

# Houndstongue

## *Cynoglossum officinale*

**Family:** *Boraginaceae* (Borage)

**Other Names:** hound's tongue, dog bur, gypsy flower

**USDA Code:** CYOF

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Biennial or short-lived perennial forb.

**Flower:** Flowers are reddish-purple, with five petals, arranged in panicles in the upper leaf axils.

**Seeds/Fruit:** The fruit is composed of four prickly nutlets each about 1/3 inch long (Whitson et al. 1996).

**Leaves:** Leaves are alternate, 1-12 inches long, 1-3 inches wide, rough, hairy, and lacking teeth or lobes (Whitson et al. 1996). Leaves often appear dusty and insect-ridden. Basal leaves are elliptical to oblanceolate and tapered at the base.

**Stems:** Houndstongue produces a single flowering stem. The stem is erect, stout, heavy, 1.5 to 3 feet high and usually branched above.

**Roots:** Houndstongue has a thick, black, woody taproot.

**Seedling:** Houndstongue forms a rosette the first year of its life cycle.

### Similar Species

**Exotics:** Rosettes may resemble burdock.

**Natives:** If not flowering, could be mistaken for members of the *Hackelia* or *Lappula* genus (stickseeds).

### Impacts

**Agricultural:** Houndstongue contains toxic alkaloids that stop liver cells from reproducing. Therefore, houndstongue reduces livestock and wildlife forage and grazing animals should be kept away from houndstongue infested areas. Animals may live six or more months after eating a lethal dose of houndstongue. Sheep are more resistant to houndstongue poisoning than cattle or horses. The burs may reduce the value of wool.

**Ecological:** Houndstongue is an early successional species on recently disturbed sites.

**Human:** Due to its toxicity to grazing animals, houndstongue should not be eaten by humans.

### Habitat and Distribution

**General requirements:** Houndstongue prefers areas with more than 10% bare ground (Butterfield et al. 1996), and is common on gravelly, alkaline soils (Stubbendieck et al. 1995).

**Distribution:** Houndstongue is found over much of North America. It grows on rangeland, pastures, abandoned cropland, roadsides, and waste places (Butterfield et al. 1996). Houndstongue is found on rangeland, pastures, and roadsides throughout Colorado up to about 9000 feet.

### Keys to Identification:

- Five-petaled reddish-purple flowers in panicles.
- Prickly nutlets are distinctive.



**Historical:** Houndstongue is a native of Eurasia that was introduced to North America as a contaminant in agricultural seed.

**Biology/Ecology**

**Life cycle:** Houndstongue is a biennial that produces a rosette the first year. During the second year a flowering stem bolts and produces fruit.

**Mode of reproduction:** Reproduces solely by seed.

**Seed production:** Mature plants can produce up to 2,000 seeds (Butterfield et al. 1996).

**Seed bank:** Seeds remaining on the parent plant may remain viable for 2-3 years. Buried seed rarely survive more than one year (Butterfield et al. 1996).

**Dispersal:** Seeds stick to clothing and animals and have the ability to be spread great distances.

**Hybridization:** No information available.

**Control**

**Biocontrol:** None known.

**Mechanical:** Mowing second year plants during flowering but before seed maturation reduces seed production and may kill the plant.

**Fire:** No information available.

**Herbicides:** Picloram at 0.25-0.5 lb., 2,4-D, or dicamba at 1.0 lb., or metsulfuron at 0.6 oz. ai/acre applied in spring provides control of houndstongue. Spring treatments with picloram, dicamba, or metsulfuron are more effective than fall treatments (Sebastian and Beck 1995). Chlorsulfuron applied 0.5 lb. ai/ac gave complete control when applied any time beginning with the rosette stage until the bolted plant had attained 10 inches in height (Butterfield et al. 1996).

**Cultural/Preventive:** Maintaining a healthy population of native perennials the best way to prevent the establishment and spread of houndstongue.

**Keys to Control:**

- Eliminate seed production.
- Re-seed controlled areas with desirable species.

**Integrated Management Summary**

Houndstongue is poor competitor with native perennials and requires disturbed or bare areas to establish. Once established, houndstongue quickly forms dense monocultures. Treat first year plants with herbicides. Mow bolted plants to eliminate seed production. Repeat this process for several years to exhaust the seed bank. It is imperative to establish a healthy population of native perennials on treated areas to prevent the re-establishment of houndstongue or other noxious weeds.

**References**

Butterfield, C., J. Stubbendieck, and J. Stumpf. 1996. Species abstracts of highly disruptive exotic plants. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/othrdata/exoticab/exoticab.htm> [Version 16 Jul 97].

Sebastian, J.R. and K.G. Beck. 1995. Houndstongue control on Colorado rangeland with spring- or fall-applied herbicides. Res. Prog. Rep. Wes. Soc. Weed Sci. pp. 11-12.

Stubbendieck, J., G.Y. Friisoe and M.R. Bolick. 1995. Houndstongue. *Weeds of Nebraska and the Great Plains*. Nebraska Department of Agriculture, Bureau of Plant Industry, Lincoln, NE.

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Houndstongue. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Wild mustard

*Brassica kabera* (DC.) L.C. Wheeler; *Sinapis arvensis* L.

**Family:** *Brassicaceae* (Mustard)

**Other Names:** charlock mustard, kabera mustard

**USDA Code:** BRKA, SIAR4

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Annual or winter annual forb.

**Flower:** Flowers are 0.5 inches in diameter, yellow, with four petals. Flowers are borne in small terminal clusters.

**Seeds/Fruit:** Seedpods are smooth, 1.25-2 inches long, and have a constricted beak that often includes the uppermost seed. Seeds are small, smooth and round, black to purplish-brown (Stubbenieck et al. 1995).

**Leaves:** Leaves are alternate, 2-8 inches long and 1-4 inches wide. Lower leaves are deeply lobed, and upper leaves are merely toothed and may be short stalked or stalkless.

**Stems:** Mature plants are 1-3 feet tall. Stems are erect and branched near the top. The lower stems are coarsely hairy.

**Roots:** Shallow taproot.

**Seedling:** Seed leaves (cotyledons) are kidney-shaped and smooth. True leaves are alternate and hairy and vary considerably in size and shape. The stem is also hairy, especially near base (Carey et al. 1993).

### Similar Species

**Exotics:** None known.

**Natives:** White mustard (*B. hirta* Moench) resembles wild mustard, except that the pods of white mustard are covered with coarse hairs.

### Impacts

**Agricultural:** Wild mustard can invade grain and other field crops as well as disturbed areas. It can reduce crop yields, lower the value of the crop, and reduce livestock forage production in rangeland.

**Ecological:** No information available.

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Wild mustard is commonly found in crops, along roadsides, cultivated fields, ditchbanks, and waste areas.

**Distribution:** Found throughout the United States

**Historical:** Wild mustard is native to Europe.

### Biology/Ecology

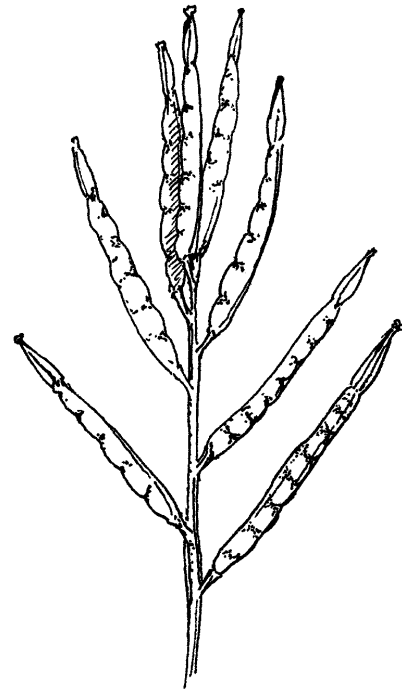
**Life cycle:** Wild mustard is self-incompatible and relies on insects for pollination (Kunin 1997). Wild mustard flowers from June through October.

**Mode of reproduction:** Reproduces by seed.

**Seed production:** Each plant produces 2,000-3,500 seeds.

### Keys to Identification:

- The seed pod beak of wild mustard is 0.3-0.6 inches long, obviously flattened, and each half has 3-5 prominent lengthwise veins.
- White mustard (*B. hirta* Moench) resembles wild mustard, except that the pods of white mustard are covered with coarse hairs.



Fruits

**Seed bank:** Seeds may remain viable in the soil for several years.

**Dispersal:** No information available.

**Hybridization:** No information available.

### Control

**Biocontrol:** None known.

**Mechanical:** Cut or pull plants before seed set.

**Fire:** No information available.

**Herbicides:** Metsulfuron is the preferred herbicide. In non-crop situations, wild mustard can be controlled by applying 2,4-D, or dicamba at 1 lb. ai/acre, or glyphosate at 1.5 lb. ai/acre in the early spring before the plants bolt. A combination of 2,4-D and dicamba is also effective (Durgan et al. 1997).

**Cultural/Preventive:** In heavily infested crop fields, changing the crop rotation will help decrease wild mustard populations. In late spring crops, wild mustard must be killed before planting through tillage or a contact herbicide.

### Keys to Control:

- Eliminate seed production and destroy new seedlings that emerge.
- Re-seed controlled areas with desirable species.

### Integrated Management Summary

As with other annual plants which reproduce by seeds, wild mustard can be controlled by eliminating seed production until the soil seed bank is depleted. Cut/pull or treat plants with herbicide prior to seed set. Prevent the establishment of new infestations by minimizing disturbance and seed dispersal.

### References

- Carey, J. Boyd, James J. Kells, and Karen A. Renner. 1993. Common Weed Seedlings of Michigan. Department of Crop and Soil Sciences Michigan State University Extension. Bulletin E-1363. <http://www.msue.msu.edu/msue/iac/e1363/e1363.htm> [27 Oct 99].
- Durgan, B.R., J.P. Yenish, R.J. Daml, and D.W. Miller. 1997. Broadleaf weed control in hard spring wheat (*Triticum aestivum*) with F8426. *Weed Technology* 11:489-495.
- Kunin, W.E. 1997. Population size and density effects in pollination: pollinator foraging and plant reproductive success in experimental arrays of *Brassica kaber*. *Journal of Ecology* 85:225-234.
- Stubbendieck, J., G.Y. Friisoe and M.R. Bolick. 1995. Wild mustard. *Weeds of Nebraska and the Great Plains*. Nebraska Department of Agriculture, Bureau of Plant Industry, Lincoln, NE.
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Wild mustard. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

=List B

## Whitetop/Hoary cress

*Cardaria draba* (L.) Desv.

**Family:** *Brassicaceae* (Mustard)

**Other Names:** heart-podded hoary cress, pepperweed, whitetop

**USDA Code:** CADR

**Legal Status:** Colorado Noxious List B (top ten worst)

### Identification

**Growth form:** Perennial forb.

**Flower:** Numerous white flowers with four petals, give the plant a white, flat-topped appearance.

**Seeds/Fruit:** Seed capsules are heart shaped, and contain two reddish-brown seeds.

**Leaves:** Leaves are alternate, 1.6-4 inches long, blue green in color, and lance-shaped. Lower leaves are stalked, while the upper leaves have two lobes clasping the stem.

**Stems:** Mature hoary cress plants are up to two feet tall with erect stems.

**Roots:** Roots are rhizomatous and usually occur at depth of 29-32 inches, but have been recorded to penetrate to a depth of 30 feet in the Pacific Northwest (FEIS 1996).

**Seedling:** No information available.

### Similar Species

**Exotics:** Two other closely related species, *Cardaria pubescens* and *Cardaria chalapensis* are designated as noxious weeds in some states (Sheley and Stivers 1999).

**Natives:** Rosettes of gumweed (*Grindelia squarrosa*) are similar, and are found in similar habitat.

### Impacts

**Agricultural:** Hoary cress is generally considered unpalatable to livestock.

**Ecological:** Hoary cress is invading rangelands throughout North America. It is a highly competitive weed once it becomes established. Hoary cress spreads primarily by extremely persistent roots and will eventually eliminate desirable vegetation and become a monoculture.

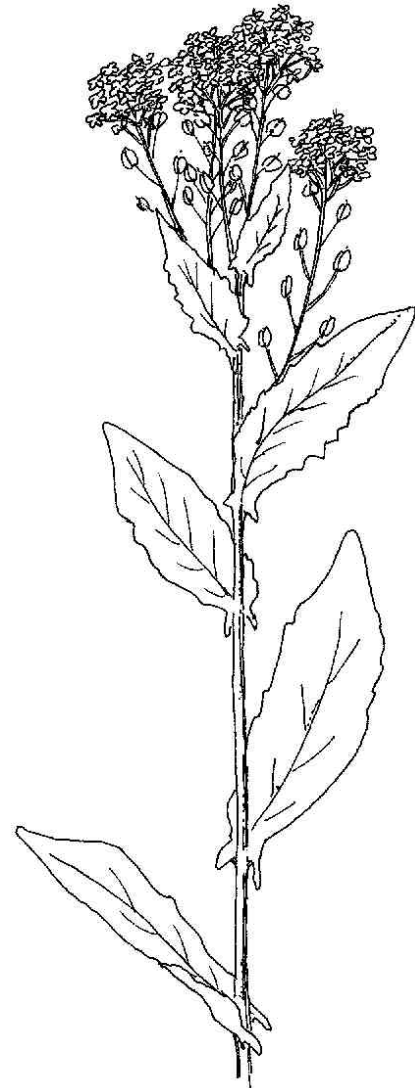
**Human:** No information available.

### Habitat and Distribution

**General requirements:** Hoary cress is typically found on generally open, unshaded, disturbed ground. Hoary cress grows well on alkaline soils that are wet in late spring and generally does better in areas with moderate amounts of rainfall. It is widespread in fields, waste places, meadows, pastures, croplands, and along roadsides (FEIS 1996). Hoary cress is commonly found in saltcedar (*Tamarix* spp.), antelope bitterbrush / rough fescue (*Purshia tridentata* / *Festuca scabrella*), antelope bitterbrush / bluebunch wheatgrass (*Pseudoroegneria spicata*),

### Keys to Identification:

- Whitetop can be easily identified by the clusters of numerous, four-petaled, white flowers that give it a flat-topped appearance.



big sagebrush (*Artemisia tridentata* spp.), and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) communities (FEIS 1996).

**Distribution:** It is widespread in the United States except along the southern boundary of the western and south-central states (USDA 1971). In Colorado, hoary cress is commonly found at elevations of 3,500 to 8,500 feet.

**Historical:** Hoary cress is a weed of Eurasian origin.

### **Biology/Ecology**

**Life cycle:** The root system of hoary cress consists of vertical and horizontal roots from which new rosettes and flowering shoots arise (Mulligan and Findlay 1974). Plants emerge in very early spring. The first leaves appear aboveground 5 to 6 weeks after planting (Mulligan and Findlay 1974, FEIS 1996). During this period, the first leaves emerge and form a loose rosette (Mulligan and Findlay 1974, FEIS 1996). Stems arise from the center of each rosette in late April (FEIS 1996). Plants flower from May to June, are self-incompatible, and are pollinated by insects. Hoary cress plants set seed by mid-summer (Whitson et al. 1996). If conditions are favorable, a second crop of seeds can be produced in the fall (Sheley and Stivers 1999).

**Mode of reproduction:** Reproduces both by seeds and vegetatively. Hoary cress spreads vigorously by creeping roots (FEIS 1996). Within three weeks of germination, a seedling root can begin producing buds (FEIS 1996). One plant can eventually result in a large colony and push out other vegetation to form a hoary cress monoculture.

**Seed production:** One plant can produce from 1,200-4,800 seeds.

**Seed bank:** 84% of seed produced are viable the first season (Mulligan and Findlay 1974, FEIS 1996). Buried seeds can remain viable for three years in the soil (Sheley and Stivers 1999).

**Dispersal:** No information available.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** Currently, there is little information about biological controls that attack hoary cress. Sheep grazing may control whitetop, but evidence is limited. Managing the grazing is important so desirable plant species are not damaged.

**Mechanical:** Mowing 2-3 times a year for several years may slow the spread and reduce seed production of hoary cress. Mowing may increase the effectiveness of subsequent herbicide application (Sheley and Stivers 1999). Mowing should be conducted during the bud stage and repeated when the plants re-bud. The effectiveness of a mowing program can be increased by planting perennial grasses as competitors.

**Fire:** Rapid growth rate may favor hoary cress after fires which temporarily eliminate native vegetation. Plants may sprout from rhizomes or establish from seeds (FEIS 1996).

**Herbicides:** Hoary cress is most commonly controlled with herbicides. However, multiple applications are usually needed to provide lasting control. The best time to apply herbicides is in May or June before flowering. The non-crop herbicides metsulfuron and chlorsulfuron are the most effective herbicides as long as the plants still have green tissue (CSU 1998a). It is important to use a non-ionic surfactant with the herbicide (Sheley and Stivers 1999). 2,4-D + dicamba is very effective when applied during the early pre-bud stage (late May through early June) (CSU 1998a). Glyphosate at 1.5 lb. ai/acre applied during the flower stage will provide good control of hoary cress. Picloram does not control whitetop. Also, spraying followed by spring mowing can control hoary cress by up to 90% (FEIS 1996).

**Cultural/Preventive:** Cultivation alone will control hoary cress when tillage begins at flowerbud stage and is repeated every ten days throughout the growing season (FEIS 1996). Reseeding of depleted areas with competitive grasses would probably be an effective complement to sheep grazing. Also, nitrogen fertilization can increase the growth of grasses and slow the rate of whitetop invasion (Sheley and Stivers 1999).

### **Integrated Management Summary**

Hoary cress is an aggressive weed since it reproduces both from seed and vegetatively. It can crowd out desirable species and form a hoary cress monoculture. In the absence of a competitor, a single plant can spread over an area 12 feet in diameter in a single year (FEIS 1996). Hoary cress is commonly controlled with herbicides and less commonly controlled by mowing. Control of hoary cress is difficult because of the perennial root system, abundant seed production, and diverse habitats of the plant (FEIS 1996).

#### **Keys to Control:**

- Exhaust the root system and eliminate seed production by mowing or treating with herbicides.
- Maintain a healthy cover of perennial plants to discourage the establishment and spread of hoary cress.

**References**

- FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].
- CSU Cooperative Extension. 1998a. *Whitetop*. Weeds in Northwest Colorado. Colorado State University Cooperative Extension. <http://www.yampa.com/Routt/CSU/nwcoloweeds.html> [11 Nov 98].
- CSU Cooperative Extension. 1998b. *Whitetop*. Colorado State University Cooperative Extension TriRiver Area. <http://www.colostate.edu/Depts/CoopExt/TRA/whtop.html> [11 Nov 98].
- Mulligan, G.A., and J.N. Findlay. 1974. The biology of Canadian weeds. 3. *Cardaria draba*, *C. chalapensis*, and *C. pubescens*. *Canadian Journal of Plant Science*. 54: 149-160.
- Sheley, R.L. and J. Stivers. 1999. *Whitetop*. In R.L. Sheley and J.K. Petroff, eds. *Biology and Management of Noxious Rangeland Weeds*. Oregon State University Press, Corvallis, OR.
- U.S. Department of Agriculture, Agricultural Research Service. 1971. *Common weeds of the United States*. Dover Publications, Inc., New York.
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. *Hoary cress. Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Blue mustard

*Chorispora tenella* (Pallas) DC.

**Family:** *Brassicaceae* (Mustard)

**Other Names:** tenella mustard, purple mustard, cross flower, bean-podded mustard

**USDA Code:** CHTE2

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Winter annual forb.

**Flower:** Flowers are small, bluish-purple, have four petals, and are connected by a stalk to a rough central stem.

**Seeds/Fruit:** Fruits have a conspicuous beak, about one-third the length of the pod. These fruits break apart transversely into numerous two-seeded sections instead of splitting longitudinally as with most mustards. Seeds are rectangular, with one flat side and one rounded side (Stubbendieck et al. 1995)

**Leaves:** Leaves are alternate and oblanceolate, with wavy or coarsely-toothed margins, and are partially covered with minute, gland-tipped hairs.

**Stems:** Mature plants are between 6-18 inches tall with branches that spread mainly from the base. Stems are partially covered with minute, gland-tipped hairs.

**Roots:** Shallow taproot.

**Seedling:** Seedlings form rosettes with deeply lobed leaves.

**Other:** Foliage has a disagreeable odor.

### Similar Species

**Exotics:** None known.

**Natives:** None known.

### Impacts

**Agricultural:** Blue mustard invades waste areas and cultivated lands, reducing crop yields and affecting crop quality (Whitson et al. 1996).

Blue mustard is a problem in winter annual crops, such as winter wheat (Klein et al. 1985). Blue mustard gives off a disagreeable odor (like stale dishrags) and dairy animals eating it may produce off-flavor milk.

**Ecological:** No information available.

**Human:** None known.

### Habitat and Distribution

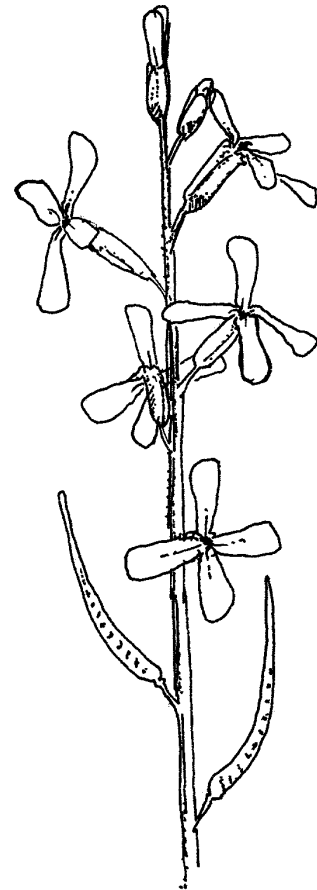
**General requirements:** Blue mustard is commonly found in dry areas such as grain fields, along roadsides, right-of-ways and waste areas. It can tolerate a wide range of environmental conditions and soils.

**Distribution:** Found throughout Colorado and the western United States. In years with favorable precipitation, blue mustard can be abundant on shale badlands in western Colorado.

**Historical:** Blue mustard was first introduced into the U.S. from Siberia in 1929 (Klein et al. 1985). Since then, it has spread and become a problem in wheat and alfalfa crops.

### Keys to Identification:

- Blue mustard is one of the first plants to flower in the early spring.
- Flowers are small, bluish-purple, have four petals, and are connected by a stalk to a rough central stem.
- The clustered green foliage smells like stale dishrags.





### **Biology/Ecology**

**Life cycle:** Blue mustard seeds germinate in late summer and fall. The plant overwinters as a rosette. The flower stalks usually bolt in March. Flowers appear in early April and viable seeds can be produced approximately 10 days after bloom (Klein et al. 1985).

**Mode of reproduction:** Seeds.

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** None known

**Mechanical:** Small infestations can be pulled. Plants are easy to pull in the spring before they flower and when soils are usually soft and moist.

**Fire:** No information available.

**Herbicides:** Metsulfuron provides excellent control. In non-crop situations blue mustard can be controlled by applying dicamba or 2,4-D at 1 lb. ai/acre, or glyphosate at 1.5 lb.

ai/acre in the early spring before the plants bolt. Sulfometuron, chlorsulfuron, or a combination of 2,4-D and dicamba can also provide effective control (Klein et al. 1985).

**Cultural/Preventive:** In heavily infested crop fields, changing the crop rotation will help decrease the blue mustard population (Klein et al. 1985). In late spring crops, blue mustard must be killed before planting through tillage or a contact herbicide (Klein et al. 1985).

#### **Keys to Control:**

- Blue mustard plants must be killed before they produce seeds.
- The best time to spray blue mustard is in the rosette stage (late February to mid-March)

### **Integrated Management Summary**

Controlling the weed is problematic as the plant flowers early and herbicides are often applied too late to be effective. As with other annual plants which reproduce by seeds, blue mustard should be controlled by eliminating seed production until the soil seed bank is depleted. Cut/pull or treat plants with herbicide prior to seed set.

### **References**

Klein, R.N., Lyon D.J., and G.A. Wicks. 1985. Blue mustard control. NebGuide G95-1272-A. Cooperative Extension, University of Nebraska Institute of Agriculture and Natural Resources. <http://ianrwww.unl.edu/pubs/weeds/g1272.htm> [26 Feb 99].

Stubbendieck, J., G.Y. Friisoe, M.R. Bolick. 1995. Blue mustard. *Weeds of Nebraska and the Great Plains*. Nebraska Department of Agriculture, Bureau of Plant Industry, Lincoln, NE.

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Blue mustard. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

# Flixweed

## *Descurainia sophia*

**Family:** *Brassicaceae* (Mustard)

**Other Names:** flixweed tansymustard, herb-sophia, fine-leaved hedge mustard

**USDA Code:** DESO2

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Winter annual forb.

**Flower:** Flowers grow in racemes, which lengthen when in fruit. These racemes may grow up to one half the total height of the plant (FEIS 1996). The petals are yellow to greenish yellow and very small.

**Seeds/Fruit:** Seeds are borne in linear pods that are between 0.75-1 inches long.

**Leaves:** Leaves are alternate, 2-3 times pinnately compound.

**Stems:** Mature plants are 8-24 inches tall.

**Roots:** Flixweed has a slender taproot.

**Seedling:** Narrow, stalked seed leaves (cotyledons).

### Similar Species

**Exotics:** None known.

**Natives:** Tansymustard (*Descurainia pinnata*) is easily confused with flixweed, but has leaves which are only 1-2 times compound.

### Impacts

**Agricultural:** In cultivated areas, flixweed can crowd out crop plants and reduce yields (Mitich 1996). In Colorado, it is becoming an increasing problem in alfalfa fields.

**Ecological:** As an introduced species, flixweed has spread very rapidly across portions of the intermountain west (Morishita 1991). Flixweed tends to establish on disturbed soils such as roadsides and move into fields and rangeland.

**Human:** No information available.

### Habitat and Distribution

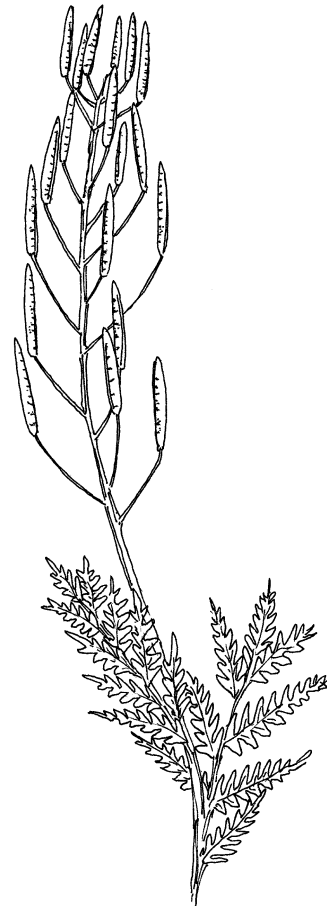
**General requirements:** Flixweed is found growing in wastelands, fields, roadsides, and other disturbed sites. Flixweed grows on a wide variety of soil types but it is most abundant on dry, disturbed sites. It is often found along roadsides and ditches where mineral soil has been exposed (FEIS 1996). Another species that is commonly associated with flixweed is field pennycress (*Thlaspi arvense*) (Mitich 1996).

**Distribution:** Common throughout North America. In Colorado, flixweed most often occurs in elevations between 3,500-10,800 feet (FEIS 1996).

**Historical:** Introduced from Europe.

### Keys to Identification:

- Flixweed can be distinguished from other mustards by its finely dissected leaves and glandular hairs.
- Flixweed fruits are narrow and over ¾ inch long, while the fruits of native tansy mustards are shorter and relatively plump.
- Flixweed's lower leaves are 2-3 times compound while native tansy mustards are 1-2 times compound.



plant in fruit

### **Biology/Ecology**

**Life cycle:** Flixweed is an early-blooming winter annual or biennial, and is one of the first weeds to appear in the spring. Flowering occurs from March through July depending on geographic location. Flixweed spreads by seeds from early to late summer.

**Mode of reproduction:** Flixweed reproduces by producing an abundance of minute seed (FEIS 1996).

**Seed production:** Large plants can produce as many as 700,000 seeds (Rutledge and McLendon 1998).

**Seed bank:** The seeds can remain viable for up to three years (Morishita 1991).

**Dispersal:** Seeds are mucilaginous when wet, which may facilitate dispersal by animals or increase adherence to soil particles (FEIS 1996).

**Hybridization:** No information available.

### **Control**

**Biocontrol:** There are no specific biological control organisms reported for flixweed.

**Mechanical:** Flixweed can be mechanically controlled through cultivation or hand pulling in the fall or early spring as long as the rosettes are small.

**Fire:** Plants are killed by fire at all stages, but seeds readily colonize burned areas (FEIS 1996).

**Herbicides:** 2,4-D 1 lb. ai/acre will provide control of flixweed.

Metsulfuron methyl and chlorsulfuron have also been used to control flixweed (Morishita 1991). Herbicides should be applied during seedling growth stage for effective control (Whitson et al. 1996).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

#### **Keys to Control:**

- Maintain a good cover of perennial plants to prevent flixweed establishment.
- Avoid overgrazing livestock.
- Control flixweed plants before they set seed.

### **Integrated Management Summary**

Flixweed is an early seral species, which quickly invades areas of exposed mineral soil with reduced plant cover. It can survive in dense stands for a few years if undisturbed, but is generally replaced by cheatgrass (*Bromus tectorum*) or other species (FEIS 1996). In later seral stages, flixweed competes poorly with perennial grasses and forbs. Land management practices which maintain healthy grass communities will prevent the spread of flixweed. As with other annual plants which reproduce by seeds, flixweed can be controlled by eliminating seed production until the soil seed bank is depleted. Cut/pull or treat plants with herbicide prior to seed set.

### **References**

- FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].
- Mitich, L.W. 1996. Intriguing world of weeds, flixweed (*Descurainia sophia*). *Weed Technology* 10:974-977.
- Morishita, D.W. 1991. Dalmatian toadflax, yellow toadflax, black henbane, and tansymustard: Importance, distribution, and control. In L.F James, J.O. Evans, M.H. Ralphs and R.D. Child, eds. *Noxious Range Weeds*. Westview Press, Boulder, CO.
- Rutledge, C. R. and T. McLendon. No Year. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97pp. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> [Version 15 Dec 98].
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Flixweed. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Dame's rocket

*Hesperis matronalis* L. ssp. *cladotricha* (Borbas) Hayek

**Family:** *Brassicaceae* (Mustard)

**Other Names:** damesrocket, sweet rocket, dame's violet

**USDA Code:** HEMA3

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Biennial or short-lived perennial forb.

**Flower:** Flowers are white or purple with four petals. Flowers are clustered in loose terminal stalks.

**Seeds/Fruit:** Fruits are many seeded, long and narrow and approximately cylindrical. Seeds are small (3-4 mm long), angular, grooved and dark reddish-brown (Stubbenieck et al. 1995).

**Leaves:** Leaves are alternate, 2-4 inches long, lance-shaped, with finely toothed margins.

**Stems:** Mature plants range from 4 inches to 3 feet in height.

**Roots:** Shallow fibrous root system.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** Flower color and scent distinguish this species from native mustards.

### Impacts

**Agricultural:** No information available.

**Ecological:** Dame's rocket is commonly planted as an ornamental, but quickly escapes cultivation because of its prolific seed production (Wisconsin DNR 1998). It is thought to be a limited invasive species that will readily invade disturbed ground but is rarely found in undisturbed areas.

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Dame's rocket prefers moist soils that have a pH range of 6-7.5. It is commonly found in gardens, partly shaded woodlands, ditches, and other areas that have moist soils and light shade (Perry 1997). Dame's rocket is often found along roadsides, pastures, rangelands, thickets and open woods.

**Distribution:** Found throughout the northern United States. In Colorado it is found up to 8100+ feet, and has been reported from Adams, Boulder, Gunnison, Larimer, Pitkin and San Miguel counties. It is likely to be found elsewhere also.

**Historical:** Dame's rocket is native to Eurasia and is sold as a garden ornamental. Part of its success can be attributed to its wide distribution in "wildflower" seed mixes (Wisconsin DNR 1998). Dame's rocket is

### Keys to Identification:

- Dame's rocket can be identified by its white or purple flowers on 3-foot long stems, and sweet fragrance.



not widely recognized as an invasive species. Consequently, it may not be recognized as a problem until it is well established (Wisconsin DNR 1998).

**Biology/Ecology**

**Life cycle:** Dame's rocket generally produces a basal rosette the first year, and flowers the following year. The plants are prolific bloomers and produce large quantities of seed from May through July. Individual plants may have several clusters of flowers at various stages of development, enabling the plant to produce both flowers and seeds at the same time (Wisconsin DNR 1998).

**Mode of reproduction:** Reproduces by seeds.

**Seed production:** Produces large quantities of seed.

**Seed bank:** The majority of the seeds will germinate the following year, but some seeds may remain dormant for several years.

**Dispersal:** No information available.

**Hybridization:** No information available.

**Control**

**Biocontrol:** None known.

**Mechanical:** Dame's rocket infestations can be controlled by pulling or cutting the flower heads after they bloom, but prior to seed dispersal (Wisconsin DNR 1998). This process may have to be repeated for several years to control an infestation. Removed plants should be put in plastic bags or burned to eliminate seed spread.

**Fire:** Burning can control dame's rocket where there is sufficient litter for fuel. However, reseeding with desirable species is necessary to avoid a re-infestation of dame's rocket or other weeds.

**Herbicides:** Glyphosate at 1.5 lb. ai/acre can be applied to seedlings for effective control. Applications should be made in the fall when the rosettes are still green.

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal. Do not use commercial "wildflower" mixes which may contain seeds of this species.

**Keys to Control:**

- Maintain a healthy cover of native perennials.
- Locate and remove plants before seed set.

**Integrated Management Summary**

Locating and removing plants immediately before seed set is the best way to prevent the spread of dame's rocket. The shallow root system of this species is likely to be conducive to control by mechanical methods such as hand pulling. As with other plants which reproduce solely by seed, integrated management efforts must include the elimination of seed production and the depletion of the seed bank. Combine herbicide or mechanical removal of rosettes with removal of seed heads from any plants that have bolted.

**References**

Wisconsin DNR. 1998. Dame's Rocket, (*Hesperis matronalis*). Exotic species factsheet. Wisconsin Department of Natural Resources. <http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/dames.htm> [13 Dec 99]

Perry, Leonard.1997. *Hesperis matronalis*, Plant lecture list for PSS 123. University of Vermont. <http://pss.uvm.edu/pss123/wmhesp.html> [2 Feb 99].

Stubbendieck, J., G.Y. Friisoe and M.R. Bolick. 1995. Damesrocket. *Weeds of Nebraska and the Great Plains*. Nebraska Department of Agriculture, Bureau of Plant Industry, Lincoln, NE.

## Dyer's woad

*Isatis tinctoria* L.

**Family:** *Brassicaceae* (Mustard)

**Other Names:** woad

**USDA Code:** ISTI

**Legal Status:** Colorado Noxious List C (new in Colorado – call your county weed supervisor!)

### Identification

**Growth form:** Winter annual, biennial, or short-lived perennial forb.

**Flower:** Flowers are bright yellow and clustered.

**Seeds/Fruit:** Seedpods are black or purplish-brown, one-celled, with a single seed.

**Leaves:** There are two types of leaves, basal and stem. The basal rosette leaves are 3-4 in, oblong, lance-shaped, and connected to the stem by a petiole. The upper stem leaves are simple, alternate, bluish-green, with a whitish nerve on the upper surface of the blade. These leaves clasp the stem with ear-like projections, and decrease in size toward the top of the stem. All leaves have a slight pubescence and are nearly entire, but occasionally toothed (Evans 1991).

**Stems:** Mature plants are 12-48 inches tall.

**Roots:** It has a thick taproot that may exceed five feet in length.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** Fruits help distinguish this species from native mustards.

### Impacts

**Agricultural:** Dyer's woad reduces forage production in crop and rangelands.

**Ecological:** Dyer's woad is an aggressive weed that infests disturbed and undisturbed sites and then spreads outward into crops and rangeland (Whitson et al. 1996). The BLM projects that infestations of dyer's woad increase 14% annually, and the Forest Service believes that it has increased several fold on Intermountain forests during the past three decades (Evans 1991). There is some evidence that dyer's woad produces allelopathic chemicals.

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Dyer's woad appears to be well adapted to the physical and environmental conditions of the Intermountain states (Evans 1991). It is especially well suited to dry, rocky, soils common to many steep hillsides throughout the western United States. Infestations are frequently observed in rugged inaccessible mountain terrain (Evans 1991). Dyer's woad is also commonly found on disturbed sites, along roadsides, waste areas and rights-of-way.

### Keys to Identification:

- Dyer's woad can be easily identified in the blossom stage by its characteristic bright-yellow, flowers clustered in an umbrella-shaped inflorescence.
- Leaves have a cream-colored midrib on the upper surface.
- Fruits are very dark, 0.5-0.75 inch long, and hang in clusters.



**Distribution:** Not yet known to be present in Colorado but expected to first invade the Western Slope or to be introduced purposefully by individuals interested in producing dye from the plant. Current distribution in the United States includes Virginia, West Virginia, northern Utah, southeastern Idaho, western Wyoming, northern California, southeast Oregon, Montana, and Nevada (Zimmerman 1997).

**Historical:** In Europe, dyer's woad has been cultivated as a source of blue dye and for medicinal properties since the 13<sup>th</sup> century (Zimmerman 1997).

### **Biology/Ecology**

**Life cycle:** Established dyer's woad plants begin growth early in the year. The plant has a deep tap root as well as roots near the soil surface. Early growth plus the two-tiered root system probably account for its competitive ability (McConnell et al. 1999). Undisturbed dyer's woad plants behave as biennials or winter annuals and typically require portions of two growing seasons to produce seed. Dyer's woad germinates in the fall or early spring. The seedlings develop rosettes that produce large taproots during the first year. During the winter the plants undergo vernalization. The following spring, new leaves grow from the crown bud in the rosette, and bolting begins. Flowering occurs in late spring, with the exact timing dependent upon elevation (Zimmerman 1997).

**Mode of reproduction:** Reproduces by seeds.

**Seed production:** Hundreds of seedpods, each containing one seed, are produced anywhere from 4-6 weeks after flowering begins (Zimmerman 1997).

**Seed bank:** Seeds do not remain viable in the soil for long periods of time (Zimmerman 1997).

**Dispersal:** No information available.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** A close relative of the Eurasian rust fungus *Puccinia thlaspeos* is the most common biological control agent used (Zimmerman 1997). It is able to prevent or reduce seed production and may also affect survival of seedlings, rosettes, and overwintering plants (Zimmerman 1997).

**Mechanical:** Pulling is probably one of the simplest, yet effective, methods of control, especially in isolated locations. Pulling is most effective along the fringe of a major infestation and in areas where the weed has been introduced far from any other major infestation (Evans 1991). For pulling to be effective, wait until the plants have bolted and begun to flower. This makes locating and identifying the plants easy. Plants can be removed by pulling if the soil is moist or dug with a shovel. The fleshy tap root must be removed below the root crown otherwise the plant will resprout (McConnell et al. 1999). Mowing is not recommended due to the plants ability to resprout from the rootstock following mechanical disturbance (Zimmerman 1997).

**Fire:** No information available.

**Herbicides:** Dyer's woad is commonly controlled with herbicides. Metsulfuron and chlorsulfuron, alone or in combinations with 2,4-D, are very effective in pastures and in rangelands where grasses and not broad-leaf plants are desired (McConnell et al. 1999). 2,4-D at 1 lb. ai/acre can be applied from the rosette stage to the early blossom stage for effective control.

**Cultural/Preventive:** In cropland, tillage will usually control the greatest extent of the problem (Evans 1991). Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

#### **Keys to Control:**

- Eliminate seed production and deplete the soil seed bank.
- Maintain a healthy cover of perennial plants to discourage re-infestation and spread..

### **Integrated Management Summary**

Within the last century dyer's woad has become a serious problem on rangelands and croplands of the United States (Zimmerman 1997). It is not yet established in Colorado, so the most important control is to be on the lookout for it and prevent new infestations. If infestations are discovered, they should be controlled immediately, and all seed production prevented. Report occurrences of this plant immediately to the county weed supervisor. Dyer's woad is an important range weed since it competes favorably with shrub and browse species characteristic of rangelands (Evans 1991). This species typically enters areas by moving along highways, railways, or canals, and then spreads into adjacent areas. Land managers and others should be trained to identify the weed and remove plants as soon as possible to prevent establishment. Eliminate seed production by pulling the plants in flower, and continue control efforts until the soil seed bank is depleted.

**References**

- Evans, J.O. 1991. The importance, distribution, and control of Dyer's woad (*Isatis tinctoria*). In L.F James, J.O. Evans, M.H. Ralphs and R.D. Child, eds. *Noxious Range Weeds*. Westview Press, Boulder, CO.
- McConnell, E.C., J.O. Evans and S.A. Dewey. 1999. Dyer's woad. In R.L. Sheley and J.K. Petroff, eds. *Biology and Management of Noxious Rangeland Weeds*. Oregon State University Press, Corvallis, OR.
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Dyer's woad. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.



## Perennial pepperweed

### *Lepidium latifolium*

**Family:** *Brassicaceae* (Mustard)

**Other Names:** tall whitetop, broad-leaved peppergrass, Virginia pepperweed

**USDA Code:** LELA2

**Legal Status:** Colorado Noxious List A (general weeds)

#### Identification

**Growth form:** Perennial forb.

**Flower:** White flowers are packed in dense clusters near the ends of branches.

**Seeds/Fruit:** Fruits are nearly round, about 0.1 inch in diameter and usually sparsely hairy.

**Leaves:** Leaves are alternate, lance-shaped, entire to toothed, bright-green to gray-green, and don't have clasping bases (whitetop leaves have clasping bases). The basal leaves are larger than the upper leaves.

**Stems:** Mature plants are 1-3 feet tall.

**Roots:** Perennial pepperweed roots grow deep into the soil.

**Seedling:** No information available.

**Other:** The leaves and stem are covered with a waxy layer (Whitson et al. 1996).

#### Similar Species

**Exotics:** Whitetop (*Cardaria draba*) leaves have clasping bases; perennial pepperweed can also be distinguished by its waxy appearance.

**Natives:** Many native members of the sunflower (*Asteraceae*) family resemble this species in the rosette stage.

#### Impacts

**Agricultural:** Perennial pepperweed invades irrigated pastures, cropland, and native meadows (FEIS 1996).

**Ecological:** Perennial pepperweed is an aggressive colonizer of riparian habitats. It establishes rapidly and can eliminate competing vegetation (FEIS 1996).

**Human:** No information available.

#### Habitat and Distribution

**General requirements:** Perennial pepperweed is most often found in open, unshaded areas on disturbed, and often saline soils.

**Distribution:** Perennial pepperweed is locally common in riparian areas, marshy floodplains, valley bottoms, and seasonally wet areas from 5,500 to 9,000 feet. It is especially prevalent in the San Luis Valley and along the South Platte River. It is found in big sagebrush (*Artemisia tridentata*) communities of the Piceance Basin of Colorado (FEIS 1996). Plant associates in these communities include twisted moss (*Tortula ruralis*) and desert goosefoot (*Chenopodium*

#### Keys to Identification:

- Perennial pepperweed has dense clusters of white flowers that appear in early summer.
- The leaves and stem are covered with a waxy layer.



Single flower - enlarged

*pratericola*) (FEIS 1996). Perennial pepperweed is found in similar environments throughout much of the western U.S.

**Historical:** Perennial pepperweed was introduced from Eurasia.

### **Biology/Ecology**

**Life cycle:** Dense flower clusters appear in early summer and continue through August.

**Mode of reproduction:** Perennial pepperweed reproduces mainly by spreading rhizomes, and can be an aggressive colonizer of disturbed areas (FEIS 1996).

**Seed production:** Perennial pepperweed produces an abundance of highly germinable seeds. Seed production is from June to August.

**Seed bank:** Seeds have no apparent dormancy.

**Dispersal:** Seeds drop from the plant or travel short distances by wind/water.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** None known.

**Mechanical:** Periodic mowing and spring burning have reduced perennial pepperweed density in Utah (FEIS 1996).

**Fire:** (See above)

**Herbicides:** Metsulfuron at the rate of 0.45 oz. ai/acre is the most effective herbicide treatment. Dicamba at 1 lb. ai/acre, glyphosate at 1.5 lb. ai/acre or glyphosate+2,4-D at 54 fl. oz. product/acre will control perennial pepperweed. Other herbicides that proved to be effective include chlorsulfuron and imazapyr.

**Cultural/Preventive:** Treat new infestations of perennial pepperweed as soon as they are found.

### **Keys to Control:**

- Plants must not be allowed to produce seed if control is to be successful.
- Use a combination of mechanical techniques and herbicide applications to control infestations.

### **Integrated Management Summary**

A combination of mechanical (cutting or pulling) and herbicide applications can provide effective control of perennial pepperweed. Plants should be cut or pulled during the flower bud stage. Herbicides should be applied to the recovering stems when they return to flower bud stage later the same year.

### **References**

FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Perennial pepperweed. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

# Bouncingbet

## *Saponaria officinalis* L.

**Family:** *Caryophyllaceae* (Pink)

**Other Names:** soapwort, lady by the garden gate

**USDA Code:** SAOF4

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Perennial forb.

**Flower:** The flowers are crowded at the ends of branches, and have five petals that are generally pink and slightly notched at the apex.

**Seeds/Fruit:** Fruits are many-seeded capsules. Seeds are dull-black and roundish or kidney-shaped.

**Leaves:** Leaves are opposite, smooth, narrow, 2-4 inches long and have three distinct veins from the base.

**Stems:** Mature plants are up to three feet tall with stout, erect, smooth, branching stems.

**Roots:** Rhizomatous root system

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** *Cerastium* spp. (mouse-ear) have separate (usually white) petals instead of united petals. Many other members of the pink family appear similar.

### Impacts

**Agricultural:** Bouncingbet can be poisonous to livestock although it is generally considered unpalatable.

**Ecological:** Bouncingbet spreads rapidly, replacing more valuable species (e.g. perennial grasses).

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Bouncingbet is often found in large dense patches on hillsides, along river courses, roadsides, meadows, and waste areas. It prefers moist, well-drained soil, and full sun to partial shade and is currently found primarily in municipal areas and nearby wildlands.

**Distribution:** Scattered throughout the United States. Bouncingbet is increasingly common in Colorado, particularly in residential areas and local open spaces where it has escaped cultivation as an ornamental species.

**Historical:** Bouncingbet was originally introduced from Europe as a garden ornamental and for its saponins, which are the source of its soap-producing qualities (Lokker and Cavers 1995).

### Biology/Ecology

**Life cycle:** Flowering begins in July and continues until September.

**Mode of reproduction:** Reproduces by seed and spreads clonally by rhizomes.

### Keys to Identification:

- Flowers are clustered at the ends of branches.
- Bouncingbet leaves originate from slightly swollen nodes.



swollen nodes

**Seed production:** No information available.

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** None known.

**Mechanical:** Bouncingbet can be controlled by mowing or pulling several times a year. Mowing or pulling should be conducted after the plants have bolted but before seed production. This process should be repeated on any re-emerging shoots from the root system.

**Fire:** No information available.

**Herbicides:** Picloram or dicamba at 1 lb. ai/acre, or glyphosate at 1.5 lb. ai/acre will provide effective control. Hexazinone is used to control bouncingbet in corn and feed crops.

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

#### **Keys to Control:**

- Eliminate seed production and exhaust the nutrient reserves in the roots.
- Maintain a healthy cover of perennial plants.

### **Integrated Management Summary**

Bouncingbet is not yet widespread in Colorado, so the most important control is to be on the lookout for it and prevent new infestations. If infestations are discovered, they should be controlled immediately, and all seed production prevented. Since bouncingbet usually grows in dense patches it is relatively easy to spot and treat. Be aware that this species is often found in wet areas, which may restrict the use of certain pesticides. As with all perennial weeds that have extensive root systems, the key to controlling bouncingbet is to eliminate seed production while depleting the nutrient reserves in the roots.

### **References**

Lokker, C. and P.B. Cavers. The effects of physical damage on seed production in flowering plants of *Saponaria officinalis*. *Canadian Journal of Botany* 73:235-243.

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Bouncingbet. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

# Halogeton

## *Halogeton glomeratus* (Bieberstein)

**Family:** *Chenopodiaceae* (Goosefoot)

**Other Names:** barilla, Aral barilla

**USDA Code:** HAGL

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Annual forb.

**Flower:** Flowers are inconspicuous in leaf axils.

**Seeds/Fruit:** Produces winged black and wingless brown seeds (FEIS 1996).

**Leaves:** Leaves are small, fleshy, and nearly tubular, with a delicate needle-like spine at the tip.

**Stems:** Mature plants range in size from a few inches to over 1.5 feet. The main stems are much branched from the base, spreading at first, and then becoming erect (Whitson et al. 1996).

**Roots:** Has a generalized type of root system. The taproot can penetrate as deep as 20 inches, with a radial spread of 18 inches (FEIS 1996).

**Seedling:** No information available.

**Other:** Plants are blue-green in the spring and early summer, turning red or yellow by late summer (Whitson et al. 1996).

### Similar Species

**Exotics:** Halogeton plants resemble Russian thistle (*Salsola* spp.) in early stages but can be distinguished by leaves that are round in cross-section with a bristle-like tip. These species are noticeably different when mature.

**Natives:** Bristle tipped leaves also distinguish halogeton from *Suaeda* spp. (sea-blite).

### Impacts

**Agricultural:** Halogeton is high in oxalates and is a serious health threat to grazing animals, especially sheep. A sheep may be killed after consuming just 12-18 ounces of halogeton, and there is no treatment once an animal is poisoned (FEIS 1996). However, halogeton is not especially palatable and is not usually grazed when more preferable forage is available.

**Ecological:** Halogeton is not an extremely competitive plant, but it rapidly invades disturbed or overgrazed lands (Whitson et al. 1996). Halogeton may permanently alter the soil surface through salt pumping, which impedes moisture infiltration and enhances evaporation (FEIS 1996).

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Halogeton seems ideally adapted to the alkaline soils and semi-arid environments. It is typically found in disturbed sites in salt-desert shrubland and surrounding big-sagebrush (*Artemisia tridentata*) steppe types. Annual precipitation at most halogeton sites ranges between 5-13 inches with 60-70% of that occurring as snow. It occurs on soils that are heavy clays, clay loams, sandy loams, and loamy sands. Halogeton has invaded open or disturbed ground such as dry lakebeds, overgrazed rangeland, and livestock congregation areas. Halogeton occurs as a dominant or codominant with other annuals such as cheatgrass (*Bromus tectorum*) and

### Keys to Identification:

- Halogeton plants resemble Russian thistle in early stages but can be distinguished by leaves that are round in cross-section with a bristle-like tip.
- Halogeton leaves have minute cottony hairs in the leaf axils.



flower - enlarged

flixweed (*Descurainia sophia*). Other species that are commonly associated with halogeton include perennial pepperweed (*Lepidium perfoliatum*), Gardner saltbrush (*Atriplex gardneri*), squirreltail (*Elymus elymoides*), and povertyweed (*Iva axillaris*) (FEIS 1996).

**Distribution in Colorado:** Found in the Rocky Mountain and Great Basin regions. It is commonly found from 2,500-7,200 feet in elevation throughout its range (FEIS 1996).

**Historical:** Introduced from Asia.

### **Biology/Ecology**

**Life cycle:** Halogeton is a winter annual in the broad sense as plants may germinate in the fall, winter, or spring depending upon soil moisture. Typically, halogeton seedlings establish from February through August, with a peak in April. Seedlings begin rapid vegetative growth in May and growth can continue through June. Near the first part of July, the plants cease vegetative growth and begin reproductive growth. Plants flower during July and August. Seeds mature by October. The majority of winged, black seeds are dropped by early November. However, brown (wingless) seeds persist and may remain on the plant until January or February.

**Mode of reproduction:** Halogeton reproduces solely by seed.

**Seed production:** Halogeton can produce 75 seeds/inch of stem, or to 200-400 pounds/acre (FEIS 1996).

**Seed bank:** Wingless seeds can persist in the soil for up to ten years (FEIS 1996).

**Dispersal:** Halogeton seeds can be spread great distances by animals and wind.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** To date, there are no specific biological control organisms established for the control of halogeton.

**Mechanical:** Halogeton is sometimes controlled by hand grubbing (Calweed 1997).

**Fire:** Fire is not recommended as a control for halogeton, and it is able to rapidly recolonize burned areas (FEIS 1996).

**Herbicides:** Glyphosate at a rate of 1.5 lb. ai/acre will control halogeton. Other commonly used herbicides are triclopyr, chlorsulfuron, a combination of 2,4-D and triclopyr (Crossbow™) (FEIS 1996, Calweed 1997), dicamba at 2 lb. ai/acre, and metsulfuron at 0.6 oz. ai/acre (Sebastian and Beck 1995).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

#### **Keys to Control:**

- Maintain a good cover of perennial plants.
- Avoid overgrazing livestock.

### **Integrated Management Summary**

Halogeton is a ruderal species that readily invades disturbed, saline-alkaline ground where other species offer no or little competition (FEIS 1996). It can invade and dominates rangeland depleted by persistent overgrazing. The best defense against halogeton is a vigorous stand of perennial range plants and variations in grazing patterns (FEIS 1996). The abundance of halogeton depends upon year to year precipitation, so outbreaks may occur sporadically (FEIS 1996).

### **References**

Calweed Database. 1997. California Noxious Weed Control Projects Inventory. Natural Resource Projects Inventory, Information Center for the Environment, University of California, Davis. <http://endeavor.des.ucdavis.edu/weeds/> [6 Jan 99].

FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].

Sebastian, J.R. and K.G. Beck. 1995. Halogeton control with metsulfuron, dicamba, picloram and 2,4-D on Colorado rangeland. Res. Prog. Rep. Wes. Soc. Weed Sci. p. 10.

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Halogeton. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

# Kochia

## *Kochia scoparia* (L.) Schrad.

**Family:** *Chenopodiaceae* (Goosefoot)

**Other Names:** summer cypress, fireweed

**USDA Code:** KOSC

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Annual forb.

**Flower:** Flowers are inconspicuous, stalkless in the axils of upper leaves and form short, dense, bracted spikes (Whitson et al. 1996).

**Seeds/Fruit:** Seeds are wedged shaped, dull brown, slightly ribbed.

**Leaves:** Leaves are 0.5-2 inches long, alternate, and lance-shaped. The upper surface of the leaf is usually smooth, while the lower surface is covered with soft hairs.

**Stems:** Mature plants are 1-6 feet tall with numerous branches. Stems are erect, simple to much-branched, and often form pyramidal or rounded tops. Stems are usually hairy, but are occasionally smooth.

**Roots:** Roots generally penetrate to depths of 6-8 feet.

**Seedling:** No information available.

### Similar Species

**Exotics:** Five-hook bassia (*Bassia hyssopifolia*) is easily distinguished from kochia by the five hooked structures on each seed.

**Natives:** None known.

### Impacts

**Agricultural:** Although kochia is readily grazed by livestock, it sometimes contains high nitrate levels and sulfate toxicity (Whitson et al. 1996).

**Ecological:** Kochia colonizes rapidly and may suppress other vegetation. It is an early successional plant on disturbed sites and can dominate vegetation for the first two years following disturbance (FEIS 1996). Kochia may spread into undisturbed sites when growing conditions are ideal.

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Kochia is most often found in open, unshaded areas on disturbed sites. It grows on a variety of soil types, and is often found on saline/alkaline soils (FEIS 1996). Kochia can also be found in grasslands, mixed-grass prairie, shortgrass prairie, floodplains, riparian areas, sagebrush, and desert shrub communities. Other common associates include salt-cedar (*Tamarix* sp.), sand dropseed (*Sporobolus cryptandrus*), saltgrass (*Distichlis spicata*), and western wheatgrass (*Agropyron smithii*) (FEIS 1996).

**Distribution:** In Colorado, kochia mainly occurs on shortgrass prairie that is dominated by blue grama (*Bouteloua gracilis*) at elevations between 4,000 and 6,000 feet, although it can grow in semi-arid situations up to 9,000 feet (FEIS 1996). It is also present along the Arkansas River floodplain (FEIS 1996).

### Keys to Identification:

- Flowers are inconspicuous forming dense spikes in leaf axils.
- Five-hook bassia (*Bassia hyssopifolia*) is easily distinguished from kochia by the five hooked structures on each seed.



**Historical:** Kochia is a native of Eurasia that has become naturalized in the Great Plains and western states (FEIS 1996).

**Biology/Ecology**

**Life cycle:** Seedlings emerge very early in the spring. Flowering and seed production may occur from July to October. Kochia is very responsive to elevated soil nitrogen levels, either through some type of soil disturbance or due to fertilization. It will often grow rapidly for 1-2 years in abandoned fields or in badly overgrazed rangeland until the readily available nitrogen is depleted. Then kochia plants are often small, presumably due to the nitrogen limitation. Kochia is rarely a problem in areas where healthy stands of perennial grasses exist.

**Mode of reproduction:** Kochia reproduces exclusively by seed.

**Seed production:** Typically, a single plant will produce about 14,600 seeds per year.

**Seed bank:** Seeds have little or no seedbank viability as they either germinate or decay in one year (FEIS 1996).

**Dispersal:** The major means of seed dispersal is through a “tumbleweed” process.

**Hybridization:** No information available.

**Control**

**Biocontrol:** None known.

**Mechanical:** Grazing or mowing alone will not control kochia or stop seed production (FEIS 1996). Small infestations can be pulled by hand.

**Fire:** No information available.

**Herbicides:** Kochia is commonly controlled with herbicides but it is not controlled with phenoxy herbicides at rates recommended for crops (FEIS 1996). Dicamba at 1 lb. ai/acre, or glyphosate at 1.5 lb. ai/acre will control kochia. Metsulfuron+dicamba is an effective mixture. Herbicides should be applied in the early spring after seedling emergence (Whitson et al. 1996).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

**Keys to Control:**

- Seedlings of kochia emerge in very early spring and should be treated with herbicides in this stage.
- Maintain vigorous stands of perennial plants, especially grasses, to prevent kochia establishment.

**Integrated Management Summary**

Even though kochia exhibits extreme reproductive plasticity (in that one plant can produce over 50,000 seeds under favorable conditions, but only 5 seeds under stressful conditions), the limited viability of kochia seeds increases the effectiveness of control methods. As with other plants which reproduce solely by seed, integrated management efforts should focus on the elimination of seed production and the depletion of the seed bank. Combine herbicide or mechanical removal of rosettes with removal of seed heads from any plants that have bolted.

**References**

FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Kochia. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.



## Russian thistle

*Salsola iberica* Sennen; *S. kali* L. var. *tenuifolia* Tausch;  
*S. kali* L. var. *ruthenica* (Iljin) Soo; and *S. pestifer* A. Nels  
*S. collina* Pallas

**Family:** *Chenopodiaceae* (Goosefoot)

**Other Names:** tumbleweed

**USDA Code:** SAIB, SACO8

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Annual forb

**Flower:** Inconspicuous flowers are borne in axils of the upper leaves. Each flower is accompanied by a pair of spiny, floral bracts (Whitson et al. 1996).

**Seeds/Fruit:** Small one-seeded fruits with winged tips. Seeds are round, black, smooth and shiny.

**Leaves:** Leaves are alternate, the first leaves are long, string-like and soft. Later leaves are short, scale-like and tipped with a stiff spine (Whitson et al. 1996).

**Stems:** Mature plants are 0.5-3 feet tall and are rounded, bushy, and highly branched. Stems are red or purplered striped.

**Roots:** The root system consists of a taproot that can grow 3 feet or more in depth with extensive lateral roots

**Seedling:** Seedling plants have long, fleshy leaves.

### Similar Species

**Exotics:** Young Russian thistle plants resemble young halogeton plants, although halogeton lacks spines.

**Natives:** None known.

### Impacts

**Agricultural:** It is well adapted to cultivated dryland agriculture, but is also found on disturbed rangeland, and wasteland.

**Ecological:** Russian thistle colonizes barren desert areas that cannot support other flora, and invades many different disturbed plant communities. Since its introduction it has become one of the most common and troublesome weeds in the drier regions of the United States (Whitson et al. 1996). Russian thistle occurs in many communities. It is most common along disturbed grassland and desert communities. In disturbed big sagebrush communities, Russian thistle dominated for the first two years. After this time plants became overcrowded and stunted, and were replaced by mustards (FEIS 1996).

**Human:** No information available.

### Habitat and Distribution

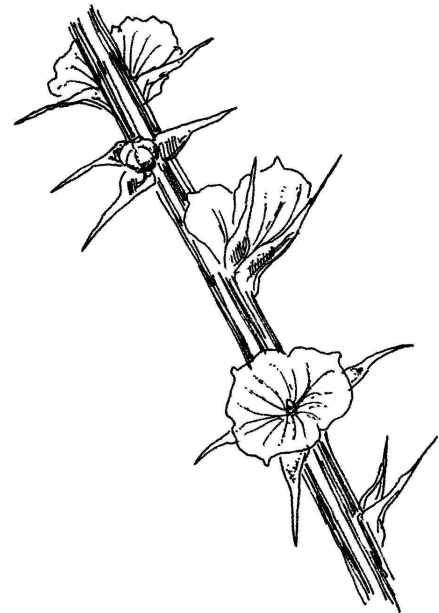
**General requirements:** Russian thistle grows in disturbed or unoccupied sites. (FEIS 1996). It grows on any type of well-drained, uncompacted soil with a sunny exposure. Russian thistle cannot tolerate saturated soil for extended periods of time.

**Distribution:** Found throughout central and western North America, up to 8550 feet (FEIS 1996).

**Historical:** No information available.

### Keys to Identification:

- Stems of Russian thistle have purple stripes.
- Inconspicuous flowers are borne in leaf axils.
- Seedling plants have long, fleshy leaves.



### **Biology/Ecology**

**Life cycle:** In spring, Russian thistle seeds will germinate at virtually any conceivable seedbed temperature (FEIS 1996). Plants typically flower from July through October. Seeds mature during August through November. Russian thistle seedlings are poor competitors, and do not establish well in crowded communities (FEIS 1996).

**Mode of reproduction:** Reproduces by seeds.

**Seed production:** One plant can produce up to about 250,000 seeds (FEIS 1996).

**Seed bank:** Seeds remain viable less than a year.

**Dispersal:** After seeds mature in the fall the plant stem separates from the root. The plant is then blown by wind. Seeds, held in the leaf axils, fall to the ground as the plant tumbles.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** The Division of Plant Industry's Biological Pest Control Section has two moth species, *Coleophora klimeschiella* and *C. parthenica*, that may be available for redistribution.

**Mechanical:** Mowing or pulling young plants can be used to control Russian thistle. However this process may have to be repeated for several years to be successful.

**Fire:** Prescribed burning is not recommended for control of Russian thistle, since it favors disturbed communities and readily recolonizes burned areas (FEIS 1996).

**Herbicides:** Dicamba at 0.5 lb., 2,4-D at 1 lb, or glyphosate at 1.5 lb. ai/acre, have been used to successfully control Russian thistle (Calweed 1997).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

#### **Keys to Control:**

- Maintain vigorous stands of perennial plants.
- Herbicides should be applied at the seedling growth stage for best results.
- Small infestations can be controlled by mowing or pulling young plants

### **Integrated Management Summary**

For effective control of Russian thistle, control methods should be accompanied by a program to maintain or enhance the natural plant cover. As with other annual plants which reproduce by seeds, Russian thistle can eventually be controlled by eliminating seed production until the soil seed bank is depleted. Cut/pull or treat plants with herbicide prior to seed set.

### **References**

- Calweed Database. 1997. California Noxious Weed Control Projects Inventory. Natural Resource Projects Inventory, Information Center for the Environment, University of California, Davis. <http://endeavor.des.ucdavis.edu/weeds/> [6 Jan 99].
- Crompton C.W. and I.J. Bassett. 1985. The biology of Canadian weeds. 65. *Salsola pestifer* A. Nels. *Canadian Journal of Plant Science*. 65: 379-388.
- FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Russian thistle. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Common St. Johnswort

### *Hypericum perforatum* L.

**Family:** *Clusiaceae* (St. Johnswort)

**Other Names:** Klamath weed, goatweed

**USDA Code:** HYPE

**Legal Status:** Colorado Noxious List A (general weeds)

#### Identification

**Growth form:** Perennial forb.

**Flower** Flowers are 0.75 inch in diameter, bright yellow, numerous in flat-topped clusters. Flowers have five separate petals that are twice as long as the sepals. Stamens are numerous and paired into three groups.

**Seeds/Fruit:** Seedpods are 0.25 inch long, rust-brown, with three-celled capsules that contain numerous seeds (Whitson et al. 1996).

**Leaves:** Leaves are opposite, not over 1 inch long, oval-shaped, with prominent veins and covered with transparent dots.

**Stems:** Mature plants are 1-3 ft high. The stems are erect, 2-sided, rust colored, with numerous branches.

**Roots:** Short rhizomes

**Seedling:** No information available.

#### Similar Species

**Exotics:** None known.

**Natives:** None known.

#### Impacts

**Agricultural:** St. Johnswort is an aggressive weed that invades grazed and disturbed lands. In dense stands, it displaces indigenous plant species, reduces livestock and wildlife forage, and poisons livestock.

**Ecological:** No information available.

**Human:** No information available.

#### Habitat and Distribution

**General requirements:** St. Johnswort is commonly found on rangeland, pasture, old meadows, along roadsides, and waste areas. It prefers dry, gravelly, or sandy soils and can tolerate pH ranges of 4.3 to 7.6 (Rutledge and McLendon 1998).

**Distribution:** In Colorado, St. Johnswort has been reported from the north central portion of the state, and in scattered areas of western Colorado (Rutledge and McLendon 1998). St. Johnswort is now common in the Pacific Northwest.

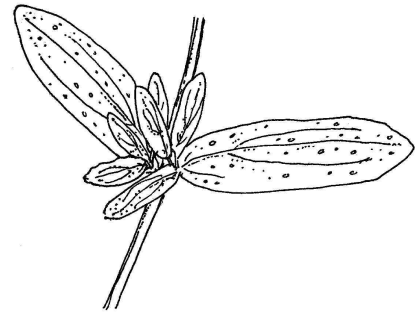
**Historical:** European in origin. Widely used as a medicinal plant, especially as an anti-depressant.

#### Biology/Ecology

**Life cycle:** St. Johnswort grows early in spring when moisture is abundant. St. Johnswort flowers from June to September. Its deep root system is capable of supporting the plant when the water available to more desirable species has been depleted (Crompton et al. 1988). Seed germination can be retarded by small amounts of calcium (Rutledge and McLendon 1998).

#### Keys to Identification:

- St. Johnswort can be identified by its leaves. Leaves are opposite, oval-shaped, with prominent veins and covered with tiny transparent dots.
- Flowers are yellow, five petaled, and have numerous stamens.



Leaves

**Mode of reproduction:** It reproduces by both seeds or from rhizomes (Crompton et al. 1988). The root system of St. Johnswort spreads laterally and is capable of forming new buds. These vegetative buds separate from the parent as soon as the new plants become established (Rutledge and McLendon 1998).

**Seed production:** It produces between 15,000-30,000 seeds/plant.

**Seed bank:** Seeds may remain viable in the soil for 6-10 years.

**Dispersal:** Seeds have a gelatinous coat that facilitates long-distance dispersal.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** There are several biological control agents that can help control this weed. Two beetles, *Chrysolina hyperici* and *Chrysolina quadrigemina*, have both been released and are established in California, Oregon, and several other western and northwestern states (Rees et al. 1996). Under favorable conditions, these beetles can significantly reduce St. Johnswort infestations. The control of St. Johnswort with these beetles is perhaps the most successful example of biocontrol in the United States. The release of these two beetles in California in 1945 was the first attempt in North America to control a weed species by using insects (Piper 1999).

**Mechanical:** In agricultural situations, St. Johnswort is readily controlled by tillage.

**Fire:** No information available.

**Herbicides:** St. Johnswort is commonly controlled with combinations of 2,4-D and picloram (Grazon P+D™), or 2,4-D and glyphosate (Rutledge and McLendon 1998).

**Cultural/Preventive:** It is imperative to maintain competitive, closed canopy plant communities dominated by desirable species using good range management practices (Piper 1999).

### **Keys to Control:**

- Remove or treat the plant with herbicides before seed production.
- Check to see if biological control is feasible in your area.
- Maintain a healthy cover of perennial plants to discourage St. Johnswort invasion and spread.

### **Integrated Management Summary**

It is not yet widely established in Colorado, so it is important to be on the lookout for it and prevent new infestations. If infestations are discovered, they should be controlled immediately, and all seed production prevented. St. Johnswort is an aggressive invader of disturbed lands. It can be poisonous to animals and is generally avoided by grazing animals. St. Johnswort reduces range carrying capacity and reduces forage available to wildlife. St. Johnswort can be difficult to control due to its large, long-lived, seed bank and extensive root system. It is most commonly controlled with herbicides but has been controlled with biological agents in certain areas. Land management practices should focus on maintaining healthy stands of desirable perennial species.

### **References**

Crompton C.W., I.V. Hall, K.I.N. Jensen, and P.D. Hilderband. 1988. The biology of Canadian weeds. 83. *Hypericum perforatum* L. *Canadian Journal of Plant Science*. 68: 149-162.

Piper, G.L. 1999. St. Johnswort. In R.L. Sheley and J.K. Petroff, eds. *Biology and Management of Noxious Rangeland Weeds*. Oregon State University Press, Corvallis, OR.

Rees, N.E., P.C. Quimby Jr., G.L. Piper, E.M. Coombs, C.E. Turner, N.R. Spencer, and L.V. Knutson (eds). 1996. *Biological Control of Weeds in the West*. Western Society of Weed Science in cooperation with USDA Agricultural Research Service, Montana Department of Agriculture, and Montana State University.

Rutledge, C. R. and T. McLendon. No Year. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97pp. Northern Prairie Wildlife Research Center Home Page. <http://www.npwr.usgs.gov/resource/othrdata/Explant/explant.htm> [Version 15 Dec 98].

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. St. Johnswort. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Field bindweed

*Convolvulus arvensis* L.

**Family:** *Convolvulaceae* (Morning-glory)

**Other Names:** small-flowered morning glory, wild morning glory, perennial morning glory, creeping jenny.

**USDA Code:** COAR4

**Legal Status:** Colorado Noxious List B

### Identification

**Growth form:** Perennial forb.

**Flower:** Flowers are white to pink, borne singularly or in pairs on long stalks from the axils of the leaves with two bracts.

**Seeds/Fruit:** Seeds are ovoid to pearl-shaped, three-angled with one rounded and two flattened sides. Seeds are dull, brownish-gray, and coarsely roughened.

**Leaves:** Leaves are alternate, simple, glabrous to finely pubescent, more or less arrowhead-shaped.

**Stems:** Stems are prostrate, 1-4 ft long, often climbing or forming dense mats.

**Roots:** The roots system and rhizomes are extensive, whitish, cord-like, and fleshy. The primary root is a taproot from which lateral roots develop (Peterson 1998).

**Seedling:** Seed leaves (cotyledons) are spatulate, and are broad and indented at the tip.

### Similar Species

**Exotics:** *Fallopia convolvulus* (black bindweed) in the knotweed family (*Polygonaceae*) is similar.

**Natives:** *Calystegia sepium* (hedge bindweed) has larger leaves and flowers.

### Impacts

**Agricultural:** Can be a problem in cultivated fields.

**Ecological:** Field bindweed can be a serious threat to native plant communities because it has such a great capacity for regeneration (Peterson 1998). Detached roots and rhizomes have the potential to produce large numbers of new shoots. Both a high rate of seed production, and long-term viability allow the plant to spread and persist. Disturbance, especially cultivation and/or overgrazing, is a prerequisite for bindweed to invade. Field bindweed's broad range of environmental tolerances make it highly competitive in most areas.

**Human:** No information available.

### Habitat and Distribution

**General requirements:** Field bindweed occurs, and is competitive on, disturbed ground that is rich in introduced species. Field bindweed cannot tolerate shade and uses its viney stems to move into sunlight. Therefore, it is unlikely that field bindweed persists in later stages of community succession (FEIS 1996). Field bindweed is

### Keys to Identification:

- Leaves of field bindweed are shaped like arrowheads.
- Flowers are funnel-shaped, white to pink, and have two small bracts 1 inch below the flower base.



commonly found on more basic (rather than acidic) soil types and those of heavier texture. It can persist in dry to moderately moist soils, and is capable of surviving drought (Rutledge and McLendon 1998).

**Distribution:** Field bindweed may be found at altitudes as high as 10,000 feet (Whitson et al. 1996).

**Historical:** Native to Europe, introduced in North America as early as the 1730s (Peterson 1998).

### **Biology/Ecology**

**Life cycle:** The leaves of field bindweed vary greatly in size and shape with environmental factors such as light intensity, soil moisture, and with damage due to frequent cultivation. Flowers appear from June to September and occasionally until the first fall frost (Rutledge and McLendon 1998). Seeds mature within 2 weeks after pollination during hot summer days (FEIS 1996). Germination can occur in the fall or spring, over a wide range of temperatures (FEIS 1996). Field bindweed overwinters by means of its roots and rhizomes. Shoots are killed back to the crown by freezing temperatures, but hardened roots can withstand temperatures as low as -6° C (Peterson 1998). Most lateral roots die back each year but some persist for several years, spreading horizontally (Peterson 1998). Buds arise on the lateral roots and develop into rhizomes that have the potential to establish new crowns when they reach the surface. Excised root segments establish new roots and crowns more effectively than rhizome segments (Peterson 1998).)

**Mode of reproduction:** Reproduces both by seed and vegetatively.

**Seeds production:** The number of seeds produced per plant ranges from 25 to 300 and seed production is variable and depends on environmental conditions.

**Seed bank:** Field bindweed seeds can remain viable in the soil for over 20 years (Peterson 1998).

**Dispersal:** Seeds have a hard impermeable seed coat. They generally fall near the parent plant but can be dispersed by water, as a contaminant in crop seeds, and by mammals and birds after ingestion.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** Currently, there has been little evidence of a biological control agent that significantly damages or reduces populations of field bindweed. Two agents that are present in the U.S. and being studied are *Aceria mahlerbae*, a gall mite, and *Tyta luctuosa*, a moth (Rees et al. 1996).

**Mechanical:** Cutting, mowing, or pulling has a negligible effect unless plants are cut below the surface in the early seedling stage. Well-established populations have a large seed bank in the soil that can remain viable for long periods of time (over 20 years).

**Fire:** Prescribed fire is not recommended as a control for field bindweed due to its potential for vegetative regrowth and a long-lived seed bank.

**Herbicides:** Chemical treatment often requires high rates as well as repeated applications. Successful treatment of bindweed can result in substantial damage to desirable plants. Foliar applications of glyphosate at 1.5 lb. ai/acre or picloram at 0.25-0.5 lb. ai/acre, dicamba, or 2,4-D at 1 lb. ai/acre can provide good control. Control is best when applied during early flowering and when soil moisture is low (Peterson 1998). Repeated applications are advised for long-term control.

**Cultural/Preventive:**

#### **Keys to Control:**

- Contain and persistently control existing stands of field bindweed in order to exhaust the root system and deplete the soil seed bank.
- Maintain a healthy cover of perennial plants to discourage field bindweed establishment.

### **Integrated Management Summary**

Field bindweed can be a serious weed in native plant communities. Field bindweed requires active management once it is established because of its potential to regenerate rapidly. Even small infestations should be viewed as a serious threat and managed aggressively. It is also tolerant of a variety of environmental conditions which makes it highly competitive for resources (Rutledge and McLendon 1998). Due to the vegetative reproductive ability of field bindweed, as well as the large seed bank of established populations, successful control requires repeated applications over several years.

### **References**

FEIS - Fire Effects Information System . 1996. Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer), US Forest Service. <http://www.fs.fed.us/database/feis/> [Version 12 Mar 98].

- Peterson, D.L. 1998. Element stewardship abstract for *Convolvulus arvensis*, field bindweed. The Nature Conservancy, Wildland Weeds Management & Research Program. <http://tncweeds.ucdavis.edu/esadocs/convarve.html> [8 Nov 98].
- Rees, N.E., P.C. Quimby Jr., G.L. Piper, E.M. Coombs, C.E. Turner, N.R. Spencer, and L.V. Knutson (eds). 1996. *Biological Control of Weeds in the West*. Western Society of Weed Science in cooperation with USDA Agricultural Research Service, Montana Department of Agriculture, and Montana State University.
- Rutledge, C. R. and T. McLendon. No Year. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97pp. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> [Version 15 Dec 98].
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Field bindweed. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Yellow nutsedge

*Cyperus esculentus* L.

**Family:** *Cyperaceae* (Sedge)

**Other Names:** chufa, chufa flatsedge, nut-grass, galingale

**USDA Code:** CYES

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Perennial graminoid.

**Flower:** Flowers are yellowish-brown in appearance. The entire cluster of flat spikelets is subtended by 3-9 leaflike bracts.

**Seeds/Fruit:** Seeds are yellowish, triangular, and oblong.

**Leaves:** Grass-like leaves originate from the base of each stem, while long leaf-like bracts radiate out from a common point just below the umbrella-like flower cluster.

**Stems:** Plants range from 6-30 inches tall, with 3-ranked leaves, and 3-angled pithy stems.

**Roots:** Tubers (at the tips of rhizomes) are dark, unevenly globe-shaped, and edible, tasting something like almonds.

**Seedling:** Stems are triangular in cross section. Leaves are smooth, hairless and deeply keeled. The plant is yellowish to pale green (Carey et al. 1993).

**Other:** The leaves have a sweet scent.

### Similar Species

**Exotics:** None known.

**Natives:** None known.

### Impacts

**Agricultural:** The nutsedges are the most difficult weeds to control in cultivated fields, often forming a solid cover over large areas in sorghum and alfalfa pastures, flood plains, dams, ditches, and along streams and roadsides (Parker 1972). Yellow nutsedge can also be troublesome in crops like onions, potatoes, beans, and corn (Whitson et al. 1996). It reduces crop yield and quality by competing for light, water, and nutrients, and by interfering with pesticide applications and harvest operations (Ackley et al. 1996).

**Ecological:** Yellow nutsedge is a noxious weed of wet soil. Infestations often start in wet areas, and then spread outward.

**Human:** No information available.

### Habitat and Distribution

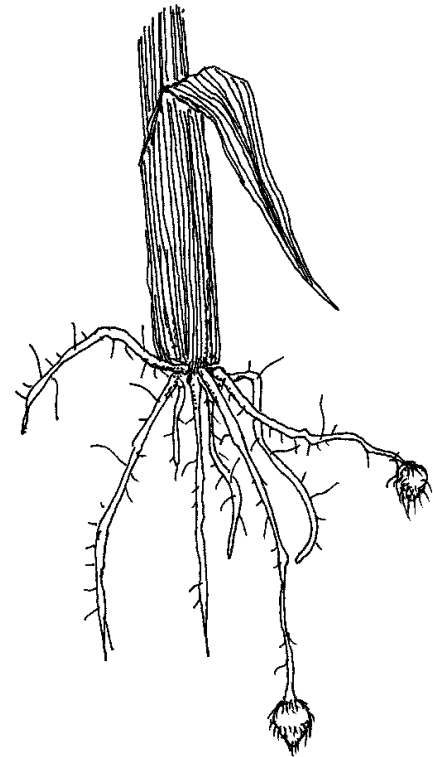
**General requirements:** Yellow nutsedge is found in many soil types, but is common on well-drained, sandy soils or damp to wet sites. It can commonly be found in irrigated crops, along streams, around lakes and ponds, wet fields, and wet prairies.

**Distribution:** Found in cultivated agricultural lands throughout North America.

**Historical:** Yellow nutsedge was probably introduced from Europe. The tubers are edible by humans and wildlife. Some people consider the tuber a delicacy.

### Keys to Identification:

- Yellow nutsedge can be identified by its stout triangular stem, and 3-ranked, grass-like leaves.
- Yellow nutsedge also has dark, unevenly globe-shaped, almond tasting tubers at the ends of slender rhizomes.



Tubers on rhizome tips



### **Biology/Ecology**

**Life cycle:** Plants are yellowish-green in color. Flowers appear one per scale, with many scales per spikelet (USDA 1997). Flowering occurs from July to October.

**Mode of reproduction:** Yellow nutsedge reproduces by rhizomes, tubers, and sometimes seed. Rhizomes radiate from the main plant, ending in bulbs or tubers, which may produce new plants.

**Seed production:** Can produce large amounts of seed under favorable conditions (Holm et al. 1991).

**Seed bank:** No information available.

**Dispersal:** No information available.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** None known.

**Mechanical:** In natural areas, yellow nutsedge may be pulled or dug before seed production. It is important to pull as much of the root system as possible to avoid regrowth from underground root buds.

**Fire:** No information available.

**Herbicides:** Herbicides are commonly used to control yellow nutsedge. In non-crop situations, picloram, dicamba, or 2,4-D at 1 lb. ai/acre will provide fair control of yellow nutsedge, although these should not be used in wet areas, where yellow nutsedge would be most likely to occur in natural areas. Sulfonylurea herbicides such as chlorimuron, nicosulfuron and primisulfuron etc. would be preferable (S. Nissen, CSU Weed Scientist).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and dispersal, and maintaining a healthy cover of perennial plants.

#### **Keys to Control:**

- Maintain a healthy cover of perennial plants.
- Eliminate seed production and stress the nutrient reserves in the root system.

### **Integrated Management Summary**

Mechanical and/or chemical control methods can be used to eliminate seed production and deplete the nutrient reserves in the rhizomatous root system. Land use practices which maintain a healthy cover of perennial plants will help prevent the spread of yellow nutsedge.

### **References**

- Ackley, J.A., H.P. Wilson, and T.E. Hines. 1996. Yellow nutsedge (*Cyperus esculentus*) control POST with acetolactate synthase-inhibiting herbicides. *Weed Technology* 10:576-580.
- Carey, J. Boyd, James J. Kells, and Karen A. Renner. 1993. Common Weed Seedlings of Michigan. Department of Crop and Soil Sciences Michigan State University Extension. Bulletin E-1363. <http://www.msue.msu.edu/msue/iac/e1363/e1363.htm> [27 Oct 99].
- Holm, L.G., D.L. Plucknett, J.V. Pancho, J.P. Herberger. 1991. *The World's Worst Weeds*. Krieger Publishing Co., Malabar, FL.
- Parker, K.F. 1972. Yellow nutsedge-*Cyperus esculentus* L. *An Illustrated Guide to Arizona Weeds*. University of Arizona Press, Tucson. <http://www.uapress.arizona.edu/online.bks/weeds/yellonut.htm> [10 Sept 99].
- U.S. Department of Agriculture. No date. Midwestern wetland flora: Field office guide to plant species. USDA. Soil Conservation Service, Midwest National Technical Center, Lincoln, Nebraska. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. <http://www.npwr.usgs.gov/resource/othrdata/plntguid/plntguid.htm> [Version 16 Jul 97].
- Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Yellow nutsedge. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

## Common teasel

*Dipsacus fullonum* (L.) ssp. *sylvestris* (Huds.) Clapham

**Family:** *Dipsacaceae* (Teasel)

**Other Names:** teasel, fuller's teasel, Venus's basin, card thistle, barbers brush, brushes and combs, church broom

**USDA Code:** DIFU2

**Legal Status:** Colorado Noxious List A (general weeds)

### Identification

**Growth form:** Biennial or sometimes monocarpic perennial forb.

**Flower:** Flowers are purple, and subtended by spiny, awned bracts. The floral bracts at the base of the head are generally longer than the head.

**Seeds/Fruit:** The fruits are four-angled, each contains a single seed.

**Leaves:** Rosette leaves are conspicuously veined, with stiff prickles on the lower midrib (Whitson et al. 1996). Stem leaves are simple, opposite, net-veined, stalkless, and clasp the stem. Flowering plants have large, oblong, opposite leaves that form cups, which are capable of holding water (Wisconsin DNR 1998).

**Stems:** Mature plants can grow up to six feet tall. The taprooted stem is rigid, furrowed (striate-angled), with several rows of downward turned prickles.

**Roots:** Shallow taproot with secondary fibrous root system.

**Seedling:** No information available.

### Similar Species

**Exotics:** None known.

**Natives:** None known.

### Impacts

**Agricultural:** Common teasel is not considered palatable and is generally ignored by livestock. It displaces native vegetation and decreases range quality.

**Ecological:** Common teasel can be an aggressive competitor in disturbed areas. Massive seed production and high germination allow it to quickly invade an area and outcompete other plants.

**Human:** No information available.

### Habitat and Distribution

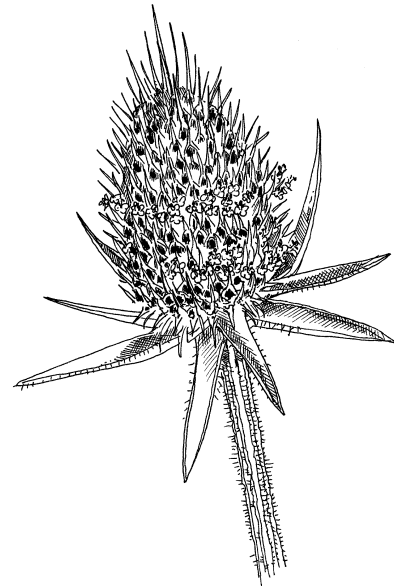
**General requirements:** Common teasel grows in open, sunny habitats that range from wet to dry. It is generally found along irrigation ditches, abandoned fields, pastures, waste places, and forests.

**Distribution:** Common teasel is spreading rapidly in America, particularly in the Pacific Northwest. In Colorado, teasel is usually found in relatively moist, disturbed situations. It is known to be collected and spread as an ornamental decoration for dried flower arrangements.

**Historical:** Common teasel is a native of Europe where it has historically had many uses. The heads of a cultivated variety of teasel are used for wool "fleeing", or raising the nap on woolen cloth. (Grieve 1995). These heads are fixed on the rim of a wheel, or on a cylinder, which is made to revolve against the surface of the cloth (Grieve 1995). No machine has yet been invented which can compete with teasel in its combined rigidity and elasticity

### Keys to Identification:

- Common teasel can be identified by its distinctive flower head. Flowers are small and packed in dense, oval-shaped heads.
- Flowers are subtended by stiff, spiny bracts that give the flower heads a bristly appearance and texture.



(Grieve 1995). The roots of common teasel are also reported to have various medicinal values ranging from a remedy for jaundice to a cleansing agent (Grieve 1995).

### **Biology/Ecology**

**Life cycle:** Common teasel is a biennial or sometimes monocarpic perennial. The plant grows as a basal rosette for a minimum of one year, and then sends up a tall, flowering stalk (Wisconsin DNR 1998). After flowering and seed set, the plant dies (Werner 1975). Flowering occurs from July to August.

**Mode of reproduction:** Reproduces by seeds only.

**Seed production:** A single teasel plant can produce over 2,000 seeds, of which 30-80% may germinate (Wisconsin DNR 1998).

**Seed bank:** Seeds can remain viable for at least two years.

**Dispersal:** No information available.

**Hybridization:** No information available.

### **Control**

**Biocontrol:** None known.

**Mechanical:** Seed production should be eliminated by cutting flowering stalks.

**Fire:** No information available.

**Herbicides:** Metsulfuron at 0.3 oz. ai/acre will control teasel.

Dicamba at a rate of 0.25-0.5 lb. ai/acre can be applied on teasel rosettes less than three inches in diameter (PMIS). For rosettes 3 inches or more in diameter, increase to 0.5-1.0 lb. ai/acre (PMIS). When teasel is bolting, apply 1.0-1.5 lb. ai/acre (PMIS).

**Cultural/Preventive:** Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities.

#### **Keys to Control:**

- Eliminate seed production by cutting seed stalks after flowering, and exhaust the seed bank in the soil.
- Re-seed controlled areas with desirable species.

### **Integrated Management Summary**

The key to controlling common teasel is to eliminate seed production and exhaust the seed bank in the soil. Common teasel does not reproduce vegetatively and dies after seed production (Werner 1975). Therefore, cutting the stalks of flowering plants is recommended as the best control in natural areas. Cut stalks should be bagged and burned. This usually requires several years of control to eliminate an infestation.

### **References**

Grieve, M. 1995. Teasel, common. A Modern Herbal. <http://www.botanical.com> [12 Jan 99].

PMIS. 1998. Noxious and Nuisance Plant Management Information System-version 4.0. CD-ROM. U.S. Army Engineers Waterway Experiment Station, Vicksburg, MS.

Werner, P.A. 1975. The biology of Canadian weeds. 12. *Dipsacus sylvestris* Huds. *Canadian Journal of Plant Science* 55: 783-794.

Whitson, T.D.(ed.), L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, R. Parker. 1996. Common teasel. *Weeds of the West*. Western Society of Weed Science, in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

Wisconsin DNR. 1998. Common teasel (*Dipsacus sylvestris*) and Cut-leaved teasel (*Dipsacus laciniatus*). Exotic teasels. Wisconsin Department of Natural Resources. <http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/teasel.htm> [26 Jan 99].