

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](http://wric.ucdavis.edu)) or retail through the Western Society of Weed Science ([wsweedscience.org](http://wsweedscience.org)) or the California Invasive Species Council ([cal-ipc.org](http://cal-ipc.org)).

*Centaurea debeauxii* Gren. & Godr. ssp. *thuillierii* Dostál  
(= *Centaurea* x *pratensis* Thuill., *C. jacea* L. nothosubsp. *pratensis* (W.D.J. Koch)  
Čelak. [Jepson Manual 2012], *C. jacea* x *nigra*, *Centaurea* x *moncktonii*)

## Meadow knapweed

**Family:** Asteraceae

**Range:** Occurs sporadically in California, Colorado, Idaho, Montana, Oregon, and Washington.

**Habitat:** Pastures and moist sites, including moist meadows, river banks, streams, irrigation ditches, and openings in forested areas tree farms, vacant lands, railroads and roadsides.

**Origin:** Native to Europe. Is a hybrid of black (*C. nigra*) and brown (*C. jacea*) knapweeds. Brown knapweed was introduced into North America as a forage crop and black knapweed was probably introduced in ship ballast or as an ornamental. European plants have been grown as crop or garden plants.

**Impact:** Meadow knapweed outcompetes grasses and other pasture species. It threatens wildlife habitat and interferes with Christmas tree plantations.

**Western states listed as Noxious Weed:** Colorado, Idaho, Oregon

**California Invasive Plant Council (Cal-IPC) Inventory:** Moderate Invasiveness (Alert)

Meadow knapweed is a taprooted perennial to 3 ft tall, generally arising from a woody crown. It resembles spotted knapweed but can be distinguished by having longer phyllaries, 15-18 mm long. Unlike squarrose, spotted and diffuse knapweeds, the leaves are simple with less lobing and are up to 6 inches long by about 1.5 inches wide.

The pink to purple flowerheads are roundish, 1 inch wide, and solitary at the tips of the branches. The phyllaries surrounding the flowers are light to dark brown, with paper-fringed margins, appearing shiny and coppery when flowers are mature. Meadow knapweed reproduces mostly by seed, but roots and root crowns can reestablish when fragmented and dispersed by cultivation or construction equipment. Achenes are brown, lack a pappus, and are much hairier than other knapweed species. Meadow knapweed seeds are primarily dispersed in rivers, streams, or irrigation water. Wildlife and birds will also spread the seed. It is not known how long seeds remain viable in the soil, but it is assumed that survival would be similar to other *Centaurea* species, 2 to 5 years, with a few seeds surviving longer.

### NON-CHEMICAL CONTROL

#### Mechanical

(pulling, cutting, disking)

It is possible to hand remove initial or small infestations. Smaller plants are much easier to remove than larger, more established plants. Established meadow knapweed plants have a large root that is hard to pull. It is best to remove as much of the root as possible before flowering. Hand pulling 2 to 4 times per year or severing plants at least 2 inches below crowns can control small infestations. This is easier when the soil is loose or wet. Plants in flower may form viable seeds even after they are pulled. As such, they may need to be placed in bags and removed from the site. Repeat visits are necessary in the following spring and summer to remove newly germinating plants or plants that have reemerged from root fragments. Monitoring of treatment sites should continue for several years.

Mowing is not effective for most knapweed species. Plants generally resprout and flower again in the same season when mowed. Plants that are regularly mowed will persist for years and can often flower and produce seed below the level of the mower. However, mowing can improve the palatability of the foliage



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|                   | <p>to grazing animals, increase the efficacy of subsequent herbicide treatments, and reduce the weed's competitiveness with desirable forage species. Furthermore, mowing at the late bud to early bloom stage can reduce seed production. Mowing after seed set can disperse seed and can stimulate stem regrowth.</p> <p>In some situations it may be feasible to cultivate infested pastures and rotate through an annual hay crop, green manure or some other cleanup crop before reseeding to the desired permanent forage species. If plans include using herbicides along with the cleanup crop, grasses allow more options than legumes. Meadow knapweed does not tolerate repeated cultivation but may resprout following the initial breakup of the crown and fleshy roots. Consider the seed reserve in the soil and devise methods to either deplete it (using herbicides or repeated cultivation) or to prevent its germination (by deep burial or shading of the soil surface). Irrigation may be needed for initial establishment of the new forage crop.</p> <p>Rototilling or plowing will eliminate knapweed. Cultivating with a disk will control young plants and seedlings, but established plants can survive if the root or root fragments remain.</p> |
| <b>Cultural</b>   | <p>Meadow knapweed green leaves may be more palatable to livestock than other knapweed species. In pastures, good grazing practices and management of grass and forage species will greatly improve control of knapweed.</p> <p>There are no studies to demonstrate the effectiveness of prescribed burning, although it is likely that the response in meadow knapweed would be similar to that of spotted or diffuse knapweed.</p>  |
| <b>Biological</b> | <p>Some biological controls introduced for other knapweeds also attack meadow knapweed. However, they have not shown much effect. Three seed-feeding insects, a moth (<i>Metzneria paucipunctella</i>), a weevil (<i>Larinus minutus</i>), and a fly (<i>Urophora quadrifasciata</i>) are established on meadow knapweed. The most promising agent is <i>Larinus minutus</i>, which may reduce weed populations if its numbers increase as they did with spotted and diffuse knapweed. <i>Larinus minutus</i> has been found attacking meadow knapweed in both Oregon and Washington, showing the most potential for damaging young plants and seedlings.</p>   |

**CHEMICAL CONTROL**

The following specific use information is based on published papers and reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. 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.

| <b>GROWTH REGULATORS</b>  |   |
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| <p>2,4-D<br/>Several names</p>  | <p><b>Rate:</b> 1 to 2 qt product/acre (0.95 to 1.9 lb a.e./acre)<br/> <b>Timing:</b> Postemergence from rosette to beginning of bolting, or fall rosette. Optimal at early flowering stage.<br/> <b>Remarks:</b> Control with 2,4-D is only temporary and does not prevent seedling establishment the following year. Generally requires repeat applications. 2,4-D is not considered as effective as other growth regulator herbicides for season-long control. It 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.</p>   |
| <p>Aminocyclopyrachlor +<br/>chlorsulfuron<br/><i>Perspective</i></p> | <p><b>Rate:</b> 4.75 to 8 oz product (<i>Perspective</i>)/acre<br/> <b>Timing:</b> Postemergence and preemergence. Postemergence applications are most effective when applied to plants from the seedling to the mid-rosette stage.<br/> <b>Remarks:</b> Provides broad-spectrum control of many broadleaf species. Although generally safe to grasses, it may suppress or injure certain annual and perennial grass species. Aminocyclopyrachlor gives control of other knapweeds and is expected to also provide the same level of control on meadow knapweed. 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<br/><i>Milestone</i></p>                              | <p><b>Rate:</b> 5 to 7 oz product/acre (1.25 to 1.75 oz ae/acre)<br/> <b>Timing:</b> Postemergence and preemergence. Postemergence applications are most effective when applied to plants from the rosette to the bolting stage. Effective control can also be obtained with a fall application to new regrowth.<br/> <b>Remarks:</b> Aminopyralid is one of the most effective herbicides for the control of meadow knapweed. It is safe on grasses, although preemergence application at high rates can greatly suppress invasive</p>   |

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|   | <p>annual grasses, such as medusahead. Aminopyralid has a longer residual and higher activity than clopyralid. Other members of the Asteraceae and Fabaceae are very sensitive to aminopyralid. For postemergence applications, a non-ionic surfactant (0.25 to 0.5% v/v spray solution) enhances control under adverse environmental conditions; however, this is not normally necessary. Other premix formulations of aminopyralid can also be used for diffuse knapweed control. These include <i>Opensight</i> (aminopyralid + metsulfuron; 1.5 to 2 oz product/acre) and <i>Forefront HL</i> (aminopyralid + 2,4-D; 1.2 to 2.1 pt product/acre). Both are applied at the rosette to bolting stages.</p>  |
| <p>Clopyralid<br/><i>Transline</i></p>                              | <p><b>Rate:</b> 0.67 to 1.33 pt product/acre (4 to 8 oz a.e./acre). Use higher rate for older plants or dense stands.</p> <p><b>Timing:</b> Preemergence (for seedling control) or postemergence (for seedling and perennial plant control). Generally optimal to apply in spring, at beginning of bolting up to the bud stage. Can also apply to fall regrowth. Results are best if applied to rapidly growing weeds.</p> <p><b>Remarks:</b> While it is very safe on grasses, it will injure many members of the Asteraceae, particularly thistles, and can also injure legumes, including clovers. Most other broadleaf species and all grasses are not injured.</p>   |
| <p>Clopyralid + 2,4-D<br/><i>Curtail</i></p>                        | <p><b>Rate:</b> 2 to 4 qt <i>Curtail</i>/acre</p> <p><b>Timing:</b> Same as for clopyralid.</p> <p><b>Remarks:</b> The combination may cause increased damage to other broadleaf species. Add a non-ionic surfactant.</p>   |
| <p>Dicamba<br/><i>Banvel, Clarity</i></p>                           | <p><b>Rate:</b> 1 to 2 pt product/acre (0.5 to 1 lb a.e./acre). Use higher rate for older plants or dense stands.</p> <p><b>Timing:</b> Postemergence from rosette to beginning of bolting, or fall rosette. Optimal at early flowering stage.</p> <p><b>Remarks:</b> Dicamba is a broadleaf-selective herbicide often combined with other active ingredients. It is not typically used alone to control knapweed species. Dicamba can also be mixed with 2,4-D (1 pt dicamba + 2 pt 2,4-D/acre) or picloram (1 to 2 pt dicamba + 0.5 to 1 pt picloram/acre) for spot treatments.</p>   |
| <p>Picloram<br/><i>Tordon 22K</i></p>                               | <p><b>Rate:</b> 1 to 2 pt product/acre (4 to 8 oz a.e./acre). Use higher rates for older plants or dense stands.</p> <p><b>Timing:</b> 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. Under favorable growing conditions, application in summer can be effective if higher application volumes are used.</p> <p><b>Remarks:</b> Broadleaf herbicide with a broader spectrum of control than aminocyclopyrachlor, aminopyralid, and clopyralid, and much longer soil residual activity. Lower rates may require annual spot treatments. Treatment made in bud stage may not prevent seed production in the year of application. Picloram has been shown to provide selective control of knapweeds for 3 to 4 years. Although well-developed grasses are not usually injured by labeled use rates, some applicators have noted that young grass seedlings with fewer than four leaves may be killed. Do not apply near trees. Picloram is a restricted use herbicide. It is not registered for use in California. Control with lower rates may be improved by tank mixing with dicamba or 2,4-D; picloram and dicamba (0.25 to 0.5 pt/acre + 0.125 to 0.25 pt/acre) and picloram plus 2,4-D (0.5 to 1 pt picloram + 1 to 2 pt 2,4-D/acre). A backpack sprayer or a wiper is highly recommended in small areas to minimize damage to non-target plants.</p> |
| <p><b>AROMATIC AMINO ACID INHIBITORS</b></p>                        |   |
| <p>Glyphosate<br/><i>Roundup, Accord XRT II,</i><br/>and others</p> | <p><b>Rate:</b> Broadcast foliar treatment: 3 qt product (<i>Roundup ProMax</i>)/acre (3.375 lb a.e./acre). Spot treatment: 1.5% v/v solution.</p> <p><b>Timing:</b> Postemergence to rapidly growing knapweed when most plants are at bud stage.</p> <p><b>Remarks:</b> 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>  |

**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.