**Anaphalis margaritacea** (L) Benth. and Hook. F. ex C.B. Clarke  
**Family:** Asteraceae

**Figure 79.** Documented range of *Anaphalis margaritacea* in northern British Columbia.

**Figure 80.** Growth habit of *Anaphalis margaritacea* in cultivation.
**Anaphalis margaritacea**

### Background Information

*Anaphalis margaritacea* can be found north to Alaska, the Yukon and Northwest Territories, east to Newfoundland and Nova Scotia, and south to North Carolina, Kentucky, Arizona, New Mexico and California. It is reported to be common throughout B.C. except in the northeast (Douglas et al. 1998).

**Growth Form:** Rhizomatous perennial herb, with few basal leaves, alternate stem leaves light green above, woolly white underneath; flower heads in dense flat-topped clusters, yellowish disk flowers; involucral bracts dry pearly white; mature plant size is 20-90 cm tall (MacKinnon et al. 1992, Douglas 1998).

**Site Preferences:** Moist to dry meadows, rocky slopes, open forest, landings, roadsides and other disturbed sites from low to subalpine elevations, throughout most of B.C. In coastal B.C., it is reported to be shade-intolerant and occupies exposed mineral soil on disturbed sites and watershed sites up to the alpine (Klinka et al. 1989).

### Seed Information

**Seed Size:**
- Length: 0.97 mm (0.85 - 1.07 mm).
- Width: 0.32 mm (0.24 - 0.37 mm).

**Seeds per gram:** 24,254 (range: 13,375 - 37,167).

**Volume to Weight Conversion:** 374.0 g/L at 66.75% purity.

**Germination Capacity:**
- At 30°/20° C untreated: 62.8% (42 - 84%).
- At 25°/15° C untreated: 86.1% (75 - 97%).
- Stratified: 54.5% (23 – 86%).

**Germination Speed:**
- To first germination: 13.3 days.
- To 50% potential: 26.2 days.

**Seed Longevity:** At least three years. In our research, *Anaphalis margaritacea* seeds two and three years old remained viable, with germination levels 15 - 18% greater than seeds grown and tested in the year they were harvested, suggesting that some after-ripening or inadvertent stratification may occur in seeds over time.

### Considerations for Growing

**Techniques for Seed Production**

**Seed treatment:** Tests indicate that untreated seeds germinate best under cool conditions, and that there is no benefit to stratification.

**Soil considerations:** Establish on loamy, finely tilled and well prepared soils with a firm seedbed.

**Stand establishment:** Site should be free of all weeds, especially rhizomatous grasses and other persistent species because there are currently no selective herbicides that can be used once plants are growing. Stands can either be established from seedlings started in the greenhouse or from seed, sown in spring.

**Row spacing:** 60–90 cm.

**Seeding density:** 300-400 PLS seed per linear metre.
Anaphalis margaritacea  
(continued)  

(Techniques for Seed Production, continued)

Seeding depth: Surface to shallow; a light dusting of peat moss or loose soil will help to keep the seeds in place.

Stand maintenance: Regularly cultivate rows and spot spray with herbicide to keep plot weed free; annual fertilization with low N formulations may extend the life of the plot. Plastic placed between rows will not only serve as mulch but will catch easily scattered seeds which can later be vacuumed or swept up.

Harvesting and Seed Processing

Dates of selective harvesting in the Bulkley Valley of northwestern B.C. have ranged from August 13th to October 21st. Link (1993) suggests that Anaphalis should be harvested when the centre of the flower is dark brown in late August to mid-September. Timing of harvest is important, as seed is easily scattered by the wind after it is ripe.

Hand clipping: Hold the seed heads over bins placed alongside the plants being clipped or place a bag over the seed heads before clipping to minimize seed loss.

Vacuum: A shop vacuum works best for this species. Hold hose over ripe, completely dry flower heads and turn on suction. Empty the canister as it fills. Modified leaf blower is not suitable for this species because fabric collection bag allows the small seeds to seep out.

Seed stripper: Not recommended.

Combine/thresher settings: Repeated runs at 1850 rpm with 1 mm gap.

Seed cleaning: Fanning mill (no air flow) twice, follow with hand sieving. Fanning mill screen sizes first run: prescreen 1.2 x 7.1 mm slot; top 1.8 x 12.7 mm slot; bottom blank; second run: prescreen 0.5 mm square; top 1.8 x 12.7 mm slot; bottom blank; then use vacuum separator with speed and suction set low to remove dust and <5% of seeds; can use hand sieve (0.5 mm screen) for finishing or as the main cleaning for small quantities.

Storage requirements: Cool, dry conditions (Link 1993).

Considerations for use in revegetation

- Anaphalis margaritacea is reported to grow well on medium to coarse textured mesic to dry soils on open woods in foothills, mountains and dry pastures in Alberta (Gerling et al. 1996).
- This species establishes slowly so it should not be counted on for quick cover or erosion control; suitable for subsoil materials and compacted soils resulting from recent roadbuilding activities.
- Anaphalis can successfully colonize on low nitrogen soils (Chapin 1994).
- It can be sown by direct broadcast seeding and raking in as part of a grass/forb mixture (Link 1993).

Other considerations

- Anaphalis was traditionally used as a poultice for sores and swellings by West Coast Natives and as a medicine for internal disorders (Turner and Bell 1973, Turner et al. 1980).
- This species has potential for use in floral arrangements and craft products, as its flower heads dry well (Douglas 1995).
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Arnica chamissonis Less. ssp. foliosa (Nutt.) Maguire
meadow arnica

Family: Asteraceae

Figure 82. Documented range of Arnica chamissonis in northern British Columbia.

Figure 83. Growth habit of Arnica chamissonis in cultivation.
Arnica chamissonis ssp. foliosa
(continued)

Background Information

Arnica chamissonis is found north to Alaska and the Yukon Territories, east to Ontario and south to New Mexico, Arizona and California. It is commonly found in B.C. (Douglas et al. 1998). MacKinnon et al. (1992) report that it is found scattered throughout northern British Columbia, but that it is locally abundant where it is found. Three subspecies are recognized in B.C.; the accessions with which we have been working are all A.c. ssp. foliosa (Nutt.) Maguire (Douglas et al. 1998). As occurrences and collections are often not identified to subspecies, subspecies are not distinguished in the range map presented in Figure 82.

Growth Form: Rhizomatous perennial herb; 5-10 pairs of opposite stem leaves; yellow ray and disc flowers; mature plant size is 20-100 cm tall, one of the tallest Arnica. Spreads easily from rhizomes, but can be propagated from seed as well (Douglas 1982, MacKinnon et al. 1992, Douglas et al. 1998).

Site Preferences: Wet to mesic meadows and forest openings, found throughout northern B.C. at low to moderate elevations (MacKinnon et al. 1992, Douglas et al. 1998).

Seed Information

Seed Size: Length: 4.09 mm (3.51 - 4.90 mm). Width: 0.76 mm (0.50 - 0.96 mm).

Seeds per gram: 2,682 (range: 2,255 - 3,470).

Volume to Weight Conversion: Unknown.

Germination Capacity: At 30º/20º C untreated: 23.3%.
At 25º/15º C untreated: 30.3% (23 - 41%).
stratified: 32.8% (29 – 36%).

Germination Speed: To first germination: 16.0 days.
To 50% potential: 39.9 days.

Seed Longevity: Unknown at present, however Kramer and Johnson (1987) report that seeds of Arnica sp. have been found in mature forest seed banks. Link (1993) reports that seeds of Arnica sororia Greene are viable for about five years. In our research, seeds of Arnica chamissonis retained their viability after storage under cool dry conditions for two years.

Considerations for Growing

Techniques for Seed Production

Seed treatment: Germination tests suggest marginal benefits to stratification; establishment likely better in cool soils (early or late in the growing season).

Soil considerations: Establish on loamy, well-drained rich humus, (pH 7), with a firm seedbed (Richters 2000).
Arnica chamissonis ssp. foliosa  
(meadow arnica)  

(Techniques for Seed Production, continued)

**Stand establishment:** Site should be free of all weeds, especially rhizomatous grasses because there are currently no selective herbicides that can be used once plants are growing. In our research, stand establishment from seed is very successful; also establishes well from peat moss plugs sown 12 weeks prior to field planting.

**Row spacing** (for both plugs and seeds): 60 to 120 cm under dry land conditions, 30 to 90 cm with good irrigation (Smith and Smith 2000); this species will spread vegetatively to quickly form rows several plants wide, hence the recommendation for wide spacing.

**Seeding density:** 60-100 PLS seeds per linear metre.

**Seeding depth:** Surface to shallow seeding (Smith and Smith 2000), a light dusting of peat moss will help to keep the seeds in place.

**Stand maintenance:** Regularly cultivate rows and spot spray with herbicide to keep plot weed free; annual fertilization with low N formulations may extend the life of the plot; stand longevity is 3-5 years. *Arnica chamissonis* is very easy to grow, as its rhizomes quickly fill in the spaces between plants. Vigorous shoot growth results in lodging, however, so high levels of N should probably not be applied.

**Harvesting and Seed Processing**

**Dates of selective harvesting** in the Bulkley Valley of northwestern B.C. have ranged from July 7th to October 6th. Watch the plants carefully and harvest seeds as soon as they are ripe. *Arnica chamissonis* seeds are not as prone to dislodging by wind as those of *A. cordifolia*.

**Hand clipping:** May or may not be suitable, as it is not yet known whether curing will facilitate after-ripening of remaining seeds. Hold the seed heads over bins placed alongside the plants being clipped or place a bag over the seed heads before clipping to minimize seed loss.

**Vacuum:** Vacuum ripe seed heads selectively as they ripen by placing vacuum intake completely over seed head.

**Seed stripper:** Not recommended for harvesting this species.

**Combine/Thresher settings:** Repeated runs at 1241 rpm with 4 mm gap; remove fluff between runs by hand or vacuum.

**Seed cleaning:** After threshing, remove remaining fluff with shop vacuum; if there are stems and twigs present put through fanning mill screens, fanning mill screen sizes: prescreen 1.2 x 7.1 mm slot; top 1.8 x 12.7 mm slot; bottom blank.

**Storage requirements:** Cool dry storage (Burton and Burton 2001b).

**Considerations for Use in Revegetation**

- In Alberta, *Arnica chamissonis* is reported to grow on wet to mesic soils (Gerling et al. 1996).
- The ability of *Arnica chamissonis* to spread rapidly through rhizomes makes it very useful for erosion control.

**Other considerations**

- *Arnica chamissonis* has potential as a garden species, though aggressive spreading needs to be contained. It is already commercially available from some specialized seed houses and nurseries.
Arnica chamissonis ssp. foliosa
(continued)

(Other considerations, continued)
• Both wild and cultivated Arnica species are used in as many as 300 drug preparations in Europe and about 20 products in Canada (Small and Catling 2000). The medicinal and pharmaceutical properties of Arnica chamissonis remain to be fully explored.

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**Arnica cordifolia** Hook.  
heart-leaved arnica  
Family: Asteraceae

**Figure 85.** Documented range of *Arnica cordifolia* in northern British Columbia.

**Figure 86.** Growth habit of wild *Arnica cordifolia*.

**Figure 87.** *Arnica cordifolia* grown in cultivation, with individual plants inserted in weed cloth holes.
**Arnica cordifolia** Hook.  
**heart-leaved arnica**

(continued)

**Background Information**

*Arnica cordifolia* occurs in boreal and cool temperate climates and is found north to Alaska, the Yukon and Northwest Territories, east to Saskatchewan and south to South Dakota, New Mexico, Arizona and California (Douglas et al. 1998).

**Growth Form:** Rhizomatous perennial herb; heart-shaped basal leaves, coarsely toothed to entire, 2-3 pairs of opposite stem leaves; yellow ray and disc flowers; mature plant size is 10–60 cm tall (MacKinnon et al. 1992, Douglas et al. 1998). Rhizomes grow laterally 1–2 cm below the soil surface. Shorter stature, slower growing and not as vigorously rhizomatous as *A. chamissonis*.

**Site Preferences:** Mesic to dry forest and meadows at low to moderate elevations throughout the northern Interior. Reported to be shade tolerant to shade intolerant (*Stickney 1993, *Steele and Geier-Hayes 1987, MacKinnon et al. 1992, Douglas et al. 1998). It inhabits exposed, moderately dry mineral soils but can occur on a variety of soil types; commonly found in open-canopy coniferous forests on high elevation water-shedding sites, so tends to co-occur with lodgepole pine (*Pinus contorta*) and soapberry (*Shepherdia canadensis*). Occurrence increases with elevation (Klinka 1989). Widely distributed in the ESSF (SNR >A), moderately abundant in the SBS and SBPS (SMR 2-5), on mesic and poorer sites in the BWBS (Beaudry et al. 1999). Recognized as diagnostic of the mv, dk and mc subzones of the ESSF (Coupé et al. 1991).

**Seed Information**

**Seed Size:**  
Length: 6.35 mm (4.34 - 8.60 mm).  
Width: 0.71 mm (0.49 - 0.95 mm).

**Seeds per gram:** 1,991 (range: 1,657 – 3,030).

**Volume to Weight Conversion:** Unknown.

**Germination Capacity:** At 30°/20° C untreated: 10.7%  
(2 - 19%).

At 25°/15° C untreated: 17.4%  
(12 - 23%).

stratified: 22.7%  
(22 – 23%).

Symbios results of 2 to 23% germination contrast with those of Romme et al. (1995), who found that nearly all *Arnica cordifolia* seeds were non-viable, with only one seed germinating  
Out of 650 seeds tested.

**Germination Speed:**  
To first germination: 13.1 days.  
To 50% potential: 21.9 days.

**Seed Longevity:** Unknown at present; however, *Kramer and Johnson (1987) report that seeds of *Arnica cordifolia* have been found in mature forest seed banks. *Link (1993) reports that seeds of *Arnica sororia* Greene, a similar species, are viable for about five years. In our research, seeds were still viable after three years of storage under cool, dry conditions.
Considerations for Growing

**Techniques for Seed Production**

*Seed treatment*: Germination tests suggest that seed stratification is slightly beneficial, and that emergence will be more successful under cool conditions (Burton and Burton 2001b).

*Soil considerations*: Requires loamy, well prepared soils, firm seedbed.

*Stand establishment*: Site should be free of all weeds, especially rhizomatous grasses, because there are currently no selective herbicides that can be used once plants are growing. Stands can either be established from rhizomes (Reed 1993), from seedlings started in the greenhouse, or from seed; appears to establish more successfully from seedlings started in a greenhouse.

*Row spacing*: Unknown; suggest 75-120 cm under dry land conditions, 30-90 cm under irrigation.

*Seeding density*: Unknown at present; suggest 60-100 PLS per linear metre (Smith and Smith 2000).

*Seeding depth*: Surface to shallow seeding; a light dusting of peat moss will help to keep the seeds in place.

*Stand maintenance*: Regularly cultivate rows and spot spray with herbicide to keep plot weed free; annual fertilization with low N formulations may extend life of the plot.

**Harvesting and Seed Processing**

*Dates of selective harvesting* in the Bulkley Valley of northwestern B.C. have ranged from June 28th to September 26th. Watch the plants carefully and harvest seeds as soon as they are ripe because they easily dislodge and blow away.

*Hand clipping*: May or may not be a suitable harvesting method, as the ability for immature seeds to ripen after clipping is unknown. Hold the seed heads over bins placed alongside the plants being clipped or place a bag over the seed heads before clipping to minimize seed loss.

*Vacuum*: Vacuum ripe seed heads selectively as they ripen by placing vacuum cleaner intake completely over seed head.

*Seed stripper*: Not recommended for harvesting this species, though presumably could be done with a fine-threaded harvesting head on a uniformly ripened crop.

*Combine/thresher* settings: Repeated runs at 1241 rpm with 4 mm gap; remove fluff between runs by hand or using a vacuum.

*Seed cleaning*: Run threshed material through fanning mill screens: prescreen 1.2 x 7.1 mm; top screen 1.8 x 12.7 mm; bottom blank.

*Storage requirements*: Cool dry storage.

**Considerations for Use in Revegetation**

- *Arnica cordifolia* is reported to grow on wet to mesic soils in Alberta (Gerling et al. 1996).
- Reported to have poor forage value for livestock and to be potentially toxic (Gerling et al. 1996) but *Collins and Urness (1983) report that it is an important constituent of summer diets of mule deer and elk.*
- Germination in the field has been poor, though, so revegetation from seedlings is recommended if ground cover is required quickly (Burton and Burton 2001b).
- *Arnica cordifolia* is moderately fire resistant, sprouting from surviving rhizomes after fire; also regenerates from wind-dispersed seeds (Reed 1993).
Arnica cordifolia Hook.  
heart-leaved arnica

(Considerations for Use in Revegetation, continued)

* fide Reed 1993a.

Other considerations
• Arnica cordifolia has good potential for cultivation in woodland gardens (Douglas 1982).
• Both wild and cultivated Arnica species are used in as many as 300 hundred drug preparations in Europe and about 20 products in Canada (Small and Catling 2000). Medicinal and nutraceutical properties of Arnica cordifolia have yet to be fully explored.

Notes
Aster conspicuus Lindl.
showy aster

Family: Asteraceae

Figure 89. Documented range of *Aster conspicuus* in northern British Columbia.

Figure 90. Growth habit of *Aster conspicuus* in the wild.
**Background Information**

* Aster conspicuus * is found throughout western North America (Reed 1993). Douglas et al. (1998) report that it is found south of 57°N, east to Saskatchewan and south to Wyoming, Idaho and Oregon. MacKinnon et al. (1992) report that it is common throughout the northern B.C. Interior, and is abundant in the southern half of the region (south of 57°N). It is a common interior species on water shedding sites (Klinka et al 1989).

**Growth Form:** Rhizomatous perennial herb; small basal leaves, thick clasping stem leaves, sand-papery to the touch when mature; blue to violet ray flowers, yellow disk flowers; mature plant size is 30–100 cm tall (MacKinnon et al. 1992, Douglas et al. 1998).

**Site Preferences:** Moist to dry meadows, forest openings, thickets, and clearings at low to middle elevations. It is reported to be able to maintain and extend itself in a vegetative condition under a closed forest canopy and then flower profusely when the canopy opens up (Breitung 1988). It is reported to be shade-tolerant to shade-intolerant, associated with increased nitrogen availability. Widely distributed in the SBS zone at SMR <6, more narrowly distributed in the BWBS (SMR 3-4) and on dry fertile sites in the SBPS (SMR <5, SNR >A), though rare in the SBPSmc (Beaudry et al. 1999). Identified as a diagnostic species of the dh, dw, dk, mh, and mw subzones of the SBS (Meidinger et al. 1991).

**Seed Information**

**Seed Size:** Length: 3.56 mm (2.44 - 4.98 mm).  
Width: 0.73 mm (0.41 - 1.01 mm).

**Seeds per gram:** 2.107 (range: 1.746 - 2.708).

**Volume to Weight Conversion:** 96.8 g/L at 81.1% purity.

**Germination Capacity:** At 30°/20° C untreated: 18.4%  
(6 - 31%).  
At 25°/15° C untreated: 8.9%  
(34 - 44%).  
stratified: 51.7%  
(39 - 65%).

**Germination Speed:** To first germination: 13.2 days.  
To 50% potential: 25.1 days.

**Seed Longevity:** In our research, seeds of *Aster conspicuus* seeds retained their viability after storage under cool dry conditions for two years.

**Considerations for Growing**

**Techniques for Seed Production**

*Seed treatment:* Higher germination can be achieved with stratification prior to sowing.

*Soil considerations:* Establish on loamy, well-prepared soils, with a firm seedbed; superior germination under cool conditions suggest importance of sowing very early or late in the growing season.

*Stand establishment:* Site should be free of all weeds, especially rhizomatous grasses because there are currently no selective herbicides that can be used once plants are growing.
Growing and Using Native Plants in the Northern Interior of B.C.

**Aster conspicuus** Lindl.  
(showy aster)

(continued)

(Techniques for Seed Production, continued)

**Row spacing**: 75 to 120 cm under dryland conditions, 30 to 90 cm with good irrigation (Smith and Smith 2000).

**Seeding density**: Not known at present; 375 PLS seeds per linear metre inferred from recommendations for the similar species, *A. ericoides*.

**Seeding depth**: Surface to shallow seeding (Pahl and Smreciu 1999); a light dusting of peat moss will help keep the seeds in place.

**Stand maintenance**: Regularly cultivate rows and spot spray with herbicide to keep plot weed free; annual fertilization with low N formulations may extend life of the plot.

**Harvesting and Seed Processing**

*Dates of selective harvesting* in the Bulkley Valley of northwestern B.C. range from August 21st to September 24th. Timing of harvest is important as seed scatters moderately easily.

**Hand clipping**: May or may not be a suitable method for harvesting, as the ability of unripe seeds to mature after clipping is unknown. Hold the seed heads over bins placed alongside the plants being clipped, or place a bag over the seed heads before clipping to minimize seed loss. To aid cleaning process, pick seeds off each head without clipping stalks.

**Vacuum**: Vacuum ripe seed heads selectively as they ripen by placing the vacuum cleaner intake completely over seed head; a shop vacuum works best for this species; harvest as soon as seeds ripen because they are easily airborne.

**Seed stripper**: Not recommended for harvesting this species, though presumably would be suitable if using a soft-threaded harvesting head on a uniformly ripe crop.

**Combine/thresher settings**: Repeated runs at 1241 rpm with 4 mm gap; can use rotary flail if seed heads are clipped an on long stalks.

**Seed cleaning**: Put through fanning mill, screen sizes: prescreen 1.2 x 7.1 mm slot; top 1.8 x 12.7 mm slot; bottom blank, then use vacuum separator with speed and suction set low to remove dust and <5% of seeds.

**Storage requirements**: Cool dry conditions.

**Considerations for Use in Revegetation**

- *Aster conspicuus* is reported to have good forage value for deer, elk, cattle and domestic sheep (*McLean 1968, *Steele and Geier-Hayes 1993, Gerling et al. 1996).
- This species is common in the summer diets of both black bear and grizzly bear (*Holcroft and Herrero 1991).
- *Aster conspicuus* has low resistance to repeated human trampling but recovers rapidly (*Cole 1988*).
- *Aster conspicuus* is moderately resistant to fire, and increases rapidly after fire by sprouting from surviving rhizomes (*Crane et al. 1986, *Fischer et al. 1987*).

*fide* Reed 1993b.

**Other considerations**

- This attractive and robust plant has potential as an ornamental garden species (Douglas 1995).
**Aster conspicuus** Lindl.  
(showy aster)

(continued)

**Notes**

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**Aster foliaceous** Lindl.
leafy aster

**Family:** Asteraceae

**Background Information**

*Aster foliaceous* is found north to Alaska, the Yukon and Northwest Territories, east to Alberta and south to New Mexico, Arizona and California (Hitchcock et al. 1969, Douglas et al. 1998). In British Columbia, it is found in all vegetation zones throughout the southern half of northern Interior (south of 56°N). Reports that it occurs in the extreme northwest corner of the province (MacKinnon et al. 1992, Douglas et al. 1998) could not be confirmed.

**Growth Form:** Rhizomatous perennial herb with a short woody stem base; stalked basal leaves, unstalked stem leaves with clasping flanges; rose-purple to blue or violet ray flowers, yellow disk flowers; mature plant size is 10-60 cm tall (MacKinnon et al. 1992).

**Site Preferences:** Moist to mesic meadows, streambanks, slopes and forests in all vegetation zones and at all elevations (MacKinnon et al. 1992, Douglas et al. 1998).
**Aster foliaceous Lindl.**
(continued)

**Seed Information**

| Seed Size | Length: 3.29 mm (2.67 mm - 3.91 mm)  
Width: 0.84 mm (0.67 - 0.98 mm) |
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<td>Seeds per gram: 2.696 (range: 2.578 – 2.814)</td>
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<td>Volume to Weight Conversion: 108.0 g/L at 72.2% purity</td>
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| Germination Capacity: At 30°/20° C untreated: 38.3%  
At 25°/15° C untreated: 53.0%  
stratified: 73.7% |
| Germination Speed: To first germination: 6.5 days  
To 50% potential: 12.3 days |
| Seed Longevity: In our research, two year old *Aster foliaceous* seeds had 10% higher germination than seeds grown in the same year, suggesting that some degree of after-ripening or inadvertent stratification may occur in storage. |

**Considerations for Growing**

**Techniques for Seed Production**

- **Seed treatment:** Higher germination can be achieved with stratification prior to sowing.
- **Soil considerations:** Establish on loamy, well-prepared soils with a firm seedbed. Superior germination under cool conditions suggests that sowing very early or late in the growing season would be advantageous.
- **Stand establishment:** Site should be free of all weeds, especially rhizomatous grasses and other persistent species because there are currently no selective herbicides that can be used once plants are growing. Stands can be established from seedlings started in the greenhouse or from seed.
- **Row spacing:** 75 to 120 cm under dryland conditions, 30 to 90 cm with good irrigation (Smith and Smith 2000).
- **Seeding density:** Unknown at present; recommendation of 375 PLS seeds per linear metre based on the similar species, *A. ericoides*.
- **Seeding depth:** Surface to shallow seeding (Pahl and Smreciu 1999); a light dusting of peat moss will help keep the seeds in place.
- **Stand maintenance:** Regularly cultivate rows and spot spray with herbicide to keep plot weed free; annual fertilization with low N formulations may extend the life of the plot.

**Harvesting and Seed Processing**

- **Dates of selective harvesting** in the Bulkley Valley of northwestern B.C. have ranged from August 16th to September 21st. Seed scatters moderately easily.
- **Hand clipping:** May or may not be a suitable method for harvesting, as the ability of immature seeds to ripen after clipping is unknown. Hold the seed heads over bins placed alongside the plants being clipped, or place a bag over the seed heads before clipping to minimize seed loss.
- **Vacuum:** Vacuum ripe seed heads selectively as they ripen by placing the vacuum cleaner intake completely over seed heads; a shop vacuum works best for harvesting this species; harvest as soon as seeds ripen, as they are easily airborne.
- **Seed stripper:** Not recommended for harvesting this species.
- **Combine/thresher settings:** Repeated runs at 1241 rpm with 3 mm gap; can use rotary flail to dislodge all remaining seeds from seed heads if harvested with long stalks.
(Harvesting and Seed Processing, continued)

Seed cleaning: Put through fanning mill, screen sizes: prescreen 1.2 x 7.1 mm slot; top screen 1.8 x 12.7 mm slot; bottom blank.

Storage requirements: Cool dry storage (Link 1993).

Considerations for Use in Revegetation
There is little information available about *Aster foliaceous*. However, the following is reported about two similar species, *Aster ericoides* (Pahl and Smreciu 1999) and *Aster laevis* (Sullivan 1992):

- *Aster ericoides* and *Aster laevis* are both considered palatable to grazing by cattle in the early stages of growth (Sullivan 1992, Pahl and Smreciu 1999).
- These *Aster* species increase in response to bison grazing on the prairies (Pahl and Smreciu 1999).
- These *Aster* species can spread quickly in open areas with little competition (Pahl and Smreciu 1999).
- *Aster laevis* sprouts well from rhizomes after being top-killed by fire (Sullivan 1992).


Other considerations
- Some *Aster* species have ornamental potential (Douglas 1995).

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Other Plant Families

*Allium cernuum* Roth var. *cernuum*

nodding onion  

Family: *Lilaceae*

**Figure 94.** Documented range of *Allium cernuum* in northern British Columbia.

**Figure 95.** Growth habit and flowers of *Allium cernuum* in cultivation.
**Background Information**

*Allium cernuum* is found south of 56°N in British Columbia, ranging from the Pacific Coast to the dry Interior, the Kootenays and the Cariboo (Turner 1997). In the rest of North America it ranges east to Ontario, south to Georgia, Texas, and northwest to Wyoming, Utah, Idaho and Oregon (Douglas et al. 2001a). Only the one variety, *A. c. var. cernuum*, is described for B.C. (Douglas et al. 2001a).

**Growth Form:** Grows from usually clustered faint pink bulbs; slender stems; several grass-like flat or channeled leaves; numerous pink to rose-purple bell-shaped flowers in a nodding umbrella-shaped cluster; smells like onion; mature plant size is up to 50 cm tall (MacKinnon et al. 1992, Douglas et al. 1994).

**Site Preferences:** Found in the southern half of the northern Interior of B.C. to 55° N in dry open woods, exposed grassy plains, rocky crevices and sandy soils at low elevations (MacKinnon et al. 1992, Douglas et al. 2001a). Reported to be shade-intolerant (Klinka et al. 1989, Beaudry et al. 1999). In northern B.C. this species is found on medium to very rich xeric and subxeric sites in the SBS and very poor to very rich xeric and sub-xeric sites in the SBPSmk, on very poor to medium xeric sites in the SBPSmc, and medium to rich xeric and sub-xeric sites in the SBPSx or SBPSd subzones (Banner et al. 1993, Beaudry et al. 1999).

**Seed Information**

**Seed Size:** Length: 2.60 mm (2.05 - 3.03 mm).

Width: 1.72 mm (1.36 - 2.04 mm).

**Seeds per gram:** 348 (range: 313 - 381).

**Volume to Weight Conversion:** Unknown.

**Germination Capacity:** At 30°/20° C untreated: 42.8% (12 – 74%).

At 25°/15° C untreated: 19.8%. stratified: 26.0%.

**Germination Speed:**

To first germination: 14.5 days.

To 50% potential: 48.6 days.

**Seed Longevity:** In our research, seeds retained their viability for two years after storage under cool dry conditions.

**Considerations for Growing**

**Techniques for Seed Production**

*Seed treatment:* Untreated seeds germinate best in warmer soils; in cooler soils cold-moist stratification may be beneficial (Young and Young 1990). Gerling et al. (1996) say that scarification may be beneficial.  

*Soil considerations:* Establish on a loamy, moist well-prepared firm seedbed.

*Stand establishment:* Site should be free of all weeds, especially rhizomatous grasses because selective herbicides cannot be used once plants are growing. Can be established from seed or bulbs.
**Allium cernuum Roth var. cernuum**

*nodding onion*

(continued)

**(Techniques for Seed Production, continued)**

**Row spacing:** Unknown; suggest 75 to 120 cm under dryland conditions, 30 to 90 cm with good irrigation.

**Seeding density:** Unknown at present; suggest 60-100 PLS seeds per linear metre (Smith and Smith 2000)

**Seeding depth:** Shallow with light dusting of peat moss to hold seed in place.

**Stand maintenance:** Regularly cultivate rows and spot spray with herbicide to keep plot weed free; stand life 2–3 years (Pahl and Smreciu 1999); annual fertilization with low N formulations may extend the life of the plot.

**Harvesting and Seed Processing**

_Dates of selective harvesting_ in the Bulkley Valley of northwestern B.C. have ranged from September 18th to September 26th. Seeds shatter moderately easily.

**Hand clipping:** Use sharp hand clippers. Hold the seed heads over bins placed alongside the plants being clipped or place a bag over the seed heads before clipping to minimize seed loss. Do not allow seed capsules to become over-ripe or they will dehisce before harvest and you will lose many seeds. Plastic between rows is recommended so dehisced seeds can be salvaged.

**Vacuum:** Not recommended.

**Seed stripper:** Unknown suitability at present.

**Combine/thresher settings:** 885 rpm with 4 mm gap. Most seeds fall from seed heads while drying.

**Seed cleaning:** Put through vacuum separator with speed set high and suction set to low to remove dust and <5% of seeds.

**Storage requirements:** Cool dry conditions.

**Considerations for use in revegetation**

- Gerling et al. (1996) report that _Allium cernuum_ has fair forage value for livestock.
- Reported to grow on wet to mesic soils in Alberta (Gerling et al. 1996).

**Other considerations**

- May have potential as a specialty health food (Marles et al. 2000).
- Can be used as a fresh or dry flavouring for food. First Peoples of British Columbia have historically used _Allium_ spp. (Turner 1997).
- _Allium cernuum_ and other wild onion bulbs may be confused with _Zigadenus venenosus_ (death camas), so care should be taken when harvesting them. The best distinction is the characteristic onion odour present in the _Allium_ species (Turner 1997).
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