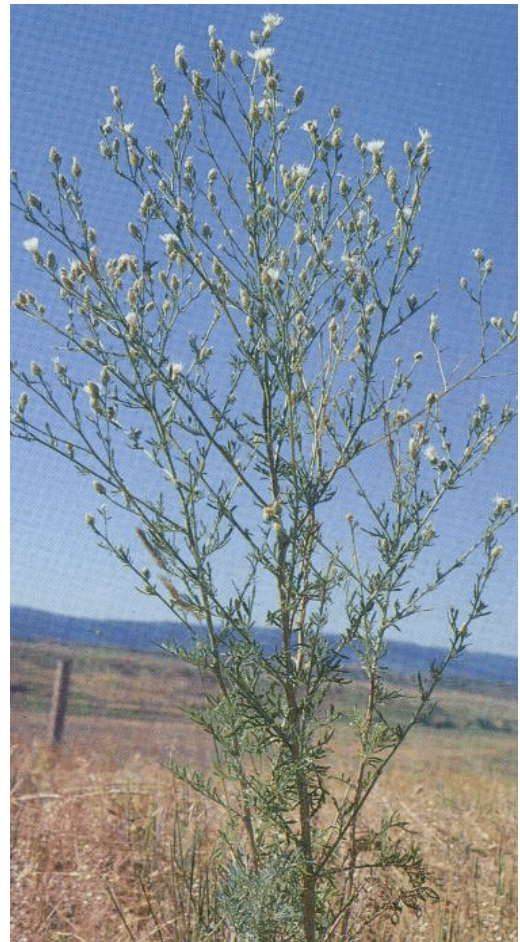


## DIFFUSE KNAPWEED

(*Centaurea diffusa*)

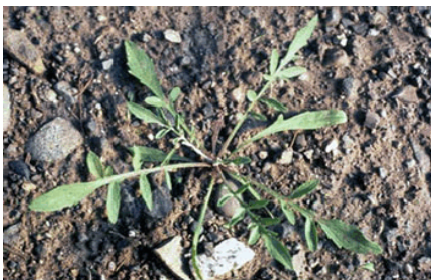
**Description:** Diffuse knapweed is a member of the Asteraceae or Sunflower family. Diffuse knapweed grows 1 to 3 feet tall from a deep taproot. Upright stems of the plant have numerous spread branches, giving a ball-shaped, tumbleweed appearance. Basal leaves, which form rosettes on a central crown, are borne on short stalks and are deeply divided into lobes on both sides of the vein. Stem leaves of the plant are stalkless and become progressively smaller and less divided higher up the stem, with the uppermost small leaves being bractlike. Flower heads are urn-shaped and  $\frac{3}{16}$  to  $\frac{1}{4}$  inch in diameter and  $\frac{5}{16}$  to  $\frac{7}{16}$  inch long, excluding spines and flowers. Flower heads are solitary or borne in clusters of two or three at the ends of the branches of the plant. Bracts surround the flower heads and are yellowish green in color with a buff or brown margin. Each bract is edged with a fringe of spines and ends with a longer spreading spine at the tip, resembling a crab like appearance. Flowers are white or purple in color. Diffuse knapweed seeds are buff to brown in color, about  $\frac{1}{8}$  inch long, and have a plume of bristle-like hairs.

Diffuse knapweed is considered a noxious weed under North Dakota state law, thus landowners are required to eradicate or control the spread of the plant.



Diffuse knapweed

### Plant Images:



Diffuse knapweed rosette

Rosette



Seedling



Flower head and bracts

**Distribution and Habitat:** Diffuse knapweed is native to the eastern Mediterranean or Eurasia region. The plant is commonly found on light, well-drained soils such as sandy or gravelly loams or loamy fine sands. Diffuse knapweed is not as competitive on shallow, very coarse-textured soils. Establishment of the plant is limited by dense shade and poorly drained soils. The plant is often found along waterways, highways, railroad tracks, and pipelines. New infestations of diffuse knapweed are also common where sites have been excessively grazed, publicly traveled, or disturbed.

**Life History/Ecology:** Diffuse knapweed is a short-lived perennial, a biennial, or occasionally an annual. The plant reproduces and spreads solely from seed. Seeds germinate in the fall or spring and develop into low-lying, tap-rooted rosettes. Plants that overwinter as a rosette bolt in early May producing one or rarely two stems. The life cycle of diffuse knapweed may be completed in one year or over several years as a rosette before flowering. Diffuse knapweed flowers from July to September. Each plant is capable of producing 400 to 900 seeds. Seed production in northeastern Washington averaged 11,200 to 48,100 seeds per square meter. Site conditions and precipitation during the growing season have the greatest impact on the number of seeds produced in a year.

An allelopathic compound, cnicin, has been isolated from diffuse knapweed leaves and shoots. However, the allelopathic effect of the plant on other plant species has been contradictory. Resource competition and competitiveness between diffuse knapweed and an associated plant community may play a more important role than allelopathy.

**History of Introduction:** Diffuse knapweed is native to eastern Mediterranean and western Asia. Diffuse knapweed was first recorded in North America in 1907. The plant was discovered in an alfalfa field in Washington. Between 1980 and 1998, the range of diffuse knapweed had extended to include 204 counties in 14 western states. In North Dakota, diffuse knapweed has been documented in Grant, Bowman, Stutsman, and Kidder counties.

**Effects of Invasion:** Diffuse knapweed is an aggressive species that can infest large areas fairly quickly. Both economic and environmental losses are evident due to diffuse knapweed invasion. Diffuse knapweed has been responsible for reducing livestock forage, plant diversity, increasing soil erosion, reducing land value, and increasing roadside maintenance. Wildlife and recreation areas are also negatively impacted.

### **Control:**

Diffuse knapweed reproduces entirely by seed, therefore management objectives for controlling the plant should involve eliminating new seed production and depleting the existing seed bank. Areas should be monitored for several years and new plants should be eradicated immediately. Prevention and early detection are important approaches for diffuse knapweed management.

*Mechanical* - Pulling or digging scattered diffuse knapweed plants is feasible if enough of the taproot is removed to discourage re-sprouting. Hand pulling should be repeated three times per year, for as many years as additional diffuse knapweed plants appear. Research has shown that shallow cultivation was ineffective in controlling diffuse knapweed, but deep cultivation eliminated the plant. Long term effects of mowing diffuse knapweed populations is unknown. Mowing diffuse knapweed can reduce seed production or alter phenological development. Mowing bolted diffuse knapweed plants for several consecutive years can reduce populations and cover of the plants or can severely disturb or damage surrounding vegetation, making the area more susceptible to knapweed infestations. In one study plants that were mowed early in the growing season produced few viable seeds, but mowed plants were also able to resprout and flower again. Prescribed burning has had variable results on diffuse knapweed

control. However, most reports suggest that diffuse knapweed may resprout from the root crown and/or establish from seed following a prescribed burn. In Washington, a prescribed burn increased the cover of diffuse and spotted knapweed populations and did not enhance desirable species.

*Chemical* - A number of herbicides are registered for control of diffuse knapweed. Picloram, dicamba, and products that contain clopyralid can be used to control small infestations. On pasture and rangeland, picloram can control diffuse knapweed for two to three years due to the residual control period of the herbicide. Herbicide application is optimum when the plant is in the rosette growth stage in the fall or in the bolt to bloom stage in the spring. Dicamba or a combination of dicamba and 2,4-D can provide good diffuse knapweed control, but for long-term control, an annual follow-up treatment may be necessary. Optimum herbicide application timing is when the plant is in the bud to bloom stage. Clopyralid also provides good control of diffuse knapweed. Control is greatest when herbicides are applied during the fall or in the early spring when the plants are in the rosette stage.

Contact your local county extension agent for recommended use rates, locations, and timing.

*Biological* - Various insects have been released as biological control agents for diffuse knapweed. Most of the control techniques use insect larvae that damage the host root, shoot, leaf, or flower, leading to a reduction in seed production. Two seedhead-feeding flies include *Urophora affinis* and *Urophora quadrifasciata*. The fly species lay their eggs inside knapweed flower buds in June. The larvae then induce galls within the flower heads where they feed on the phloem, which can reduce seed production. A European root-mining moth, *Agapeta zoegana*, attacks the rosette stage of diffuse knapweed. Two seed-head weevils include *Bangasternus fausti* and *Larinus minutus* and two root moths include *Pelochrista medullana* and *Pterolonche dispersa*. The root beetle, *Sphenoptera jugoslavica*, has also been released on diffuse knapweed. Biological control agents reduce seed numbers, but established plants are still able to produce enough seed to maintain population levels, therefore, insects alone may not effectively control diffuse knapweed populations. Biocontrol agents have not been introduced in North Dakota at this time.

In addition, two fungal pathogens can infect diffuse knapweed under certain conditions. *Puccinia jaceae* is a rust infection that attacks the leaves and stresses the plant. *Sclerotinia sclerotiorum* is a common soil fungus that can cause the plant to wilt or die under ideal conditions.

Grazing diffuse knapweed may not be an effective control method because the plant is suggested to be unpalatable. However, diffuse knapweed is most likely to be grazed by domestic sheep when the plant is in the rosette through bud stage, green and succulent, or the only plant available. Grazing methods may be patterned after programs designed for yellow starthistle and spotted knapweed control where early and late season grazing appear to be the most effective when plants are bolting or in the pre-spiny stage.

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Diffuse knapweed and seedling photographs courtesy of Weeds of the West, Tom Whitson.

Rosette photograph courtesy of King County Noxious Weed Control Program.

Flower head and bracts photograph courtesy of Stevens County Noxious Weed Control Board, Washington.