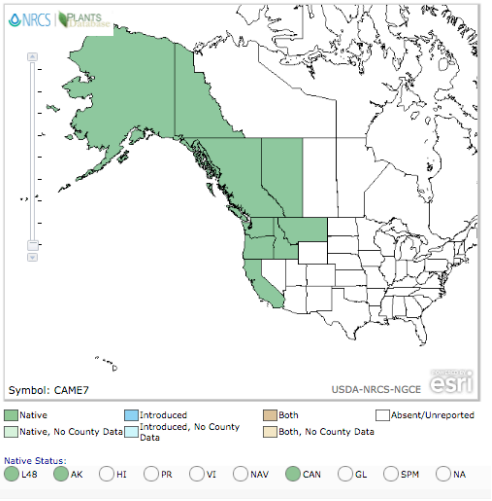
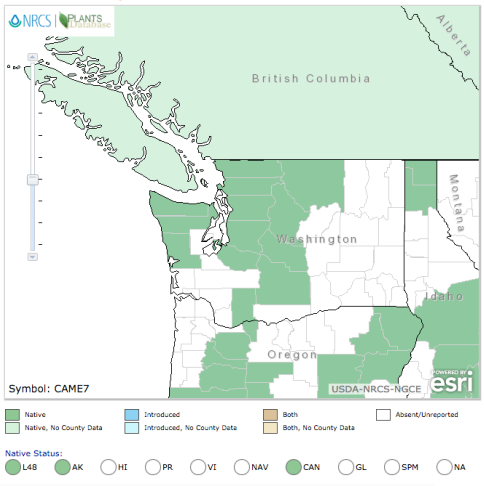
**Plant Propagation Protocol for *Cassiope mertensiana***
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*CAME7.pdf*




***North America distribution map***




***Washington State distribution map***

Image credits: USDA PLANTS Database

| **TAXONOMY** | |
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| Plant Family | |
| Scientific Name | Ericaceae |
| Common Name | Western Moss Heather |
| Species Scientific Name | |
| Scientific Name | *Cassiope mertensiana* (Bong.) G. Don |
| Varieties | *Cassiope mertensiana* (Bong.) G. Don var. *gracilis* (Piper) C.L. Hitchc.<br>*Cassiope mertensiana* (Bong.) G. Don var. *mertensiana* (USDA) |
| Sub-species | *Cassiope mertensiana* (Bong.) subsp. *californica* (Piper), *Cassiope mertensiana* (Bong.) subsp. *ciliolata* (Piper) (Klinkenberg 2016) |
| Cultivar | None |
| Common Synonym(s) | *Andromeda mertensiana* (Bong.) |
| Common Name(s) | White-heather, Western moss-heather, white moss heather, amerikansk kantljung (US National Plant Germplasm System) |
| Species Code | CAME7 |
| **GENERAL INFORMATION** | |
| Geographical range | See North American and Washington State distribution maps above. *Cassiope mertensiana* is found from Alaska south through the mountains of Washington and Oregon to central California. It also occurs in the east to Idaho, Montana, and the Canadian Rockies. Of the two varieties, *C. m.* var. *mertensiana* occurs more in |

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| | the western range, from Alaska south to central California. *C. m.* var. *gracilis* ranges east to Montana from the Northwest. (Robson, Richter, and Filbert 2008)<br>Subspecies *Cassiope mertensiana* (Bong.) subsp. *californica* (Piper) is endemic to Sierra Nevada.<br>Subspecies *Cassiope mertensiana* (Bong.) subsp. *ciliolata* (Piper) is endemic to the mountain ranges of northwestern California. (Klinkenberg 2016) |
| Ecological distribution | *C. mertensiana*'s native habitat is alpine heath, meadows, rocky ledges, and moist to dry slopes in maritime, subcontinental alpine tundra, subalpine boreal climates, and alpine zones. (Klinkenberg 2016) |
| Climate and elevation range | *C. mertensiana* lives in an alpine tundra and boreal climate type. The species can tolerate annual precipitation between 31 and 123 inches per year. (Calflora 2016) It usually occurs between 1650 and 3740 meters in elevation, but extremes are as follows:<br>Minimum elevation = 10 meters<br>Maximum elevation = 3740 meters<br>(Klinkenberg 2016, Calflora 2016) |
| Local habitat and abundance | *C. mertensiana* likes cool, damp, gritty soil (Wildflower.org 2016). It is a very shade-intolerant evergreen shrub that prefers nitrogen-poor, acidic soils. It is associated with *Barbilophozia floerkei, Cassiope stelleriana, Phyllodoce empetriformis*, and *Vaccinium deliciosum*. (Klinkenberg 2016) Other associated species include *Antennaria lanata, Deschampsia atropurpurea, and Leutkea pectinata.* (Franklin and Dyrness, 1988) |
| Plant strategy type / successional stage | It is a stress-tolerator, climax to near climax successional stage plant (Franklin and Dyrness 1988). |
| Plant characteristics | *C. mertensiana* is a dwarf, evergreen mat-forming shrub) ranging from 5 to 30 cm in height and eventually much wider. Slender stems are almost completely concealed by its leaves.<br>**Leaves:** It has tiny, lance-shaped leaves that are 2 - 5mm long and densely arranged in four rows along the stems.<br>**Flowers/Seeds:** The flowers are small white bells with five fused petals and fie reddish sepals that bloom near the branch tips.<br>  <br>*Photo credit: Neal Kramer*<br>*C. mertensiana* blooms in mid to late summer, earlier at lower elevations.<br>**Fruits:** Fruit are globe-shaped capsules, about 4mm |

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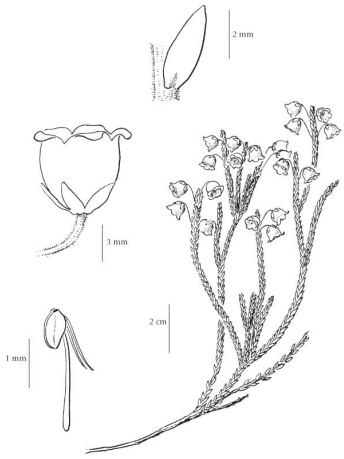
| | wide. They have five chambers and many seeds. (Klinkenberg 2016)<br>  <br>  <br>*Cassiope mertensiana* var. *mertensiana*<br>  <br><br>*Photo credits: Aaron Schusteff (top left), The Illustrated Flora of B.C. (top right), S & J Perkins (bottom)* |
| **PROPAGATION DETAILS** | |
| Ecotype | N/A |
| Propagation Goal | Plants |
| Propagation Method | Seeds - Seeds take a long time to grow to a transplant size. Cuttings take less time to reach an adequate size for planting. Growing in greenhouses until they are in gallon containers is the best method of production. (Potash & Aubry 1997) |
| Product Type | Containers |
| Stock Type | |
| Time to Grow | The seedlings from seeds will not be transplantable into a larger pot until a full year of growing. (Potash & Aubry 1997) |
| Target Specifications | Information not available. |
| Propagule Collection Instructions | Collect seeds from early September until first |

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| | snowfall. Cut entire inflorescence and place in paper bag upside down. Dry for 2 to 4 weeks inside of paper bag. Using #30 screen, separate seeds from surrounding duff. Grind up all flowers inside of the bag to get any remaining seeds. (Potash & Aubry 1997) |
| Propagule Processing/Propagule Characteristics | No information available for seed life or seed density. |
| Pre-Planting Propagule Treatments | There is no advantage to stratification for *C. mertensiana.* Seeds germinate based on light. No information available for seed storage. (Potash & Aubry 1997). |
| Growing Area Preparation | *C. mertensiana* has been found to grow best in certain mixes meant for different forms of propagation material. Using the appropriate "Seed mix" (Table 1) in seedling flats, sew the seeds on the surface of the medium. (Potash & Aubry 1997) |

| Cuttings Compost Mix | Seed Mix | Potting Soil Mix |
|---|---|---|
| 3 parts fine sphagnum peat | 3 parts sphagnum peat | 5 parts ground Douglas fir bark |
| 3 parts horticulture variety perlite | 3 parts #3 horticulture vermiculite | 2 parts fine sphagnum peat |
| 1 part #4 washed sand (sharp silicon for masonry) | 1-2 parts propagation grade perlite | 1 part #3 horticulture vermiculite |
| | 1 part #4 washed sand | 1-2 parts potting or propagation grade perlite |
| | | ½ part dry wetting agent, perlite base |
| | | <1 part #4 sand (sharp quartz) |

**Table 1:** Soil mixtures.
Mixes courtesy of Potash and Aubry

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| Establishment Phase Details | Shade seedlings from direct sunlight with a shadecloth in the summer. (Potash & Aubry, 1997) Seeds may also be planted into flats or containers in gritty soil, left outside in the cool moist winter weather for germination in spring or later (Robson, Richter, and Filbert 2008) |
| Length of Establishment Phase | Information not available. |
| Active Growth Phase | The best time of year to transplant is winter or spring. During the process, avoid handling the roots. It is best to use a spoon for any transplantation of the seedlings into pots. Once in the pots, keep under shade cloth for a few weeks and mist once or twice a |

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| | day. In the summer, mound up Douglas fir mulch around the seedlings and water the mulch every day. Water once daily first summer following transplanting into containers. (Potash & Aubry, 1997) |
| Length of Active Growth Phase | Information not available. |
| Hardening Phase | Information not available. |
| Length of Hardening Phase | Information not available. |
| Harvesting, Storage and Shipping | Information not available. |
| Length of Storage | Information not available. |
| Guidelines for Outplanting / Performance on Typical Sites | Recommended planting density is 18- 24" apart. Growth is slow, however, plants can grow to be over 20 years old. (Pojar & Mackinnon, 1994) |
| Other Comments | |
| **PROPAGATION DETAILS** | |
| Ecotype | N/A |
| Propagation Goal | Plants |
| Propagation Method | Cuttings - The easiest and cheapest way to propagate with is cuttings from existing plants found in the wild, as they root the fastest and are the easiest to acquire. Seeds take a long time to grow to a transplant size. Cuttings take less time to reach an adequate size for planting. Growing in greenhouses until they are in gallon containers is the best method of production. The costs of propagation materials include the labor of gathering cuttings and the cost of running a greenhouse for over a year to create gallon-sized plants. (Potash & Aubry 1997) |
| Product Type | Containers |
| Stock Type | Information not available. |
| Time to Grow | Information not available. |
| Target Specifications | Information not available. |
| Propagule Collection Instructions | Collect cuttings in late summer or fall. Avoid flowering and secondary growth stems. Use shaded sections of the plant. Slice 1/8" off of base of 3-5" cutting. Remove leaves within ½" of basal end and keep cuttings in bucket of cold water. (Potash & Aubry 1997). |
| Propagule Processing/Propagule Characteristics | N/A |
| Pre-Planting Propagule Treatments | Cuttings can be stored in a refrigerator for 3 to 4 weeks if given fresh water every 3 to 4 days and kept in an open ziplock bag. (Potash and Aubry 1997) |
| Growing Area Preparation / Annual Practices for Perennial Crops | Apply rooting hormone to base of cutting (for example, suspend basal end of cuttings in a solution of 1 tablespoon of "Dip 'n Grow" and 1 quart of water for 24 to 72 hours.) *C. mertensiana* has been found to |

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| | grow best in certain mixes meant for different forms of propagation material. Use 10x20" flats with "cuttings compost mix" (See Table 1 in seed section). Plant 50 cuttings per flat. Place on mist bench with bottom heat at 55-65 degrees F in winter and 65 degrees F in spring/summer. (Potash and Aubry 1997) |
| Establishment Phase Details | Shade from full sun. Fertilize every 2 weeks with 9-45-15 plant starter diluted to ½ strength and Maxicrop liquid kelp at ¼ recommended strength. Transplant to shallow pots after 3-4 months or when roots fill out the flat. (Potash and Aubry 1997) |
| Length of Establishment Phase | 3- 4 months |
| Active Growth Phase | Information not available. |
| Length of Active Growth Phase | Information not available. |
| Hardening Phase | Information not available. |
| Length of Hardening Phase | Information not available. |
| Harvesting, Storage and Shipping | Information not available. |
| Length of Storage | Information not available. |
| Guidelines for Outplanting / Performance on Typical Sites | Recommended planting density is 18- 24" apart. Growth is slow, however, plants can grow to be over 20 years old. (Pojar & Mackinnon, 1994) |
| Other Comments | |
| **PROPAGATION DETAILS** | |
| Ecotype | N/A |
| Propagation Goal | Plants |
| Propagation Method | Layering - *Cassiope mertensiana* layers readily in the field. (Robson, Richter, and Filbert 2008) |
| Product Type | Containers |
| Stock Type | Information not available. |
| Time to Grow | Information not available. |
| Target Specifications | Information not available. |
| Propagule Collection Instructions | Push stems under the soil surface and old them in place until roots form. (Robson, Richter, and Filbert 2008) |
| Propagule Processing/Propagule Characteristics | N/A |
| Pre-Planting Propagule Treatments | N/A |
| Growing Area Preparation / Annual Practices for Perennial Crops | *C. mertensiana* has been found to grow best in certain mixes meant for different forms of propagation material. Use 10x20" flats with "cuttings compost mix" (See Table 1 in seed section). Plant 50 cuttings per flat. Place on mist bench with bottom heat at 55-65 degrees F in winter and 65 degrees F in spring/summer. (Potash and Aubry 1997) |
| Establishment Phase Details | Shade from full sun. Fertilize every 2 weeks with 9-45-15 plant starter diluted to ½ strength and Maxicrop |

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| | liquid kelp at ¼ recommended strength. Transplant to shallow pots after 3-4 months or when roots fill out the flat. (Potash and Aubry 1997) |
| Length of Establishment Phase | 3- 4 months |
| Active Growth Phase | The best time of year to transplant is winter or spring. Once in the pots, keep under shade cloth for a few weeks and mist once or twice a day. Water once daily first summer following transplanting into containers. (Potash & Aubry, 1997) |
| Length of Active Growth Phase | Information not available. |
| Hardening Phase | Information not available. |
| Length of Hardening Phase | Information not available. |
| Harvesting, Storage and Shipping | Information not available. |
| Length of Storage | Information not available. |
| Guidelines for Outplanting / Performance on Typical Sites | Recommended planting density is 18- 24" apart. Growth is slow, however, plants can grow to be over 20 years old. (Pojar & Mackinnon, 1994) |
| Other Comments | |
| **INFORMATION SOURCES** | |
| References | (See References below) |
| Other Sources Consulted | (See Other Sources below) |
| Protocol Author | Stephanie Farrell |
| Date Protocol Created or Updated | May 16, 2016 |

**References:**


1. Borealforests.org. Shrub Species of the World's Boreal Forests, "*Cassiope mertensiana.*" Web. Accessed 12 May 2016. http://www.borealforest.org/world/herbs_shrubs/white_mountain_heather.htm
2. Calflora: Information on California plants for education, research and conservation. "Plant Characteristics and Associations – *Cassiope mertensiana*". 2016. Berkeley, California: The Calflora Database [a non-profit organization]. Web. Accessed 15 May 2016. http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1665
3. Franklin, J. & Dyrness, C.T. (1988). Natural Vegetation of Oregon and Washington. Corvalis, OR: Oregon State University Press. p. 452. Print.
4. Klinkenberg, Brian. 2015. E-Flora BC: Electronic Atlas of the Plants of British Columbia. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. Web. Accessed 16 May 2016. http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Cassiope%20mertensiana%20var.%20mertensiana
5. Lady Bird Johnson Wildflower Center. "Native Plant Database – *Cassiope mertensiana* (Bong.) G. Don, western moss heather," Web. Accessed 12 May 2016. http://www.wildflower.org/plants/result.php?id_plant=CAME7

6. Pojar, J. & MacKinnon, A. (1994). *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska.* Renton, WA: Lone Pine Publishing. p. 62. Print.
7. Potash, L. & Aubry, C. (1997). *Native plant notebook: Mt. Baker-Snoqualmie National Forest.* Sedro Wooly, WA: North Cascades Institute. Print.
8. USDA. "USDA Plant Profile – *Cassiope mertensiana* (Bong.) G. Don, western moss heather" NRCS. Web. Accessed 16 May 2016 http://plants.usda.gov/core/profile?symbol=CAME7
9. U.S. National Plant Germplasm System. 2015. "Taxonomy, Species Nomenclature in the database – Taxon: *Cassiope mertensiana* (Bong.) G. Don. " Web. Accessed 19 Apr 2016. https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?id=9411

**Other Sources (consulted, but contained no pertinent information):**

1. Baskin, Carol C. & Baskin. 2014. *SEEDS: Ecology, Biogeography and Evolution of Dormancy and Germination, Second Edition.* Academic Press, San Diego. Print.
2. Deno, Norman C. 1991. *Seed Germination Theory and Practice*. Pennsylvania State University, State College, PA. Print.
3. Deno, Norman C. 1994. *Seed Germination Theory and Practice, Second Edition*. Pennsylvania State University, State College, PA. Print.
4. Young, James A. & Young, Cheryl G. 1986. *Collecting, Processing, and Germinating Seeds of Wildland Plants.* Timber Press, Portland. Print. p. 192.

# White Mountain Heather - *Cassiope mertensiana*


**Range:** Found from Alaska to California and Nevada, in the Canadian Rockies and Western Montana. (borealforest.org, 2006)
**Climate, elevation:** Located near or above the timberline in alpine heath and alpine parkland. Generally found between 1400 to 2000 meters in elevation. (borealforest.org, 2006)
**Local occurrence:** Common at high altitudes on open, moist slopes. (borealforest.org, 2006)
**Habitat preferences:** Found on open slopes that are covered by snow in the winter. Prefers a moist, partial to full sun environment. (borealforest.org, 2006)
**Plant strategy type/successional stage:** Stress tolerator, climax to near climax succesional stage (Franklin and Dyrness, 1988).
**Associated species:** *Antennaria lanata, Deschampsia atropurpurea, Leutkea pectinata, Phyllodoce empetriformis, Vaccinium deliciosum.* (Franklin and Dyrness, 1988)
**May be collected as:** Seeds, Layers, Cuttings. (Pojar & Mackinnon, 1994)
**Collection restrictions or guidelines:** For cuttings, avoid flowering and secondary growth stems. Use shaded sections of the plant. (Potash & Aubry, 1997)
**Seed germination:** There is no advantage to stratification for C. mertensiana. Seeds germinate based on light. (Potash & Aubry, 1997)
**Seed life:** not available
**Recommended seed storage conditions:** No available information for seed storage. Cuttings can be stored in a refrigerator for 3 to 4 weeks if given fresh water every 3 to 4 days and kept in an open zip-lock bag. (Potash & Aubry, 1997)
**Propagation recommendations:** It is easiest to propagate cuttings from existing plants found in the wild. Seeds take a long time to grow to a transplant size. Cuttings take less time to reach an adequate size for planting. (Potash & Aubry, 1997)

- Cuttings: 10 steps to propagating cuttings from Potash and Aubry:

1. Slice 1/8" off base of 3-5" cutting
2. Remove leaves within 1/2 " of basal end and keep cuttings in bucket of cold water
3. Make a solution of 1 tablespoon "Dip 'n Grow" to 1 quart water
4. Suspend basal end of cuttings in solution and soak for 24 to 72 hours
5. Use 10 x 20" flats with "cuttings compost mix" (see table 1)
6. 50 cuttings per flat
7. Place on mist bench with bottom heat at 55-65 °F in winter and 65°Fin spring/summer
8. Shade from full sun
9. Fertilize every 2 weeks with 9-45-15 plant starter diluted to 1/2 strength and Maxicrop liquid kelp at 1/4 recommended strength
10. Transplant to shallow pots after 3-4 months or when roots fill-out flat

- Seeds: Collect seeds from early September until first snowfall. Cut entire inflorescence and place in paper bag upside down. Allow to dry for 2 to 4 weeks inside of paper bag. Using #30 screen, separate seeds from surrounding duff. Grind up all flowers inside of the bag to get any remaining seeds. Using the "Seed mix" (Table 1) in seedling flats, sew the seeds on the surface of the medium. This is because of the size of each seed. The seedlings from seeds will not be transplantable into a larger pot until a full year of growing. Shade seedlings from direct sunlight with a shade cloth in the summer. (Potash & Aubry, 1997)

- Transplanting: The best time of year to transplant is winter or spring. During the process, avoid handling the roots. It is best to use a spoon for any transplantation of the seedlings into pots. Once in the pots, keep under shade cloth for a few weeks and mist once or twice a day. In the summer, mound up Douglas fir mulch around the seedlings and water the mulch every day. (Potash & Aubry, 1997)

**Soil or medium requirements:** C. mertensiana has been found to grow best in certain mixes meant for different forms of propagation material. They are cuttings, seeds, and then medium for potting up seedlings.

| Cuttings Compost Mix | Seed Mix | Potting Soil Mix |
|---|---|---|
| 3 parts fine sphagnum peat<br>3 parts horticulture variety | 3 parts sphagnum peat<br>3 parts #3 horticulture | 5 parts ground Douglas fir bark<br>2 parts fine sphagnum peat |

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| perlite<br>1 part #4 washed sand (sharp silicon for masonry) | vermiculite<br>1-2 parts propagation grade perlite<br>1 part #4 washed sand | 1 part #3 horticulture vermiculite<br>1-2 parts potting or propagation grade perlite<br>½ part dry wetting agent, perlite base<br><1 part #4 sand (sharp quartz) |

**Table 1:** Soil mixtures.
Mixes courtesy of Potash and Aubry

**Installation form:** The cheapest form to propagate with is cuttings, they root the fastest and are the easiest to come by. Growing in greenhouses until they are in gallon containers are the best form. The costs of propagation materials are the labor of gathering cuttings and the cost of running a greenhouse for over a year to create gallon sized plants. (Potash & Aubry, 1997)
**Recommended planting density:** 18-24" apart.
**Care requirements after installed:** Water once daily first summer following transplanting into containers. (Potash & Aubry, 1997)
**Growth Rate:** Slow. Can grow to be over 20 years old. (Pojar & Mackinnon, 1994)
**Sources cited:**


borealforests.org. Shrub Species of the World's Boreal Forests. Retrieved April 12, 2006 from http://www.borealforest.org/world/herbs_shrubs/white_mountain_heather.htm
Franklin, J. & Dyrness, C.T.. (1988). Natural Vegetation of Oregon and Washington. (pp. 452). Corvalis, OR: Oregon State University Press.
Photos: UW Library Digital Collection, Plants of Western Washington Collection. Retrieved April 12, 2006 from http://content.lib.washington.edu/plantsweb/index.html
Potash, L. & Aubry, C. (1997). **Native plant notebook : Mt. Baker-Snoqualmie National Forest.** Sedro Wooly, WA: North Cascades Institute.
Pojar, J. & MacKinnon, A. (1994). **Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska.** (pp. 62). Renton, WA: Lone Pine Publishing.



Compiled April 12, 2006 by Ryan Williams