



COLORADO STATE PARKS
BEST MANAGEMENT PRACTICES
WEED PROFILE



Date Created: April 25, 2003

Revised: April 1, 2005

Author: Various

Parks Affected: Many

Yellow toadflax

(*Linaria vulgaris* P. Miller)



Other Common Names: butter and eggs, wild snapdragon, common toadflax

Description: Yellow toadflax is a perennial herb of the Figwort (Scrophulariaceae) family. Mature yellow toadflax plants are 1-3 feet tall with 1-25 vertical, floral stems. Leaves are soft, lance-shaped, and pale green. Leaves are mainly alternate but lower leaves appear to be opposite due to crowding. Flowers are bright yellow and resemble snapdragons. Flowers are arranged in a raceme at the ends of the branches. Seed capsules are round-ovate, 0.3-0.5 inches long, and two-celled. Seeds are brown or black, circular, and surrounded by a notched wing.

Impacts: Yellow toadflax is quick to establish in open sites and is capable of adapting growth to a wide range of environmental conditions. Yellow toadflax aggressively forms colonies through adventitious buds from creeping root systems. These colonies can push out native grasses and other perennials, thereby altering and simplifying the species composition of natural communities and reducing forage production for livestock and wildlife. Yellow toadflax contains a poisonous glucoside that is reported to be mildly poisonous to cattle (Morishita 1991). However, the plant is considered unpalatable and reports of livestock poisonings are rare.

Habitat: Yellow toadflax has a highly variable habitat that depends on environmental factors such as shading, grazing, and soil type (Saner *et al.* 1994). In Colorado, yellow toadflax is typically found from 6,000 to 8,500 feet. It is abundant on the western slope, but can be found on the eastern slope of the State as well.

Stewardship Summary: Yellow toadflax rapidly colonizes open sites. It is most commonly found along roadsides, fences, rangelands, croplands, clear cuts, and pastures. Disturbed or cultivated ground is a prime candidate for colonization. The seedlings of yellow toadflax are considered ineffective competitors for soil moisture with established perennials and winter annuals (Morishita 1991). However, once established, yellow toadflax suppresses other vegetation mainly by intense competition for limited soil water. Mature plants are particularly competitive with winter annuals and shallow-rooted perennials.

Biology/Ecology: Spring emergence occurs around mid-April and depends primarily on temperature. A smaller fall flush of seedlings can occur in the fall. Prostrate stems emerge in September and produce leaves that are ovate, 0.9-1.5 inches in size. Prostrate stems are tolerant to freezing and are associated with floral stem production the following year (Robocker 1974). The strong, upright floral stems that are characteristic of mature toadflax plants develop after a winter's dormancy, and emerge about the same time as seedlings in mid-April. Flowering occurs from May through August and seeds mature from July through October (Saner *et al.* 1994). Yellow toadflax is self-incompatible and relies on insects for pollination. The two most important pollinators are bumblebees and halictid bees (Zimmerman 1996). A mature plant can produce up to 30,000 seeds annually. A single stem has been reported to contain over 5,000 seeds (Saner *et al.* 1994). These seeds can remain dormant for up to ten years.

Keys to Identification:

- Yellow toadflax can be identified by its yellow, snapdragon-like, flowers.
- It can be distinguished from dalmation toadflax by its leaves. The leaves of yellow toadflax are narrow, lance-shaped, and pointed at both ends. The leaves of dalmation toadflax are shorter, wider, and broad-based.

Yellow toadflax can reproduce vegetatively and this enables a stand of toadflax to spread rapidly. Stems develop from adventitious buds on primary and lateral roots. These buds can grow their own root and shoot system, and become independent plants the next year. Yellow toadflax colonies persist mostly via vegetative means while those of Dalmation toadflax persist both by vegetative and seed reproduction (Lajeunesse 1999).

Control: The key to controlling yellow toadflax is to limit vegetative spread of established colonies (by cutting, pulling, or spraying seed stalks prior to seed set, or by using insects to destroy flowers, seeds, or damage plants). Once current seed production has been controlled, toadflax seedlings that emerge from the soil seed bank must be destroyed every year until the seed bank is diminished.

Hand pulling toadflax before seed set each year can be an effective control method especially in coarse-textured soils where large portions of the roots can be pulled. However, this method must be repeated as long as there are viable seeds in the soil (up to 10 years). Cutting or mowing yellow toadflax reduces the current year growth and possibly seed dispersal, but will not kill the plant. They are not recommended to control any toadflax species (Lajeunesse 1999).

Keys to Control:

- Limit vegetative spread of colonies.
- Destroy seedlings that emerge from the soil seed bank.
- Maintain a cover of native perennial plants to discourage infestation elsewhere.

Effectiveness of herbicides on both toadflax species is highly variable, reflecting in part their high genetic variability (Lajeunesse 1999). Yellow toadflax is difficult to control with herbicides. Herbicides should be applied during flowering when carbohydrate reserves in the root of the plants are at their lowest.

Picloram or dicamba at 1 lb. ai/acre, or glyphosate at 1.5 lb. ai/acre, will kill yellow toadflax plants in some situations. 2,4-D, MCPA, 2,4-DB, MCPB and mecoprop are ineffective on yellow (Lajeunesse 1999).

The Division of Plant Industry's Biological Pest Control Section currently has one species, *Calophasia lunula*, that may be available for redistribution on dalmation toadflax infestations. *C. lunula* larvae feed extensively on leaves and flowers of toadflax, severely damaging the plants.

In agricultural areas, low-till cultivation practices have contributed to the resurgence of toadflax populations (McClay 1992). By not tilling the soil, and subsequently damaging the root system of toadflax plants, toadflax colonies have been able to flourish. Intensive clean cultivation techniques are recommended for successful toadflax control on agricultural land. This requires at least two years with 8-10 cultivations in the first year and 4-5 cultivations in the second year (Morishita 1991).

Burning is not a recommended control method for yellow toadflax (Saner *et al.* 1994). The large, deep root system protects the plant from burning. In fact, areas that have been recently disturbed by fire are susceptible to increased toadflax infestation.

Works Cited

- Lajeunesse, S. 1990. Dalmation and yellow toadflax. In: R.L. Sheley and J.K. Petroff (eds.) *Biology and management of noxious rangeland weeds*. Oregon State University Press, Corvallis. pg. 202-216.
- McClay, A.S. 1992. *Effects of Brachypterolus pulicarius (L.) (Coleoptera: Nitidulidae) on flowering and seed production of common toadflax*. The Canadian Entomologist 124: 631-636.
- Moroshita, D.W. 1991. *Dalmation toadflax, yellow toadflax, black henbane, and tansymustard: importance, distribution, and control*. Pages 399-408 In: L.F. James, J.O. Evans, M.H. Ralphs, and R.D. Child (editors) *Noxious range weeds*. Westview Press, Boulder, San Francisco, and Oxford.
- Robocker, W.C. 1974. *Life history, ecology, and control of dalmation toadflax*. Tech. Bull No. 79. Wash. Agric. Exp. Stn.
- Saner, M.A. 1994. *The biology of Canadian weeds*. 105. *Linaria vulgaris* Mill. Canadian Journal of Plant Science 75: 525-537.
- Zimmerman, J.A.C. 1996. *Ecology and distribution of Linaria vulgaris (L.) Miller, Scrophulariaceae*. USGS Biological Resources Division, Colorado Plateau Field Station-Flagstaff, Arizona. Internet. 01/14/98. Available: <http://www.nbsc.nau.edu/FNF/Vegetation/Exotics/linarititle.html>