



spine-tipped bracts curve away from the flowering head. The flower receptacle is fleshy and has pits to hold seeds. The plants flower from mid-June to September. Scotch thistle seeds have the ability to mature in flower buds and heads that have been removed from the stalk. Both species can produce up to 14,000 seeds per plant. Seeds remain viable for up to 30 years but germinate readily with moisture in spring and fall.

Scotch thistle includes two species, *Onopordum acanthium* L. and *O. tauricum* Willd. Both are non-native biennial forbs. During the first year of growth, both species appear as a rosette in spring or fall. During the second year in mid to late spring the stems bolt, the plants flower, set seed, and the plants die. Both Scotch thistle species can grow up to 12 feet tall and basal rosettes can be up to 2 feet in diameter. Stems are numerous and branched. Characteristically, the entire length of stems from both species have broad wings with spiny tips. *O. acanthium* leaves have an overall gray color from dense woolly hairs. *O. tauricum* leaves are glandular and not as hairy as *O. acanthium*. For both, leaves are spiny. Both species have a distinct mid-rib. Flower heads are terminal, violet to reddish in color, 1 to 3 inches in diameter, and arranged in a raceme. One plant can produce up to 100 flower heads. The

Scotch thistle invades rangeland, overgrazed pastures, roadsides, and irrigation ditches. Both species prefer moist soil, such as areas adjacent to creeks and rivers. Roadsides appear to be especially vulnerable to invasion likely due to the water runoff from the shoulders. Maintaining healthy pastures and native plants, minimizing soil disturbance, changing land use practices to prevent overuse, and using seed-free equipment are critical measures to preventing infestations. As with most biennials, once established, limiting seed production is critical to effective control. Due to the robust, spiny nature of Scotch thistle, this plant can act as a living barbed wire fence, making areas impassible for wildlife, livestock, and people and unpalatable to cattle.

To control seed production, plants with buds or flowers should be collected, bagged and immediately disposed of or destroyed. Chemical control is most effective when plants are in rosette stage, spring or early fall. Mechanical controls

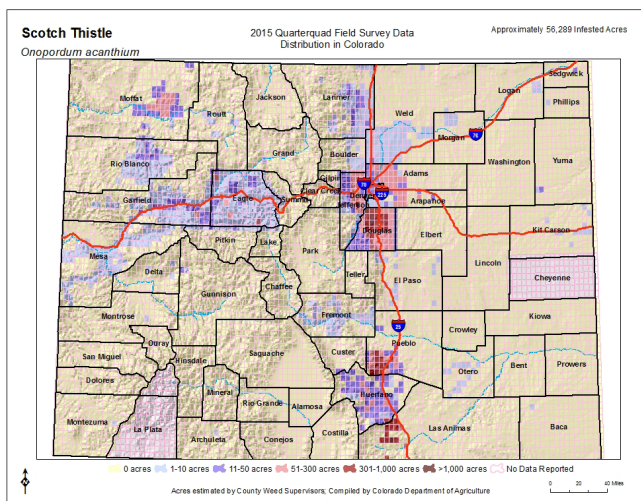
can be used to eliminate small patches or plants in a later growth stage.

Scotch thistle is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be eradicated; some populations may be contained or suppressed depending on state regulations. For state regulations described for each county, refer to the most recent Rule, or visit www.colorado.gov/ag/weedcontacts for details.



Scotch thistle
Onopordum acanthium L. and *O. tauricum* Willd.

2015 Quarter Quad Survey



Key ID Points

1. Pitted fleshy flower receptacle.
2. Prominent mid-rib.
3. Wide lobed leaves with distinct mid-rib.
4. Wide spiny wings extend the length of the stem.

Integrated Weed Management Recommendations

Effective integrated management means using a variety of eradication methods along with restoration, prevention of seed production and dispersal, and monitoring. Maintain robust healthy native landscapes. Restore degraded sites. Avoid soil disturbance. As with most biennials, prevent seed production in the first and second year of growth. Prevent seed from dispersing, such as on contaminated equipment. Rest sites until they are effectively restored. Change land use practices. Use methods appropriate for the site.



CULTURAL CONTROL METHODS

Effectiveness begins with maintaining or restoring a competitive native forb and forb assemblage. Continue restoration efforts until native plants are robust and abundant. Use locally adapted native seeds whenever possible to improve competitiveness. Include cool season and warm season, as well as perennial and annual grasses in revegetation efforts. Soil may need to be restored by adding soil amendments, soil microbes, mycorrhizal fungi and nitrogen fixing plants such as legumes. Manage land uses so they do not create bare mineral soil or compact soil. Annual crop cultivation appears to be an effective control measure.



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BIOLOGICAL CONTROL METHODS

Domestic livestock are likely to avoid this plant due the large number of spines all over the plant. Goats and sheep may eat flower heads if plants are small. Since most livestock and herbivores avoid the leaves and stems, Scotch thistle can become an “increaser” in over-grazed systems. Properly managed grazing systems can increase desirable plant vigor and indirectly reduce Scotch thistle. There are no known biological control agents effective against scotch thistle or authorized in Colorado. For more information about biological control agents, visit the Colorado Department of Agriculture’s Palisade Insectary website at www.colorado.gov/ag/biocontrol.



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MECHANICAL CONTROL METHODS

Methods, such as tilling, hoeing and digging, are best for infestations smaller than 0.5 acres; weigh this against other plants present, ecology and site condition. Sever roots below the soil surface during the first year before the plant stores energy and in the second year before seed production. Mowing, chopping and deadheading stimulates more flower production; these methods require consecutive years of season-long treatments. Flower heads must be collected, bagged, and disposed of or destroyed; seeds will mature and germinate if left on the ground. Fire gives Scotch thistle a competitive advantage. Large fleshy stems and leaves would not be consumed in a low severity fire and seeds would remain unaffected. High severity fires would likely damage native plants, which favors Scotch thistle if seeds are not killed and this is not recommended.

CHEMICAL

NOTE: The following are recommendations for herbicides that can be applied to pastures and rangeland. Rates are approximate and based on equipment with an output of 30 gal/acre. Follow the label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Aminopyralid* (Milestone)	7 oz. product/acre + 0.25-0.5% v/v non-ionic surfactant	Apply in spring rosette to early bolting growth stages or in fall to rosettes. *Product not permitted for use in the San Luis Valley.
Chlorsulfuron** (Telar)	1-2.6 oz. product/acre (0.75 oz. active ingredient/acre)+ 0.25% v/v non-ionic surfactant	Spring from bolting to flower bud stages. **This herbicide has residual soil activity that will affect all broadleaf seedlings germinating after application has occurred.
Metsulfuron + Chlorsulfuron (Cimarron X-tra)	2 oz. product/acre + 0.25-0.5% v/v non-ionic surfactant	Apply during rosette to flower bud stages.
Clopyralid (Transline)	0.67-1.33 pints product/acre + 0.25% v/v non-ionic surfactant	Apply to rosettes in spring or fall.
Aminocyclopyrachlor + chlorsulfuron (Perspective)*	4.75-8 oz. product/acre + 0.25% v/v non-ionic surfactant	Apply from the seedling to the bolting stage. IMPORTANT: Applications greater than 5.5 oz. product/acre exceeds the threshold for selectivity. DO NOT treat in the root zone of desirable trees and shrubs. Not for use on grazed or feed forage.

Colorado Department of Agriculture - Conservation Services

305 Interlocken Parkway

Broomfield, CO 80021

(303) 869-9030

www.colorado.gov/ag/weeds



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