

Spotted Knapweed



Centaurea biebersteinii DC.

Synonyms

Acosta maculosa auct. non Holub,
Centaurea maculosa auct. non Lam.

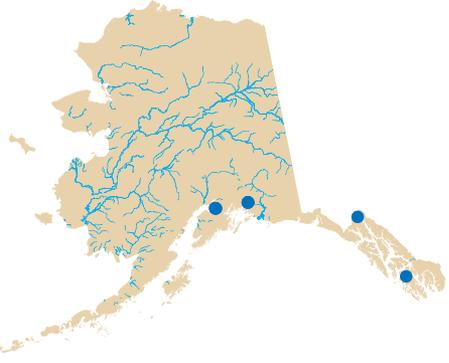
Related Species

Russian Knapweed
Acroptilon repens (L.) DC.

Description

Spotted knapweed is a biennial to short-lived perennial plant. Seedling cotyledons are ovate, with the first leaves lance-shaped, undivided, and hairless. Young seedlings can appear grass-like. Stems grow 1–4 feet tall, and are many-branched, with a single flower at the end of each branch. Rosette leaves are indented or divided about half-way to the midrib. Stem leaves are alternate and pinnately divided and get increasingly smaller toward the tip of each branch. Flower heads are urn-shaped, up to 1 inch wide, and composed of pink, purple, or sometimes white disk flowers. A key characteristic of spotted knapweed is the dark comb-like fringe on the tips of the bracts, found just below the flower petals. These dark-tipped bracts give this plant its “spotted” appearance.

Russian knapweed is a creeping perennial plant that is extensively branched, with solitary urn-shaped pink or purple flower heads at the end of each branch. Similar in appearance to spotted knapweed, Russian knapweed can be distinguished by its slightly smaller flower heads, flower head bracts covered in light hairs, with papery tips, and scaly dark brown or black rhizomes, which have a burnt appearance.



Spotted knapweed flower.

XID Services photo by Richard Old

Leaves and stems of both spotted and Russian knapweeds are covered in fine hairs, giving the plants a grayish cast.

Similar Species

Knapweeds can be distinguished from thistles (*Cirsium* spp.) by their lack of spiny leaves. Spotted and Russian knapweeds could be confused with several other invasive knapweed species that are not yet found in Alaska but have the potential to grow here. Diffuse or spreading knapweed (*Centaurea diffusa* Lam.) is distinguished from spotted knapweed by its spine-tipped floral bracts. Yellow star thistle (*C. solstitialis* L.) also has spine-tipped floral bracts as well as yellow flowers.

Ecological Impact

Spotted knapweed often forms dense stands in natural communities outside of Alaska. It reduces native plant vigor, diversity, and forage quality and degrades wildlife habitat. For example, winter-ranging elk may avoid foraging in infested communities (Rice et al. 1997). Knapweeds are allelopathic, inhibiting the establishment and growth of surrounding plants (Whitson et al. 2000). Erosion of topsoil has been shown to increase after spotted knapweed invasion. Sediments in surface runoff from sites dominated



UAF Cooperative Extension Service photo by Michael Rasz

Spotted knapweed infestation along Turnagain Arm.

by spotted knapweed were found to be approximately three times greater than the amount of sediments from native bunchgrass sites (Rice et al. 1997).

Russian knapweed is extremely competitive, and dense patches will totally exclude other vegetation. The allelopathic compound cnicin is contained in the leaves and is released into the soil after leaves fall. Grazing animals generally avoid Russian knapweed due to the bitter taste, and it can cause chewing disease in horses.

Biology and Invasive Potential

Spotted knapweed reproduces entirely by seed. Large plants may produce over 20,000 seeds (Royer and Dickinson 1999), and 30% of seeds can remain viable after 8 years of burial (Mauer et al. 1987). Anthropogenic disturbances, including overgrazing and mechanical soil disturbance, accelerate its invasion. Other soil disturbances, such as frost heave, small mammal burrowing, or trampling and grazing by native ungulates, can also facilitate spotted knapweed invasion (Tyser and Key 1988). Seeds lack pappus but have been reported to be dispersed by wind as well as by rodents and livestock (Mauer et al. 1987). Humans are the primary vector for spotted knapweed movement, through



Photo by Ron Broda

Russian knapweed.



XID Services photo by Richard Old

Spotted knapweed rosette.

seed dispersal on vehicles, machinery, and aircraft as well as the contamination of hay, commercial seed, and floral arrangements (Mauer et al. 1987). Spotted knapweed seeds germinate over a wide range of soil depths, moisture levels, and temperature regimes. Seedlings that emerge early in spring have a high probability of survival and reproduction in the following year. Those emerging later (June to July) experience reduced survival and fail to produce stems frequently the following season (Schirman 1981). Spotted knapweed grows well in porous, well-drained soils characterized by high pH and high nutrient availability. Although spotted knapweed tolerates both dry and moist conditions, it is particularly adapted to warm summers (Beck 2003). It is listed as a noxious weed in 15 of the United States and four Canadian provinces.

Russian knapweed reproduces both by seed and by vegetative root buds, although it is a poor seed producer and germination rarely occurs in the field (Selleck 1964). Plants grow radially, and a patch can cover over 100 square feet within two years. Russian knapweed is most frequently found on moist soils, but is tolerant of a wide range of soil moistures (Roche and Roche 1991). It is also drought-tolerant, surviving on sites that receive as little as 10 inches of

annual precipitation (Watson 1980). Russian knapweed is listed as a noxious weed in four Canadian provinces and 25 of the United States, including Alaska (Alaska Administrative Code 1987).

Distribution and Abundance

Spotted knapweed establishes primarily along highways, waterways, railroad ways, and pipelines. Semi-arid grasslands and open forests have been invaded in Montana, Idaho, Colorado, Massachusetts, and North Dakota (Lym and Zollinger 1992, Rice et al. 1997). Overall this species has infested hundreds of thousands of acres in the northwestern United States and at least 8,500 acres of rangeland in British Columbia (Royer and Dickinson 1999). In Alaska, it has been found in Skagway and Valdez, on Prince of Wales Island, and along the Seward Highway between Anchorage and Girdwood. Available data suggest that this species was only recently introduced to Alaska, as it was first reported in 2001 (ALA 2004). Spotted knapweed is native to central and southeastern Europe and has also invaded northern Europe, Asia, and Australia.

Russian knapweed is now widespread in the United States and especially common in the semi-arid portions of the western states and adjacent Canadian provinces. It invades disturbed grasslands, shrublands, and riparian woodlands, accounting for a total of 1,500,000 acres infested in North America in 2000 (Zouhar 2001a). It has not been documented in Alaska as of early 2005 but could arrive at any time. Russian knapweed is native to Asia, and it was initially introduced to North America in the early 1900s, primarily as a seed contaminant. Its spread from these locations is linked to the distribution of infested hay.

Management

Long-term control of large knapweed infestations requires a combination of grazing management, herbicide use, biological control, and vegetative suppression. Hand-pulling can be effective if new infestations are small and control efforts are persistent. Areas must be monitored until the

seedbank is exhausted. Most knapweed control has been conducted in agricultural settings, with less information available on the use of herbicides in native plant communities (Lym and Zollinger 1992, Rice et al. 1997). A number of herbicides effectively control spotted knapweed on rangeland (Davis 1990). For long-term control, herbicides must be applied annually until the seed bank is exhausted, and a revegetation program is necessary to resist reinvasion. In order to suppress knapweeds, other plant species must remove a significant amount of moisture from the soil during periods when knapweeds are in the vulnerable seedling stage. However, vegetative suppression alone will not provide lasting knapweed control (Stannard 1993). A number of biological control agents have been moderately successful in Montana and other western states (Rees et al. 1996). The populations of knapweed in Alaska have been small, and in most cases they have been eradicated or controlled via hand pulling.

Notes

Knapweeds originated in central Asia and are now found on all continents except Antarctica.



USDA Forest Service photo by Michael Shephard

Spotted knapweed spreading along a roadside.