DIFFUSE KNAPWEED: Options for control

Diffuse knapweed, a class-B non-designate noxious weed in Lincoln County, Washington (*Centaurea diffusa)* is of the Asteraceae family. Also known as White knapweed and Tumble knapweed, was introduced here as a contaminant of alfalfa from the Caspian Sea region of Turkistan.

Diffuse knapweed, is a biennial or short-lived perennial species, with a long tap root. The single, upright stem produces several spreading branches. The basal leaves are short-stalked and divided into lobes on both sides of the center vein. The stem leaves are stalkless, becoming smaller and less divided near the top of the stem. The flowers, which are generally white (sometimes pink or lavender), occur in urn-shaped heads that grow in clusters at the ends of the branches. The bracts of the flower heads are leathery, with obvious veins. The lower and middle bracts are yellowish-green with a buff or brown margin; they are edged with a fringe of spines plus a longer, spreading spine at the tip.

Diffuse knapweed establishes a rosette in its first season of growth and it commonly bolts the second year. However, when stressed by drought, grazing, or mowing, it may show short-term perennial characteristics. While plants may regenerate from the crown, diffuse knapweed reproduces primarily by seed. A single plant can produce 18,000 seeds. The seeds are dispersed when the plant breaks off at the base and behaves as a tumbleweed. These tumbleweeds are transported by vehicles and wind. The seeds are moved in shoelaces, by feeding rodents, and in contaminated hay and crop seed.

Rosettes form in the first season, bolt the second year, but when stressed by drought, grazing or mowing, it may turn perennial.

Diffuse knapweed is a very aggressive species that can infest large areas quickly. Diffuse knapweed overtakes and suppresses native vegetation, reducing species diversity and wildlife habitat. It can also increase soil erosion. This plant is **allelopathic**, meaning it alters the soil chemistry around it to inhibit the growth of other plants. The species has little value as forage for cattle and limited seasonal value for big game. Knapweed infestations increase production costs for ranchers, impair the quality of wildlife habitat, decrease plant diversity, increase soil erosion rates, decrease the visual quality and appeal of recreational lands, and pose wildfire hazards.

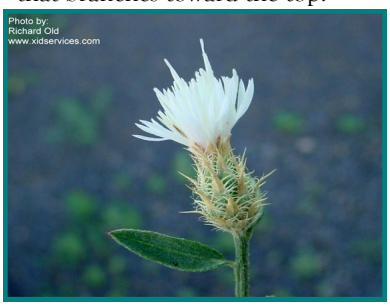
Diffuse knapweed has been found in a wide range of habitats in Washington, including sandy river shores, gravel banks, rangelands, pastures, and hayfields on sandy loams, loams, and silt loams. Diffuse knapweed appears to grow best on well-drained, light textured soils. It is not tolerant of flooding or shade. While it is not tolerant of cultivation with annual crops, diffuse knapweed thrives in gravel pits, roadsides, railroad tracks, vacant lots, trails, and heavily grazed pasture.

Diffuse knapweed grows from a single upright stem.

Later in growth, knapweed develops a single shoot, 1 to 2 ft. tall that branches toward the top.

Key identifying traits

- **Leaves** are grayish green, alternate, **hairy** and bitter.
- The **basal leaves** are short-stalked & divided into lobes on both sides of the center vein.
- **Stem leaves** are stalkless, becoming smaller and less divided near the top of the stem.
- **Flowers** are generally white (sometimes pink or lavender), occur in urn-shaped heads that grow in clusters at the ends of the branches.
- **Bracts** of flower head are leathery, with obvious veins.
- **Bracts** surrounding flowers are tipped with definite slender spines, the primary identifier.



Flower heads contain two types of flowers, ray flowers around the edges surrounding tubular disk flowers.

The spiny thistles can damage the mouth and digestive tract of animals that attempt to feed on it.

Biology and ecology

- **Biennial** or short lived perennial, with long tap roots.
- **Reproduces** primarily by seed, but can rejuvenate from root crown.
- A **single plant** can produce **18,000 seeds** which are dispersed by **tumbleweed** action.
- **Flowers** from early July to September.
- Does **not** grow well in dense shade or poorly drained soils.

At maturity, the plant breaks off at the base and tumbles in the wind, dispersing its some 18,000 seeds.

CONTROL MEASURES:

For this and other publications, see our website at: www.co.lincoln.wa.us

Prevention:

- Beware of fill dirt, hay and seed from outside your area. **Early detection** is vital to prevent invasion.

Biological:

- Seed head weevil **Larinus minutus can eradicate** Diffuse knapweed.

Cultural:

- Healthy competitive vegetation helps lessen chance of invasion, but doesn't preclude it.

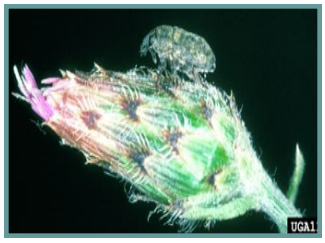
Mechanical:

- Cultivation, digging and pulling can eliminate plants and seed production if repeated frequently. Seeds remain viable in the soil for years. This is not effective unless combined with re-seeding as the disturbance simply creates an optimal seedbed.
- Cutting or mowing the above-ground portion of the plant before seed set may provide an effective way to reduce seed production, but will not control it. Mowing actually increases the density, due to stimulated germination from the soil seed bank. Mowing should be followed by a fall herbicide treatment.

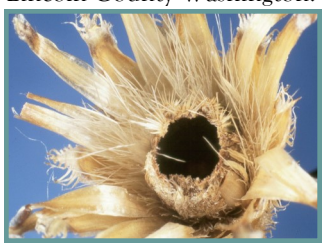
Chemical:

- Clopyralid + 2,4-D (Curtail) 2 Qts./Acre; picloram (Tordon) 0.5—1 Qt./Acre; dicamba (Vanquish/Clarity) (0.58 Qt/Acre. All are effective at controlling this plant.
- **Always** use a **surfactant**.
- **Read** the **label** instructions before applying.

Adult Larinus minutus



Larinus minutus is one of the biggest bio success stories for Lincoln County Washington.



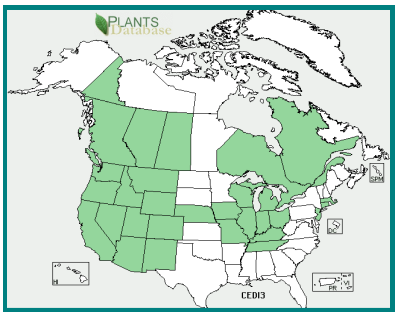
Hollowed out seed head from exiting adults

Larinus minutus is a **highly effective biological control agent. It is unequivocally the most destructive of all the insects released against knapweed in North America thus far.** It readily survives in most sites where released, develops huge populations, and is capable of severely impacting a weed population within three to five years after being released. We urge anyone plagued by diffuse knapweed to acquire and release this beetle on lands under their supervision when suitable.

Adults are active in the field from mid-May to early August. Upon emergence from their over wintering sites in the spring, adults congregate, often in massive numbers, beneath the leaves and in and around the root crowns of the rosettes, where they feed. Several dozen beetles can totally defoliate and subsequently kill an averaged-sized rosette in less than a week. Once the plant initiates stem development, the beetles will feed on the stems, branches, leaves, and immature flower buds. Such feeding can kill the plant or cause pronounced stunting and flower head deformation. These injured plants assume a bluish-green or gray color and are easily detected in a knapweed stand.

Adult weevils are very active, readily moving many miles in search of knapweed. Mating begins approximately four weeks after the initial emergence and continues throughout the duration of their adult lives. Females feed on knapweed flowers and pollen to acquire nutrients necessary for egg production. They lay their eggs among the featherlike structures known as pappus hairs on the opened flower heads. Each female can produce between 28 and 130 eggs during her lifetime, averaging 66. The eggs have a three-day incubation period. Newly emergent larvae feed on the pappus hairs; subsequent larvae feed on the developing seeds and receptacle tissue of the flower head. A single Larinus minutus larva, during its four-week developmental period, is capable of consuming all of the seeds in a diffuse knapweed head. In areas where the weevil is well established, Larinus minutus larvae can readily destroy every seed head in a stand of knapweed.

Mature larvae construct egg-shaped pupal chambers from seed fragments and pappus hairs within the damaged heads. Adults exit from the heads from mid-July to mid-August by chewing out a round hole at the top of the pupal cell. These hollowed-out heads are highly visible, providing a means to quickly assess the occurrence and extent of the beetle population. Adults feed on knapweed foliage for several weeks before seeking out sheltered over wintering sites. One generation is completed per year in Washington. At least 200 Larinus minutus per acre are recommended.



People are the major cause of knapweed spread from one location to another. Inspect vehicles, hay, machinery and gravel, etc. carefully if they have come from a knapweed infested area.

Photos and references courtesy of: Gary Piper, WSU; Rich Old; Linda Wilson, Eric Coombs, Nathan Belliston; Wikipedia; NWCB written findings; Colorado State University; Arizona Cooperative Extension; USDA Forest Service.

Lincoln County Noxious Weed Control Board
405 Ross St.
Davenport, WA 99122
509-725-3646