

Centaurea biebersteinii & nigra

SPOTTED KNAPWEED & BLACK KNAPWEED

ENGLISH NAMES Spotted knapweed¹ and black knapweed² or lesser knapweed²

SCIENTIFIC NAME *Centaurea biebersteinii*¹ (alt. *Centaurea maculosa*) and *Centaurea nigra*²

FAMILY Asteraceae



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Spotted knapweed and black (lesser) knapweed have pink to purple thistle-like flowers with either spotted (black-tipped) or black flower bracts.

RANGE/KNOWN DISTRIBUTION

Spotted knapweed and black knapweed are both native to Europe. They were first reported in North America at the end of the 19th century from Washington State. They are now found throughout Europe, the western United States and Canada, Argentina (spotted knapweed) and Australia (black knapweed). Spotted knapweed is widely spread throughout British Columbia, while black knapweed has been reported only in southern BC.

IMPACTS ON GARRY OAK AND ASSOCIATED ECOSYSTEMS

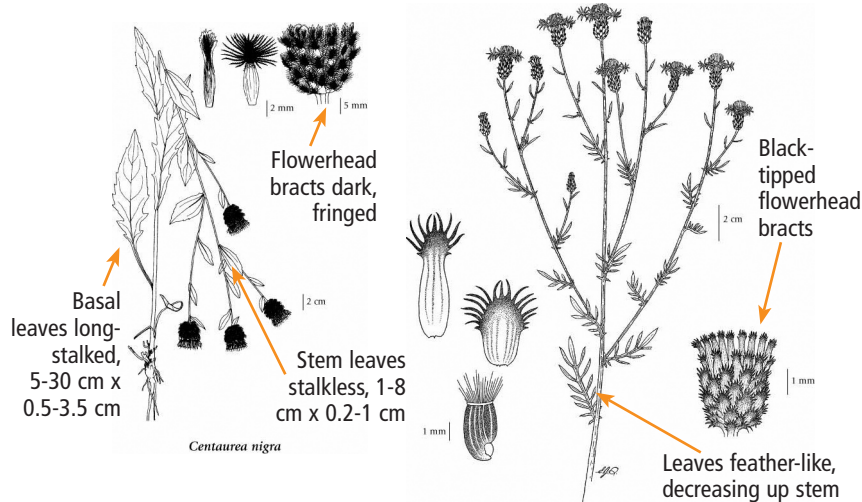
The impact of spotted knapweed and black knapweed on Garry oak ecosystems specifically is not yet fully known. These species prefer open and seasonally dry habitats like those found in Garry oak ecosystems, making Garry oak and associated ecosystems susceptible to invasion. Disturbance, one of the greatest threats to these ecosystems, is often the gateway to invasion, resulting in the spread of invasive species into adjacent undisturbed areas. Vast monocultures rapidly spread following colonization, possibly out-competing native species for moisture and nutrients and thus reducing biodiversity. Spotted knapweed does particularly well in deeper soiled sites where its long taproot allows it to reach water that is inaccessible to other species during the dry summer months. Spotted knapweed produces a phytotoxin and alters the soil's mycorrhizal community, giving it further competitive advantage. Its taproots do not hold soil as well as the fibrous roots of native plants, or allow the soil to retain as much water, resulting in increased surface runoff and soil erosion.

FIELD DESCRIPTION

Spotted knapweed and black knapweed grow up to 1.8 m and 1.5 m tall and have stout taproots. Both plants are hairy and blue-gray in colour, appearing woolly. The basal leaves in spotted knapweed are once or

INVASIVE SPECIES IN GARRY OAK AND ASSOCIATED ECOSYSTEMS IN BRITISH COLUMBIA

CENTAUREA BIEBERSTEINII & NIGRA



Vascular Plants of the Pacific Northwest, Leo C. Hitchcock; Arthur Cronquist, and Mario Ownbey, illustrations by Jeanne R. Janish. Published by the University of Washington Press (1969).

Centaurea biebersteinii

twice divided into narrow linear to lance-shaped lobes. The basal leaves of black knapweed are broadly lance-shaped and toothed or shallowly lobed. Flowering stems are narrow, upright and branched in the upper half; black knapweed has few stems while spotted knapweed has up to 20. The stem leaves of both species have few to no lobes, becoming smaller and more linear up the stem. Flowerheads are singular, oblong to egg-shaped, and whitish to pink or purple in colour. Flowerhead bracts of spotted knapweed are black-tipped (giving a spotted appearance) and have distinct veins, while the bracts of black knapweed have dark brown to black and bristly margins. The seeds of spotted knapweed are dark brown or black, while the seeds of black knapweed are pale brown, and both have paler lengthwise stripes.

LIFE HISTORY

Spotted knapweed is a biennial to short-lived perennial (reportedly living up to 9 years), while black knapweed is a perennial. Plants are rosettes of leaves in the first year, resprouting from the root crown and producing flowering stems in successive years. Flowering occurs from June until October. Reproduction is almost exclusively by seeds, which these species produce prolifically (up to 146,000/m²/year for spotted knapweed depending on conditions). The majority of seeds remain within 1 m of the parent plant, forming large monoculture colonies, although long distance dispersal does occur via wind, watercourses, animals and vehicles. Reproduction can also occur by lateral shoots below the soil, resulting in multiple rosettes per root crown.

CENTAUREA BIEBERSTEINII & NIGRA

HABITAT

Spotted knapweed and black knapweed prefer dry and open sites. They are often found in fields, grasslands, meadows, open forests, beaches, sand bars, and disturbed areas such as roadsides, pastures and forest clearings. Spotted knapweed prefers nutrient-rich and coarse, well-drained soils having high moisture availability. It has been reported to grow at up to 3,000 m in elevation.

MANAGEMENT

Spotted knapweed and black knapweed are best controlled when infestations are caught early, before seed banks have developed in the soil. If an infestation is already large, priority should be given to areas of highest conservation value, such as those with rare species. Control requires an integrated management approach using a combination of the following methods.

Develop a long-term, realistic program for invasive species removal before undertaking any work. Before taking action, obtain expert advice. Please refer to the introductory section of this manual.

PHYSICAL CONTROL: For very small populations, hand pulling the entire root crown and taproot can be an effective method for control of these species. This might need to be done several times throughout the growing season and continued for several years until the seed bank is depleted. It is advised that gloves be worn when pulling these plants as continual contact may cause irritation. For larger populations where hand pulling is not feasible, the flower heads can be cut or mowed before they set seed and removed from the site. This should be conducted late in the flowering stage so as to prevent plants from regrowing. It is cautioned that repeated mowing may result in lower-growing plants that continue to set seed below mower height and mowing should be combined with other management options.

BIOLOGICAL CONTROL: At least 13 insects have been released for the biological control of spotted knapweed, the effectiveness of which varies. These agents attack the flower heads and roots, causing damage to the plants and reducing their competitive advantage. The larvae of seed head gall flies (*Urophora affinis* and *U. quadrifasciata*) have resulted in reducing seed production by 50% to 92%. Several fungi and bacteria have also been introduced as biological control agents.

CENTAUREA BIEBERSTEINII & NIGRA

CHEMICAL CONTROL: The careful spot treatment of knapweeds with herbicides such as glyphosate and triclopyr can help to reduce knapweed occurrences. As with other treatment methods, this should be repeated each year as plants emerge from the seed bank. Treatment should occur in the fall, when susceptible native species are dormant. Treatment with herbicides can be destructive to native vegetation, totally modify the ecosystem, persist for several years following application, and be costly for large areas. *Herbicides should only be used with extreme caution, and under expert advice, in sensitive Garry oak ecosystems.*

OTHER TECHNIQUES: Grazing by sheep and goats could have the same effect as mowing. However, resulting stresses on the ecosystem due to trampling and increased grazing should be managed. Fire has not been effective at managing spotted knapweed as fires do not usually burn hot enough to prevent resprouting or to kill seeds. It has even been reported to increase the occurrence of knapweed. However, annual summer burning has been shown to reduce spotted knapweed populations by limiting reproduction. Burning might increase the effectiveness of other management options when implemented in combination.

PREVENTATIVE MEASURES: The best way to prevent knapweed infestations is to avoid spreading seeds into uninfested areas by removing seeds from clothing and shoes when leaving an infested site. Small patches should be removed immediately, before the seed bank can become established.

PERSISTENCE: Seeds of spotted knapweed can remain viable in the seed bank for at least 8 years.

SELECT REFERENCES

Carpinelli, M. 2009. Fact sheet: Spotted knapweed. In Weeds Gone Wild: Alien plant invaders of natural areas. www.nps.gov/plants/alien/. Plant Conservation Alliance's Alien Plant Working Group.

Invasive Plant Council of British Columbia. 2008. Targeted Invasive Plant Solutions: Invasive Knotweeds. www.invasiveplantcouncilbc.ca/images/stories/documents/tips/Invasive_Knapweeds_TIPS.pdf. Williams Lake, BC.

Sheley, R.L., J.S. Jacobs, and M.F. Carpinelli. 1998. Distribution, biology, and management of diffuse knapweed (*Centaurea diffusa*) and spotted knapweed (*Centaurea maculosa*). *Weed Technology* 12 (2): 353-362.

A comprehensive annotated bibliography of literature specific to spotted knapweed and black knapweed is available at www.goert.ca.

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For more information contact the Garry Oak Ecosystems Recovery Team, or see the website at www.goert.ca