

Plant Propagation Protocol for *Crataegus douglasii*

ESRM 412 – Native Plant Production

URL: <https://courses.washington.edu/esrm412/protocols/2025/CRDO2.pdf>

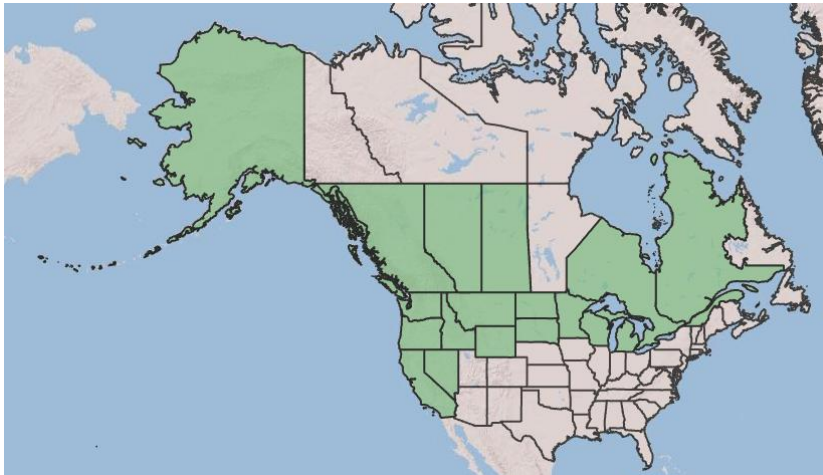


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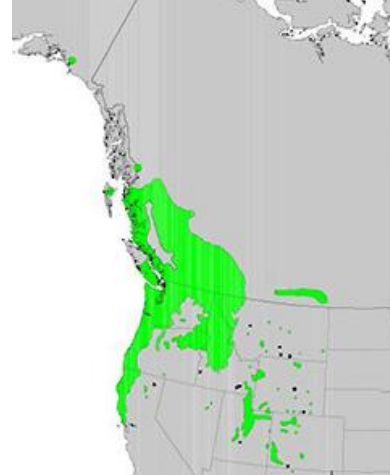
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North American Distribution



Sourced from USDA Plants Database

Pacific Northwest Distribution



Sourced from USDA Forest Service

TAXONOMY

Plant Family	
Scientific Name	Rosaceae
Common Name	Rose family
Species Scientific Name	
Scientific Name	<i>Crataegus douglasii</i> Lindl
Varieties	Douglasii – black hawthorn Rivularis – river hawthorn (8)
Sub-species	There are no recognized subspecies.
Cultivar	There are no recognized cultivars.

Common Synonym(s)	<p><i>Crataegus rivularis</i> (Nutt.) Sarg (8): Some sources consider this to be a synonym or variety of <i>Crataegus douglasii</i> while others treat it as its own species.</p> <p><i>Crataegus columbiana</i> Howell (6): Considered by some to be the same species, considered by others to be its own distinct species. It should be noted that its thorns are longer than those of the <i>Crataegus douglasii</i> (14).</p>
Common Name(s)	Black hawthorn, Douglas hawthorn, river hawthorn, western thornapple, black hawberry (6).
Species Code (as per USDA Plants database)	CRDO2
GENERAL INFORMATION	
Geographical range	With a broad range, the black hawthorn can be found in the United States as far north as Alaska, and far south as California. Its range stretches eastward across the northern United States into the Great Lakes area. In Washington state it can be found on both sides of the Cascade Mountain range. Within Canada it is found in British Columbia, Alberta, Saskatchewan, Ontario, and Quebec. See maps above for North American and Pacific Northwest distribution (6, 8).
Ecological distribution	<p>Moist places like the edges of streams and forests, and open meadows (2, 13).</p> <p>Can be found in the following ecosystems according to the Forest Resource Ecosystem Classification System (8)</p> <p>FRES20 Douglas-fir FRES21 Ponderosa pine FRES28 Western hardwoods FRES29 Sagebrush FRES34 Chaparral - mountain shrub FRES35 Pinyon - juniper FRES36 Mountain grasslands</p>
Climate and elevation range	Typically found at lower elevations from 2,200-5,400 feet (8).
Local habitat and abundance	<p>Commonly found with black cottonwood, eastern cottonwood, quaking aspen, and ponderosa pine (8).</p> <p>KUCHLER PLANT ASSOCIATIONS (8): K023 Juniper - Pinyon Woodland K037 Mountain-mahogany - oak scrub K038 Great Basin Sagebrush K051 Wheatgrass - bluegrass K055 Sagebrush steppe</p>

Plant strategy type / successional stage	Not usually found on recently, or frequently disturbed sites. It predominately occurs as an understory species but has been found in pure stands. As a fire-resistant species, surviving roots can regrow after destruction of above ground portion (6, 8). In consideration of its tendency to be an understory species as well as its fire resistance, it is presumable that it has the potential to be both an early-successional and late-successional species. It should be noted that no sources explicitly list it as such.
Plant characteristics	Deciduous and broadleaf, the black hawthorn can present as a thicket like shrub and/or a tree. At full maturity height can vary from 15-40 ft tall. Branches, armed with thorns 0.8-2.5 cm long, ascend from long trunks to form a rounded crown. The 2.5-5 cm long leaves alternate and have margins that vary from entire near the base, transition to doubly toothed in the middle portion, and are somewhat lobed at the apex. Small white flowers have 5 styles and grow in clusters on long slender stalks. Fruit is reddish-purple to black and glossy (15).
PROPAGATION DETAILS: FROM SEED	
Ecotype	N/A, protocol was not experimentally derived
Propagation Goal	Plants suitable for outplanting conditions.
Propagation Method	Seed
Product Type	container
Stock Type	172 ml conetainer (9), if not attainable SC-10 (supercell, 164 ml) will suffice.
Time to Grow	9 months (9)
Target Specifications	Height: 22 cm Caliper: 7 mm Root System: firm plug within containers (9).
Propagule Collection Instructions	Seeds ripen in the summer from late July through August. Collection of fruit may be done directly from trees or from the ground. Frequent cutting tests are recommended as the number of seeds per fruit can vary greatly. (5)
Propagule Processing/Propagule Characteristics	21,317 seeds per pound (6). Seed can be stored for 2-3 years (5, 9).
Pre-Planting Propagule Treatments	Cleaning should occur immediately after collection. Fruits should be spread out to avoid excess heating until cleaning occurs. Seeds can be extracted from macerated fruit by floating off the pulp. Once clean, Seeds can be stored for 2-3 years at 5°C in moist storage. (5, 9) Seeds have both physical and physiological dormancy. Multiple seed treatments should be applied to ensure the highest germination rates. Once seeds are allowed to dry for several weeks at room temperature (9), acid scarification should be performed for 0.5-3

	hours. This should be followed by a 3-month warm stratification at 60°F, 15°C, and then a 3-month cold stratification at 40°F, 4°C (2). Seed treatment recommendations vary, with some stating that warm stratification between acid scarification and cold stratification is not necessary
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds may be sown 8-12 inches apart in seed beds and covered with ¼ inch of firm soil (8, 9). They may also be sown in 172 ml conetainers or SC-10 in a medium containing milled sphagnum peat, perlite, and vermiculite with a controlled release fertilizer (10).
Establishment Phase Details	Germination of properly treated seeds should occur within 2 weeks. Thinning should be performed at this stage (10). It should be noted that seeds sown fresh, in natural conditions, may not germinate in the 1 st year and will instead germinate the following spring. (2, 8)
Length of Establishment Phase	4 weeks (10)
Active Growth	Growth following germination is rapid. Once seedlings are established, thinning should take place. Seedlings respond quickly to produce 4-6 true leaves within 2 weeks of thinning. It is recommended to fertilize plants with 20-20-20 liquid NPK at 100 ppm. With fertilization, plants are expected to reach a height of 16 cm within 13 weeks. (10)
Length of Active Growth Phase	16 weeks. Seedlings may be up planted to gallon size containers at this time (10).
Hardening Phase	It is recommended to fertilize with 10-20-20 liquid NPK at 200 ppm during August and September. Irrigation is gradually reduced in September and October. Plants were given one final irrigation prior to winterization (10).
Length of Hardening Phase	4 weeks (10)
Harvesting, Storage and Shipping	Total Time to Harvest: 9 months Harvest Date: September Storage Conditions: Overwinter in outdoor nursery under insulating foam and snow (10).
Length of Storage	5 months (10)
Guidelines for Outplanting / Performance on Typical Sites	Due to rapid growth of taproot, seedlings should be installed in outplanting sites as soon as possible after hardening. Seedlings in 1-gallon pots should be planted before they reach 8 ft tall in the fall or the spring (7). When grown from seed it takes 5-8 years of maturation to bear fruit (16).
Other Comments	Sowing fresh seeds within outplanting site is possible, although success rates can be as low as 50%. For best results nursery propagation is recommended. Once established, it is a great soil and back stabilizer (8).

PROPAGATION DETAILS: VEGETATIVE	
Ecotype	N/A, protocol was not experimentally derived.
Propagation Goal	Plants suitable for outplanting conditions.
Propagation Method	Vegetative
Product Type	Cuttings
Stock Type	Softwood cuttings
Time to Grow	Approximately 1 year. Cutting should be ready to install in outplanting site the spring after it is collected from the mother plant (11).
Target Specifications	Cutting has developed a healthy root system that fills the container.
Propagule Collection Instructions	<p>Harvest season: Late spring to early summer, before the season's growth has hardened (1, 4, 11).</p> <p>Length: Cuttings should be 6-8 inches long (4, 11).</p> <p>General instructions for harvest of cuttings (1):</p> <ul style="list-style-type: none"> - Tools <ul style="list-style-type: none"> ○ sharp pruning shears ○ spray bottle of disinfectant ○ spray bottle of water ○ permanent labels and markers ○ plastic bag and ties ○ portable insulated cooler - Process: <ul style="list-style-type: none"> ○ Select healthy mother plant ○ Using clean shears, make a straight cut just above a node. This will ensure the ideal regrowth of mother plants. To prevent spread of disease, make sure to clean shears with disinfectant between cuttings, especially when moving to a new mother plant. ○ Trim cuttings to length by making a diagonal cut just below a node. ○ Label with date, location of mother plant, and any pertinent information. ○ Place cuttings into plastic bag and mist to prevent desiccation. ○ Place bag into insulated cooler for transportation from harvest location site to nursery.
Propagule Processing/Propagule Characteristics	Trim leaves from the bottom half of cuttings, leaving 2-3 healthy pairs for photosynthesis (4, 11).

Pre-Planting Propagule Treatments	Storage: should be kept to a minimum. Ideally, only for the transportation from the collection site to nursery, at which time they should be struck (1, 4, 11). Treatment: Although it is not completely necessary, application of root stimulating hormone is recommended (4, 11).
Growing Area Preparation / Annual Practices for Perennial Crops	Media: rooting medium containing peat moss, perlite, and vermiculite (11). Containers: can be struck into seed trays or rooting bed. Often better to start cuttings in individual 1-gallon or 3-gallon pots. If using a growth stimulating hormone, poke holes into the medium that are roughly the same diameter of the cuttings to prevent hormone from being displaced from the ends. Insert cuttings into holes and firm soil around them (4, 11).
Establishment Phase Details	After cuttings are struck it is important to keep them moist while avoiding over watering. This can be done through misting or keeping cuttings in a humid greenhouse environment (1, 4, 11).
Length of Establishment Phase	It typically takes 4-8 weeks for roots to form but may be longer without the use of a rooting hormone. Transplant individuals into 3-gallon pots at end of establishment (4, 11).
Active Growth Phase	Remove any cuttings that failed to root (4). Ensure that the medium stays moist but not waterlogged (1, 4, 11). Fertilizer may be applied but is not necessary (11).
Length of Active Growth Phase	From the end of establishment through fall, 3-4 months.
Hardening Phase	Discontinue horticultural lighting. Move from warm, humid greenhouse to unheated greenhouse then to cold frame or high tunnel to gradually increase exposure to cold conditions. Wean off rich nitrogen fertilizers and reduce watering schedule while still maintaining enough moisture to prevent desiccation (1).
Length of Hardening Phase	Begin hardening 6 weeks before 1 st frost (1).
Harvesting, Storage and Shipping	Can be stored outdoors over the winter (1).
Length of Storage	Through the winter until spring planting, 3-4 months (1).
Guidelines for Outplanting / Performance on Typical Sites	Can be planted in the fall after the active growth phase and allowed to naturally harden (4, 11). For ideal survival, planting should occur in spring (11). Flowering typically occurs when plants are 5-8 years old if grown from seeds (16). Propagation from cuttings can expedite flowering but can still take several years. This is due to the allocation of energy towards root establishment.
Other Comments	Propagation using cuttings is less effective and reliable than seed. Success rates can be as low as 20% (11). Due to this, nurseries usually rely on seed propagation, which is more reliable.

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