

## YELLOW TOADFLAX

(*Linaria vulgaris*)

**Description:** Yellow toadflax, also referred to as butter-and-eggs, jacob's ladder, common toadflax, toadflax, common linaria, and wild snapdragon, is a member of the Scrophulariaceae or figwort family.

Yellow toadflax is a herbaceous perennial with stems that are somewhat woody at the base and smooth towards the top of the plant. Stems of yellow toadflax are sparingly branched and usually 1 to 3 feet tall. Leaves are linear, narrow, pointed at both ends, and usually 1 to 2 inches in length. Leaves of the plant are mainly alternate but may appear to be opposite due to crowding. Both stems and leaves are pale green in color. The flowers that grow at the base of the upper leaves resemble a snapdragon, the upper lip is yellow, the corolla is two-lobed, and the lower lip is three-lobed with an orange spot. A long spur is located at the base of the flower and can be as long as the rest of the flower combined. Yellow toadflax seeds are dark brown to black, 1/12 inch in diameter, and flattened with a papery circular wing.

Yellow toadflax can be distinguished from Dalmatian toadflax by leaf structure. Yellow toadflax has narrow linear leaves and Dalmatian toadflax has broad, heart-shaped leaves.

### Plant Images:



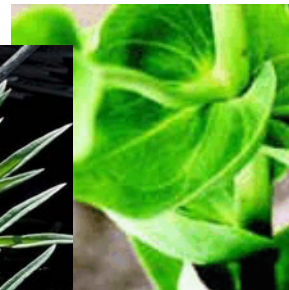
© 2000 Janet Nyak  
Yellow toadflax



Rosette



Yellow toadflax leaves



Dalmatian  
toadflax leaves



Flowers

**Distribution and Habitat:** Yellow toadflax is native to south-central Eurasia and is most commonly found throughout the northeastern United States and throughout southeastern Canada. The plant is also found localized in other parts of the continent. Yellow toadflax occurs in a wide range of habitats but is limited by wet or dark conditions. The plant is often found in well-drained, relatively coarse textured soils. In North America, yellow toadflax occurs on gravelly or sandy soil on roadsides, railroad yards, waste sites, dry fields, grainfields, gardens, pastures, and cultivated fields.

**Life History/Ecology:** Yellow toadflax is a herbaceous perennial that reproduces by seeds and by vegetative root buds. Seedlings begin to emerge in the spring from April to mid-May when soil temperatures warm. Vegetative shoots are also able to regenerate from vegetative buds on root stocks. Roots of mature yellow toadflax can penetrate into the soil 3 feet or more, while lateral roots can be several yards in length. Yellow toadflax flowers from late June through August in North Dakota. Seed production of the plant is highly variable and has been estimated at 15,000 to 30,000 seeds per plant. Seeds may remain viable for a period of ten years or more. Survival of yellow toadflax may rely mostly on vegetative reproduction of roots, due to lower seed production.

Occasional cases of mild poisoning have been reported in cattle; however, the plant is usually avoided by livestock.

**History of Introduction:** Yellow toadflax was introduced in the United States during the mid-1800s as an ornamental. The plant is considered to be naturalized across Canada and parts of the United States. Yellow toadflax continues to be sold commercially as an ornamental plant. In North Dakota, yellow toadflax has been reported in McHenry, Barnes, Stutsman, Stark, Walsh, Burke, Grant, Kidder, Bottineau, Mountrail, Morton, Ward, Dickey, Pierce, Logan, McKenzie, Burke, Ramsey, and Dunn Counties.

**Effects of Invasion:** Yellow toadflax can have a negative impact on rangelands, pastures, cropland, disturbed areas, and roadsides. The plant can displace existing plant communities and associated wildlife. Yellow toadflax often displaces desirable forage plants on rangeland and is generally avoided by cattle. Minimum and no-till farming methods may enable yellow toadflax to invade areas that otherwise may have kept populations at an acceptable level if regularly tilled.

### **Control:**

Management objectives for yellow toadflax control should involve eliminating or reducing seed production and vegetative spread of established populations. Seeds of yellow toadflax can remain viable in the soil for a period of ten years or more, therefore infestations should be monitored for several consecutive growing seasons to prevent germination of new plants. Yellow toadflax spreads mainly by roots of established infestations, therefore programs should emphasize control of vegetative spread before prevention of seed production. Seedlings of yellow toadflax are also very vulnerable to competition, control strategies, and dehydration which should be an important consideration in development of a management plan. Site-specific management efforts are also required to determine the most effective and economical methods for a particular population because yellow toadflax infestations are highly variable and can respond differently to control measures.

*Mechanical* - Pulling yellow toadflax by hand can be effective for small infestations, especially in sandy soils or when soils are moist. Hand pulling should remove as much of the roots as possible and should be repeated for several years to be successful. Cultivation, where feasible, can control yellow toadflax. Cultivation should begin in early June and be repeated every 7 to 10 days. Eradication of plant populations can require at least two years, with four to five cultivations during the second year. Tillage

should be consistent and shallow to prevent spreading of yellow toadflax roots. Mowing is not recommended for yellow toadflax control because the root reserves and buried seeds are not affected. Burning also has not been effective because soil temperatures do not get high enough to kill the roots or buried seeds of the plant. Prescribed burns may stimulate production of vegetative stems and may also increase the competitiveness of yellow toadflax by removing desirable, native species. Further research is needed to determine the effects of prescribed burns for yellow toadflax control.

*Chemical* - Effectiveness of herbicides on yellow toadflax is highly variable. Yellow toadflax is resistant to 2,4-D, MCPA, 2,4-DB, MCPB, or mecoprop. Glyphosate, amitrole, diquat, and picloram can be used for spot treatments. In pasture and rangeland, picloram has been used to control yellow toadflax, but has been found to be ineffective on some sites. Repeated herbicide treatments at high rates are necessary to successfully reduce infestations.

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

*Biological* - Several biological control agents are available to use against yellow toadflax. However, success of these agents remains unknown at this time. A defoliating moth, *Calophasia lunula*, an ovary-feeding beetle, *Brachyterolus pulicarius*, and two seed capsule-feeding weevils, *Gymnaetron antirrhini* and *Gymnaetron netum*, have been released in Canada and the United States. A stem-boring weevil, *Mecinus janthinus*, and a root-boring moth, *Eteobalea intermediella*, have also been released to control yellow toadflax in Canada and the United States. These species each may have some degree of impact on individual plants or on seed production. Documented research on these biological control agents is limited. Currently, biological control is not recommended in North Dakota because of the limited yellow toadflax acreage.

Overgrazing by cattle in the spring can increase the establishment of yellow toadflax by reducing desirable species; therefore, proper stocking rates need to be maintained.

## References:

- Carpenter, A., Murray, T. 1998. Element stewardship abstract for *Linaria genistifolia* (L.) P. Miller *ssp. dalmatica* (L.) Maire & Petitmengin and *Linaria vulgaris* P. Miller. Dalmatian and Yellow toadflax [Online.] Available: <http://tncweeds.ucdavis.edu/esadocs/linadalm.html>. Prepared for The Nature Conservancy, Arlington, VA 17 pp.
- Lym, R. G. 2002. Dalmatian toadflax and yellow toadflax. North Dakota State Univ. Ext. Ser. Circ. W-1239. Fargo, ND.
- Mitich, L. W. 1993. Intriguing world of weeds: yellow toadflax. *Weed Technol.* 7:791-793.
- Saner, M.A., D. R. Clements, M. R. Hall, D. J. Doohan, and C.W. Crompton. 1995. The biology of Canadian weeds. 105. *Linaria vulgaris* Mill. *Can. J. Plant Sci.* 75:525-537.
- Sherry, Lajeunesse. 1999. Dalmatian and yellow toadflax. p. 202-216 *In* R. L. Sheley and J. K. Petroff. *Biology and Management of Noxious Rangeland Weeds*. Corvallis, OR: Oregon State University Press.
- Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, and R. Parker. 2000. *Weeds of the West*.

Zouhar, K. 2003. *Linaria* spp. In: Fire Effects Information System [Online]. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> (January 2005).

Yellow toadflax photographs courtesy of Janet Novak, Connecticut Botanical Society.

Rosette photograph courtesy of Weeds of the West, Tom Whitson.

Yellow toadflax leaves photograph courtesy of T. Breitenfeldt, Montana War on Weeds (<http://mtwow.org>).

Dalmatian toadflax leaves photograph courtesy of King County Noxious Weed Program (<http://dnr.metrokc.gov/wlr/lands/weeds/weedid.htm>).

Flowers photograph courtesy of Biopix.dk.