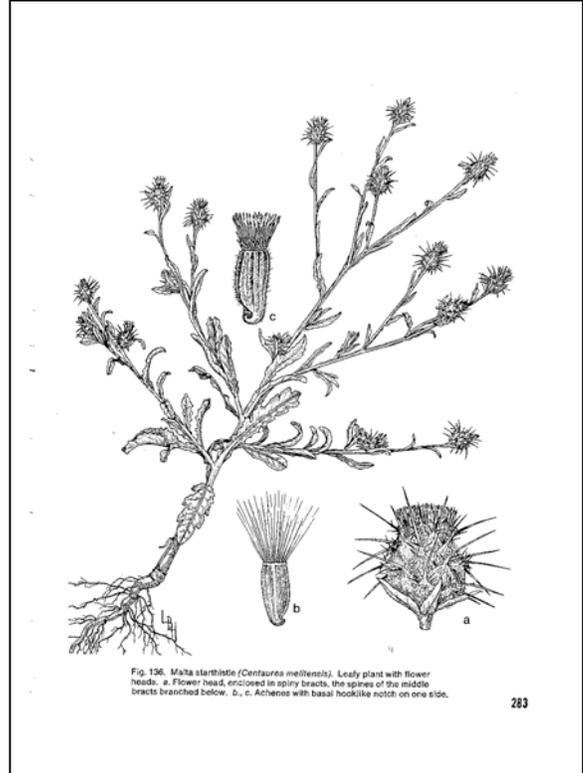


MALTA STARHISTLE *Centaurea melitensis*

Life History/Identification:

Malta starthistle is a close relative of yellow starthistle (*Centaurea solstitialis*). Other common names for this plant include Tocalote, Napa starthistle or Maltese centaur. The plant is an annual or biennial and reproduces from seed. The plant forms a rosette during the first growing season. The leaves of the rosette are deeply lobed and the surfaces are covered with stiff, thick hairs and resinous dots. The mature plants of Malta starthistle have stiff, upright stems that are openly branched from near the base. The plants have vertical ribs along the stems that are extensions of the leaves. These extensions are sometimes referred to as "wings". The wings on Malta starthistle are approximately 0.1 inch wide. Wings on yellow starthistle are somewhat larger. The flowers of Malta starthistle occur singly or are groups of 2 or 3 at the ends of the stems. Vigorous plants can develop flowers in the leaf axils. Malta starthistle has slightly smaller seed heads compared to yellow starthistle. The spines on the phyllaries are about ¼ inch long, brown to purple tinged and are branched near the midpoint. The spines are flattened when observed in cross section. Malta starthistle has a single taproot. Sources for new infestations may be contaminated seed or vehicles traveling from infested areas. Unlike its close relative yellow starthistle, Malta starthistle does not cause chewing disease in horses.



Northern Arizona Localities:

Currently, there are only small, isolated populations of Malta starthistle in Northern Arizona. There is a small population in Dead Horse State Park near Cottonwood, and infestations in Verde Valley. Most of the current infestations in Arizona are found below 4,000 feet in altitude, in Apache, Yavapai, Maricopa, Pinal, Graham, Pima, and Cochise counties. Malta starthistle grows in a variety of open areas including disturbed sites, grasslands, rangelands, and woodlands. Its ability to adapt to a wide variety of habitats gives it the ability to invade many habitats throughout the Coconino, Kaibab and Prescott National Forests.

Origin & Impacts:

Malta starthistle is a native of Southern Europe where it grows in dry places and disturbed ground. It grows in a variety of open areas including disturbed sites, grasslands, rangelands, and woodlands. Its ability to adapt to a wide variety of habitats gives it the ability to invade many habitats throughout the Coconino, Kaibab and Prescott National Forests. All species of the genus *Centaurea* are less palatable than native or exotic forage plants. Occupancy of sites by one or more species of the genus can cause a decrease in forage production. This can impact range carrying capacity of livestock allotments and decrease the quality and quantity of wildlife habitat. Replacement of native perennial grass species by Malta starthistle or other members of the genus contribute to soil erosion. The finely divided root structure of perennial bunch grasses secures the topsoil and prevents erosion from wind and water. Malta starthistle and other members of the genus *Centaurea* have a single taproot. This leaves many areas of the soil exposed to the elements of erosion. Any protection that *Centaurea spp.* may provide the soil is generally lost in the fall when plants senesce. However, perennial bunchgrasses provide protection for the soil even when they are dormant. Recreation and scenic values of natural areas can be impacted by the presence of Malta starthistle and other exotics. Malta starthistle plants have spines and can decrease the enjoyment of

hikers and animals using the area. Yellow starthistle (*Centaurea solstitialis*) is a close relative of this species.

Control:

Integrated pest management systems are most effective, combining the suppression of Malta starthistle with the enhancement of perennial grass species. Grazing always gives starthistle an ecological advantage over grasses, so 12-18 months of rest from grazing may be required after treatment. Prevention and detection of new populations, as well as eradication and containment of existing populations all need to be addressed to achieve control over Malta starthistle. Mapping of distribution and extent as well as consistent monitoring are also necessary to determine which combinations of control methods will be most effective in each circumstance. Most local land management agencies have adopted policies to map and monitor noxious weed populations through the collaboration of South West Exotic Mapping Project (USGS).

Cultural Control:

Prevent Malta starthistle from becoming established. Do not drive through areas that are infested with Malta starthistle. Check and clean all footwear, livestock and vehicles for attached starthistle plants when leaving infested areas. Purchase hay that is certified as being weed-free.

Mechanical Control:

Hand pulling or grubbing Malta starthistle is most effective for very small infestations, perimeter populations, or along riparian zones. Pull plants after they have bolted and before their flowers have bloomed. Repeat every 2-4 weeks during the growing season, removing as much of the root as possible. Cultivation, where feasible, will control (reduce) Malta starthistle within two years. Tilling must be done five or six times a year, two weeks apart, starting in June. Remember that seeds may stay dormant in the soil for at least ten years. Mowing is not recommended, as plants can produce side branches with more flowers. A study in California found that the yellow starthistle seed-bank can be reduced by burning the areas at least three years in a row just as the plants are beginning to flower. For burning to be a useful control agent in Northern Arizona, biannual burn/torch plans must coincide with Flagstaff's biannual rainfall.

Chemical Control *(Noted here are chemical control techniques that have been used in other areas.*

Always check with weed specialists or chemical suppliers before treatment to ensure correct dosage and application. Mention of these products does not imply endorsement by the USDA Forest Service, Northern Arizona Weed Council or The Nature Conservancy.):

Selective soil residual herbicides applied at the correct time may control weeds long enough to establish competitive grasses. Initial treatment should be in early spring, with follow-up before plants bolt. Picloram (Tordon 22K™), dicamba (Banvel™), clopyralid (for high water table), and triclopyr (Garlon 4™) have been used, but repeat applications are needed. Other favorable broadleaf species will also be affected. 2,4-D has also been used, but plants should not be treated more than once every 2-3 years to minimize selection for herbicide-resistant Malta starthistle plants.

Biological Control *(No exotic species should be introduced into an ecosystem without extensive research into the long-term effects. Mention of the species below does not imply appropriateness for use in Northern Arizona.):*

Lasioderma haemorrhoidale a beetle that feed on the seed heads of Malta starthistle was inadvertently introduced from the Mediterranean area. However, it does not eradicate infestations of Malta starthistle. There are no approved biological control agents available for use on Malta starthistle. Some of the same agents that are available for yellow starthistle may also work on Malta starthistle. Using a biological control agent on a species for which it is not intended could lead to serious ecological harm and loss of the financial investment. However, due to the large number of seeds and seed longevity of Malta starthistle, insects alone cannot completely control an infestation.

Note: No single control method, or any one-year treatment program, will ever achieve effective control of an area infested with Malta starthistle. The fast growth, high seed viability, and long seed dormancy of this plant require long-term cooperative integrated management programs and planning in order to contain and reduce Malta starthistle infestations.

Species Management Plan
Malta Starthistle
Centaurea melitensis

Life History/ Identification: Malta starthistle is a native of Southern Europe where it grows in dry places and disturbed ground. It is a close relative of yellow starthistle (*Centaurea solstitialis*). Other common names for this plant include Tocalote, Napa starthistle or Maltese centaury. The plant is an annual or biennial and reproduces from seed. The plant forms a rosette during the first growing season. The leaves of the rosette are deeply lobed and the surfaces are covered with stiff thick hairs and resinous dots. The mature plants of starthistle have stiff, upright stems that are openly branched from near the base. The plants have vertical ribs along the stems that are extensions of the leaves. These extensions are sometimes referred to as “wings”. The wings on Malta starthistle are approximately 0.1 inch wide. Wings on yellow starthistle are somewhat larger. The flowers of Malta starthistle occur singly or are groups of 2 or 3 at the ends of the stems. Vigorous plants can develop flowers in the leaf axils. Malta starthistle has slightly smaller seed heads compared to yellow starthistle. The spines on the phyllaries are about ¼ inch long, brown to purple tinged and are branched near the midpoint. The spines are flattened when observed in cross section. Malta starthistle has a single taproot. Sources for new infestations may be contaminated seed or vehicles traveling from infested areas. Unlike its close relative yellow starthistle, Malta starthistle does not cause chewing disease in horses. Chewing disease is a serious neurological disease. One of the effects is loss of control of the muscles of the face and head needed for eating and drinking. The animal can eventually die if the condition is left untreated.

Status: *Centaurea melitensis* is currently not included on the noxious weed list for the Coconino, Kaibab and Prescott National Forests. There are only isolated populations of this species in Northern Arizona and the identification of *C. melitensis* and *C. solstitialis* can be easily confused. The plant is included on the Southwestern Exotic Mapping Program Noxious Weed and Special Species of Concern List: Year 2000. *C. melitensis* is not included on the Arizona Noxious Weed List.

Known Locations: There is a small population of Malta starthistle in Dead Horse State Park near Cottonwood. (check swamp for others)

Impacts: Malta starthistle grows in a variety of open areas including disturbed sites, grasslands, rangelands, and woodlands. Its ability to adapt to a wide variety of habitats gives it the ability to invade many habitats throughout the Coconino, Kaibab and Prescott National Forests. All species of the genus *Centaurea* are less palatable than native or exotic forage plants. Occupancy of sites by one or more species of the genus can cause a decrease in forage production. This can impact range carrying capacity of livestock allotments and decrease the quality and quantity of wildlife habitat. Replacement of native perennial grass species by Malta starthistle or other members of the genus contribute to soil erosion. The finely divided root structure of perennial bunch grasses secures the topsoil and prevents erosion from wind and water. Malta starthistle and other members of the genus *Centaurea* have a single taproot. This leaves many areas of the soil exposed to the elements of erosion. Any protection that *Centaurea spp.* may provide the soil is generally lost in the fall when plants senesce. However, perennial bunchgrasses provide protection for the soil even when they are dormant. Recreation and scenic values of natural areas can be impacted by the presence of Malta starthistle and other exotics. Malta starthistle plants have spines and can decrease the enjoyment of hikers and animals using the area.

Control:

Yellow starthistle (*Centaurea solstitialis*) is a close relative of this species. More extensive control efforts have been done for Yellow starthistle. General information on control is probably useful for yellow starthistle and Malta starthistle. Refer to the *Species Action Plan for Yellow Starthistle* for control efforts on that species.

1. Cultural Control:

Prevention and detection of new populations, as well as eradication and containment of existing populations all need to be addressed to achieve control over Malta starthistle. **Mapping** of distribution and extent as well as consistent monitoring are also necessary to determine which combinations of control methods will be most effective in each circumstance. Most local land management agencies have adopted policies to map and monitor noxious weed populations through the collaboration of South West Exotic Mapping Project (USGS).

Prevention is the most effective and least expensive method of control. Maintenance of a vigorous, competitive plant community will control or reduce the rate of Malta starthistle spread. Plan activities to avoid areas infested with Malta starthistle if possible. If not, cleaning all equipment, tires, boots and hooves when leaving infested areas will prevent the creation of new infestations. Purchase only certified weed-free hay, and don't allow livestock to graze infested areas in summer and fall. Reseeding any disturbed sites with vigorous, hardy, early successional natives will also deter establishment of new Malta starthistle seedlings. Prevention is important and must be continued at all times to prevent new infestations, but something also has to be done as quickly as possible about the existing populations.

2. Mechanical Control

Hand pulling or grubbing Malta starthistle is most effective for small infestations, perimeter populations, or along riparian zones. Pull after plants have bolted and before flowers have bloomed. Repeat every 2-4 weeks for the growing season removing as much of the root as possible. If flower buds have already formed, bag all plants until they can be burned in a hot fire at a controlled site.

Cultivation, where feasible, **will control** (reduce) Malta starthistle within two years. Tilling must be done five or six times a year, two weeks apart, starting in June. Remember that seeds may stay dormant in the soil for at least ten years.

Mowing is **not recommended**, as plants produce side branches with more flowers. Mowing can be used to stress the weeds once they grow above desirable grasses during revegetation as long as no more precipitation is expected that year, very unlikely with Northern Arizona's biannual rainfall.

3. Chemical Control: *Noted here are chemical control techniques in use in other areas. Always check with weed specialists or chemical suppliers to ensure correct dosage and application. Mention of these products does not imply endorsement by the Northern Arizona Weed Council, San Francisco Peaks Weed Management Area, the USDA Forest Service, nor the Nature Conservancy. Currently the use of herbicides is not allowed on lands administered by the Coconino, Kaibab and Prescott National Forests. Always check with your local land manager before using herbicides on public lands.*

Chemical control is a costly but effective tool for controlling Malta starthistle in highly productive soils, high-risk areas, or around the perimeter of large infestations to contain spread. As mentioned above it can be effectively combined with other mechanical treatments to reduce cost. Or if manpower is the limiting factor chemical treatment can be used first to reduce the population, then after revegetation has begun hand-pulling could be used to prevent remaining plants from going to seed. Selective soil residual, foliar, or pre-emergent herbicides applied at the correct time and rate may control Malta starthistle long enough to establish competitive grasses. Picloram (Tordon™ or Amdon™) at a rate of .25 lb active ingredient per acre to seedlings, rosettes, or plants beginning to bolt provided broadleaf selective systemic control for three years for

Callihan et al. (1989). Well-established grasses are unaffected at this rate, but grass plants with less than four leaves may be killed. Triclopyr (Garlon 4™) another broadleaf-selective herbicide in combination with burning and reseeded of grasses has been used to effectively reduce a Malta starthistle population and establish a dense cover of annual and perennial grasses (Hastings and DiTomaso 1996). Dicamba (Banvel™) and/or 2,4-D (low volatile ester or amine) at a rate of 0.5 lb ai/ac can be used in sensitive areas such as riparian zones, control lasts about one year. 2,4-D should not be used in one area more than once every 2-3 years to minimize selection for herbicide-resistant Malta starthistle plants. Clopyralid at 1.2 lb ai/ac applied before the bud stage can be used to effectively control Malta starthistle in areas with a high water table.

.4. Biological Control

Lasioderma haemorrhoidale a beetle that feed on the seed heads of Malta starthistle was inadvertently introduced from the Mediterranean area. However, it does not control infestations of Malta starthistle. There are no approved biological control agents available for use on Malta starthistle. Some of the same agents that are available for yellow starthistle may also work on Malta starthistle. However, biological control is not without its own risks. No agent should be released without first getting expert advice. Using a biological control agent on a species for which it is not intended could lead to death of the agent and loss of the financial investment.

5. Integrated Control

Integrated control is almost always a necessary part of noxious weed control. . Examples of this include mechanical removal of weed species such as Malta starthistle followed by revegetation of the site, or a combination of mechanical control and herbicide treatment.

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