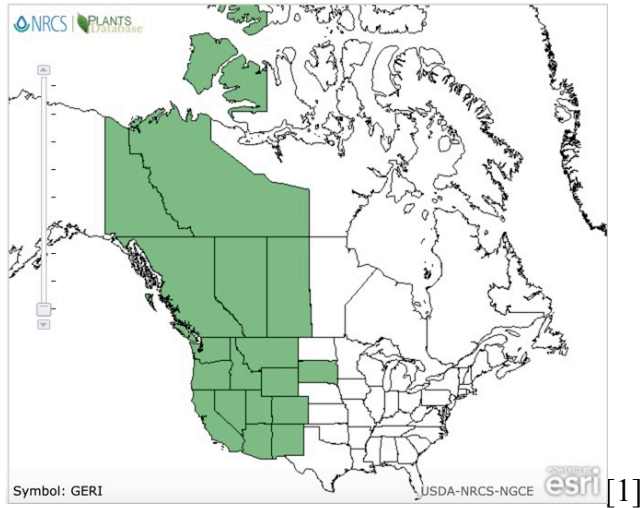


## Plant Propagation Protocol for *Geranium richardsonii*

ESRM 412 – Native Plant Production

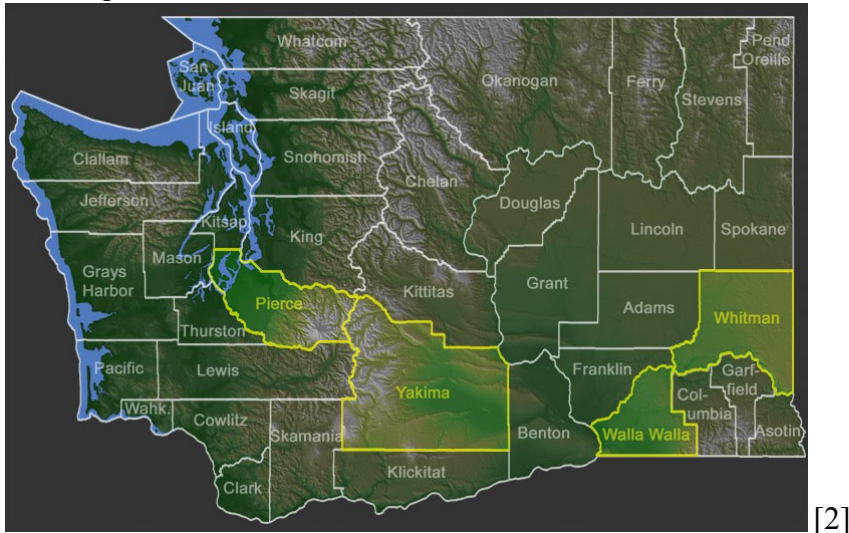
Protocol URL: [https://courses.washington.edu/esrm412/protocols/\[USDA Species Code.pdf\]](https://courses.washington.edu/esrm412/protocols/[USDA Species Code.pdf])

### North American Distribution



[1]

### Washington Distribution



[2]

## TAXONOMY

### Plant Family

Scientific Name Geraniaceae

Common Name Geranium Family

### Species Scientific Name

Scientific Name *Geranium richardsonii* Fisch. and Trautv

Varieties none

Sub-species none

Cultivar	
Common Synonym(s)	none
Common Name(s)	Richardson's Geranium, White Geranium <sup>2</sup> , White Crane's Bill <sup>2,3</sup>
Species Code (as per USDA Plants database)	GERI
<b>GENERAL INFORMATION</b>	
Geographical range	See maps above. Richardson's geranium is the most widespread native geranium <sup>6</sup> In North America: YT south to CA, NM and SD <sup>4</sup> In Washington: East of the Cascades <sup>2</sup>
Ecological distribution	Occurs in Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, wetland-riparian communities. <sup>5</sup>
Climate and elevation range	In Canada elevation ranges from 210 m to 2200 m. <sup>8</sup> In the US elevation ranges from 878 m to 3,600 m <sup>6</sup> , although the data is from limited states.
Local habitat and abundance	<p>Found mostly in partial shade, from the lowlands to well up in the mountains<sup>2</sup>, such as in meadows, thickets, moist open forest, woodlands, and valleys.<sup>4</sup></p> <p>Richardson's geranium grows best on moist to semiwet soils with good drainage<sup>9,10</sup>. It is moderately tolerant of drought<sup>10</sup>. It grows best on loam, sandy loam, and clayey loam soils derived from shale and limestone, but occurs on gravelly substrates as well<sup>9,10</sup>.</p> <p>Known associated species include: quaking aspen (<i>Populus tremuloides</i>)-dominated community types in Wyoming, Idaho, Utah, Colorado, and Montana.<sup>6</sup> In Wyoming, Richardson's geranium occurs in spruce/field horsetail (<i>Picea</i> spp./<i>Equisetum arvense</i>) and spruce/sweet-scented bedstraw (<i>Galium triflorum</i>) riparian community types.<sup>6</sup> In wet meadows of Utah, Richardson's geranium is codominant with western wheatgrass (<i>Pascopyrum smithii</i>).<sup>6</sup> Richardson's geranium is a dominant understory species in the subalpine fir/mountain bluebells (<i>Mertensia ciliata</i>) habitat type and in aspen-dominated communities of northern New Mexico and southern Colorado.<sup>12</sup> In Canada, Richardson's geranium is a member of the subboreal, aspen-dominated spruce zone<sup>14</sup>.</p>

	<p>It is also commonly associated with sugar pine (<i>Pinus lambertiana</i>), incense-cedar (<i>Calocedrus decurrens</i>), willows (<i>Salix</i> spp.), black cottonwood (<i>Populus trichocarpa</i> var. <i>hastata</i>), narrowleaf cottonwood (<i>P. angustifolia</i>), thinleaf alder (<i>Alnus incana</i> ssp. <i>tenuifolia</i>), hackberry (<i>Celtis occidentalis</i>), boxelder (<i>Acer negundo</i>), alligator juniper (<i>Juniperus deppeana</i>), Utah juniper (<i>J. utahensis</i>), Gambel oak (<i>Quercus gambelii</i>), bigtooth maple (<i>Acer grandidentatum</i>), Rocky Mountain maple (<i>A. glabrum</i>), dwarf bilberry (<i>Vaccinium myrtillus</i>), grouse whortleberry (<i>V. scoparium</i>), red-osier dogwood (<i>Cornus sericea</i>), rose (<i>Rosa</i> spp.), russet buffaloberry (<i>Shepherdia canadensis</i>), mountain snowberry (<i>Symphoricarpos oreophilus</i>), shrubby cinquefoil (<i>Potentilla fruticosa</i>), common chokecherry (<i>Prunus virginiana</i>), antelope bitterbrush (<i>Purshia tridentata</i>), slender wheatgrass (<i>Elymus trachycaulus</i>), California brome (<i>Bromus carinatus</i>), Letterman needlegrass (<i>Stipa lettermanii</i>), Arizona fescue (<i>Festuca arizonica</i>), mountain muhly (<i>Muhlenbergia montana</i>), Rosssedge (<i>Carex rossii</i>), Kentucky bluegrass (<i>Poa pratense</i>), western meadowrue (<i>Thalictrum occidentale</i>), northern bedstraw (<i>Galium boreale</i>), western yarrow (<i>Achillea millefolium</i>), fireweed (<i>Epilobium angustifolium</i>), and starry Solomon-seal (<i>Smilacina stellata</i>)<sup>6</sup></p>
Plant strategy type / successional stage	<p>Raunkiaer Life Form: Hemicryptophyte<sup>6</sup> Geophyte<sup>6</sup></p> <p>Erosion control, short-term revegetation potential, and long-term revegetation potential are rated as medium<sup>6</sup></p>
Plant characteristics	<p>Dicot, Forb/Herb<sup>1</sup>. Perennial<sup>4</sup> with a short lifespan<sup>1</sup></p> <p>Richardson's geranium reproduces by seed and rhizomes.<sup>9</sup> Bees are common pollinators, and flower beetles may also pollinate Richardson's geranium. It is an active ballist; seed is throw 3.3 feet(1 m) or more from the parent plant. Flower beetles may aid in dispersal.<sup>6</sup></p> <p>Its stout woody taproot allows Richardson's geranium to withstand grazing by cattle, making it a hardy plant even around grazers<sup>9</sup></p>

<b>PROPAGATION DETAILS (Native Plant Network Propagation Protocol Database) <sup>11</sup></b>	
Ecotype	Old Faithful Main Shop Area of Yellowstone National Park
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	10-cubic-inch containers
Time to Grow	N/A  Growth rate is medium <sup>1</sup>
Target Specifications	N/A
Propagule Collection Instructions	N/A  From USDA database <sup>1</sup> : bloom period is mid-spring. Seeds can be collected from the field only. Fruit and seed abundance is medium. The fruit and seed period begins in the spring and ends in the summer.
Propagule Processing/Propagule Characteristics	40,000 seeds per pound <sup>1</sup> Seed does not remain viable for more than one winter. <sup>13</sup>  Process dry seedheads in hammermill using #8 (0.125 in diameter holes) screen. Large debris can be removed from processed material using hand sieves. Run remaining material over fanning mill with high wind to remove chaff.
Pre-Planting Propagule Treatments	A 6-week cold moist stratification at 34 to 37øF resulted in fair germination of 1-y-old seeds (about 40 to 50%), although trials to determine optimum dormancy breaking treatment were not conducted. Sow seeds directly onto a peat-lite mix and cold chill, or stratify seeds in a 50:50 sand:peat moss mix in a ventilated ziplock bag. Moisten seed and media and allow to imbibe water overnight before placing in cooler. Ten-cubic-inch containers are adequate for 1-0 production.
Growing Area Preparation / Annual Practices for Perennial Crops	For container production, use a well-drained peat-lite mix with baseline nutrition. Ten-cubic-inch containers.
Establishment Phase Details	This species grows well in a greenhouse at 75 to 80øF days and 60 to 65øF nights on 14- to 16-hour photoperiods. Keep media fairly moist. Fertigate

	weekly with 9-45-15 at 150 to 250 ppm for the first 4 to 6 weeks then use 20-10-20 at 150 to 200 ppm each week for the remainder of the growing season.
Length of Establishment Phase	At least 8 weeks.
Active Growth Phase	N/A
Length of Active Growth Phase	N/A
Hardening Phase	Move containerized material (at least 2 months old) started in the greenhouse that winter to an outdoor hoophouse in late spring/early summer (i.e. "finish" the plants in the hoophouse). Our hoophouse is ventilated but not cooled, and the containers are usually exposed to full sunlight for 2 to 4 weeks early in the season. The hoophouse is then covered with a 50% shade cloth until temperatures cool in the fall. Another option is to finish container plants in the greenhouse and then move them to the shadehouse in late summer, allowing 30 to 60 days of hardening prior to winter. The shade is usually removed in late summer/early fall and replaced with clear plastic. The plants harden-off gradually in the hoophouse prior to winter. Bridger is characterized by a high number of solar days that keeps the environment inside the hoophouse relatively mild until winter. In the case of premature and severely cold weather, a small propane heater is used at keep temperatures above freezing.
Length of Hardening Phase	As a standard practice, we allow a minimum of 30 days of hardening off prior to killing frost, 60 days is preferred.
Harvesting, Storage and Shipping	No experience, this species was delivered as actively growing stock in early summer of the first growing season. We generally prefer to hold over all container plants for one winter prior to outplanting.
Length of Storage	None in this case, but generally one winter prior to outplanting.
Guidelines for Outplanting / Performance on Typical Sites	N/A  Plant is mature at 3 feet and has a moderate growth rate in natural habitats. <sup>1</sup>
Other Comments	Easy to grow from seeds
<b>INFORMATION SOURCES</b>	
References	See below.
Other Sources Consulted	Albers F., Van der Walt J.J.A. (2007) Geraniaceae. In: Kubitzki K. (eds) Flowering Plants · Eudicots.

	<p>The Families and Genera of Vascular Plants, vol 9. Springer, Berlin, Heidelberg</p> <p>“Growing Geraniums.” <i>The Center for Agriculture, Food, and the Environment. University of Massachusetts Amherst</i>,  <a href="https://ag.umass.edu/greenhouse-floriculture/fact-sheets/growing-geraniums">https://ag.umass.edu/greenhouse-floriculture/fact-sheets/growing-geraniums</a>. Accessed: 04/29/19.</p> <p>Williams, Charles F., et al. “Floral Dimorphism, Pollination, and Self-Fertilization in Gynodioecious GERANIUM RICHARDSONII (Geraniaceae.” <i>American Journal of Botany</i>, vol. 87, no. 5, 2000, pp. 661–669.</p>
Protocol Author	Lia Koklic
Date Protocol Created or Updated	05/01/19

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