

This WEED REPORT does not constitute a formal recommendation. When using herbicides always read the label, and when in doubt consult your farm advisor or county agent.

This WEED REPORT is an excerpt from the book *Weed Control in Natural Areas in the Western United States* and is available wholesale through the UC Weed Research & Information Center (wric.ucdavis.edu) or retail through the Western Society of Weed Science (wsweedsociety.org) or the California Invasive Species Council (cal-ipc.org).

Centaurea calcitrapa L.; purple starthistle
Centaurea iberica Spreng.; Iberian starthistle

Purple and Iberian starthistle

Family: Asteraceae

Range: Purple starthistle is found in Arizona, California, Oregon, Washington, Utah, and southeastern New Mexico. All of the Oregon and Washington populations have been controlled or are currently being treated for eradication. Iberian starthistle is found in Oregon, Washington, Wyoming and California.

Habitat: Purple starthistle prefers fertile alluvial soils and forms dense stands in pasture, range, open forest, and riparian areas. Iberian starthistle often colonizes banks and watercourses and other moist areas.

Origin: Purple starthistle is native to southern Europe, and Iberian starthistle is native to southeastern Eurasia.

Impact: The rigid spines of purple and Iberian starthistle make the plants unpalatable and reduce the quality of infested hay. These plants restrict access and deter grazing by livestock and wildlife. Infestations can limit recreational opportunities, cause injuries, and degrade the quality of parks and natural areas. Purple starthistle can inhabit a wide range of environmental conditions and replace native species. Purple starthistle is known globally as an introduced weedy plant and is considered invasive or noxious in North and South America, New Zealand and Australia.

Western states listed as Noxious Weed: Both species are listed in Arizona, California, Nevada, Oregon; *C. calcitrapa* is also listed in Washington

California Invasive Plant Council (Cal-IPC) Inventory: *Centaurea calcitrapa*, Moderate Invasiveness

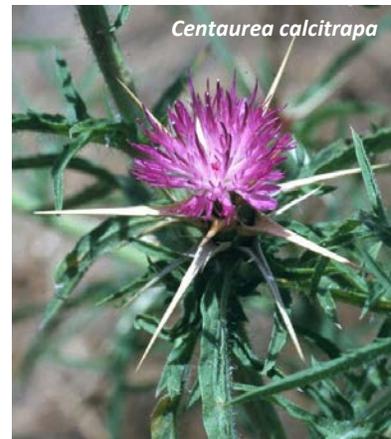
Both species are annuals to perennials, to 3 ft tall. They exist as basal rosettes until they bolt. Bolting stems are erect, with highly branched flowering stems developing at maturity, usually in late spring and summer. A long taproot provides a competitive advantage over annual and perennial grasses, reducing available forage.

Both species produce spiny heads with purple flowers. The pappus on Iberian starthistle has white bristles ~1 mm long, while purple starthistle usually lacks a pappus. Plants reproduce only by seed, which disperse with the seedhead as a unit. Most fall just below the parent plant, but some can move longer distances when they attach to animals. Most seed germinates the first year, but buried seeds of both species can remain dormant for about 3 years.

The specific epithet for purple starthistle, *calcitrapa*, was derived from caltrop, a spiked weapon from the Middle Ages that was dropped on the battlefield to injure advancing troops and horses.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Hand pulling, grubbing, or digging can be used to control small infestations. These techniques must be repeated several times a year. Purple starthistle populations were sharply reduced after 3 years of hand grubbing. Mowing is not effective at killing plants but can reduce seed production if timed at full bloom. Regrowth occurs from root crowns when the tops are removed.
Cultural	Conventional grazing by sheep or cattle will not control purple starthistle and in fact can promote it,



	<p>because grazing animals usually avoid this plant and selectively feed on species that would otherwise compete with it.</p> <p>Burning is not considered an effective tool for control.</p> <p>In California where purple starthistle is a common pasture weed, fertility management is occasionally used as a management tool.</p>
Biological	<p>While there are many biological control programs for other species of <i>Centaurea</i>, there is no biological control program for purple or Iberian starthistle.</p>

CHEMICAL CONTROL

The following specific use information is based on published papers or reports by researchers and land managers. These are products known to provide effective control. Those that do not provide sufficient control have been omitted from the table. Other trade names may be available, and other compounds also are labeled for this weed. For foliar applications, use low pressure and a coarse spray pattern to reduce spray drift damage to non-target species. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

GROWTH REGULATORS	
<p>2,4-D</p> <p>Several names</p>	<p>Rate: 1 to 2 qt product/acre (0.95 to 1.9 lb a.e./acre)</p> <p>Timing: Postemergence in spring when plants are still in rosettes but before flower stems elongate. Treat rapidly growing plants. Thoroughly covering foliage enhances control.</p> <p>Remarks: Generally requires repeat applications. It is not considered as effective as other growth regulator herbicides for season-long control. 2,4-D is broadleaf-selective and has no soil activity. Do not apply ester formulation when outside temperatures exceed 80°F. Amine forms are as effective as ester forms for small rosettes, and amine forms reduce the chance of off-target movement from volatility.</p>
<p>Aminocyclopyrachlor + chlorsulfuron</p> <p><i>Perspective</i></p>	<p>Rate: 4.75 to 8 oz product (<i>Perspective</i>)/acre</p> <p>Timing: Postemergence and preemergence. Postemergence applications are most effective when applied to plants from the seedling to the mid-rosette stage.</p> <p>Remarks: Aminocyclopyrachlor gives control of many members of the genus <i>Centaurea</i>, including purple starthistle. Its effect is similar to aminopyralid. <i>Perspective</i> provides broad-spectrum control of many broadleaf species. Although generally safe to grasses, it may suppress or injure certain annual and perennial grass species. Do not treat in the root zone of desirable trees and shrubs. Do not apply more than 11 oz product/acre per year. At this high rate, cool-season grasses will be damaged, including bluebunch wheatgrass. Not yet labeled for grazing lands. Add an adjuvant to the spray solution. This product is not approved for use in California and some counties of Colorado (San Luis Valley).</p>
<p>Aminopyralid</p> <p><i>Milestone</i></p>	<p>Rate: 4 to 7 oz product/acre (1 to 1.75 oz a.e./acre). These rates are used for control of diffuse and spotted knapweed, and are expected to provide similar control of purple and Iberian starthistle</p> <p>Timing: Postemergence to rapidly growing plants in fall, or in spring from rosette to bolting stages. Late winter to early spring applications provide residual control of germinating seedlings.</p> <p>Remarks: A non-ionic surfactant (0.25 to 0.5% v/v of spray solution) enhances control under adverse environmental conditions. Aminopyralid is a broadleaf herbicide.</p>
<p>Clopyralid</p> <p><i>Transline</i></p>	<p>Rate: 0.67 to 1.33 pt product/acre (4 to 8 oz a.e./acre)</p> <p>Timing: Postemergence to starthistle rosettes but before flower stem elongates. Plants should be rapidly growing at time of treatment.</p> <p>Remarks: Apply in 10 to 40 gal/acre of water.</p>
<p>Clopyralid + 2,4-D</p> <p><i>Curtail</i></p>	<p>Rate: 2 to 5 qt <i>Curtail</i>/acre</p> <p>Timing: Postemergence after most rosettes emerge but before flower stem elongates.</p> <p>Remarks: Use higher rates for fallow and Conservation Reserve Program (CRP) applications. With CRP applications, use in established grass only. Apply in enough total spray volume to ensure good coverage. Add a non-ionic surfactant.</p>

<p>Dicamba <i>Banvel, Clarity</i></p>	<p>Rate: 2 to 4 pt product/acre (1 to 2 lb a.e./acre). Use higher rate for older plants or dense stands. Timing: Postemergence when plants are still in rosettes but before flower stems elongate. Plants should be rapidly growing at time of treatment. Remarks: Dicamba is a broadleaf-selective herbicide often combined with other active ingredients. It is not typically used alone to control starthistles.</p>
<p>Picloram <i>Tordon 22K</i></p>	<p>Rate: 1 to 2 pt product/acre (4 to 8 oz a.e./acre) Timing: Preemergence and postemergence. With postemergence application, optimally treat at rosette to mid-bolting stage (before flowering to prevent current year seed production), or fall rosette stage. Apply when plants are growing rapidly. Remarks: Picloram gives a broader spectrum of control than aminopyralid, aminocyclopyrachlor, and clopyralid, and has much longer soil residual activity. Most broadleaf plants are susceptible. It will not damage perennial grasses at the suggested rate. Treatment made in bud stage may not prevent seed production in the year of application. Do not apply near trees. <i>Tordon 22K</i> is a restricted-use herbicide. Picloram is not registered for use in California.</p>
<p>AROMATIC AMINO ACID INHIBITORS</p>	
<p>Glyphosate <i>Roundup, Accord XRT II,</i> and others</p>	<p>Rate: Broadcast foliar treatment: 3 qt product (<i>Roundup ProMax</i>)/acre (3.375 lb a.e./acre). Spot treatment: 1.5% v/v solution Timing: Postemergence to rapidly growing plants when most plants are at bud stage. Remarks: Glyphosate will only provide control during the year of application; it has no soil activity and will not kill seeds or inhibit germination the following season. Glyphosate is nonselective. To achieve selectivity, it can be applied using a wiper or spot treatment to control current year's plants.</p>
<p>BRANCHED-CHAIN AMINO ACID INHIBITORS</p>	
<p>Sulfometuron <i>Oust</i> and others</p>	<p>Rate: 3 to 5 oz product/acre (2.25 to 3.75 oz a.i./acre) Timing: Preemergence or early postemergence, before or during the rainy season when weeds are germinating and actively growing. Remarks: Treated soil should be left undisturbed to reduce the potential movement of the herbicide by soil erosion due to wind or water. Treatment of powdery, dry soil or light, sandy soil when there is little likelihood of rainfall soon after treatment may result in off target movement when soil particles are moved by wind or water.</p>
<p>Photosynthetic inhibitors</p>	
<p>Hexazinone <i>Velpar L</i></p>	<p>Rate: 1 to 2.5 gal product/acre (2 to 5 lb a.i./acre) Timing: Preemergence or postemergence when weeds are germinating or actively growing. Remarks: <i>Centaurea</i> control is only registered for uncultivated non-agricultural areas (such as rights-of-way), uncultivated agricultural areas (non-crop producing which includes uses such as farmyards and barrier strips), and industrial sites. Use lower rate on coarse-textured soils (sand to sandy loam). Use the higher rate on fine-textured soils (clay loam to clay) and on soils high in organic matter. High rates of hexazinone can create bare ground, so only use high rates in spot treatments.</p>

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.