

DALMATIAN TOADFLAX

(*Linaria genistifolia*)

Description: Dalmatian toadflax is a member of the Scrophulariaceae or figwort family. Dalmatian toadflax is a herbaceous perennial weed with stems that are robust and somewhat woody at the base and smooth towards the top of the plant. Stems of Dalmatian toadflax are waxy and can grow 2 to 3 feet tall. The leaves of the plant are alternate, light green, waxy, and heart-shaped. The base of the leaf tends to clasp the stem. Flowers, which grow at the bases of upper leaves, resemble a snapdragon and are bright yellow with an occasional orange colored throat. A long spur is located at the base of the flower and can be as long as the rest of the flower combined. Dalmatian toadflax seeds are disk-shaped 0.08 inch in diameter, dark brown to black in color, and often have irregular papery wings.

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

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



Dalmatian toadflax

Plant Images:



Rosette



Dalmatian toadflax leaves



Yellow toadflax
leaves



Flowers

Distribution and Habitat: Dalmatian toadflax is native to the Mediterranean region. The plant is often found in well-drained, relatively coarse-textured soils varying from coarse gravels to sandy loams. Dalmatian toadflax is highly competitive in areas where summers tend to be dry. Dalmatian toadflax can establish on roadsides, near dwellings, vacant lots, cemeteries, gravel pits, fields, waste areas, and other disturbed sites.

Life History/Ecology: Dalmatian toadflax is a deep-rooted, short-lived herbaceous perennial plant that reproduces by seeds and by vegetative buds on the roots. Seedlings usually emerge first on south- or southeast-facing slopes in early spring when soils warm. In eastern Washington, emergence begins in the first or second week in March and lasts until the first or second week in April. Vegetative shoots are also able to regenerate from vegetative buds on root stocks. Roots of mature Dalmatian toadflax can penetrate four to ten feet into the soil. Dalmatian toadflax flowers from late June through August in North Dakota. Seed production of the plant is highly variable and has been estimated at up to 500,000 seeds per plant. Seeds may remain viable for a period of ten years or more. New infestations of Dalmatian toadflax usually originate from seed; however, established stands of Dalmatian toadflax can spread by both seed and vegetative production.

History of Introduction: Dalmatian toadflax was cultivated as an ornamental for nearly four centuries in Europe and was brought to the west coast of North America as an ornamental in 1874. Heaviest infestations of Dalmatian toadflax are found in the northwestern United States. Dalmatian toadflax was first recorded in North Dakota in 1937 at Walhalla in Pembina County. Currently in North Dakota, the plant has been recorded in Slope, Ward, Kidder, and McHenry Counties.

Effects of Invasion: Once established, Dalmatian toadflax can become a concern in pasture and rangelands, as well as natural areas where the plant may displace more desirable native species. Dalmatian toadflax can cause economic impacts on rangelands and wildlife habitats due to a reduction in cattle-carrying capacity and land depreciation.

Control:

Management objectives for Dalmatian toadflax control should involve eliminating or reducing seed production and vegetative spread of established populations. Seeds of Dalmatian 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. Seedlings of Dalmatian toadflax are also very vulnerable to control strategies, competition, and dehydration which should be an important consideration in the 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 Dalmatian toadflax infestations are highly variable and can respond differently to control measures. Control methods should be combined into an integrated management system for the best long-term control of the plant.

Mechanical - Pulling Dalmatian toadflax by hand can be effective for small infestations, especially in sandy soils or when soils are moist because more of the root system can be removed. Cultivation, where feasible, can control Dalmatian toadflax. Cultivation should begin in early June and be repeated every seven to ten days. Eradication of plant populations may require at least two years, with four to five cultivations the second year. Mowing is not recommended for Dalmatian toadflax control because the root reserves and buried seeds are not affected. However, mowing flowering stems prior to seed production for several consecutive years can stress plants and reduce seed production. Burning has not been an effective control measure since soil temperatures do not get high enough to kill the roots of the plant. Dalmatian toadflax infestations may be enhanced following a prescribed burn because the disturbance may favor growth and reproduction of the plants. In one study, a spring prescribed burn increased Dalmatian toadflax biomass and seed production after one growing season but did not affect density or cover.

Chemical - Effectiveness of herbicides on Dalmatian toadflax is highly variable. The waxy leaf surface of Dalmatian toadflax provides a protective barrier that may hinder herbicide uptake. In pasture and

rangeland, picloram, imazapic, and chlorsulfuron have been used to control Dalmatian toadflax. Repeated herbicide treatments at high rates are necessary to successfully reduce infestation.

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

Biological - Several biological control agents are available for use against Dalmatian 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 Dalmatian 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 Dalmatian toadflax acreage.

Sheep may suppress stands of Dalmatian toadflax and limit seed production. In Montana, preliminary results of field trials indicated that 35 to 45 percent of Dalmatian toadflax foliage was stripped including the terminal 6 to 10 inches of the plant stems when ewes and lambs were placed in a hilly rangeland area of moderate to heavy infestations. Sheep continued to consume Dalmatian toadflax populations even though other forages were present. Further research is needed to determine the effectiveness of grazing for Dalmatian toadflax control. Generally, overgrazing by livestock can increase establishment of the plant because the disturbance allows Dalmatian toadflax to effectively out-compete other grazed plants.

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Dalmatian toadflax and rosette photograph courtesy of Weeds of the West, Tom Whitson.

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

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