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EXTENSION

MontGuide

# Oxeye Daisy: Identification, Biology and Integrated Management

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This MontGuide describes oxeye daisy biological and ecological characteristics. It also provides mechanical, cultural and chemical management options to control this species.

MT200002AG Revised 8/09

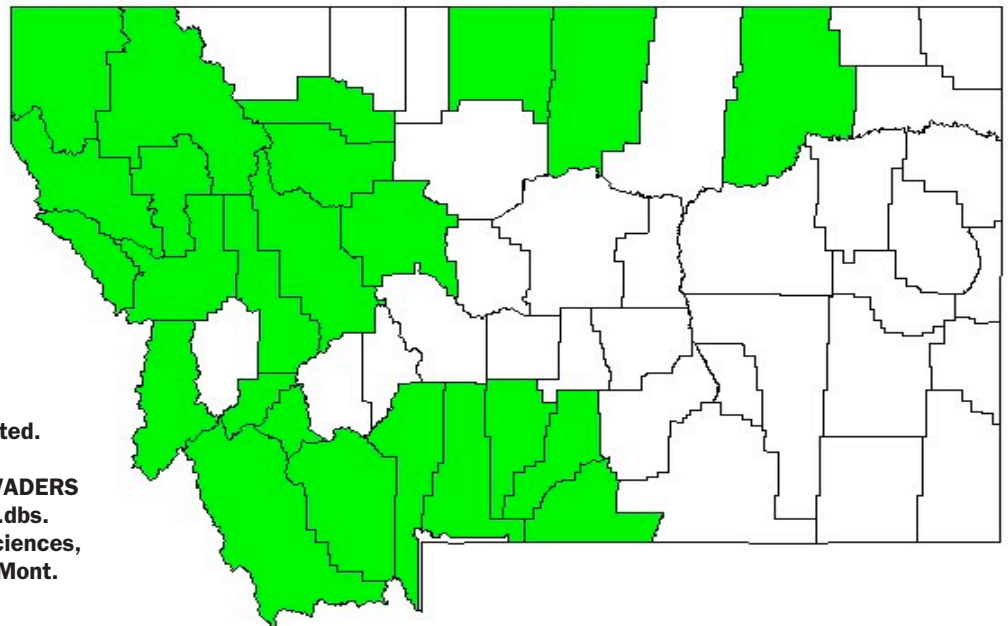
**OXEYE DAISY (*LEUCANTHEMUM VULGARE* LAM.),** also known as *Chrysanthemum leucanthemum*, *Leucanthemum leucanthemum*, and a number of common names (bull daisy, button daisy, dog daisy, field daisy, goldens, marguerite, midsummer daisy, moon flower, and white weed), is an invasive weed that has become an aggressive invader of pastures, meadows and roadsides throughout the United States. In western pastures and meadows, it can form dense stands that replace other vegetation and decrease forage production and plant diversity. Because of the plant's beauty and showiness, conscientious management is often neglected. Its spread in pastures is exacerbated by large herbivores that avoid it and feed instead on grasses. A land manager's ability to correctly identify oxeye daisy and understand the plant's life cycle and growth requirements is important in selecting management strategies that effectively suppress oxeye daisy populations and promote healthy desired vegetation.

## Origin and distribution

Oxeye daisy, native to Europe, was introduced to North America both intentionally as an ornamental and incidentally as a contaminant of imported hay and grain seeds. It escaped from agricultural lands and spread quite readily. Oxeye daisy is currently found in every state of the U.S. It is common

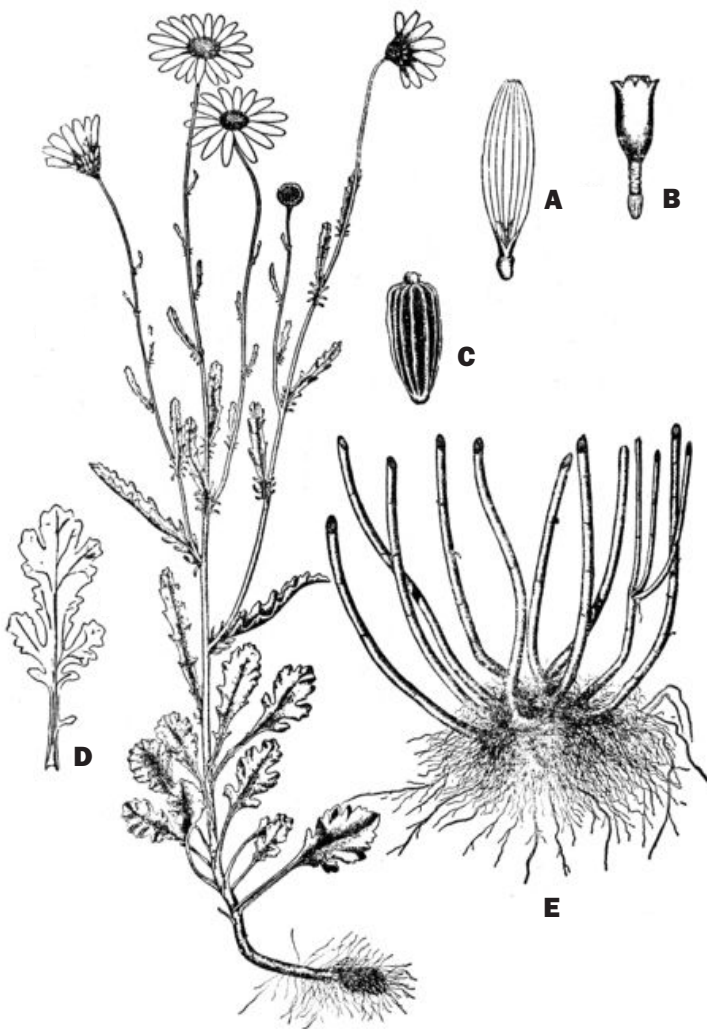
in the Northeast and the Great Plains, and less common in the South. Oxeye daisy appeared in the northwestern United States in the late 1800s and had spread to more than half the counties in the region by 1937. It is now the most prevalent roadside weed in the Pacific Northwest and is listed as a noxious weed in four western states: Colorado, Washington, Wyoming and Montana.

In Montana, Lewis and Clark County was the first to report oxeye daisy in 1890. Today, oxeye daisy occurrence has been reported in about half of the counties in Montana (Figure 1). Typically invading upland pastures and meadows, oxeye daisy is also a problem along roadsides, railway embankments, waterways, abandoned croplands, waste areas, woodlands, gardens, lawns, and rangelands in Montana. Oxeye daisy grows in a wide range of soil textures and tends to be more abundant on poorer soils. This weed may have a low tolerance for shading by other vegetation since it is seldom noticed in ungrazed or lightly grazed grasslands.



**FIGURE 1. Counties in Montana where oxeye daisy has been reported. Information taken from *Invaders Database System* (Rice, P.M. *INVADERS Database System* (<http://invader.dbs.umt.edu>); Division of Biological Sciences, University of Montana, Missoula, Mont. 59812-4824).**

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**FIGURE 2. Oxeye daisy plant with ray flower (A), disc flower (B), seed (C), lower leaf detail (D), and rootstalk (E).**

## Identification and biology

Oxeye daisy is a member of the Asteraceae family, the same family as sunflower (*Helianthus annuus*). Oxeye daisy looks like a typical daisy, and could be mistaken for other ornamental daisies (see below). Flower heads are borne individually on the tops of long slender stems. Flowers are 1.5 to 2 inches across with yellow centers from which 20 to 30 white petals radiate (Figure 2). The petals are slightly notched at the tip (Figure 2a). Stems grow one to three feet tall and are smooth, frequently grooved and sometimes branch near the top. Leaves are smooth, dark green and often glossy, progressively decreasing in size upward on

### Oxeye Daisy Look-a-likes

Scentless chamomile (*Anthemis arvensis*) and Shasta daisy (*Chrysanthemum maximum*) look very similar to oxeye daisy. However, chamomile is an annual plant with smaller flowers and much more finely dissected leaves. Shasta daisy usually grows 6 to 12 inches taller than oxeye daisy and has larger flower heads.

the stem. Basal and lower leaves are lance-shaped with “toothed” margins and petioles that may be as long as the leaves. The upper leaves are alternately arranged, narrow and often clasp the stem. Seeds are brown to black and  $\frac{1}{16}$  of an inch long with 8 to 10 white ridges down the side (Figure 2c). The plant has shallow, branched rhizomes and strong adventitious roots. When crushed, the plant has an unpleasant odor.

### How does oxeye daisy grow?

Oxeye daisy is a perennial plant that reproduces primarily by seed, although underground stems, or rhizomes, contribute to the plant's propagation. The plant is a prolific seed producer; each flower may produce 100 to 250 seeds. Smaller plants typically produce 1300 to 1400 seeds, but a single, healthy, robust plant may produce up to 26,000 seeds. Germination occurs throughout the growing season, but most new seedlings emerge when conditions are favorable in the spring. Rhizomes develop when seedlings are at the sixth-leaf stage. Stems may emerge from rhizome buds in April or May. Mature plants flower in June through August. Seeds typically mature in August and may be viable as soon as 10 days after the flower blossoms. Seeds are dispersed close to the parent plant. Seeds that do not germinate in the spring may remain viable in the soil for many years. One study found 82 percent of seeds were viable after six years and one percent were still viable after 39 years. After seed set, plants die back to the ground under drought conditions, but rosettes can grow from rhizomes when fall moisture and temperature conditions are favorable.

## Impacts

The full extent of ecological, environmental, economical and sociological impacts of oxeye daisy are not well documented. The greatest impact of oxeye daisy is on forage production of infested pastures and meadows. Because cattle avoid grazing oxeye daisy, carrying capacity of heavily infested pastures is reduced when cattle are the primary grazers. Dense stands of oxeye daisy can decrease plant diversity and increase the amount of bare soil in an area. In cultivated areas, oxeye daisy serves as a host and reservoir for several species of gall-forming nematodes that feed on crops.

## Integrated management

Because oxeye daisy is such a showy, pretty plant, proper management is often neglected. Education and awareness, prevention practices, and a combination of control methods are important components of an effective management approach.

Oxeye daisy is sometimes an ingredient in wildflower seed mixes, so consumers should read labels carefully. In addition, landowners often avoid mowing the plant because it looks so pretty on their lawn or in their gardens.

**TABLE 1. Examples of herbicides that can be used to manage oxeye daisy. Consult herbicide labels for additional rate, application, and safety information. Additional information can be found at <http://www.greenbook.net>.**

<b>Herbicide Active Ingredient Trade Name</b>	<b>Product per acre</b>	<b>Timing</b>
<i>Aminopyralid</i> Milestone	4 to 6 ounces	Prebud
<i>Aminopyralid + 2,4-D</i> ForeFront R&P	2 to 2.5 pints	Rosette to early flower
<i>Metsulfuron</i> Escort/Cimarron	0.5 to 1 ounce	Rosette to early flower
<i>Picloram</i> Tordon 22K/Picloram22	1.5 pints or 1.5 pints + 1 quart 2,4-D	Rosette to early flower
<i>Glyphosphate</i> Many trade names	1 to 2 quarts	Use as part of a revegetation program
<i>Clopyralid</i> Transline	$\frac{2}{3}$ to 1 pint (weak control)	Young, actively growing plants
<i>Clopyralid + 2,4-D</i> Curtail	64 ounces (weak control)	Young, actively growing plants

As with other weeds, preventing establishment and minimizing spread is critical. Practices such as prescribed grazing and nutrient management will help encourage competitive desired plants, improve control efforts, and reduce the establishment and spread of oxeye daisy. It is important to minimize the amount of bare soil exposed by farming, haying practices or livestock grazing, and avoid transporting weed seeds from infested sites to uninfested sites.

Once oxeye daisy is established, persistent mowing, chemical applications and prescribed grazing can effectively control populations. Integrating various techniques will give the best control. Because oxeye daisy seeds remain viable in the seedbank for many years, persistent treatment and preventing seed production over many years is necessary.

Two management methods, prescribed burning and biological control, are not feasible options for oxeye daisy. *Prescribed burning* is not recommended for controlling oxeye daisy as fire may increase vulnerability of a site to invasion by exposing bare mineral soil. *Biological control agents* have not been developed to manage oxeye daisy.

*Mowing* may reduce oxeye daisy seed production if plants are mowed as soon as flower buds appear. Mowing may have to be repeated during a long growing season because mowing may stimulate shoot production and subsequent flowering. Mowing can be combined with nutrient treatment if used on pastures infested with oxeye daisy. Mowing may improve herbicide contact with rosettes. Haying may favor oxeye daisy.

*Hand pulling and grubbing* (i.e. digging up roots) may be practical for controlling small populations of oxeye daisy. Root systems are shallow and the plant can be dug up and removed. Hand removal will have to be continued for several years because remaining roots may sprout and seedlings will continue to emerge from the soil seedbank.

*Tilling* destroys the shallow root system of oxeye daisy, thus it is not normally a problem in cultivated crop fields. However, cultivating is not possible in many pastures, rangelands and roadside areas. It is possible to spread root fragments and seeds within and between crop fields, so cleaning tillage equipment is very important. Repeated tillage or herbicide treatment to resprouted plants may reduce oxeye daisy regrowth.

*Grazing*, depending on how it is applied, can either exacerbate or suppress oxeye daisy invasions. Horses, sheep and goats will readily graze oxeye daisy, but cattle and pigs avoid it. Prescribed grazing management using multiple livestock species can be timed to maintain the vigor of rangeland plants and reduce oxeye daisy establishment and spread. Effective grazing programs for oxeye daisy suppression include short-duration, high-intensity grazing with cattle prior to flower production, followed by grazing with goats or sheep to consume remaining oxeye daisy plants.

Where oxeye daisy is already a major member of the plant community, it may increase with continuous cattle grazing because the plants are typically avoided by cattle. However, cattle can suppress oxeye daisy if properly managed. In a study conducted at Montana State University, intensive grazing with cattle over a two-year period reduced oxeye daisy seeds in the soil seedbank and decreased densities

**TABLE 2. Oxeye daisy control one year after herbicides were applied (Montana location).**

<b>Herbicide Active Ingredient</b>	<b>Product per acre</b>	<b>Average control (%)</b>
Aminopyralid	4 ounces	100
Metasulfuron	0.5 to 1 ounce	97-100
Picloram	1.5 pints	95



of oxeye daisy seedlings and rosettes. However, there was no difference in mature stem density two years following intensive cattle grazing. In the same study, grazing with sheep or goats reduced dominance of oxeye daisy. Oxeye daisy stem density increased in non-grazed and grazed areas over two years, but rosette density decreased in areas grazed by sheep and goats. Grazing should be carefully monitored to prevent damage to desirable vegetation. An adequate canopy of grass (at least 50 percent) needs to be maintained to shade oxeye daisy and prevent it from becoming well-established.

**Chemicals** can be used to manage oxeye daisy on range, wildland, and pasture sites. Several herbicides, including aminopyralid, aminopyralid + 2,4-D, metsulfuron, or picloram provide effective oxeye daisy control. Application rates and timing of application are shown in Table 1. Oxeye daisy is moderately resistant to some 2,4-D-based herbicides except at high rates (five pounds active ingredient per acre). In a study conducted in Montana, metsulfuron and aminopyralid provided the most consistent oxeye daisy control at the lowest rates one year after treatment (Table 2). Label information for all herbicides should be carefully followed not only for application restrictions but also for restrictions that apply to grazing and harvest of forage after application.

Oxeye daisy is not highly competitive and reinvasion following herbicide treatment may be slowed or prevented by establishing and maintaining a healthy desirable plant community. Glyphosate will control oxeye daisy in cropland or where revegetation is planned. Combining herbicides with fertilization in pastures may be an effective strategy as well. For example, in an unpublished study in Washington, picloram at 0.5 pints per acre or 2,4-D at two quarts per acre were applied followed by application of nitrogen fertilizer (ammonium nitrate-sulfate) at 0, 40, 80, and 160 pounds per acre across herbicide treated areas. Nitrogen fertilizer alone decreased oxeye daisy cover almost the same as herbicide treatments. Results showed that 80 pounds of nitrogen per acre alone was the most cost-effective treatment after seven years.

## Glossary

**Adventitious root** – Root that grows from somewhere other than the primary root; for example, roots that arise from stems or leaves.

**Perennial** – A plant that lives for more than two years.

**Petiole** – A stalk of a leaf that attaches to the stem.

**Rhizome** – A horizontal stem that is usually found underground, often sending out roots and shoots from its nodes.

*Note:* Information in this document is provided for educational purposes only. Reference to commercial products or trade names does not imply endorsement by MSU Extension. Common chemical and trade names are used in this publication for clarity. Inclusion of a common chemical or trade name does not imply endorsement of that particular product or brand of herbicide and exclusion does not imply non-approval. This publication is not intended to replace the product label.

### Oxeye Daisy Uses and Lore

A beautiful flower long admired by gardeners, song-writers and poets, oxeye daisy also has uses for culinary purposes and home remedies.

- Young leaves may be enjoyed in a salad.
- In the early 19th century, fresh flowers were used to destroy or drive away fleas.
- Infusions are still prescribed for antispasmodic, diuretic, and tonic principles, mainly in the treatment of asthma, whooping cough, and nervous excitability, and as a lotion for applying to ulcers and sores.



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