before outplanting” (Young, 2001b).
Hardening Phase	“Move seedlings to the shadehouse 2 to 3 months before outplanting” (Young, 2001b).
Length of Hardening Phase	2-3 months (Young, 2001b)

Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	“Flowering and fruiting will begin after three to five years of growth” (Schmidt, 1980, p. 246-247).
Other Comments	None
<b>PROPAGATION DETAILS</b>	
Ecotype	Tennessee Valley, California (Young, 2001a)
Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Container (plug)
Stock Type	Deepot 40 (Young, 2001a)
Time to Grow	60 days (Young, 2001a)
Target Specifications	When ready, plants should be firmly rooted into container (Young, 2001a).
Propagule Collection Instructions	Collect hardwood cuttings between November and January. Cuttings must be 0.25’ in diameter and 4” long, with 4 nodes minimum (Young, 2001a).
Propagule Processing/Propagation Characteristics	Keep cuttings cool and moist (Young, 2001a).
Pre-Planting Propagule Treatments	“Cuttings are dipped in a mild bleach solution for 30 seconds. Make a 45 degree angle cut just below last node at the base of the cutting. Cut top leaving one leaf above the top node. Cuttings should be 3 nodes in length. Cuttings are treated with Hormex (3000 ppm IBA) rooting powder” (Young, 2001a).
Growing Area Preparation / Annual Practices for Perennial Crops	Fill flats with a 3 to 1 mixture of perlite and vermiculite. In each flat, strike 50 cuttings 2 inches deep. Water by misting until cuttings root (Young, 2001a).
Establishment Phase Details	After 60 days, transplant each cutting to a Deepot 40 filled with a standard potting mix. Expected transplant survival is 50% (Young, 2001a).
Length of Establishment Phase	60 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	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	None

### INFORMATION SOURCES

References	<p>Bonner, F. T., &amp; Karrfalt, R. P. (2008). <i>The Woody Plant Seed Manual</i> (Vol. 727, Agriculture Handbook). Washington, D.C.: U.S. Dept. of Agriculture, Forest Service.</p> <p>Emery, D. E. (1988). <i>Seed Propagation of Native California Plants</i>. Santa Barbara, California: Santa Barbara Botanic Garden.</p> <p>Kruckeberg, A. R. (1996). <i>Gardening with Native Plants of the Pacific Northwest: Second Edition, Revised and Enlarged</i>. Seattle, WA: University of Washington Press.</p> <p>Schmidt, M. G. (1980). <i>Growing California Native Plants</i>. Berkeley, CA: University of California Press.</p> <p>Tutka, M. (2016, August). Plant Guide for California coffeeberry (<i>Frangula californica</i>). Retrieved May 16, 2018, from <a href="https://plants.usda.gov/plantguide/pdf/pg_frca12.pdf">https://plants.usda.gov/plantguide/pdf/pg_frca12.pdf</a></p> <p>U.S. Department of Agriculture, Forest Service. (1974). <i>Seeds of Woody Plants in the United States</i> (Vol. 450, Agriculture Handbook). Washington, D.C.: U.S. Dep. Agric.</p> <p>USDA NRCS NGCE. (n.d.). <i>Plants Database: FRCA12</i> [Map]. Retrieved May 15, 2018, from <a href="https://plants.usda.gov/core/profile?symbol=FRCA12">https://plants.usda.gov/core/profile?symbol=FRCA12</a></p> <p>Young, B. (2001a). Native Plant Network Propagation Protocol Database Protocol Information: <i>Frangula californica</i>. Retrieved May 16, 2018, from <a href="https://nnp.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=rhamnaceae-frangula-716">https://nnp.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=rhamnaceae-frangula-716</a></p> <p>Young, B. (2001b). Native Plant Network Propagation Protocol Database Protocol Information: <i>Frangula californica</i>. Retrieved May 16, 2018, from</p>
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	<p><a href="https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=rhamnaceae-frangula-672">https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=rhamnaceae-frangula-672</a></p> <p>Young, J. A., &amp; Young, C. G. (1992). <i>Seeds of Woody Plants in North America, Revised and Enlarged Edition</i>. Portland, OR: Dioscorides Press.</p>
Other Sources Consulted	<p>Dirr, M. A., &amp; Heuser, C. W., Jr. (2006). <i>The Reference Manual of Woody Plant Propagation: From Seed to Tissue Culture</i>. Cary, NC: Varsity Press.</p> <p>Rose, R., Chachulski, C. E., &amp; Haase, D. L. (1998). <i>Propagation of Pacific Northwest Native Plants</i>. Corvallis, OR: Oregon State University Press.</p>
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