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Managing Scotch Thistle

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Scotch thistle (*Onopordum acanthium*) is a native of Europe and Asia. It was introduced into the United States in the late 19th Century as an ornamental; it has since escaped cultivation. Scotch thistle is also known by two other common names: cotton thistle and woolly thistle. This is because the leaves and upper stems are covered with thick cottony hairs.

Scotch thistle is an invasive weed that infests disturbed and neglected lands. It prefers sites near ditch banks and rivers, but also infests pastureland, crops, rangeland and roadsides. Its leaves are armed with sharp spines, making access to areas infested with scotch thistle difficult.

Historically, scotch thistle has been used to treat cancers, ulcers, and to slow the discharge of mucous membranes. Its thick hairs were used to stuff pillows and the oil from its seeds was used for cooking and burning. Although it had significant historical uses, scotch thistle is no longer used for these purposes and has become a troublesome weed for farmers, ranchers and land managers.

Description and Habitat

Scotch thistle is a biennial that flowers in the summer. The first year, scotch thistle grows very spiny leaves in a large rosette (a plant with leaves radiating from the crown (center) close to the ground and without flower stalks) that can be 12 inches or more wide (Fig. 1). Flowering shoots are produced the second season. The plants grow eight to 12 feet tall, up to five feet wide, and are multi-branched. The shoots and leaves are covered with thick hairs giving the plant a distinct

bluish-green look. The leaves grow down the winged stems. The oblong leaves on the plant can be up to two feet long and a foot wide. Their lobes end in a very sharp yellow, green or white spine. The stems of scotch thistle become coarse and the leaves become more rectangular with age. The vibrant purple flower grows at the end of leafy stalks, as a single flower or as a cluster of flowers (Fig. 2). The flowers are an inch in diameter or larger. In dry years, when the plant is short, it can still flower and create as many seeds as a full-sized plant. Plants grow 70 to over 300 flower heads, and each flower produces 100 to 200 seeds.

Scotch thistle reproduces only by seed. It has an egg-shaped (obovate) seed that is dark brown



Figure 1. A scotch thistle plant in flower with a second season flower head (upper insert) and a first season rosette (lower insert).

or black with a bristle-like pappus (hairs) at one end. Seeds germinate and plants thrive in wide-open, disturbed, moist areas such as ditches, gullies, and roadsides. A water-soluble germination inhibitor in the seed coat must be leached away to allow the seed to germinate, thus the need for moisture.

Although scotch thistle prefers disturbed areas with high soil moisture, drier areas do not limit its invasive nature. It commonly invades overgrazed lands, rangeland, pastures, roadsides and construction sites.



Figure 2. Scotch thistle flower head.

Associated Impacts

Scotch thistle is present in all of Nevada's 17 counties. It drastically reduces productive rangeland by out competing desirable forage species. It can be so thick that it becomes an impenetrable, thorny barrier for ranchers, cattle, wildlife and recreationists.

Although, scotch thistle is considered a biennial weed, it can behave as an annual or a short-lived perennial. All of these variations contribute to the persistence of the plant. It is not bound by strict photoperiods (daylight) or temperature requirements for growth and flowering. Its flexibility in flowering is responsible for its success in so many different climates and growing conditions.

Wind, water, wildlife, livestock and human activities disperse the seeds. Most of the seeds fall close to the plant. The seeds remain viable in the soil for up to seven years. The seed must be completely embedded in the soil to germinate. Scotch thistle seeds will germinate and seedlings will grow in nutrient-deficient soils. Moisture and temperature determine the plant's success, not an

abundance of soil nutrients. This gives scotch thistle an advantage over desirable plant seedlings that attempt to compete in nutrient-deficient soils and allows it to thrive in overgrazed pastures and rangeland.

In addition to lost rangeland, scotch thistle is responsible for lost wildlife habitats and recreational areas. Wildlife forage is reduced by the presence of scotch thistle. Campsites and trails can become inaccessible and no longer enjoyable when infested with scotch thistle. Access to trails, stream banks and fishing areas can be completely cut off by scotch thistle.

Control and Management

Because scotch thistle reproduces by seed, it is one of the few invasive weeds that can be controlled by mechanical, chemical and cultural methods. A persistent combination of these methods will yield the best results. Keep in mind that scotch thistle has the ability to germinate nearly year round. This adds to the difficulties associated with control and the timing of herbicide applications. A combination of control methods is recommended.

- **Prevention**

The best and most cost effective method for weed control is prevention. This stage is often overlooked until costlier methods of control are required. By monitoring your land and destroying single plants or new infestations, great expense can be avoided. Cooperative effort among land managers is recommended to successfully prevent weed infestations among adjacent landowners. If a small infestation is found and eradicated immediately, before seeds are produced, it will reduce the chance of further infestation on your land and your neighbor's.

- **Mechanical/ Physical Controls**

Mechanical and physical control is very effective if completed before scotch thistle goes to seed. Mechanical control is effective because scotch thistle does not reproduce vegetatively. Severing the roots of the rosette or the plant kills it. Small infestations can be pulled by hand. This should be done with caution while wearing heavy gloves, a long-sleeved shirt and pant, and eye protection because scotch thistle has stout spines.

Most mechanical methods, such as tilling, are

not appropriate for rangeland and waterways. It is very important to keep scotch thistle out of these areas.

Mowing makes the stand more uniform, which makes herbicide applications more effective, but mowing does not kill scotch thistle. Mowing before seed dispersal will limit the amount of seed available for germination. However, plants are able to produce seed even after they have been mowed. Consequently, mowing is not recommended unless used with a follow-up herbicide application or tillage.

- **Biological/Cultural Controls**

Currently, there are no insect biological control agents for scotch thistle in the United States.

Sheep and cattle will not graze scotch thistle. Goats will, but only in its early rosette stage. After it has developed a coarse stem and stout spines, goats refuse to eat it.

An infestation of scotch thistle may be reduced or eliminated with the planting of competitive grasses. Revegetating an area with competitive grasses following treatment helps prevent the invasion and establishment of new scotch thistle plants. Desirable forage that emerges during the growing season should be managed to increase its competitiveness. Not only does this help reduce the possibility of reinfestation by scotch thistle, the increased forage provides increased protection from soil erosion.

As part of a good grazing plan, the establishment of desirable forages is integral to a weed management program. By monitoring for scotch thistle, not overgrazing pastures, and establishing desirable forage, scotch thistle's threat can be reduced.

- **Chemical Control**

Various chemicals control scotch thistle. The growing stages, environmental conditions, stand size, density, location, and the product's cost are all factors to consider in selecting the correct herbicide for the job. A combination of chemical treatments may be necessary to achieve the desired level of control. Always check with your state or county weed specialist before purchasing and applying herbicides. *The label on each*

product must be read, understood and followed correctly. It's the law!

Applying herbicides to scotch thistle rosettes is very effective. In this stage, applying products that contain clopyralid, dicamba, MCPA, picloram or 2, 4-D will successfully kill scotch thistle. It is effective to spray the rosettes in the spring or fall, but it is more effective in the fall. All live plants that escaped the spring application will be seedlings or rosettes and ready to be sprayed later in summer or fall. Do not let them go to seed. Table 1 (back page) is a list of chemicals and the suggested application rates to use on scotch thistle. Remember to carefully follow state or county restrictions in addition to the label directions. Failure to do so makes the applicator liable for any damages created by the chemical.

Summary

Scotch thistle is responsive to mechanical, cultural and chemical control methods. A combination of treatments is recommended, followed by a sound revegetation program. This will provide satisfactory management of scotch thistle. Retreatments of the area may be necessary for four to six years or until the seeds in the soil are exhausted. Revegetation along with an active control program will ensure healthy pastures, rangeland, cropland and recreation areas for years.

Additional Resources:

- 1) Ball, D., P.J.S. Hutchinson, T.L. Miller, D.W. Morishita, R. Parker, R.D. William, and J.P. Yenish. 2001. *Pacific Northwest Weed Management Handbook*. Oregon State University, Corvallis, OR. pp. 408.
- 2) Sheley, R.L. and J.K. Petroff. 1999. *Biology and Management of Noxious Rangeland Weeds*. Oregon State University Press. Corvallis, OR. pp. 202-216.
- 3) Bussan, A.J., S.A. Dewey, T.D. Whitson and M.A. Trainor. 2001. *Weed Management Handbook*. Montana State University, Bozeman, MT. pp. 294.

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Table 1. Recommended herbicides and application rates to control scotch thistle.¹

<i>Common Name</i> Herbicide Name	<i>Rate (ae or ai/A)²</i> or product/A	<i>Timing</i>	<i>Remarks and Cautions</i>
2, 4-D Many Products	1.5 - 2 lb	Apply to seedlings, rosettes in fall & before flower stalk elongates in spring.	Do not allow spray to drift onto sensitive crops.
<i>chlorsulfuron</i> ³ Telar (75DF)	0.75 oz 1 oz. product	Apply to young actively growing plants.	Agitate mixture, use 0.25% nonionic surfactant; do not treat frozen ground, dry soils & sandy soils without rain, & avoid sensitive crops.
<i>clopyralid</i> ³ Transline (3EC)	0.09 - 0.375 lb 0.25 - 1 pt product	Apply up to thistle bud stage.	There are labeled crop, grazing & hay restrictions; soil residuals may damage crops up to 4 years.
<i>clopyralid</i> ³ + 2,4-D <i>amine</i> Curtail (2.38EC)	1 - 5 qt product	Apply to actively growing thistle up to bud stage.	There are labeled crop, grazing & hay restrictions; soil residuals may damage crops up to 4 years.
<i>dicamba</i> Banvel, Clarity	0.5 - 1 lb	Apply to seedlings, rosettes in fall & before flower stalk elongates in spring.	Soil residual may affect crops for 12 to 18 months, grasses tolerate these rates.
<i>metsulfuron</i> ³ Escort (60DF)	0.6 oz 1 oz product	Apply post emergent to actively growing plants.	Non-cropland use only, use 0.025% v/v nonionic or silicone surfactant, use mixture within 24 hours, do not apply to fescue or creeping meadow foxtail.
<i>picloram</i> Tordon 22K (2EC)	0.25 lb	Apply in fall before bolting; follow up applications will be necessary to control seedlings & escaped plants.	Restricted Use Herbicide; Avoid water & sensitive plants; soil residuals may last over one year.
<i>triclopyr</i> + <i>clopyralid</i> ³ Redeem R&P	1.5 - 2 pt product	Apply to actively growing thistle from rosette to early bolting.	Apply no more than 4 pts per year; avoid drift; observe labeled over-seeding & reseeded restrictions.

1. Application rates adapted from the Pacific Northwest Weed Management Handbook and the Montana, Utah, Wyoming 2001 – 2002 Weed Management Handbook.
2. Acid equivalent or active ingredient per acre = ae or ai/A.
3. Caution: These products are persistent in alkaline (high pH) soils and may affect crops sown in subsequent years where they have been applied.

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