



COLORADO STATE PARKS
BEST MANAGEMENT PRACTICES
WEED PROFILE



Date Created: April 25, 2003
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Author: Various
Parks Affected: Many

Russian knapweed
Acroptilon repens (L.) De Candolle;
Centaurea repens L.



Family: *Asteraceae* (Sunflower)

Other Names: Turkestan thistle, mountain bluet, creeping knapweed

USDA Code: ACRE3, CERE6

Legal Status: Colorado Noxious List B (top ten worst)

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 colored at maturity.

Seeds/Fruit: Seeds are oval and compressed. Seeds are grayish 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, toothed, and become progressively smaller. Rosette leaves are lance-shaped, tapering at both ends with the broadest part at the tip.

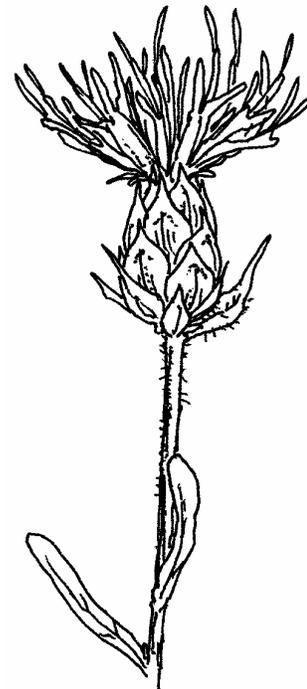
Stems: Mature plants are between 18-36 inches tall. The stems are erect, thin, stiff, branched, and when young are covered with soft, short, gray hair (Zimmerman 1996).

Roots: Russian knapweed has a well-developed root system, which functions as the major means of propagation and spreading. The roots are easily recognizable by their black or dark brown color 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 grayish-green, but is not hairy.

Keys to Identification:

- Russian knapweed can be distinguished from other knapweeds by the pointed papery tips of the floral bracts.



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 the *Asteraceae* resemble knapweed in the rosette stage.

Impacts

Agricultural: No information available.

Ecological: Russian knapweed forms dense colonies that displace native species and reduce forage production (Whitson 1999). Russian knapweed does not establish readily in healthy, natural habitats. It typically invades disturbed areas, forming dense single-species stands. Once established, Russian knapweed uses a combination of adventitious shoots and allelopathic

chemicals to spread outward into previously undisturbed areas. The plant extends radially in all directions and can cover an area of 39 feet² within two years (Watson 1980). Russian knapweed contains an allelopathic polyacetylene compound, which inhibits the growth of competing plants (Stevens, 1986). Tests conducted with alfalfa (*Medicago sativa*), barnyard grass (*Echinochloa crus-galli*), and red millet (*Panicum miliaceum*) indicated Russian knapweed effectively inhibits root length elongation of grasses as well as 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 for Russian knapweed to quickly colonize and dominate new sites.

Human: No information available.

Habitat and Distribution

General requirements: Russian knapweed is commonly found along roadsides, riverbanks, irrigation ditches, pastures, waste places, clearcuts and croplands. It is not restricted to any particular soil but does especially well in clay soil. Selleck (1964) observed that Russian knapweed infestations increased in dry locations but decreased in moist locations due to competition with perennial grasses.

Distribution: Russian knapweed is found throughout the western United States. In Colorado, Russian knapweed is widespread in the southwest portion of the state, with scattered infestations elsewhere on both the east and west slope.

Historical: Russian knapweed is native to Eurasia, and was probably introduced to North America as a contaminant in crop seed.

Biology/Ecology

Life cycle: Russian knapweed spreads by creeping horizontal roots and seed. Shoots emerge early in spring shortly after soil temperatures remain above freezing. All shoot development originates from root-borne stem buds (Watson 1980). These buds arise adventitiously at irregular intervals along the horizontal roots. Plants form rosettes and bolt in late May to mid-June. Russian knapweed flowers from June to October (Zimmerman 1996). It does not appear to reproduce extensively from seed.

Mode of reproduction: Russian knapweed reproduces primarily vegetatively. The root system consists of the original root (taproot), one to many horizontal roots, and their vertical extensions. Buds on the horizontal roots can form adventitious shoots that may grow to be independent plants.

Seed production: A single plant may produce 1,200 seeds per year.

Seed bank: Seeds may remain viable for 2-8 years (Carpenter and Murray 1998).

Dispersal: Knapweed seeds are often spread in hay and on vehicle undercarriages.

Hybridization: No information available.

Control

Biocontrol: The Division of Plant Industry's Biological Pest Control Section is working to establish *Subanguina picridis* (a gall forming nematode) at three sites in Colorado. However, this species is currently unavailable for general redistribution.

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 lower in vigor. 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. A combination of cutting and herbicides can be used to control Russian knapweed. In the fall, apply picloram to any plants that have re-emerged. This process may have to be repeated annually for several years to exhaust the soil seed bank.

Fire: No information available.

Herbicides: Spraying Curtail® herbicide, which is a mixture of 2,4-D and clopyralid, on dormant plants in the fall has been very effective at controlling Russian knapweed in Utah, but only if it is followed by reseeding during the year following treatment (Chad Reid, pers. comm.). Picloram at 1 lb. ai/acre is widely used on Russian knapweed and is considered to be the most effective herbicide regardless of time of application (Duncan 1994). Clopyralid is also effective against

Keys to Control:

- Use an aggressive monitoring program to detect new infestations.
- A combination of mechanical, chemical, and biological control and re-seeding is needed to remove an infestation of Russian knapweed.

knapweeds and thistles and will kill other composites, legumes and smartweeds, but has little or no impact on many other forbs. In Wyoming, picloram applied either at bloom or seed stage at 0.38 lb. ai/ac, clopyralid at 0.25 lb. ai/ac and the combination of clopyralid (0.18 lb./ac) + 2,4-D (1.0 lb./ac) + picloram (0.25 lb./ac) provided 95% control two years after application (Whitson 1999). Glyphosate at 1.5 lb. ai/acre or dicamba at 1 lb. ai/acre can be applied during the bud-growth stage can be used to control the topgrowth of Russian knapweed. However, abundant regrowth from the root systems will occur the following year and additional applications may be necessary. Timing of applications to the late bud and fall growth stage is critical with most herbicides to achieve good control of knapweed. A backpack sprayer or a wick is highly recommended to minimize damage to non-target plants if they are abundant.

The best way to control Russian knapweed is to combine herbicide treatment with seeding competitive grasses. Benz et al. (1999) found that clopyralid + 2,4-D treatment of Russian knapweed in the late bloom stage followed by fall seeding of a bunchgrass and a sod-forming grass was the most effective method they tested. Substituting metsulfuron herbicide for the clopyralid + 2,4-D resulted in lower control but it was still effective.

Cultural/Preventive: Preventive measures include maintaining healthy native communities, and minimizing disturbance and seed distribution.

Integrated Management Summary

Russian knapweed is characterized by its extensive root system, low seed production, and persistence. It is a strong competitor and can form dense colonies in disturbed areas. The most effective method of control for Russian knapweed is to prevent its establishment through proper land management. The healthier the natural community, the less susceptible it will be to Russian knapweed invasion. Areas should be monitored three times a year (spring, summer, and fall) and all Russian knapweed plants should be destroyed immediately. Since Russian knapweed is so persistent, it is important to combine killing Russian knapweed with seeding competitive grasses.

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