



# Guide to Weeds in British Columbia



BRITISH  
COLUMBIA

Ministry of Agriculture,  
Food and Fisheries



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# ACKNOWLEDGEMENTS

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Dr. Brian Wikeem, co-author of the *Field Guide to the Biological Control of Weeds in British Columbia: Land Management Handbook Number 27* (1994), and Sandra Wikeem, adapted appendix 4 of the Colorado handbook for British Columbia. Roy Cranston and David Ralph, on behalf of the British Columbia Ministry of Agriculture, Food and Fisheries, reviewed all materials associated with this project. Their involvement has been critical to its completion. Illustrations in the *Guide to Weeds in British Columbia* are reprinted by permission of the University of Washington Press from *Vascular Plants of the Pacific Northwest* by C. Leo Hitchcock, Arthur Cronquist, Marion Ownby, and J. W. Thompson (5 Vols., 1955-69), illustrated by Jeanne R. Jannish and John H. Rumely, and from Volumes 1 to 7 of *The Illustrated Flora of British Columbia* (1998 – 2000) by G.W. Douglas, et al. Gail F. Harcombe, graphics specialist from the British Columbia Ministry of Water, Land and Air Protection, provided electronic versions of the graphics in Douglas et al. The illustrations from this volume are by Elizabeth Stephens, Jane Lee Ling, and Sherry Mitchell. Paul Pryce of the Open Learning Agency contributed original illustrations of common crupina, jointed goatgrass, purple nutsedge, yellow starthistle, tartary buckwheat, and quack grass.

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This project also includes:

- *Weed Watch*, a video for weed awareness workshops
- Weed awareness public service announcements
- *WeedBC*, a website at <http://weedsbc.ca>

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# INTRODUCTION

The issue of weed management in the province of British Columbia is of ongoing concern to landowners, land managers, and of course, to the BC Ministry of Agriculture, Food and Fisheries. Several valuable publications, including the *Field Guide to Noxious Weeds and Other Selected Weeds of British Columbia* (1996), already assist in the identification of noxious weeds. However, simply knowing which weeds infest an area cannot solve the problem. A comprehensive resource geared toward providing an integrated approach to weed population management has long been needed. In the year 2000, the Ministry identified six projects for development through BC's Open Learning Agency (OLA). The *Integrated Weed Management Project* was one.

The Ministry is grateful for the cooperation and assistance provided by the State of Colorado in making this project a success. The State of Colorado published a weed management handbook, *Creating an Integrated Weed Management Plan: A Handbook for Owners and Managers of Land with Natural Value* in 2000. In 2001, the Ministry and OLA acquired permission to adapt this resource to the needs of the citizens of British Columbia.

At the outset of the adaptation process two additional goals were identified. First, team and community members voiced a concern about lack of public awareness of the negative impact of noxious weeds on agricultural enterprises and the natural environment. A decision was made to produce a series of public service announcements

(PSA's) for broadcast on the *Knowledge Network* and privately owned television stations. A set of five PSA's was produced, and it is hoped that they will inform recreationalists, as well as homeowners and landowners, of the implications of an unchecked increase in noxious weed populations. Secondly, a need for awareness and management training sessions was identified. A *Train-the-Trainers* workshop in Kamloops provided a group of agricultural specialists with experience in using the *Seven Steps to Managing Your Weeds: A Manual for Integrated Weed Management in British Columbia*, a companion resource for the *Guide to Weeds in British Columbia*. A capstone video, *Weed Watch*, hosted by Sue Ellen Fast, was added to the set of training materials.

As the project progressed, the decision was made to make information available on the World Wide Web. *Weeds BC* was created to provide free and open access to information for the public. Please check out the *Weeds BC* site at <http://www.weedsbc.ca>. You will find information on weed identification, impacts, and management strategies, as well as noxious weed legislation. The fully searchable site is a valuable and accessible source of information on the prevention of destructive weed populations in British Columbia.

*Gale Parchoma (Editor)*  
*Dini Steyn (Project Manager)*

# ANNUAL SOW THISTLE

## *Sonchus oleraceus* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Common sow thistle, spiny-leaved sow thistle, spiny annual sow thistle, spiny milk thistle, prickly sow thistle, sharp-fringed sow thistle.

**Legal Status:** Provincial Noxious.



## Identification

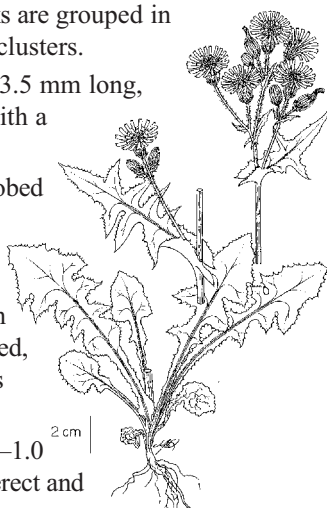
**Growth form:** Annual forb.

**Flower:** Several small (less than 2.5 cm across), yellow dandelion-like flower heads on sometimes glandular stalks are grouped in open, flat- or round-topped clusters.

**Seeds/Fruit:** Seeds are 2.5–3.5 mm long, reddish brown and ribbed with a parachute-like pappus.

**Leaves:** Leaves are deeply lobed and basal leaves end with a large, pointed segment. Leaf margins have small, weak teeth (Frankton and Mulligan 1970). Basal leaves are stalked, but upper leaves are stalkless and clasp the stem.

**Stems:** Mature plants are 0.1–1.0 m tall. The single stems are erect and



branched only near the top. The hollow stems exude a milky juice when cut (Douglas et al. 1998).

**Roots:** A short taproot.

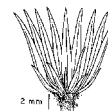
**Seedling:** No information available.



### Similar Species

**Exotics:** Perennial sow thistle (*Sonchus arvensis*) differs from annual sow thistle in its extensive creeping roots and larger flower heads. Prickly annual sow thistle (*Sonchus asper*) has very prickly leaf margins, and its leaves are rarely sharply lobed. Wall lettuce (*Lactuca muralis*) has a fibrous root system, numerous flower heads, and an ivy-like segment on the end of the leaves.

**Natives:** Several native lettuces (*Lactuca* sp.) resemble annual sow thistle, but they tend to have more numerous flower heads and lack the distinctive large, pointed lobe on the end of the basal leaves.



## Impacts

**Agricultural:** A common weed of cultivated crops, grain fields, and orchards. It acts as an alternate host to aphids, several viral diseases, and nematodes (Hutchinson et al. 1984).

**Ecological:** Invades both native plant communities and disturbed sites. Rapid germination and establishment combined with wind dispersal of seeds over great distances allow annual sow thistle to colonize new areas rapidly. They are adapted to a wide range of

environmental conditions but are most competitive in temperate climates with abundant moisture (Zollinger and Parker 1999). They tolerate saline soils but are better adapted to slightly acid to alkaline soils (Hutchinson et al. 1984). This weed tolerates saturated soils and can be a problem in marshes, ponds, and other riparian areas.

**Human:** Sow thistles contain chemical compounds used for industrial and pharmaceutical purposes.

## Habitat and Ecology

**General requirements:** This weed grows in a wide range of environments but does best on fertile, moist soils in full sunlight. In BC, annual sow thistle grows on cultivated fields, gardens, roadsides, riparian areas, and disturbed sites such as gravel pits and logged areas.

**Distribution:** Most frequent in the province's southern coastal regions but present in all agricultural reporting regions. It occurs in all Canadian provinces and throughout the northern US.

**Historical:** Introduced from Europe.

**Life cycle:** Annual sow thistle usually overwinters as seeds, but plants may overwinter as rosettes. Seeds germinate from spring through autumn. Plants form rosettes, then bolt, flower, set seed, and complete their life cycle rapidly. Flowers are produced from June to early October. Sometimes a second generation grows in one growing season.

**Mode of reproduction:** By seed.

**Seed production:** Each plant produces about 6,100 seeds. Seed production is greater when there is adequate moisture.

**Seed bank:** Seeds remain viable for several years in cultivated soil.

**Dispersal:** The tall stalks, lightweight seeds, and parachute-like pappus promote dispersal by wind (Hutchinson et al. 1984). Seeds can also disperse by water, be ingested by birds and animals, and attach to fur or feathers.

**Hybridization:** Leaves of some plants appear to be intermediate between annual sow thistle and spiny-annual sow thistle (*Sonchus asper*), but true hybrids are rare (Hutchinson et al. 1984).

## Management

**Biocontrol:** *Cystiphora sonchi* forms galls on vegetative parts of the plant but has not been approved for release in BC. Sow thistle is palatable for cattle or sheep, and intensive grazing can suppress infestations on some sites by preventing seed-set.

**Mechanical:** Seed production can be prevented by mowing before seed-set, but mowing must be lower than 20 cm to prevent regrowth. In mild climates where the plants overwinter as rosettes, repeated tillage from late August to freeze-up gives excellent management. Tillage during March through May manages spring annuals as they emerge (Hutchinson et al. 1984). Cultivation every three months can stimulate germination and eventually deplete the seed bank.

**Fire:** Fire is unlikely to manage annual sow thistle. Improved fertility following fire, such as on logging slash piles, may make an ideal seedbed for this weed.

**Herbicides:** Annual sow thistles are susceptible to many pre-emergence herbicides such as simazine and atrazine on cropland and dichlobenil on non-cropland. Foliar applications of MCPA, MCPB, 2,4-D, and 2,4-DB obtain good management post-emergence (Hutchinson et al. 1984). Selective herbicides applied before blooming can prevent seed production. Consult the most recent edition of BC Ministry of Agriculture,

Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Preventive measures include removal of seedlings by cultural or chemical means before they establish and set seed, managing weeds on field borders, and planting weed-free crop seed. Small infestations can be hand-pulled.

### Integrated Management Summary

On cultivated areas an integrated approach of intensive cultivation, competitive crops, selective herbicides, or a combination of all 3 may be practical. On rangeland and undisturbed areas, seedlings on new infestations can be hand-pulled or herbicides applied. Established populations may be managed with intensive grazing or herbicides. Chemical control may not be possible on the riparian areas where this weed commonly occurs.

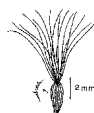
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# BARNYARD GRASS

*Echinochloa crusgalli* (L.) Beauv.

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** None.

**Other Common Names:** Large barnyard grass, cocksbur grass, summer grass.

**Legal Status:** Not categorized.



**Growth form:** Annual grass.

**Flower:** Seed heads are often purplish and consist of crowded spikelets with large seeds. Awns (bristly hairs) may be absent or up to 2.5 cm long (Whitson et al. 1996).

**Seeds/Fruit:** The seeds resemble millet. They are about 3 mm long, shiny, and can be white, yellowish, greyish, or brown (Frankton and Mulligan 1970).

**Leaves:** The leaves are long, flat, 1.0–1.5 mm wide, slightly roughened to smooth, and lack ligules (membranes where the blade joins the stem).



**Stems:** Stems are 0.3–1.5 m tall. They are usually erect but may spread over the ground. Stem bases are often reddish to dark purple (Whitson et al. 1996).

**Roots:** Fibrous.

**Seedling:** Leaves may be slightly red at the base and have pointed tips. The stem is somewhat flattened until the 3-leaf stage (Royer and Dickinson 1999).



## Similar Species

**Exotics:** Can be distinguished from all other grasses in the province by the lack of ligules.

**Natives:** Some authorities recognize another barnyard grass (*Echinochloa pungens*). Many manuals consider this the same species since the 2 forms are so similar and the plants often hybridize. The *Echinochloa pungens* form was originally confined to open ground, such as eroding riverbanks, but now has spread to roadsides, lawns, and cultivated fields (Frankton and Mulligan 1970).

## Impacts

**Agricultural:** Considered one of the world's worst weeds, it is widespread in irrigated fields, gardens, barnyards, and other cultivated soils. It reduces crop yields and causes forage crops to fail to establish by removing up to 80% of the available soil nitrogen (Royer and Dickinson 1999). The high levels of nitrates it accumulates can poison livestock. It acts as an alternate host for several mosaic virus diseases. Heavy infestations can interfere with mechanical harvesting.

**Ecological:** Barnyard grass commonly occurs along roadsides, ditches, railway rights-of-way, and in disturbed areas such as gravel pits and dumps. It also invades riparian communities along riverbanks and shores of lakes and ponds.

**Human:** Used occasionally as a forage crop, but it grows in sparse stands and requires considerable moisture to be productive. The seeds are grown for human consumption in tropical Africa and Asia (Hitchcock 1971).

## Habitat and Ecology

**General requirements:** Requires a frost-free period of 160–200 days, warm summer days, and abundant soil

moisture. It tolerates a wide variety of soil types but is best adapted to areas with rich, moist soil and little



competition. In BC, it grows in moist open places, ditches, cultivated land, gardens, riverbanks, and disturbed habitats.

**Distribution:** Occurs in southern areas of the province and is present in all agricultural reporting regions. It ranges across North America to the Maritimes and south to the states of Florida and California.

**Historical:** Introduced from Europe. Originally cultivated as a forage and sold as a “wonder grass.”

**Life cycle:** Barnyard grass overwinters as a seed. It germinates in late spring after the soil has warmed. Some seeds continue to germinate over the summer. It completes its life cycle during the summer and dies after seed production in September or October (Maun and Barrett 1986).

**Mode of reproduction:** Primarily by seed. Stems often root from lower nodes that contact the soil, allowing the plant to spread during the growing season, but new plants do not survive over the winter.

**Seed production:** Individual plants can produce up to 40,000 seeds/year (Royer and Dickinson 1999). Seed production is highly variable and relates to growing conditions.

**Seed bank:** New seeds are dormant. Dormancy is often broken by exposure to low winter temperatures, alternating spring temperatures, or spring flooding, but some seeds remain dormant much longer. Deeply buried seeds (over 8 cm) lose no viability for 3 years, and some seeds can remain viable up to 13 years (Maun and Barrett 1986).

**Dispersal:** Water, birds, insects, machinery, and animal feet. Contaminated seed is probably the most common dispersal method.

**Hybridization:** *Echinochloa crusgalli* and *Echinochloa pungens* hybrids intergrade to be nearly indistinguishable.

## Management

**Biocontrol:** None.

**Mechanical:** Repeated shallow spring tillage can reduce emergence. Mowing is not effective since it stimulates growth from lateral buds.

**Fire:** Not effective.

**Herbicides:** Barnyard grass exhibits resistance to a number of herbicides, especially atrazine. In fact, the weed became a serious problem in some crops such as corn only after chemical control removed competing, non-tolerant weeds. Pre-emergent herbicides are most effective, since the plants are most susceptible at the seedling stage and established plants are resistant to most chemicals. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Small infestations are easily

hand-pulled. Fertilizing with liquid manure can spread viable seeds. Thoroughly compost manures from livestock that have eaten this plant. Do not move livestock that have eaten barnyard grass onto uninfested areas.

### Integrated Management Summary

Effective control relies on preventing establishment and seed production. Use cultural control on small infestations before the population can establish a seed bank and use appropriate herbicides on large infestations. Seed disturbed areas to perennial grasses and forbs to provide ground cover and competition. Manage grazing animals to maintain perennial plant communities.

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# BLACK KNAPWEED

## *Centaurea nigra* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Lesser knapweed.

**Legal Status:** Not categorized.



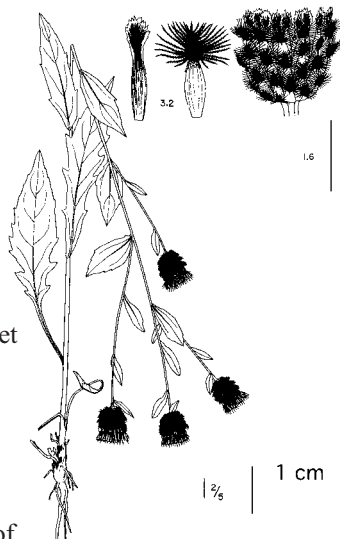
## Identification

**Growth form:** Perennial forb.

**Flower:** Flower heads are solitary at the ends of the branches. The flowers are rose to purple, occasionally white, and all are tubular. Floral bracts have long, black fringes from a black or dark brown triangular centre that gives a black appearance to the seed heads.

**Seeds/Fruit:** The flattened seeds are light brown or light grey, 3.0–3.5 mm long, with a short, bristly tip (Douglas et al. 1998).

**Leaves:** Basal leaves are up to 15 cm long, are usually toothed or shallowly lobed, and have long stalks. Upper leaves of



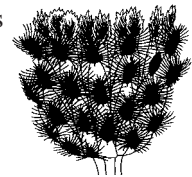
the stems are generally stalkless and narrow with entire margins. Lower stem leaves are larger, on stalks, and generally lobed (Douglas et al. 1998).

**Stems:** Stems are erect, unwinged, freely branched near the top, and 10–80 cm tall.

**Roots:** Black knapweed has both a vertical taproot and spreading lateral roots.

**Seedling:** Autumn emerging seedlings overwinter as a rosette of leaves.

**Other:** The whole plant is dull green and covered with small, rough hairs.



## Similar Species

**Exotics:** Black knapweed is distinguished from other knapweeds by the floral bracts that have long, black fringes from a black or dark brown triangular centre. The heads tend to be larger than those of diffuse or spotted knapweed.

**Natives:** Native members of the sunflower family can resemble knapweed in the seedling/rosette stage.

## Impacts

**Agricultural:** Black knapweed can infest disturbed rangeland and reduce forage production.

**Ecological:** Black knapweed does not establish readily in healthy, natural habitats. It typically invades

disturbed areas and can form dense stands.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Black knapweed has been found in BC at low- to mid-elevations along roadsides and in fields. Outside the province it grows along roadsides, riverbanks, and irrigation ditches, and in pastures, disturbed habitats, clear-cuts, and croplands. It can tolerate a wide range of environmental conditions but appears best adapted to moist soils that

receive summer rainfall.

**Distribution:** Currently this species is rare in the province south of 51° N (Douglas et al. 1998). It is only known to be present in the Kootenay and Omineca agricultural reporting regions.

**Historical:** No information available.

**Life cycle:** Black knapweed generally flowers from July through August. Seeds germinate from spring through early autumn. Seedlings that emerge in the autumn often overwinter as a rosette of leaves and resume growth in the spring.

**Mode of reproduction:** By seed and occasionally from root shoots (Roche and Roche 1991).

**Seed production:** Black knapweed can produce over 1,000 seeds/plant.

**Seed bank:** Seeds can remain viable in the soil for over 5 years.

**Dispersal:** People are the most significant agent for spread. Knapweed is often spread in hay and on vehicle undercarriages.

**Hybridization:** Black knapweed readily crosses with brown knapweed (*Centaurea jacea*) to form the fertile hybrid, meadow knapweed (*Centaurea debauxii*).

## Management

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**Biocontrol:** None.

**Mechanical:** Small infestations can be pulled and larger infestations can be mowed, burned, or mulched and then treated with herbicides as soon as new seedlings emerge.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, or a combination of clopyralid and 2,4-D have all been used effectively to manage black knapweed. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Minimize disturbance and establish robust stands of grasses or forbs to out-compete black knapweed.

### Integrated Management Summary

Land managers must learn to identify knapweed. New infestations of this species should be a high management priority. Timely management of a few plants is very cost-effective compared to treating larger acreage later. Since black knapweed establishes in disturbed sites, persistent monitoring of commonly disturbed areas (e.g., roadsides, along trails, stream banks, and where hay is fed) is a good way to search for new infestations. Manage knapweed infestations with a combination of mechanical and chemical treatments. In addition, improving the health of a natural area and guarding against disturbance or overuse are good preventive measures.

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# BLACK NIGHTSHADE

*Solanum americanum* P. Mill. var. *nodiflorum* (N.J. Jacq.)

**Family:** *Solanaceae* (Nightshade).

**Other Scientific Names:** *Solanum nigrum*.

**Other Common Names:** Garden nightshade, common nightshade.

**Legal Status:** Not categorized.



## Identification

**Growth form:**

Annual or short-lived

perennial forb.

**Flower:** Flowers are white to pale blue, 5–10 mm wide, and borne in clusters.

**Seeds/Fruit:** The globe-shaped berries of black nightshade are 8 mm wide. Green when immature but turn black upon maturity (Basset and Munro 1985).

**Leaves:** Alternate, ovate, wavy-edged, and tapered.



**Stems:** Single-stemmed, erect, 15–60 cm tall. Smooth appearance.

**Roots:** Taproot.

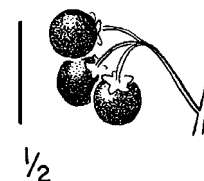
**Seedling:** Ovate, tapering to a pointed tip.



### Similar Species

**Exotics:** Black nightshade can be distinguished from hairy nightshade (*Solanum physalifolium*) by its smooth stems and leaves, and the smaller covering (calyx) on top of the berry.

**Natives:** None known.



## Impacts

**Agricultural:** Commercial berry crop quality is significantly reduced when black nightshade berries mix with them. The plant also produces a sticky substance that clogs agricultural equipment such as combine screens and rotors (Basset and Munro 1985).

Berries can be poisonous to cattle, sheep, goats, pigs, ducks, and chickens (Basset and Munro 1985).

**Ecological:** No information available.

**Human:** Poisonous to humans.

## Habitat and Ecology

**General requirements:** In BC, occupies dry to moderately dry sites at low- to mid-elevations. Commonly found on disturbed soils such as roadsides, rights-of-way, cultivated fields, flowerbeds, and vegetable gardens. Black nightshade is found on a variety of soils from sandy/gravelly soils to fertile cultivated soils but seems to be adapted to soils that are high in nitrogen.

**Distribution:** Occurs infrequently in southern parts of the province (Douglas et al. 2000) but is present in the

Okanagan, Thompson, Mainland, Vancouver Island, and Peace River agricultural reporting regions. Not considered a major concern in the province.

**Historical:** Introduced from South America.

**Life cycle:** Germinates in spring and through the summer. Flowering begins by mid-June, and the berries mature 4–5 weeks later. Maximum flower initiation occurs under full sunlight (Masset and Munro 1985).

**Mode of reproduction:** By seed.

**Seed production:** Capable of producing 2,500–5,000 seeds/plant (Basset and Munro 1985).

**Seed bank:** Can remain viable for more than 5 years.

**Dispersal:** Berries and seed are dispersed by rodents,

birds, livestock, and humans and along watercourses.

**Hybridization:** May hybridize with other closely related nightshades (Basset and Munro 1985).

## Management

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**Biocontrol:** None.

**Mechanical:** Mowing and tillage over several years before seed-set may achieve eradication.

**Fire:** No information available.

**Herbicides:** Post-emergence application of dicamba and glyphosate will provide control. Atrazine, cyanazine, and linuron have also been effective (Basset and Munro 1985). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and eliminating seed production and dispersal.

### Integrated Management Summary

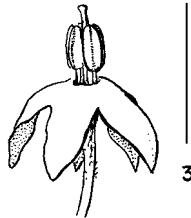
Integrated management should focus on eliminating seed production and depleting the seed bank. Use mechanical or chemical methods to prevent seed production, and revise land management practices to ensure the maintenance of a vigorous perennial plant community.

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# BLUE MUSTARD

## *Chorispora tenella* (Pallas) DC.

**Family:** *Brassicaceae* (Mustard).

**Other Scientific Names:** None.

**Other Common Names:** Tenella mustard, purple mustard, cross flower, bean-podded mustard.

**Legal Status:** Not categorized.



### Identification

**Growth form:** Winter annual forb.

**Flower:** Flowers are small and bluish purple, have 4 petals, and are connected by a stalk to a rough central stem.

**Seeds/Fruit:** Fruits have a conspicuous beak, about one-third the length of the pod. These fruits break apart transversely into numerous 2-seeded sections instead of splitting longitudinally as with most mustards. Seeds are rectangular, with one flat side and one rounded side (Stubbendieck et al. 1995).



**Leaves:** Leaves are alternate and oblanceolate, with wavy or coarsely toothed margins, and are partially covered with minute, gland-tipped hairs.

**Stems:** Mature plants are 10–50 cm tall, with branches that spread mainly from the base. Stems are partially covered with minute, gland-tipped hairs.

**Roots:** Shallow taproot.

**Seedling:** Seedlings form rosettes with deeply lobed leaves.

**Other:** Foliage has a disagreeable odour.



### Similar Species

**Exotics:** None known.

**Natives:** None known.

## Impacts

**Agricultural:** Blue mustard invades disturbed habitats and cultivated lands, reducing crop yields and affecting crop quality (Whitson et al. 1996). It is a problem in winter annual crops, such as winter wheat (Klein et al. 1985). Blue mustard gives off a disagreeable odour

(like stale dishrags), and dairy animals eating it may produce off-flavour milk.

**Ecological:** No information available.

**Human:** None known.

## Habitat and Ecology

**General requirements:** Blue mustard is commonly found in dry areas such as grain fields, along roadsides, rights-of-way, and disturbed habitats. It can tolerate a wide range of environmental conditions and soils.

**Distribution:** Blue mustard is frequent in the low-elevation areas of the BC Interior. It is also found throughout the western US.

**Historical:** Introduced from Siberia in 1929 (Klein et al. 1985).

**Life cycle:** Blue mustard seeds germinate in late

summer and autumn. The plant overwinters as a rosette. The flower stalks usually bolt in March. Flowers appear in early April, and viable seeds can be produced approximately 10 days after bloom (Klein et al. 1985).

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Small infestations can be pulled. Plants are easy to pull in the spring before they flower and when soils tend to be soft and moist.

**Fire:** No information available.

**Herbicides:** Metsulfuron-methyl provides excellent control. Blue mustard can be controlled with dicamba, 2,4-D, or glyphosate applied before plants bolt. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** In heavily infested crop fields, changing the crop rotation will help decrease the blue mustard population (Klein et al. 1985). In late spring

crops, blue mustard must be killed through tillage or with a contact herbicide (Klein et al. 1985) before planting.

### Integrated Management Summary

Controlling blue mustard can be challenging because the plant flowers early and herbicides are often applied too late to be effective. Blue mustard should be controlled by preventing seed production until the soil seed bank is depleted. Cut, pull, or treat plants with herbicide before seed-set.

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# BLUEWEED

## *Echium vulgare* L.

**Family:** *Boraginaceae* (Borage).

**Other Scientific Names:** None.

**Other Common Names:** Viper's bugloss, blue devil.

**Legal Status:** Regional Noxious: Cariboo, Central Kootenay, Columbia-Shuswap, East Kootenay, Okanagan-Similkameen, Thompson-Nicola.



## Identification

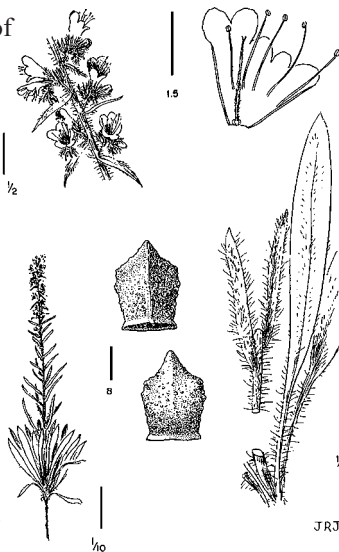
**Growth form:** Biennial forb.

**Flower:** Numerous flowers (10–20 mm long) are arranged on the upper side of short

stems that elongate after flowering (BC Ministry of Agriculture and Fisheries 1988). Buds are reddish purple, becoming bright blue upon flowering. The petals are fused at the base into a short tube that flares at the top into unequal lobes (Douglas et al. 1998).

**Seeds/Fruit:** Nutlets are clustered together in groups of 4. Each nutlet (seed) is 3 mm long, greyish brown, angular, roughened, and wrinkled.

**Leaves:** Basal leaves are narrow, 6–25 cm long, and have stalks. The alternate



stem leaves become progressively smaller and stalkless moving up the stem. All leaves are covered with stiff hairs. The hairs are sometimes swollen at the base.

**Stems:** Stems are erect and covered with short hairs and scattered long, stiff hairs, and grow 30–80 cm tall. The long hairs often have swollen dark bases that form conspicuous flecks on the stems (Frankton and Mulligan 1970).

**Roots:** Long, stout, and black taproots, with smaller fibrous lateral roots.

**Seedling:** The seed leaves (cotyledons) are 9–14 mm long and 4–7 mm wide and are covered with fine, needle-like hairs (Royce and Dickinson 1999). The plant produces a flat rosette with long, narrow leaves in the first year.

### Similar Species

**Exotics:** With its bright blue flowers and rough, hairy foliage, this plant is not likely to be confused with other plants.

**Natives:** None known.

## Impacts

**Agricultural:** Usually not found in cultivated crops but can invade rangelands and pastures. Seeds can contaminate clover and other crop seeds and can act as an alternate host for viral diseases.

**Ecological:** This plant is generally unpalatable and increases in overgrazed pastures. Competition with native species in BC is unknown.

**Human:** None known.

## Habitat and Ecology

**General requirements:** Blueweed grows in dry roadsides, disturbed habitats, rocky pastures, and rangelands at low- to mid-elevations in BC. It is well adapted to dry, rocky, or shallow soils, especially over limestone.

**Distribution:** Frequent in the central and south-central areas of the province, it is also present on the Mainland, Vancouver Island, and in northern parts (Douglas et al. 1998) and is considered a major concern in the Kootenay, Okanagan, Thompson, and



Cariboo agricultural reporting regions. It is found in every Canadian province, and especially Ontario and Quebec (Frankton and Mulligan 1970).

**Historical:** Introduced from Europe.

**Life cycle:** Germinates in autumn and overwinters as a rosette. In spring, the stems elongate and flowering begins by late June to early July. Seeds ripen from August to November, depending on geographic location (NS Department of Agriculture and Fisheries 2001).

**Mode of reproduction:** By seed.

**Seed production:** A single plant may produce up to 2,800 seeds.

**Seed bank:** Seeds can remain viable in the soil for several years.

**Dispersal:** Most seeds fall to the ground near the parent plant. The rough seeds stick to clothing, animal fur, and feathers. Dead flower stalks may break off and be dispersed by the wind.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Cutting established blueweed can reduce seed production, but repeated treatments may be required to prevent shoots from re-sprouting and producing seed. Repeated defoliation will eventually deplete root reserves and reduce the plant's capacity to flower (NS Department of Agriculture and Fisheries 2001).

**Fire:** No information available.

**Herbicides:** Spring or early autumn application of 2,4-D will manage blueweed. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Small infestations can be managed with hand-pulling.

### Integrated Management Summary

Integrated management can combine cultural, mechanical, and chemical treatments. New infestations can often be managed with hand-pulling. Seed disturbed areas to perennial grasses and forbs, and manage grazing animals to maintain perennial plant communities. For larger infestations, chemical management may be required as well.

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# BOG RUSH

## *Juncus effusus* L.

**Family:** *Juncaceae* (Rush).

**Other Scientific Names:** None.

**Other Common Names:** Common rush, soft rush, swamp grass.

**Legal Status:** Not categorized.



**Growth form:** Densely tufted perennial, 30–60 cm in diameter.

**Flower:** Numerous small, non-showy flowers are produced in clusters 3–12 cm long along one side of the stem.

**Seeds/Fruit:** Egg-shaped capsule 2.0–2.5 mm long. The capsules contain numerous minute (0.5 mm) seeds (Douglas et al. 2001).

**Leaves:** The true leaves are basal and are reduced to short sheaths at the base of the stem.

**Stems:** The stems, often mistaken for leaves, grow 0.3–1.3 m tall. They are



usually hollow, round, and smooth, but occasionally they are lined with many fine ridges.

**Roots:** Stout, spreading rhizomes.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** Bog rush is a native plant that may be difficult to tell apart from other native rushes. Distinguishing characteristics of bog rush are its large size, its habit of forming dense clumps, and the position of the inflorescence at the side of the stem.



## Impacts

**Agricultural:** Troublesome on lowland pastures. This unpalatable plant for livestock can compete with hay and pasture crops, reducing pasture yields and carrying capacity.

**Ecological:** Spreads and replaces other native species in disturbed, wet, poorly drained areas. It can become

dominant on overgrazed riparian sites.

**Human:** Used as a landscape ornamental for water gardens, where it is usually grown in submerged tubs to prevent invasive spread (Perry. Undated).

## Habitat and Ecology

**General requirements:** Well adapted to wet, poorly drained conditions, especially on muck soils and on river shores that are periodically flooded. It tolerates 8–13 cm of standing water, is adapted to acidic conditions, and requires open sunlight (Perry. Undated). In undisturbed conditions, it is found in shallow marshes, fresh meadows, and along the edges of bogs. In disturbed conditions, it will disperse into wet to moist sites in pastures, fields, ditches, clearings, and forest margins. It is found at low- to mid-elevations in BC.

**Distribution:** Common in coastal areas of the province, but it also occurs in the southern Interior. It grows in temperate regions of North America and Eurasia.

**Historical:** Native to BC.

**Life cycle:** A perennial plant that spreads outward along its rootstocks each growing season. It flowers in midsummer.

**Mode of reproduction:** Spreads by seeds and rhizomes.

**Seed production:** No information available.

**Seed bank:** Seeds remain viable a long time, resulting in a large, persistent seed bank (Leck et al. 1989).

**Dispersal:** Seeds drop from the plant, but others are dispersed by water, wildlife, and livestock.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Tussocks can be grubbed out and then deeply buried, or dried and burned. Once bog rush is removed, the land should be cultivated for 1–2 years and then seeded to grass (Muenscher 1980).

**Fire:** Deeply buried rhizomes are not affected by fire.

**Herbicides:** Glyphosate and 2,4-D are effective applied as either a wipe-on or a broadcast treatment. Use a surfactant with 2,4-D to help the herbicide adhere to the leaves. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Drainage favours grasses and reduces bog rush on pastures. Maintain hay and grass crops in high vigour to minimize bog rush invasion.

Avoid disturbance and graze riparian areas moderately to promote vigorous stands of sedges and other desirable vegetation.

### Integrated Management Summary

Try to control water levels in pastures and hayfields to low levels that will reduce invasion of bog rush. Manage pastures to maintain a vigorous cover of perennial grasses and forbs that can compete with bog rush. Minimize disturbance and graze wet areas moderately to promote vigorous stands of native or introduced vegetation that can compete with bog rush.

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# BULL THISTLE

## *Cirsium vulgare* (Savi) Tenore

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Common thistle, spear thistle, fuller's thistle.

**Legal Status:** Not categorized.



### Identification

**Growth form:** Biennial forb.

**Flower:** Flowers are 4–5 cm wide and clustered at the ends

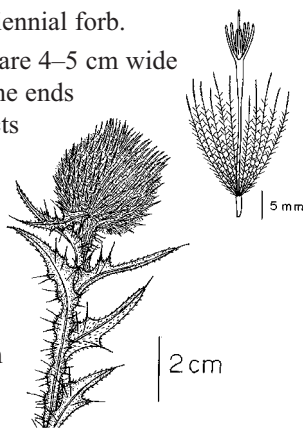
of branches. The flower bracts are somewhat tapered and covered with spines (Whitson et al. 1996).

Flowers are pinkish to dark purple, rarely white.

**Seed/Fruit:** Shiny light-brown seeds are capped with a circle of plume-like white hairs.

**Leaves:** The alternate, deeply lobed leaves have stout spines at the lobes and tips. The bases of the leaves clasp the stems with distinctive spiny wings.

**Stems:** The stems are erect and branched, with the branches spreading upward. Plants range from 0.3 to 2.0 m tall (Douglas et al. 1998).



**Roots:** A short, fleshy taproot with several primary roots extending from the root crown. Each bears a number of smaller lateral roots.

**Seedlings:** Seed leaves (cotyledons) are round to spatulate, and smooth. First true leaves are oval to spatulate with spines and a rough, bumpy surface (Carey et al. 1993). First-year plants form a rosette.

### Similar Species

**Exotics:** Bull thistle is similar to other thistles (*Carduus*, *Cirsium*, and *Onopordum* genera) but can be distinguished by flower size, bracts, and leaf surfaces.

**Natives:** Several species of *Cirsium* are native to BC, but the wavy-leaved thistle (*Cirsium undulatum*) is most similar to bull thistle. Unlike bull thistle, wavy-leaved thistle has densely woolly and wingless stems (Frankton and Mulligan 1970).

## Impacts

**Agricultural:** Heavy infestations can exclude livestock from areas. Additionally, the presence of bull thistle in hay decreases forage value and lowers market price (Zimmerman 1997). It is an aggressive weed but will not survive where cultivation has cut back its stem and destroyed its root system (FEIS 1996).

**Ecological:** Bull thistle is often a transient species, appearing in recent clear-cuts or disturbed areas and becoming a dominant species for several years (Rees et al. 1996).

**Human:** Reported to cause hay fever in some individuals (FEIS 1996).

## Habitat and Ecology

**General requirements:** Bull thistle grows in dry to moist habitats that include roadsides, cultivated fields, pastures, and logged forestland and disturbed habitats associated with soil disturbance (Powell et al. 1994). It grows on a wide range of soil types, ranging from gravelly to clay-textured. Bull thistle is generally

intolerant to shade and is nearly absent if light is reduced to less than 40% of full sunlight (FEIS 1996).

**Distribution:** Common throughout eastern Canada and the US. It is widespread and locally abundant in all areas of BC (Powell et al. 1994) and is present in all agricultural reporting regions.

**Historical:** Introduced from Eurasia as a seed contaminant.

**Life cycle:** Biennial, forming a rosette in the first year and bolting in the second year (Frankton and Mulligan 1970).

**Mode of reproduction:** By seed.

**Seed production:** Mature plants can produce up to 4,000 seeds/plant (Zimmerman 1997).

**Seed bank:** Seeds are highly viable and usually germinate rapidly whenever conditions are favourable in spring and autumn (FEIS 1996). Seeds that are buried to 12 cm may remain viable for up to 3 years (Zimmerman 1997).

**Dispersal:** Seeds have a pappus and can be windblown for long distances, but Zimmerman (1997) found that 65% of the seeds land within 2 m of the parent plant.

**Hybridization:** No information available.

## Management

**Biocontrol:** *Urophora stylata* (seedhead fly), released in BC, can reduce seed production up to 80% in some areas (Zimmerman 1997).

**Mechanical:** Cutting and mowing topgrowth or cutting the taproot just below the root crown before seed-set will eliminate annual seed production. Repeated applications of the treatment may be necessary. Cutting and mowing treatments are most effective before the plant has bolted.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, glyphosate, and 2,4-D all provide effective management. Herbicides should be applied in the rosette stage or after mowing as the plant becomes more tolerant of herbicides once the flower stalk is produced (FEIS 1996). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read**

**the label for full use and precautionary instructions.**

**Cultural/Preventive:** Minimize disturbance and establish stands of perennial grasses or forbs.

### Integrated Management Summary

A combination of prevention, cultural control, and chemical control is probably the best strategy for bull thistle. Reduce disturbances and reseed areas already disturbed. Use biocontrol agents if they are available. Do not use chemical management if biocontrol agents have been released unless the agent has not established.

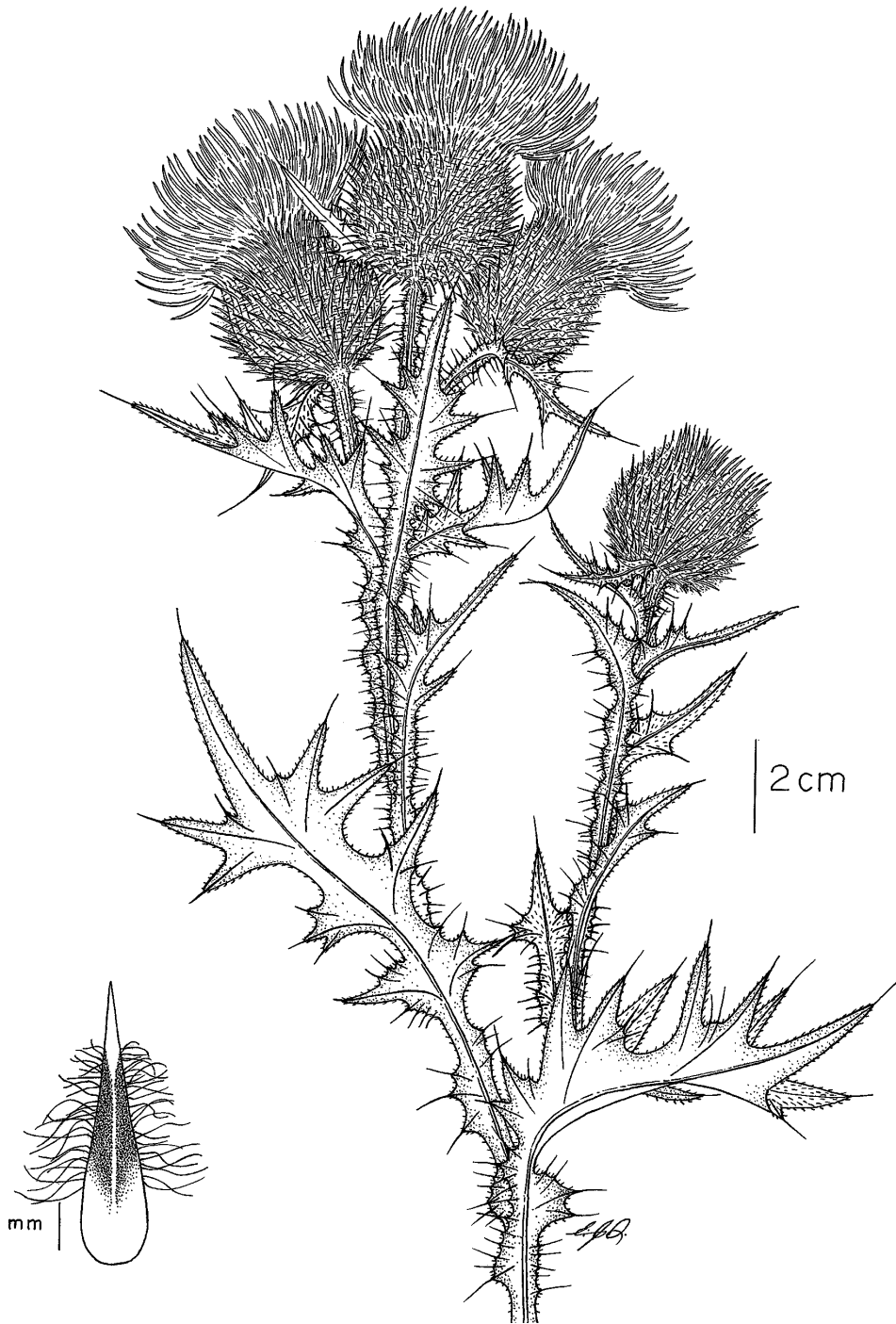
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# CANADA THISTLE

*Cirsium arvense* (L.) Scop.  
*var. horridum* Wimm. & Grab.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Field thistle, Californian thistle.

**Legal Status:** Provincial Noxious.



## Identification

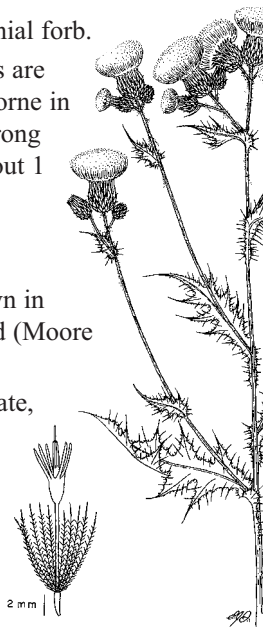
**Growth form:** Perennial forb.

**Flower:** Flower heads are white to purple and borne in clusters of 1–5/branch, with a strong vanilla scent. Heads are only about 1 cm in diameter. Floral bracts are spineless.

**Seeds/Fruit:** One-seeded fruits (achenes) are straw or light brown in colour, straight or slightly curved (Moore 1975).

**Leaves:** Leaves are spiny, alternate, oblong or lance-shaped, with the base stalkless and clasping, or extended down along the stem.

**Stems:** Mature plants range from 0.3 to 2.0 m in height.



**Roots:** Canada thistle has both horizontal and vertical roots. The horizontal roots produce numerous shoots, while vertical roots store water and nutrients in small branches.

**Seedling:** Early spring growth appears as rosettes with spiny-tipped, wavy leaves.

### Similar Species

**Exotics:** Numerous introduced thistles are present in BC. Plumeless thistle (*Carduus acanthoides*) has floral bracts that are covered with sharp spines. Flowers tend to be solitary (Powell et al. 1994).

**Natives:** Wavyleaf thistle (*Cirsium undulatum*) is most common on grassland and dry forests (Douglas et al. 1998). Flower heads are usually large and the plant looks more like bull thistle than Canada thistle.

## Impacts

**Agricultural:** Canada thistle infests crops, pastures, rangelands, roadsides, and riparian areas (Beck 1996).

**Ecological:** The plant spreads rapidly through horizontal roots (rhizomes) that give rise to shoots (Moore 1975). Its root system can be extensive,

growing up to 5.5 m in one season, but most often patches spread about 1–2 m/year (Nuzzo 1998). The plant can form dense patches and virtual monocultures.

**Human:** Thickets can restrict recreational access to infested areas.

## Habitat and Ecology

**General requirements:** Canada thistle is adapted to a wide range of soil types and environmental conditions (FEIS 1996). This weed occurs throughout the agricultural areas of all Canadian provinces (Frankton and Mulligan 1970) and over a wide range of elevations and habitats in BC. Although it mainly occurs in disturbed areas, it invades native plant communities, meadows, wetlands, and forested habitats. It is best adapted to rich, heavy loam, clay

loam, and sandy loam, with an optimum soil depth of 50 cm (FEIS 1996). Canada thistle can tolerate saline soils (up to 2% salt) and a wide range of soil moisture conditions. The plant usually occurs in areas with 45–90 cm annual precipitation or where supplemental soil moisture is available (Beck 1996). It is also somewhat shade intolerant and can grow along the edge of forested areas, but is rarely found within forests except in openings.



**Distribution:** Canada thistle is widespread in all areas of BC (Powell et al. 1994) on roadsides, cultivated fields and pastures, and logged forests and other disturbed areas. It is present in all of the province's agricultural reporting regions but is considered a major concern only in the Omineca and Peace River regions.

**Historical:** Introduced from Eurasia likely as a contaminant of crop seed as early as the late 18<sup>th</sup> century.

**Life cycle:** Canada thistle is the only thistle with male and female flowers on separate plants (Frankton and Mulligan 1970). Female flowers can be distinguished from male ones by the absence of pollen (abundant in male flowers) and the presence of a distinct vanilla-like fragrance. Flowering occurs from June to October, depending on elevation and latitude, and seeds mature

from July to October. Large patches may contain only male plants and have no seed production. Roots and shoots develop during the winter and stems begin to elongate in early spring when temperatures reach about 5° C and when daylight exceeds 14 hours (Nuzzo 1998; Haderlie et al. 1991; FEIS 1996).

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** Plants can produce up to 5,200 seeds annually but average about 1,500 seeds/plant (Rutledge and McLendon. Undated).

**Seed bank:** Seeds usually germinate in mid-spring. Most seeds do not remain viable after 3 years.

**Dispersal:** Primarily by wind.

**Hybridization:** No information available.

## Management

**Biocontrol:** A number of agents have been released in BC with no success. The seed weevil *Larinus planus* and the stem gall fly *Urophora carduii* are being redistributed. Localized attack by a non-specific rust fungus and aphid species is occasionally reported.

**Mechanical:** Repeated mowing can be effective in reducing seed-set. Intensive cultivation aimed at depleting food reserves in the roots, followed by competitive cropping, is effective in the long term.

**Fire:** No information available.

**Herbicides:** Numerous herbicides are registered for control or suppression of Canada thistle. On pastures and idle areas, spring and autumn applications of clopyralid or a dicamba/2,4-D mix have been effective when roots are actively growing. Clopyralid alone can be applied in spring or autumn. Spring applications should coincide with the rosette to bud stages. Spring applications of picloram have also been effective when Canada thistle is in the pre-bud to early bud growth stages. Consult the most recent edition of BC Ministry

of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Reduce the spread of Canada thistle seeds by always purchasing certified crop seed. Eliminate new seedlings before they form a well-developed root system.

### Integrated Management Summary

The tendency of this species to grow in wet areas may restrict the use of herbicides. Integrated management must involve combinations of mowing, cultivation, herbicides, and competitive seeding to deplete the aggressive creeping root system.

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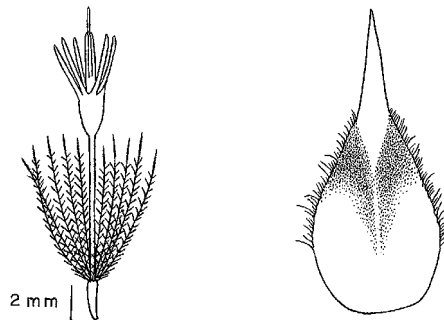
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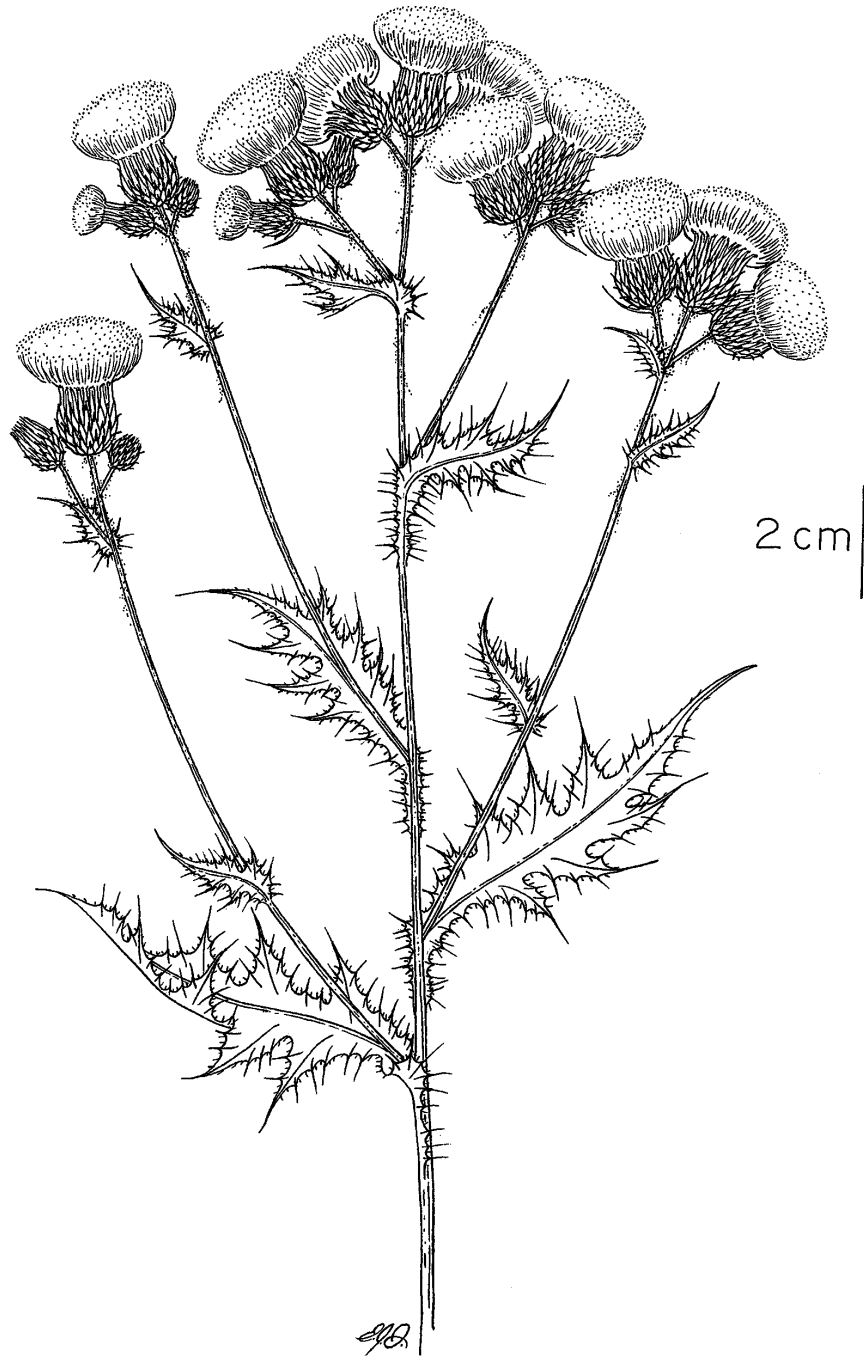
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# CHEATGRASS

## *Bromus tectorum* L.

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** None.

**Other Common Names:** Downy brome, downy chess, early chess, drooping brome, downy cheat, slender chess, downy brome grass, military grass, broncgrass, Mormon oats.

**Legal Status:** Not categorized.



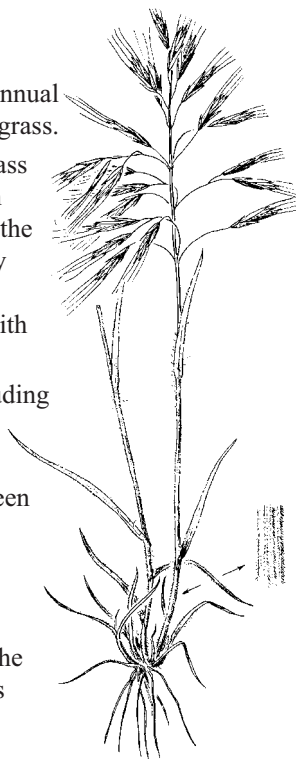
### Identification

**Growth form:** Annual or winter annual grass.

**Flower:** Cheatgrass panicles change colour from green to purple to brown as the plant matures and eventually dries. Branches are slender, drooping, hairy, flexuous, with up to 8 spikelets.

**Seeds/Fruit:** Spikelets including awns are 2–5 cm long, nodding, with 2–8 florets.

**Leaves:** Leaves are light green and hairy. Sheaths are fused except near the node at the bottom of each sheath. The lower sheaths are conspicuously hairy, while the upper sheaths are sometimes smooth.



**Stems:** Mature plants are generally 10–75 cm tall. Stems are erect, slender, glabrous, or slightly hairy.

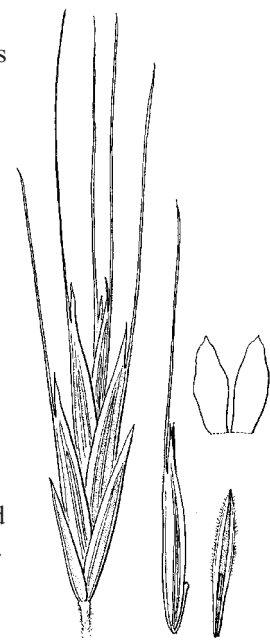
**Roots:** The finely divided fibrous root system typically reaches a depth of about 30 cm but can grow to 150 cm deep in the field (Hironaka 1961; Hulbert 1955).

**Seedling:** Distinguished by hairy leaf blades and sheaths.

#### Similar Species

**Exotics:** Similar to Japanese brome (*Bromus japonicus*) and rye brome (*Bromus secalinus*).

**Natives:** None known.



### Impacts

**Agricultural:** Cheatgrass can be troublesome in winter wheat and other crops. Awns many injure livestock and animals' eyes and mouths, but the plant has good spring forage values before seed-set (Stubbenieck et al. 1997).

**Ecological:** Can form dense stands on sites that were previously disturbed, especially overgrazed areas.

The plant competes effectively for moisture with climax dominants such as bluebunch wheatgrass (*Elymus spicatus*) and can interrupt the rate of successional change from low stages of succession to higher stages of succession for long periods of time (Harris 1967).

**Human:** No information available.

### Habitat and Ecology

**General requirements:** In BC, cheatgrass grows at low- to mid-elevations at the coast, and in the grasslands and dry forests of the Interior. It is common in recently burned rangeland, winter crops, disturbed areas, abandoned fields, eroded areas, and overgrazed

grasslands (Upadhaya et al. 1986). It can invade rangelands that have never been grazed by livestock (Svejcar and Tausch 1991).

**Distribution:** Cheatgrass is common in southern parts but rare elsewhere in the province (Douglas et al.

1990). It is present in all agricultural reporting regions except the Peace River but is not considered a major concern in any region.

**Historical:** Introduced from Eurasia, possibly in ship ballast. Found at Spences Bridge as early as 1890 (Mosley et al. 1999).

**Life cycle:** A winter annual that can germinate in autumn or spring when soil moisture is adequate. Autumn-germinated plants will establish a root system that allows the plant to take early advantage of spring moisture. Seeds mature about 2 months later (Upadhaya et al. 1986; Stubbendieck et al. 1997).

Plant heads appear in late April to early May, followed

by flowering within a week, and seeds mature in mid- to late June (Upadhaya et al. 1986).

**Mode of reproduction:** By seed.

**Seed production:** Cheatgrass can produce up to 450 kg seeds/ha, depending on plant density and environmental conditions (Upadhaya et al. 1986).

**Seed bank:** Generally a low retention of seeds in the soil because of high germination rates.

**Dispersal:** Seeds are dispersed short distances by wind, but the awns can attach to fur or clothing.

**Hybridization:** No information available.

## Management

**Biocontrol:** None. Controlled livestock grazing can help regulate cheatgrass populations, but grazing prescriptions depend on the mixture of plants in the plant community.

**Mechanical:** Ponzetti (1997) reported that repeated mowing every 3 weeks during spring and summer was as effective at managing seed production, but this method was labour-intensive and expensive.

**Fire:** Fire has been effective in the US if plants are burned after they have dried but before the seeds have dropped (Carpenter and Murray 1998). Some seeds will survive, and if a fire is not repeated within 3–4 years it is likely the population will re-establish.

**Herbicides:** Spring applications of quizalofop, fluazifop-p-butyl, sethoxydim, and glyphosate have successfully controlled cheatgrass on various rangeland sites in the US. Management was usually best when the plants were less than 10 cm tall and growing vigorously (Wiese et al. 1995). Autumn applications are generally used in cropland situations by farmers growing winter wheat or other cool-season crops. Consult the most recent edition of BC Ministry of

Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent new infestations by minimizing disturbance and seed dispersal and maintaining vigorous perennial plant communities. Hand-pulling can be effective for a small infestation, especially before the plants set seed. On larger infestations, hand-pulling may be required for several years until the seed bank is depleted. Seed disturbed areas to perennial grasses to provide competition.

### Integrated Management Summary

Integrated management will require a combination of chemical control, cultural control, seeding perennial grasses, and proper livestock management where land is grazed.

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# CHICORY

## *Cichorium intybus* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Coffeeweed, blue sailors, succory.

**Legal Status:** Not categorized.



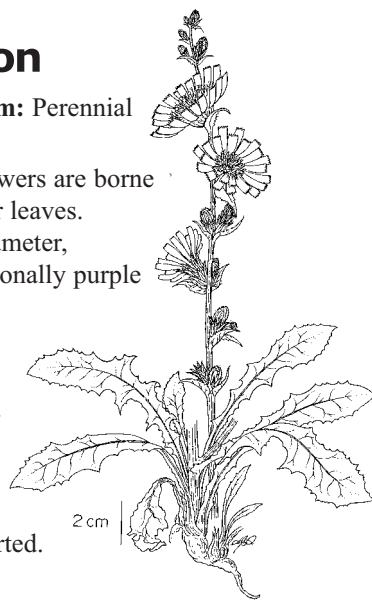
### Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are borne in the axils of the upper leaves. Flowers are 4 cm in diameter, usually blue, but occasionally purple or white.

**Seeds/Fruit:** Fruits are ribbed and tipped by a crown of minute scales.

**Leaves:** Basal leaves are rough, 8–25 cm long, lance-shaped, toothed or pinnately parted.



Upper leaves are smaller, alternate, stalkless, clasping the stem, with undivided margins.

**Stems:** Mature plants range in size from 0.3 to 2.0 m tall. Stems are erect and branched above. The entire plant exudes a milky juice when broken.

**Roots:** Plants grow from a deep taproot.

**Seedling:** No information available.



### Similar Species

**Exotics:** None known.

**Natives:** Chicory can be distinguished from blue lettuce (*Lactuca tatarica*) by its more branched growth pattern and stalkless flowers.



## Impacts

**Agricultural:** Although this plant is grown as a hay crop in Europe, dairy products from cows that eat it may taste bitter (Stubbendieck et al. 1995).

**Ecological:** In BC chicory invades disturbed areas and

native plant communities, but its impacts have not been documented.

**Human:** Milky latex may cause dermatitis.

## Habitat and Ecology

**General requirements:** Chicory is found from low- to mid-elevations at the coast and on Interior grasslands and forests. It frequents roadsides, fields, and disturbed habitats. It can adapt to a wide range of soils and environmental conditions but often occurs on high-lime soils.

**Distribution:** Chicory occurs frequently in southern areas of the province and is common throughout North America. It is present in the Kootenay, Okanagan, Thompson, Mainland, Vancouver Island, Cariboo, and Omineca agricultural reporting regions.

**Historical:** Introduced from Eurasia. Often planted for use as salad greens, and the root is used as a substitute for coffee (Whitson et al. 1996).

**Life cycle:** Flowering occurs from July to September, depending on location.

**Mode of reproduction:** By seeds.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.



## Management

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**Biocontrol:** None.

**Mechanical:** Chicory can be managed by mowing and cutting before plants set seed. Repeated treatments may be required over several years to exhaust nutrient reserves in the roots and to control new plants that emerge from the soil seed bank.

**Fire:** No information available.

**Herbicides:** A combination of picloram and 2,4-D can be effective when plants are actively growing (Dow AgroSciences 1998). Combinations of dicamba, 2,4-D, and picloram or dicamba, 2,4-D, and glyphosate have also been used to control chicory (Dow AgroSciences 1998). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal. Hand-pulling plants before seed-set can be effective on new and small infestations, especially before a seed bank has become established.

### Integrated Management Summary

Maintaining healthy plant communities and re-vegetating disturbed areas prevent the spread of chicory. Combine preventive measures with mechanical and chemical control. Use herbicides with cultural methods where appropriate, especially on new infestations.

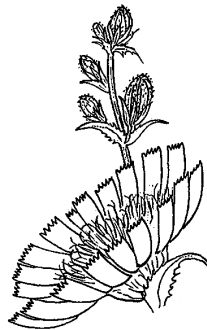
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# CLEAVERS

## *Galium aparine* L.

**Family:** *Rubiaceae* (Bedstraw).

**Other Scientific Names:** None.

**Other Common Names:** Bedstraw, white hedge.

**Legal Status:** Regional Noxious: Peace River.



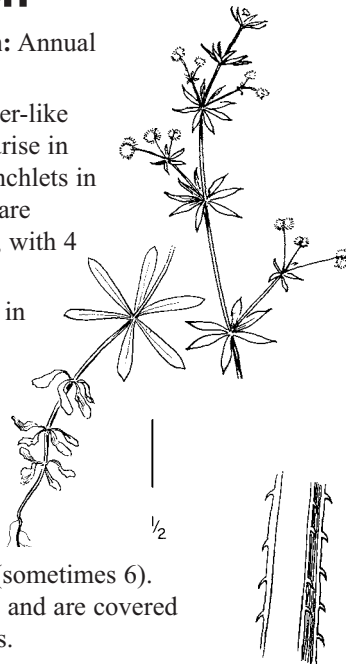
### Identification

**Growth form:** Annual forb.

**Flower:** Saucer-like flowers are stalked and arise in clusters of 3–5 from branchlets in most leaf axils. Flowers are white, 1.6–2.0 mm wide, with 4 lobes.

**Seeds/Fruit:** Nutlets are in pairs, 3–5 mm wide, covered in short, hooked hairs.

**Leaves:** The few basal leaves soon wither. The narrow stem leaves, 1–4 cm long, are in whorls of 8 (sometimes 6). Leaves have pointed tips and are covered with bristly, hooked hairs.



**Stems:** Solitary stems are weak with few branches and may be climbing or prostrate, 10–100 cm long. Stems are square with short, backward-pointing hairs at the base of each leaf.

**Roots:** Annual taproot.

**Seedling:** The cotyledons (seed leaves) are rounded with a notch at the tip. The first leaves appear in a whorl of 4 and have spines on the tips (Royer and Dickinson 1999).

### Similar Species

**Exotics:** False cleavers (*Galium spurium*) closely resembles cleavers, but it has smaller (1.0–1.5 mm wide), greenish cream flowers with smaller nutlets (1.5–3.0 mm long).

**Natives:** Seven *Galium* species are native to BC, and all have square stems with leaves in whorls. Only one, *Galium bifolium*, is an annual, and its leaves are in whorls of 4 instead of 8.



### Impacts

**Agricultural:** Problematic in forage, grain, and canola crops. It is a competitive plant that reduces yield, becomes entangled in harvesting equipment, and reduces the quality and value of crop seed. It is a contaminant in canola, where it reduces the value of the seed and reduces the quality of the pressed oil.

**Ecological:** Occurs in non-cultivated areas such as fields, thickets, open forests, and rocky bluffs. Cleavers clings to other plants while it competes for light, moisture, and nutrients.

**Human:** Fruits are used as a coffee substitute.

### Habitat and Ecology

**General requirements:** In BC, found in moderately dry to moist fields, lawns, gardens, disturbed areas, beaches, and open forests at low- to mid-elevations (Douglas et al. 1999). Adapted to damp, moist soil (Alberta Agriculture 1983).

**Distribution:** Found in all areas of the province but

considered a major concern in the Peace River region.

**Historical:** Introduced from Europe.

**Life cycle:** An annual plant that usually completes its life cycle in one year but can overwinter and grow as a winter annual. Most seedlings emerge in mid-spring, but seeds continue to germinate through the summer.

Plants flower from June through August, and seed is produced from August until frost (Alberta Agriculture 2001).

**Mode of reproduction:** By seed.

**Seed production:** A single plant can produce 3,500 seeds (Alberta Agriculture 2001).

**Seed bank:** Seed can remain viable up to 6 years.

**Dispersal:** Cleavers seeds are similar in size and shape to canola seed and cannot be easily separated mechanically. Planting contaminated canola is the main source for spread, but harvesting equipment, animals, humans, and contaminated animal manure can also disperse the seeds.

**Hybridization:** Little evidence.

## Management

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**Biocontrol:** None.

**Mechanical:** Tillage can manage emerging seedlings at pre-seeding, post-seeding, in the autumn, or on summerfallow. Tillage at some stages may encourage weed germination, so a second cultivation may be required. Tilling on summerfallow can prevent seed production and is most effective under warm, dry conditions so the plants cannot re-root. Mowing will not control cleavers because of the plant's prostrate growth habit.

**Fire:** Not managed by fire.

**Herbicides:** Many herbicides and herbicide mixes are used to manage cleavers in cereal crops. Herbicides are also available for control in canola varieties resistant to specific herbicides such as glyphosate, glufosinate ammonium, and imazethapyr. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific

recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Rotations that include summerfallow, cereals, or annual and perennial forages can effectively manage cleavers populations (Alberta Agriculture 2001). Planting with certified weed-free seed, cleaning farm equipment, and composting manure before spreading also will reduce spread.

### Integrated Management Summary

Manage cleavers for prevention and early control and eradication. Use certified weed-free seed. Till soils to manage emerging seedling and spray appropriate herbicides as required.

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# COAST TARWEED

## *Madia sativa* Molina

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Chilean tarweed.

**Legal Status:** Not categorized.



## Identification

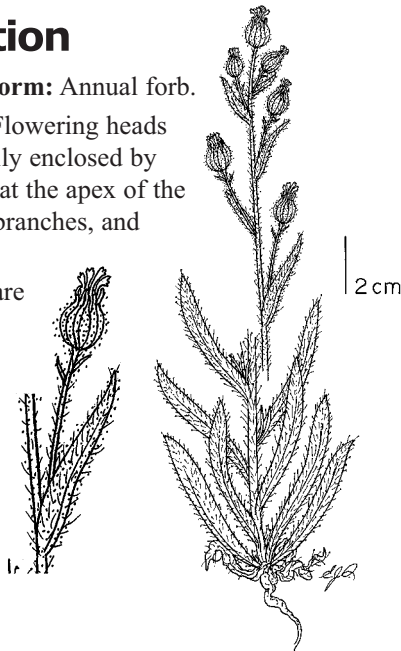
**Growth form:** Annual forb.

**Flower:** Flowering heads are partially enclosed by leaves and clustered at the apex of the stem, at the ends of branches, and in the leaf axils.

**Seeds/Fruit:** Seeds are slender, light grey, grey, or black.

**Leaves:** Leaves are alternate, narrow, and lance-shaped.

**Stems:** Mature plants are 0.2–1.0 m tall. Stems are erect, leafy, simple, or branching.



**Roots:** Taproot.

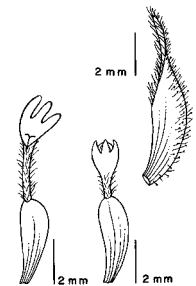
**Seedling:** No information available.

**Other:** The entire plant is sticky and hairy and has a disagreeable odour. It is called tarweed due to its sticky, glandular texture.

## Similar Species

**Exotics:** Six tarweed species occur in BC, but it is not clear which are introduced or native (Douglas et al. 1998).

**Natives:** Clustered tarweed (*Madia glomerata*) is common to dry roadsides, meadows, and open slopes and is scattered throughout southern BC (Douglas et al. 1998).



## Impacts

**Agricultural:** No information available.

**Ecological:** Coast tarweed is self-compatible, which facilitates its establishment and spread (Zardini 1992).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Coast tarweed occurs along dry roadsides and in disturbed areas (Douglas et al. 1998). In other areas it is also found on dry hillsides and overgrazed rangeland (Whitson et al. 1996).

**Distribution:** Coast tarweed occurs infrequently in southern BC at low elevations (Douglas et al. 1998). It is present in the Kootenay, Thompson, Mainland, Vancouver Island, Cariboo, and Omineca agricultural reporting regions. Outside BC the plant is found from Washington to California (Whitson et al. 1996; Zardini 1992).

**Historical:** Possibly introduced from South America.

**Life cycle:** Annual or occasionally biennial. Coast tarweed is a self-compatible plant capable of rapidly establishing in disturbed areas.

**Seed production:** Prolific seed producer.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Pull or cut before seed-set.

**Fire:** No information available.

**Herbicides:** **No information available.** Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance, eliminating

seed production, and maintaining healthy native plant communities.

### Integrated Management Summary

Cut/pull or treat plants with herbicide before they set seed. Manage new infestations immediately to ensure that seeds are not being introduced into the environment.

## References

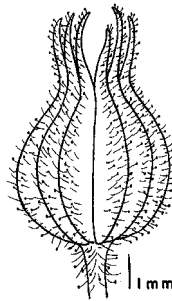
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Douglas, G. W., G. B. Straley, D. Meidinger, and J. Pojar, eds. 1998. *Illustrated Flora of British Columbia*. Vol. 1: *Gymnosperms and Dicotyledons (Aceraceae through Asteraceae)*. Province of British Columbia.

Smeda-Hirschman, G. 1995. *Madia sativa*, a potential oil crop of central Chile. *Economic Botany* 49: 257–259.

Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Coast tarweed. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

Zardini, E. 1992. *Madia sativa* Mol. (Asteracea-Heliantheae-Madinae): An ethnobotanical and geographical disjunct. *Economic Botany* 46: 34–44.



# COMMON BUGLOSS

## *Anchusa officinalis* L.

**Family:** *Boraginaceae* (Borage).

**Other Scientific Names:** None.

**Other Common Names:** Common alkanet.

**Legal Status:** Regional Noxious: Kootenay/Boundary.



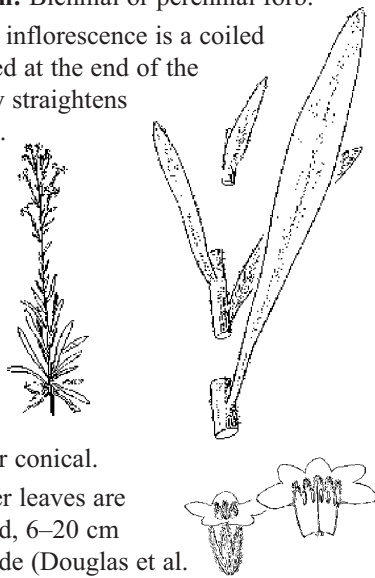
## Identification

**Growth form:** Biennial or perennial forb.

**Flower:** The inflorescence is a coiled cluster located at the end of the stalk. The coil gradually straightens as the flower buds open. The tubular flowers are initially reddish but eventually turn deep purplish blue with white centres.

**Seeds/Fruit:** Each flower produces a cluster of 4 barbless nutlets. The nutlets are squat and asymmetric or conical.

**Leaves:** Basal and lower leaves are stalked and lance-shaped, 6–20 cm long and 1.0–5.0 cm wide (Douglas et al. 1998). The stem leaves become gradually smaller upward and lack stalks. The leaves are



succulent and covered with stiff hairs (BC Ministry of Agriculture and Food. Undated).

**Stems:** Plants often have several stems and grow 30–80 cm tall. The angular stems are covered with spreading hairs.

**Roots:** Long taproot.

**Seedling:** No information available.



### Similar Species

**Exotics:** European bugloss (*Anchusa arvensis*) and Italian bugloss (*Anchusa azurea*) also occur in BC, but they have very limited distribution and only a few specimens have been found. Common hound's-tongue (*Cynoglossum officinale*) has a similar appearance, but it has only a single stem per plant, the inflorescences do not uncoil, and the nutlets are strongly barbed.

**Natives:** Northern hound's-tongue (*Cynoglossum boreale*) also resembles common bugloss, but it has more leaves that are rounded, the inflorescences do not uncoil, and the nutlets are barbed.

## Impacts

**Agricultural:** This weed invades pastures and hay lands, where it reduces carrying capacity and yield. It causes spoilage in baled alfalfa hay because the succulent leaves and stems become mouldy. Common bugloss is not a problem in cultivated crops.

**Ecological:** Invades rangelands and disturbed areas where competing vegetation is sparse.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Commonly found on dry, fertile, lime-free, well-drained soils. It frequently occurs on warm, sandy, and gravelly glacial out-wash soils (BC Ministry of Agriculture and Food. Undated). Found on roadsides, dry fields, pastures, and disturbed areas in BC.

**Distribution:** Common bugloss occurs only rarely in south-central BC and southern Vancouver Island. The largest infestations are near Rock Creek and the Rutland-Black Mountain area near Kelowna, and other sightings have been noted in the south Okanagan and Keremeos areas. It is also found in northern Washington.

**Historical:** Introduced from Europe.

**Life cycle:** This perennial forms a rosette of basal leaves in its first year. A single flowering stalk is formed in the second year and multiple stalks appear in subsequent years.

**Mode of reproduction:** Primarily by seed but root fragments will re-sprout.

**Seed production:** A single plant can produce about 900 seeds annually.

**Seed bank:** No information available.

**Dispersal:** Ingestion of seeds by animals and seed-bearing stalks being tumbled in the wind. Vehicles, animal and human feet, redistribution of soils and gravels, and contaminated hay.

**Hybridization:** None known.

## Management

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**Biocontrol:** None.

**Mechanical:** Cutting or mowing before plants flower will prevent seed production. Flowering stalks should be bagged, removed from the site, and burned.

**Fire:** Fire can destroy above-ground parts of the plant but will not affect the deep taproot and seeds in the seed bank.

**Herbicides:** **No specific recommendations.** Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Small populations could be hand-pulled. Pulling is easier in young plants before the deep taproot has developed. Monitor disturbed sites, especially on sandy or gravelly areas, for new outbreaks. Inspect purchased hays and monitor stock feeding areas. Remove any new infestations

immediately by pulling or cutting, and destroy any flowering stalks. Clean equipment, vehicles, and footwear before leaving an infested area. Maintaining a strong population of native perennials is the best way to prevent the establishment of common bugloss.

### Integrated Management Summary

Early detection is important because this plant has a limited distribution in BC. Hand-pull plants and remove from the site before a seed bank can establish. Seed disturbed areas to perennial grasses and forbs to provide cover and competition against common bugloss. Manage grazing animals to maintain perennial plant communities.

## References

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BC Ministry of Agriculture and Food. Undated. Weed Alert. Common Bugloss.

Douglas, G. W., D. Meidinger, and J. Pojar. 1998. *Illustrated Flora of British Columbia*. Vol. 2:

*Gymnosperms and Dicotyledons (Balsaminaceae through Cuscutaceae)*. Province of British Columbia.



# COMMON BURDOCK

## *Arctium minus* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Lesser burdock, wild burdock, bardane, wild rhubarb, beggars button.

**Legal Status:** Regional Noxious: Bulkley-Nechako, Cariboo, Columbia-Shuswap, Fraser-Fort George, Kitimat-Stikine, North Okanagan, Okanagan-Similkameen, Peace River, Thompson-Nicola.



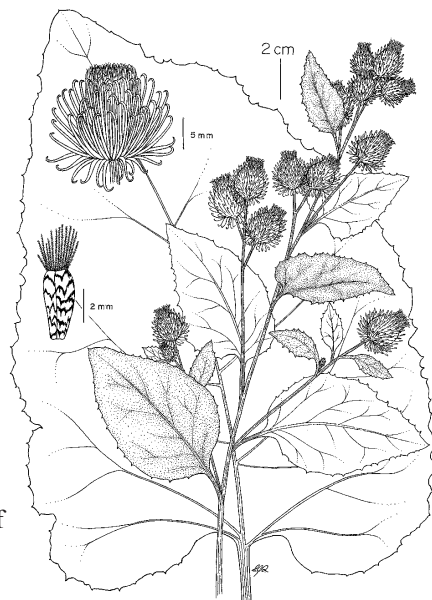
## Identification

**Growth form:** Biennial forb.

**Flower:** Flowers are purple, less than 2.5 cm across, and borne in short-stalked clusters along the stems.

**Seeds/Fruit:** Mature flower heads form a prickly bur that readily sticks to clothing or animals.

**Leaves:** Stem leaves are alternate, broadest at the leaf base, and somewhat diminished upward. Lower leaf stalks are hollow. Leaf margins are toothed or wavy, and the entire leaf is woolly beneath and dark green



above. Rosette leaves are large, hairy, and heart-shaped.

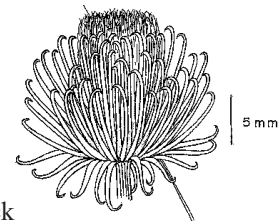
**Stems:** Mature plants are 1–3 m tall. The stem is erect, coarse, and much branched.

**Roots:** Large, fleshy taproot.

**Seedling:** Leaves of the rosette stage are large, simple, and usually heart-shaped (Stubbendieck et al. 1995).

### Similar Species

**Exotics:** Great burdock (*Arctium lappa* L.) is also listed as a regional noxious weed. Unlike common burdock, it has solid lower leaf stalks. Also, great burdock has individual flowers larger than 2.5 cm across, that are borne on long stalks and form a flat-topped cluster. Great burdock is quite rare in southern BC and is found on dry roadsides, disturbed areas, and pastures of low- to mid-elevations. Cocklebur (*Xanthium strumarium*) has smaller, spiny-margined leaves.



**Natives:** None known.

## Impacts

**Agricultural:** Common burdock is not considered a problem in crops since it is intolerant to cultivation. Livestock are fond of common burdock, and the foliage imparts a bitter taste to the milk if it is eaten in large quantities. Common burdock burs can become entangled in the hair of sheep, damaging the quality and reducing the value of the wool.

**Ecological:** Due to its biennial nature, common burdock is confined to areas that are not severely disturbed on an annual basis.

**Human:** Because of its diuretic effects, common burdock has been listed as a poisonous plant (Gross et al. 1980).



## Habitat and Ecology

**General requirements:** Common burdock is found at low- to mid-elevations in grasslands and forests. It can commonly be found growing along roadsides, ditches, stream banks, pastures, and disturbed habitats. It often occurs in riparian areas that have moist, fertile soils with high nitrogen contents.

**Distribution:** Established throughout much of Canada and the US. It is frequent in coastal, west-central, and southern BC from low- to mid-elevations (Douglas et al. 1998). Burdock is a major concern in the Okanagan, Thompson, Cariboo, Omineca, and Peace regions, and is present in the Kootenay, Mainland, and Vancouver Island agricultural reporting regions.

**Historical:** Introduced from Eurasia.

**Life cycle:** Germination occurs mainly in early spring (Gross et al. 1980). During the first year, the plant

forms a rosette. The following year the plant produces a stout, grooved, rough stem with numerous branches. Flowering and seed production occur from July to September. Seeds are mature by September, depending on location, and are shed continuously throughout the autumn, winter, and following spring.

**Mode of reproduction:** By seed.

**Seed production:** Common burdock typically produces 6,000–16,000 seeds/plant.

**Seed bank:** No information available.

**Dispersal:** Bur-like seed heads are readily dispersed by attaching to animal fur or clothing.

**Hybridization:** Possibly hybridize with other *Arctium* species.

## Management

**Biocontrol:** None.

**Mechanical:** Tillage can be used to kill the plants at the rosette stage. Mowing or cutting can be used to eliminate seed production. Mow after the plant has bolted but before it has flowered.

**Fire:** No information available.

**Herbicides:** Common burdock can be controlled with 2,4-D, picloram, dicamba, or glyphosate. Herbicides are most effective when applied to first-year rosettes. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new

infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining healthy native communities.

### Integrated Management Summary

As with other plants that reproduce solely by seed, integrated management efforts must include the elimination of seed production and the depletion of the seed bank. Combine herbicide or tillage treatment of rosettes with removal of seed heads from any plants that have bolted. Preventing dispersal of burs is particularly important.

## References

- Douglas, G. W., G. B. Straley, D. Meidinger, and J. Pojar, eds. 1998. *Illustrated Flora of British Columbia*. Vol. 1: *Gymnosperms and Dicotyledons (Aceraceae through Asteraceae)*. Province of British Columbia.
- Gross, R. S., P. A. Werner, and W. Hawthorn. 1980. The biology of Canadian weeds. 38. *Arctium minus* (Hill) Bernh. and *A. lappa* L. *Canadian Journal of Plant Science* 60: 621–634.
- Stubbendieck, J., G. Y. Friisoe, and M. R. Bolick. 1995. Common burdock. *Weeds of Nebraska and the Great Plains*. Lincoln: Nebraska Department of Agriculture, Bureau of Plant Industry.

- Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Common burdock. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.



# COMMON CHICKWEED

*Stellaria media* (L.) Vill.

**Family:** Caryophyllaceae (Pink).

**Other Scientific Names:** None.

**Other Common Names:** Common starwort.

**Legal Status:** Not categorized.



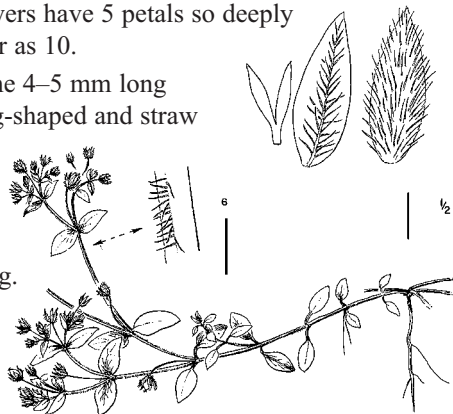
## Identification

**Growth form:** Annual to winter annual forb.

**Flower:** The stalked flowers arise either singly from the leaf axils or in small clusters at the end of the stems. The small (6 mm across), white, star-shaped flowers have 5 petals so deeply cleft they appear as 10.

**Seeds/Fruit:** The 4–5 mm long capsules are egg-shaped and straw coloured and contain many tiny reddish brown seeds 0.9–1.3 mm long.

**Leaves:** Basal leaves are absent. The fleshy stem leaves are opposite, oval, entire, and covered in hairs. The lower leaves are stalked, but the upper leaves are stalkless.



**Stems:** Stems usually are prostrate but may be upright. They are much branched and round in cross-section and have a conspicuous line of hairs on one side. Stems frequently root at the swollen nodes.

**Roots:** Roots are a slender rhizome that break easily when pulled.

**Seedling:** Seedlings have opposite, fleshy leaves that are oval with pointed tips. The first pair of leaves has a fringe of white hairs on the stalk (Royer and Dickinson 1999).

### Similar Species

**Exotics:** Grass-leaved starwort (*Stellaria graminea*) is found in the province, but common chickweed is distinguished by its broad leaves and line of hairs on one side of the stem. Mouse-ear, or field chickweed (*Cerastium arvense*), is a similar mat-forming weed, but it is a much hairier plant.

**Natives:** There are a number of native starworts (*Stellaria* sp.), but none have the line of hairs on one side of the stem.

## Impacts

**Agricultural:** This is a problematic weed in cultivated crops, gardens, and lawns. Its early, rapid spring growth can smother seedling crops, while its shade tolerance allows it to persist in tall crops, such as cereals. The succulent leaves remain green after cutting and tangle on moving parts of harvest equipment. Detached chickweed plants can re-sprout, and during cool, wet weather the mats will grow on harvested

swaths, delaying harvesting and complicating pickup (Alberta Agriculture 1995).

**Ecological:** Not competitive in established plant communities, though under cool, moist conditions it can establish on disturbed sites.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Chickweed is shade tolerant and well adapted to fertile soils and moist, cool growing conditions. In BC, it grows in grain fields,

cultivated fields, pastures, gardens, and disturbed habitats at low- to mid-elevations.

**Distribution:** Chickweed is present in all agricultural

reporting regions of the province. It is found across Canada and in much of the world (Frankton and Mulligan 1970).

**Historical:** Introduced from Europe.

**Life cycle:** Chickweed can germinate in both spring and autumn, although the winter annual form occurs only in mild climates. Plants grow quickly and begin flowering 4–5 weeks after emergence. The plant may also germinate throughout the growing season if weather conditions are favourable (Alberta Agriculture 1995).

**Mode of reproduction:** Mainly by seed, but plants can root at the nodes of the stems in moist, loose soil.

**Seed production:** Flowering continues over a long time and seeds mature quickly after flowering. A single plant can produce 15,000 seeds in a growing season (Cranston et al. 2000).

**Seed bank:** Seeds are immediately viable. Most seeds germinate within 3 years, but 30% are viable after 10 years (Royer and Dickinson 1999). Seeds require light to germinate, and deeply buried seeds can survive up to 60 years (Alberta Agriculture 1995).

**Dispersal:** Seeds can be transported on farm equipment and by contaminated soils. Ingested seeds can also be dispersed in animal manure.

**Hybridization:** None known.

## Management

**Biocontrol:** None.

**Mechanical:** Tillage can manage chickweed effectively, but different approaches are required for different situations. Shallow tillage is recommended in spring to encourage weed growth. It should be followed by a second tillage to remove the weed seedlings before seed-set. Autumn tillage will prevent seed production and overwintering, but plants should be deeply buried in the soil. Mowing is generally ineffective because the stems are so prostrate many flowers will be missed.

**Fire:** No information available.

**Herbicides:** Numerous herbicides can be used to manage this plant. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Common chickweed cannot compete with vigorous plant stands. Strong perennial crops can be used in rotation to suppress chickweed.

Vigorous annual crops can be produced by increasing seeding rates and by delaying seeding until emerging chickweed is managed. Similarly, thorough summerfallowing (spring and autumn) with repeated, deep tillage will give annual crops a competitive advantage.

### Integrated Management Summary

Chickweed infestations can be prevented or managed by maintaining competitive crops or perennial native plant communities. Management is achieved in established populations by stopping seed production and preventing plants from re-establishing after tillage. In temperate climates, where this weed is a winter annual, plant establishment and autumn seed production should be prevented.

## References

- Alberta Agriculture. 1995. Chickweed. <http://www.agric.gov.ab.ca/pests/weeds/64010020.html>
- Cranston, R., D. Ralph, and B. Wikeem. 2000. *Field Guide to Noxious and Other Selected Weeds of British Columbia*. BC Ministry of Agriculture, Food and Fisheries and Ministry of Forests.
- Douglas, G. W., G. B. Straley, D. Meidinger, and J. Pojar. 1998. *Illustrated Flora of British Columbia*. Vol. 2: *Dicotyledons (Balsaminaceae through Cuscutaceae)*. Province of British Columbia.

- Frankton, C., and G. Mulligan. 1970. *Weeds of Canada*. Publication 948. Ottawa: Canada Department of Agriculture.

- Royer, F., and R. Dickinson. 1999. *Weeds of Canada and the Northern United States*. Edmonton: University of Alberta Press.



# COMMON CRUPINA

## *Crupina vulgaris* Cass.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** None.

**Legal Status:** Provincial Noxious.



### Identification

**Growth form:**

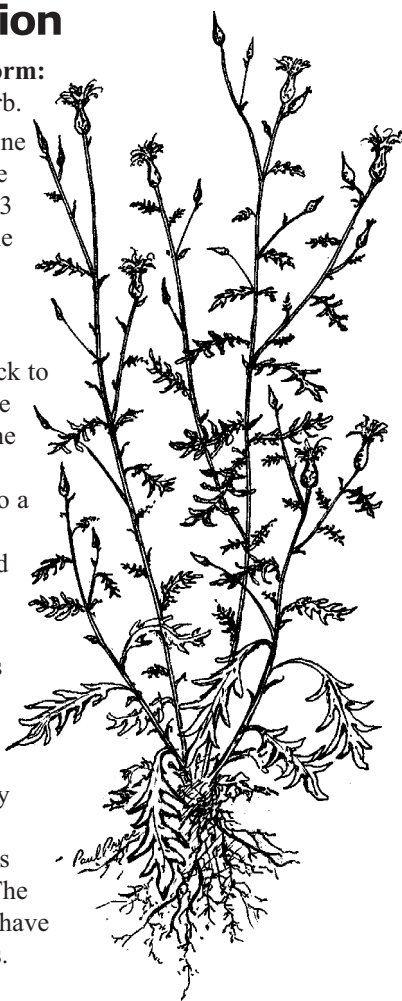
Annual forb.

**Flower:** One

or more rose to purple flower heads about 1.3 cm long, located at the end of each branch (Thill et al. 1999).

**Seeds/Fruit:** The black to silvery beige seeds are 0.3–0.6 mm long, cone shaped, covered with fine hairs, and taper to a blunt point. A pappus of 0.6-cm-long barbed hairs surrounds the wide end of the seed.

**Leaves:** Young plants begin with smooth basal leaves but become toothed, then lobed, then finely dissected as the plant develops. Basal leaves can be 7.5 cm long. The alternate stem leaves have finely divided leaflets.

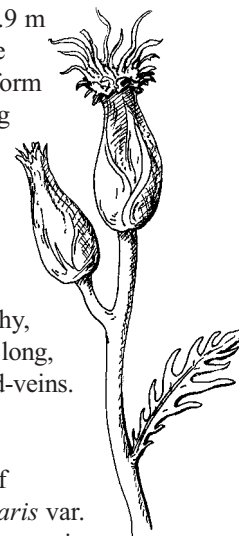


Older leaves become prickly as stiff hairs develop (Thill et al. 1999).

**Stems:** Mature plants are 0.2–0.9 m tall and usually produce a single stem. Five to 15 branches will form near the top under good growing conditions, but if the plant is crowded or growing under poor conditions only 1–3 branches will form.

**Roots:** A short taproot.

**Seedling:** Seedlings have 2 fleshy, stalkless cotyledons 1.3–2.5 cm long, with prominent red or purple mid-veins.



### Similar Species

**Exotics:** There are 2 varieties of common crupina (*Crupina vulgaris* var. *typica* and var. *brachypappa*) present in North America. Common crupina var. *brachypappa* is distinguished from var. *typica* by the large number of stem leaves (about 40), larger seeds, and longer pappus bristles. Both varieties are considered noxious in the US. Common crupina seedlings are similar to those of knapweeds (*Centaurea* sp.). Crupina can be identified by the fleshy cotyledons and the prominent mid-vein.

**Natives:** None known.

### Impacts

**Agricultural:** Invades hayfields and grass seed fields. Common crupina seed can contaminate hay and other forage crops, reducing their value.

**Ecological:** Infests disturbed grasslands and open

forest sites, where it can form dense stands and compete with native plant species.

**Human:** None known.

## Habitat and Ecology

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**General requirements:** Adapted to a wide range of conditions. Usually found on well-drained sandy or loamy soil, where annual precipitation varies from 40 to 75 cm, and at elevations of 300–975 m.

**Distribution:** Does not occur in BC. Presently, it occupies areas of Washington, Oregon, Idaho, and California.

**Historical:** Introduced from Eurasia.

**Life cycle:** This winter annual usually germinates in late summer or autumn, but it can germinate in spring. Plants overwinter as rosettes, bolt in April, and begin flowering during May and June. Flowering will continue until frost or until soil moisture is no longer

available (Thill et al. 1999).

**Mode of reproduction:** By seed.

**Seed production:** From 2 to 23 seeds/plant, depending on growing conditions.

**Seed bank:** Most seeds germinate in the first autumn following an after-ripening period. Seeds can survive in the soil up to 32 months.

**Dispersal:** Seed can disperse short distances by wind and water, on the fur of rodents and other wildlife, as well as on hooves of cattle.

**Hybridization:** The 2 varieties of common crupina can hybridize.

## Management

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**Biocontrol:** None.

**Mechanical:** Hand-pulling or hoeing can be effective for small infestations. Plants should be controlled before they set seed, and follow-up treatments may be necessary.

**Fire:** Prescribed burning has reduced seedling populations, but long-term effects are unknown.

**Herbicides:** Clopyralid, 2,4-D, dicamba, and picloram have been effective. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Seed competitive grasses on disturbed sites to prevent invasion and promote control. Managing grazing animals to minimize disturbance and maintain perennial plant communities can effectively

control this weed, provided the grasses are well adapted to the site. Clean livestock before moving them to a new area.

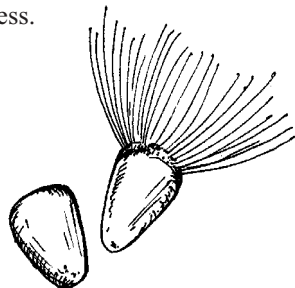
### Integrated Management Summary

Successful management of common crupina requires site-specific integration of several control methods (Thill et al. 1999). Preventive actions and prompt control of new outbreaks will stop new infestations, while combinations of herbicides, prescribed burns, reseeding, and grazing management will control existing crupina populations.

## References

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Thill, D. C., C. T. Roche, and D. L. Zamora. 1999. Common crupina. In R. L. Sheley and J. K. Petroff, eds. *Biology and Management of Noxious Rangeland Weeds*. Corvallis: Oregon State University Press.



# COMMON GROUNDSEL

## *Senecio vulgaris* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Old-man-in-the-spring.

**Legal Status:** Not categorized.



### Identification

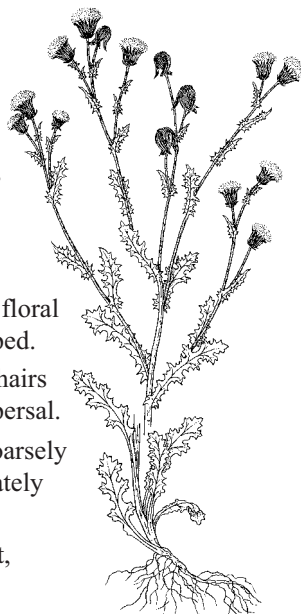
**Growth form:** Annual, winter annual, or sometimes biennial forb.

**Flower:** Flower heads are numerous and have yellow disk flowers but no ray flowers. The floral bracts (phyllaries) are black-tipped.

**Seeds/Fruit:** Seeds have white hairs (pappus) that promote wind dispersal.

**Leaves:** Leaves are alternate, coarsely and irregularly toothed, or pinnately parted.

**Stems:** Mature plants have erect, branched stems 0.25–1.4 m tall.



**Roots:** Small taproot with secondary fibrous root system.

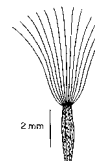
**Seedling:** Seed leaves (cotyledons) and young leaves are purple below.



### Similar Species

**Exotics:** Woodland groundsel (*Senecio sylvaticus*) is frequent in coastal and southwestern BC.

**Natives:** Thirty-two native and introduced species of *Senecio* occur in the province (Douglas et al. 1998).



## Impacts

**Agricultural:** A problematic weed in cultivated crops, gardens, and nurseries. Poisonous to cattle and horses.

**Ecological:** No information available.

**Human:** Contains pyrrolizidine alkaloids, which can cause irreversible liver damage and possibly death in humans.

## Habitat and Ecology

**General requirements:** Grows mainly in cultivated soil but may be found in pastures or along roadsides and disturbed areas. It is best adapted to wet environments and nutrient-rich soils.

**Distribution:** Common in west-central and southwestern BC, but rare elsewhere in the province (Douglas et al. 1998). Present in all agricultural reporting regions but not considered a major concern in any region. It is widely distributed throughout the US.

**Historical:** Introduced from Europe.

**Life cycle:** Seeds germinate in late autumn or early

spring. Seedlings appear as tiny rosettes with sharply notched leaves that are purple on the underside. Common groundsel flowers from April through October. Seeds may mature in opened flowers even after the plants have been killed.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** Seeds are easily dispersed by wind.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** In croplands, tillage in autumn and early spring will kill common groundsel seedlings. Small infestations can be pulled and larger infestations can be cut or mowed.

**Fire:** No information available.

**Herbicides:** Many infestations have developed resistance to triazine herbicides. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Common groundsel has a relatively small root system and is easy to hand-pull. Prevent establishment of new infestations by

minimizing disturbance and seed dispersal, eliminating seed production, and maintaining vigorous perennial plant communities.

### Integrated Management Summary

Ensure that grazing management maintains vigorous perennial plant communities. Cut, hand-pull, and apply herbicides immediately if this plant invades. Seed disturbed area to provide adequate ground cover to prevent invasion.

## References

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Douglas, G. W., G. B. Straley, D. Meidinger, and J. Pojar, eds. 1998. *Illustrated Flora of British Columbia*. Vol. 1: *Gymnosperms and Dicotyledons (Aceraceae through Asteraceae)*. Province of British Columbia.

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# COMMON TANSY

## *Tanacetum vulgare* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Garden tansy.

**Legal Status:** Regional Noxious: Bulkley-Nechako, Central Kootenay, Columbia-Shuswap, East Kootenay, North Okanagan.



## Identification

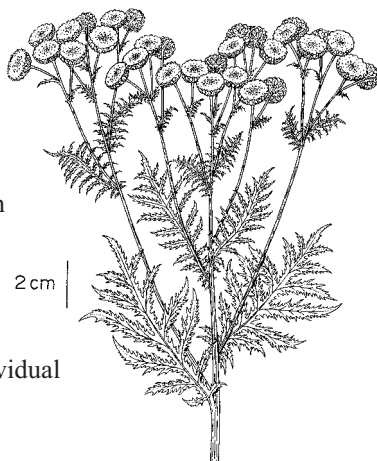
**Growth form:** Perennial forb.

**Flower:** Yellow flowers are numerous in flat-topped,

dense clusters at the tops of the plants. Button-like flower heads lack ray flowers.

**Seeds/Fruit:** Seeds (achenes) are yellowish brown with short, 5-toothed crowns.

**Leaves:** Alternate, deeply divided into numerous narrow, individual leaflets.



**Stems:** Mature plants are 0.4–1.5 m tall. The erect stems are often purplish red and dotted with glands.

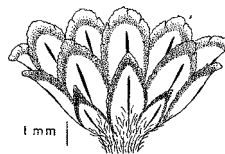
**Roots:** Rhizomatous.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** None known.



## Impacts

**Agricultural:** Considered an undesirable forage and may be toxic to livestock.

**Ecological:** No confirmed information but may displace native species.

**Human:** Can be toxic if large quantities are consumed.

## Habitat and Ecology

**General requirements:** Common tansy grows at low- to mid-elevations along roadsides, on stream banks, and in disturbed habitats and pastures. It grows best in full sun and in fertile, well-drained soil.

**Distribution:** This weed is common in BC south of 55° N (Douglas et al. 1998) and is present in all agricultural reporting regions of the province. It is considered a major concern in the Kootenay, Okanagan, and Omineca regions.

**Historical:** Introduced from Europe as an ornamental and medicinal herb (Whitson et al. 1996). It has been

used for centuries for treating various ailments and as an insect repellent.

**Life cycle:** Flowering typically occurs from July to September.

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.



## Management

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**Biocontrol:** None.

**Mechanical:** Common tansy can be mowed before flowering and seed-set to eliminate seed production. This method may have to be repeated to eliminate regrowth from rootstocks.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, and glyphosate can be used to manage this plant. The best time for treatment is between the early flower (bud) to bloom stage (Dow AgroSciences 1998). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining healthy native communities.

### Integrated Management Summary

Mechanical methods, such as mowing or hand-cutting, are most effective in combination with other management measures because this plant is rhizomatous. Plants can regrow from severed roots, and cut stems may still produce viable seed. Manage the spread of common tansy by preventing seed production and dispersal, minimizing the spread of cut rootstocks, and establishing vigorous stands of perennial plants.

## References

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# CORN SPURRY

## *Spergula arvensis* L.

**Family:** *Caryophyllaceae* (Pink).

**Other Scientific Names:** None.

**Other Common Names:** Sandweed, pickpurse.

**Legal Status:** Not categorized.



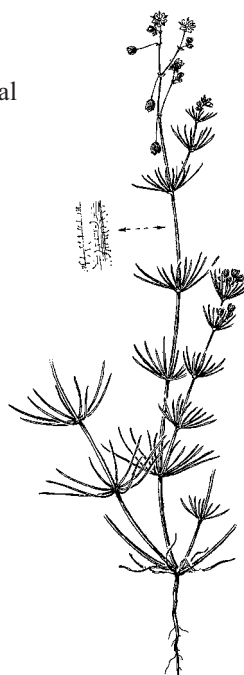
### Identification

**Growth form:** Annual forb.

**Flower:** White flowers are numerous, small (about 6 mm across), and borne in forked clusters at the end of the stems.

**Seeds/Fruit:** Capsules are egg-shaped, 1.2–2.2 cm long, and contain numerous seeds. The tiny seeds (1.0–1.5 mm) are blackish with tiny whitish warts. They are circular, except for a notch on one side and a narrow, winged margin.

**Leaves:** The slender, fleshy leaves are attached to each stem node in whorls of 6–10. Each needle-like leaf is about 1 mm thick,



20–50 mm long, rounded on the upper surface, and grooved on the lower.

**Stems:** Several, branched, yellowish green, somewhat sticky, prostrate to erect, and 10–60 cm tall.

**Roots:** Small taproot.

**Seedling:** Seedlings have a few needle-like leaves with a blunt tip arising from the centre of the sprout.

### Similar Species

**Exotics:** The Pink family contains many weedy species, but none have the whorled, needle-like leaves of corn spurry.

**Natives:** The sand spurries (*Spergularia* sp.) resemble corn spurry, but they have opposite leaves and their seeds have broad wings on the margins (Frankton and Mulligan 1970).



### Impacts

**Agricultural:** A problem of grain fields and other cropland. The weed is an alternate host for some viral diseases.

**Ecological:** Grows in fields and disturbed habitats, often on sandy, gravelly, or acidic soils.

**Human:** No information available.

### Habitat and Ecology

**General requirements:** Tolerates dry to moderately dry conditions and is adapted to well-drained, acidic soils. Found in cultivated fields, abandoned fields, and disturbed habitats.

**Distribution:** Most common in coastal areas of the province, but occurs in all agricultural reporting regions. It is found throughout the Pacific Northwest states and most of Canada.

**Historical:** Introduced from Eurasia.

**Life cycle:** Plants germinate in the spring; flowering begins by June and continues through October (BC Ministry of Agriculture and Fisheries 1988).

**Mode of reproduction:** By seed.

**Seed production:** Each plant can produce as many as 10,000 seeds (Royer and Dickinson 1999).

**Seed bank:** Seeds may remain viable in the soil as long as 10 years.

**Dispersal:** Contaminated soils and crop plant materials

carry seeds. Seeds can also be dispersed by vehicles, humans, and animals.

**Hybridization:** None known.

## Management

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**Biocontrol:** None.

**Mechanical:** Repeated, shallow tillage can induce germination and destroy emerging seedlings. Weeds should be tilled before they set seed.

**Fire:** No information available.

**Herbicides:** Corn spurry is resistant to 2,4-D and MCPA. Dicamba and dicamba mixes are used on pastures and rangelands when the weeds are actively growing. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Small infestations can be hand-pulled or hoed. Remove plants before seed-set.

### Integrated Management Summary

Use clean, high-quality seed. Maintain cultivated crops and forages in a competitive condition. Prevent seed production through tillage or herbicide use.

## References

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Royer, F., and R. Dickinson. 1999. *Weeds of Canada and the Northern United States*. Edmonton: University of Alberta Press.



# CREEPING BUTTERCUP

## *Ranunculus repens* L.

**Family:** *Ranunculaceae* (Buttercup).

**Other Scientific Names:** None.

**Other Common Names:** None.

**Legal Status:** Not categorized.



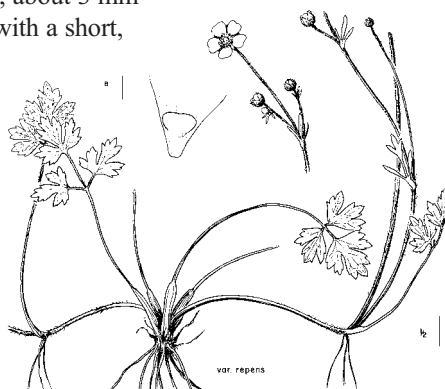
## Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are borne on long stalks (up to 15 cm long) at branches and at the end of the stems. The typical buttercup flowers are bright yellow with 5 or more petals. Each petal is 6–18 mm long and 5–12 mm wide. The sepals are greenish and soon drop off.

**Seeds/Fruit:** The seeds are clustered in a globe- to egg-shaped head 5–10 mm long and 5–8 mm wide (Douglas et al. 1999). The seeds are egg-shaped to circular, strongly flattened, about 3 mm long, and tipped with a short, curved beak.

**Leaves:** Basal leaves are borne on stalks up to 40 cm long. Each leaf has 3 parts, with each leaflet either lobed or



divided again. Stem leaves are alternate. The lower stem leaves are similar to the basal leaves with long stalks, but the leaves become smaller, simpler, and stalkless moving up the stem.

**Stems:** The slightly hairy stems are usually hollow and can be up to 1 m long. Some stems are erect, but each plant usually has one or more stems (stolons) that creep along the ground and root freely at the nodes.

**Roots:** Slender, shallow, fibrous roots.

**Seedling:** No information available.



### Similar Species

**Exotics:** Creeping buttercup is the only introduced buttercup with a creeping habit. Tall buttercup (*Ranunculus acris*) is sometimes confused with creeping buttercup, and both grow in the same habitats. Tall buttercup has a more upright growth habit and deeply incised leaves.

**Natives:** Macoun's buttercup (*Ranunculus macounii*) resembles creeping buttercup and shares similar habitats. It has hairy stems and smaller flowers (4–6 mm long and 3–5 mm wide).

## Impacts

**Agricultural:** A common weed of grain and forage crops that depletes the soil of potassium and other nutrients, causing deficiencies in associated crops (Lovett-Doust et al. 1990). This plant is most problematic in BC on poorly drained permanent pastures, where it reduces carrying capacity. Many buttercups contain an acrid juice that causes oral and gastrointestinal inflammations in livestock (Frankton and Mulligan 1970).

**Ecological:** Colonizes disturbed areas. It is usually found in heavy, wet clay soils but can also survive in sand or gravel when moisture is adequate (Lovett-Doust et al. 1990). It often grows by streams, swamps, and ponds, and in seepage areas. It can dominate disturbed riparian areas, forest openings, and along paths.

**Human:** Occasionally used as a ground cover in ornamental plantings.

## Habitat and Ecology

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**General requirements:** Adapted to a wide range of climatic zones, except during prolonged droughts. It grows along stream banks, ditches, roadsides, lawns, meadows, pastures, and cultivated crops. It commonly occurs in poorly drained disturbed habitats.

**Distribution:** Present in all of the province's agricultural reporting regions except for the Omineca and Peace River districts. It occurs across Canada and the US, where it is distributed in a band extending mainly between 30° and 50° N (Lovett-Doust et al. 1990).

**Historical:** Introduced from Eurasia.

**Life cycle:** Plants overwinter as leafy rosettes with a crown and roots in mild climates such as those of BC, or as roots with a crown where winters are more severe (Lovett-Doust et al. 1990). In spring, lateral stolons are produced that spread, root at the nodes, and produce small clone plants. This process is repeated until autumn, when the stolon internodes wither and the new

plants become independent. Some plants flower and set seed during the growing season. Seeds overwinter and germinate the following spring.

**Mode of reproduction:** Primarily by rooting along stolons but also from seed.

**Seed production:** There are less than 100 seeds/plant, and only about 25% of flowering plants set seed.

**Seed bank:** Seed densities can be up to 12,000 seeds/m<sup>2</sup> in pastures (Lovett-Doust et al. 1990). New seeds appear to be dormant and germinate sporadically over the year. Buried seeds can remain viable for up to 5 years.

**Dispersal:** Seeds are dispersed by wind, birds, rodents, and livestock. Vehicles and human activities also spread the seeds. Plants fragment easily, and any human activities that disturb soils could spread the weed.

**Hybridization:** Little evidence of hybridization.

## Management

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**Biocontrol:** None.

**Mechanical:** Repeated tillage over several years may reduce root reserves and control the plant on cropland, but root fragments easily regenerate (Muenscher 1955).

**Fire:** Not effective.

**Herbicides:** Glyphosate, MCPA, and 2,4-D are effective with spring and autumn applications while crops are dormant. Mecoprop provides effective control in turf. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Seed disturbed areas to perennial grasses and forbs. Manage grazing animals to maintain a perennial plant community that can provide competition. Improve drainage.

### Integrated Management Summary

Use tillage, hand-pulling, and herbicides, as appropriate. Prevent new infestations by seeding disturbed areas, managing grazing animals to maintain perennial plant communities, and seeding disturbed areas.

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# CURLED DOCK

*Rumex crispus* L.

**Family:** *Polygonaceae* (Buckwheat).

**Other Scientific Names:** None.

**Other Common Names:** Curly dock, sour dock, yellow dock.

**Legal Status:** Not categorized.



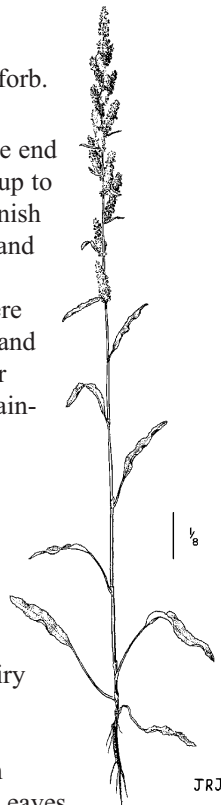
## Identification

**Growth form:** Perennial forb.

**Flower:** Numerous small flowers are clustered at the end of the stem in a large, dense panicle up to 60 cm long. Flower clusters are greenish red initially, then mature to pinkish, and finally, to brown. Flower stalks are jointed. Petals are absent; instead there are an outer whorl of 3 green sepals and an inner whorl of 3 red sepals (Royer and Dickinson 1999), each with a grain-like swelling.

**Seeds/Fruit:** A 3-sided achene is enclosed by the inner sepals. Seeds are reddish brown, about 10 mm long, shiny, and 3-sided (Frankton and Mulligan 1970).

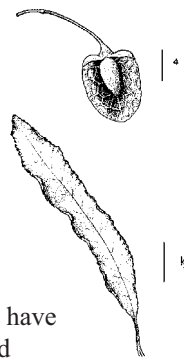
**Leaves:** Dark green basal leaves, 10–30 cm on long, pimply, finely hairy stalks. Stem leaves are alternate and become smaller with shorter stalks moving up the stem. A papery sheath surrounds the stem at the leaf joint. Leaves have pronounced wavy and crisped (curled) margins.



**Stems:** Reddish stems up to 1.6 m tall are unbranched below the inflorescence and are usually solitary (Douglas et al. 1999).

**Roots:** Stout, fleshy taproot with a yellow centre that can extend 1.5 m into the soil.

**Seedling:** Cotyledons are oblong and pale green. Lance-shaped leaves have prominent veins on the underside and have a papery sheath at the base (Royer and Dickinson 1999).



## Similar Species

**Exotics:** There are several other dock species, but most are not tall, unbranched plants with crisped and wavy leaf margins. Broadleaved dock (*Rumex obtusifolius*) and patience dock (*Rumex patientia*) most closely resemble curled dock, but their leaves are more rounded—not as wavy or as crisped. Broadleaved dock has larger leaves that are rounded or heart-shaped at the base (Cranston et al. 2000).

**Natives:** The native docks (*Rumex* sp.) do not resemble curled dock.

## Impacts

**Agricultural:** Can be a problem in cultivated cropland, pastures, and hayfields. Seeds and vegetation are toxic to poultry (Royer and Dickinson 1999) and cause dermatitis and gastric problems when large amounts are eaten by cattle (Northern Prairie Wildlife Center. Undated). It is an alternate host to many crop diseases.

**Ecological:** Open, disturbed areas are often invaded. This weed is especially common in riparian areas, including wet meadows, pond edges, and irrigation ditches, but its impacts on native plant communities have not been documented.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Adapted to moist to wet soils in open sites and can tolerate poor drainage. In BC, it grows in cultivated crops, pastures, fencerows, and riparian areas, especially those that have been disturbed.

**Distribution:** Found in every agricultural reporting region of BC. Curled dock occurs across Canada and the US.

**Historical:** Introduced from Eurasia.

**Life cycle:** A rosette measuring 10–30 cm long is produced in the first year. Plants produce tall, flowering stalks beginning in the second year that flower from June to September, depending on geographic location.

**Mode of reproduction:** Vegetatively from root fragments and by seed.

**Seed production:** About 30,000–60,000 seeds/plant (Northern Prairie Wildlife Research Center. Undated).

**Seed bank:** Nearly 90% of seeds will germinate with adequate light, but seeds that are buried more than 3 cm in the soil will remain dormant and are extremely long lived (Northern Prairie Wildlife Research Center. Undated). About half are viable after 50 years and some survive to 80 years (Royer and Dickinson 1999).

**Dispersal:** Primarily by wind or water. Rough seed pods stick to fur and feathers of animals and seeds can pass through cattle or wildlife. Cultivation or other soil disturbances disperse root fragments.

**Hybridization:** Broad-leaved dock (*Rumex obtusifolius*) and curled dock often hybridize.

## Management

**Biocontrol:** None.

**Mechanical:** Cultivation induces seedling emergence but requires follow-up treatment for control. Cultivation may spread established plants with well-developed root systems. Mowing before plants flower can prevent seed production.

**Fire:** No information is available, but fire would not likely affect the deep taproot.

**Herbicides:** Spring applications of MCPA, dicamba, and 2,4-D amine, when seedlings are at the 2–4 leaf stage, have been effective. Glyphosate applied in full leaf stage will control dock prior to ploughing. New seedlings can be suppressed with MCPA/MCPB or 2,4-DB. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** New infestations can be controlled by hand-pulling or digging up plants. Seed disturbed areas to perennial grasses, and manage livestock to maintain perennial plant communities.

### Integrated Management Summary

Curled dock is shade intolerant and a poor competitor in dense stands of other plant species. Maintain vigorous perennial stands on forage crops and native plant communities, especially in riparian areas where control with herbicides may not be possible. Minimize soil disturbance in riparian areas since exposure to light stimulates germination.

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# DALMATIAN TOADFLAX

*Linaria genistifolia* spp. *dalmatica* (L.)  
Marie and Petitmengin

**Family:** *Scrophulariaceae* (Figwort).

**Other Scientific Names:** *Linaria dalmatica*.

**Other Common Names:** Broad-leaved toadflax, wild snapdragon.

**Legal Status:** Provincial Noxious.



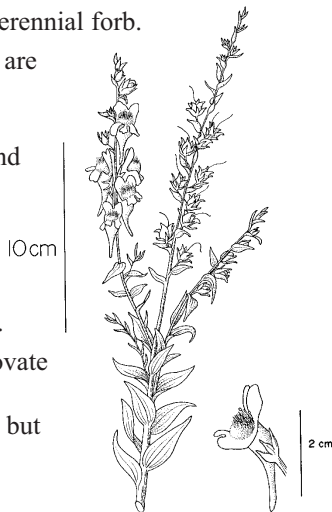
## Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are borne in loose, elongate, terminal racemes. Flowers are bright yellow and resemble snapdragons.

**Seeds/Fruit:** Fruits are egg-shaped to nearly round capsules. Seeds are sharply angular and slightly winged.

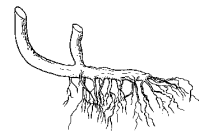
**Leaves:** Leaves are broad, ovate to ovate-lanceolate, and are alternate, generally clasping but crowded.



**Stems:** Mature plants are 0.6–1.2 m tall. A single toadflax plant contains 1–25 vertical floral stems.

**Roots:** The taproot may penetrate 1 m into the soil. Horizontal roots may grow to be several meters long and can develop adventitious buds that may form independent plants.

**Seedling:** No information available.



## Similar Species

**Exotics:** Yellow toadflax (*Linaria vulgaris*) is similar in appearance but has more linear pointed leaves and is generally smaller.

**Natives:** None known.

## Impacts

**Agricultural:** Low-till cultivation practices have contributed to the resurgence of toadflax populations on agricultural lands (McClay 1992). Dalmatian toadflax contains a glucoside, a quinoline alkaloid, and peganine, which make it toxic to livestock. However, it is generally considered unpalatable to livestock (Rees et al. 1996). Reports of livestock poisonings are rare.

**Ecological:** Dalmatian toadflax is a persistent, aggressive invader and capable of forming dense

populations through creeping root systems. Populations can compete with native grasses and other forbs, altering the species composition of natural communities. Infestations also can occur in small openings on excellent-condition rangeland (Lajeunesse 1999). Toadflax can also reduce forage production for livestock and other ungulates (Robocker 1974).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** In BC, grows at low- to mid-elevations in the Interior along roadsides and in disturbed areas, gardens, cultivated fields, grassland, and transitional forest-grassland (Powell et al. 1994). It can adapt to a wide range of environmental conditions and is tolerant of low temperatures and coarse, textured soils.

**Distribution:** Occurs widely throughout Canada and the US, but the heaviest infestations are found in BC,

Alberta, and the northwestern US (Lajeunesse 1999). It occurs throughout the Okanagan, Similkameen, Thompson, East Kootenay, Cariboo, Skeena, and Boundary areas (Powell et al. 1994). It is regarded as a major concern in all of the province's agricultural reporting regions except the Mainland.

**Historical:** Introduced from Europe, likely as an ornamental.



**Life cycle:** Plants emerge mid-April, depending on geographic location. During the first year the plant forms a rosette and develops a deep root system. Prostrate stems emerge in autumn and produce ovate leaves. These stems are tolerant to freezing and develop into floral stems the following year (Robocker 1974). Floral stems develop after winter dormancy and emerge about the same time as new seedlings in mid-April. A single plant can produce 1–25 floral stems. Flowering occurs from May to August and seeds mature from July to September. Dalmatian toadflax also reproduces vegetatively from root buds and

possibly from root fragments (Zimmerman 1996). The main taproot may penetrate 0.9–1.2 m into the soil, and lateral roots can extend up to 3.7 m.

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** A mature plant can produce up to 500,000 seeds annually (Morishita 1991).

**Seed bank:** Seeds may remain viable up to 10 years.

**Dispersal:** By wind and animals. Deer, elk, and birds eat seeds and seed heads.

**Hybridization:** No information available.

## Management

**Biocontrol:** Five agents occur in BC: *Brachyterolus pulicarius* (beetle), *Calophasia lunula* (moth), *Eteobalea intermediella* (moth), *Gymnaetron antirrhini* (weevil), and *Mecinus janthinus* (beetle). *Mecinus janthinus* has established well in several areas of the province and reduction in toadflax populations have been recorded (Dr. R. DeClerk-Floate: Personal communication to Dr. Brian M. Wikeem).

**Mechanical:** Cutting plants reduces topgrowth seed reproduction but will not kill the plant. Hand-pulling toadflax before seed-set each year can be an effective management method for new and small populations, especially if a seed bank has not developed. On a local basis, sheep grazing can suppress infestations and reduce seed production (Lajeunesse 1999), but grazing should be applied before the plants set seed.

**Fire:** No information available.

**Herbicides:** Autumn applications of picloram and picloram mixed with 2,4-D have provided management on some sites. In a US study, diclorprop was also effective at management. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Intensive disking can be an

effective management method on cropland under some circumstances. This method requires at least 2 years with 8–10 cultivations in the first year, and 4–5 cultivations in the second year (Morishita 1991). Follow-up seeding with appropriate perennial species is also required to provide competition with the weed. Hand-pulling can be effective for small infestations in a new area. Pull plants before seed-set to eliminate development of a seed bank.

### Integrated Management Summary

Integrated management should focus on impeding vegetative spread and reducing seed production (Lajeunesse 1999). Successful control can be obtained by pulling or killing the plants with herbicide before toadflax seed production begins (Carpenter and Murray 1998). Since the plant also spreads vegetatively and viable seeds remain in the soil for up to 10 years, these treatments must be repeated for several years to eradicate the stand locally. Seed disturbed areas to perennial grasses and forbs to provide ground cover and competition.

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# DIFFUSE KNAPWEED

## *Centaurea diffusa* Lam.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Spreading knapweed, tumble knapweed.

**Legal Status:** Provincial Noxious.

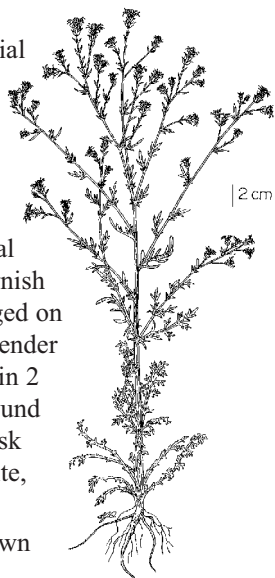


### Identification

**Growth form:** Biennial or short-lived perennial forb.

**Flower:** Flower heads are broadly urn-shaped, 1.5–2.0 cm tall, solitary or in clusters of 2–3 at the ends of the branches. Floral bracts are yellowish with a brownish margin, sometimes spotted, fringed on the sides, and terminating in a slender bristle or spine. The heads contain 2 types of flowers: ray flowers around the edges surrounding tubular disk flowers. The ray flowers are white, rose-purple, or lavender.

**Seeds/Fruit:** Seeds are light brown to black.



**Leaves:** Basal leaves are stalked and divided into narrow, hairy segments. Stem leaves are smaller, alternate, less divided, and stalkless, and become bract-like near the flower clusters.

**Stems:** Stems are upright, 10–60 cm tall, highly branched, angled, with short, stiff hairs on the angles.

**Roots:** Taproot.

**Seedling:** Seedlings have finely divided leaves that are covered with short hairs.



### Similar Species

**Exotics:** Diffuse knapweed may be distinguished from other knapweeds by the terminal spine on the floral bract.

**Natives:** None.

### Impacts

**Agricultural:** Reduces the productivity of rangeland by displacing desirable forage species for livestock and wildlife.

**Ecological:** A pioneer species that can quickly invade disturbed plant communities, reduce biological

diversity, and increase soil erosion (Watson and Renney 1974; Sheley et al. 1997).

**Human:** No information available.

### Habitat and Ecology

**General requirements:** Diffuse knapweed is found on grasslands, shrub lands, and dry open forests at low- to mid-elevations in BC. It occurs in pastures, along roadsides, and on disturbed areas in both rural and urban environments. Diffuse knapweed is not common on cultivated lands or irrigated pasture because it cannot tolerate cultivation or excessive moisture (Watson and Renney 1974).

**Distribution:** Diffuse knapweed is distributed throughout southern BC east of the Coast-Cascade

mountains. It is considered a major concern in the Kootenay, Okanagan, Thompson, Cariboo, Omineca, and Peace River agricultural reporting regions. Pockets also occur in the Chilcotin (Powell et al. 1994). The plant is widely spread throughout the northwestern US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Diffuse knapweed is usually regarded as a biennial, although some plants may remain as rosettes for several years, depending on environmental conditions (Thompson and Stout 1991). Flower buds

are usually formed in early June, flowering occurs in July, and seeds are formed by mid-August (Watson and Renney 1974).

**Mode of reproduction:** By seed.

**Seed production:** A single diffuse knapweed plant can produce up to 18,000 seeds (Harris and Cranston 1979), and a stand of diffuse knapweed can produce up to 40,000 seeds/m<sup>2</sup> (Watson and Renney 1974).

**Seed bank:** Seeds may remain dormant in the seed bank for many years.

## Management

**Biocontrol:** Ten biological control agents have been released on diffuse knapweed in the province: *Agapeta zoegana* (moth), *Chaetorellia acrolophi* (fly), *Larinus minutus* (weevil), *Larinus obtusus* (weevil), *Pelochrista medullana* (moth), *Pterolonche inspersa* (moth), *Puccinia jaceae* (stem and leaf rust), *Sphenoptera jugoslavica* (beetle), *Urophora affinis* (fly), and *Urophora quadrifasciata* (fly) (Powell et al. 1994). In addition, *Cyphocleonus achates* (weevil) has successfully moved onto diffuse knapweed in some habitats.

**Mechanical:** Cutting or mowing before seed-set can be effective to reduce seed production, but it will not eliminate large infestations. Cut plants and rosettes may survive and re-bolt. Ideally, mowings should be followed by an autumn herbicide treatment (Sebastian and Beck 1999). Hand-pulling can be effective on small infestations, but it often needs to be repeated, depending on the size of the initial weed population.

**Fire:** The direct effects of fire to control diffuse knapweed have been conflicting. One study reported that neither spring nor autumn burning reduced knapweed populations on 2 grassland sites near Vernon (Nicholson 1992). In another study, Zimmerman (1997) reported that fire effectively controlled diffuse knapweed, and a vigorous stand of grasses occupied the burned sites. Under some circumstances, fire can be used to remove standing dead material, which may increase the efficacy of herbicides applied after the burn (Roche and Roche 1999).

**Herbicides:** Several herbicides are effective to control diffuse knapweed. Picloram is the most widely

**Dispersal:** Seeds are distributed around the parent plant when plants sway in the wind, but mature plants often break at the stem and become tumbleweeds, allowing seeds to disperse over great distances (Watson and Renney 1974; Zimmerman 1997). Livestock, wildlife, and humans also readily disperse the plant.

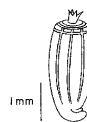
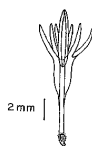
**Hybridization:** No information available.

recommended (Harris and Cranston 1979). Other herbicides, such as clopyralid, dicamba, 2,4-D, and glyphosate, are also effective (Beck 1997; Youtie 1997; Watson and Renney 1974). To maximize effectiveness, herbicides should be applied before plants set seed, or to rosettes in the autumn. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent establishment by managing to minimize disturbance. Clean machinery, vehicles, and equipment. Manage grazing or other land use to maintain vigorous native communities.

### Integrated Management Summary

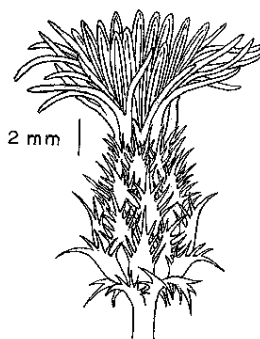
The most effective management method for diffuse knapweed is to prevent establishment. Small infestations should be dealt with immediately by hand-pulling the plants, herbicide application, or both. Seed disturbed sites immediately to prevent further infestation. Follow-up is essential to ensure that the initial treatment was effective. On sites too large for these methods to be effective, biocontrol should be considered.



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# FIELD BINDWEED

## *Convolvulus arvensis* L.

**Family:** *Convolvulaceae* (Morning-glory).

**Other Scientific Names:** None.

**Other Common Names:** Small-flowered morning glory, wild morning glory, perennial morning glory, creeping jenny.

**Legal Status:** Not categorized.



## Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are funnel shaped, up to 2.5 cm across, white to pink, and borne singly or in pairs on long stalks from the axils of the leaves with 2 tiny bracts.

**Seeds/Fruit:** Conical capsules contain ovoid to pear-shaped seeds. The dull, brownish grey seeds are 3-angled with 1 rounded and 2 flattened sides.

**Leaves:** Leaves are alternate, simple, glabrous to finely pubescent, more or less arrowhead-shaped.

**Stems:** Slender, twining stems are prostrate, up to 3 m long, often climbing or forming dense mats.



**Roots:** The root system and rhizomes are extensive, whitish, cord-like, and fleshy. The primary root is a taproot from which lateral roots develop (Peterson 1998).

**Seedling:** Seed leaves (cotyledons) are spatulate and broad and indented at the tip.

### Similar Species

**Exotics:** Black bindweed (*Polygonum convolvulus*) in the knotweed family (*Polygonaceae*) is similar but infrequent in southern BC and rare northward. Hedge bindweed (*Convolvulus sepium*) has larger leaves and flowers. This species is native to eastern North America but has been introduced into the province (Douglas et al. 1998).

**Natives:** None known.

## Impacts

**Agricultural:** Can reduce crop yields and its twining stems can interfere with harvesting and landscape plantings. It also acts as an alternate host for some crop diseases.

**Ecological:** Field bindweed can be a threat to native plant communities because of its broad range of

environmental tolerances (Peterson 1998). Detached roots and rhizomes can produce large numbers of new shoots. The plant produces a large number of seeds that remain viable in the soil for long periods.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Field bindweed grows in coastal and low- to mid-elevation regions of BC's Interior, where it is found on cultivated lands, roadsides, and disturbed habitats, especially on disturbed ground. Field bindweed cannot tolerate shade and uses its viney stems to move into sunlight. Therefore, it is unlikely that field bindweed persists in later stages of community succession (FEIS 1996).

Field bindweed is commonly found on more basic (rather than acidic) soil types and those of heavier texture. It can persist in dry to moderately moist soils and is capable of surviving drought (Rutledge and McLendon. Undated).

**Distribution:** Field bindweed is common in southern BC, but rarely occurs as far northward as Dawson Creek (Douglas et al. 1998). It is present in the



Kootenay, Okanagan, Thompson, Mainland, and Vancouver Island agricultural reporting regions, but it is not considered a major concern anywhere. It is found throughout most of Canada and the US.

**Historical:** Introduced from Europe as early as the 1730s (Peterson 1998).

**Life cycle:** The leaves vary greatly in size and shape with environmental factors, such as light intensity and soil moisture, and with damage due to frequent cultivation. Flowers appear from June to September and occasionally until the first autumn frost (Rutledge and McLendon. Undated). Seeds mature within 2 weeks of pollination. Germination occurs in the autumn or spring, over a wide range of temperatures (FEIS 1996). Field bindweed overwinters by means of its roots and rhizomes. Shoots are killed back to the crown by freezing temperatures, but hardened roots can withstand temperatures as low as  $-6^{\circ}\text{C}$  (Peterson

1998). Most lateral roots die back each year, but some persist for several years, spreading horizontally (Peterson 1998). Buds arise on the lateral roots and develop into rhizomes that can establish as new crowns when they reach the surface (Peterson 1998).

**Mode of reproduction:** By seed and vegetatively from roots.

**Seeds production:** The number of seeds produced per plant ranges from 25 to 300, and seed production is variable and depends on environmental conditions.

**Seed bank:** Seeds can remain viable in the soil for over 20 years (Peterson 1998).

**Dispersal:** Seeds have a hard, impermeable coat. They generally fall near the parent plant, but can be dispersed by water, as a contaminant in crop seeds, and by mammals and birds after ingestion.

**Hybridization:** No information available.

## Management

**Biocontrol:** None in BC. *Aceria mahlerbae* (gall mite) and *Tyta luctuosa* (moth) are being studied in the US (Rees et al. 1996).

**Mechanical:** Cutting and mowing have little effect on plant populations unless plants are cut below the root crown at early stages of growth. Established populations have a large seed bank in the soil that can remain viable for over 20 years.

**Fire:** Fire is not recommended because of the plant's potential for vegetative regrowth and a long-lived seed bank.

**Herbicides:** Foliar applications of glyphosate, picloram, dicamba, and 2,4-D have provided good management in the US during early flowering and when soil moisture is low (Peterson 1998). Chemical treatment often requires high rates and repeated applications. These can damage non-target species. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production

Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Hand-pulling seedlings can be effective for small, new infestations before plants set seed.

### Integrated Management Summary

Cutting, mowing, hand-pulling, and herbicides all are possible methods to combine to manage this weed. Use both cultural and chemical methods as required when infestations are small. Seed disturbed areas with perennial grasses and forbs to provide competition against this weed.

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# FIELD HORSETAIL

## *Equisetum arvense* L.

**Family:** *Equisetaceae* (Horsetail).

**Other Scientific Names:** None.

**Other Common Names:** Common horsetail, mare's-tail, horse pipes.

**Legal Status:** Not categorized.



### Identification

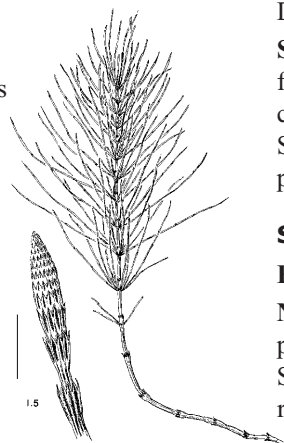
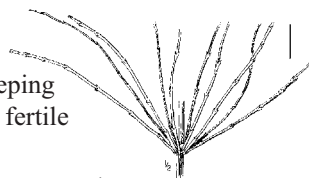
**Growth form:** Creeping perennial with both fertile and sterile stems.

**Flower:** Spore-bearing cones borne at the top of fertile stems. Cones are rounded, 1–4 cm long.

**Seeds/Fruit:** Spores.

**Leaves:** No true leaves, but whorls of green, 4-angled, leaf-like branches grow either outward or nearly erect from below the sheathed nodes on sterile stems.

**Stems:** Both fertile and sterile stems are jointed. Fertile stems are light brown, unbranched and about 30 cm tall. Sterile stems are green, 10–80 cm tall, and can be either sprawling or erect. They



are hollow and grooved and have sheathed nodes and whorls of solid branches.

**Roots:** Extensive dark rhizomes with a felt-like surface and small tubers (Frankton and Mulligan 1970). Roots may extend 2 m deep (Royer and Dickinson 1999).

**Sporeling:** Sporelings are the result of fertilization of small male and female structures called prothalli that arise from the spores. Sporelings grow into the familiar horsetail plants (Cody and Wagner 1980).



### Similar Species

**Exotics:** None.

**Natives:** Four horsetail species that are native to the province appear very similar to common horsetail. Swamp horsetail (*Equisetum fluviatile*) grows in riparian habitats and hybridizes with field horsetail.

## Impacts

**Agricultural:** Troublesome in pastures, hayfields, grain fields, orchards, nurseries, and small-fruit crops, especially on soils that are poorly drained or have a high water table (Cody and Wagner 1980). Plants are poisonous to young horses and sheep, especially when dried in hay. Horsetail plugs harvesting equipment and can delay drying of harvested grains and forages.

**Ecological:** Horsetail can form dense stands on

disturbed sites, such as roadsides and embankments. It is common in undisturbed, wet habitats. It often dominates riparian habitats, such as swamps and stream banks, and can be common in seepage areas of forests.

**Human:** Sometimes used medicinally. Also used as ground cover to prevent soil erosion.

## Habitat and Ecology

**General requirements:** Tolerates a very wide range of climatic and soil conditions. Often found on wet, poorly drained soils, but it can grow in dry sandy or gravelly soil if there is a saturated sub-soil. In BC, field horsetail is found in pastures, cultivated crops, orchards, landscape plantings, roadsides, embankments,

riparian sites, and shady forests.

**Distribution:** Occurs throughout BC, across Canada, and through much of the US. Present in all agricultural reporting regions but not regarded as a major concern in any region.

**Historical:** Native to BC.

**Life cycle:** Fertile stems develop in early spring, then spores are shed and fertile stems wither. Sterile stems grow as the fertile stems are fading and remain green until autumn, then die. Rhizomes expand and send up new, sterile shoots throughout the growing season.

**Mode of reproduction:** Spores, rhizomes, and root tubers. Rotting or fragmented rhizomes can produce new plants.

**Spore production:** Each cone produces about 100,000 spores.

**Seed bank:** Spores are relatively short-lived. They must disperse to moist soil and germinate quickly in order to survive.

**Dispersal:** Spring-like mechanisms inside the cone eject the spores for some distance. Tiny spores are dispersed by water. Fragmented rhizomes and tubers may be transported by agricultural and road-building equipment (Cody and Wagner 1980).

**Hybridization:** Horsetails hybridize quite readily. In BC, field-swamp horsetail hybrids (*Equisetum arvense* x *fluviatile*) occur in riparian habitats where both species grow (Douglas et al. 2000).

## Management

**Biocontrol:** None.

**Mechanical:** Deep cultivation may give short-term control, but cultivation may enhance the spread of this plant by moving tubers and fragmented rhizomes. Shallow cultivation is not advised (BC Ministry of Agriculture, Food and Fisheries 1996). Mowing before spore production can reduce spread potential.

**Fire:** Burning of fertile stems can prevent spore production but will not injure the deeply buried rhizomes.

**Herbicides:** Few herbicides are registered to control horsetail. Dichlobenil is used for control in woody ornamentals, orchards, nurseries, berries, and shelterbelts. Amitrol provides control in non-cropped areas and shelterbelts, and MCPA formulations provide topgrowth control in grass pastures and cereals (BC Ministry of Agriculture, Food and Fisheries 1996). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Improved drainage and vigorous, perennial grass cover will reduce horsetail in pastures and hayfields. Mulching with porous landscape fabrics or black plastic effectively controls this plant, but sawdust or bark mulches are ineffective (BC Ministry of Agriculture, Food and Fisheries 1996).

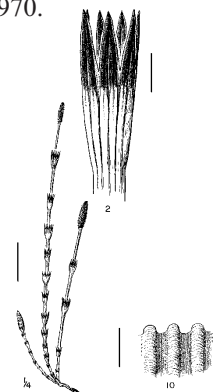
### Integrated Management Summary

This is a dominant native plant in many riparian ecosystems in BC and an important food source for geese and other waterfowl. Management should consider the context of the plant on the landscape. Herbicides and mowing can be effective. Grazing management on private pasture should maintain perennial plant communities that can compete with this species.

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# FIELD SCABIOUS

## *Knautia arvensis* (L.) Coult.

**Family:** *Dipsacaceae* (Teasel).

**Other Scientific Names:** *Scabiosa arvensis*.

**Other Common Names:** Blue buttons, pincushion.

**Legal Status:** Regional Noxious: Kootenay-Boundary, Thompson-Nicola, Bulkley-Nechako.



## Identification

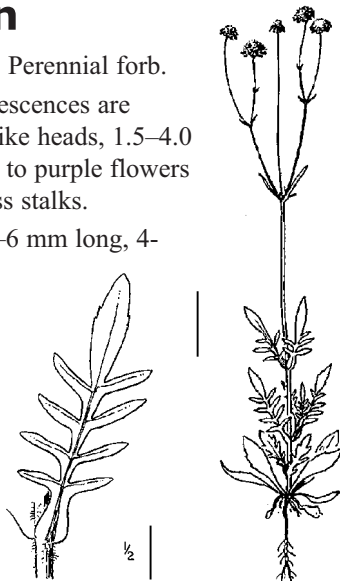
**Growth form:** Perennial forb.

**Flower:** Inflorescences are dense, clover-like heads, 1.5–4.0 cm wide, with violet-blue to purple flowers on the end of long, leafless stalks.

**Seeds/Fruit:** Seeds are 5–6 mm long, 4-angled, and densely hairy (Douglas et al. 1998).

**Leaves:** Basal leaves are coarsely toothed, while stem leaves are opposite and feather-shaped.

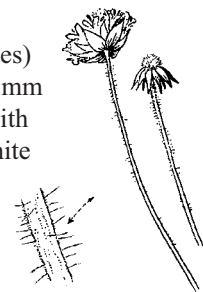
Lower leaves are 10–25 cm long but are smaller higher on the plant.



**Stems:** Stems are erect, hairy, and grow 0.3–1.3 m tall.

**Roots:** Well-developed woody taproot, often branched below the soil.

**Seedling:** The cotyledons (seed leaves) are club-shaped, 15 mm long, and 5 mm wide. The first leaves are rounded with wavy margins and have scattered white hairs. Later leaves become lobed (Royer and Dickinson 1999).



### Similar Species

**Exotics:** Caucasian scabiosa (*Scabiosa caucasica*), an ornamental perennial for gardens, has a similar appearance to field scabious.

**Natives:** None.

## Impacts

**Agricultural:** Competes with forage stands and native pastures, causing declines in hay production and pasture carrying capacity. Once established, it is difficult to eradicate.

**Ecological:** Plants establish easily along roadsides and disturbed areas and are capable of invading undisturbed plant communities (BC Ministry of Agriculture, Food and Fisheries. Undated).

**Human:** This plant is sometimes grown as an ornamental and butterfly attractant. It has a high oil content and is being considered as a source for high-performance lubricants and certain dietary fats.

## Habitat and Ecology

**General requirements:** Adapted to nutrient-rich and moderately moist to dry loam soils (BC Ministry of Agriculture, Food and Fisheries. Undated). It is found on roadsides, pastures, and fields at mid-elevations.

**Distribution:** This plant is absent from Vancouver Island and the Lower Mainland but is present in all other agricultural reporting regions in the province. It is

most troublesome in the Kootenays, Okanagan, Thompson, and Omineca regions.

**Historical:** Introduced from Eurasia.

**Life cycle:** Life cycle in BC not described. Initially produces a rosette of basal leaves then sends up flowering shoots.

**Mode of reproduction:** By seeds.

**Seed production:** A single plant can produce up to 2,000 seeds.

**Seed bank:** Seeds remain viable in the soil for many years.

**Dispersal:** Most seeds fall from the plants, but others can be spread by birds and human activities.

**Hybridization:** None known.

## Management

**Biocontrol:** None.

**Mechanical:** Cut or mow pastures before seed-set. Cultivation can manage this weed. Heavily infested pastures and hayfields can be cultivated and rotated to an annual crop.

**Fire:** No information available.

**Herbicides:** Picloram and metsulfuron-methyl provide excellent control. Picloram can be applied spring or autumn, while metsulfuron-methyl should be applied to actively growing plants up to the early flower bud stage. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Small infestations of immature plants can be hand-pulled. Seed production can be

reduced by cattle grazing early in the season, but the plant becomes unpalatable as it produces flowering stalks. Maintain vigorous perennial plant communities and seed disturbed sites to provide ground cover and competition.

### Integrated Management Summary

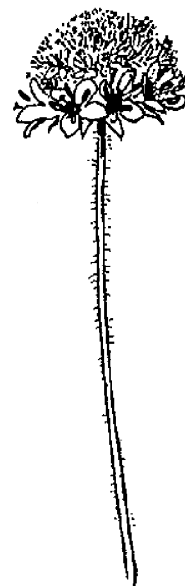
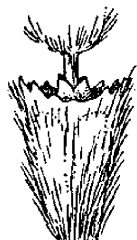
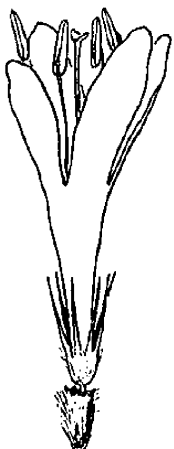
Seed production must be prevented to manage this weed. This can be done by grazing or mowing plants before they flower or by applying appropriate herbicides.

## References

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# FLIXWEED

## *Descurainia sophia* (L.) Webb ex Prantl

**Family:** *Brassicaceae* (Mustard).

**Other Scientific Names:** None.

**Other Common Names:** Flixweed tansymustard, herb-sophia, fine-leaved hedge mustard.

**Legal Status:** Not categorized.



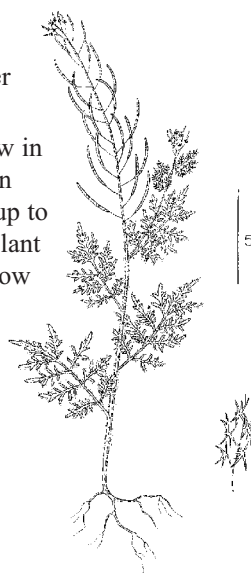
### Identification

**Growth form:** Winter annual forb.

**Flower:** Flowers grow in racemes, which lengthen when in fruit. These racemes may grow up to one-half the total height of the plant (FEIS 1996). The petals are yellow to greenish yellow and very small.

**Seeds/Fruit:** Seeds are borne in linear pods that are 11–33 mm long.

**Leaves:** Leaves are alternate, 2–3 times pinnately compound.



**Stems:** Mature plants are 0.3–1.0 m tall.

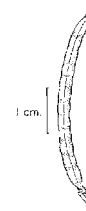
**Roots:** Flixweed has a slender taproot.

**Seedling:** Narrow, stalked seed leaves (cotyledons).

### Similar Species

**Exotics:** None known.

**Natives:** Tansy mustard (*Descurainia pinnata*) is easily confused with flixweed but has leaves that are only 1–2 times compound.



## Impacts

**Agricultural:** In cultivated areas, can crowd out crop plants and reduce yields (Mitich 1996).

**Ecological:** As an introduced species, flixweed has spread very rapidly across portions of the intermountain West (Morishita 1991).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Flixweed is found growing in disturbed habitats, fields, roadsides, and logged-over forests. It grows on a wide variety of soil types, but it is most abundant on dry, disturbed sites. It is often found along roadsides and ditches where mineral soil has been exposed (FEIS 1996).

**Distribution:** Frequent throughout BC at low- to mid-elevations and present in all agricultural reporting regions except the Queen Charlotte Islands and

adjacent coast (Douglas et al. 1998). It is common throughout North America.

**Historical:** Introduced from Europe.

**Life cycle:** Flixweed is an early-blooming winter annual or biennial and is one of the first weeds to appear in the spring. Flowering occurs from March through July, depending on geographic location. Flixweed spreads by seeds from early to late summer. Flixweed is an early seral species that quickly invades



areas of exposed mineral soil with reduced plant cover. It can survive in dense stands for a few years if undisturbed but is generally replaced by other seral species (FEIS 1996). In later seral stages, flixweed competes poorly with perennial grasses and forbs.

**Mode of reproduction:** By seed.

**Seed production:** Large plants can produce as many as 700,000 seeds (Rutledge and McLendon. Undated).

**Seed bank:** The seeds can remain viable for up to 3 years (Morishita 1991).

**Dispersal:** Seeds are mucilaginous when wet, which may facilitate dispersal by animals or increase adherence to soil particles (FEIS 1996).

**Hybridization:** No information available.

## Management

**Biocontrol:** None.

**Mechanical:** Can be managed through cultivation or hand-pulling in the autumn or early spring as long as the rosettes are small.

**Fire:** Plants are killed by fire at all stages, but seeds readily colonize burned areas (FEIS 1996).

**Herbicides:** Metsulfuron-methyl, chlorsulfuron, and 2,4-D all provide management of flixweed in the US (Morishita 1991). Herbicides should be applied during seedling growth stage for effective management (Whitson et al. 1996). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent new infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining native communities.

### Integrated Management Summary

Land management practices that maintain perennial grass communities will prevent the spread of flixweed. It can be managed by eliminating seed production until the soil seed bank is depleted. Cut, pull, or treat plants with herbicide prior to seed-set. Seed disturbed areas with perennial grasses to provide competition.

## References

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# GORSE

## *Ulex europaeus* L.

**Family:** *Fabaceae* (Pea).

**Other Scientific Names:** None.

**Other Common Names:** Furze, whin, prickly broom.

**Legal Status:** Provincial Noxious.



### Identification

**Growth form:** Perennial shrub.

**Flower:** Yellow, pea-like flowers, 15–20 cm long, borne on velvety, short stalks. Flowers usually appear singly but may be in small clusters.

**Seeds/Fruit:** Flattened pods are  $\frac{1}{2}$  dark (black, grey, or brown) and hairy, about 10–20 mm long, with several seeds in each pod.

**Leaves:** The leaves are alternate and deciduous. Leaflets are arranged in threes on young plants but are reduced to stiff scales or spines in mature plants. The spines are stiff, grooved, and branched, 1.5–2.5 cm long.



**Stems:** Mature shrubs grow 1–3 m tall, usually with a single, densely branched, erect stem. Branches are 5-angled, greenish with sparse black hairs, and tipped with spines (Douglas et al. 1999).

**Roots:** Deep taproot and lateral fibrous roots just below the soil surface. Adventitious roots may form on branches in contact with the ground.

**Seedling:** No information available.

### Similar Species

**Exotics:** Resembles Scotch broom (*Cystius scoparius*), another densely branched, medium to tall shrub with 5-angled stems and yellow, pea-like flowers that grows in similar habitats, but Scotch broom has no spines.

**Natives:** *Ulex* are not native to North America.

### Impacts

**Agricultural:** Present in some pastures on Vancouver Island.

**Ecological:** This pioneer species invades disturbed habitats, where it competes with native vegetation, reduces access for recreation, increases fire hazard, and

has the potential to impair forest regeneration in logged areas. It has been problematic in some cut-blocks on Vancouver Island.

**Human:** Originally used for stock fodder, for stock-proof hedgerows, and as an ornamental.

### Habitat and Ecology

**General requirements:** In BC, grows on dry, open, sandy or rocky clearings, old fields, cut banks, coastal bluffs, logged areas, flood plains, roadsides, and rights-of-way. Gorse occurs at low elevations with mild winters and relatively dry, cool summers. It tolerates a wide range of soils from sands to clays and is adapted to low fertility. It grows best on acidic soils.

**Distribution:** Most common on southern Vancouver Island near Victoria, but populations occur on Pender Island, West Vancouver on the Mainland, and

Skidegate on the Queen Charlotte Islands.

**Historical:** Introduced from Europe. Gorse had escaped cultivation as early as 1883 in the Victoria area (Macoun 1883).

**Life cycle:** Plants flower in spring and autumn, and most seedlings emerge in late spring, summer, or autumn. Germination is highest in open, unshaded areas. Plants grow rapidly for the first 15 years, and some plants can live up to 45 years.

**Mode of reproduction:** By seed.

**Seed production:** Seed production is variable, depending on crowding, plant size, habitat, and weather conditions. Annual production can average 500–600 seeds/m<sup>2</sup>.

**Seed bank:** More than 100 million seeds might accumulate in the seed bank under a continuous, mature stand of gorse (Meeklah 1979). Gorse seeds

have hard coats and can persist in the soil 25–40 years.

**Dispersal:** The maturing seed pods explode and disperse seeds at least a meter from the parent. Ants, animals, birds, machinery, and water can all disperse the seeds. Water is an especially important dispersal mechanism in the province, since many populations grow near the sea.

**Hybridization:** No information available.

## Management

**Biocontrol:** A number of agents are used for managing gorse in different areas of the world, including the gorse seed weevil (*Exapion ulicis*), gorse spider mite (*Tetranychus lintearius*), shoot-tip moth (*Agonopterix uliciteella*), and gorse thrips (*Sericothrips staphylinus*). The gorse spider mite appears promising since it is able to reduce gorse vigour and increase mortality by sucking plant juices. It is unlikely to eradicate the shrub but probably could reduce the population to tolerable levels. No biocontrol agents are currently approved for release in Canada.

**Mechanical:** Manual cutting and mechanical control have been effective in controlling small gorse infestations or on larger areas that are accessible with equipment. Since manual cutting can target individual plants, this technique can be valuable in sensitive habitats such as riparian areas or where gorse is interspersed with rare species. It may be the only cutting method possible on steep and undulating terrain. Specialized machinery has been used to cut and crush gorse on large, accessible sites on Vancouver Island. Gorse sometimes coppices after cutting, and mechanical control can stimulate germination.

**Fire:** Fire can reduce above-ground portions of mature gorse shrubs, kill seedlings, destroy viable seeds on the plant, and reduce seeds in the soil seed bank. Unless fires are very intense, however, plants can re-sprout from the base and more deeply buried seeds remain viable. Usually fire is combined with other management practices such as grazing, herbicide application, or seeding native forages to achieve long-term control. Fire has not been widely used to control gorse in the province, although it may be a useful tool on a site-specific basis.

**Herbicides:** Few herbicides have been tested and approved for gorse in BC. Limited trials using 2,4-D have had variable results. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. Before applying herbicides, read the label for full use and precautionary instructions.

**Cultural/Preventive:** Goats and sheep control gorse through browsing and trampling. Best results are achieved with intensive management and browsing young, un-hardened plants. Seeding to competitive perennial grasses and forbs may reduce seedling survival, especially if fertilizers are applied.

### Integrated Management Summary

Long-term management will likely result from an integrated management program. Gorse has been effectively controlled on forestland in New Zealand by using a combination of burning followed by herbicide applications, although these treatments may have limited application in BC, considering the current distribution of the plant. Other treatment combinations have integrated machinery, herbicides, sowing, domestic forages, and grazing before planting sites to crop trees. Introduction of biocontrol agents, such as the gorse spider mite, will also contribute to gorse control.

## References

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Douglas, B. J., A. G. Thomas, I. N. Morrison, and M. G. Maw. 1985. The biology of Canadian weeds. 70. *Setaria viridis* (L.) Beauv. *Canadian Journal of Plant Science* 65: 669–690.

Forcella, F., and K. R. Banken. 1996. Relationships among green foxtail (*Setaria viridis*) seedling development, growing degree days, and time of nicosulfuron application. *Weed Technology* 10: 60–67.

Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Green foxtail. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.





# GREEN FOXTAIL

*Setaria viridis* (L.) Beauv.

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** None.

**Other Common Names:** Green bristlegrass, pigeongrass, wild millet.

**Legal Status:** Regional Noxious: Peace River.



## Identification

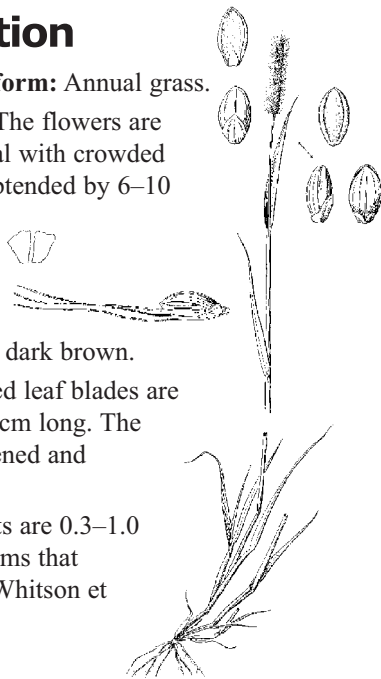
**Growth form:** Annual grass.

**Flower:** The flowers are cylindrical with crowded spikelets that are subtended by 6–10 long, yellowish bristles (Whitson et al. 1996).

**Seeds/Fruit:** Seeds are oval, greenish to dark brown.

**Leaves:** The flattened leaf blades are usually less than 15 cm long. The leaf sheath is roughened and hairless.

**Stems:** Mature plants are 0.3–1.0 m tall, with erect stems that branch at the base (Whitson et al. 1996).



**Roots:** Short, fibrous roots.

**Seedling:** Leaf blades are hairless, as is the leaf sheath, except for short hairs along margins. The leaf lacks auricles and has a hair-like ligule (Carey et al. 1993).

## Similar Species

**Exotics:** Green foxtail can be distinguished from yellow foxtail (*Setaria glauca*) by the lack of long, twisting hairs on the upper surface of the leaf blade near the base. Green foxtail can be distinguished from bur bristlegrass (*Setaria verticillata*) by the presence of long hairs on the axis of the flowers (rachis) and by the forward-facing barbs of the bristles.

**Natives:** None known.

## Impacts

**Agricultural:** A nuisance in cultivated fields and irrigated valleys, the plant can be a serious problem in spring-seeded alfalfa, small grain, and row crops (Whitson et al. 1996). Green foxtail can cause yield reductions, cleaning costs, and expensive control costs,

and it is also reported to have allelopathic effects on cabbage seedlings (Douglas et al. 1985).

**Ecological:** No information available.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Green foxtail is commonly found in field crops (especially corn), vegetables, lawns, gardens, and disturbed habitats along roadsides and streams. It is adapted to moist, medium- to coarse-textured soils.

**Distribution:** Found throughout BC and common throughout North America. It is present in all agricultural reporting regions and considered a major concern in the Peace River district.

**Historical:** Introduced from Eurasia.

**Life cycle:** A summer annual that overwinters as a seed on or below the soil surface. It generally emerges in early spring following periods of high rainfall. Flowering occurs from July to September, depending on geographic location, and seeds can mature within 2 weeks of flowering. Seeds readily fall from the flower structures when mature (Douglas et al. 1985).

**Mode of reproduction:** By seed.

**Seed production:** Typically produces 5,000–12,000 seeds/plant; however, the number of seeds/plant is highly dependent upon the size of the plant, and some plants may produce up to 34,000 seeds.

**Seed bank:** Seeds can remain viable for up to 6 years (Douglas et al. 1985).

**Dispersal:** Seeds may be distributed by human activity, animals, birds, and water (Douglas et al. 1985).

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** In natural areas, green foxtail could be mowed to eliminate seed production. However, since seeds already in the soil may remain viable for 6 years, repeated treatments are necessary to deplete the seed bank.

**Fire:** No information available.

**Herbicides:** On rangeland, glyphosate has been effective when green foxtail is 5–10 cm tall. (Douglas et al. 1985). Numerous herbicides are registered for control in various crop commodities. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent new infestations by minimizing disturbance, eliminating seed production and dispersal, and maintaining vigorous perennial native communities. Clean machinery, vehicles, and equipment. Manage grazing or other land uses to maintain vigorous perennial communities.

### Integrated Management Summary

Focus control methods toward eliminating seed production until the soil seed bank is depleted. Cut, pull, or treat plants with herbicide before seed-set, and repeat treatments as necessary.

## References

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Carey, J. B., J. J. Kells, and K. A. Renner. 1993. Common weed seedlings of Michigan. Department of Crop and Soil Sciences, Michigan State University Extension. Bulletin E-1363.

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Forcella, F., and K. R. Banken. 1996. Relationships among green foxtail (*Setaria viridis*) seedling development, growing degree days, and time of nicosulfuron application. *Weed Technology* 10: 60–67.

Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Green foxtail. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.



# HAIRY NIGHTSHADE

## *Solanum physalifolium* Rusby

**Family:** *Solanaceae* (Nightshade).

**Other Scientific Names:** *Solanum sarrachoides*.

**Other Common Names:** Hoe nightshade.

**Legal Status:** Not categorized.



### Identification

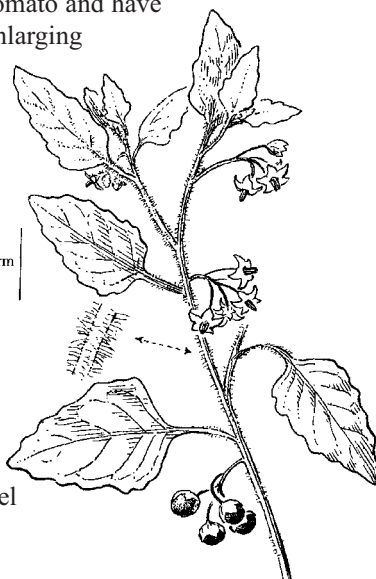
**Growth form:** Annual forb.

**Flower:** The flowers resemble those of the potato and tomato and have

5 white petals and an enlarging green calyx (Whitson et al. 1996).

**Seeds/Fruit:** As the fruit matures, the calyx cups the lower half of the greenish or yellowish berry-like fruit (Whitson et al. 1996).

**Leaves:** Leaves are alternate, egg-shaped (ovate), tapered to the tip, and covered with glandular hairs. May feel sticky when handled.



**Stems:** Mature plants are 10–90 cm tall, spreading, and freely branching. The stems are light green and round or slightly angular with glandular hairs.

**Roots:** No information available.

**Seedling:** The first true leaves of hairy nightshade have wavy edges and prominent veins. The leaves have numerous fine, short hairs, especially along the underside of the main vein (Calweed 1997).



### Similar Species

**Exotics:** Hairy nightshade is distinguishable from black nightshade (*Solanum americanum* var. *nodiflorum*) by the hairy appearance of its foliage and the covering calyx on top of the berry, which covers half of the fruit.

**Natives:** None known.

### Impacts

**Agricultural:** A common weed of disturbed habitats and cultivated fields. Berries frequently become mixed with agricultural crops, which decreases their quality. The plants produce a sticky substance that can clog agricultural equipment such as combine screens and rotors (Basset and Munro 1985). The plant contains

toxic alkaloids, especially in the berries, that can poison cattle, sheep, goats, pigs, ducks, and chickens (Basset and Munro 1985; Whitson et al. 1996).

**Ecological:** No information available.

**Human:** Berries are considered toxic.

### Habitat and Ecology

**General requirements:** In BC, found at low- to mid-elevations on dry to moderately dry sites on a variety of soils and climates. Commonly found on disturbed soils such as roadsides, rights-of-way, and overgrazed rangeland, as well as cultivated fields, flowerbeds, and vegetable gardens. Hairy nightshade has been found on sandy/gravelly soils to fertile cultivated soils but seems

to be adapted to soils that are high in nitrogen.

**Distribution:** Widely distributed in the US but infrequent in southern parts of BC (Douglas et al. 2000).

**Historical:** Introduced from South America.

**Life cycle:** Typically, hairy nightshade plants begin to



germinate in the spring and continue to germinate through the summer. Flowering begins by mid-June, and berries mature 4–5 weeks later. Full sunlight is needed for maximum flower initiation (Basset and Munro 1985).

**Mode of reproduction:** By seed.

**Seed production:** Capable of producing 2,500–5,000 seeds/plant (Basset and Munro 1985).

**Seed bank:** No information available.

**Dispersal:** Berries and seeds are dispersed by rodents, birds, livestock, and humans, and along watercourses.

**Hybridization:** Reported to be able to hybridize with other closely related nightshades (Basset and Munro 1985).

## Management

**Biocontrol:** None.

**Mechanical:** No information available.

**Fire:** No information available.

**Herbicides:** Post-emergence application of dicamba has been effective. Atrazine, cyanazine, or linuron will also manage small seedlings (Basset and Munro 1985). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Hand-pulling can be effective on small populations, especially before a seed bank develops, but it may take several years to accomplish eradication.

### Integrated Management Summary

Integrated management should focus on eliminating seed production and depleting the seed bank. Use mechanical or chemical methods to prevent seed production, and revise land management practices to ensure the maintenance of a vigorous perennial plant community.

## References

Basset, I. J., and D. B. Munro. 1985. The biology of Canadian weeds. 67. *Solanum ptycanthum* Dun., *S. nigrum* L. and *S. sarrachoides* Sendt. *Canadian Journal of Plant Science* 65: 401–414.

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# HEMP-NETTLE

## *Galeopsis tetrahit* L.

**Family:** *Lamiaceae* (Mint).

**Other Scientific Names:** None.

**Other Common Names:** Dog nettle.

**Legal Status:** Not categorized.

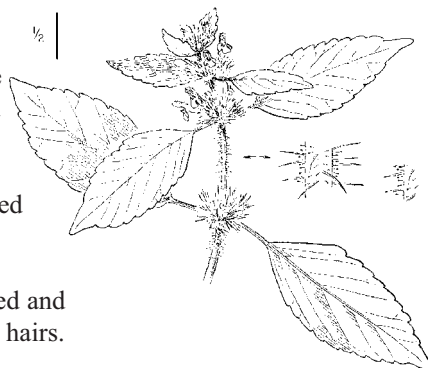
## Identification

**Growth form:** Annual forb.

**Flower:** Flowers occur in dense clusters from leaf axils. Flowers can be purple, pink, white, or pale yellow with dark markings (Douglas et al. 1999). Petals are fused into a tube with 2 lips. The sepals fuse to form a spine-tipped calyx that elongates as the fruit matures (Royer and Dickinson 1999).

**Seeds/Fruit:** Four clustered nutlets are produced from each flower. Nutlets are egg-shaped, 3–4 mm long, and smooth (Douglas et al. 1999).

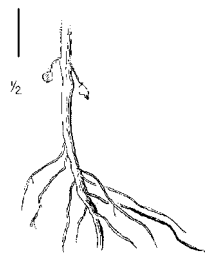
**Leaves:** Opposite leaves are stalked and egg-shaped and lance-like, and have large, rounded teeth and pointed tips. Leaves are prominently veined and covered in bristly hairs.



**Stems:** Branched stems grow 15–100 cm tall and are square with bristly hairs. Stems are swollen below the leaf nodes, where stiff, downward-pointing hairs are found (Royer and Dickinson 1999).

**Roots:** Fibrous taproot.

**Seedling:** Rounded cotyledons have a notch at the tip and 2 pointed lobes at the base. The first leaves are opposite, coarsely toothed, and prominently veined (Royer and Dickinson 1999).



### Similar Species

**Exotics:** Hemp-nettle has square stems like most of the mint family, but its prickly hairs, the spiny calyx, and swollen stems below the joints distinguish this plant from all others (Frankton and Mulligan 1970).

**Natives:** Same comment as for exotics.

## Impacts

**Agricultural:** Infests grain fields, canola, and pastures. It reduces yield and carrying capacity through competition with crops for nutrients and moisture. Its small seeds contaminate small grains and are difficult to remove. It acts as an alternate host for a potato fungus and several nematodes.

**Ecological:** Commonly grows in disturbed habitats such as roadsides, barnyards, and gardens but also is found in wooded areas and forest margins.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Hemp-nettle tolerates a wide range of temperatures and soil types but appears best adapted to moist soils. It is most abundant on moist, rich, black soils. In BC this weed is found in cultivated fields, pastures, roadsides, disturbed habitats, and open forests.

**Distribution:** Present in all agricultural reporting regions. It grows to the northern limits of agriculture in every Canadian province but is of greatest concern in parts of the Prairie provinces (Frankton and Mulligan 1970). Small populations are found in Washington, Idaho, and Montana (Royer and Dickinson 1999).

**Historical:** Introduced from Eurasia.

**Life cycle:** Seeds germinate in early spring after overwintering in the soil. Additional seeds can germinate throughout the growing season if conditions are favourable. Flowering occurs from July to September, depending on geographic location. Late-emerging seedlings may not mature because seeds often are shed before they mature.

**Mode of reproduction:** By seeds.

**Seed production:** A single plant can produce about 400 plants (O'Donovan and Sharma 1987).

**Seed bank:** Seeds can remain viable in the soil for several years (Royer and Dickinson 1999).

**Dispersal:** Primarily by wind and through agricultural operations such as seeding and harvesting. Seed can also be spread through contaminated crop seed and livestock feed.

**Hybridization:** Hemp-nettle is believed to be a hybrid of *Galeopsis pubescens* and *Galeopsis speciosa* (O'Donovan and Sharma 1987).

## Management

**Biocontrol:** None.

**Mechanical:** Spring cultivation can control seedlings as they emerge. Repeated cultivation of summerfallow or other non-seeded areas may reduce populations. Clip forages with hemp-nettle infestations before seed-set.

**Fire:** No information available.

**Herbicides:** Hemp-nettle is resistant to 2,4-D. A number of herbicides are registered for control or suppression of hemp-nettle in various crops. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Contaminated crop seed and livestock feed contribute to the dispersal of the plant.

Monitor feeding areas for new weeds. Clean equipment before leaving an infested site. Delayed seeding will allow early-growing seedlings to be removed by cultivation. Plant companion crops with slow-growing forage crops.

### Integrated Management Summary

A combination of tillage and spring applications of herbicides appears to be the most effective combination of treatments to control this weed. Preventive actions, such as cleaning equipment and farm machinery, will help reduce the spread of this weed.

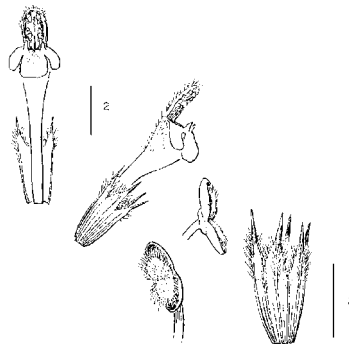
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# HOARY ALYSSUM

*Berteroa incana* (L.) DC.

**Family:** *Brassicaceae* (Mustard).

**Other Scientific Names:** None.

**Other Common Names:** None.

**Legal Status:** Regional Noxious: Kootenay-Boundary.



## Identification

### Growth form:

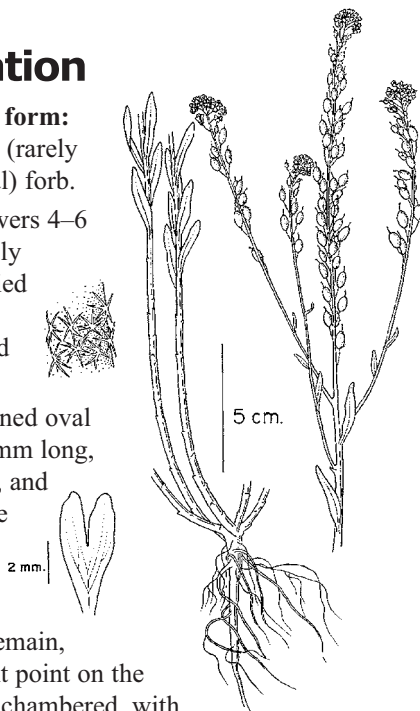
Biennial (rarely perennial) forb.

**Flower:** White flowers 4–6 mm long with deeply notched petals carried on slender stalks.

Sepals are hairy and soon drop off.

**Seeds/Fruit:** Flattened oval seed pods are 5–8 mm long, have star-like hairs, and are held close to the stem (BC Ministry of Agriculture, Food and Fisheries

1998). The styles remain, making a prominent point on the tips. Seed pods are chambered, with each chamber containing 3–7 seeds. Seeds, 2–3 mm long, are aligned in rows in the chambers (Douglas et al. 1998).

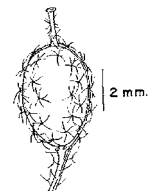
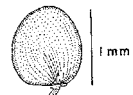


**Leaves:** All leaves are grey with star-shaped hairs. Basal leaves are 3–5 cm long with slender stalks. Stem leaves face upward, pressed close to the stem. Lower stem leaves have short stalks, but stalks are lacking higher on the stem.

**Stems:** Erect and branched, 0.3–1.1 m tall, and covered with star-shaped hairs.

**Roots:** Slender taproot.

**Seedling:** No information available.



### Similar Species

**Exotics:** Pale alyssum (*Alyssum alyssoides*), desert alyssum (*Alyssum desertorum*), and wall alyssum (*Alyssum murale*) resemble hoary alyssum, but they are smaller plants with much smaller seed pods (at most 4 mm long) that carry only 1–2 seeds/chamber. Wall alyssum and desert alyssum have yellow flowers. Hoary alyssum is also similar to false flaxes (*Camelina* sp.) but differs in having pods on erect stems that touch, or nearly touch, the stem (Frankton and Mulligan 1970).

**Natives:** None similar.

## Impacts

**Agricultural:** Tends to increase in forage crops following drought or winterkill. Horses consuming this plant may be troubled with fever, limb edema, and laminitis.

**Ecological:** Establishes in dry, disturbed habitats, such as roadsides and railway embankments.

**Human:** None known.

## Habitat and Ecology

**General requirements:** Most common on dry sandy or gravelly soils. Grows on meadows, pastures, hayfields, dry fields, roadsides, embankments, and other disturbed habitats.

**Distribution:** Present in south-central and southeastern

BC in the Okanagan, Thompson, and Kootenay agricultural regions. Present across southern Canada.

**Historical:** Introduced from Eurasia.

**Life cycle:** Can behave as an annual, biennial, or perennial. The plant emerges in early spring and

continues to flower and produce seed until frost. Flowering period is from June to September. Perennial form overwinters as a rosette.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** None known.

## Management

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**Biocontrol:** No agent available.

**Mechanical:** Small populations are killed by hand-pulling or hoeing. Mowing can prevent seed production.

**Fire:** No information available.

**Herbicides:** Most commonly 2,4-D is used, but dicamba and glyphosate also are effective. Apply in spring or autumn to actively growing plants. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Grazing or crop management should aim to promote a healthy and competitive forage stand to resist invasion.

### Integrated Management Summary

Early detection is important to prevent large infestations. Hand-pull plants before they mature in order to prevent seed-set and establishment of a seed bank. Apply herbicides to control seedlings and mature plants. Seed disturbed areas to perennial grasses and forbs to provide cover and competition against this weed.

## References

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Frankton, C., and G. A. Mulligan. 1970. Weeds of Canada. Publication 948. Ottawa: Canada Department of Agriculture.



# HOARY CRESS

## *Cardaria draba* (L.) Desv.

**Family:** *Brassicaceae* (Mustard).

**Other Scientific Names:** None.

**Other Common Names:** Whitetop, heart-podded hoary cress, pepperweed.

**Legal Status:** Regional Noxious: Columbia-Shuswap, North Okanagan, Thompson-Nicola.



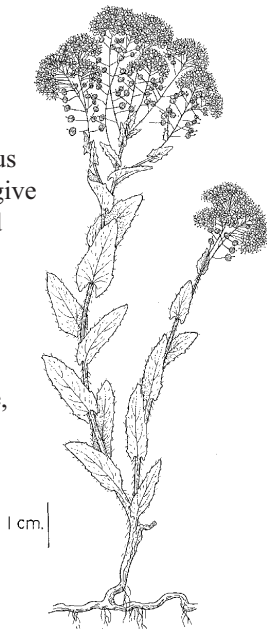
### Identification

**Growth form:**  
Perennial forb.

**Flower:** Numerous white flowers with 4 petals give the plant a white, flat-topped appearance.

**Seeds/Fruit:** Seed capsules are heart-shaped and contain 2 reddish brown seeds.

**Leaves:** Leaves are alternate, 4–10 cm long, blue-green in colour, and lance-shaped. Lower leaves are stalked, while the upper leaves have 2 lobes clasping the stem.



**Stems:** Mature hoary cress plants are up to 50 cm tall with erect stems.

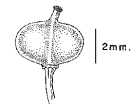
**Roots:** Roots are rhizomatous and usually occur at a depth of 75–80 cm but have been recorded to penetrate to 9 m in the US Pacific Northwest (FEIS 1996).

**Seedling:** No information available.

### Similar Species

**Exotics:** Globe-pod hoary cress (*Cardaria pubescens*) is infrequent in south-central BC (Douglas et al. 1998). Perennial pepperweed (*Lepidium latifolium*) is a regional noxious weed in the province.

**Natives:** Rosettes of gumweed (*Grindelia squarrosa*) are similar and found in similar habitats.



## Impacts

**Agricultural:** Generally considered unpalatable to livestock. Often spread as a contaminant of alfalfa hay.

**Ecological:** Once established, hoary cress is a highly competitive weed and spreads primarily by roots. It can

be highly competitive with native vegetation on rangelands.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Hoary cress grows at low- to mid-elevations on the coast and in the Interior grassland and forest regions of BC, where it is found on dry roadsides, fields, and disturbed habitats (Douglas et al. 1998). It is typically found on open, unshaded, disturbed ground. Hoary cress grows well on alkaline soils that are wet in late spring and does better in areas with moderate amounts of rainfall. Outside BC, it is widespread in fields, disturbed habitats, meadows, pastures, and croplands, and along roadsides (FEIS 1996).

**Distribution:** Hoary cress is infrequent in southern BC (Douglas et al. 1998), but is considered a major concern in the Okanagan and Thompson agricultural reporting regions and is present in the Kootenay and Cariboo. It is widespread in the US except along the southern boundary of the western and south-central states (USDA 1971).

**Historical:** Introduced from Eurasia.

**Life cycle:** The root system of hoary cress consists of vertical and horizontal roots from which new rosettes and flowering shoots arise (Mulligan and Findlay 1974).

Plants emerge in very early spring. The first leaves appear above ground 5–6 weeks after planting (Mulligan and Findlay 1974; FEIS 1996). During this period, the first leaves emerge and form a loose rosette (Mulligan and Findlay 1974; FEIS 1996). Stems arise from the centre of each rosette in late spring (FEIS 1996). Plants flower from May to June and are pollinated by insects. Hoary cress plants set seed by midsummer (Whitson et al. 1996). If conditions are favourable, a second crop of seeds can be produced in the autumn (Sheley and Stivers 1999). When unimpeded by competition from other plants, a single plant can spread over a 3.5 m<sup>2</sup> area in one year (FEIS 1996).

## Management

**Biocontrol:** None. Sheep grazing may manage hoary cress.

**Mechanical:** Mowing 2–3 times a year for several years may slow the spread and reduce seed production. Mowing should be conducted during the bud stage and repeated when the plants re-bud.

**Fire:** Fire may enhance hoary cress populations by setting back other vegetation because the plant rapidly re-sprouts from rhizomes or establishes from seeds (FEIS 1996).

**Herbicides:** Spring applications of metsulfuron-methyl and chlorsulfuron have been effective in the US when the plants still have green tissue (CSU 1998). It is important to use a non-ionic surfactant with the herbicide (Sheley and Stivers 1999). A combination of 2,4-D and dicamba can also be effective when applied during the early pre-bud stage (CSU 1998). Glyphosate, applied during the flower stage, will provide good control of hoary cress. Picloram does not control hoary cress. Multiple herbicide applications are usually needed to provide lasting control. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** One plant can produce 1,200–4,800 seeds.

**Seed bank:** 84% of seed produced are viable the first season (Mulligan and Findlay 1974; FEIS 1996). Buried seeds can remain viable for 3 years (Sheley and Stivers 1999).

**Dispersal:** No information available.

**Hybridization:** No information available.

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Cultivation alone will manage hoary cress when tillage begins at flower bud stage and is repeated every 10 days throughout the growing season (FEIS 1996). Also, nitrogen fertilization can increase the growth of grasses and slow the rate of hoary cress invasion (Sheley and Stivers 1999).

### Integrated Management Summary

Hoary cress is usually managed with herbicides and less commonly by mowing. Management is difficult because of the plant's deep rhizomatous root system, abundant seed production, and the diversity of habitats in which it can survive (FEIS 1996). Mowing may increase the effectiveness of subsequent herbicide application (Sheley and Stivers 1999) and may be even more effective if sites are seeded to perennial grasses.

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Sheley, R. L., and J. Stivers. 1999. Whitetop. In R. L. Sheley and J. K. Petroff, eds. *Biology and Management of Noxious Rangeland Weeds*. Corvallis: Oregon State University Press.

US Department of Agriculture, Agricultural Research Service. 1971. *Common Weeds of the United States*. New York: Dover Publications.

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# HOUND'S-TONGUE

## *Cynoglossum officinale* L.

**Family:** *Boraginaceae* (Borage).

**Other Scientific Names:** None.

**Other Common Names:** Dog bur, gypsy flower.

**Legal Status:** Provincial Noxious.



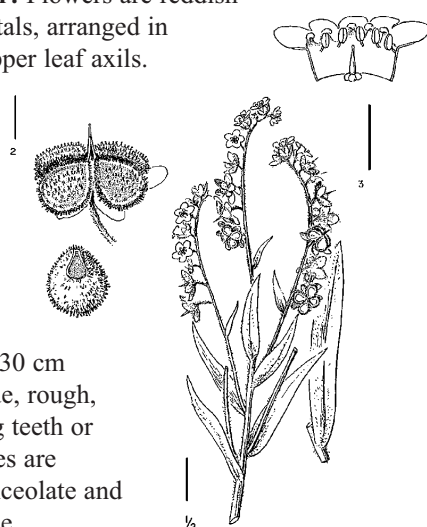
## Identification

**Growth form:** Biennial or short-lived perennial forb.

**Flower:** Flowers are reddish purple, with 5 petals, arranged in panicles in the upper leaf axils.

**Seeds/Fruit:** The fruit is composed of 4 nutlets, each about 7 mm long (Powell et al. 1994).

**Leaves:** Leaves are alternate, 10–30 cm long, 2–5 cm wide, rough, hairy, and lacking teeth or lobes. Basal leaves are elliptical to oblanceolate and tapered at the base.



**Stems:** The plant may produce a single flowering stem or multiple stems/plant. The stem is erect, 0.3–1.2 m tall, and usually branched above.

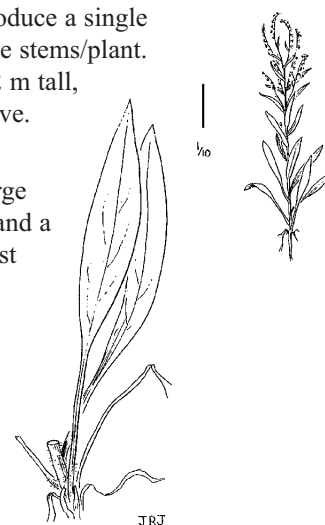
**Roots:** A woody taproot.

**Seedling:** Seedlings emerge both spring and autumn, and a rosette develops in the first year.

### Similar Species

**Exotics:** None.

**Natives:** Northern hound's-tongue. Infrequent in BC, occurring in forest openings in the lower montane zone (Douglas et al. 1998).



## Impacts

**Agricultural:** Hound's-tongue on rangeland and pasture decreases forage available to grazing animals. The barbed seeds readily cling to hair, wool, and fur of animals. This can result in reduced sale value, stress on animals, and veterinary costs if the burrs cause eye irritation (Upadhyaya et al. 1988). The plant contains toxic alkaloids that stop liver cells from reproducing. Animals may live 6 or more months after eating a lethal dose. Plants have proven a problem in infested

hay, but standing plants are seldom grazed. Sheep are more resistant to hound's-tongue poisoning than cattle or horses.

**Ecological:** Hound's-tongue is an early successional species, but its impacts on biodiversity and forage production on rangelands have not been documented.

**Human:** Not recommended for human consumption, although medicinal properties are purported.

## Habitat and Ecology

**General requirements:** Hound's-tongue grows from grasslands to low- and mid-elevation forests in BC. It is associated with soil disturbance on dry sites on

pastures, roadsides, and logged-over forestland (Powell et al. 1994). It appears adapted to areas with alkaline soils (Stubbendieck et al. 1995).

**Distribution:** Occurs primarily in the southern Interior. It is considered a major concern in the Kootenay, Okanagan, Thompson, and Cariboo agricultural reporting areas. It is widely distributed in the US, where it grows on rangeland, pastures, abandoned cropland, roadsides, and disturbed habitats (Butterfield et al. 1996).

**Historical:** Introduced from Eurasia, likely as a contaminant in seed.

**Life cycle:** A biennial or short-lived perennial that produces a rosette during the first year. During the second year (or subsequent years), the plant bolts and produces seeds.

**Mode of reproduction:** By seed.

**Seed production:** Mature plants can produce up to 2,000–4,000 seeds annually (Powell et al. 1994).

**Seed bank:** Seeds remaining on the parent plant may remain viable for 2–3 years. Buried seed rarely survive more than a year (Butterfield et al. 1996).

**Dispersal:** Seeds attach to clothing, livestock, and wildlife and can easily be spread great distances.

**Hybridization:** No information available.

## Management

**Biocontrol:** *Mogulones cruciger* (weevil) was released in BC in 1998, and preliminary results indicate the insect is having a significant impact on hound's-tongue. Research continues on other specialized insects as well. Two indigenous diseases, *Erysiphe cynoglossi* and *Phoma pomorum*, cause a mildew and brown lesions on the leaves, respectively.

**Mechanical:** Mowing plants before seed-set reduces the seed production and may kill the plant.

**Fire:** No information available.

**Herbicides:** In BC, excellent long-term control is achieved with picloram applied in spring, summer, or autumn. Dicamba provides good control applied either spring or autumn (Upadhaya and Cranston 1991). Spring applications of picloram, dicamba, and metsulfuron-methyl have been more effective than autumn treatments in the US (Sebastian and Beck 1995). Glyphosate also controls actively growing plants. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Hand-pulling can be effective for small populations and especially before the plant sets seed. Clean cattle, horses, dogs, and yourself before moving from a hound's-tongue-infested area. Check vehicle for seeds.

### Integrated Management Summary

Hound's-tongue can quickly form dense stands on disturbed areas. Treat first-year plants with herbicides, or hand-pull plants. Mow bolted plants to eliminate seed production. Repeat this process to exhaust the seed bank. Ensure that areas where livestock congregate (such as corrals and gates) are weed-free, especially when the weed is in seed-set. Manage livestock to maintain a vigorous population of perennial plants to provide ground cover. Check people, vehicles, and dogs for seeds before you leave an infested area.

## References

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# JOINTED GOATGRASS

## *Aegilops cylindrica* Host

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** *Cylindropyrum cylindricum*.

**Other Common Names:** Jointgrass.

**Legal Status:** Provincial Noxious.



### Identification

**Growth form:**  
Winter annual.

**Flower:**

The seed head is 5–10 cm long with 5–10 spikelets (joints)/head.

**Seeds/Fruit:**

Spikelets are 1.0 cm long with 1–3 viable seeds. At maturity, spikelets separate with a segment of the stem still attached (Whitson et al. 1996).

**Leaves:** Leaves are alternate, simple, with a



flap-like appendage (auricle) at the base, and a leaf blade 40–65 mm wide, with hairs.

**Stems:** Mature plants are generally 35–75 cm tall with one to many tillers.

**Roots:** Short fibrous root system.

**Seedling:** No information available.

**Similar Species**

**Exotics:** Similar in appearance to winter wheat (*Triticum aestivum*).

**Natives:** None known.



### Impacts

**Agricultural:** Jointed goatgrass has become a very serious weed in winter wheat and other cereal crops. Its genetic similarity and similar growth characteristics to winter wheat make it very difficult to manage without adversely harming crop production. It also infests rangeland surrounding wheat-growing areas throughout

the western US (Morishita 1998), but is not known as a problem in BC.

**Ecological:** No information available.

**Human:** No information available.

### Habitat and Ecology

**General requirements:** Grows on both cultivated lands and rangelands. It is adapted to areas where annual rainfall ranges from 60 to 125 cm.

**Distribution:** This plant is not currently known in BC but is found throughout the western US (Lyon 1998) at elevations up to 1,800 m (including northern Idaho).

**Historical:** Possibly introduced from Turkey in contaminated wheat.

**Life cycle:** Flowers in early to mid-June, depending on geographic location. Some seeds germinate immediately after they are shed, but others can persist in the soil for years (Lyon 1998). Seeds usually

germinate from early August through October, but they can also germinate in late spring and still mature if temperatures are low enough.

**Mode of reproduction:** By seed.

**Seed production:** A single plant can produce up to 100 spikes, 1,500 spikelets or joints, and up to 3,000 seeds (Lyon 1998).

**Seed bank:** Soil moisture plays an important role in seed viability and dormancy, but seeds rarely remain viable in the soil for over 5 years (Morishita 1998).

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

**Biocontrol:** None.

**Mechanical:** Mowing can be effective if plants are cut after flowering but before the seeds mature (Stahlman 1998).

**Fire:** Fire can be an effective control under some circumstances but soil surface temperature must exceed 95°C for at least 60 seconds (Stahlman 1998). Fire has been most effective in controlling jointed goatgrass as a post-harvest treatment on winter wheat stubble in Washington State but has been less successful as a spring treatment (Stahlman 1998).

**Herbicides:** No herbicide will selectively manage jointed goatgrass in winter wheat because the 2 species are so closely related genetically. Various combinations of atrazine, hexazinone, metribuzin, or diuron have been effective in the US (Stahlman 1998) when fields are in fallow. Jointed goatgrass is usually best managed when plants are less than 10 cm tall. Applications of glyphosate at various rates have also been effective, especially when the plant is under 6 cm tall (Beck et al. 1995).

Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Management should aim to prevent the introduction of seed in the soil seed bank and to deplete viable seed in soil (Stahlman 1998). Jointed goatgrass seeds are difficult to distinguish from wheat and are often spread by being planted with wheat or by uncleaned combines. Spread can be minimized by sowing jointed goatgrass-free seed wheat, covering trucks transporting contaminated grain, thoroughly cleaning machinery before moving from infested to non-infested areas, processing contaminated grain before feeding to livestock, and not baling or transporting contaminated straw to non-infested areas (Stahlman 1998).

### Integrated Management Summary

An integrated management strategy should focus on preventing the establishment of new infestations in susceptible areas and depleting the soil seed bank.

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# KOCHIA

## *Kochia scoparia* (L.) Schrad.

**Family:** *Chenopodiaceae* (Goosefoot).

**Other Scientific Names:** None.

**Other Common Names:** Summer cypress, burning bush, fireweed.

**Legal Status:** Regional Noxious: Peace River.



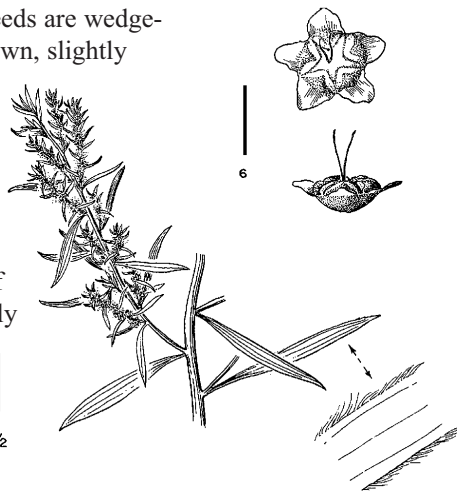
## Identification

**Growth form:** Annual forb.

**Flower:** Flowers are inconspicuous, stalkless in the axils of upper leaves, and form short, dense, bracted spikes (Whitson et al. 1996).

**Seeds/Fruit:** Seeds are wedge-shaped, dull brown, slightly ribbed.

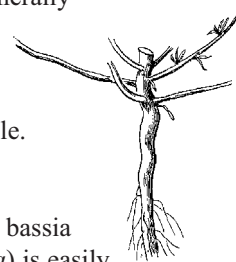
**Leaves:** Leaves are 2–6 cm long, alternate, and lance-shaped. The upper surface of the leaf is usually smooth, while the lower surface is covered with soft hairs.



**Stems:** Mature plants are 0.3–1.5 m tall with numerous branches. Stems are erect and simple to branched, and often form pyramidal or rounded tops. Stems are usually hairy but are occasionally smooth.

**Roots:** Taproots generally penetrate to depths of 2.0–2.4 m.

**Seedling:** No information available.



### Similar Species

**Exotics:** Five-hook bassia (*Bassia hyssopifolia*) is easily distinguished from kochia by the 5 hooked structures on each seed. This plant is infrequent in south-central and southeast BC (Douglas et al. 1998).

**Natives:** None known.

JRJ

## Impacts

**Agricultural:** Although palatable to livestock, kochia sometimes contains high nitrate levels and sulphate toxicity (Whitson et al. 1996).

**Ecological:** Colonizes rapidly and may suppress other vegetation. An early successional plant on disturbed

sites and can dominate vegetation for the first 2 years following disturbance (FEIS 1996). Kochia may spread into undisturbed sites when growing conditions are ideal.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Locally common in dry areas of the Interior in roadsides, ditches, and disturbed habitats (Parish et al. 1996), kochia is generally found in open, unshaded areas on disturbed sites. It grows on a variety of soil types and is often found on saline/alkaline soils (FEIS 1996). Kochia can also be found in grasslands, mixed-grass prairie, shortgrass

prairie, flood plains, riparian areas, sagebrush, and desert shrub communities.

**Distribution:** Frequent in south-central BC but rare in southwestern and northwestern regions (Douglas et al. 1998). It is present in the Kootenay, Okanagan, and Thompson agricultural reporting regions but is considered a major concern only to the Peace River. It



is found in all but some of the Atlantic provinces and is widespread in the western US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Seedlings emerge early in the spring. Flowering and seed production may occur from July to October. Kochia appears very responsive to elevated soil nitrogen levels. It often grows vigorously for 1–2 years in abandoned fields until nitrogen is depleted. Kochia is rarely a problem in vigorous stands of perennial grasses.

**Mode of reproduction:** By seed.

**Seed production:** Seed production can vary widely among individual plants from 5 seeds/plant to over 50,000 seeds/plant. Typically, a single plant will produce about 14,600 seeds/year.

**Seed bank:** Seeds are not persistent in the seed bank and decay in one year (FEIS 1996).

**Dispersal:** Primarily by breaking off at the stem and tumbling.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Grazing or mowing alone will not manage kochia or stop seed production (FEIS 1996). Small infestations can be pulled by hand.

**Fire:** No information available.

**Herbicides:** Spring applications of dicamba, glyphosate, and a combination of metsulfuron-methyl and dicamba have been effective for management in the US (Whitson et al. 1996). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Minimize disturbance and seed

dispersal, eliminate seed production, and maintain vigorous perennial plant communities. Seed disturbed areas to perennial grass to promote competition.

### Integrated Management Summary

Integrated management should focus on eliminating seed production and depleting the seed bank. Combine herbicide or mechanical removal of rosettes with removal of seed heads from any plants that have bolted. Seed disturbed areas to perennial grasses.

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# LADY'S-THUMB

## *Polygonum persicaria* L.

**Family:** *Polygonaceae* (Buckwheat).

**Other Scientific Names:** *P. maculata*, *P. vulgaris*.

**Other Common Names:** Spotted knotweed.

**Legal Status:** Not categorized.



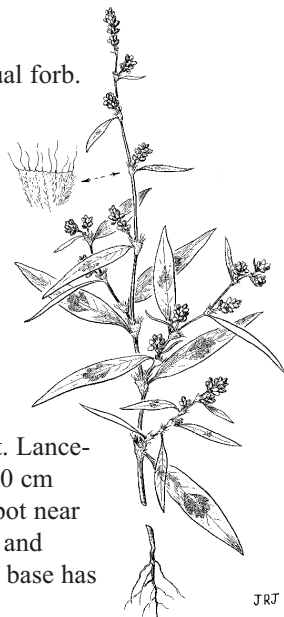
### Identification

**Growth form:** Annual forb.

**Flower:** Flowers are pink or purplish and are carried in crowded, rounded, spike-like clusters at the ends of the stems or from the leaf axils.

**Seeds/Fruit:** Seeds are black, shiny, smooth, and 2–3 mm long. They are either 3-sided or lens-shaped.

**Leaves:** Basal leaves are absent. Lance-shaped leaves are alternate, 3–10 cm long, and usually have a dark spot near the middle. The stalks are short and thick and a papery sheath at the base has long hairs.



**Stems:** Stems are much branched and can be prostrate or erect, 0.2–1.0 m long.

**Roots:** Taproot.

**Seedling:** Smartweeds (lady's-thumb) and knotweed (*Polygonums*) have a papery sheath where the leaf joins the stem.

### Similar Species

**Exotics:** Green smartweed (*Polygonum lapathifolium*) also has the distinctive dark blotch on the leaves, but it has white flowers and sticky yellow hairs on the underside of the leaf and lacks long, bristly hairs on the leaf sheath.

**Natives:** Forms of lady's-thumb that lack the typical dark blotch can be confused with water-pepper (*Polygonum hydropiperoides*). Water-pepper has rhizomes and the flowers are carried in slender racemes.



### Impacts

**Agricultural:** A common weed of cereals, oilseeds, vegetables, berries, and forages. It competes with crops, causing yield reductions. Smartweeds (lady's-thumb) can delay harvesting since the large, succulent plants are slow to dry.

**Ecological:** Occurs along roadsides and ditches and in disturbed areas, especially where moist or shady. Sometimes found in riparian areas, such as in moist meadows and along lake or pond shorelines.

**Human:** No information available.

### Habitat and Ecology

**General requirements:** Found along roadsides and ditches, on cultivated land, and in disturbed areas.

**Distribution:** Present in all agricultural regions but most common in southwestern BC, becoming less frequent in northern regions (Douglas et al. 1999). Common throughout southern Canada and the northern US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Overwinters as seed. Germinates in spring and completes its life cycle in one season.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** Small seeds can be carried by water or wind. Seeds carried in mud can be carried on vehicles and equipment. Contaminated crop seed disperses the weed over long distances.

**Hybridization:** Not known.

## Management

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**Biocontrol:** None.

**Mechanical:** Hand-hoeing or harrowing can kill young plants. Repeated cultivation will stop emerging plants from setting seed and will eventually exhaust the seed bank. Frequent mowing in pastures and meadows will prevent seed-set.

**Fire:** Not known to control lady's-thumb.

**Herbicides:** There are many herbicides registered for control, depending on crop. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Use clean, high-quality seed. Clean vehicles and equipment before leaving an infested area. Keep forage crops and pastures in a competitive state. Minimize disturbance to riparian

areas where control options are limited. Monitor these areas and remove new outbreaks by hand-pulling.

### Integrated Management Summary

Early detection is important because this plant has a limited distribution in BC. Hand-pull plants and remove plant material from the site before a seed bank can establish. Apply appropriate herbicides on new infestations to prevent seed-set and dispersal. Seed disturbed areas to perennial grasses and forbs to provide cover and competition against lady's-thumb. Manage grazing animals to maintain perennial plant communities.

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# LAMB'S-QUARTERS

## *Chenopodium album* L.

**Family:** *Chenopodiaceae* (Goosefoot).

**Other Scientific Names:** *Chenopodium strictum* spp. *glaucophyllum*.

**Other Common Names:** Pigweed.

**Legal Status:** Not categorized.



### Identification

**Growth form:** Annual forb.

**Flower:** The inflorescences are dense clusters found at the stem tips or in the leaf axils. The inconspicuous flowers are small and greenish and lack petals. Flowering time is May through September.

**Seeds/Fruit:** Black, shiny, flattened seeds are surrounded by a papery envelope, 1.0–1.5 mm broad (Douglas et al. 1998).

**Leaves:** Leaves can vary from narrow with entire margins to wedge-shaped with toothed or lobed margins (BC Ministry of Agriculture and Fisheries 1987). The somewhat succulent leaves are alternate, stalked, and 3–10 cm long. The leaf undersides are pale or purplish in colour with fine, greyish mealy particles that can be rubbed off.



**Stems:** Each plant has a single, much-branched stem that can grow 0.2–2.0 m tall. The grooved stems are bluish and become blotched with red or purple with age.

**Roots:** Short, much-branched taproot.

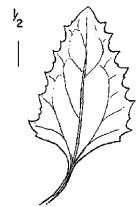
**Seedling:** The cotyledons are up to 15 mm long and are rounded and fleshy and have pinkish undersides. The first leaves are opposite and egg-shaped, but later leaves are alternate (Royer and Dickinson 1999).



### Similar Species

**Exotics:** Oak-leaved goosefoot (*Chenopodium glaucum*) has a prostrate or spreading growth form and has smaller leaves (1–3 cm long).

**Natives:** Leaves of maple-leaved goosefoot (*Chenopodium hybridum*) are thinner and resemble maple leaves. Various species of orache (*Atriplex* sp.) resemble the *Chenopodiums* but can be distinguished by having at least some pairs of opposite leaves.



### Impacts

**Agricultural:** One of the most abundant weeds of agronomic, horticultural, and vegetable crops. Its tall stature and high water consumption allow it to out-compete crops and seriously reduce yield. It is palatable to livestock when young, but, under very fertile conditions, it can cause nitrate poisoning to sheep and swine.

**Ecological:** This weed invades disturbed habitats such as roadsides and abandoned fields and is common on logged-over lands, especially on burned slash-piles. It does not usually invade native plant communities.

**Human:** Airborne pollen causes hay fever. Leaves, shoots, and seeds are consumed by humans. An extract of the leaves is used to treat internal parasites.

## Habitat and Ecology

**General requirements:** The plant tolerates a wide range of environmental conditions but requires sunlight and well-drained soils. It is often associated with sandy or gravelly soils, such as a gravel pit. It is most abundant on cultivated, calcareous soils. In BC, it is found in cultivated crops, gardens, fields, roadsides, and disturbed places.

**Distribution:** Common in all agricultural reporting regions of the province and found throughout Canada and the US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Lamb's-quarters is a summer annual. Seeds overwinter under the soil, then germinate, flower, and set seed before killing frost in the autumn. Seedlings can emerge from May until September, and flowering can occur from May to October. Both dormant and

non-dormant seeds are produced and more dormant seeds are produced early in the season when the days are long. Seeds are more likely to remain dormant under drought or shaded conditions (Bassett and Crompton 1978).

**Mode of reproduction:** By seed.

**Seed production:** About 72,000 seeds are produced on an average-sized plant.

**Seed bank:** Seeds can remain viable in the seed bank for nearly 40 years,

**Dispersal:** Most seeds drop beside the parent plants. Birds and livestock consume and spread the seeds. Agricultural practices, road building, and moving gravels and ballast also disperse seeds.

**Hybridization:** No evidence of hybridization.

## Management

**Biocontrol:** None, although many insects, microorganisms, and viruses attack lamb's-quarters.

**Mechanical:** This weed is highly susceptible to cutting or trampling, especially during early stages of growth (Bassett and Crompton 1978). Mowing can be effective if applied before plants flower. Emergence is not reduced by initial tillage in the spring because this species germinates throughout the growing season. Repeated tillage is required to destroy seedlings, prevent seed-set, and deplete the seed bank.

**Fire:** Fire does not affect the large seed bank.

**Herbicides:** Lamb's-quarters is susceptible to many commonly used herbicides. Some populations of the weed are resistant to the triazine group of herbicides (e.g., atrazine). Herbicides are most effective during early growth stages. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** In natural areas, minimize disturbance, graze native plants moderately, and seed disturbed areas to perennial grasses to maintain competitive forage growth. Grazing the weed, especially early in the season, will prevent seed production and crop-yield losses (note caution re: potential for nitrate toxicity of young, fertile plants).

### Integrated Management Summary

Lamb's-quarters requires disturbed, open habitats to grow. Maintaining vigorous perennial stands will prevent establishment. The plant can be managed with mowing, grazing, or herbicides.

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# LEAFY SPURGE

## *Euphorbia esula* L.

**Family:** *Euphorbiaceae* (Spurge).

**Other Scientific Names:** *Euphorbia virgata*.

**Other Common Names:** None.

**Legal Status:** Provincial Noxious.



## Identification

**Growth form:** Perennial forb.

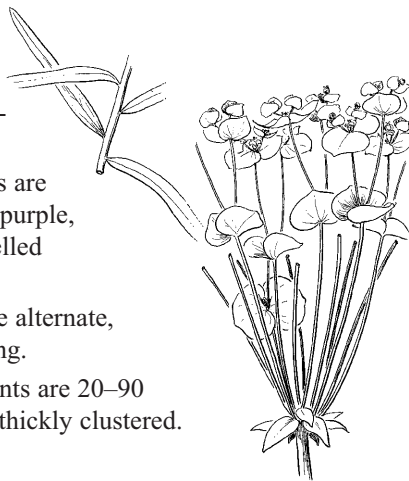
**Flower:** Flowers are yellowish green, small, arranged in numerous small clusters with

distinctive paired bracts underneath. Bracts are heart shaped and yellow-green.

**Seeds/Fruit:** Seeds are oblong, greyish to purple, contained in a 3-celled capsule.

**Leaves:** Leaves are alternate, narrow, 2–6 cm long.

**Stems:** Mature plants are 20–90 cm tall. Stems are thickly clustered.



**Roots:** Extensive lateral root system.

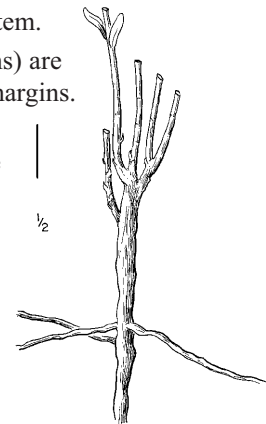
**Seedling:** Seed leaves (cotyledons) are linear to lanceolate, with entire margins.

**Other:** The entire plant contains white, milky latex. Foliage of the plant is smooth and hairless.

### Similar Species

**Exotics:** Six species of spurge occur in BC, all introduced (Douglas et al. 1999).

**Natives:** None.



## Impacts

**Agricultural:** Invades rangeland and reduces its productivity for livestock and wildlife (Lajeunesse et al. 1999).

**Ecological:** Leafy spurge is a long-lived perennial that reproduces by seeds and buds on persistent, creeping roots (Powell et al. 1994). All parts of the plant contain a milky latex that is poisonous to some livestock. The

plant produces an allelopathic compound that inhibits the growth of other plants (Butterfield et al. 1996).

**Human:** The milky latex can cause irritation, blotching, blisters, and swelling. Wear gloves while pulling or contacting this plant. Never rub the eyes or face until after the hands are thoroughly washed.

## Habitat and Ecology

**General requirements:** In BC, grows at low- to mid-elevations on dry roadsides, fields, grasslands, open forests, and disturbed habitats. Leafy spurge has a wide range of ecological tolerances from very dry to very wet but appears best adapted to semi-arid areas (Butterfield et al. 1996). It grows on a range of soil types but is most abundant in coarse-textured soils and least abundant on clayey soils (Butterfield et al. 1996).

**Distribution:** Isolated pockets occur in the Thompson, Cariboo, Boundary, East Kootenay, Nechako, and North Okanagan areas (Powell et al. 1994). It is considered a major concern in the Kootenay, Okanagan, Thompson, Cariboo, and Omineca agricultural reporting regions. It is widespread throughout Canada and the western US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Emerges in the spring and develops flowers within 1–2 weeks after stem elongation (Butterfield et al. 1996). Flower clusters have 8–16 branches. Flowering generally ends in late June to mid-July, depending on geographic location. Three seeds are produced per cluster (Powell et al. 1994). Seeds mature about 30 days following pollination.

**Mode of reproduction:** By seed but primarily from lateral roots. Roots can extend nearly 4.5 m laterally and about 9 m deep, with up to 300 buds forming on the roots (Butterfield et al. 1996).

## Management

**Biocontrol:** Seven biocontrol agents have been released in the province: *Aphthona nigriscutis*, *A. cyparissiae*, *A. czwalinae*, *A. lacertosa*, *A. flava* (flea-beetles), *Hyles euphorbiae* (moth), and *Lobesia euphorbiana* (moth). Thus far, *Aphthona nigriscutis* has had the most significant impact, although other *Aphthona* species have been successful in selected habitats. Sheep-grazing has been successfully used to manage spurge on ranches in Montana: once the sheep were removed, the spurge would quickly return (Biesboer 1998). There are likely few opportunities for this kind of management in BC.

**Mechanical:** Tillage, mowing, and pulling are generally ineffective control treatments because of the plant's extensive root system.

**Fire:** Burning alone is unlikely to provide adequate control because of the extensive root system.

**Herbicides:** Picloram has been used successfully on small infestations (Lajeunesse et al. 1999). Spring applications of a combination of picloram and 2,4-D also were effective when the herbicide was applied before flowers emerged (Beck 1996). Similarly, annual applications of dicamba and 2,4-D in combination have also provided good management (Beck 1996). Beck (1996) found that applications of glyphosate were effective when applied at one-month intervals and

**Seed production:** A large plant may produce up to 130,000 seeds (Rutledge and McLendon. Undated).

**Seed bank:** Seeds can remain viable in the soil 5–8 years, although most seeds will germinate in the first 2 years (Butterfield et al. 1996).

**Dispersal:** Mature seeds can be dispersed up to 4.5 m from the parent plant. Seeds float on water and can be transported by animals and remain in flooded seed banks.

**Hybridization:** No information available.

followed by autumn grass seeding. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Cultural methods such as hand-pulling, mowing, and cutting are not likely to have much success in controlling leafy spurge. Protect disturbed areas by seeding to perennial grasses. Ensure that grazing maintains vigorous perennial plant communities.

### Integrated Management Summary

Integrated management will require a combination of prevention, biocontrol, chemical control, and seeding disturbed areas to perennial grasses. Where infestations are large, the only likely long-term management strategy will be biocontrol, at least initially. Seeding and good land management practices must follow.

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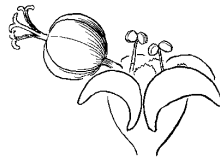
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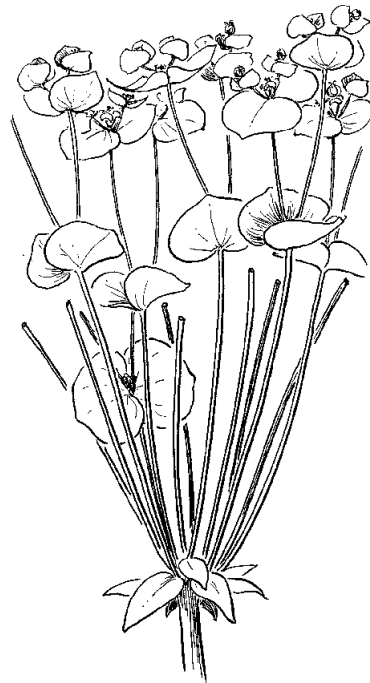
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# MARSH PLUME THISTLE

*Cirsium palustre* (L.) Scop.

**Family:** Asteraceae (Sunflower)

**Other Scientific Names:** None.

**Other Common Names:** Marsh thistle.

**Legal Status:** Regional Noxious: Bulkley-Nechako, Fraser-Fort George.



## Identification

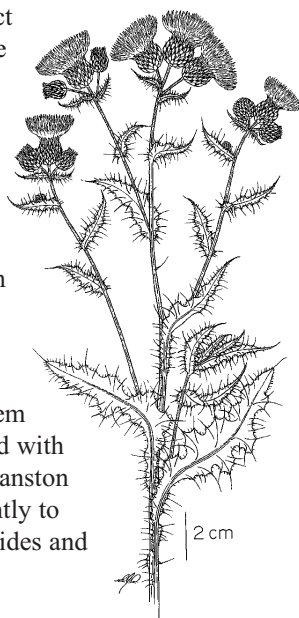
**Growth form:** Biennial forb.

**Flower:** Compact clusters of purple

flowers form at the tip of the stems. Bracts at the base of the flowers are sticky and tipped with a long spine.

**Seeds/Fruit:** Seeds are straw-coloured, 2.5–3.5 mm long, with a 9–10 mm long tawny pappus (Douglas et al. 1998).

**Leaves:** Spiny basal and stem leaves are deeply segmented with prominent woody veins (Cranston et al. 2000). Leaves are lightly to densely hairy on the undersides and have winged bases.



**Stems:** Slender, erect stems are usually unbranched and grow 0.3–2.0 m tall. Stems have spiny wings arising from the winged leaf-bases.

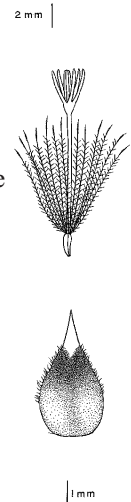
**Roots:** Fibrous.

**Seedling:** No information available.

### Similar Species

**Exotics:** The prominent spiny wings of the stems separate marsh plume thistle from most thistles (*Cirsium* sp.). Bull thistle (*Cirsium vulgare*) is a stout, branched biennial whose leaves bear stout, long spines at the tip of the lobes.

**Natives:** No native species have stems with spiny wings.



## Impacts

**Agricultural:** Does not invade cultivated areas but can spread in moist pastures. This unpalatable plant replaces desirable forage plants, thereby reducing carrying capacity.

**Ecological:** Can colonize undisturbed riparian habitats, moist fields, and meadows, where it may replace native

vegetation, reducing wildlife and livestock forage values. Colonizes cut-blocks after harvesting and forms dense stands that compete with tree seedlings. Tall, persistent stems can cause snow press and other forms of mechanical injury to tree seedlings.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Well adapted to moist-to-wet openings, including pastures, bog and fen communities, cut-blocks, and roadsides. Grows in a range of soil types, including forest floor and even gravel, provided seepage is present. Although generally shade-intolerant, it will germinate under the forest canopy.

**Distribution:** Present in the Cariboo, Vancouver Island, and Omineca agricultural regions. Most common in the Robson Valley between McBride and Prince George.

**Historical:** Introduced from Europe.

**Life cycle:** A biennial that germinates in the first year,

overwinters as a rosette, then sets seed and dies the following year.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** Wind and water disperse the light, parachute-like pappus. Ingestion of seeds by birds may also disperse seeds.

**Hybridization:** None known.

## Management

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**Biocontrol:** No specific agents available. A seed-eating weevil (*Rhinocyllus conicus*) has successfully established on marsh plume thistle in the Robson Valley Forest District and experimental trials are currently underway.

**Mechanical:** In areas that are suitable for use of mowing equipment, mowing before flowering will prevent seed-set.

**Fire:** Effect not known.

**Herbicides:** Research is required to develop a herbicide prescription for this species.

**Cultural/Preventive:** On small infestations, hand-pull seedlings, rosettes, and mature plants before they set seed.

### Integrated Management Summary

Learn to identify this weed. Early detection is important to limit establishment of mature plants, seed banks, and large infestations. On small infestations, hand-pull seedlings, rosettes, and mature plants before they set seed. Where practical, seed disturbed areas to perennial grasses and forbs to provide cover and competition against this weed.

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# MEADOW KNAPWEED

*Centaurea debauxii* Gren. & Godr.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** *Centaurea debauxii*.

**Other Common Names:** None.

**Legal Status:** Regional Noxious: Columbia-Shuswap.



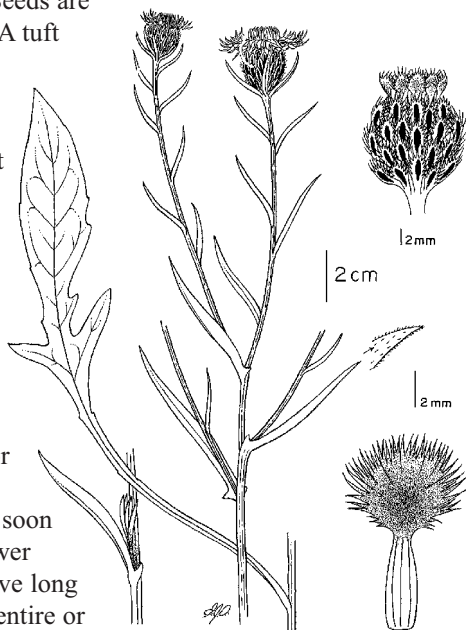
## Identification

**Growth form:** Perennial forb.

**Flower:** Several to many large pink to purplish red (occasionally white) heads are borne at the end of branches. The bracts are light to dark brown with a tattered fringe or comb at the tips (Douglas et al. 1998).

**Seeds/Fruit:** Seeds are 2–3 mm long. A tuft (pappus) of papery bristles 4–5 mm long may be present or lacking.

**Leaves:** The lance-shaped basal leaves are sparsely covered in long hairs and may be pinnately cut or have wavy margins. They soon wither. The lower stem leaves have long stalks and are entire or



may be shallowly lobed; the upper stem leaves are small, stalkless, and unlobed.

**Stems:** Stems are erect, branched, and thinly covered in hairs. Plants grow 0.4–1.0 m tall.

**Roots:** Taproot with a woody crown.

**Seedling:** No information available.

### Similar Species

**Exotics:** Resembles many of the knapweeds, but meadow knapweed, black knapweed (*Centaurea nigra*), and brown knapweed (*Centaurea jacea*) are distinguished by their undivided leaves. Meadow knapweed may be a hybrid of brown and black knapweed, so it is difficult to distinguish the 3 species (Frankton and Mulligan 1970). Black knapweed has a well-developed pappus, long stalks on the lower stem leaves, and a narrow fringe on the involucre bracts. Brown knapweed has no pappus and has short stalks on the lower leaves and a narrow fringe on the involucre bracts. Meadow knapweed has a weakly developed to absent pappus, long stalks on the lower stem leaves, and wide, bushy fringes on the involucre bracts.

**Natives:** None.



## Impacts

**Agricultural:** Can invade rangeland and pastures, causing reduction in carrying capacity. It can also result in reduced yields in hayfields.

**Ecological:** Not known to establish in undisturbed natural plant communities. Typically, it grows on

roadsides and disturbed areas, where it forms dense stands that hinder re-establishment of desirable native species.

**Human:** None.

## Habitat and Ecology

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**General requirements:** Infests roadsides, fields, pastures, and disturbed habitats at low- to mid-elevations.

**Distribution:** Considered a major concern in the Okanagan agricultural reporting region and present in most areas of BC except for the Peace River, Cariboo, and Lower Mainland regions. It is common in Oregon and northern California.

**Historical:** Introduced from Europe.

**Life cycle:** Perennial. Seeds can germinate from spring through autumn, with autumn-germinated plants usually overwintering as a rosette. Plants flower from July through August, depending on geographic location.

**Mode of reproduction:** By seed.

**Seed production:** No information is available. Black knapweed, a close relative, can produce more than 1,000 seeds/plant.

**Seed bank:** Seeds can remain viable in the soil for several years.

**Dispersal:** Most seeds are dispersed beside the plant. Can be dispersed by birds, which eat the seeds, or by wind.

**Hybridization:** Considered a hybrid of black and brown knapweed.

## Management

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**Biocontrol:** *Urophora affinis* (fly) and *Urophora quadrifasciata* (fly), 2 seed head flies released to manage diffuse and spotted knapweed, can use this species as a host plant. Although they may reduce seed production, these agents alone cannot manage this weed.

**Mechanical:** Larger infestations can be mowed to remove topgrowth, then new seedlings treated with herbicide as they emerge. Bag and burn mown plants.

**Fire:** Fire can destroy seeds on standing seed heads, but it will not kill seeds in the seed bank. Herbicides are required to control emerging seedlings following burning.

**Herbicides:** Picloram, dicamba, or a combination of clopyralid and 2,4-D have all been effective. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Small infestations can be hand-pulled. Minimize disturbance and manage for vigorous pastures dominated with perennial plants or natural communities.

### Integrated Management Summary

Control new infestations immediately. Disturbed areas such as roadsides, feeding areas, corrals, trails, and stream banks should be monitored for new infestations and controlled. Seed disturbed areas with perennial grasses and forbs.

## References

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# NIGHT-FLOWERING CATCHFLY

## *Silene noctiflora* L.

**Family:** *Caryophyllaceae* (Pink).

**Other Scientific Names:** *Melandrium noctiflorum*.

**Other Common Names:** Sticky cockle, night-flowering campion.

**Legal Status:** Regional Noxious: Peace River.



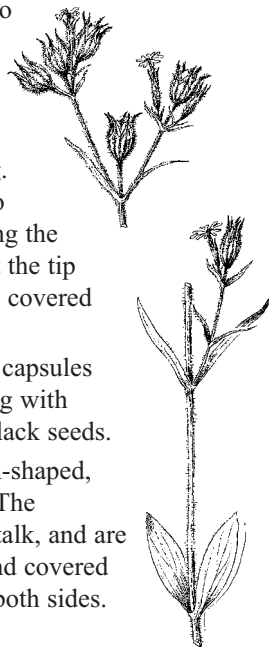
## Identification

**Growth form:** Annual forb.

**Flower:** The white to pinkish flowers are fragrant, arranged in small clusters, and open only at night. The flowers have 5 notched petals, 20–35 mm long. The sepals are fused together to form a tubular calyx surrounding the flower. The calyx has 5 teeth at the tip and 10 prominent nerves and is covered in sticky hairs.

**Seeds/Fruit:** The pale, smooth capsules are egg-shaped, 1.5–2.5 cm long with tiny, rough, brown to greyish black seeds.

**Leaves:** Basal leaves are spoon-shaped, 5–12 cm long, on short stalks. The opposite stem leaves have no stalk, and are lance-shaped, 2–10 cm long, and covered in slightly sticky stiff hairs on both sides.



**Stems:** The several stems are erect and branched, 20–90 cm tall. Stems are swollen at the nodes and hairy, with the hairs becoming sticky near the top.

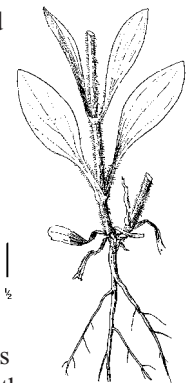
**Roots:** Taproot.

**Seedling:** A leaf rosette is formed after the seedling leaves (cotyledons) have emerged.

### Similar Species

**Exotics:** White cockle (*Lychnis alba*) is perennial and lacks the sticky hairs on the upper part of the plant. The white cockle produces separate male and female flowers, while the catchfly has both sexes in the same flower.

**Natives:** A number of *Silene* are native to the province, and several are rare. While all *Silene* share the tubular flower and inflated calyx, the native species are nearly all perennial and none have the stickiness of night-flowering catchfly.



## Impacts

**Agricultural:** Infests grain fields, legume crops, and pastures and can be a problem in gardens and horticultural nurseries. It sometimes contaminates clover and forage seed, making it difficult to clean. Livestock find it unpalatable, whether in pasture or cured in hay (BC Ministry of Agriculture and Food 1984).

**Ecological:** Grows on roadsides, railroads, fields, and disturbed habitats, where it usually remains a minor component. Its prolific seed production enables it to colonize disturbed sites rapidly.

**Human:** None known.

## Habitat and Ecology

**General requirements:** In BC, grows in fields, disturbed areas, and roadsides at low- to mid-elevations. It requires high summer temperatures for germination and usually grows on sandy or gravelly soils.

**Distribution:** Found in all agricultural reporting regions in the province and considered a major concern in the Peace River region. It is found in all provinces (but is uncommon in Newfoundland and the Maritimes) and throughout the northern US (McNeill 1980).

**Historical:** Introduced from Europe. This plant was known in Canada by the 1860s.

**Life cycle:** An annual or winter annual, night-flowering catchfly overwinters as seed or as leafy rosettes if there is protective snow cover. In spring, the stems rapidly elongate, and flowering begins by mid-June, with some plants not coming into flower until September. Seed ripens about a month after flowering starts. Some seeds germinate in the autumn but most remain dormant over winter.

**Mode of reproduction:** By seed.

**Seed production:** A single plant can produce over 2,500 seeds.

**Seed bank:** Seeds are very viable, especially after an after-ripening period of 3–6 months. Seeds remain viable longer than 3 years in cultivated soil.

**Dispersal:** Most seeds fall to the ground from the parent plant. Seeds are very similar to those of crop clovers and are difficult to separate, so seed impurities have been an important source of dispersal. Ingested seeds survive passage through the digestive system of livestock.

**Hybridization:** None known.

## Management

**Biocontrol:** None.

**Mechanical:** Shallow cultivation can create sufficient disturbance to population density of this plant.

**Fire:** In Britain, stubble burning and early tillage has decreased density, but this weed flowers much later in Britain than in BC.

**Herbicides:** Resistant or somewhat resistant to several common herbicides, including 2,4-D, MCPA, fenoprop, and mecoprop (McNeill 1980). EPTC and trifluralin are effective when used before planting, while bromoxynil and MCPB are effective post-emergence. More consistent management is often achieved with combinations of 2 or more herbicides. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Improved separation of crop seed has reduced the spread of night-flowering catchfly.

### Integrated Management Summary

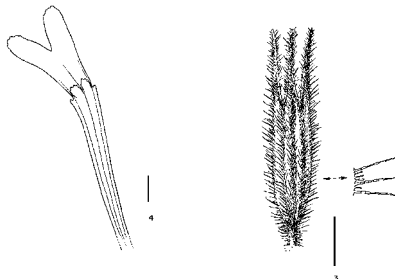
Once established, night-flowering catchfly is most effectively managed with herbicides. Small infestations can be hand-pulled. Minimize disturbance and seed disturbed areas to perennial grasses and forbs. Manage grazing animals to maintain perennial plant communities.

## References

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# NODDING THISTLE

*Carduus nutans* L. spp. *leiophyllis* (Petrovic) Stoj. & Stef.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Musk thistle, nodding plumeless thistle.

**Legal Status:** Not categorized.



## Identification

**Growth form:**

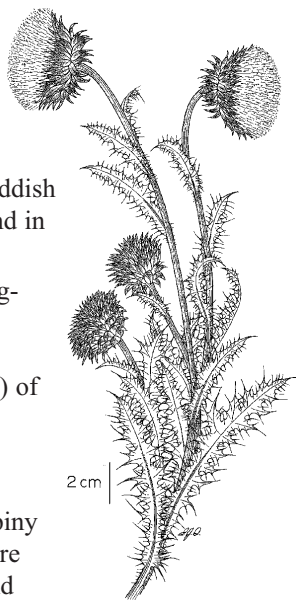
Biennial forb.

**Flower:** Flower

heads are terminal, solitary, 2.5–5.0 cm in diameter, nodding. Flowers are deep reddish purple. Flower head bracts end in sharp, spiny tips.

**Seeds/Fruit:** One-seeded, egg-shaped fruit (achene) about 5 mm long, shiny, yellowish brown, with a plume (pappus) of white hair-like bristles.

**Leaves:** Stem leaves are alternate, dark green, deeply lobed or pinnately cut, and spiny margined. The leaf margins are often white. The leaves extend onto the stem, giving a winged appearance (Whitson et al. 1996).



**Stems:** The smooth, non-spiny stems grow 0.3–2.4 m tall (Douglas et al. 1998). It can appear as a solitary stem or with several highly branched stems from one base.

**Roots:** Fleshy taproot.

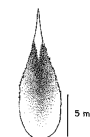
**Seedling:** No information available.



### Similar Species

**Exotics:** Similar to plumeless thistle (*Carduus acanthoides*). Rosettes of plumeless thistle are distinguished from those of nodding thistle by having leaves that are deeply serrate (saw-toothed) almost to the midrib.

**Natives:** There are many native thistle species (in the genus *Cirsium*). The natives generally do not have leaves clasping the stem all the way from node to node (strongly decurrent leaves). Many have hairy upper and lower leaf surfaces and are blue-green or grey in colour.



## Impacts

**Agricultural:** Reduces pasture production and is unpalatable to livestock.

**Ecological:** A highly competitive weed that invades pasture, rangeland, forestland, cropland, and disturbed areas, where it spreads rapidly and forms extensive

stands (Rutledge and McLendon. Undated). Nodding thistle may produce allelopathic chemicals that inhibit desirable plants beyond the spread of the rosettes (Wardle et al. 1993).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Found along dry roadsides and disturbed habitats at mid-elevations. Nodding thistle does not appear to have any specific climatic requirements other than a cool period before flowering (Butterfield et al. 1996). It occurs in areas with as little as 25 cm of annual precipitation and establishes best in

bare soil (FEIS 1996). Nodding thistle grows on all soil textures, but the soils must be well-drained and have a pH range of 6.0–8.9 (Butterfield et al. 1996).

**Distribution:** Found throughout North America. Nodding thistle occurs in isolated pockets in the Chilcotin, Thompson, Nicola, Kootenay, Okanagan,



Similkameen, Boundary, and Bulkley Valley areas of BC (Powell et al. 1994; Douglas et al. 1998).

**Historical:** Introduced from Eurasia or North Africa.

**Life cycle:** Seeds germinate in the autumn, forming a rosette of leaves. Typically, nodding thistle overwinters as a rosette and bolts the following spring between April and June. Flowering begins in late May or early June and continues through mid-July (Butterfield et al. 1996). Seeds mature and are dispersed 1–3 weeks after flowering. Seedlings establish only on bare soils and do not establish well under shaded conditions (Beck 1999).

## Management

**Biocontrol:** *Rhinocyllus conicus* (weevil), *Trichosirocalus horridus* (weevil), and *Urophora solstitialis* (fly) have been released in BC (Powell et al. 1994). Adult *Rhinocyllus* feed on the leaves in spring, mate, and deposit eggs on the bracts (Butterfield et al. 1996). When the eggs hatch, the larvae begin to bore into the flower head, reducing the ability of the plants to produce viable seed. In some cases the weevil has reduced nodding thistle populations to less than 10% of pre-release levels (Rutledge and McLendon. Undated). This weevil is not entirely host-specific, however, and will complete its life cycle on native thistles (Louda et al. 1997).

**Mechanical:** Repeated mowing, hand-pulling, or cutting can be used to stop the spread of nodding thistle. Mowing or hand-cutting after flowering, but before seed-set, prevents seed development and dispersal (Heidel 1987). When pulling nodding thistle, it is important to completely remove the crown so that the plant does not simply re-bolt and produce seeds. Repeated visits at weekly intervals over the 4–7-week flowering period are necessary because not all plants flower at the same time (Heidel 1987). Cut plants should be deeply buried or burned because seeds can mature and become viable after cutting (Rutledge and McLendon. Undated).

**Fire:** No information available.

**Herbicides:** Nodding thistle is usually controlled with herbicides. Chemical control is most effective at the rosette stage, and quickly decreases once the plant has bolted (Butterfield et al. 1996). Clopyralid, 2,4-D, and dicamba are all effective before the plant bolts. A

**Mode of reproduction:** By seed.

**Seed production:** Average productivity is approximately 10,000 seeds/plant, but a single plant can produce up to 100,000 seeds (Beck 1999).

**Seed bank:** Seeds can remain viable for at least 10 years.

**Dispersal:** By wind, water, wildlife, and livestock (Beck 1999).

**Hybridization:** May hybridize with plumeless thistle (*Carduus acanthoides*).

combination of 2,4-D and dicamba provided 97% control in an experiment in Minnesota (Butterfield et al. 1996). Butterfield et al. (1996) found that a autumn application of picloram to rosettes, when other plants were dormant, was effective and had less impact on non-target species. Metsulfuron is effective on bolted plants (Beck 1999). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining vigorous native communities.

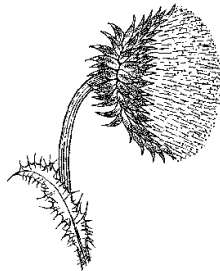
### Integrated Management Summary

The key to managing nodding thistle is to prevent seed production. Dense nodding thistle stands can be spot-treated with herbicides or by pulling or cutting (Rutledge and McLendon. Undated). Control methods may have to be repeated for many years to completely eliminate a stand because seeds can remain in the seed bank for up to 10 years. Most infestations in BC are so severely stressed by insect agents that other methods of control are seldom required.

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- Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Musk thistle. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.





# ORANGE HAWKWEED

*Hieracium aurantiacum* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Orange-red king devil, devil's paintbrush.

**Legal Status:** Regional Noxious: Bulkley-Nechako, Cariboo, Central Kootenay, Columbia-Shuswap, East Kootenay, Thompson-Nicola.



## Identification

**Growth form:**  
Perennial forb.

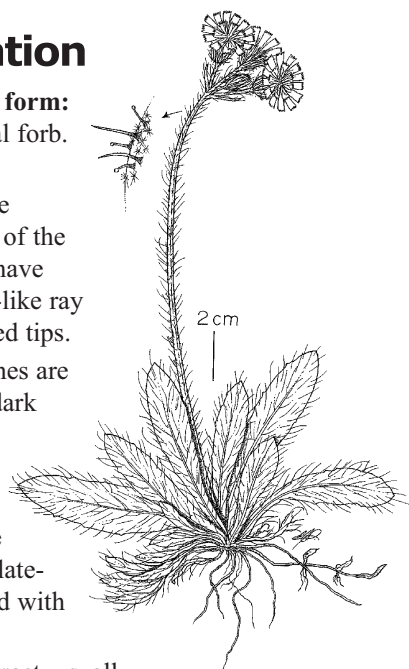
**Flower:**

Flowering heads are clustered at the top of the leafless stems and have orange to red petal-like ray flowers with notched tips.

**Seeds/Fruit:** Achenes are about 2 mm long, dark brown or black, have ridges and bristly plumes.

**Leaves:** Leaves are mostly basal, spatulate-shaped, and covered with stiff hairs.

**Stems:** Stems are erect, usually solitary with stiff hairs (at the base) and 0.3–1.2 m tall (Douglas et al. 1998).



**Roots:** Fibrous root system with a woody stem base. Stolons root at nodes.

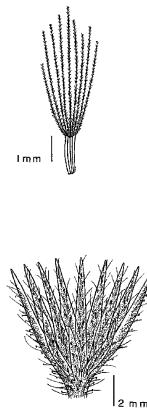
**Seedling:** Seedling leaves have bristly hairs.

**Other:** Plants contain milky juice.

## Similar Species

**Exotics:** There are 14 hawkweeds in BC, but only orange hawkweed has orange flowers. All other native and exotic hawkweeds have either white or yellow flowers. The yellow flowered hawkweed (*Hieracium pilosella*) is similar but occurs only rarely in the south of the province.

**Natives:** See above.



## Impacts

**Agricultural:** Hawkweed is not normally competitive with crop species in the US (Callihan et al. 1997); its impact on agricultural crops in BC is unknown.

**Ecological:** Although new populations of orange hawkweed likely originate from seeds, established

populations expand largely through vegetative growth by stolons. Patches can expand quickly, producing dense mats of rosettes (Callihan et al. 1997).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Orange hawkweed grows in the province at low- to mid-elevations, usually on open areas such as pastures, meadows, clearings, roadsides, and disturbed sites. It appears best adapted to well-drained, coarse-textured soils (Wilson et al. 1997) that are often acidic (Frankton and Mulligan 1970).

**Distribution:** Scattered and locally abundant in BC south of 55° N and is regarded as a major concern in the Kootenay, Okanagan, Thompson, Cariboo, Omineca, and Peace River agricultural reporting regions. Orange hawkweed is established and spreading rapidly in northern Idaho, northeastern

Washington, and northwestern Montana (Wilson and Callihan 1999).

**Historical:** Introduced from Europe.

**Life cycle:** Perennial plants that form rosettes in spring and early summer and spread primarily by stolons. Plants flower in June–July and quickly produce seed. Plants overwinter as rhizomes and regrow the next spring (Wilson et al. 1997).

**Mode of reproduction:** By seed, stolons, and rhizomes.

**Seed production:** Flowering stem may produce several hundred seeds.

**Seed bank:** No information available.

**Dispersal:** Believed to be spread primarily by recreationists, pack animals, and hay. Although seeds are plumed, they are not widely dispersed by wind (Wilson et al. 1997).

**Hybridization:** No information available.

## Management

**Biocontrol:** None currently available. BC supports an international Hawkweed Biocontrol Consortium currently researching the potential for biological control.

**Mechanical:** Hand-pull small infestations but take care not to scatter roots and stolons. Mowing prevents seed production but encourages increased vegetative reproduction.

**Fire:** No information available.

**Herbicides:** Picloram and picloram plus 2,4-D provide excellent control in BC when applied to actively growing plants in spring and early summer. Spring applications of dicamba are recommended for turf and lawns (Callihan et al. 1997). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific

recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining healthy native communities.

### Integrated Management Summary

Integrated management strategies should focus on detecting and eradicating infestations as early as possible and on implementing land use practices that promote a continuous cover of perennial vegetation.

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# OXEYE DAISY

## *Leucanthemum vulgare* Lam.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** *Chrysanthemum leucanthemum*.

**Other Common Names:** White daisy.

**Legal Status:** Regional Noxious: Cariboo, North Okanagan, Peace River, Thompson-Nicola.



## Identification

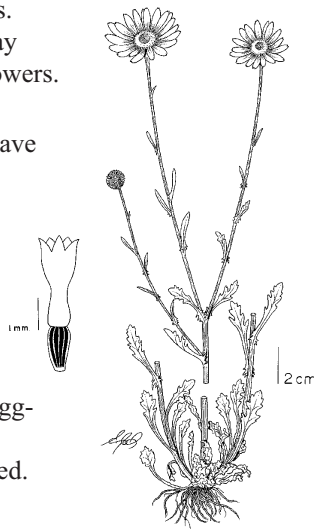
**Growth form:** Short-lived perennial forb.

**Flower:** Flowering heads are solitary at the ends of branches.

Flower heads have white ray flowers and yellow disk flowers.

**Seeds/Fruit:** Fruits are cylindrical and black and have about 10 ribs.

**Leaves:** Alternately arranged leaves become progressively smaller upward along the stem. Basal and lower stem leaves are 4–15 cm long, lance-shaped to narrowly egg-shaped. The upper leaves become stalkless and toothed.



**Stems:** Mature plants are 20–80 cm tall with erect, smooth to sparsely hairy stems.

**Roots:** The plants have shallow, branched rhizomes.

**Seedling:** No information available.

### Similar Species

**Exotics:** Oxeye daisy is sometimes confused with the ornamental Shasta daisy (*Chrysanthemum maximum*), a more robust plant with larger flowers. Scentless chamomile (*Matricaria maritima*) and stinking chamomile (*Anthemis cotula*) also have white ligulate flowers with yellow tubules (Frankton and Mulligan 1970).

**Natives:** None known.



## Impacts

**Agricultural:** The plant is unpalatable to cattle. Dense infestations can reduce forage for livestock and wildlife. Oxeye daisy is of major concern as a contaminant in Peace River fine seed production.

**Ecological:** Oxeye daisy can become noxious and is capable of dominating pastures and rangeland (Rutledge and McLendon. Undated).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Often grows along roadsides and in fields and disturbed areas on moist to moderately dry sites. It is often present on disturbed forest sites such as landing and skid trails in BC.

**Distribution:** Occurs at low- to mid-elevations in grasslands and dry to moist forests. It is common throughout the province south of 56°N (Douglas et al. 1998). It is widely distributed throughout Canada and the US. This species is regarded as a major concern in the Okanagan, Thompson, Cariboo, Omineca, and

Peace River agricultural reporting regions and is present in the Kootenay, Mainland, and Vancouver Island regions.

**Historical:** Introduced from Eurasia.

**Life cycle:** Rosettes must experience a period of cold temperatures to initiate flowering (Rutledge and McLendon. Undated). Flowering occurs from June through August, depending on location. The plant grows vigorously in nutrient-poor soils (Olson and Wallander 1999).

**Mode of reproduction:** By seeds and vegetatively from roots.

**Seed production:** Some plants produce over 500 seeds.

**Seed bank:** Seeds can remain viable in the soil 2–3 years or longer (Rutledge and McLendon. Undated).

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Hand-pulling or digging before seed production. However, for this method to be successful it is important to remove as much of the underground part as possible.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, 2,4-D, and glyphosate are effective herbicides. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed

dispersal, eliminating seed production, and maintaining healthy native communities.

### Integrated Management Summary

Integrated treatments should include a combination of nitrogen fertilization and herbicide treatment. Sheep or goats have been effective in selectively grazing oxeye daisy without adversely affecting the desirable species, but this approach may not be practical in most places where the plant grows in BC.

## References

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# PARASITIC DODDER

## *Cuscuta* spp.

**Family:** *Cuscutaceae* (Dodder).

**Other Scientific Names:** Five species are present in BC: *Cuscuta approximata*, *C. cephalanthi*, *C. epithymum*, *C. pentagona*, and *C. salina*.

**Other Common Names:** Strangleweed.

**Legal Status:** Provincial Noxious.



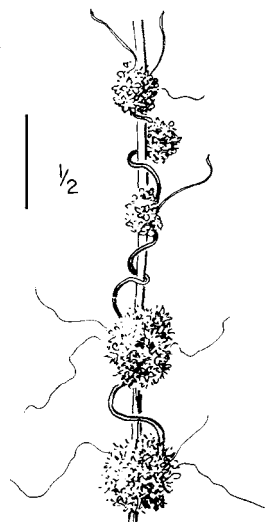
**Growth form:** Parasitic annual forb.

**Flower:** Tiny white or cream flowers, usually clustered.

**Seeds/Fruit:** Seed pods are rounded capsules, containing 1–4 tiny, rough seeds.

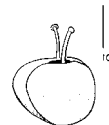
**Leaves:** No true leaves or green parts. Leaves are reduced to minute scales.

**Stems:** Slender, thread-like yellow to orange twining stems coil around forbs and shrubs. They adhere to host plants with wart-like suckers.



**Roots:** Minimal underground roots until the twining stems contact a host plant, then aerial roots and suckers are produced.

**Seedling:** Germinating stems produce slender stems without seed leaves (cotyledons).



### Similar Species

**Exotics:** Ten species of dodder have been found in Canada, all similar in appearance and effect (Frankton and Mulligan 1970).



**Natives:** Several native dodders are present and are parasitic.

## Impacts

**Agricultural:** Dadders attack many vegetables, forage crops (particularly alfalfa), and ornamentals. Dadders can act as alternate hosts for some viral diseases of vegetables. Legumes in particular are attacked by 3 species in BC (*C. approximata*, *C. epithymum*, and *C. pentagona*). The twining stems also can get tangled in harvesting equipment.

**Ecological:** Dadders can parasitize many native plants from herbs to shrubs. *C. salina* appears to have a close host relation with plants of the goosefoot (particularly *Salicaria*) and sunflower family on saline sites in the Fraser Valley, southern Vancouver Island, and the Gulf Islands.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Dadders appear well adapted to cultivated situations and succeed with many crops.

**Distribution:** Distributed across Canada and the US. Species are present in all agricultural reporting regions of the province except the Omineca and Peace River regions. Most species are rare except for *C. epithymum* and *C. salina* (Douglas et al. 1998). Most are restricted to low-elevation coastal areas, but *C. approximata* and

*C. epithymum* are found at mid-elevations in dry regions of the Interior.

**Historical:** *C. pentagona* and *C. salina* are native species; all others were introduced from Eurasia.

**Life cycle:** Seeds germinate in the soil and produce slender stems. The stems have a short time to make contact with a host plant before the seedling dies. The dodder twines around the host plant and develops



suckers that penetrate the host, extracting food from it. The dodder loses contact with the soil. Stems of the dodder proliferate, sometimes forming dense mats, then flowers and seed are produced (Frankton and Mulligan 1970).

**Mode of reproduction:** By seed.

**Seed production:** Can produce over 16,000 seeds/plant.

**Seed bank:** Seeds can remain dormant and viable in the soil for over 60 years (BC Ministry of Agriculture, Food and Fisheries. Undated).

**Dispersal:** Seeds fall to the ground but can be harvested and transported with crops such as hay or on ornamentals.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Infestations should be cut and burned before seeds ripen. Tillage alone is not effective for dodder.

**Fire:** Burning dodder-infested material will destroy the plant and the seeds.

**Herbicides:** In alfalfa, chlorpropham should be applied after dodder has germinated but before it has attached to the alfalfa plants. Glyphosate can effectively manage dodder without harming alfalfa when applied at very low rates soon after the dodder attaches (BC Ministry of Agriculture, Food and Fisheries 2000). Use of non-selective herbicides is often recommended for roadside and non-crop infestations. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** New infestations should be immediately burned or destroyed. Thoroughly clean

equipment, tools, and footwear before leaving infested areas. Do not transport dodder-infested materials to other areas. Hay infested with dodder should not be bought or sold. Inspect new sources of hay on arrival and watch stock and feeding areas for new infestations. If livestock have consumed infested hay, keep them contained in one area until the seed has passed through their digestive systems.

### Integrated Management Summary

Use a combination of cultural management and herbicides as required. Early detection is important and immediate management of new infestations is essential.

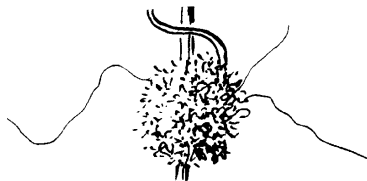
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# PERENNIAL PEPPERWEED

## *Lepidium latifolium* L.

**Family:** *Brassicaceae* (Mustard).

**Other Scientific Names:** None.

**Other Common Names:** Tall whitetop, broad-leaved peppergrass, Virginia pepperweed.

**Legal Status:** Regional Noxious: East Kootenay, Thompson-Nicola.

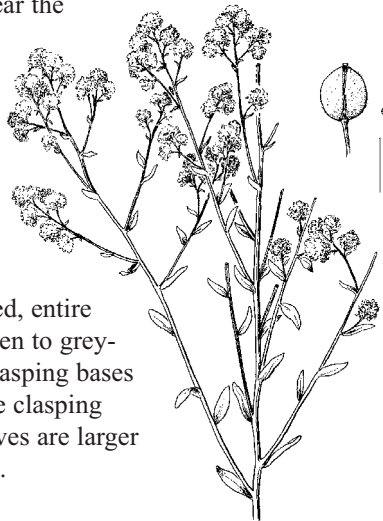


**Growth form:** Perennial forb.

**Flower:** White flowers are packed in dense clusters near the ends of branches.

**Seeds/Fruit:** Fruits are nearly round, about 2 mm in diameter, and usually sparsely hairy.

**Leaves:** Leaves are alternate, lance-shaped, entire to toothed, bright green to grey-green, and without clasping bases (whitetop leaves have clasping bases). The basal leaves are larger than the upper leaves.



**Stems:** Mature plants are 0.5–2.0 m tall.

**Roots:** Perennial pepperweed roots grow deep into the soil.

**Seedling:** No information available.

**Other:** The leaves and stem are covered with a waxy layer (Whitson et al. 1996).

### Similar Species

**Exotics:** Whitetop (*Cardaria draba*) leaves have clasping bases; perennial pepperweed can also be distinguished by its waxy appearance.

**Natives:** Many native members of the sunflower (*Asteraceae*) family resemble this species in the rosette stage.



## Impacts

**Agricultural:** Invades irrigated pastures, cropland, and native meadows (FEIS 1996).

**Ecological:** Aggressively colonizes riparian habitats and can eliminate competing vegetation (FEIS 1996).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** In BC, perennial pepperweed, although rare, grows on beaches and tidal shores, along roadsides, in fields and disturbed habitats. Outside the province it is most often found in open, unshaded areas on disturbed and often saline soils. Perennial pepperweed is locally common in riparian areas, marshy flood plains, valley bottoms, and seasonally wet areas from 1,675 to 2,750 m.

**Distribution:** Perennial pepperweed is known from Vancouver and Windermere (Douglas et al. 1998) and

also from Cranbrook (1997) and Walachin (1998). It is considered a major concern in the Kootenay and Thompson agricultural reporting regions. This weed is found throughout much of the western US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Dense flower clusters appear in early summer and continue through August.

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** Perennial pepperweed produces an abundance of highly germinable seeds. Seed production is from June to August.

**Seed bank:** Seeds have no apparent dormancy.

**Dispersal:** Seeds drop from the plant or travel short distances by wind and water.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Periodic mowing and spring burning have reduced perennial pepperweed density in Utah (FEIS 1996).

**Fire:** (See above.)

**Herbicides:** Metsulfuron-methyl is the most effective herbicide in the US. Dicamba, glyphosate, chlorsulfuron, imazapyr, and a combination of glyphosate and 2,4-D have also been effective in the US. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Cutting and pulling can manage this weed if plants are treated before seed-set.

### Integrated Management Summary

Cutting or pulling, combined with herbicide applications, can provide effective management of perennial pepperweed. Plants should be cut or pulled during the flower bud stage and herbicides applied to the recovering stems before they set seed.

## References

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Douglas, G. W., D. Meidinger, and J. Pojar, eds. 1998. *Illustrated Flora of British Columbia*. Vol. 2: *Dicotyledons (Balsaminaceae through Cuscutaceae)*. Province of British Columbia.

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# PERENNIAL SOW THISTLE

## *Sonchus arvensis* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** *Sonchus uliginosus*.

**Other Common Names:** Creeping sow thistle, field sow thistle, field milk thistle, gutweed, swine thistle, marsh sow thistle.

**Legal Status:** Provincial Noxious.



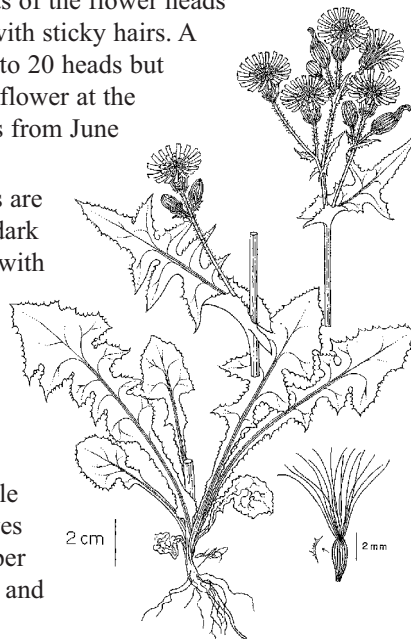
## Identification

**Growth form:** Perennial forb.

**Flower:** Small, yellow, dandelion-like flower heads are grouped in loose clusters up to 5 cm across. The clusters are borne on glandular stalks and the bracts of the flower heads are often covered with sticky hairs. A plant may have up to 20 heads but usually only a few flower at the same time. Flowers from June to September.

**Seeds/Fruit:** Seeds are 2.5–3.5 mm long, dark brown, and ribbed with a parachute-like pappus (Douglas et al. 1998).

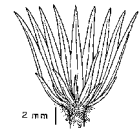
**Leaves:** Leaves are alternate with weakly prickled margins and variable shapes. Lower leaves are stalked, but upper leaves are stalkless and clasp the stem.



**Stems:** Mature plants are 0.4–2.0 m tall. The single stems are erect and branched only near the top. The stems exude a milky juice when cut.

**Roots:** Perennial sow thistle has a vigorous root system with a deep vertical root as well as fleshy, spreading, horizontal roots.

**Seedling:** The first leaves are spatula-shaped and have irregular teeth that point downward and have a prickle on the tip (Royer and Dickinson 1999).



## Similar Species

**Exotics:** Perennial sow thistle differs from annual sow thistle (*Sonchus oleraceus*) by its extensive creeping roots and larger flower heads. Prickly lettuce (*Lactuca serriola*) has smaller flowers, but its leaves are prickly on the underside midrib (Frankton and Mulligan 1970).

**Natives:** Several native lettuces (*Lactuca* sp.) resemble perennial sow thistle, but they either lack the extensive, creeping root system, or, in the case of blue lettuce (*Lactuca tatarica*), the flowers are blue.

## Impacts

**Agricultural:** An aggressive, creeping weed that can severely reduce yields in cultivated fields and grain fields. It is not easily managed with chemicals or cultivation (Alberta Environmental Centre 1983). This weed is an alternate host for several viral diseases.

**Ecological:** Sow thistle is able to invade both natural habitats and disturbed sites, where it competes for

light, nutrients, light, and space. It can establish and become a serious problem on marshes, ponds, and other riparian areas. Chemicals from the roots and decaying residue from old growth inhibit seed germination of other species.

**Human:** Sow thistles contain chemical compounds used for industrial and pharmaceutical purposes.

## Habitat and Ecology

**General requirements:** Adapted to a wide range of environmental conditions but is most competitive in temperate climates with abundant moisture. Does best on sites in fertile, moist soils in full sunlight (Zollinger and Parker 1999). Grows on dry to moderately dry roadsides, disturbed areas, cultivated fields, and riparian areas.

**Distribution:** Present in all agricultural regions of BC and a major concern in the Peace River region. It occurs in all Canadian provinces and throughout the northern US and is especially troublesome in the Prairie provinces (Zollinger and Parker 1999).

**Historical:** Introduced from Europe, likely in seed crops.

**Life cycle:** Perennial sow thistle spreads by creeping horizontal roots and seed. The above-ground portion of

the plant dies over winter, and new shoots emerge from buds on the roots in spring. Plants flower from July to September, depending on geographic location. Seeds are dispersed in the autumn and can germinate to overwinter as rosettes or germinate in spring.

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** Seed production is highly variable, depending on weather conditions, and ranges from 1,400 to 35,000 seeds/m<sup>2</sup> (Zollinger and Parker 1999).

**Seed bank:** Seeds are relatively short-lived, with viability decreased by nearly half after 2 years.

**Dispersal:** Mainly by wind, but some birds feed on the seeds.

**Hybridization:** No information available.

## Management

**Biocontrol:** Two insects have been approved for release in Canada, but neither are currently available in BC. *Tephritis dilacerata* (fly) attacks the seed heads, while *Cystiphora sonchi* forms galls on vegetative parts of the plant. Several pathogens are being tested in Canada and the US. Sow thistle is palatable to cattle and sheep, and heavy grazing can manage some populations.

**Mechanical:** Intensive cultivation (every 3–4 weeks) over a long period can kill sow thistle by exhausting root reserves, but intermittent tillage simply spreads the roots and increases distribution. Mowing prior to flowering can prevent seed production, but several mowings are required because of perennial sow thistle's long flowering period (Zollinger and Parker 1999).

**Fire:** No information available.

**Herbicides:** Sow thistles are relatively resistant to herbicides, and high rates are required to kill the extensive root system. Sub-lethal concentrations may increase root shoot growth (Zollinger and Parker 1999). Clopyralid, dicamba, 2,4-D, picloram, and glyphosate have been effective when plants are at the pre-bud or bud stage. Glyphosate is non-selective and is used to prepare a seedbed for re-vegetation. Sow thistles have waxy leaves, so the spray solutions must have good wetting ability. Consult the most recent

edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** New populations can be prevented by hand-pulling or cultivation before their extensive root systems establish. Seed disturbed areas to perennial grasses and forbs to provide ground cover and competition against this weed.

### Integrated Management Summary

Perennial sow thistle management on cultivated areas involves an integrated approach of intensive cultivation, competitive crops, selective herbicides, or a combination of all 3. On rangeland and undisturbed areas, seedlings from new infestations can be removed by hand-pulling or herbicides, while established populations may be managed with intensive grazing or herbicides. Chemical control may not be possible on the riparian areas where this weed commonly occurs.

## References

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Alberta Environmental Centre. 1983. *Weeds of Alberta*. Alberta Agriculture Agdex 640-4.

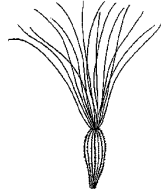
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Royer, F., and R. Dickinson. 1999. *Weeds of Canada and the Northern United States*. Edmonton: University of Alberta Press.

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# PLUMELESS THISTLE

## *Carduus acanthoides* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Bristly thistle, spiny plumeless thistle.

**Legal Status:** Regional Noxious: Central Kootenay.



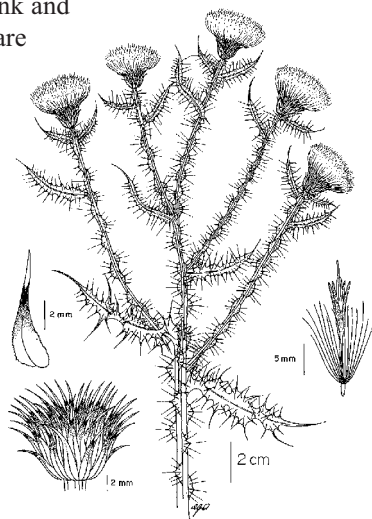
## Identification

**Growth form:** Winter annual or biennial forb.

**Flower:** Flower heads are solitary at the ends of branches or in clusters of 2–5. Flower bracts are narrowly lance-shaped and appear as sharp spines. Flowers are purplish-pink and clustered in heads that are 2–5 cm in diameter.

**Seeds/Fruit:** One-seeded fruit (achene), capped by a ring of bristles.

**Leaves:** Basal rosette leaves are usually 10–20 cm long with spiny lobes. Stem leaves alternate, stalkless, hairy underneath, and blending into the stem.



**Stems:** Mature plants are 0.3–1.2 m tall and have a stout, fleshy taproot. Stems are freely branched above and covered with leaf-like spines that extend up to the flowering heads (Whitson et al. 1996).

**Roots:** Thick, fleshy taproot.

**Seedling:** No information available.

**Other:** Closely related to musk or nodding thistle (*Carduus nutans*).

### Similar Species

**Exotics:** Similar to musk/nodding thistle. Rosettes are distinguished from those of nodding thistle by having deeply serrate (saw-toothed) leaves almost to the midrib.

**Natives:** Native thistles generally do not have leaves clasping the stem all the way from node to node (strongly decurrent leaves), and many have hairy upper and lower leaf surfaces and are blue-green or grey in colour.

## Impacts

**Agricultural:** Unpalatable to livestock; large or dense infestations may reduce available forage.

**Ecological:** Does not typically pose a threat to high-quality natural areas, although it has been known to invade native and restored grasslands despite the

presence of dense, native prairie vegetation (Wisconsin DNR 1998). One of the most aggressive thistles due to its large seed production (Feldman 1997).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Grows in pastures, fields, disturbed habitats, and logged-over areas and along roadsides at mid-elevations.

**Distribution:** In BC occurs in isolated pockets in the Cariboo, Kamloops, Kootenay, and Boundary areas (Powell et al. 1994). Especially problematic on the

Great Plains and in mesic pastures of the intermountain West of the US, it is a major concern in the Kootenay and Omineca agricultural reporting regions in the province and is also present in the Thompson agricultural region.

**Historical:** Introduced from Eurasia.



**Life cycle:** Seedlings emerge from early spring to late autumn and the length of time to flowering can vary from 4 to 22 months (Wisconsin DNR 1998). A single taproot is formed and stem elongation occurs in early May. Flowering begins in early June and lower branches continue to flower until mid-August (Wisconsin DNR 1998).

**Mode of reproduction:** By seed.

**Seed production:** A single plant can produce up to 9,000 seeds.

**Seed bank:** Under favourable conditions, 90–95% of seeds may germinate (Feldman 1997) and seeds can remain viable in the soil for up to 10 years (Wisconsin DNR 1998).

**Dispersal:** Seeds are mainly dispersed by wind.

**Hybridization:** May hybridize with musk or nodding thistle (*Carduus nutans*).

## Management

**Biocontrol:** *Rhinocyllus conicus* (weevil) and *Trichosirocalus horridus* (rosette weevil) appear to limit populations of plumeless and musk or nodding thistle (Powell et al. 1994), but they may also use native thistles as an alternate host.

**Mechanical:** As with musk or nodding thistle, plumeless thistle flower heads can be cut and removed to eliminate seed production. Rosettes can also be removed mechanically. This can be an effective control method for relatively small infestations. However, it must be repeated annually to exhaust the soil seed bank.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, 2,4-D, and glyphosate have all been used successfully to manage this species. Metsulfuron-methyl will also control plumeless thistle. Herbicides should be applied in the spring, 10–14 days before bolting, or in the autumn to new rosettes. Metsulfuron-methyl should be applied to bolting

plants. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Reseed controlled areas with desirable species.

### Integrated Management Summary

Management of plumeless thistle is similar to that of nodding thistle. Elimination of seed production is key. Rosettes can be pulled or dug out by hand prior to bolting, or treated with herbicide. Once plants have bolted, seed heads must be removed to prevent the production of viable seed.

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- Wisconsin Department of Natural Resources. 1998. Musk or nodding thistle (*Carduus nutans*), plumeless or bristly thistle (*Carduus acanthoides*), and bull thistle (*Cirsium vulgare*). <http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/thistles.htm> [27 Jan 99].



# POISON HEMLOCK

## *Conium maculatum* L.

Family: *Apiaceae* (Parsley).

**Other Scientific Names:** None.

**Other Common Names:** Hemlock.

**Legal Status:** Not categorized.



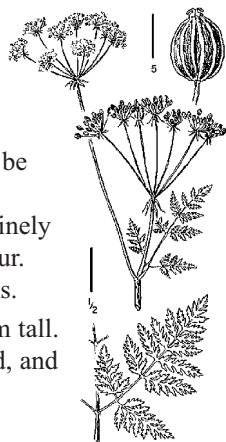
**Growth form:** Biennial forb.

**Flower:** White flowers are borne in umbrella-like clusters supported by a stalk.

**Seeds/Fruit:** Light brown, ribbed, and concave.

**Leaves:** Generally alternate but may be opposite above (Stubbendieck et al. 1995). Leaves are shiny, green, and finely divided and have a strong musty odour. Leaflets are segmented on short stalks.

**Stems:** Mature plants grow 1.2–3.0 m tall. Stems are erect, extensively branched, and covered with purple spots.



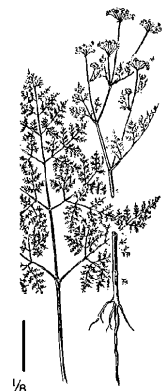
**Roots:** Taproot.

**Seedling:** Seedling leaves are fern-like in appearance.

### Similar Species

**Exotics:** Similar to other exotic members of the parsley family, such as wild caraway (*Carum carvi*) and wild carrot (*Daucus carota*). Spotted stems are diagnostic.

**Natives:** Water hemlock (*Cicuta douglasii*), which is similar in appearance, lacks the distinctive spotted stems.



## Impacts

**Agricultural:** Poison hemlock crowds out desirable forage species and can poison livestock and humans. Sheep are less sensitive to it than cattle and horses (DiTomasso 1999).

**Ecological:** Although not an aggressive invader, poison

hemlock may gradually increase in native riparian and lowland communities.

**Human:** All parts of the plant are highly poisonous, and poison hemlock should be handled with care.

## Habitat and Ecology

**General requirements:** Poison hemlock is generally found on dry to moist soils, can tolerate poorly drained soils, and tends to be scattered in riparian areas. It is usually found along streams, irrigation ditches, and the borders of pastures and cropland, and it can gradually invade perennial crops.

**Distribution:** In BC it is found in wet to mesic habitats in the lowland zone and is locally common in the southwest of the province, particularly in the Vancouver and Victoria areas (Douglas et al. 1998). It is present in the Kootenay, Okanagan, Mainland, Vancouver Island, and Cariboo regions.

**Historical:** Introduced from Europe, the plant is thought to have been used to kill Socrates.

**Life cycle:** Poison hemlock is a biennial that can grow up to 3 m tall. In the first year, plants form a small seedling that resembles wild carrot. Plants usually bolt in the second year and produce numerous clusters of white flowers. Plants flower from April through July, and seeds begin in July and continue into winter. Most seeds mature before dispersal and can germinate immediately if environmental conditions are favourable, but some seeds remain dormant (Baskin and Baskin 1990).

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** Seeds may remain viable in the soil for about 3 years (Calweed 1997).

**Dispersal:** Seeds can be spread by machinery, on clothing, or in transported soil. They are also dispersed to a limited extent by water and wind.

**Hybridization:** No information available.

## Management

**Biocontrol:** *Agonopterix alstroemeriana* (moth), accidentally introduced into the US, apparently feeds exclusively on poison hemlock. It is found in Colorado and is a biological control agent in Idaho, Oregon, and Washington, where it is effective (William et al. 1996). This species has not been found in BC.

**Mechanical:** Poison hemlock can be controlled by digging, repeated mowing, pulling, or spring/winter burns. Care should be taken to avoid contact with bare skin (wear gloves). Wash hands thoroughly after handling any part of this plant.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, 2,4-D, and glyphosate have been used for chemical control of poison hemlock. Apply foliar herbicides during the rosette stage with a wick to minimize damage to adjacent desirable vegetation. Cut any stems that arise after treatment. Herbicide treatment may need to be repeated for several years until the seed bank is depleted (Panter

and Keeler 1988). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by eliminating seed production and maintaining healthy native communities.

### Integrated Management Summary

The tendency of this species to grow in wet areas may restrict the use of certain herbicides. Eliminate seed production and exhaust the soil seed bank by removing seed heads before seeds mature. Use gloves for hand-pulling, and avoid touching the plant with bare skin.

## References

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# PUNCTUREVINE

## *Tribulus terrestris* L.

**Family:** *Zygophyllaceae* (Caltrop).

**Other Scientific Names:** None.

**Other Common Names:** Goathead, bullhead, Mexican sandbur, Texas sandbur.

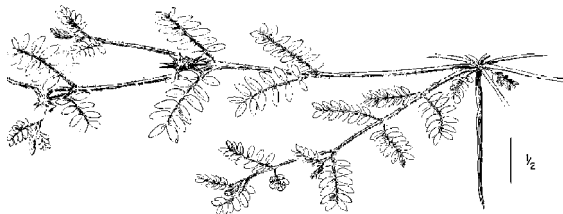
**Legal Status:** Regional Noxious: Okanagan-Similkameen.



**Growth form:** Annual forb.

**Flower:** Flowers are yellow, have 5 petals, and are borne solitary on short stalks in the leaf axils.

**Seeds/Fruit:** The sharp-pointed fruits are 2–6 mm long and break into 5 sections at maturity. Each section contains 2–4 seeds.



**Leaves:** Leaves are opposite, hairy, and divided into 4–8 pairs of leaflets. Leaflets are oval and 5–15 mm long.

**Stems:** Mature plants have numerous trailing stems that are 0.6–1.5 m long. The freely branching stems form mats up to 100 cm wide.

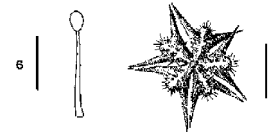
**Roots:** Taproot.

**Seedling:** Seedling leaves are oval with a prominent central groove.

### Similar Species

**Exotics:** None known.

**Natives:** None known.



## Impacts

**Agricultural:** The hard, spiny burs of puncturevine can damage wool and injure livestock and other animals. Puncturevine can be toxic to livestock, especially sheep (WSU 1999).

**Ecological:** Forms dense mats on open ground.

**Human:** The spiny burs can puncture skin and have even been known to puncture rubber bicycle tires.

## Habitat and Ecology

**General requirements:** In BC, occurs in the dry grasslands of the Interior. It grows along roads, beaches, and in pastures, dry fields, and disturbed habitats. It can grow in compacted soil, sandy or moist soils, and rich soils (WSU 1999).

**Distribution:** Occurs rarely in southern areas of the province (Douglas et al. 2000). It is known only from the Okanagan at Osoyoos Lake and Oliver. It is classified as a major concern in the Okanagan agricultural reporting region and is not present in all other agricultural reporting regions. Although it is widely scattered across much of the US, there is no evidence of spread in BC since the 1970s.

**Historical:** Introduced from Eurasia.

**Life cycle:** Germinates soon after the first rain in spring and summer but will germinate after any wet period. Flowering and seed production occur from July to October (Whitson et al. 1996), depending on geographic location. Flowers are open only in the morning.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** May remain dormant 4–5 years (Whitson et al. 1996).

**Dispersal:** Spiny burs attach to animals, humans, or the tires of vehicles.

**Hybridization:** No information available.

## Management

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**Biocontrol:** *Microlarinus lareynii* (stem-boring weevil) has been released in BC but establishment is not known. *Microlarinus lypriformus* (fruit-boring weevil) has been released in Colorado.

**Mechanical:** Can be controlled by digging, hand-pulling, or tilling infestations before flowering and seed production.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, and glyphosate have been effective. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance, eliminating seed production and dispersal, and maintaining vigorous perennial plant communities.

### Integrated Management Summary

Integrated management should focus on eliminating seed production and depleting the seed bank. Herbicides may be applicable on upland sites, but the plant is also established on the lakeshore at Osoyoos Lake, where herbicides cannot be used. Hand-pulling may be practised for a small population, but follow-up treatments will be required to ensure long-term control.

## References

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# PURPLE LOOSESTRIFE

## *Lythrum salicaria* L.

**Family:** *Lythraceae* (Loosestrife).

**Other Scientific Names:** None.

**Other Common Names:** Purple lythrum.

**Legal Status:** Not categorized.



## Identification

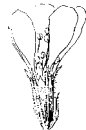
**Growth form:** Perennial forb or woody half-shrub.

**Flower:** Showy flowers are purple with 5–7 petals arranged in long vertical racemes.

**Seeds/Fruit:** Fruits are many-seeded capsules, seeds are small and ovoid.

**Leaves:** Leaves are simple, entire, and opposite or whorled (Whitson et al. 1996).

**Stems:** Annual stems arise from a perennial rootstock (Mal et al. 1992). Stems are erect and often grow 0.5–2.0 m tall. Plants become taller and bushier over the years as the rootstock matures.



**Roots:** Short rhizomes and taproot.

**Seedling:** No information available.

### Similar Species

**Exotics:** Sweet rocket or dames'-violet (*Hesperis matronalis*), an introduced mustard rare in south-central BC but frequent in the province's southwest and known on Vancouver Island and the adjacent mainland (Douglas et al. 1998).

**Natives:** Sometimes confused with fireweed (*Epilobium* sp.), which has 4-petaled flowers.



## Impacts

**Agricultural:** No information available.

**Ecological:** Purple loosestrife is an ornamental escape that occupies wetlands, stream banks, and shallow ponds. It can form dense stands that reduce plant and animal diversity in wetland ecosystems (Bender and Randall 1987). Dense infestations can impede water flow in canals and ditches. Where it coexists with

cattails (*Typha latifolia*), it is favoured by fluctuating water levels because marsh draw-down helps loosestrife seedling establishment. Cattails, however, appear able to compete with loosestrife where water levels remain constant and relatively deep (FEIS 1996).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Found in wet areas at low- to mid-elevation in BC. It grows in ditches, irrigation canals, marshes, stream and lake shorelines, and wetlands (Powell et al. 1994). Some common associates include cattail, reed canarygrass (*Phalaris arundinacea*), sedge (*Carex* sp.), bulrush (*Scirpus* sp.),

rush (*Juncus* sp.), and willow (*Salix* sp.). The plant can tolerate a wide range of conditions (up to 50% shade), can grow on calcareous and acidic soils (Rutledge and McLendon. Undated), and will even grow in standing water. Moisture is required for growth and reproduction, but well-established plants can persist on

dry sites for many years (Powell et al. 1994).

**Distribution:** Common in the Lower Fraser Valley and frequent on southern Vancouver Island (Douglas et al. 1999). There are also localized pockets in the south Okanagan and Boundary areas. It is regarded as a major concern in Kootenay, Okanagan, Mainland, and Vancouver Island agricultural reporting regions and is present in the Thompson and Omineca regions as well. It occurs throughout North America.

**Historical:** Introduced from Eurasia and first recorded in North America in 1814 (Bender and Randall 1987).

**Life cycle:** Begins its growth about 7–10 days after cattail and reed canary grass. Seedlings that establish in the spring grow rapidly and produce flowers 8–10 weeks after germination. After flowering, each stem supports a dense, spiraling row of dark-brown seed capsules.

## Management

**Biocontrol:** Three agents have been released in the province (Powell et al. 1994). *Hyllobius transversovittatus* (root boring beetle) can seriously damage the root system, stunt growth, and reduce seed production. Adult weevils emerge in April and feed on loosestrife shoots. Eggs are deposited on the shoot base, and larvae bore into the roots. Two leaf-eating beetles, *Galerucella californiensis* and *Galerucella pusilla*, both feed on the foliage and flower heads of the plant, and larvae leave the plant and pupate in the soil (Powell et al. 1994). These have resulted in stunted growth and reduced seed production at numerous coastal locations.

**Mechanical:** No information available.

**Fire:** No information available.

**Herbicides:** Since purple loosestrife is found in wet soils, herbicide use is restricted. Glyphosate, triclopyr, and 2,4-D have been used successfully to manage this plant in the US on some suitable sites. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**Mode of reproduction:** By seed and vegetatively from roots. Detached root or stem fragments can also root and develop into flowering stems (FEIS 1996).

**Seed production:** A single flowering stalk can produce 300,000 seeds, and densities exceeding 32,000 stems/ha have been recorded (FEIS 1996).

**Seed bank:** Seeds may remain viable for up to 20 years.

**Dispersal:** Seeds are mainly distributed by water, but they can also be dispersed by animals and humans. Seeds do not drop from capsules until the air temperature becomes cold in the early autumn.

**Hybridization:** No information available.

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent new infestations by minimizing disturbance and seed dispersal. Hand-pulling isolated plants can be effective on small infestations. Pulling should be conducted before plants set seed. Remove the entire root of the plant to avoid regrowth from root fragments.

### Integrated Management Summary

The key to effective management is early detection when infestations are small. Small infestations should be eradicated by hand-pulling or herbicide application where appropriate. It is fairly easy to manage small numbers of plants when the seed bank in the soil is small. Eradicating large population may only be possible with biocontrol.

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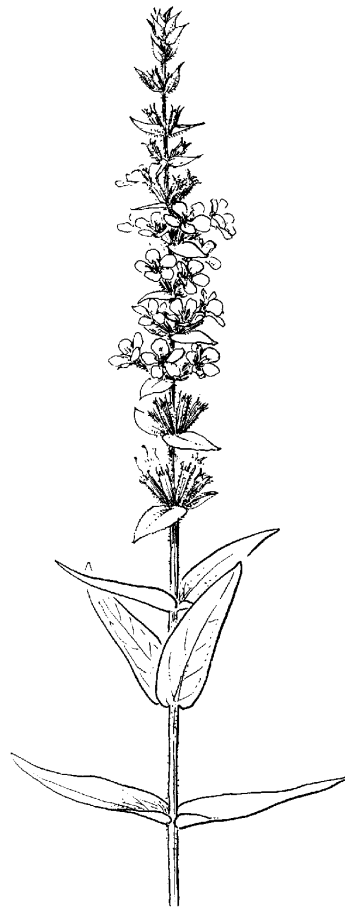
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<http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> [15 Dec 98].

Whitson, T. D. (ed.), L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 1996. Purple loosestrife. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.







# PURPLE NUTSEdge

*Cyperus rotundus* L.

**Family:** *Cyperaceae* (Sedge).

**Other Scientific Names:** None.

**Other Common Names:** Nutgrass.

**Legal Status:** Provincial Noxious.



## Identification

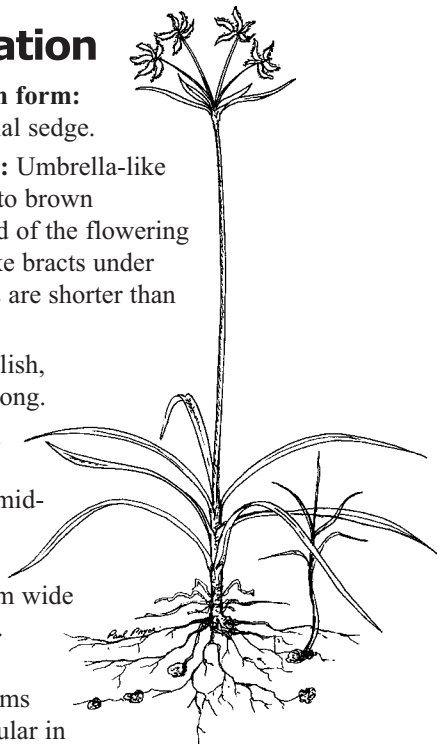
**Growth form:**  
Perennial sedge.

**Flower:** Umbrella-like clusters of purple to brown spikelets at the end of the flowering stems. The leaf-like bracts under the flower clusters are shorter than the inflorescence.

**Seeds/Fruit:** Purplish, triangular, and oblong.

**Leaves:** The basal leaves are linear with a prominent mid-rib and abruptly tapered point. Leaves are 3–8 mm wide and 5–15 cm long.

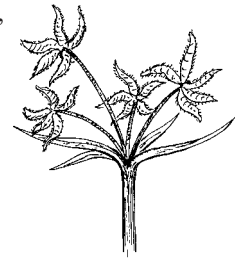
**Stems:** Plants are 30–60 cm tall. Stems are upright, triangular in



cross-section, and as long as or longer than basal leaves.

**Roots:** Much-branched rhizomes bear many tubers (nutlets). The bitter-tasting tubers are oblong, covered in reddish scales, and often connected in chains.

**Seedling:** Uncommon, since most plants develop from tubers. Leaves are smooth, ribbed, and 3-ranked, and stems are triangular in cross-section.



## Similar Species

**Exotics:** Yellow nutsedge is very similar in appearance but has yellowish brown spikelets with long, leafy bracts, the leaves gradually tapering to a point, and the smooth, round tubers being borne on the end of the rhizomes.

**Natives:** None known.

## Impacts

**Agricultural:** Nutsedges are among the most difficult weeds to control and can rapidly colonize turf, ornamental areas, pastures, and cultivated fields. It is a highly competitive plant because of its upright growth habit, rhizomatous root system, and rapid growth.

**Ecological:** This plant is well adapted to wet, sandy soils and poses a threat to riparian areas where disturbance has depleted the native plant community.

**Human:** Used as an ornamental for water gardens.

## Habitat and Ecology

**General requirements:** Well adapted to moist conditions and sandy soil such as ditches (Whitson et al. 1996).

**Distribution:** Not yet present in BC but is widely distributed in Arizona and southern California. Nutlets of purple nutsedge have been discovered in ornamental

nursery stock (roses) imported from Arizona.

**Historical:** Introduced in North America from Eurasia.

**Life cycle:** Rhizomes sprout from underground tubers in spring that develop into a bulbil. The bulbil produces 2 types of shoots: an upright leafy shoot that produces food to support the plant, and an underground runner

that establishes another bulbil a short distance from the parent plant. This process is repeated throughout the growing season until August, when the plant has produced enough food to complete its life cycle the following year (Kopec 1996).

**Mode of reproduction:** From tubers and occasionally from seed.

**Seed production:** No information available.

**Seed bank:** No information available on seeds. Tubers can remain dormant in the soil for extended periods.

**Dispersal:** Plants spread from rhizomes.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Cutting often stimulates the plant to produce tubers and nutlets from new rhizomes. Mechanical methods to defoliate the plant must be applied repeatedly to deplete food reserves in the nutlets and prevent storage of new food.

**Fire:** Likely to be ineffective because of the extensive root system.

**Herbicides:** The sulfonylurea group of herbicides have been effective in managing purple nutsedge.

Up to 3–5 applications/season over 3–4 years may be required to gain control. A single application may only stimulate new growth from the tubers (Kopec 1996). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Learn to identify this weed. Control new infestations immediately.

### Integrated Management Summary

Prevention is essential to keeping purple nutsedge out of BC. Public awareness can help to identify new introductions. Use tillage, mulching, competitive cropping, herbicides, and crop rotation to prevent and manage new infestations (BC Ministry of Agriculture, Food and Fisheries. Undated).

## References

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# QUACKGRASS

## *Elytrigia repens* (L.) Nevski

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** *Agropyron repens*.

**Other Common Names:** Couchgrass.

**Legal Status:** Regional Noxious: Peace River.



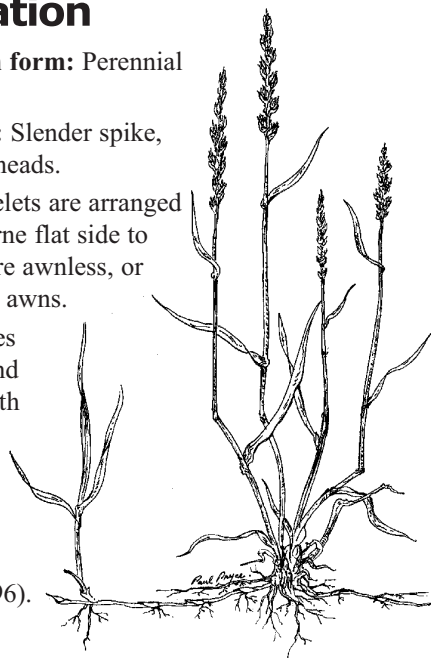
### Identification

**Growth form:** Perennial grass.

**Flower:** Slender spike, resembling wheat heads.

**Seeds/Fruit:** Spikelets are arranged in 2 long rows, borne flat side to the stem. Florets are awnless, or with short, straight awns.

**Leaves:** Leaf blades are flat, pointed, and 6–12 mm wide, with small, ear-like appendages (auricles) at the junction of the blade and sheath (Whitson et al. 1996).



**Stems:** Mature plants are usually 0.3–1.0 m tall and have erect stems.

**Roots:** Rhizomes are yellowish white, cord-like, sharp-pointed, and somewhat fleshy.

**Seedling:** Both leaf sheath and blade are hairless or sparsely hairy. Clasping auricles and a short membranous ligule are present (Carey et al. 1993).



### Similar Species

**Exotics:** None known.

**Natives:** None known.

### Impacts

**Agricultural:** Quackgrass reduces productivity in crops, rangeland, and pasture.

**Ecological:** Quackgrass rapidly invades and quickly stabilizes moist eroding soils. It invades mixed-grass

prairies, stream banks, roadsides, ditches, crop fields, gardens, yards, and disturbed moist areas. It is believed to be allelopathic (Whitson et al. 1996).

**Human:** No information available.

### Habitat and Ecology

**General requirements:** In BC, grows at low- to mid-elevations in fields, gardens, roadsides, and disturbed sites. It is well adapted to moist soils in temperate climates. The plant is only moderately shade tolerant and vigour is reduced when shading exceeds 50%.

**Distribution:** Quackgrass is common in southern parts of the province and occurs in all agricultural reporting regions in the province. It is considered a threat to the fine seeds industry in the Peace River. It is widely distributed in North America.

**Historical:** Introduced from Europe.

**Life cycle:** Rhizomes begin growth in early spring and then again in autumn with the onset of seasonal rains and cooler temperatures. Quackgrass flowers from June through August. Cross-pollination is necessary for seed production. Seeds germinate in autumn or spring, and plants are capable of producing seeds more than once per season.

**Mode of reproduction:** Mainly vegetatively from roots but also by seed.

**Seed production:** No information available.

**Seed bank:** Seeds may remain viable for up to 10 years.

**Dispersal:** No information available.

**Hybridization:** Although considered a weed, quackgrass is often crossed with other wheat grasses to create hybrids for grazing.

## Management

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**Biocontrol:** None.

**Mechanical:** Very difficult to manage by mechanical methods because broken rhizomes quickly regenerate (Rutledge and McLendon. Undated). Mowing can prevent flowering the following season under some circumstances (FEIS 1996).

**Fire:** Burning may reduce vigour and abundance (Rutledge and McLendon. Undated).

**Herbicides:** Many herbicides are available for selective control of quackgrass in crops and non-crop situations. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent new infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining healthy native communities.

### Integrated Management Summary

Combining mowing or burning to reduce plant vigour with herbicides may be the most effective way to control quackgrass. It may also be gradually replaced by other species through natural succession processes (Rutledge and McLendon. Undated).

## References

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# REDROOT PIGWEED

## *Amaranthus retroflexus* L.

**Family:** *Amaranthaceae* (Amaranth).

**Other Scientific Names:** None.

**Other Common Names:** Rough pigweed, red pigweed, green amaranth.

**Legal Status:** Not categorized.



### Identification

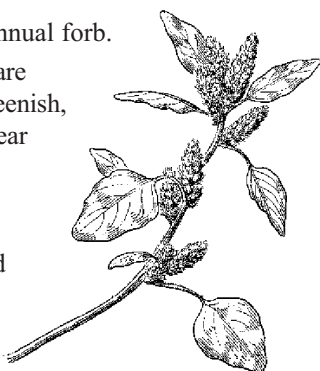
**Growth form:** Annual forb.

**Flower:** Flowers are inconspicuous, greenish, and without petals. They appear in dense, spike-like clusters up to 20 cm long at the stem ends and in leaf axils. Spine-tipped bracts give the head a bristly appearance. Plants flower from June to September, depending on geographic location.

**Seeds/Fruit:** Fruit is a capsule 1.5–2.0 mm long that contains a single glossy black seed.

**Leaves:** Alternate, dull green leaves have hairs and prominent whitish veins on the underside. Blades 3–8 cm long are carried on long stalks that often appear to droop.

**Stems:** Rough, angular stems grow 0.5–1.0 m tall. Plants are usually branched. Stems are red near the



roots and hairy near the tips, with dandruff-like scales beneath the flowers (Douglas et al. 1998).

**Roots:** Short, fleshy taproot is often pinkish to red.

**Seedling:** Cotyledons are lanceolate with reddish purple undersides. The stem is dark red near the soil surface. The first leaves are rounded, are notched at the tip, and have prominent veins (Royer and Dickinson 1999).

### Similar Species

Exotics: None.

**Natives:** Several pigweeds native to North America grow in BC. Tumble pigweed (*Amaranthus albus*) and prostrate pigweed (*Amaranthus blitoides*) bear their flowers in tiny clusters at the leaf bases instead of in spikes at the end of the stems. Green pigweed (*Amaranthus powellii*) is a slender plant with long terminal spikes and lacks the upper-stem hairs found on redroot pigweed (Frankton and Mulligan 1970).



## Impacts

**Agricultural:** One of the most common agricultural weeds, this plant infests grains, field crops, orchards, and forages. It causes significant crop yield reduction because of its rapid growth and large seed production. When grown on fertile soils, it can accumulate nitrates that can poison livestock (Alberta Agriculture 1983). This weed is a common soil contaminant and is a host to several pests of vegetable and ornamental crops, including the tarnished plant bug, European corn borer,

green peach aphid, and several viral diseases (Royer and Dickinson 1999).

**Ecological:** Grows on disturbed soils, especially around buildings. It is most abundant on fertile soils. It is unlikely to invade vigorous natural communities and does not tolerate shade.

**Human:** Can cause allergic reactions.

## Habitat and Ecology

**General requirements:** This weed requires disturbed, open conditions and thrives on fertile soils. It grows in cultivated crops, gardens, fields, roadsides, and disturbed habitats.

**Distribution:** This plant is present in all agricultural regions of the province but is more common in the south. It is found across North America.

**Historical:** Native to North America.

**Life cycle:** Redroot pigweed is an annual that germinates late in the spring when the soil has warmed, often after cultivated seedlings have emerged. Germination can continue through the summer with adequate soil moisture (Weaver and McWilliams 1980). Plants can set seed within 8 weeks of germinating, allowing 2 generations per growing season in most climates (Royer and Dickinson 1999).

**Mode of reproduction:** By seed.

**Seed production:** Each plant can produce 100,000–150,000 seeds.

**Seed bank:** Seeds are initially dormant, and most seeds germinate the spring following seeding. Some

seeds can remain dormant in the soil for up to 40 years, but most seeds are unviable after 3 years. Seeds buried below 2.5 cm will not germinate.

**Dispersal:** By wind, birds, or animals. Farm machinery, road building, and contaminated seed can also spread seeds.

**Hybridization:** Redroot pigweed will often hybridize with other pigweeds, producing a mixture of characteristics, but the hybrids are often sterile (Weaver and McWilliams 1980).

## Management

**Biocontrol:** None.

**Mechanical:** Shallow tillage in spring or autumn will encourage redroot pigweed germination. Follow-up tillage or herbicide application is needed to kill the seedlings. Plants up to 4 weeks old are easily killed by cultivation, but older plants often recover from trampling, clipping, or other injury (Weaver and McWilliams 1980). Mowing before flowering will prevent seed-set. Several mowings may be required in one season.

**Fire:** Fire will clean up herbage and destroy seeds on the plants but will not affect the seed bank. Improved fertility from fire may provide an ideal seed bed.

**Herbicides:** Redroot pigweed is relatively susceptible to herbicides commonly recommended to control broadleaf weeds both pre- and post-emergence. Some populations are resistant to triazine herbicides after repeated years of application. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Treat new infestations immediately. Focus attention on areas with fertile soils like farmyards, corrals, and manure piles. Till, mow, or hand-pull small populations before they set seed. Maintain healthy perennial plant communities.

### Integrated Management Summary

Redroot pigweed is a pioneering species adapted to open, fertile conditions. It competes against other plants by its rapid growth and prolific seed production. Reducing opportunities for establishment can control this weed. Till, cut, or hand-pull before large infestations establish and a seed bank develops. For large infestations, use appropriate herbicides. Seed disturbed areas to perennial grasses and forbs and manage livestock to maintain perennial plant communities.

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# RUSH SKELETONWEED

## *Chondrilla juncea* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Skeletonweed, gum succory, devil's-grass, naked weed, hog-bite.

**Legal Status:** Provincial Noxious.



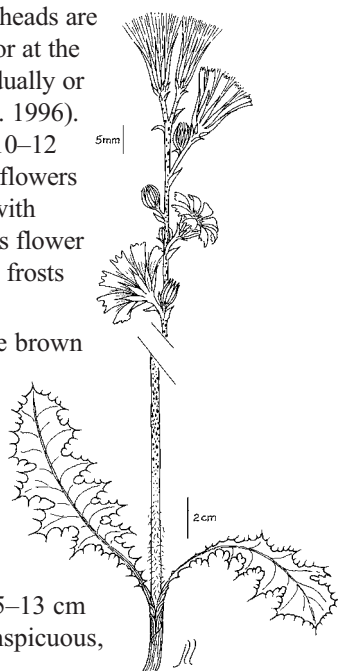
## Identification

**Growth form:** Perennial forb.

**Flower:** Flower heads are produced along or at the ends of stems, either individually or in groups of 2–3 (Rees et al. 1996). Each flower head contains 10–12 strap-shaped, bright yellow flowers that are flat across the end with distinct lobes or teeth. Plants flower in midsummer until autumn frosts (Powell et al. 1994).

**Seeds/Fruit:** Seeds are pale brown to nearly black and have a white pappus.

**Leaves:** Leaves form in a basal rosette, are sharply toothed, and wither as the flower stem develops. Rosette leaves are lance-shaped, deeply lobed, and 5–13 cm long. Stem leaves are inconspicuous,

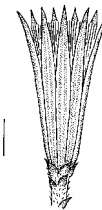


narrow, and entire (Whitson et al. 1996).

**Stems:** Mature plants are 0.4–1.0 m tall. Lower stems have short, downwardly bent, coarse hairs. Upper stems are smooth.

**Roots:** Deep, extensive root system.

**Seedling:** No information available.



### Similar Species

**Exotics:** There are 3 forms of rush skeletonweed in the US, each differing in the morphology of their inflorescence and their susceptibility to control measures (Sheley et al. 1999). It has not been clearly established if all 3 forms occur in BC.

**Natives:** Sometimes confused with rushlike skeleton-plant (*Lygodesmia juncea*), which has pink (occasionally white) flowers and grows in the southern Interior.

## Impacts

**Agricultural:** Infestations of rush skeletonweed can reduce livestock and wildlife forage (Sheley et al. 1999). The extensive and deep root system makes the plant difficult to manage (Whitson et al. 1996).

The latex the plant produces can cause serious problems with crop harvest machinery when the plant establishes on cropland (Rees et al. 1996). Rush skeletonweed can provide limited value as forage

during a drought. Rosette leaves and pre-flowering stems are palatable and nutritious.

**Ecological:** In the US, rush skeletonweed has formed dense monocultures that displace native plants, but it rarely invades healthy native communities (Sheley et al. 1999).

**Human:** No information available.



## Habitat and Ecology

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**General requirements:** Rush skeletonweed occupies rangelands, roadsides, and disturbed habitats at mid-elevations in the dry grassland zone of the province (Powell et al. 1994). It generally inhabits well-drained, light-textured soils. It is capable of growing in a wide range of conditions but appears best adapted to areas that have cool winters, warm summers, and a predominance of winter and spring rainfall (Rees et al. 1996). This species grows in disturbed habitats and in overgrazed rangeland, especially in the US Pacific Northwest and California (Sheley et al. 1999).

**Distribution:** Infestations occur in the Vernon area, Crescent Valley, Kimberley, Windermere, and Creston. Rush skeletonweed presently is regarded as a major concern in the Kootenay and Okanagan agricultural reporting regions.

## Management

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**Biocontrol:** *Aceria chondrillae* (gall mite) and *Puccinia chondrillina* (stem and leaf rust) have been released in BC. The gall mite appears to be effective in distorting the growth of the plant, but no data are available to assess its effect on rush skeletonweed populations. *Puccinia chondrillina* has had impacts on this species in California (Supkoff et al. 1988). Rotational grazing with sheep can control rush skeletonweed if the weeds are grazed at a moderate level while desirable plants are grazed lightly (Sheley et al. 1999).

**Mechanical:** Hand-pulling can be used on small infestations, but repeated treatments will likely be required because of the plant's extensive root system. Mowing and cultivation are ineffective at controlling rush skeletonweed (Sheley et al. 1999).

**Fire:** No information available.

**Herbicides:** Picloram has been effective when applied to rosettes (Sheley et al. 1999). Repeated applications of a mixture of glyphosate and dicamba have also been effective on rush skeletonweed populations in California (Calweed 1997). Similarly, annual applications of a mixture of clopyralid and dicamba provided 95% control of rush skeletonweed in Australia over 3 years (Heap 1993). Herbicides should

**Historical:** Introduced from southern Europe.

**Life cycle:** A tap-rooted perennial forb.

**Mode of reproduction:** By seed and vegetatively from roots. Plants reach 0.4–1.0 m tall at maturity. Rosettes develop from root buds in the autumn (Powell et al. 1994) or from germinating seed.

**Seed production:** A single multi-stemmed plant may produce as many as 15,000–20,000 seeds.

**Seed bank:** No information available.

**Dispersal:** Seeds are dispersed by wind, water, animals, and humans.

**Hybridization:** No information available.

be applied after the plant has bolted but before it sets seed. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions. Cultural/Preventive:** Prevent establishment of new infestations. Manage land use to maintain vigorous native communities. Seed disturbed areas to desirable perennial species.

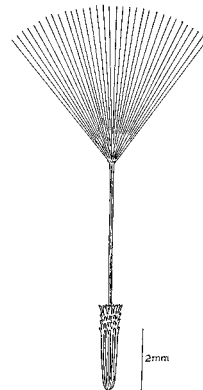
### Integrated Management Summary

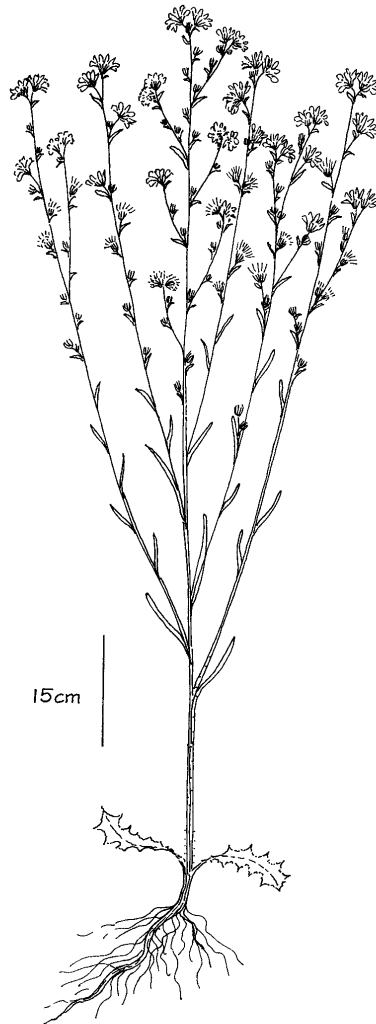
Rush skeletonweed is not widely spread in the province and it is thus important that new infestations be identified early and dealt with immediately. Hand-pulling, cutting to prevent seed-set, and herbicide applications should all be considered for early treatment. Report occurrences of this plant immediately to the weed specialists in the Ministry of Agriculture, Food and Fisheries, the Ministry of Forests, or your Regional District Weed Coordinator.

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# RUSSIAN KNAPWEED

## *Acroptilon repens* (L.)

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** *Centaurea repens*.

**Other Common Names:** Turkestan thistle, mountain bluet, creeping knapweed.

**Legal Status:** Regional Noxious: North Okanagan.



### Identification

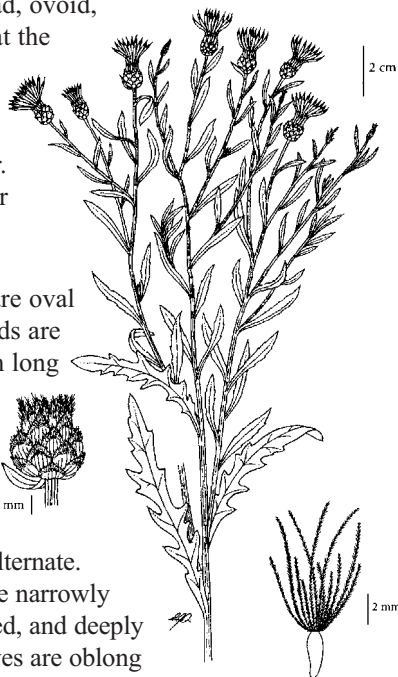
**Growth form:** Perennial forb.

**Flower:** The flower heads of Russian knapweed are urn-shaped, solitary, and composed of disk flowers only (Zimmerman 1996). Floral bracts are broad, ovoid, entire, and greenish at the base, with papery, finely hairy edges.

Flowers are numerous, all tubular. The petals are pink or purple, turning straw coloured at maturity.

**Seeds/Fruit:** Seeds are oval and compressed. Seeds are greyish or ivory, with long white bristles (pappus) at the tip when young, but these fall from the seed as it matures.

**Leaves:** Leaves are alternate. Lower stem leaves are narrowly oblong to lance-shaped, and deeply lobed. The upper leaves are oblong



and toothed and become progressively smaller.

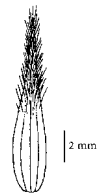
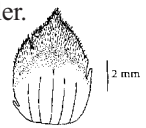
Rosette leaves are lance-shaped, tapering at both ends with the broadest part at the tip.

**Stems:** Mature plants are 0.45–1.0 m tall.

The stems are erect, thin, stiff, branched, and when young are covered with soft, short, grey hair (Zimmerman 1996).

**Roots:** Russian knapweed's well-developed root system functions as the major means of propagation and spreading. The roots are easily recognizable by their black or dark brown colour and presence of small, alternately arranged scale leaves, which support buds in their axils (Zimmerman 1996).

**Seedling:** The cotyledons (seed leaves) are oval. The first true leaves are alternate and lanceolate with shallow toothed or smooth edges. The surface of the leaves looks greyish green but is not hairy.



### Similar Species

**Exotics:** Russian knapweed can be distinguished from other knapweeds by the pointed papery tips of the floral bracts.

**Natives:** Many native members of *Asteraceae* resemble knapweed in the rosette stage.

### Impacts

**Agricultural:** Reduces yield and quality of cereal crops and is toxic to horses. Plant extracts have been shown to be inhibitory to growth of other plants.

**Ecological:** Russian knapweed forms dense stands that can displace native species and reduce forage production (Whitson 1999). Once established, the plant extends in all directions and can cover an area of 3.6 m<sup>2</sup> within 2 years (Watson 1980). Russian knapweed contains allelopathic compounds that inhibit the growth of competing plants (Stevens 1986). Tests conducted

with alfalfa (*Medicago sativa*), barnyard grass (*Echinochloa crusgalli*), and red millet (*Panicum miliaceum*) revealed it inhibited root elongation of grasses and broad-leaved plants by 30% when the polyacetylene compound is at a soil concentration of 4 parts per million (Stevens 1986). This allelopathic effect, combined with dense vegetative reproduction, allows Russian knapweed to colonize and dominate new sites quickly.

**Human:** No information available.

## Habitat and Ecology

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**General requirements:** Russian knapweed occurs in southern BC east of the Coast-Cascade mountains in low- to mid-elevation grasslands and forests. It commonly grows along roadsides, riverbanks, irrigation ditches, pastures, clear-cuts, cropland, and disturbed habitats. It is not restricted to any particular soil but does especially well in clay soils. Selleck (1964) observed that infestations increased in dry locations but decreased in moist locations due to competition with perennial grasses.

**Distribution:** Russian knapweed is found in the south of the province east of the Coast-Cascade Mountains (Douglas et al. 1998), particularly in warm valley bottoms (Powell et al. 1994). It is considered a major problem in the Okanagan agricultural reporting region and is present in the Kootenay, Okanagan, Thompson, and Peace River areas.

**Historical:** Introduced from Eurasia, probably as a contaminant in crop seed.

**Life cycle:** Russian knapweed has an extensive root

system and low seed production and is very persistent. It is a strong competitor and can form dense colonies in disturbed areas. Russian knapweed spreads by rhizomes and seed. Shoots emerge early in spring. All shoot development originates from root-borne stem buds (Watson 1980). Buds arise adventitiously at irregular intervals along the roots. Plants form rosettes and bolt in late May to mid-June, depending on locality. The plant flowers from June to October (Zimmerman 1996).

**Mode of reproduction:** Primarily vegetatively; possibly by seed.

**Seed production:** A single plant may produce 1,200 seeds/year.

**Seed bank:** Seeds may remain viable 2–8 years (Carpenter and Murray 1998).

**Dispersal:** Knapweed seeds are often spread in hay and on vehicle undercarriages.

**Hybridization:** No information available.

## Management

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**Biocontrol:** *Subanguina picridis* (nematode) has been experimented with as a biocontrol agent in BC and Colorado but is not available for general distribution.

**Mechanical:** Cutting or removal of the above-ground portion of the plant reduces the current-year growth and may eliminate seed production, but it will not kill Russian knapweed. Cutting several times before the plants bolt stresses Russian knapweed plants and forces them to use nutrient reserves stored in the root system. The plants that re-emerge are usually smaller in size and less vigorous. Once plants have bolted, there are no more buds on the roots capable of reproduction until buds begin to form again in mid-August to September.

**Fire:** No information available.

**Herbicides:** Picloram is considered the most effective herbicide for Russian knapweed regardless of application time (Duncan 1994). Clopyralid is also effective and has little or no impact on many other forbs. Whitson (1999) found that combinations of picloram, clopyralid, and 2, 4-D were effective for managing Russian knapweed in Wyoming at the bloom or seed stage. Benz et al. (1999) found that clopyralid + 2,4-D treatment of Russian knapweed in the late bloom stage followed by autumn seeding of a

bunchgrass and a sod-forming grass was the most effective management method. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Maintain perennial native communities, and minimize disturbance and seed distribution.

### Integrated Management Summary

A combination of cutting and herbicides can be used to manage Russian knapweed. In the autumn, apply picloram to plants that have re-emerged. Repeated applications may be required for several years to exhaust the soil seed bank. The most effective method of control for Russian knapweed is to prevent its establishment, maintaining vigorous perennial plant communities. Seed disturbed sites to perennial grasses to provide competition.

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# RUSSIAN THISTLE

## *Salsola kali* L.

**Family:** *Chenopodiaceae* (Goosefoot).

**Other Scientific Names:** None.

**Other Common Names:** Tumbleweed.

**Legal Status:** Regional Noxious: Peace River.



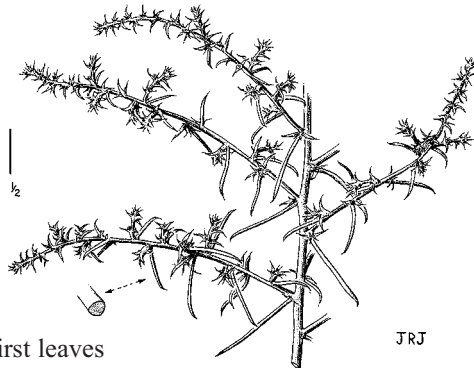
## Identification

**Growth form:** Annual forb.

**Flower:** Inconspicuous flowers are borne in axils of the upper leaves. Each flower is accompanied by a pair of spiny floral bracts (Whitson et al. 1996).

**Seeds/Fruit:** Small, one-seeded fruits with winged tips. Seeds are round, black, smooth, and shiny.

**Leaves:** Leaves are alternate; the first leaves are long, string-like, and soft.



Later leaves are short, scale-like, and tipped with a stiff spine (Whitson et al. 1996).

**Stems:** Mature plants are 0.1–1.0 m tall and are rounded, bushy, and highly branched. Stems are red or purple striped.

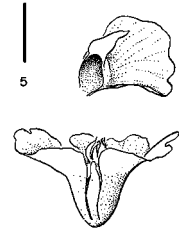
**Roots:** The root system consists of a taproot that can grow 1 m or more in depth with extensive lateral roots.

**Seedling:** Seedling plants have long, fleshy leaves.

### Similar Species

**Exotics:** Small kochia (*Kochia scoparia*) plants can sometimes look similar.

**Natives:** None known.



## Impacts

**Agricultural:** Well adapted to cultivated dryland agriculture but also found on disturbed rangeland and disturbed habitats.

**Ecological:** Russian thistle colonizes barren desert areas that cannot support other flora and invades many different disturbed plant communities. Since its introduction it has become one of the most common and troublesome weeds in the drier regions of the US

(Whitson et al. 1996). It occurs in many communities and is most common along disturbed grassland and desert communities. In disturbed big sagebrush communities, it dominated for the first 2 years. Plants then became overcrowded and stunted and were replaced by mustards (FEIS 1996).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** In BC, Russian thistle grows at low- to mid-elevations along roadsides, railroad tracks, fields, and disturbed or unoccupied sites. It grows on well-drained, uncompacted soil with a sunny exposure. It cannot tolerate saturated soil for extended periods.

**Distribution:** Frequent in southern areas of the province (Douglas et al. 1998), Russian thistle is found throughout central and western North America.

**Historical:** Introduced from Eurasia.

**Life cycle:** Russian thistle is capable of germinating over a wide range of seedbed temperatures (FEIS 1996).



Plants usually flower from July through October, depending on geographic location. Seeds mature during August through November. Seedlings are poor competitors and do not establish in communities with high plant density (FEIS 1996).

**Mode of reproduction:** By seed.

**Seed production:** One plant can produce up to about 250,000 seeds (Cranston et al. 1996).

**Seed bank:** Seeds remain viable less than a year.

**Dispersal:** After seeds mature in the autumn the plant stem separates from the root, and the plant tumbles in the wind.

**Hybridization:** No information available.

## Management

**Biocontrol:** None available in BC.

**Mechanical:** Mowing or pulling young plants can be used to manage Russian thistle. Repeated applications over several years may be required for successful management.

**Fire:** Prescribed burning is not recommended for managing the plant because it colonizes disturbed habitats such as burned areas (FEIS 1996).

**Herbicides:** Dicamba and glyphosate have been successfully used to manage Russian thistle (Calweed 1997). Numerous herbicides are registered for control in crop situations. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production, and maintaining healthy native communities.

### Integrated Management Summary

Russian thistle only can be managed by eliminating seed production and by depleting the soil seed bank. Cut, pull, or treat plants with herbicide before seed-set. Seed disturbed areas to perennial grasses.

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# SCENTLESS CHAMOMILE

## *Matricaria perforata* Merat

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** *Matricaria maritima* var. *agrestis*;  
*Matricaria maritima* var. *inodoura*.

**Other Common Names:** Scentless mayweed, false chamomile.

**Legal Status:** Provincial Noxious.



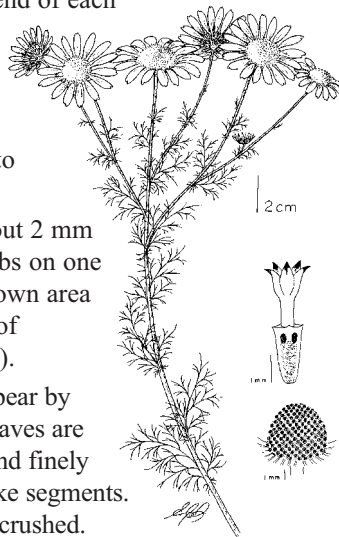
## Identification

**Growth form:** Annual, biennial, or sometimes perennial forb.

**Flower:** Single white daisy-like flowers with yellow centres at the end of each stem. The numerous bracts of the flower head are arranged in overlapping rows. The receptacle lacks scales. Flowers from June to October.

**Seeds/Fruit:** Seeds are about 2 mm long, dark brown, with 3 ribs on one side and a broad central brown area on the other (BC Ministry of Agriculture and Food 1984).

**Leaves:** Basal leaves disappear by flowering time. The stem leaves are alternate, usually smooth, and finely divided into short, thread-like segments. Leaves are odourless when crushed.



**Stems:** Mature plants are 5–100 cm tall. The stems are erect to semi-erect, smooth, and branched.

**Roots:** Extensive, fibrous root system.

**Seedling:** The cotyledons (seed leaves) are rounded and stalkless. The first leaves are divided into narrow segments (Royer and Dickinson 1999).

### Similar Species

**Exotics:** Several introduced plants have flowers and leaves similar to scentless chamomile. Leaves of wild chamomile (*Matricaria recutita*), stinking mayweed (*Anthemis cotula*), and pineapple weed (*Matricaria discoidea*) have a strong odour when crushed, while scentless chamomile leaves are almost odourless. Corn chamomile (*Anthemis arvensis*) has stems that are hairy below the heads, and the receptacle has scales (Frankton and Mulligan 1970). Oxeye daisy (*Leucanthemum vulgare*) has similar flowers, but the leaves on scentless chamomile are much more finely dissected.

**Natives:** None.



## Impacts

**Agricultural:** Reduces yields in grain and seed fields, hayfields, pastures, and cultivated crops. On cropland, it is most problematic in areas with high soil moisture and minimal tillage (Harris and McClay 2001). It is unpalatable to livestock and can form dense stands in pastures and hayfields (Alberta Agriculture 1994).

**Ecological:** This plant is well adapted to heavy soils around shorelines and watercourses, and it germinates under periodic flooding conditions, which allows near monocultures to grow near ponds, streams, and other frequently flooded areas (Alberta Agriculture 1995).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Grows from low- to mid-elevations in BC and is found on dry shorelines, roadsides, fencelines, disturbed areas, and perennial forage crops.

**Distribution:** Present in all of the province's

agricultural regions and is a major concern in the Kootenay, Okanagan, Peace River, and Thompson regions. It occurs in all provinces of Canada but is most common in the Maritimes and Prairies.

**Historical:** Introduced from Europe.

**Life cycle:** Annual, biennial, or short-lived perennial. Seedlings may emerge anytime from spring to autumn. The early-emerging plants flower during the year of germination, but later-emerging plants overwinter to develop into a large, multiple-branched plant. Flowering can occur from May to October, depending on geographic location, with overwintering plants flowering first. The plant has a long flowering season, and seeds are viable as soon as the flower is formed (Alberta Agriculture 1985).

**Mode of reproduction:** By seed.

**Seed production:** Up to a million seeds can be produced by each plant and up to 1.8 million seeds/m<sup>2</sup> can be produced in a dense stand (Alberta Agriculture 1995).

**Seed bank:** Seeds remain viable longer in undisturbed soil than in cultivated land.

**Dispersal:** Seeds float readily on water so that first infestations are often around watercourses (Alberta Agriculture 1985). Seeds also disperse in contaminated crop seed, in animal feed, and on equipment.

**Hybridization:** No information available.

## Management

**Biocontrol:** The seed-head weevil (*Omphalapion hookeri*) and the stem-boring weevil (*Microplontus endentulus*) have both been released in BC. Monitoring is required to determine impact.

**Mechanical:** Frequent shallow tillage will manage seedlings effectively by encouraging germination of seeds after the current seedlings have been destroyed. Plants are less likely to re-establish if soils are tilled during hot, dry weather and before plants flower. Seed production can be reduced if plants are mowed before they flower in pastures, hay land, and non-crop land. Scentless chamomile produces new flowers below the cutting height of the swather. Mowing will be effective only if the stands are mowed early and often, with each successive mowing lower than the previous one (Alberta Agriculture 1997).

**Fire:** Burning seed heads can be effective to prevent spread.

**Herbicides:** Picloram, dicamba, and MCPP have been effective in non-crop areas. Apply herbicides early in the season before flowering. Consult the most recent edition of BC Ministry of Agriculture, Food and

Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Hand-pulling can prevent spread into new areas and can be effective on small infestations. Scentless chamomile does not compete well with vigorous plants. Avoid disturbance in natural areas and graze moderately to maintain competitive perennial plant communities (Alberta Agriculture 1997).

### Integrated Management Summary

Management can be achieved through prevention of seed production and competition from desirable plants. An integrated approach using tillage, mowing, and cropping can be used to manage this plant (Alberta Agriculture 1997).

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# SCOTCH THISTLE

## *Onopordum acanthium* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Cotton thistle, winged thistle.

**Legal Status:** Regional Noxious: North Okanagan.



### Identification

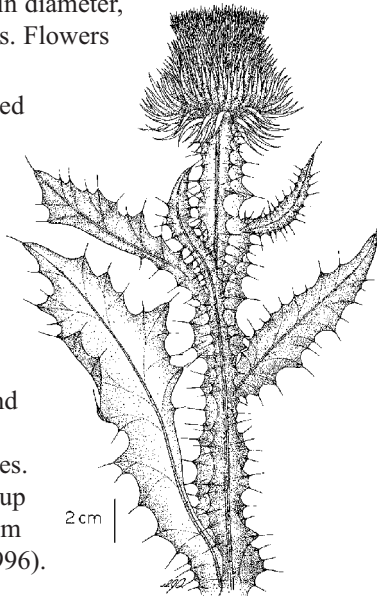
**Growth form:** Biennial or perennial forb.

**Flower:** Flower heads are numerous, 2.5–5.0 cm in diameter,

with spine-tipped bracts. Flowers are violet to reddish.

**Seeds/Fruit:** One-seeded fruit (achene) is wrinkled, brown to greyish black, and tipped with a plume (pappus) of slender bristles (Stubbenieck et al. 1995).

**Leaves:** Leaves are alternate, very large, and irregularly lobed, and have sharp yellow spikes. Rosette leaves may be up to 60 cm long and 30 cm wide (Whitson et al. 1996).



Upper and lower leaf surfaces are covered with a thick mat of cotton-like or woolly hairs, giving the foliage a grey-green colour (Dewey 1991).

**Stems:** Mature plants can be 1.5–3.0 m tall. Stems are numerous and branched and have broad, spiny wings and woolly hairs.

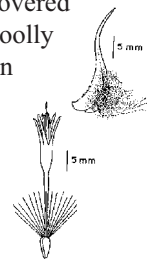
**Roots:** Thick, fleshy taproot.

**Seedling:** No information available.

### Similar Species

**Exotics:** Scotch thistle is the only member of this genus in BC (Douglas et al. 1998).

**Natives:** None.



### Impacts

**Agricultural:** Can be competitive with desirable native forage species when it forms dense stands that are impenetrable to livestock. This species can occasionally invade field crops.

**Ecological:** No information available.

**Human:** No information available.

### Habitat and Ecology

**General requirements:** In BC, Scotch thistle is found at low elevations along roadsides and disturbed areas (Douglas et al. 1998). It also grows in irrigation ditches, in disturbed habitats, and on rangelands. The seeds contain a water-soluble germination inhibitor, so it is often successful in moist areas that are adjacent to riparian or sub-irrigated areas along stream courses.

**Distribution:** Present only and regarded as a major concern in the Okanagan.

**Historical:** Introduced from Eurasia.

**Life cycle:** A biennial that produces a large, ground-level rosette the first year and a tall, spiny plant in the second year. Flowering occurs from mid-June to September, depending on location.

**Mode of reproduction:** By seed.

**Seed production:** Individual plants can produce 70–100 flowering heads, each containing 100–140 seeds (Young and Evans 1969).

**Seed bank:** Seeds may remain viable in the soil for over 30 years.

**Dispersal:** Mainly by wind. Seeds can be dispersed by attaching to clothing or animal fur, or by transport in hay, machinery, or water.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Mowing or hand-cutting are usually most effective in combination with other methods. Plants can regrow from severed roots, and cut stems may still produce viable seed.

**Fire:** No information available.

**Herbicides:** Picloram, dicamba, 2,4-D, and clopyralid have been effective in managing Scotch thistle. Combinations of dicamba and 2,4-D, or clopyralid and 2,4-D, have also been used. Herbicides should be applied in spring before the plant bolts or in the autumn to rosettes (Beck 1991). Metsulfuron-methyl is effective after bolting begins (Beck 1999). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Maintain a strong, competitive perennial plant cover.

### Integrated Management Summary

Management has been effective when the taproot is cut 2.5–5.0 cm below the ground and a follow-up application of herbicides occurs. New infestations should be dealt with immediately. Manage livestock grazing to maintain vigorous native plant communities and seed disturbed areas to perennial plants.

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# SHEEP SORREL

*Rumex acetosella* L.

**Family:** *Polygonaceae* (Buckwheat).

**Other Scientific Names:** *Rumex angiocarpus*.

**Other Common Names:** Field sorrel, red sorrel, sourgrass.

**Legal Status:** Not categorized.



## Identification

**Growth form:** Annual or perennial creeping forb.

**Flower:** Small flowers form in narrow panicles at the end of the stems. Flower stalks are jointed near the base of the flower (Douglas et al. 1999). Male and female flowers are borne on separate plants. Male flowers are orange-yellow and female flowers are red-orange (Cranston et al. 2000). In female flowers the inner sepals tightly enclose the seeds.

**Seeds/Fruit:** Smooth, shiny seeds are triangular, reddish brown, about 1.5 mm long.



**Leaves:** Basal leaves are mostly arrow-shaped with lobes pointed outward, but some may be linear or egg-shaped. Leaves are smooth with blades 1–5 cm long and stalks often are longer than the blades (Douglas et al. 1999). Stem leaves are alternate and nearly without stalks. Leaves have a distinctive sour taste.

**Stems:** Smooth, wiry, unbranched below the inflorescence, and 15–30 cm tall.

**Roots:** Slender, much-branched rhizomes.

**Seedling:** No information available.

### Similar Species

**Exotics:** Garden sorrel (*Rumex acetosa*) has similar arrowhead-shaped leaves, but the leaf lobes point downward, and it is an annual plant with a taproot.

**Natives:** No native sorrels resemble sheep sorrel.



## Impacts

**Agricultural:** Infests meadows and pastures, often on poorly drained or impoverished soils. Sheep sorrel can result in forage seeding failures on soils with large seed banks (Frankton and Mulligan 1970). A common problem in turf as well.

**Ecological:** Commonly occupies roadsides, fields,

pastures, and other disturbed habitats, especially on sandy soils or where recent fires have occurred. Heavy infestations may inhibit re-establishment of native species (Northern Prairie Wildlife Research Center. Undated).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Tolerates a wide range of soil conditions from acid to alkaline but is most common on soils with low fertility. In BC, it is found in gardens, lawns, pastures, roadsides, meadows, and disturbed areas.

**Distribution:** Found in all agricultural regions, but it is

most common in southern BC. It occurs in all provinces and throughout the US.

**Historical:** Introduced from Eurasia.

**Life cycle:** Perennial that quickly develops spreading rhizomes after germination. The rhizomes produce whitish buds that grow into leafy above-ground shoots

and result in very dense patches. The plant may grow as an annual that completes its life cycle in one growing season.

**Mode of reproduction:** By seeds and creeping rhizomes.

**Seed production:** About 250 seeds/plant.

**Seed bank:** No information available.

**Dispersal:** By wind, water, and vehicles. Soil disturbance spreads rhizomes, which re-establish.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Cultivation can be effective in controlling this species, but inadequate treatments may spread rootstocks of established plants. Effective cultivation requires repeated and frequent removal of topgrowth for one or more seasons, which will eventually starve the roots. Plants are generally too low to be affected by mowing.

**Fire:** Fire probably kills topgrowth but may not affect rhizomes.

**Herbicides:** Many herbicides are registered for control. Control is most effective on actively growing, young plants. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Competitive crops resist invasion of this weed. Application of lime or fertilizer

(especially nitrogen) favours desirable plants. Deteriorating pastures may require reseeding. Companion crops help impede population growth of this weed while the forage seedlings get established.

### Integrated Management Summary

Early detection is important to limit establishment of mature plants and large infestations. Hand-pull plants before mature plants establish extensive root systems with rhizomes. Apply herbicides to control mature plants and seed disturbed areas to perennial grasses and forbs to provide cover and competition against this weed.

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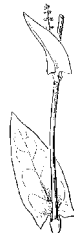
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# SHEPHERD'S-PURSE

*Capsella bursa-pastoris* (L.) Medic.

**Family:** Brassicaceae (Mustard).

**Other Scientific Names:** None.

**Other Common Names:** None.

**Legal Status:** Not categorized.



## Identification

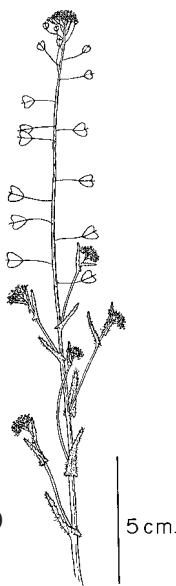
**Growth form:** Annual or winter annual.

**Flower:** The inflorescence is a long, many-flowered raceme. Flowers are clustered at the end of slender, spreading stalks 7–15 mm long (Douglas et al. 1998). Each tiny flower has 4 notched petals.

**Seeds/Fruit:** Fruit are flattened triangular or heart-shaped pods resembling a purse. Stalks elongate after the pods develop.

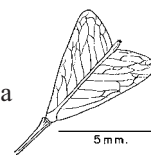
**Leaves:** Basal leaves are stalked, deeply lobed, and hairy, and form a rosette. Stem leaves are alternate and unstalked, and clasp the stems.

**Stems:** Stems are erect and simple or branched at the base. Stems grow 10–90 cm tall and are covered with grey hairs.



**Roots:** Thin, branched taproot.

**Seedling:** Cotyledons are rounded and long-stalked with a grainy appearance. The first true leaves are opposite with numerous star-shaped hairs (Royer and Dickinson 1999).



### Similar Species

**Exotics:** Stinkweed (*Thalspi arvensis*) also has flattened seed pods on stalks along a raceme, but it has much larger seed pods and the whole plant is completely smooth.

**Natives:** Some species of rock cress (*Arabis* sp.) resemble shepherd's purse, but none have the distinctive purse-shaped pods.



## Impacts

**Agricultural:** This weed of cultivated fields, row crops, hayfields, and pastures can seriously reduce crop yield. It is a host to many viral diseases as well as to a fungus that attacks vegetables in the mustard family (Royer and Dickinson 1999).

**Ecological:** Common on disturbed areas in native plant communities but impacts poorly understood.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** This plant grows under a wide range of environmental conditions. It is found in cultivated fields, hayfields, gardens, and roadsides and other disturbed areas. It is commonly found on slash piles on logged areas.

**Distribution:** Shepherd's purse grows in all agricultural regions of the province and is found in temperate regions around the world.

**Historical:** Introduced from Eurasia.

**Life cycle:** The annual form germinates in the spring or summer and produces seed the first year. Winter annuals germinate late in summer or in autumn, overwinter as rosettes, and set seed the following year.

**Mode of reproduction:** By seed.

**Seed production:** One plant may produce up to 40,000 seeds.



**Seed bank:** Both dormant and non-dormant seeds are formed. Non-dormant seeds germinate readily at high or alternating temperatures and account for seedlings emerging late in the season. Dormant seeds are very long-lived in the soil and will remain dormant if buried deeper than 2 mm (Holm et al. 1977). Dormancy can be broken with exposure to light following a period of cool temperatures (below 15°C). These conditions are met with spring tillage.

**Dispersal:** Seeds can be dispersed through ingestion by birds or animals, or spread on vehicles, on equipment, or in hay.

**Hybridization:** None known.

## Management

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**Biocontrol:** None.

**Mechanical:** Small infestations can be hand-pulled or tilled. Frequent cultivation of summerfallow or unplanted areas will bring seeds to the surface and maximize germination. Repeated harrowing may be required in infested fields before reseeding.

**Fire:** Fire is ineffective.

**Herbicides:** Numerous herbicides are available for control of shepherd's purse. Their selection depends on the crop and environmental conditions. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Monitor disturbed areas for new outbreaks. Maintain strong perennial stands in pastures.

If necessary, reseed deteriorating stands. Prevent seed-set on established infestations by mowing or herbicide application.

### Integrated Management Summary

Integrated management may require a combination of mechanical, cultural, and chemical treatments, depending on an infestation's size and location. On cropland, this plant can be a significant weed, but on non-cropland it is often regarded as a nuisance with little ecological impact.

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# SPOTTED KNAPWEED

*Centaurea biebersteinii* DC.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** *Centaurea maculosa*.

**Other Common Names:** None.

**Legal Status:** Provincial Noxious.



## Identification

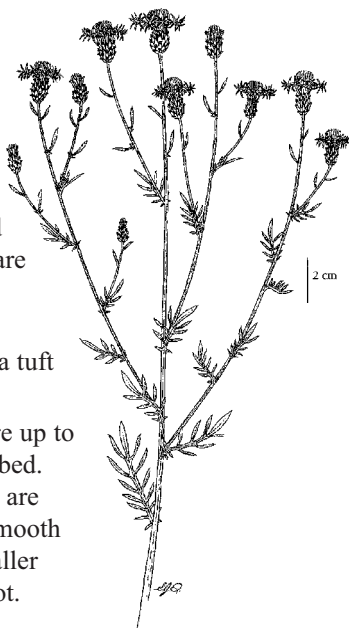
**Growth form:** Biennial or short-lived perennial forb.

### Flower:

Flowering heads are solitary at the ends of branches. The floral bracts are stiff and tipped with a dark, comb-like fringe that gives a spotted appearance. The flowers are pinkish purple or, rarely, cream coloured.

**Seeds/Fruit:** Seeds have a tuft of persistent bristles.

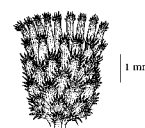
**Leaves:** Rosette leaves are up to 15 cm long and deeply lobed. The principal stem leaves are pinnately divided, have smooth margins, and become smaller toward the top of the shoot. Leaves are alternate.



**Stems:** Mature plants are 0.2–1.8 m tall with one or more erect stems.

**Roots:** Spotted knapweed has a stout taproot.

**Seedling:** Rosettes of spotted and diffuse knapweed are nearly indistinguishable. Leaves are narrow and 1–2 times pinnately divided (Stubbenieck et al. 1995).



### Similar Species

**Exotics:** Other knapweeds include diffuse knapweed (*Centaurea diffusa*), which has a distinct terminal spine on the floral bracts; Russian knapweed (*Acroptilon repens*), whose flowers are smaller than those of spotted knapweed and do not have black mottling on the flower bracts; and squarrose (*C. virgata* var. *squarrosa*) and black (*C. nigra*) knapweeds.

**Natives:** None in Canada. Other native members of the sunflower family can resemble knapweed in the seedling/rosette stage.

## Impacts

**Agricultural:** Spotted knapweed reduces or displaces desirable forage plant species and reduces carrying capacity for livestock and wildlife (Sheley and Jacobs 1997).

**Ecological:** Spotted knapweed is a highly competitive weed that invades disturbed areas and degrades desirable plant communities. It forms near monocultures in some areas of western North America,

including BC. Although spotted knapweed is usually found in disturbed areas, it may invade adjacent areas that are relatively undisturbed (Rutledge and McLendon. Undated).

**Human:** Spotted knapweed can cause skin irritation. Hands and exposed skin should be washed with soap and water following contact with this plant.

## Habitat and Ecology

**General requirements:** Spotted knapweed is widespread at low- to mid-elevation grasslands and dry open forests. It is commonly found on roadsides, fields,

and disturbed areas. It is adapted to well-drained, light- to coarse-textured soils but is intolerant to dense shade. It tends to inhabit moister habitats than diffuse

knapweed, preferring areas that receive 30–50 cm annual precipitation, but it can survive in very dry climates such as those of Ashcroft and Osoyoos.

**Distribution:** Spotted knapweed is widely distributed throughout North America. In the US, it is especially prevalent in Washington, Idaho, Montana, and Wyoming (Sheley and Jacobs 1997). The weed is frequent in southern BC east of the Coast-Cascade mountains. It is regarded as a major concern in the Kootenay, Okanagan, Thompson, Cariboo, Omineca, and Peace River agricultural reporting regions and is present on the Mainland and Vancouver Island.

**Historical:** Introduced from Europe.

**Life cycle:** Spotted knapweed is a perennial plant that germinates in spring or autumn. Seedlings develop into rosettes that usually persist for one growing season while the plant develops a root system (FEIS 1996). Plants usually bolt for the first time in the spring of the second growing season and flower from August through September, depending on elevation and latitude. Individual flowers bloom 2–6 days (FEIS 1996). Plants are self-fertile and are also cross-pollinated by insects.

## Management

**Biocontrol:** Twelve biocontrol agents have been released in the province for managing spotted knapweed: *Agapeta zoegana* (moth), *Chaetorellia acrolophi* (fly), *Cyphocleonus achates* (weevil), *Larinus minutus* (weevil), *Larinus obtusus* (weevil), *Metzneria paucipunctella* (moth), *Pelochrista medullana* (moth), *Puccinia jaceae* (stem and leaf rust), *Sphenoptera jugoslavica* (beetle), *Terrellia virens* (fly), *Urophora affinis* (fly), *Urophora quadrifasciata* (fly) (Powell et al. 1994). Currently, there is no single biological control agent that effectively manages this weed. The most promising agents thus far are the root-feeding insects *Agapeta zoegana* and *Cyphocleonus achates*. Other species, such as the seed head weevils, *Larinus minutus* and *Larinus obtusus*, and the seed head flies, *Urophora affinis* and *Urophora quadrifasciata*, may be having an impact on seed production. Cattle and sheep will graze spotted knapweed, although sheep appear to be the more effective control animal. Olson et al. (1997) found that sheep would graze on spotted knapweed rosettes and seedlings when associated grasses were dormant. No similar work has been done in the province, however.

**Mechanical:** Cutting, mowing, or pulling spotted knapweed before the plant sets seed can be effective on a local basis for small populations. However, spotted knapweed seeds can remain dormant in the soil for

**Mode of reproduction:** By seed.

**Seed production:** This species is a prolific seed producer, with individual plants producing up to 140,000 seeds/m<sup>2</sup> (Rutledge and McLendon. Undated). Most seeds are shed immediately after reaching maturity.

**Seed bank:** Spotted knapweed seeds exhibit 3 germination behaviours: dormant light-sensitive, dormant light-insensitive, and non-dormant (FEIS 1996). Dormant seeds form a seed bank and may remain viable in the soil for over 8 years (Rutledge and McLendon. Undated). Roze (1981) found that the average density of spotted knapweed seeds in the seed bank from 4 sites in BC ranged from 620 to 5,628 seeds/m<sup>2</sup>.

**Dispersal:** Spotted knapweed seeds usually shed in the immediate area around the parent plant (Watson and Renney 1974). Seeds are often spread in hay and on vehicle undercarriages.

**Hybridization:** No information available.

long periods, so follow-up treatments will be required to make sure the plant has been controlled. Attempt to remove the entire root system so the plant will not resprout from the crown or remaining roots.

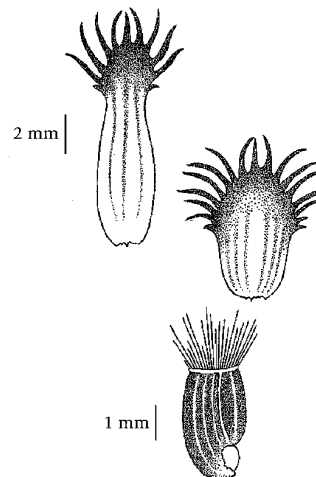
**Fire:** The role of fire as an effective management tool is unclear. Watson and Renney (1974) report that it was a successful control in Russia and grasses replaced it. No similar work has been conducted in the province.

**Herbicides:** Several herbicides are effective. Picloram has been most effective but persists in the soil and can damage non-target species (Harris and Cranston 1979; Watson and Renney 1974). Other effective herbicides such as dicamba, 2,4-D, clopyralid, and glyphosate are also effective (Beck 1997). On suitable terrain these can be broadcast-applied, but a backpack sprayer or wick may be more appropriate on small areas to minimize damage to non-target plants. Herbicides should be applied before the mature plants set seed to maximize effectiveness. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal. Seed all disturbed sites to provide soil cover and competition with weeds.

### Integrated Management Summary

Spotted knapweed can spread readily by stems that are carried on vehicles or in infested hay or seed. Early detection and prompt control of small infestations are the best ways to manage this weed. Spotted and diffuse knapweed can be managed similarly (Beck 1997). They are readily controlled with herbicides but will re-invade unless cultural techniques are used (Beck 1997). Sheley and Jacobs (1997) found that a 90% reduction in diffuse knapweed was necessary to shift the competitive relationship in favour of bluebunch wheat grass.



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# SQUARROSE KNAPWEED

*Centaurea virgata* Lam. var. *squarrosa* (Willd.) Boiss.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** None.

**Legal Status:** Not categorized.



## Identification

**Growth form:** Perennial forb.

**Flower:** Flower heads are small, numerous, and have 4–8 rose- or pink-coloured flowers. The flower bract tips are spreading, with the terminal spine longer than the lateral spines on each bract.

**Seeds/Fruit:** No information available.

**Leaves:** Lower leaves are deeply dissected, upper leaves are bract-like.

**Stems:** Mature plants are typically 30–45 cm tall with highly branched stems.

No illustration available.

Very similar in appearance to diffuse knapweed.

**Roots:** Taproot.

**Seedling:** Seedlings have deeply indented, grey-green leaves.

### Similar Species

**Exotics:** Often confused with diffuse knapweed (*Centaurea diffusa*), but a true perennial, and bracts are recurved. Unlike diffuse knapweed, seed heads are deciduous, falling off the stems soon after seeds mature.

**Natives:** None known.

## Impacts

**Agricultural:** Can reduce forage production potential for livestock and wildlife.

**Ecological:** A highly competitive weed that can

displace native rangeland plants. This species is well adapted to dry disturbed areas.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Squarrose knapweed is generally found on light, dry, porous soils. It appears best adapted to open habitats. It is rare on cultivated lands and irrigated pasture in the US because it cannot tolerate cultivation or excessive moisture.

**Distribution:** Not present in BC. In the US, squarrose knapweed is found on plains, rangelands, and forested benchlands and is currently established in California, Utah, Oregon, and Washington.

**Historical:** Introduced from Eurasia.

**Life cycle:** Perennial forb. Squarrose knapweed may remain as a rosette for several years before it bolts and produces seeds (Roche and Roche 1991). Once it has

matured, it can continue to flower and produce seeds for several years. Squarrose knapweed flowers from June through August. Seed heads are deciduous and fall off the stems soon after seeds mature.

**Mode of reproduction:** By seed.

**Seed production:** Each seed head produces 3–4 seeds.

**Seed bank:** Seeds may remain viable in the soil for several years.

**Dispersal:** The seed heads readily attach to animal fur and vehicle tires.

**Hybridization:** No information available.

## Management

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**Biocontrol:** *Urophora affinis* (fly) and *Urophora quadrifasciata* (fly), which attack spotted (*Centaurea maculosa*) and diffuse knapweed (*C. diffusa*), will apparently use this species as an alternate host. However, there is no information indicating that these insects have any impact on the plant.

**Mechanical:** Cutting, mowing, and removing the plant before it sets can reduce seed production, but it is not likely to eliminate the infestation. A program with cutting and mowing over several years will typically be required for long-term management.

**Fire:** Burning is not recommended for managing squarrose knapweed. Roche (1999) reported that this species will increase when fire is applied to dry rangeland sites.

**Herbicides:** Picloram, clopyralid, dicamba, and glyphosate all have been effective management agents (Beck 1997; Youtie 1997; Watson and Renney 1974). Herbicides should be applied before the mature plants

set seed to maximize effectiveness, but autumn application to newly re-sprouted basal leaves can also be effective (Roche 1999). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent establishment of new infestations. Manage land use to maintain vigorous native communities.

### Integrated Management Summary

This species does not occur in the province and should be a priority for immediate eradication if it is found.

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# STORK'S-BILL

*Erodium cicutarium* (L.) L'Her.

**Family:** Geraniaceae (Geranium).

**Other Scientific Names:** None.

**Other Common Names:** Redstem filaree, cranesbill, cutleaf filaree.

**Legal Status:** Not categorized.

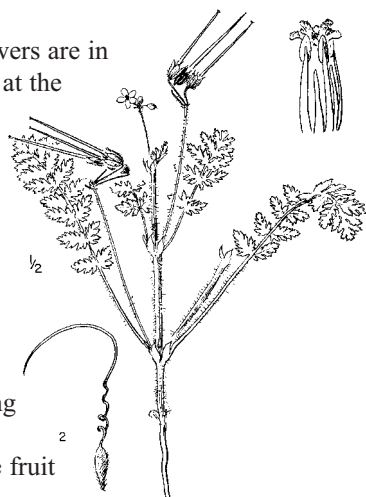


## Identification

**Growth form:** Winter annual or biennial forb.

**Flower:** Flowers are in an umbrella-like cluster at the end of long, slender stalks arising from the leaf axils.

Flowers are purplish pink and generally borne in clusters of 2 or more (Whitson et al. 1996). The persistent styles of this plant are 2.5–5.0 cm long and coil together at maturity, enveloping the fruit at the base.



**Seeds/Fruit:** Fruits are 5-lobed and long-beaked, with each lobe splitting away at maturity.

**Leaves:** The leaves of young plants form a basal rosette. Older leaves grow up to 30 cm long and are divided into narrow, feather-like lobed or toothed segments. Both leaves and stems are hairy.

**Stems:** Mature plants have decumbent to erect stems that are 3–40 cm long.

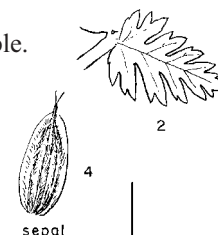
**Roots:** The slender taproot is about 8 cm long, and there are secondary fibrous roots.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** None known.



## Impacts

**Agricultural:** Can compete with agricultural crops for moisture and nutrients. It may also cause livestock poisoning and is an alternate host for beet curly top, peach yellow bud mosaic, and strawberry green petal, among other plant diseases (Royer and Dickinson 1999).

**Ecological:** An annual, winter annual, or biennial that can quickly invade disturbed sites.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** In BC, grows from low- to mid-elevations in moist to dry fields, woodlands, and disturbed habitats on well-drained, clayey, loamy, or sandy soil. It will tolerate a broad range of climates and can grow in areas that experience harsh, snowy winters because its short growing season allows it to complete its life cycle before the onset of freezing weather (FEIS 1996). It will tolerate partial shade, but plant vigour is reduced.

**Distribution:** Common in southwestern and south-central BC (Douglas et al. 1999) and throughout North America. Reported from all agricultural reporting regions except the Omineca but is not considered a major concern anywhere in the province.

**Historical:** Introduced from Europe, perhaps as early as the 1700s by Spanish explorers (FEIS 1996).

**Life cycle:** Plants often germinate in the autumn and



develop leaves. The following spring the plant resumes growth and flowers in the spring. Seeds ripen from May to June, depending on geographic location.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** Seeds can remain viable for many years (FEIS 1996).

**Dispersal:** When moist, the coiled styles enveloping the seed expand, uncoil, and drive the arrow-shaped fruit into the ground.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Mowing or burning before seed-set can eliminate seed production.

**Fire:** (See above.)

**Herbicides:** Can be controlled with late autumn or early spring applications of 2,4-D or dicamba to rosettes, but it is tolerant of glufosinate (Ehlhardt and Stracham 1993). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Minimize disturbance, eliminate seed production and dispersal, and maintain vigorous perennial plant communities.

### Integrated Management Summary

Integrated management should focus on reducing or eliminating seed production and depleting the seed bank. Combine herbicide or mechanical methods to remove rosettes and remove seed heads from flowering plants. Seed disturbed areas to perennial grasses and manage livestock to minimize disturbance and maintain vigorous perennial plant communities.

## References

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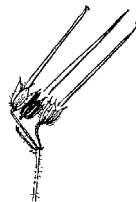
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# ST. JOHN'S-WORT

## *Hypericum perforatum* L.

Family: *Clusiaceae* (St. John's-wort).

**Other Scientific Names:** None.

**Other Common Names:** Klamath weed, goatweed.

**Legal Status:** Not categorized.



### Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are 2 cm in diameter, bright yellow, numerous in flat-topped clusters. Flowers have 5 separate petals that are twice as long as the sepals. Stamens are numerous and paired into 3 groups.

**Seeds/Fruit:** Seed pods are 6 mm long, rust-brown, with 3-celled capsules that contain numerous seeds (Whitson et al. 1996).



**Leaves:** Leaves are opposite, 1–3 cm long, oval-shaped, with prominent veins and covered with transparent dots.

**Stems:** Mature plants are 0.1–1.0 m high. The stems are erect, 2-sided, rust coloured, with numerous branches.

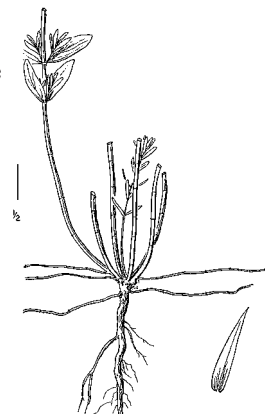
**Roots:** Short rhizomes.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** None known.



## Impacts

**Agricultural:** St. John's-wort invades grazed and disturbed lands. In dense stands, it displaces native plant species and reduces livestock and wildlife forage. The plant also contains a toxin that causes skin

irritation and blistering in light-coloured livestock when they are exposed to sunlight (Powell et al. 1994).

**Ecological:** No information available.

**Human:** Commercially available as an antidepressant.

## Habitat and Ecology

**General requirements:** In BC, St. John's-wort grows at low- to mid-elevations in coastal, grassland, and open forested regions. It is commonly found on rangeland, pasture, and meadows and along roadsides and disturbed areas. It is best adapted to dry, gravelly, or sandy soils and can tolerate pH ranges of 4.3–7.6 (Rutledge and McLendon. Undated).

**Distribution:** St. John's-wort occurs in scattered pockets in the Kootenays, Okanagan, Boundary, North Thompson, Cariboo, Skeena, Fraser Valley, and Vancouver Island areas. It is not present in the Peace River area. It is common throughout the US Pacific Northwest (Powell et al. 1994).

**Historical:** Introduced from Eurasia.

**Life cycle:** St. John's-wort grows early in spring when soil moisture is available, and flowers from June to September, depending on geographic location. Its deep root system is capable of supporting the plant when the water available to other species has been depleted (Crompton et al. 1988).

**Mode of reproduction:** By seed and vegetatively from roots. The root system spreads laterally and is capable of forming new buds that separate from the parent (Rutledge and McLendon. Undated).

**Seed production:** It produces 15,000–30,000 seeds/plant.

**Seed bank:** Seeds may remain viable in the soil 6–10 years.

**Dispersal:** Seeds have a gelatinous coat that facilitates long-distance dispersal.

**Hybridization:** No information available.

## Management

**Biocontrol:** *Chrysolina hyperici* (beetle) and *Chrysolina quadrigemina* (beetle) have been released in the province (Powell et al. 1994) and have continued to produce sustainable populations on the weed, although the insect needs to be moved to new populations periodically. *Agrilus hyperici* (beetle), *Aplocera plagiata* (moth), and *Aphis chloris* (aphid) have also been released in the province.

**Mechanical:** Can be managed by tillage in agricultural fields.

**Fire:** No information available.

**Herbicides:** Combinations of 2,4-D and picloram, or 2,4-D and glyphosate have successfully managed this weed in the US (Rutledge and McLendon. Undated). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Maintain plant communities dominated by perennial grasses and forbs (Piper 1999).

### Integrated Management Summary

St. John's-wort is considered to be under successful biological control throughout the province. For small infestations, herbicide use and seeding disturbed areas are likely the best combination initially. Manage grazing animals to maintain dense stands of perennial species.

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# SULPHUR CINQUEFOIL

## *Potentilla recta* L.

**Family:** *Rosaceae* (Rose).

**Other Scientific Names:** None.

**Other Common Names:** Rough-fruited cinquefoil.

**Legal Status:** Regional Noxious: Columbia-Shuswap, North Okanagan, Okanagan-Similkameen, Thompson-Nicola.



## Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are light-yellow (sulphur coloured) with 5 petals.

**Seeds/Fruit:** Each flower produces numerous small seeds (1 mm) that are slightly flattened.

**Leaves:** Leaves are alternate, palmately compound with 5–7 toothed leaflets on each leaf. Leaf stalks have conspicuous perpendicular hairs, and leaves appear green on the underside.

**Stems:** Mature plants are 30–70 cm tall, with one to several stems growing from well-developed rootstocks (Whitson et al. 1996).

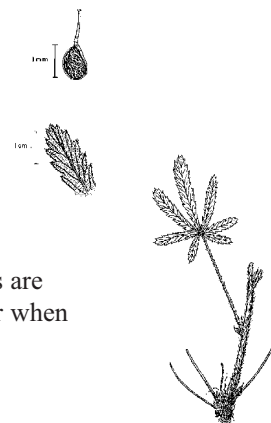


**Roots:** Fibrous roots and lateral rhizomes.

**Seedling:** No information available.

### Similar Species

Twenty-seven species of *Potentilla* are found in BC (Douglas et al. 2000). Floral characteristics, arrangements of leaves and leaflets, and the type and arrangement of hairs are important features to consider when identifying cinquefoil.



## Impacts

**Agricultural:** Unpalatable to grazing animals. It is also very competitive with native plants and reduces forage for livestock and wildlife on rangelands (Rice 1999).

**Ecological:** A competitive, early successional species that can dominate sites and displace native plant

species in both disturbed and undisturbed habits. It may also alter ecosystem function, although this has not been verified scientifically (Powell 1996).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Sulphur cinquefoil is a pioneer species found in habitats from early succession to relatively dense forest overstorey, but the plant appears intolerant of complete shade (Powell 1996). It appears adapted to a wide range of soils and climates, but currently it is mostly restricted to the grasslands and dry forest zones in BC (Powell 1996).

**Distribution:** Naturalized throughout much of North America, occupying dry to moist habitats, roadsides, pastures, overgrazed rangelands, and disturbed areas (Douglas et al. 1999). Common in southern British

Columbia, especially in the Douglas fir zone (Powell 1996). Considered a major concern in the Kootenay, Okanagan, and Thompson agricultural reporting regions.

**Historical:** Introduced from Eurasia.

**Life cycle:** A long-lived perennial. Plants germinate in spring and establish a woody taproot. Plants can live up to 20 years, but the central core of the taproot slowly rots away and the plant gives out to other species. In southern parts of the province, flowering

occurs from June to late July and seeds are set in July and August. Herbaceous material dries in August to end the life cycle (Powell 1996).

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** Some plants produce 1,650 seeds (Powell 1966).

**Seed bank:** Seed survival may be short, not exceeding 2 years (Powell 1996).

**Dispersal:** Seeds can be dispersed by birds, small mammals, ungulates, and other grazing animals, either through digestion or by being picked up and moved on hooves or in hair. Seeds can also be dispersed in cut hay and bedding material (Powell 1996).

**Hybridization:** No information available.

## Management

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**Biocontrol:** None. Preliminary screening work is currently being conducted.

**Mechanical:** Small infestations can be managed by hand-digging.

**Fire:** No information available.

**Herbicides:** Picloram, clopyralid, and 2,4-D have been effective in the US. Picloram and, to a lesser extent, glyphosate have been used for management in BC. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** It does not survive cultivation well.

### Integrated Management Summary

Integrated management should focus on prevention of new infestations through grazing management and maintaining vigorous perennial plant communities. Cultural controls, such as hand-pulling, can be effective on new infestations but should be followed up to ensure that the plant has been eradicated. Seed disturbed areas to perennial grasses to provide competition. Use appropriate herbicides for larger infestations, along with other management techniques.

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# TANSY RAGWORT

*Senecio jacobaea* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** Common ragwort.

**Legal Status:** Provincial Noxious.



## Identification

**Growth form:** Biennial or short-lived perennial.

**Flower:** Several to many daisy-like, bright yellow flowers in flat-topped clusters. The black-tipped bracts of the flower heads are arranged in a single row. Plants flower from July through September, depending on geographic location.

**Seeds/Fruit:** Ribbed seeds are 1 mm long with a pappus of white hairs about 3 mm long.

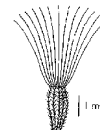
**Leaves:** Basal leaves are stalked, 4–20 cm long, and 2–6 cm wide. Stem leaves are alternate, becoming progressively smaller and stalkless moving upward. All leaves are deeply cut, giving the plant a ragged appearance



**Stems:** Mature plants are 0.2–1.2 m tall. The one to several stems are erect and are branched near the top.

**Roots:** A poorly developed to evident taproot with well-developed fibrous roots.

**Seedling:** The first 2–3 leaves are rounded with small teeth on the margin, but later leaves are deeply lobed. Star-shaped hairs are present on the first to fourth leaf stage but are later hairless (Royer and Dickinson 1999).



## Similar Species

**Exotics:** The leaves of common tansy (*Tanacetum vulgare*) are sharply toothed, and the flowers look like yellow buttons because the ray flowers are absent.

**Natives:** Dryland ragwort (*Seneca eremophilus*) resembles tansy ragwort, but the leaf tips are pointed rather than rounded.

## Impacts

**Agricultural:** Tansy ragwort reduces forage production of pastures by up to 50% (BC Ministry of Agriculture, Food and Fisheries. Undated). Contains alkaloids that can poison livestock, but the plant is often avoided. Animals can be affected through contaminated hay or silage. Cattle and horses should not be grazed on pastures with more than 5% cover of tansy ragwort.

**Ecological:** Primarily a weed on agricultural land but has been appearing on coastal clear-cuts in BC (Douglas et al. 1998).

**Human:** Trace amounts of alkaloids appear in milk and honey produced from infested pastures, raising concerns for human consumption of these products.

## Habitat and Ecology

**General requirements:** Grows on disturbed sites in pastures, hayfields, roadsides, and clear-cuts.

**Distribution:** Frequent and considered a major concern in the Lower Mainland and southern Vancouver Island

agricultural reporting regions; also present in the Okanagan. Found in the Atlantic provinces and Ontario (Frankton and Mulligan 1970).

**Historical:** Introduced from Eurasia.

**Life cycle:** A low-growing rosette is produced in the first year. Flower-bearing stems are produced in the second, and often subsequent, years. Seeds germinate in both spring and autumn, forming new rosettes.

**Mode of reproduction:** By seed.

**Seed production:** One plant can produce more than 150,000 seeds.

**Seed bank:** Seeds can remain dormant 4–5 years and remain viable over 20 years.

**Dispersal:** Primarily by wind, water, and animals.

**Hybridization:** No information available.

## Management

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**Biocontrol:** Five agents have been released in BC: *Tyria jacobaeae* (moth), *Botanophila seneciella* (fly), *Longitarsus flavicornis* (beetle), *Longitarsus jacobaeae* (beetle), and *Cochylis atricapitana* (moth). In BC, the cinnabar moth (*Tyria*) causes localized defoliation but fails to provide long-term control. *Longitarsus jacobaeae* has resulted in localized control, particularly in combination with the root-boring *Cochylis* moth.

**Mechanical:** Seed production can be prevented by repeated mowing before flowering is advanced. Plants mown after flowering can still set seed. Small infestations can be pulled by hand.

**Fire:** No information available.

**Herbicides:** Spring or mid-autumn applications of 2,4-D are effective at managing young seedlings and rosettes. Dicamba, or a combination of dicamba and 2,4-D, is effective at more advanced growth stages. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying**

**herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Seed disturbed areas to perennial grasses and forbs. Manage grazing animals to maintain perennial plant communities. Hand-pull plants and remove them from new infestations. Cut plants before they go to seed.

### Integrated Management Summary

Cultural, mechanical, chemical, and biological control methods are all possible. Use cultural and mechanical methods on small infestations. Apply herbicides to manage medium-sized populations, and use biocontrol for large infestations where it is impractical to use other management methods. Plants must be cut prior to formation of the easily wind-blown seeds.

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Frankton, C., and G. A. Mulligan. 1970. *Weeds of Canada*. Publication 948. Ottawa: Canada Department of Agriculture.

Royer, F., and R. Dickinson. 1999. *Weeds of Canada and the Northern United States*. Edmonton: University of Alberta Press.



# TARTARY BUCKWHEAT

*Fagopyrum tataricum* (L.) Gaertn.

**Family:** *Polygonaceae* (Buckwheat).

**Other Scientific Names:** None.

**Other Common Names:** Tartarian buckwheat, sarrasin.

**Legal Status:** Regional Noxious: Peace River.



## Identification

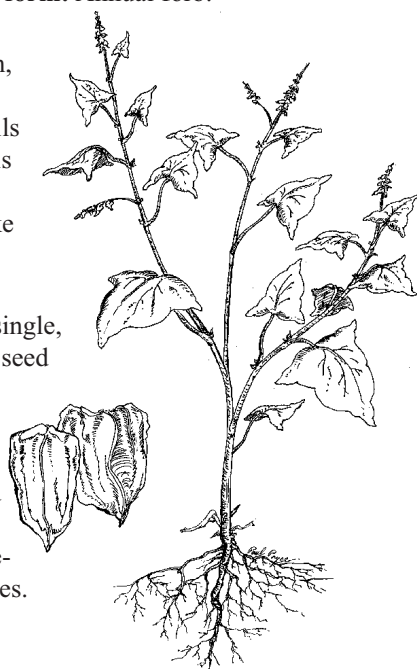
**Growth form:** Annual forb.

**Flower:**  
Greenish,

small flowers are clustered at leaf axils and stem tips. Petals are absent; instead there are 5 petal-like sepals.

**Seeds/Fruit:** Each flower produces a single, wrinkled, 3-angled seed that protrudes from the sepals.

**Leaves:** Light green, heart-shaped leaves are 3–10 cm long and have wide-spreading basal lobes.



Leaves are alternate and stalked and have paper sheaths where the stalk joins the stem.

**Stems:** Erect, green stems to 1.0 m.

**Roots:** Taproot.

**Seedling:** Cotyledons are round with stalks and are notched at the base. First leaves are triangular with rounded basal lobes and a papery sheath at the base of the leaves (Royer and Dickinson 1999).

### Similar Species

**Exotics:** Buckwheat (*Fagopyrum esculentum*) has reddish stems, larger white or reddish flowers, and smooth fruit (Frankton and Mulligan 1970).

**Natives:** Wild buckwheat (*Polygonum convolvulus*) is a twining or prostrate plant whose seeds do not protrude from the sepals (Frankton and Mulligan 1970).

## Impacts

**Agricultural:** A serious weed of cereal and oilseed crops, tartary buckwheat reduces crop yields by as much as 70% and lowers crop quality. Seeds are difficult to remove from grains, reducing grain quality and increasing dockage and cleaning costs (Sharma 1986). Heavily contaminated grains cannot be used for flour, rolled oats, or malting processes (Royer and Dickinson 1999). Infestations can occur in pastures and forage seedings. Pigs and other livestock can suffer

severe skin inflammation after eating large quantities of this species and being exposed to sunlight.

**Ecological:** Occurs in roadsides and other disturbed habitats but is not likely to invade perennial native communities.

**Human:** Used for livestock feed, as a green manure crop, and as a soil renovator (Sharma 1986).

## Habitat and Ecology

**General requirements:** Well adapted to relatively moist and cool weather but is susceptible to frost in spring or autumn. It tolerates a wide range of soil conditions but appears best adapted to well-drained

soils; most competitive on low-fertility soils.

**Distribution:** In BC it grows in cereal and oilseed crops, forage crops, roadsides, and disturbed areas.



This plant is only found in the Peace River agricultural reporting area, where it is regarded as a major concern. Found throughout the US and Canada and is a significant concern in north-central Alberta and west-central Manitoba (Royer and Dickinson 1999).

**Historical:** Introduced from Asia as a cultivated crop.

**Life cycle:** Plants overwinter as seed. Most seeds germinate in spring, but some germination occurs throughout the growing season. Mature seeds are produced 60–80 days after emergence. Tartary buckwheat flowers indeterminately, so flowers, immature seeds, and mature seeds may all be present at one time. One generation per year is produced (Sharma 1986).

**Mode of reproduction:** By seeds.

**Seed production:** A single plant can produce 400–1,100 seeds, depending mainly on the size of the individual plant.

**Seed bank:** Fresh seeds require after-ripening to germinate. The period of after-ripening depends on environmental conditions and occurs fastest under warm, dry conditions. Soils are likely to contain seeds at all stages from dormant to fully after-ripened (Sharma 1986)

**Dispersal:** Some seeds are shed and scattered before harvest, but many seeds are harvested with the crop and contaminate the seed. Machinery can locally disperse seeds, but contaminated seed is the main source of long-distance movement.

**Hybridization:** None known.

## Management

**Biocontrol:** None.

**Mechanical:** Cultivation kills seedlings, so practices such as delayed seeding, autumn and spring tillage, summerfallowing, and post-seeding cultivation are effective control methods. Shallow autumn tillage can result in a flush of emerging seedlings that will be killed by frost, if post-harvest weather conditions are warm and dry enough to allow seed after-ripening. Mowing before seed-set will prevent seed production.

**Fire:** No information available.

**Herbicides:** Tartary buckwheat is susceptible to many herbicides. Dicamba, dicamba mixes, and 2,4-D have been effective on pastures and rangelands when weeds are actively growing. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Fall-seeded crops can reduce infestations through competition and by stimulating autumn emergence of weed seedlings that cannot survive the winter.

### Integrated Management Summary

A combination of tillage, seeding, and herbicides appears to be the best approach to integrated management of this species. Forage crops used in a rotation also may control tartary buckwheat. Fertilizers containing phosphorous can improve crop yield at the expense of tartary buckwheat, but the fertilizer must be placed near the crop seed.

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# VELVETLEAF

## *Abutilon theophrasti* Medic

**Family:** *Malvaceae* (Mallow).

**Other Scientific Names:** None.

**Other Common Names:** Velvetweed, piemaker, elephant-ear, Indian mallow.

**Legal Status:** Provincial Noxious.



### Identification

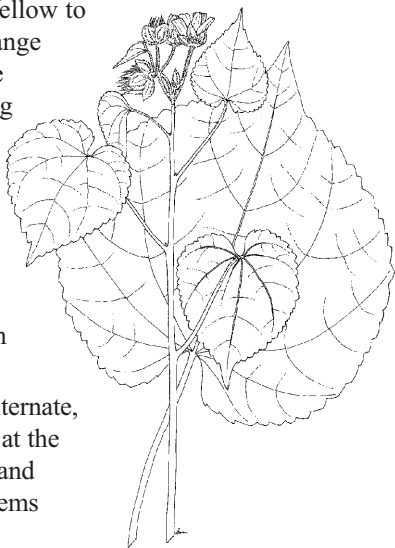
**Growth form:** Annual forb.

**Flower:** Yellow to yellow-orange

5-petalled flowers are borne on stalks arising from the leaf axils.

**Seeds/Fruit:** Fruits are rounded with 9–15 segments arranged in a disk, each containing numerous grey-brown seeds.

**Leaves:** Leaves are alternate, heart-shaped, pointed at the end, 10–20 cm wide, and attached on slender stems



(Whitson et al. 1996). Leaves remain perpendicular to the sun all day (Duyssen 1997).

**Stems:** Mature plants are 1–2 m tall. Stems are erect and branched, and the entire plant is covered with short, soft, “velvety” hairs.

**Roots:** Taproot.

**Seedling:** The seed leaves (cotyledons) have slightly different shapes: one is nearly round, the other more heart-shaped. Both cotyledon margins are entire, and cotyledons are covered on both surfaces with short hairs (Carey et al. 1993).

### Similar Species

**Exotics:** None known.

**Natives:** None known.

## Impacts

**Agricultural:** A serious problem in croplands in North America because of its high seedling vigour, rapid growth habit, tolerance to many herbicides, and ability to produce large amounts of seed (Starke and Renner 1996). It is often a pest in corn, sorghum, milo, and spring wheat (Duyssen 1997). Seeds can contaminate chicken feed and reduce the salability of eggs (Duyssen 1997).

**Ecological:** The plant is able to produce large amounts of seed that remain viable for many years, and it is a successful seed producer even under competition. The roots also exude a chemical that inhibits fungal growth.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** In BC, velvetleaf occurs only at low elevations. It is commonly found in cultivated fields, gardens, fencelines, and disturbed areas. It well adapted to sunny areas with rich soils.

**Distribution:** Widespread throughout North America. It occurs infrequently in southwestern BC and is known only from the Lower Fraser Valley (Douglas et

al. 1999), where it is a potential threat to agricultural production, particularly corn.

**Historical:** Introduced from either China or India for commercial fiber production. It is believed that the entire North American population is derived from a single plant (Duyssen 1997).

**Life cycle:** Flowering occurs from late June through October. Seeds may germinate throughout the growing season. Seeds have a hard coat that contains bacteria and tannin-like compounds to protect it from infection (Duyssen 1997).

**Mode of reproduction:** By seed.

**Seed production:** A single plant may produce 700–1,700 seeds (Duyssen 1997).

**Seed bank:** Seeds retain their viability in the soil for over 50 years, making eradication difficult (Whitson et al. 1996). If infestations are allowed to persist and establish a seed bank, this weed can be troublesome.

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Cutting or mowing plants after flowering but before seed-set should eliminate the current year seed production.

**Fire:** No information available.

**Herbicides:** In non-crop situations, glyphosate, picloram, 2,4-D, and dicamba been used post-emergence to control velvetleaf. Herbicides should be applied before seed-set. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Infestations can be difficult to eradicate because of the long viability of seeds in the soil. Tillage can be effective in reducing seedling

emergence if the seeds are buried at least 7.5 cm in the soil. Prevent the establishment of new infestations by minimizing disturbance, eliminating seed production and dispersal, and maintaining vigorous perennial native communities.

### Integrated Management Summary

Velvetleaf is usually not a problem on rangeland or forestland in BC. If this plant is found, eliminate seed production until the soil seed bank has been depleted. Cut, pull, or treat plants with herbicide before they set seed.

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# WATER HEMLOCK

*Cicuta douglasii* (DC.) Coult. & Rose

**Family:** *Apiaceae* (Parsley).

**Other Scientific Names:** None.

**Other Common Names:** Douglas's water hemlock, Western water hemlock.

**Legal Status:** Not categorized.



## Identification

**Growth form:** Perennial forb.

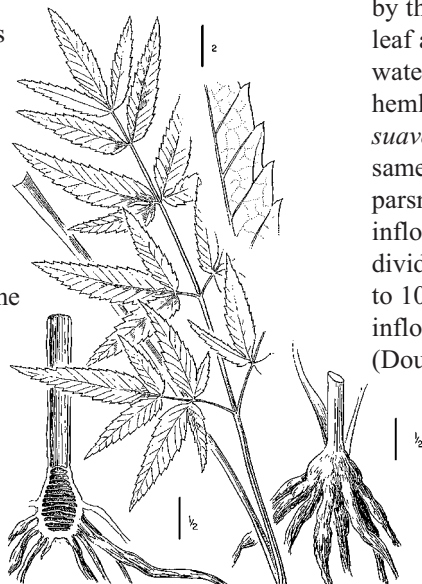
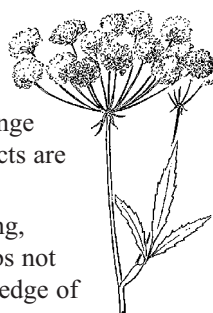
**Flower:** Flower heads comprise several to many small, compact clusters forming several compound umbels. Flowers range from white to greenish; involucre bracts are mostly lacking (Douglas et al. 1998).

**Seeds/Fruit:** Egg-shaped, 2–4 mm long, smooth, glabrous, corky-thickened; ribs not equal, with a narrow raised border on edge of dark intervals (Douglas et al. 1998).

**Leaves:** Basal and stem leaves divided 1–3 times, leaflets 3–4 times as long as broad, lance-shaped to narrowly oblong or elliptical, sharply pointed and toothed, 4–7 mm long; lateral veins ending at base of the teeth (Douglas et al. 1998).

**Stems:** Solitary or in a cluster, from a tuberous-thickened and chambered base; leafy, glabrous, 0.5–2.0 m tall. Stems hollow, streaked with purple. The somewhat swollen base with cavities separated by cross partitions of solid tissue is easily seen when the stem is split lengthwise at the base just above the roots.

**Roots:** Taproot or clusters of tuberous roots around the stem base; chambered. Chambers contain the highly toxic yellowish, oily exudate, cicutoxin. USE EXTREME CAUTION when cross-sectioning the roots.



**Seedling:** Seedling leaves are fern-like in appearance.

## Similar Species

**Exotics:** Poison hemlock (*Conium maculatum*), which is similar in appearance and highly poisonous, is locally common in the Vancouver and Victoria areas and rare in south-central BC (Douglas et al. 1998). Differs from water hemlock by having fern-like leaves that give the plant a lacy appearance compared to water hemlock, where the leaflets are 3–4 times as long as broad. Fruits of water hemlock also have a narrow raised border, whereas the fruits on poison hemlock are egg-shaped, flattened, and smooth.

**Natives:** There are 4 native *Cicuta* species in BC and all are highly poisonous. Spotted cowbane (*Cicuta maculata*) is common throughout BC and differs from water hemlock in its much narrower leaves and notable spots on the stems. Bulbous water hemlock (*Cicuta hulfifera* L.), which is infrequent east of the Cascade Mountains (Douglas et al. 1998), is readily recognized by the small bulblets that grow at the angles formed by leaf and stem (Frankton and Mulligan 1970). European water hemlock is rare in northeastern BC. Water hemlock is also similar to hemlock water-parsnip (*Sium suave*), which occupies similar habitats and has the same distribution as spotted cowbane. Hemlock water-parsnip is not poisonous; its roots are solid; the inflorescence has bractlets; and the leaves are once divided, with each leaflet being linear and growing up to 10 cm long. Water hemlock roots are chambered, the inflorescence is bractless, and the leaflets are divided (Douglas et al 1998).

## Impacts

**Agricultural:** All water hemlocks are highly poisonous to livestock. A single root can kill a mature cow.

**Ecological:** Commonly grows in wet stream banks, ditches, marshes, meadows, and wet pastures.

**Human:** Water hemlock is a highly poisonous plant that should be handled with care. All parts of the plant are poisonous to humans.

## Habitat and Ecology

**General requirements:** Water hemlock is generally found on moist soils, can tolerate poorly drained soils, and is often scattered in riparian areas. It is usually found along streams, irrigation ditches, and the borders of marshes (Douglas et al 1998).

**Distribution:** In BC it is found in wet habitats east of the Coast-Cascade mountains and north to the Yukon (Douglas et al. 1998). It is present in all agricultural reporting regions.

**Historical:** Native.

**Life cycle:** Douglas's water hemlock is a biennial that can grow 3 m tall. In the first year, plants form a small seedling that resembles wild carrot. Plants usually bolt

in the second year and produce numerous clusters of white flowers. Plants flower from April through July. Seed-set begins in July and continues into winter. Most seeds mature before dispersal and can germinate immediately if environmental conditions are favourable, but some seeds remain dormant.

**Mode of reproduction:** By seed.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** By water and wind. Can also be spread by machinery, on clothing, or in transported soil.

**Hybridization:** No information available.

## Management

**Biocontrol:** None.

**Mechanical:** Water hemlock can be controlled by digging, repeated mowing, and pulling. **Care should be taken to avoid contact with bare skin** (wear latex or rubber gloves). Wash hands thoroughly after handling any part of this plant. Dispose of gloves and thoroughly clean any equipment used to control this plant immediately after use.

**Fire:** No information available.

**Herbicides:** No information available. Application of herbicide will likely be restricted by proximity to water and riparian areas. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by removing plants, eliminating seed

production, and maintaining healthy native communities. Fence infestations to restrict livestock access if practical.

### Integrated Management Summary

The tendency of this species to grow in wet areas may restrict the use of herbicides. Eliminate seed production and exhaust the soil seed bank by removing seed heads before seeds mature. Use latex or rubber gloves for hand-pulling, and avoid touching the plant with bare skin. Dispose of gloves after contact with the plant and thoroughly clean all equipment used in handling this plant before subsequent use.

## References

Douglas, G. W., G. B. Straley, D. Meidinger, and J. Pojar. 1998. *Illustrated Flora of British Columbia*. Vol. 1: *Gymnosperms and Dicotyledons (Aceraceae through Asteraceae)*. Province of British Columbia.

Frankton, C., and G. A. Mulligan. 1970. *Weeds of Canada*. Publication 948. Ottawa: Canada Department of Agriculture.



# WHITE COCKLE

*Silene latifolia* Poir. ssp. *alba*  
(P. Mill.) Greuter & Burdet

**Family:** Caryophyllaceae (Pink).

**Other Scientific Names:** *Lychnis alba*, *Silene latifolia*, *Silene alba*.

**Other Common Names:** White campion.

**Legal Status:** Regional Noxious: Peace River.



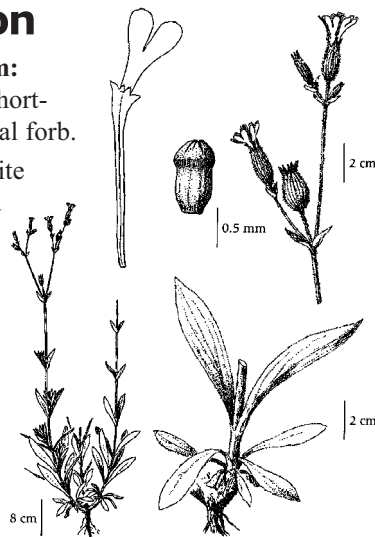
## Identification

**Growth form:**  
Biennial or short-lived perennial forb.

**Flower:** The showy white flowers are fragrant and are arranged in open, spreading clusters with a few to many flowers. The flowers have 5 notched petals that are longer than the calyx. The sepals are fused together to form a sticky, tubular calyx surrounding the flower. The plant has either male or female flowers. In male plants the calyx is 15–22 mm long with 10 veins. In female plants the calyx is 20–30 mm long, has 20 veins, and becomes inflated as fruit ripen. Plants flower from June to September (Frankton and Mulligan 1970).

**Seeds/Fruit:** The capsules are egg-shaped, up to 20 mm long with 10 teeth at the tip. The tiny, kidney-shaped seeds are bluish brown and are covered with warts.

**Leaves:** Basal leaves are lance-shaped, stalked, and 2–10 cm long. The stem leaves are opposite, lance-shaped, and occur in 5–10 pairs. The lower pairs are stalked and often larger than the basal leaves, but they



become smaller and eventually without stalks higher on the stem (Douglas et al. 1998).

**Stems:** The thick, almost woody base is branched with a few non-flowering shoots and several erect flowering shoots (McNeill 1977). The hairy stems grow 0.3–2.0 m tall and have swollen nodes.

**Roots:** Initially a taproot, 5–40 cm deep, then thick, fleshy lateral roots develop and spread outward (McNeill 1977).

**Seedling:** Seedlings are yellowish green. The first pair of leaves is lance-shaped, and the second pair has finely toothed margins (Royer and Dickinson 1999).

### Similar Species

**Exotics:** White cockle may be confused with night-flowering catchfly (*Silene noctiflora*) and red cockle (*Silene dioica*). Catchfly is an annual, produces male and female flowers on a single plant, and has sticky hairs on its upper part. White cockle produces separate male and female flowers, but catchfly has both sexes in the same flower. Red cockle, which is rare in BC, has deep pink to red flowers.

**Natives:** A number of *Silene* are native to BC, and several of them are rare. Although all *Silene* have a tubular flower and inflated calyx, most native species have male and female flowers on the same plant.

## Impacts

**Agricultural:** Mostly a problem in grain fields, alfalfa and clover crops, and pastures. White cockle seeds can contaminate clover and forage seed.

**Ecological:** Occupies open sites such as roadsides and disturbed places. It can rapidly colonize disturbed sites and compete with native vegetation because of its high

rate of seed production. It is adapted to unshaded sites on well-drained, unsaturated soils. The seeds require a long growing season for ripening, and its seedlings do not tolerate high temperatures (McNeill 1977).

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Grows in cultivated crops (especially legume and grains), hayfields, fields, disturbed areas, railroads, and roadsides at low- to mid-elevations in BC on dry, well-aerated soils.

**Distribution:** Present in all agricultural reporting regions in the province and considered a major concern in the Peace River region. It is found across all of southern Canada, especially in Ontario and Quebec, but less commonly in the Maritimes. It occurs throughout the northern US (McNeill 1977).

**Historical:** Introduced from Europe.

**Life cycle:** Plants can germinate, flower, and set seed in a single season, but plants from later-germinating seed overwinter as leaf rosettes on a well-developed root. In spring, the erect stems emerge and the basal leaves wither. Over-wintered plants flower earliest, the most rapid

flowering and seed-set occurring during the longest days.

**Mode of reproduction:** Mostly from seed but root and stem fragments can establish.

**Seed production:** A single plant can produce over 25,000 seeds/year (NS Department of Agriculture and Fisheries 2001).

**Seed bank:** Some populations may require after an after-ripening period. Seeds require light for germination, and deeply buried seeds have poor emergence. Buried seeds remain viable, however, and germinate well when brought to the surface.

**Dispersal:** Most seeds fall around the parent plant. White cockle seeds are similar to other clovers, so seed impurities have been a source of dispersal.

**Hybridization:** Hybridizes with red campion (*Silene dioica*).

## Management

**Biocontrol:** None.

**Mechanical:** Over-wintering rosettes can be killed with seed-bed preparation that buries the root-crowns or leaves them exposed to desiccate at the soil surface. Seeds are not adversely affected by cultivation. During the growing season, tillage may spread the weed through regeneration of plant fragments. Mowing can reduce seed production, but to be effective many passes over the long flowering season may be required.

**Fire:** Fire is unlikely to affect populations of this plant because of its large seed bank.

**Herbicides:** White cockle is resistant to several common herbicides, including 2,4-D, 2,4-DB, MCPA, and MCPB (McNeill 1977). Spring and early autumn applications of dicamba provide some management (NS Department of Agriculture and Fisheries 2001). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Avoid using contaminated seed. New infestations should be promptly eradicated before seed-set by hand-pulling, tilling, or herbicides.

### Integrated Management Summary

White cockle is difficult to manage because of its prolific seed production, long flowering season, and resistance to herbicides. Prevention is the best approach, but once white cockle does appear, it is necessary to prevent seed production through tillage, mowing, or herbicides. Management practices that encourage competitive crop plants or perennial native plant communities will help prevent invasion. Seed disturbed areas to perennial grasses and forbs to provide ground cover and competition against this plant.

## References

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Royer, F., and R. Dickinson. 1999. *Weeds of Canada and the Northern United States*. Edmonton: University of Alberta Press.



# WILD CHERVIL

*Anthriscus sylvestris* (L.) Hoffm.

**Family:** *Apiaceaea* (Parsley).

**Other Scientific Names:** None.

**Other Common Names:** None.

**Legal Status:** Regional Noxious: Fraser Valley.



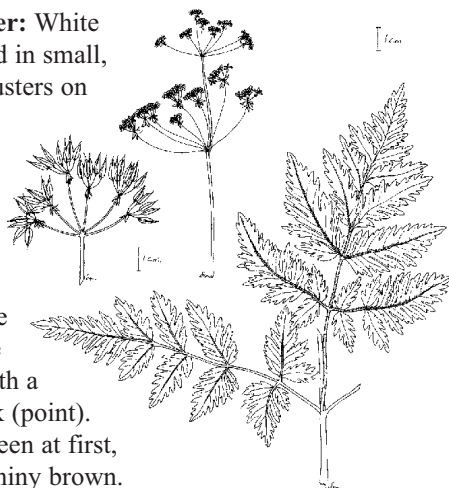
## Identification

**Growth form:** Annual, biennial, or short-lived perennial forb.

**Flower:** White flowers produced in small, umbrella-like clusters on 2-cm-long stalks at the end of the stems.

**Seeds/Fruit:** Each flower produces 2 joined seeds. The narrow seeds are 6–7 mm long with a pronounced beak (point). The seeds are green at first, then mature to shiny brown.

**Leaves:** The basal and stem leaves are



similar: fern-like, triangular in outline, and smooth to softly hairy. Each leaf is divided into smaller leaflets that in turn are also divided. The bases of the leaves clasp the stem.

**Stems:** The branching stems grow 0.3–1.8 m tall (Cranston et al. 2000). The stems are hollow and furrowed and bear a fringe of hairs at the stem nodes.

**Roots:** The thick, tuberous taproots are aggressive and spread rapidly, often extending nearly 2 m in the soil. Roots on mature plants are difficult to remove.

**Seedling:** No information available.

### Similar Species

**Exotics:** Salad chervil (*Anthriscus cerefolium*) is similar but is smaller and aromatic. Bur chervil (*Anthriscus caucalis*) has hairy leaves and seeds covered in short, hooked prickles.

**Natives:** None known.

## Impacts

**Agricultural:** Wild chervil competes with pasture and hay crops, which reduces carrying capacity and forage production. Livestock will graze it when it is immature, but it becomes unpalatable near maturity. It is generally not problematic in cultivated crops, but it acts as a host for a viral disease that infects other plants in the same family, including carrots, parsnips, and celery. It is difficult to control because of its very deep root system and tolerance to herbicides (BC Ministry of Agriculture, Food and Fisheries 1998).

**Ecological:** Wild chervil competes with other plants for light, water, space, and nutrients. It is able to shade out smaller plants because of its tall stature. Since this weed is well adapted to ditches, stream banks, and moist woods, native riparian plant communities are at risk. Wild chervil also grows along roadsides, fencelines, and rights-of-way.

**Human:** This plant is sometimes a component of British wildflower seed mixes.

## Habitat and Ecology

**General requirements:** Wild chervil grows under a range of conditions but thrives in wet to moist disturbed sites, especially where soils are rich. In BC it grows at low- to mid-elevations in fields, pastures, and

edges of woods, and along roadsides and fencelines.

**Distribution:** Wild chervil is spreading rapidly in the Abbotsford-Chilliwack areas of the Fraser Valley (BC Ministry of Agriculture, Food and Fisheries 1998) and



occurs in the province's southeast (Douglas et al. 1998). Recent infestations have been found in northern Washington.

**Historical:** Introduced from Europe, possibly in wildflower mixes.

**Life cycle:** This weed is considered a biennial but can persist as a short-lived perennial by forming sprouts at the side of the taproots. Usually it forms a rosette in the first year and produces seeds in the second year.

## Management

**Biocontrol:** None.

**Mechanical:** Rosettes and immature plants can be controlled by hand-pulling or digging, but mature plants must be removed below the crown to prevent re-sprouting the following year (BC Ministry of Agriculture, Food and Fisheries 1998). Frequent cultivation may prevent establishment. Mowing can deplete food reserves, but it must be done repeatedly before the plant sets seed.

**Fire:** The deep, extensive root system would not be affected by fire.

**Herbicides:** Chemical control is often precluded due to the wet habitat wild chervil prefers. Mowing at pre-bloom and treating regrowth with mecoprop, dicamba, or clopyralid have been effective in Nova Scotia (Darbyshire et al. 1999). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Learn to identify wild chervil

**Mode of reproduction:** By seed and from root buds at the top of the root.

**Seed production:** This weed is a prolific seed producer.

**Seed bank:** No information available.

**Dispersal:** Birds, water, and human activity spread seeds. Mowing after seed-set spreads seeds along roads and rights-of-way.

**Hybridization:** None known.

and take immediate action to control any infestations. Manage infested patches by grubbing out, applying herbicides, or cutting to prevent seed-set. Cut and bag any flowering plants for burning or deep burial. Make sure equipment, vehicles, and footwear are clean before leaving infested sites, and do not move soil from infested sites (BC Ministry of Agriculture, Food and Fisheries 1998).

### Integrated Management Summary

The deep root system and its resistance to herbicides make this weed very difficult to manage. New infestations must be removed immediately before the root systems develop. For established stands, a combination of herbicides with timed mowing or grazing has been effective (NS Department of Agriculture and Fisheries 2001).

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# WILD MUSTARD

*Brassica kaber* (DC.) L.C. Wheeler

**Family:** *Brassicaceae* (Mustard).

**Other Scientific Names:** *Sinapis arvensis*.

**Other Common Names:** Charlock mustard, kaber mustard.

**Legal Status:** Regional Noxious: Peace River.



## Identification

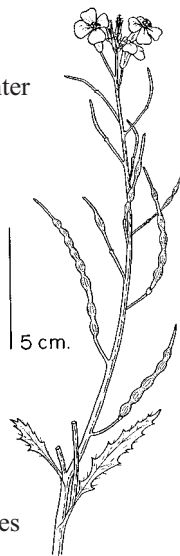
**Growth form:** Annual or winter annual forb.

**Flower:** Flowers are 13 mm in diameter, yellow, with 4 petals. Flowers are borne in small terminal clusters up to 30 cm long.

**Seeds/Fruit:** Seed pods are smooth, 4–5 cm long and 2 mm wide, and have a constricted beak that often includes the uppermost seed. Seeds are small, smooth, round, and black to purplish brown (Stubbenieck et al. 1995).

**Leaves:** Leaves are alternate, 5–15 cm long, and 2.5–10.0 cm wide. Lower leaves are deeply lobed, and upper leaves are merely toothed and may be short stalked or stalkless.

**Stems:** Mature plants are 0.3–1.0 m tall. Stems are erect and branched near the top. The lower stems are coarsely hairy.



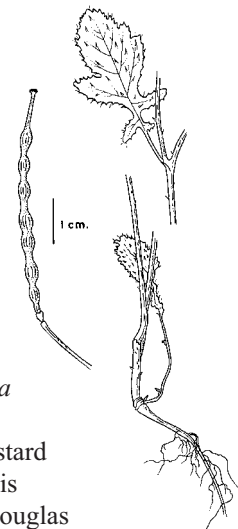
**Roots:** Shallow taproot.

**Seedling:** Seed leaves (cotyledons) are kidney-shaped and smooth. True leaves are alternate and hairy and vary considerably in size and shape. The stem is also hairy, especially near its base (Carey et al. 1993).

### Similar Species

**Exotics:** None.

**Natives:** White mustard (*Brassica hirta*) resembles wild mustard, except that the pods of white mustard are covered with coarse hairs. This species is rare in southern BC (Douglas et al. 1998).



## Impacts

**Agricultural:** Wild mustard can invade grain and other field crops as well as disturbed areas. It can reduce crop yields, lower the crop value, and reduce livestock forage production in rangeland.

**Ecological:** No information available.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** In BC, wild mustard is found at lower elevations at the coast and Interior grasslands, where it grows under dry to average soil moisture conditions on fields and disturbed habitats. In other areas it is commonly found in crops and along roadsides and cultivated fields.

**Distribution:** Rare in southwestern and south-central BC (Douglas et al. 1998) and considered a major

concern only in the Peace River agricultural reporting region.

**Historical:** Introduced from Europe.

**Life cycle:** Wild mustard relies on insects for pollination (Kunin 1997).

**Mode of reproduction:** By seed.

**Seed production:** Each plant produces 2,000–3,500 seeds.

**Seed bank:** Seeds may remain viable in the soil for several years.

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Cut or pull plants before seed-set.

**Fire:** No information available.

**Herbicides:** Metsulfuron-methyl, 2,4-D, or dicamba have been effective in the early spring before the plants bolt. A combination of 2,4-D and dicamba is also effective (Durgan et al. 1997). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Cultivate fields in mid- to late spring. Apply a contact herbicide before planting.

### Integrated Management Summary

Cut, pull, or apply appropriate herbicides to new infestations. Prevent establishment of new populations by maintaining vigorous perennial plant communities on rangeland and pasture. Seed disturbed areas to perennial plants to minimize opportunities for invasion.

## References

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# WILD OATS

## *Avena fatua* L.

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** None.

**Other Common Names:** Oatgrass, poor oats, wheat oats.

**Legal Status:** Provincial Noxious.



## Identification

**Growth form:** Annual grass.

**Flower:** Drooping spikelets in a loose, open panicle. Each spikelet has a pair of large glumes (papery scales) with 2–3 florets inside. Flowering begins in July.

**Seeds/Fruit:** Seeds are variable in colour (Frankton and Mulligan 1970), but all seeds have a dark, bent, twisted awn about 3 cm long. Seeds are hairy at the base with a circular scar at the point of seed attachment.

**Leaves:** Leaf blades are flat, long (20–30 cm), and broad (1.0–1.5 cm wide). A papery membrane (ligule) is visible at the base of the blade.



**Stems:** Erect, hollow stems grow 0.6–1.5 m tall.

**Roots:** Extensive, fibrous root system.

**Seedling:** The seedling leaves are slightly hairy and are twisted counter-clockwise. The seed remains on the root of the seedling (Royer and Dickinson 1999).



### Similar Species

**Exotics:** Cultivated oats (*Avena sativa*) resembles wild oats but wild oats are much larger plants. Cultivated oat seeds have short, straight awns and lack the circular scar. The open panicle with its large, drooping spikelets bearing long, bent awns distinguishes wild oats from other grains and grasses.

**Natives:** None.

## Impacts

**Agricultural:** Responsible for losses in crop productivity through competition (BC Ministry of Agriculture and Food 1984). It also results in lowered grain quality and increased costs for grain cleaning and weed control (tillage and herbicides). Long awns on the seed can injure livestock. Wild oats is an alternative host for virus diseases of grains and alfalfa.

**Ecological:** Virtually absent on undisturbed lands but can invade disturbed sites, where its rapid growth and

development make it competitive. The plant is adapted to a wide range of environmental conditions, but it becomes a serious weed in temperate climates with moist soils. Chemicals from the roots inhibit seed germination and seedling growth of other species (Sharma and Vanden Born 1978).

**Human:** Improved cultivated oat varieties have been developed through genetic crossing with wild oats.

## Habitat and Ecology

**General requirements:** In BC, wild oats occurs in fields and disturbed areas. In the Prairies, it is found in grain fields, oilseed crop fields, fallow fields, roadsides, waste places, disturbed areas, and gardens.

**Distribution:** Present in all agricultural reporting

regions but occurs rarely in the Peace River region (Sharma and Vanden Born 1978). It also occurs in all Canadian provinces.

**Historical:** Introduced from Eurasia.

**Life cycle:** Germinates mostly in the spring or autumn,

but it can germinate throughout the growing season during cool, moist conditions (Alberta Agriculture 1995). Roots and shoots develop quickly and plants begin flowering by early July, depending on growing conditions and geographic location. Flowering may extend up to 6 weeks, with seed-set and seed shedding occurring over a prolonged time (Sharma and Vanden Born 1978).

**Mode of reproduction:** By seed.

**Seed production:** Seed production can range from 20 to 250 seeds/plant.

## Management

**Biocontrol:** None, but wild oats is susceptible to many of the same organisms as cultivated oats, including insects, nematodes, fungi, and a virus.

**Mechanical:** Plants can be managed with cultivation at germination but especially before seed-set. Tilling is most effective at the 3-leaf growth stage to minimize removal of soil moisture and nutrients. Mowing can prevent seed-set in heavy to moderate infestations. The mowed wild oats can be used for green feed or silage if the seeds have started to set (Alberta Agriculture 1995).

**Fire:** Seeds are not tolerant to high temperatures. Burning windrow of straw immediately after harvesting can reduce viable seeds (Sharma and Vanden Born 1978).

**Herbicides:** Numerous herbicides are registered for wild oats control in various commodities. Overuse of some herbicides has resulted in a major increase in herbicide-resistant wild oats populations. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Seed bank:** Seeds are initially dormant but most germinate in the first and second spring. On cropland in Alberta, about 3% remained dormant and viable for up to 12 years (Alberta Agriculture 1995).

**Dispersal:** Most seeds are shed around the parent plants. Seeds are moved with the crop during harvesting when the plant is mixed with crops.

**Hybridization:** Cultivated oats and wild oats hybridize readily.

**Cultural/Preventive:** Autumn-seeded crops, such as fall rye and winter wheat, can reduce wild oats infestations on cropland, especially if a dense cover crop establishes (Sharma and Vanden Born 1978). Forage crops used in a crop rotation also are effective.

### Integrated Management Summary

Wild oats is a serious and persistent problem in cultivated crops because the plants set seed before crops mature, and seeds can remain viable in the soil for long periods (BC Ministry of Agriculture and Food 1984). Selective herbicides or cultivation can kill the plants before they set seed. Growing competitive crops, which reduce the amount of wild oats seed produced, or burning wild oats seeds after harvest, can also prevent or reduce infestations. A competitive stand of perennial vegetation will discourage this weed on rangelands and pastures.

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# WILD PROSO MILLET

## *Panicum miliaceum* L.

**Family:** *Poaceae* (Grass).

**Other Scientific Names:** None.

**Other Common Names:** Proso millet, broom corn millet, common millet.

**Legal Status:** Not categorized.



### Identification

**Growth form:**

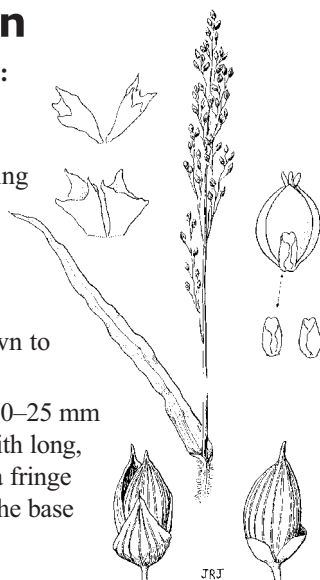
Annual grass.

**Flower:** The

inflorescence is a spreading panicle 15–30 cm wide and not fully extended from the leaf sheath.

**Seeds/Fruit:** Seeds are smooth, shiny, olive brown to black.

**Leaves:** Leaf blades are 10–25 mm wide. Sheaths are open with long, spreading hairs. There is a fringe of dense hairs (ligule) at the base of the leaf blade.



**Stems:** Mature plants are 0.6–1.8 m tall with erect stems that branch at the base.

**Roots:** Not rhizomatous, short fibrous root system.

**Seedling:** Both surfaces of the leaf blade as well as the sheath are densely hairy. The back of midrib often has a row of hairs protruding at a 90° angle. Auricles are lacking, and the ligule is hair-like. The large, shiny, dark brown to black seed coat often persists on the root system.

**Similar Species**

**Exotics:** Common witchgrass (*Panicum capillare*) has erect panicles and shorter spikelets.

**Natives:** None.



### Impacts

**Agricultural:** One of the fastest-spreading weeds in the US corn belt, this weed is a vigorous competitor in row crops (Whitson et al. 1996) and appears to be most competitive in corn, soybeans, and beans (Wilson 1992).

**Ecological:** Not a problem in rangelands or natural areas.

**Human:** No information available.

### Habitat and Ecology

**General requirements:** Commonly found in crops (especially corn) and along field edges and roadsides. In BC, it is particularly adapted to sandy, droughty soils, but it can grow on a wide range of soils.

**Distribution:** The plant occurs infrequently in the province but has been found in cornfields in the Kamloops, Salmon Arm, Enderby, and Abbotsford areas. It is present in the Okanagan, Thompson, Mainland, and Peace River agricultural reporting regions. It is common in much of the US.

**Historical:** Introduced from Eurasia. Grown for human consumption, chicken feed, or bird seed.

**Life cycle:** Seeds germinate in spring and throughout the summer when soil temperatures rise (Wilson 1992). Flowering begins in July and continues throughout the summer. Seeds mature from late August through September, depending on geographic location (Wilson 1992).

**Mode of reproduction:** By seed.

**Seed production:** A single plant may produce 400–2,100 seeds (Wilson 1992).

**Seed bank:** Seeds can remain viable in the soil for 5 or

more years.

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

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**Biocontrol:** None.

**Mechanical:** Properly timed cultivation (Wilson 1992), beginning as soon as the crop emerges and continuing until it begins to close the row, can provide up to 95% management (Wilson 1992).

**Fire:** No information available.

**Herbicides:** In non-crop situations glyphosate will provide excellent management (Wilson 1992). Numerous herbicides are registered for pre-plant, pre-emergence, and post-emergence control in annual crops in Canada. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations.

**Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Always select clean, high-quality, certified seed. Clean farm equipment, especially combines, before leaving an infested field (Wilson 1992). Crop rotation can be used to manage wild proso millet. Alfalfa has been used for long-term management. Regular mowing prevents seed production (Wilson 1992).

### Integrated Management Summary

Combining early season cultivation with either pre-planting or post-emergence herbicides has resulted in the most consistent control (Wilson 1992).

## References

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# YELLOW NUTSEdge

*Cyperus esculentus* L. var. *leptostachyus* Boeckl.

**Family:** *Cyperaceae* (Sedge).

**Other Scientific Names:** None.

**Other Common Names:** Yellow nut-grass, chufa, chufa flatsedge, galingale.

**Legal Status:** Provincial Noxious.



## Identification

**Growth form:** Perennial or annual sedge.

**Flower:** Flowers are yellowish brown in appearance. Three to 9 leaf-like bracts under the flower clusters are longer than the flowers.

**Seeds/Fruit:** Seeds are yellowish, triangular, oblong, and 1–2 mm long.

**Leaves:** Grass-like leaves originate from the base of each stem, while long, leaf-like bracts radiate out from a common point just below the umbrella-like flower cluster.

**Stems:** Plants range from 10 to 70 cm tall, with 3-ranked leaves and 3-angled pithy stems.



**Roots:** Long, scaly rhizomes have small tubers at the tips that are dark, unevenly globe-shaped, and edible, tasting something like almonds.



**Seedling:** Stems are triangular in cross-section. Leaves are smooth, hairless, and deeply keeled. The plant is yellowish to pale green (Carey et al. 1993).

**Other:** The leaves have a sweet scent.

### Similar Species

**Exotics:** Purple nutsedge (*Cyperus rotundus*) is very similar in appearance, but it has a purple seed head, its tubers are bitter, and its leaves taper to an abrupt point rather than a gradual one as in yellow nutsedge.

**Natives:** None known.

## Impacts

**Agricultural:** The nutsedges are difficult weeds to manage in cultivated fields, often forming a solid cover over large areas in sorghum and alfalfa pastures, flood plains, dams, and ditches, and along streams and roadsides (Parker 1972). Yellow nutsedge can also be troublesome in crops like onions, potatoes, beans, and corn (Whitson et al. 1996). It reduces yield and quality by competing for light, water, and nutrients, and by

interfering with pesticide applications and harvest operations (Ackley et al. 1996). It is increasing as a concern to berry production in BC.

**Ecological:** Yellow nutsedge is a noxious weed of wet soil. Infestations often start in wet areas and then spread outward.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Yellow nutsedge is found in many soil types but is common on well-drained, sandy soils or damp to wet sites. It can commonly be found in irrigated crops, along streams, around lakes and ponds, wet fields, and wet prairies.

**Distribution:** In BC, this plant is causing concern in coastal agricultural areas, where it grows on moist to

moderately dry sites. It is found only in the Mainland agricultural reporting region, where it is considered a major concern. It is also found in cultivated agricultural lands, turfgrass, nurseries, and native habitats in eastern Canada and throughout the US.

**Historical:** Introduced from Europe. The tubers are edible by humans and wildlife.



**Life cycle:** Plants are yellowish green. Flowers appear one per scale, with many scales per spikelet (USDA. Undated). Flowering occurs from July to October.

**Mode of reproduction:** By rhizomes, tubers, and sometimes seed. Rhizomes radiate from the main plant, ending in bulbs or tubers that may produce new plants.

**Seed production:** Under favourable conditions large amounts of seed can be produced (Holm et al. 1991).

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.

## Management

**Biocontrol:** None.

**Mechanical:** May be pulled or dug before seed production. It is important to pull the entire root system to avoid regrowth from underground root buds.

**Fire:** No information available.

**Herbicides:** Very difficult to gain long-term control with herbicides. Bentazon is registered for control in blueberries. Non-selective control is possible with repeat glyphosate applications. Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and dispersal and maintaining perennial plant communities.

### Integrated Management Summary

Mechanical and/or chemical management methods can be used to eliminate seed production and deplete the nutrient root reserves. Land use practices that maintain perennial plant cover will help prevent the spread of yellow nutsedge. Management efforts must be directed at prevention of tuber formation.

## References

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# YELLOW STARThISTLE

## *Centaurea solstitialis* L.

**Family:** Asteraceae (Sunflower).

**Other Scientific Names:** None.

**Other Common Names:** St. Barnaby's thistle.

**Legal Status:** Provincial Noxious.

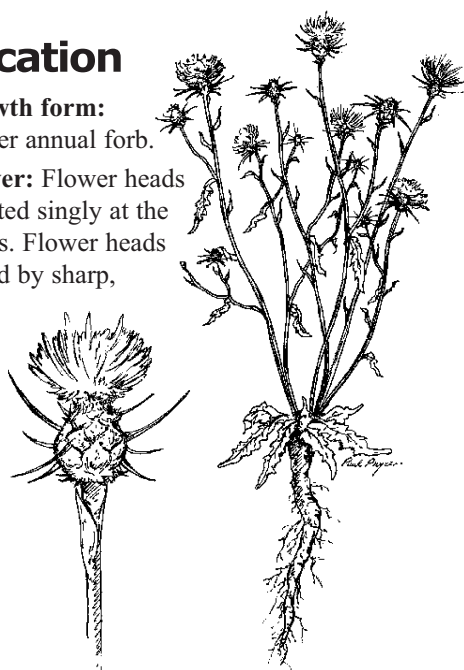


### Identification

**Growth form:**  
Winter annual forb.

**Flower:** Flower heads are yellow, located singly at the ends of branches. Flower heads are distinguished by sharp, straw-coloured thorns, which are up to 2 cm long.

**Seeds/Fruit:** Yellow starthistle has 2 types of seeds: plumed and plumeless.



**Leaves:** Basal leaves are deeply lobed; upper leaves are entire and sharply pointed.

**Stems:** Mature plants are 60–90 cm tall and have rigid, branching, winged stems covered with cottony hairs (Whitson et al. 1996).

**Roots:** Taproot.

**Seedling:** Seedlings have oblong, tongue-shaped cotyledons (Herzog and Randall 1998).



### Similar Species

**Exotics:** None in BC.

**Natives:** None known.

### Impacts

**Agricultural:** In horses yellow starthistle causes a neurological disorder called “chewing disease” (Maddox et al. 1985).

**Ecological:** A pioneering plant that becomes established on disturbed land. In the US, it forms dense

infestations, reducing the available forage for livestock and wildlife. It may have allelopathic effects on some associated native species (Maddox et al. 1985).

**Human:** No information available.

### Habitat and Ecology

**General requirements:** Yellow starthistle invades rangelands, pastures, roadsides, cropland, and disturbed habitats. It is intolerant of shade and requires light for rosette and taproot development (FEIS 1996). It can establish on deep, well-drained soils as well as on shallow, rocky soils that receive 25–100 cm of annual precipitation.

**Distribution:** Yellow starthistle is not known to occur in the province but is well established in the US Pacific Northwest, where it appears to be spreading. It occupies mid- to high-elevation sites and appears best adapted to

dry habitats formerly dominated by big sagebrush (*Artemisia tridentata*), bluebunch wheatgrass (*Elymus spicatus*), Idaho fescue (*Festuca idahoensis*), and Sandberg bluegrass (*Poa secunda*) (Sheley et al. 1999).

**Historical:** Introduced from Europe.

**Life cycle:** Seedlings usually emerge in the autumn, form rosettes, and begin growing a taproot. Root growth continues throughout the winter. Yellow starthistle bolts in late spring and flowers from June through August, depending on elevation and latitude.

**Mode of reproduction:** By seed.

**Seed production:** Plants usually produce 700–1,000 seeds/plant, but vigorous plants may produce up to 170,000 seeds/plant (Herzog and Randall 1998; FEIS 1996).

**Seed bank:** Seeds may remain viable for several years (Herzog and Randall 1998).

**Dispersal:** Plumed and plumeless seeds are dispersed at different times. Plumed seeds are dispersed by wind shortly after maturity. Plumeless seeds remain in the seed head until it disintegrates in the autumn or winter.

**Hybridization:** No information available.

## Management

**Biocontrol:** None available in the province. The most commonly used biological control agent in the US is *Bangasternus orientalis*, a seed head weevil. Larvae feed on the seeds and can destroy up to 60% of the seeds in a head (Rees et al. 1996).

**Mechanical:** Hand-pulling can be used to remove small infestations of yellow starthistle. Mowing can be used to control larger infestations. Mowing alone is ineffective as a management method but can be helpful in stressing yellow starthistle plants that grow above desirable seeded species during re-vegetation (Sheley et al. 1999).

**Fire:** Hastings and DiTomasso (1996) reported that yellow starthistle was controlled with prescribed burning in California grasslands. Burning should be conducted during the early flowering stage before seed-set.

**Herbicides:** Herbicides are most effective when applied from the seedling to bolt stages. Picloram, dicamba, and 2,4-D are the most commonly used herbicides for this weed. Consult the most recent

edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Grazing management should aim to promote plant communities with perennial grasses and forbs that provide good ground cover.

### Integrated Management Summary

Integrate herbicide applications with seeding of competitive grasses where applicable. Cattle and sheep will graze yellow starthistle before it has spines, but the plant may need to be grazed several times in a growing season for successful management. As this weed is not currently in the province, all efforts must be directed toward maintaining a competitive perennial cover and to preventing plants found from going to seed.

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# YELLOW TOADFLAX

*Linaria vulgaris* P. Miller

**Family:** *Scrophulariaceae* (Figwort).

**Other Scientific Names:** None.

**Other Common Names:** Butter and eggs, wild snapdragon, common toadflax.

**Legal Status:** Provincial Noxious.



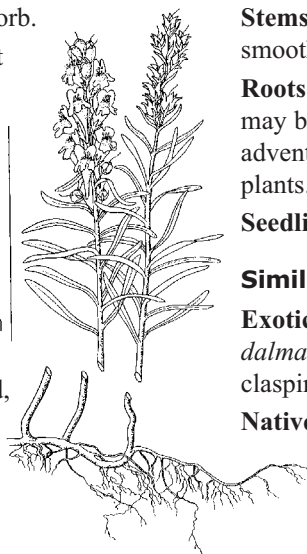
## Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are bright yellow and resemble snapdragons. Flowers are arranged in a raceme at the ends of the branches.

**Seeds/Fruit:** Seed capsules are round-ovate, 5–10 mm long, and 2-celled. Seeds are brown or black, circular, and surrounded by a notched wing. 10 cm

**Leaves:** Leaves are soft, lance-shaped, and pale green. Leaves are mainly alternate, but lower leaves appear to be opposite due to crowding.



**Stems:** Mature plants are 10–80 cm tall with 1–25 smooth, erect floral stems.

**Roots:** Taproots may be up to 1 m long. Lateral roots may be several meters long and can develop adventitious buds that may form new plants.

**Seedling:** No information available.

### Similar Species

**Exotics:** Leaves of Dalmatian toadflax (*Linaria dalmatica*) are shorter, wider, and broad-based, clasping the stem.

**Natives:** None known.



## Impacts

**Agricultural:** Yellow toadflax contains a glucoside that is mildly poisonous to cattle (Morishita 1991). The plant is considered unpalatable to cattle and poisonings are rare.

**Ecological:** Yellow toadflax establishes in open areas but is adapted to a wide range of environmental conditions (Saner et al. 1995). The plant spreads

rapidly from adventitious buds on creeping root systems. The plant competes with native grasses and forbs and can alter species diversity on some sites. Dense populations can also reduce forage production for livestock and wildlife.

**Human:** No information available.

## Habitat and Ecology

**General requirements:** Seems best adapted to sites with well-drained sandy or gravelly soils, dry summers, and open, sparsely vegetated sites (Lajeunesse 1999). In BC it is found in grasslands and open forests and on disturbed sites such as roadsides, railroad tracks, logged forests, cultivated fields, and gravel pits.

**Distribution:** Occurs in all Canadian provinces and territories and throughout the continental US (Saner et al. 1995). In BC it is locally abundant in the Okanagan, Similkameen, Thompson, Boundary, East Kootenay,

and Cariboo regions (Powell et al. 1994). It is present in all of the province's agricultural reporting regions except the Mainland and Vancouver Island but is not considered a major concern in any region.

**Historical:** Introduced from Eurasia as an ornamental plant.

**Life cycle:** Prostrate stems emerge in autumn and are tolerant to freezing. These stems develop into floral stems the following year that begin growth about the same time as new seedlings in mid-April, depending on

geographic location. Plants flower from May through August, and seeds mature from July to October (Saner et al. 1995).

**Mode of reproduction:** By seed and vegetatively from roots.

**Seed production:** A mature plant can produce up to 30,000 seeds annually, and a single stem can contain over 5,000 seeds (Saner et al. 1995).

**Seed bank:** Seeds can remain dormant for up to 10 years.

**Dispersal:** Primarily by wind but may also be dispersed by water and ants (Rutledge and McLendon. Undated).

**Hybridization:** No information available.

## Management

**Biocontrol:** Five species occur in BC that could be used for yellow toadflax: *Brachypterolus pulicarius* (beetle), *Calophasia lunula* (moth), *Eteobalea intermediella* (moth), *Gymnaetron antirrhini* (weevil), and *Mecinus janthinus* (beetle).

**Mechanical:** Cutting or mowing removes current-year growth and can also reduce seed production and dispersal. However, they do not kill the plant and are not recommended (Lajeunesse 1999).

**Fire:** Burning is not recommended because of the plant's large, deep root system (Saner et al. 1995).

**Herbicides:** Difficult to manage with herbicides. Herbicides should be applied during flowering when carbohydrate reserves in the root are at their lowest. Picloram, dicamba, and picloram with 2,4-D have all been effective in some situations (Sebastian and Beck 1999). Consult the most recent edition of BC Ministry of Agriculture, Food and Fisheries Crop Production Guides for specific recommendations. **Before applying herbicides, read the label for full use and precautionary instructions.**

**Cultural/Preventive:** Hand-pulling can be effective, especially in coarse-textured soils where roots can be

pulled easily. Repeated applications may be required until the seed bank and root fragments have been depleted. Seed disturbed areas to perennial grasses and forbs to provide ground cover and competition. Manage for vigorous perennial plant communities.

### Integrated Management Summary

Integrated management must combine prevention, cultural control, mechanical control, herbicides, and biocontrol agents. For new and small infestations, hand-pulling and mechanical methods may be appropriate to limit seed production and spread, but repeated applications of treatments are likely. For larger infestations, herbicides may be appropriate. For very large infestations, the only practical solution may be biocontrol. Seeding disturbed areas to perennial grasses and forbs and adjusting management practices to maintain vigorous perennial plant communities all contribute to managing this plant successfully.

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