



Identification and Management of Malta Starthistle (*Centaurea melitensis* L.)

Susan Donaldson, Water Quality Education Specialist, University of Nevada Cooperative Extension
Dawn Rafferty, State Weed Specialist, Nevada Dept. of Agriculture

Malta starthistle, also called Maltese starthistle, tocalote or Napa thistle, is an annual invasive weed that resembles yellow starthistle (*Centaurea solstitialis* L.). Originally thought to have been introduced during the 1700s from southern Europe, it is now a pest in many western states. Scattered populations also occur in the Midwest and Eastern United States. Due to its potential to infest Nevada, it has been designated a noxious weed by Nevada Department of Agriculture.

Why should we be concerned?

Like so many invasive weed species, Malta starthistle will rapidly displace diverse native vegetation and create a monoculture, or pure stand of the weed. When this occurs, range forage value is lost, as it is low in palatability. Its root structure is ineffective at protecting soil against erosion. The spiny flowerhead on Malta starthistle guarantees that recreationists will avoid infested areas. However, Malta starthistle is not known to cause chewing disease in horses, unlike yellow starthistle, according to DiTomaso (2007).

What does Malta starthistle look like?

Malta starthistle is a grayish-green annual with winged stems. The rosettes of the plants have entire or deeply lobed leaves, and the surfaces are evenly covered with stiff, thick hairs and resinous dots. The leaf margins can be smooth, toothed, or wavy. Adult plants grow stiff stems 1 foot to 2 feet tall that branch from just above the base. The stem leaves are alternate, narrow, and unlobed, with the attached leaf bases

continuing down the ridged stems, giving the appearance of green wings.

The flowers are small and yellow, about ½-inch in height, and have a wooly appearance in the bud stage. Flowers are produced from May through September in groups of up to three at the tips of the branches. Straw colored spines tinged with purple or brown are produced below the flower head.

While both yellow and Malta starthistles have winged stems and yellow flowers, the spines on



Malta starthistle

Photo courtesy of Steven Thorsted, CalPhotos



Malta starthistle rosette

Photo courtesy of J. DiTomaso, UC Davis

Malta starthistle are shorter (5-12 mm vs. 10-25 mm for yellow starthistle) and usually purplish at the base. The largest spine of each of the middle bracts is usually branched below, with smaller spines at the base. Malta starthistle has only pappus-bearing seed, and the spiny bracts surrounding the flowers do not fall off in winter, as they do with yellow starthistle. The plants often complete flowering and die back earlier than yellow starthistle, and the taproots do not extend as deep into the ground.

Where does it grow?

Malta starthistle is found in alfalfa and grain fields, grasslands, pastures, banks of irrigation ditches, rangeland, roadsides, and open disturbed sites. It has been found growing at elevations as high as 7200 feet in California and Arizona.

How does it spread?

Malta starthistle must produce seed to ensure a new crop the following year. Seed production varies widely. Flower heads produce one to 60 or more seeds, and each plant may have one to 100 or more flower heads. The seeds have hairs and hook-like bases that allow them to attach to animals, people, and vehicles, spreading them over greater distances. The young seedlings are very resistant to fall drought, allowing them to survive in Nevada's dry climate. They are

capable of tolerating drought conditions to a greater degree than yellow starthistle. Consequently, Malta starthistle is more common in drier areas, where it appears to be spreading rapidly.

Malta starthistle seeds are spread by wind as well as contaminated soil, fill material, gravel, and irrigation water.

How is Malta starthistle controlled?

Early detection and rapid response techniques are essential to avoid large infestations of Malta starthistle. Little specific research has been done on the control of Malta starthistle. Methods that are successful for controlling yellow starthistle will likely also control Malta starthistle. The following recommendations are based in part on research results from studies on the control of yellow starthistle.

In order to successfully control any annual, it is essential to prevent seed production. Mechanical methods, including hand pulling, grazing, mowing, burning, and cultivation, can be used over a period of several years to deplete seed banks and manage infestations. Time manual removal efforts to occur after plants have bolted but before they produce viable seed, or at the early flowering stage. Early summer tillage may provide control, if the roots are detached from the shoots. When mechanical



Malta starthistle (left) has shorter spines than yellow starthistle (right).

*Photo courtesy of John M. Randall,
The Nature Conservancy*

cultivation is practiced, it must be repeated throughout the germination period and prior to seed production.

Mowing has been successful in controlling yellow starthistle when carefully timed. If plants are mowed before the seed heads reach the spiny stage, competing vegetation may be suppressed, allowing expansion of the starthistle. Instead, plants should be mowed at the early flowering stage if they have an erect, high-branched growth form. Mowing too early may also encourage reblooming and greater seed production. Research on yellow starthistle showed that two well-timed, repeated mowings over a three-year period effectively controlled over 90% of plants. However, plants with sprawling, low-branching forms are unlikely to be effectively controlled by mowing. Mowing must be completed before plants have produced viable seed.

When feasible, late winter or early spring burning can control Malta starthistle in the rosette stage. However, burning may adversely affect competitive vegetation.

Grazing has been used to minimize spread and reduce, but not eliminate, infestations of yellow starthistle. To maximize effectiveness, graze by sheep, goats, or cattle when flower buds have formed, but spines have not yet been produced. When livestock graze during the mid- to late-summer months, they will avoid the spiny starthistle plants.

Biological controls to reduce Malta starthistle populations have not been studied extensively. The beetle, *Lasioderma haemorrhoidale*, which feeds on seed heads, was introduced unintentionally from the Mediterranean region, but does not appear to adequately control the weed. Research completed in 2001 suggests that the rust, *Puccinia centaurea*, holds some promise for control. It is specific to Malta starthistle, and does not infect yellow starthistle or bachelor's button (*Centaurea cyanus*). The research suggests that heavy, early infection

with the rust tends to suppress further growth and reproduction of Malta starthistle, although further research is needed to confirm these findings.

Chemical controls are also effective. Clopyralid (Transline®) is effective on all starthistles, as is picloram (Tordon 22K®). A 2,4-D/dicamba mixture (Weedmaster®) may also be effective. Postemergent treatments generally work best on seedlings and young plants up to 4 to 6 inches in height. However, chemicals with no soil residual activity will not prevent seeds in the soil from sprouting. Suggested chemical controls are shown in the table on the next page.

Special care must be taken when applying herbicides near or in streams, rivers, ponds, or lakes, or in areas with shallow water tables. Always read and follow label directions when applying pesticides.

References:

- Allred, K.W. and R. D. Lee. 1999. Knapweeds, starthistles, and basketflowers of New Mexico. The New Mexico Botanist, Issue #10, January 12, 1999.
<http://aces.nmsu.edu/academics/rangesciencecehbarium/documents/10.pdf>.
- California Department of Food and Agriculture. Malta Starthistle or Tocalote.
<http://www.cdfa.ca.gov/phpps/ipc/weedinfo/centaurea2.htm>
- DiTomaso, J.M. and E.A. Healy. 2007. Weeds of California and Other Western States. University of California Publication 3488.
- USDA Forest Service. 2010. Field Guide for Managing Malta Starthistle. Southwestern Region, TP-R3-16-1.
- Woods, D.M., V. Popescu and M.J. Pitcairn. 2001. *Puccinia centaurea*, a naturally occurring pathogen of tocalote. California Department of Food and Agriculture Biological Control Program. <http://plant.cdfa.ca.gov/biocontrol/annuals/2001annual/2001-28-ceme-rust.html>.

Suggested Chemical Controls*

Chemical	Sample Brand Names**	Sample Rate per Acre*	Timing	Notes
2,4-D	Various	1 to 2 qt	Early rosette stage; use higher rates at later rosette stage or early bolting	Spray thoroughly; little soil residual effect
Aminopyralid & 2,4-D	GrazonNext®	1.5 to 2 pt	Early rosette stage	Spray thoroughly; soil residual effect can last for about 1 month
Clopyralid	Transline®	2/3 to 1 1/3 pt	Early rosette stage; early to mid winter; use higher rate on bolting to bud stage	Spray thoroughly; season-long residual effect
Dicamba & 2,4-D	Weedmaster®	1 pt to 1 qt	Early rosette stage; use higher rates at later rosette stage or early bolting	Spray thoroughly; short-lasting residual effect
Imazapyr	Arsenal®	1 qt	Can apply during any stage	Slow to show effects; soil residual effect increases with soil pH
Metsulfuron	Escort®	1 oz	Early rosette stage; use higher rates at later rosette stage or early bolting	Slow to show effects; soil residual effect increases with soil pH
Picloram	Tordon 22K®	1 to 3 pt	Early rosette stage; use higher rates at later rosette stage or early bolting	Spray thoroughly; visible effects in 2-4 weeks; lasting soil residual effect

* Recommendations taken from USDA Forest Service (2010).

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