

## Managing Hoary Cress

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Hoary cress or heart-podded whitetop (*Cardaria draba*) (Fig. 1) and whitetop or globe-podded whitetop (*Cardaria pubescens*) are growing in all 17 counties in Nevada. Lens-podded whitetop (*Cardaria chalepensis*) has been reported in Washoe, Elko, Lyon, Eureka and Lincoln Counties. These three exotics look alike, invade the same sites and are equally difficult to control. Members of the mustard family (*Brassicaceae*), they are long-lived rhizomatous perennials that were introduced into the United States in the late 1800's, most likely via contaminated alfalfa seed. Today they have spread all over the world. Their seeds have been used to make pepper, and honey bees make high quality honey from their flowers.

### Habitat

The whitetops grow well in many environments, but they commonly grow in disturbed, alkaline soils with moderate moisture. They do particularly well in sub-irrigated pastures, hay fields (especially alfalfa), and rangeland meadows. The whitetops also grow in acidic soils with limited moisture. They do well along roadsides, ditch banks, and in many other unshaded disturbed areas. They are aggressive invaders in much of Nevada because their seeds germinate and the plants grow in moderately salty soils.

### Identification

The whitetops have leaves at the base of their stems as well as along their stems. Their basal leaves are short-stalked and emerge from the crown. Stem leaves clasp the stem at their base,



Figure 1. Hoary cress (*Cardaria draba*) in flower.

are grayish green and arrowhead shaped. Their grayish green appearance comes from the fine soft white hairs that cover the leaves and stem.

White flowers are borne in clusters at the top of slender stalks that grow from 10 to 24 inches tall. Individual flowers are less than ¼ inch wide. They have four petals and six stamens. The flat-topped flower clusters may be several inches wide (Fig. 2).

The shape of the seedpods can be used to identify the three cardarias. Hoary cress has a heart-shaped, broad, flat seedpod, lens-podded whitetop's pod is flat and round, and *Cardaria pubescens* has a small, purplish, globe-shaped pod. In general, all are tipped with a small beak, are reddish brown and about ½ inch long. They

have two to four seeds each. These plants are prolific seed producers; they produce up to 850 seeds per stem and 4,800 seeds per plant. Over a long season, such as in southern Nevada, the whitetops may produce seed twice.

The seeds spread by wind, animals, vehicles, and water. They are often a contaminant in crop seed. Whitetop seeds can germinate within three weeks of being dispersed from the plant.



**Figure 2. Whitetop flower cluster and seedpods.**

The seeds can remain viable in the soil for up to three years. Seed longevity impacts the management strategies used; follow up treatments over several years will be necessary.

Whitetop seeds usually germinate in the fall, but some germinate in spring. In as little as three weeks, a seedling can become a rosette (a plant with leaves radiating from the crown (center) close to the ground and without flower stalks) and establish lateral roots. The plant continues to grow both above and below ground until the first frost. The lateral roots grow widely; up to 12 feet the first season and two to five feet each season thereafter. The lateral roots may turn down and grow several feet deep. They may produce rhizomes (horizontal underground stems) that sprout additional plants. A single whitetop plant can produce 450 new shoots in a single growing season. With competition, they produce fewer new plants.

The first year, whitetop normally grows and over winters as a rosette. In the spring, it emerges before other plants. This makes it a competitor of desirable spring vegetation since it uses moisture and other resources first. It

eventually crowds out other vegetation, forms an infestation of only whitetop (monoculture) and devastates the site.

### **Impacts of Whitetop**

An infestation of whitetop:

- Reduces biodiversity by displacing plants from plant communities and eventually the animals that are dependant upon those plants for food and habitat.
- Reduces forage quality and quantity.
- Reduces crop, pasture, and rangeland productivity.
- Forms a dense stand of only whitetop.
- Replaces forage for wildlife and livestock. Contains glucosinolates that are toxic to cattle.
- Reduces available soil moisture and nutrients early in the season.
- Devalues the land, making land sales difficult.
- Increases operating costs of private and public lands.

### **Weed Management Options**

**Prevention** is the most cost reducing and time effective weed management strategy.

Prevent whitetop establishment by:

- Cleaning clothing, vehicles and other equipment before entering an uninfested area.
- Ensuring that workers, recreationists, and the public refrain from entering infested lands and, if entering the area is necessary, that they remove seed and plant debris from their clothing, vehicles, and equipment before leaving the area.
- Not grazing plants with seed and holding livestock for 10 to 14 days if they have grazed infested areas.
- Grazing appropriately to maintain competitive forage by rotating livestock to allow desirable plants to recover and altering seasonal use.
- Limiting seed dispersal by cutting the flower heads before they produce seed. Although this prevents dispersal of seed, it usually stimulates more vegetative reproduction from the roots.

- Keeping banks of waterways free of whitetop and screening irrigation water to remove seed and plant fragments before irrigating non-infested land.
- Not grading roadsides with established stands until the whitetop is eradicated.
- Sowing certified weed-free seed in croplands and rangeland revegetation.

If whitetop does become established, it should be contained as soon as possible.

**Containment** can be achieved by managing the outside perimeter to prevent the spread of whitetop. Continue using prevention techniques for the uninfested area and apply integrated management options to the infested area using a combination of the following.

**Mechanical control** in fall or early spring is appropriate for small seedling stands. When pulling, hoeing or tilling the seedlings, make sure to get the lateral and vertical roots. If fragments of the root remain, new plants will develop. This practice is effective in riparian areas and around the home. Pulling and cultivation must be done on a regular basis, sometimes several times a season. For example, tilling whitetop must be repeated every 10 to 21 days until no seedlings emerge. Do not till or mow an established stand; this stimulates the rhizomes to grow new plants.

**Cultural control** options are limited because of whitetop's dominant invasive nature. Planting legumes that compete with whitetop for soil moisture can aid control.

Flooding is effective on heavy soils, but the complete submersion of whitetop for several weeks is required to kill it and flooding usually kills any desirable vegetation that is present. Flooding can also reduce land fertility as a result of leaching or erosion of the soil.

Unfortunately there are no successful **biological controls** available in the United States for whitetop. Cattle will not eat whitetop unless there is nothing else to eat. They should be kept away from whitetop; it contains glucosinolate, an alkaloid toxic to cattle. Sheep will graze whitetop in the rosette stage. Grazing, like mowing, stimulates the vegetative growth and spread of whitetop if it is grazed later in the season.

**Chemical control** is difficult because whitetop establishes itself in crops and on rangeland where desirable broad-leaved plants, many of which are legumes, are present. Legumes are sensitive to herbicides and will be lost if sprayed. Crops such as alfalfa, peas, onions, and sugar beets are damaged or killed by pre-emergent and post-emergent herbicides that effectively kill whitetop. There are no registered herbicides for these crops that will kill whitetop and not kill the crop.

Managers should treat whitetop in the fall after the crop has been harvested to ensure that future crops are not lost to the herbicide or to whitetop infestations.

In Nevada, land managers have few chemicals to use against whitetop. If used correctly, 2, 4-D can provide fair to good control. Chlorsulfuron (Telar<sup>®</sup>) and metsulfuron (Escort<sup>®</sup>) can be used on non-cropland. Caution: chlorsulfuron and metsulfuron persist in alkaline soils (high pH) for several years. The soil residual may kill or damage crops, forage, and plants used in rangeland revegetation if planted too soon following treatment. Because desirable species cannot grow, a new infestation of whitetop or other noxious weed may invade the area.

Small infestations in cropland may be controlled by application of foliar active products such as glyphosate. Dicamba can extend the window of control without creating long soil residuals.

Once the weed is eradicated, it is very important to **revegetate** the land. Planting desirable forage or crops that emerge all season long will increase competition with whitetop. Also, crop and grazing rotations should be implemented to maintain healthy and productive stands of forage.

Not only are the whitetops great seed producers, but they also spread from roots and rhizomes increasing control costs and limiting viable management options. Following any treatment, the treated area must be monitored and spot treatments applied to prevent re-establishment of the whitetop. This may include pulling, tilling, or herbicide treatment of the new plants. It is not known how long the rhizome can remain viable in the soil, but seeds can remain viable for three years. Therefore, monitoring and spot treatments must continue for

several years until new plants do not emerge or seeds do not germinate.

An active, cooperative **Weed Management Strategy** among local landowners and land managers is the best defense against invasive weeds, especially whitetop. Prevention, early detection and eradication (when possible) or containment, consistent monitoring, control and revegetation with competitive grasses and legumes are all components of an effective strategy. No one element of the strategy is successful alone.

Persistence and vigilance at every step of the weed management strategy are keys to ensuring success. Constant monitoring for new and returning weeds, follow-up treatments, and revegetation may need to be repeated several times to restore a healthy, productive environment. Healthy pastures, crops, ditches, riverbanks, and rangeland act as a natural barrier to weed invasion. Not only do they reduce the ability for invasive weeds to establish, they provide forage for livestock and wildlife, compliment native habitats, increase plant and animal diversity, improve aesthetics of the landscape, control erosion, and create more opportunities for recreation.

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