

SPOTTED KNAPWEED: Options for control

Spotted knapweed, a class-B non-designate noxious weed in Lincoln County, Washington (*Centaurea biebersteinii*) is of the Asteraceae family. Spotted knapweed is a native of central Europe and has also been called bachelor's button. In past times, young women wore spotted knapweed flowers to attract bachelors.

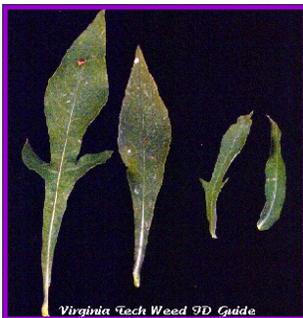
Spotted knapweed is a short-lived perennial. Seeds germinate during summer or fall, forming a seedling with a rosette of leaves. In early stages of growth, spotted knapweed has deeply cut grey-green leaves with short, thin, grayish hairs and ridged stems. In the following spring, flower stalks develop and seeds are produced in August. Since spotted knapweed is a perennial, new rosettes are also formed during the summer and spring from established root systems.

Spotted knapweed grows 12 to 60 inches tall, is more erect and has more limited branching than diffuse knapweed. Dead spotted knapweed stems generally remain erect during the winter unless crushed by heavy snow-pack. Spotted knapweed is capable of producing flower buds until

frost, but normally starts to senesce when soil water is depleted. Peak bud production generally occurs from late June to mid-July, depending on seasonal temperature and rainfall patterns.



Seedlings usually stay in the rosette stage through the winter & continue growing in early April.



Leaves are deeply lobed with progressively smaller leaves high on stem.



Spotted knapweed gets its name from the black-tipped spots on the bracts.

The flower heads of spotted knapweed are larger than those of diffuse knapweed. The bracts of spotted knapweed seed heads have dark, comb-like tips that give the head a spotted appearance. The seed heads open soon after the seed is mature. Some seeds have short pappus (tufts of hairs) on top, enabling them to catch on fur and feathers. The flowers of spotted knapweed are usually pink to purple, but occasionally white. Each plant produces up to 25,000 seeds that are dispersed by wind, animals, and people. Seeds may remain viable for 8 years. Spotted knapweed is competitive, crowding out other competitors. It also produces a chemical that acts like a herbicide, which inhibits plants of other species.

Spotted Knapweed produces a natural herbicide called "catechin" that eradicates plants around it. This is called allelopathy. Early detection and rapid response are key elements in eradicating Spotted Knapweed. This noxious weed can be found in rangelands, dry meadows, pastures, upland rocky areas, roadsides and sandy or gravelly flooded plains of streams and rivers

The bio agent *Larinus minutus* has shown excellent results in Lincoln County. Contact the Weed Board for more information and to see if it's the right choice for your



Key identifying traits

- **Bracts** surrounding flowers are tipped by a dark comb-like fringe leading to the name "spotted".
- Flowering **heads** are solitary at end of branches.
- **Flowers** are pinkish-purple, occasionally cream colored.
- Upright branched **stems**, up to 5 ft. tall when in flower.
- **Leaves** deeply lobed with progressively smaller leaves high on stem.
- Short, thin hairs on the **leaves**, give the plant a silvery-gray cast.

Biology and ecology

- **Biennial** or short lived perennial, tap-rooted, growing 1 to 4 feet tall.
- **Reproduces** by seed only.
- Prefers **full sun** and **well drained** soil.
- Averages **25,000 seeds** per plant.
- Seeds remain viable up to eight years.
- **Germinates** in spring or fall.
- **Flowers** from early July to August.
- Spotted knapweed **decreases habitat** for livestock and deer and elk.



Multi-branched with sparse leaves, spotted knapweed reaches 5 feet tall.



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



Spotted knapweed is very aggressive, and can infest large areas very quickly.

CONTROL MEASURES:

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

Prevention:

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

Biological:

- *Urophora affinis* & *Urophora quadrifasciata*, seed head gall flies and *Larinus minutus*, a seed eating beetle, have all shown good control on spotted knapweed. However, *Larinus minutus* can eliminate acres of spotted knapweed alone.

Cultural:

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

Mechanical:

- Tillage, digging, pulling (be sure to remove as much of the root as possible) and cutting, all reduce or eliminate plants and seed production if repeated frequently and thoroughly enough.
- Be sure to monitor sites carefully for regrowth, as disturbed soil aides in germination of any seeds present.

Chemical:

- Weedmaster (dicamba + 2,4-D), Redeem R&P (clopyralid + triclopyr), Milestone, and Tordon (picloram) have shown good control and eradication results.
- **Always** use a **surfactant**.
- **Read the label** instructions before applying.



Larinus minutus, a seed eating beetle, is a huge success in Lincoln County.



Urophora affinis, a seed head gall fly.



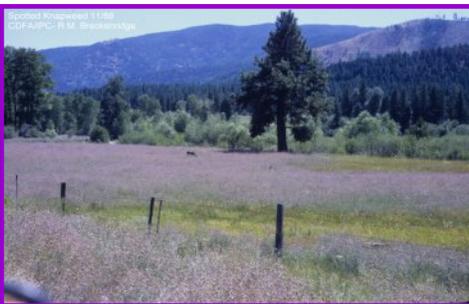
Urophora quadrifasciata, a seed head gall fly.

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 spotted or 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 overwintering 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.

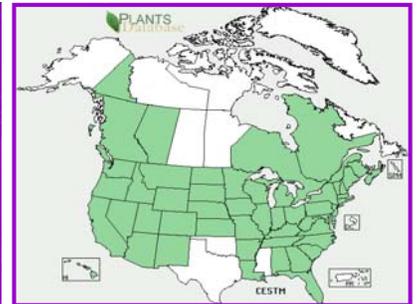
Mature larvae construct egg-shaped pupal chambers from seed fragments and pappus hairs within the damaged heads. Adults exit the heads from mid-July to mid-August by chewing out a round hole at the top of the pupal cell. These hollowed-out heads are highly visible, providing a means to quickly assess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



Knapweed secretes a chemical into the soil that kills and prevents other plants from growing. This is called allelopathy.



Spotted knapweed infests the road side ditches along this busy corridor.



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