

Yellow Starthistle is Invading Nevada!



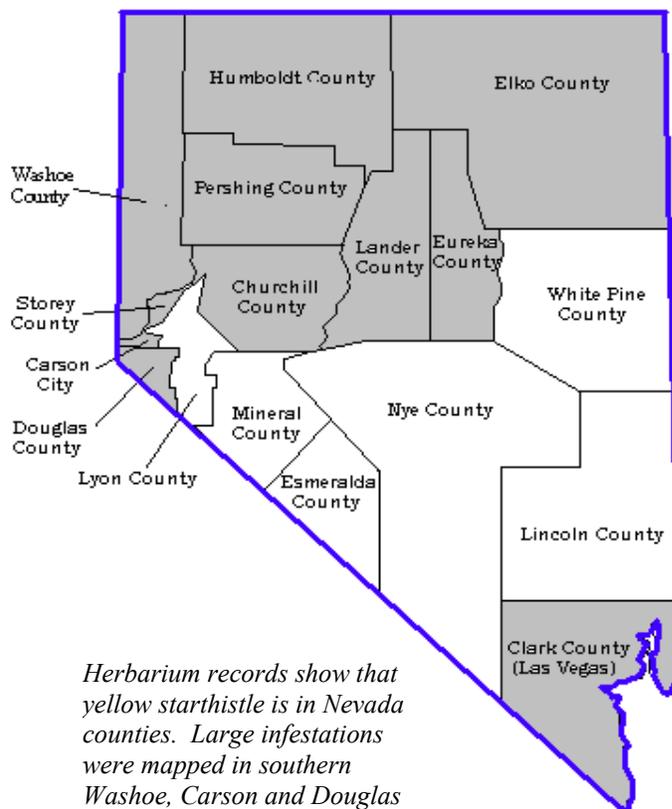
Yellow starthistle is extremely competitive and invasive. By 2000, 22 of 100 million acres were infested in California. If not managed and controlled, it quickly crowds out native species. Its roots grow faster and deeper than those of many native forage plants and shrubs.

Yellow starthistle is palatable to livestock until the flower head produces spines. Once the spines appear, livestock, with the exception of goats, avoid grazing it. The long-term ingestion of the weed causes the neurological disorder “chewing disease” in horses. The first signs of poisoning are twitching of the lips, tongue flicking, and involuntary chewing. Permanent brain damage can result and horses may starve to death.

Yellow starthistle, *Centaurea solstitialis*, originated in Eurasia and was first found in the United States in 1869, growing in California. It is common along roadsides, streams, ditches, and railroad rights-of-way, in waste areas, rangelands, hay fields, and pastures and it is rapidly invading other western states. This weed develops dense infestations and successfully depletes soil moisture eliminating other desirable plants.

Yellow starthistle is a gray-green plant with a long taproot. It has bright, dandelion-yellow flowers with sharp, one-inch tan spines at the flower base. The rigid stems branch from the base upward reaching a height from 6 to 72 inches. Stems and leaves are covered with cobwebby hairs that make the plant appear gray-green early in the year. From mid-summer on, infestations create a dull, grayish tan landscape.

Yellow starthistle grows as a winter annual, or rarely as a short-lived perennial. Each plant can produce nearly 75,000 seeds, resulting in 50 to 200 million seeds per acre for heavily infested areas. Most seeds will germinate the following year, but some are able to remain in the soil for as long as 10 years before germinating.



Herbarium records show that yellow starthistle is in Nevada counties. Large infestations were mapped in southern Washoe, Carson and Douglas counties in 2000.

Control of yellow starthistle can best be accomplished with an integrated weed management approach. This involves monitoring the weed infestation, implementing a combination of control methods and establishing desirable, competitive vegetation at the site.

Monitor yellow starthistle by locating and recording infestations on a map. Pay special attention to sensitive areas that include but are not limited to threatened and endangered species habitats, transportation corridors, rangelands, agricultural fields, and recreation areas. Update maps yearly.

After monitoring, assess available resources and develop treatment strategies for each infested site. At a minimum, the infestation should be contained to keep the weed from spreading to non-infested areas. This strategy is helpful when dealing with large infestations. Reducing the size of the infestation takes more time and resources than containment and therefore should be a long-term goal. Eradication may be possible if the infested area is small.

Early detection, prevention and control prevent large infestations. Manage yellow starthistle by:

- Communicating with neighbors about infested areas, alerting each other to new infestations, and working together to implement effective management schemes.
- Monitoring large infested areas and new infestations.
- Insisting on weed-free forage, grain, and seeds for planting.
- Checking soil that is sold or moved for contamination with yellow starthistle seeds.
- Thoroughly cleaning the undercarriage of all vehicles and machinery entering your area.
- Managing animals to prevent distribution of yellow starthistle.

Biological control does not completely control yellow starthistle, although it is the least-cost method that has the highest potential for long-term, sustainable management. Yellow starthistle can be managed with four biological control organisms; insects, fungi, livestock grazing, and competitive plants.

Three weevils and three flies are approved for biological control of yellow starthistle by the USDA and have become established in California. The hairy weevil and the false peacock fly have proven most successful in California. Current evidence indicates a



The false peacock fly reduces seed production significantly if the site's environmental conditions are adequate for the insect's survival. California Agriculture 54:6, p33.

50-75 percent reduction in seed production with infestations that have significant bioagent populations. A rust fungus is also effective in containing yellow starthistle infestations.

Grazing with sheep, goats, or cattle can be an effective control measure if completed after the bolting stage but before the flowering spiny stage. The grazing helps reduce weed biomass and seed production. Grazing compliments other management measures. Mixed species livestock grazing will distribute the impact due to different grazing patterns among each species. Cattle and goats can greatly decrease yellow starthistle infestations, but goats continue to graze yellow starthistle after it has flowered whereas cattle stop grazing after the spines appear. For this reason goats have become the animal of choice in controlling relatively small yellow starthistle infestations. As with other control methods timing is important and grazing is usually most efficient during May and June.



Grazing is most effective when livestock consume yellow starthistle intensively after the bolting stage but before the flowering, spiny stage. UC Davis Pub 21541: p 12

Plant competition is one of the best methods for suppressing yellow starthistle while maintaining high forage production and plant diversity. Environmental factors to consider before choosing a competitor include soil conditions, elevation, precipitation, and overall climate. Land-use objectives must also be considered for instance, forage production, wildlife habitat development, recreation or conservation. If suppression of yellow starthistle is the only objective, then it is important to choose a species that is more vigorous than yellow starthistle. This may be difficult because only a few plant species displace yellow starthistle. Perennial bunchgrasses are commonly used to restore yellow starthistle infestations. Legumes are also used in weed suppression efforts. Combining different species is an effective method to improve soil recovery and microbial activity, though it limits the use of selective herbicides in yellow starthistle control.



Here pubescent wheatgrass was established to compete against a large yellow starthistle infestation. California Agriculture 54:6, p35.

One choice is to use only perennial grasses in the initial stage of weed management followed by seeding with broadleaf species. Each management scheme is not going to work under all situations. Monitoring the success rate is key to finding the optimal weed management program for a site.

Physical control involves four methods; mowing, tilling, hand pulling, and prescribed burning.

Mowing can be effective, but timing is critical. The area must be mowed when two to five percent of the seed heads are flowering. This prevents the production of viable seed and ensures that the lowest branches of the weed are above mower height. This is important because yellow starthistle can produce

new seed heads if the lowest branches are not removed.

Tilling the infested area early in the summer can be effective. Tilling can lead to rapid reinfestation by yellow starthistle or other invasive weeds unless repeated and revegetation with a desirable species follows. Most range and wildland sites would be too costly to till because of location and terrain.



Yellow starthistle grows in the smallest cracks.

Hand pulling small infestations works well. Removing individual plants will prevent seed production and slow plant re-establishment and is appropriate in many urban locations.

Prescribed burning is most effective when it is conducted after native species have dispersed their seeds but before yellow starthistle has produced any seeds. Burning infested areas is risky as fire may escape. It also reduces air quality and may be restricted by local ordinances. Prescribed fire cannot be used with insect biocontrol agents. Fire should be integrated with other control methods to maximize its effectiveness. One option would be to use a chemical control agent in the first year followed by a prescribed burn in the second year. This would cause legumes to be suppressed in the first year while grasses are stimulated, and the fire would promote legume growth in the second year. This control method is effective, but like other methods, it must be repeated and continuously monitored to reduce yellow starthistle infestations.

Chemical controls are effective, but when used repeatedly may cause an increase in other weeds and resistance in yellow starthistle.

Clopyralid (Transline[®], Stinger[®]) is very effective on yellow starthistle. It is highly selective, used at low application rates and has low toxicity. Curtail[®] (clopyralid in combination with 2,4-D) is also available and has selectivity. Picloran[®] (Tordon[®] -a

restricted use product) and chlorsulfuron selectively kill yellow starthistle. Clopyralid and chlorsulfuron



Aerial application of herbicides can reduce heavy infestations. This can be used to help other control methods gain a competitive advantage over yellow starthistle. California Agriculture 54:6, p32.

control most broadleaf plants and are active in soil, especially alkaline soil (high pH) for up to four years. They limit the species that can be used in crop rotations and revegetation efforts. Use clopyralid or chlorsulfuron in late winter or very early spring, and monitor their effectiveness to determine when another application is necessary. Clopyralid and chlorsulfuron may not be suitable for sites where increased plant diversity is desired or where native plant populations may be threatened.

For spot treatments of escaped plants 2,4-D is effective but it has no residual soil activity and will not stop germination of yellow starthistle. 2,4-D also damages late season broadleaf species and should only be applied when plants are not under severe stress.

Repetitive use of most herbicides can lead to resistant biotypes of yellow starthistle or allow other noxious weeds to take over the site. Herbicides are effective when used in a multiyear program. Using herbicides in the first year can greatly reduce the yellow starthistle population and thus reduce the seedbank. The result of this management program is high forage production during the following growing season if natives rebound or revegetation is practical. Drought stress limits the effectiveness of most herbicides. Only use herbicides in combination with other control methods and a re-vegetation program.

For more information on managing yellow starthistle on your land, contact local University of Nevada Cooperative Extension offices or phone Dr. Wayne S Johnson at (775)-784-1931 or visit his web site at www.ag.unr.edu/wsjs.

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