

YELLOW STARHISTLE

(*Centaurea solstitialis*)

Description: Yellow starthistle is a member of the knapweed complex in the Asteraceae or sunflower family. Yellow starthistle is a winter annual that can range from 2 to over 3 feet tall, dependent upon environmental conditions. Stems of the plant are branched with winged stems. Lower leaves of the plant are deeply lobed, while upper leaves are entire and linear. Both stems and leaves are covered with loose, pubescent hairs that give the plant a white-grayish appearance. Each stem ends with a bright yellow flower that is surrounded by a bract armed with stout, straw-colored spines. Yellow starthistle seeds are light to dark brown in color and may or may not contain plumes.

Yellow starthistle is considered a noxious weed under North Dakota state law, thus landowners are required to eradicate or control the spread of the plant.

Plant Images:



Yellow starthistle



Rosette



Winged stems



Flower head

Distribution and Habitat: Yellow starthistle is native to Europe. The plant is capable of establishing on either deep, well-drained soils, or shallow, rocky soils which are subject to varying amounts of precipitation. Yellow starthistle invades rangelands, grainfields, orchards, vineyards, cultivated crops, pastures, roadsides, and wastelands.

Life History/Ecology: Yellow starthistle is a winter annual that depends on seed production for population survival. A single plant can produce as many as 150,000 seeds. Most Yellow starthistle seeds are plumed, and are dispersed at maturity. However, some seeds are plumeless and are retained in the seedhead until dispersed in the winter months. Yellow starthistle typically germinates in the fall

until the soil dries or becomes too cold, but emergence can occur in the spring after snowmelt. Rosettes of the plant begin to form in March and continue into May. Yellow starthistle bolts in late May to early June and flowering begins in early to mid-July. In early fall, the leaves of the plant dry to a silvery-grey skeleton with cottony-white terminal seedheads. Seeds of the plant can remain viable in the soil for a few years.

Yellow starthistle is poisonous to horses. When ingested, the plant causes a neurological disorder called equine nigropallidal encephalomalacia or chewing disorder. If horses continue to feed on yellow starthistle, brain lesions and mycosal ulcers in the mouth may form which eventually leads to death.

History of Introduction: Yellow starthistle is native to the Mediterranean region of Europe. Yellow starthistle was first introduced into North America during the mid-to late 1800s, as a contaminate in alfalfa seeds shipped to California. In North Dakota, the plant was first collected in Grand Forks County in 1964. North Dakota infestations have been eradicated in Kidder, Mountrail, Williams, LaMoure, and Ransom counties.

Effects of Invasion: Yellow starthistle is adapted to a wide variety of environments and has the ability to out-compete desirable, native plant species for nutrients and moisture. As a result, plant diversity and native wildlife habitats are reduced. Dense stands of yellow starthistle can drastically reduce forage production and grazing capacity in rangelands. Overgrazing can cause livestock and wildlife to feed on and be injured by the spiny portions of yellow starthistle. Cropland yields are also reduced by the plant.

Control:

Management objectives for yellow starthistle control should involve periodic monitoring of populations and preventing seed production. Seeds of yellow starthistle can remain viable in the soil for a few years, therefore, particular attention is required for several consecutive growing seasons to prevent germination of new plants. Control methods should be combined into an integrated management system for the best long-term control of the plant.

Mechanical - Hand-pulling can be an effective means of controlling yellow starthistle if conducted prior to seed production and dispersal. Hand-pulling is most effective for newly discovered infestations. Cultivation practices that sever the roots below the soil surface may provide complete control of the plants. Tillage should be conducted before viable seeds are produced and dispersed, and should be repeated to deplete the seed bank. Generally, mowing is not effective for controlling yellow starthistle because plants may tend to grow more prostrate to escape cuttings. However, mowing can stress the plant population if mowed during the early flowering growth stage. In northern California, areas were mowed once at the early flowering stage, and again four to six weeks later after regrowth during the floral bud stage. Yellow starthistle seed production, canopy size, and plant densities were reduced. Prescribed burning can be effective for yellow starthistle control. In California, prescribed burns were conducted in late June to early July prior to yellow starthistle seed production but following seed dispersal and senescence of desirable grasses and forbs. Three consecutive years of burning reduced seedling density, summer vegetative cover, and the yellow starthistle seed bank. Prescribed burns do not affect the soil seed bank of the plant, therefore repeated burns are more effective.

Chemical - Yellow starthistle can be controlled using various herbicides, including 2,4-D, dicamba, picloram, clopyralid, and glyphosate. Dicamba and 2,4-D can be applied from the rosette or bud to bloom stage of the plant. Clopyralid plus 2,4-D can be applied from bud to bloom stage or in the fall. Clopyralid plus triclopyr and picloram can be applied in the rosette stage or bud to bloom stage.

Glyphosate is best applied to yellow starthistle in bud to bloom stage and imazapic should be applied in fall during the rosette growth stage.

Contact your local county extension agent for recommended use rates, locations, and timing.

Biological - Three weevils, *Bangasternus orientalis*, *Eustenopus villosus*, *Larinus curtus*, and three flies, *Chaetorellia australis*, *Urophora sirunaseva*, *Urophora jaculata*, have been released on yellow starthistle in Canada and the Pacific Northwest. Larvae of the insects feed on the flower heads of the plant.

One pathogen has been widely examined for yellow starthistle control. The Mediterranean rust fungus, *Puccinia jaceae*, attacks the leaves and stems of the plant. This stress to the plant causes a reduction in flower head and seed production.

Yellow starthistle can be grazed prior to spine development. Grazing by cattle and sheep can suppress the plant, but is dependent upon grazing intensity and frequency. In California, yellow starthistle control was achieved by using cattle to graze infestations in the bolting, pre-spiny stage, followed by 1 to 3 additional grazings to remove regrowth. Grazing may need to be continued and repeated for at least three years to reduce the yellow starthistle seed bank.

References:

- DiTomaso, J. 2001. Element stewardship abstract: *Centaurea solstitialis* L. In: Weeds on the web: The Nature Conservancy wildland invasive species program, [Online]. Available: <http://tncweeds.ucdavis.edu/esadocs/documnts/centsols.html> (February 2005).
- DiTomaso, J. M., G. B. Kyser, and M. S. Hastings. 1999. Prescribed burning for control of yellow starthistle (*Centaurea solstitialis*) and enhanced native plant diversity. *Weed Sci.* 47:233-242.
- Lym, R. G. 2002. Yellow starthistle (*Centaurea solstitialis*) identification and control. North Dakota State Univ. Ext. Ser. Circ. W-1222. Fargo, ND.
- Kyser, G. B. 2002. Instability in a grassland community after the control of yellow starthistle (*Centaurea solstitialis*) with prescribed burning. *Weed Sci.* 50:648-657.
- Maddox, D. M., A. Mayfield, and N. H. Poritz. 1985. Distribution of yellow starthistle (*Centaurea solstitialis*) and Russian knapweed (*Centaurea repens*). *Weed Sci.* 33:315-327.
- Roche', B. F. Jr., and C. T. Roche'. 1991. Identification, introduction, distribution, ecology, and economics of centaurea species. p. 274-291 In L. F. James, J. O. Evans, M. H. Ralphs, and R. D. Child. *Noxious Range Weeds*. Boulder, CO: Westview Press.
- Sheley, R. L., L. L. Larson, and J. S. Jacobs. 1999. Yellow starthistle. p. 408-416 In R. L. Sheley and J. K. Petroff. *Biology and management of noxious rangeland weeds*. Corvallis, OR: Oregon State University Press.
- Shinn, S. L. and D. C. Thill. 2003. The response of yellow starthistle (*Centaurea solstitialis*), spotted knapweed (*Centaurea maculosa*), and meadow hawkweed (*Hieracium caespitosum*) to imazapic. *Weed Technol.* 17(1):94-101.

Whitson, T. D., editor. 2000. Weeds of the West 9th Ed. Western Society of Weed Science, Newark, CA 94560. 630pp.

Zouhar, K. 2002. *Centaurea solstitialis*. In: Fire Effects Information System, [Online]. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis> (February 2005).

Yellow starthistle and winged stems photographs courtesy of North Dakota State University, NDSU Extension Service.

Rosette photograph courtesy of Stevens County Noxious Weed Control Board, Washington.

Flower head photograph courtesy of Washington State Noxious Weed Control Board.