

**DRAFT WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD**
(March 1997)

Scientific Name: *Linaria dalmatica* (L.) P. Mill. ssp. *dalmatica*

Common Name: Dalmatian toadflax

Family: Scrophulariaceae

Legal Status: Class B:

- (a) regions 1, 2, 5, 8, 10
- (b) Douglas Co. of region 3 lying south of T25N, west of R25E, and east of R28E.
- (c) Okanogan Co. lying within T33,34,35N, R19,20,21 22E, except the SW, SE and NE quarters of the NE quarter of S27, T35N, R21E; and the NE quarter of the SE quarter of S27, T35N, R21E.
- (d) Kittitas, Chelan, Douglas and Adams Counties of region 6.
- (e) Intercounty Weed Dist. No. 51.
- (f) Weed Dist. No. 3 of Grant Co.
- (g) Lincoln and Adams Counties.
- (h) the western 2 miles of Spokane Co. of region 7.
- (i) region 9 except as follows:
 - (i) those areas lying within Yakima Co.
 - (ii) those areas lying west of the Klickitat River and within Klickitat Co.

Description and Variation: Dalmatian toadflax is an erect, short-lived, perennial herb, 0.8 to 1.5 m tall. The plant is hairless and glaucous, growing from a woody, branching base. The light green, waxy, alternate leaves are heart-shaped and clasp the stem. Flowers are bright yellow tinged with orange and resemble snapdragon flowers. The petals have two lips; the upper lip is 2-lobed while the lower one is 3-lobed. Individual flowers are nearly sessile, occurring in long, terminal racemes (USDA-ARS 1971; Morishita 1991).

Economic Importance: *Beneficial* - Because of its showy flowers, Dalmatian toadflax has been cultivated as an ornamental (Alex 1962).

Detrimental - Mature Dalmatian toadflax plants are strongly competitive. Studies indicate that plots without Dalmatian toadflax may produce 2.5 times as much grass as plots with toadflax (Robocker 1974). Mature plants are especially competitive with shallow-rooted perennials and winter annuals. Because of its competitive ability, Dalmatian toadflax is a concern in pasture and rangelands, as well as natural areas, where it may outcompete more desirable, native species.

Geographic Distribution: In its native habitat, Dalmatian toadflax occurs from the Dalmatian coast of the former Yugoslavia to Romania, Bulgaria, Albania, Greece, Crete, Turkey, Azerbaijan, Syria, Iran, and Iraq. Its Old World latitudinal range is roughly 35° N to 47° N. In North America, the species is known from at least 15 states and six Canadian provinces, with a latitudinal range of 35° N to 56° N (Alex 1962).

Habitat: In North America, Dalmatian toadflax occurs in a variety of habitats, including: roadsides, pastures, rangeland, and waste areas. It has spread most extensively west of the 100th meridian, occurring primarily on coarse-textured soils, ranging from sandy loams to coarse gravels (Alex 1962).

History: Because of its showy flowers, Dalmatian toadflax has been cultivated since the 16th century and has subsequently become widely distributed throughout the world. Dalmatian toadflax was probably introduced to North America in the late 1800's as an ornamental. The first records of the species in Washington date back to the 1920's, when the species was collected near Spokane (1926) and Bingen (1927) (Alex 1962).

Growth and Development: Dalmatian toadflax is a short-lived perennial. Seedlings generally germinate in the spring. After germination, a primary stem emerges, which may be joined by one to three adventitious stems that develop from the hypocotyl of the seedling; both types of stems can produce flowers. Prostrate vegetative stems also develop adventitiously from the crown and roots of the seedling. The prostrate stems persist over winter and then die when the floral stems begin to develop. Plants produce one to 25 floral stems in the spring, flowering in May. The average life span of a Dalmatian toadflax plant is three years, during which time the plant may produce half a million seeds (Robocker 1974).

Reproduction: Dalmatian toadflax is a perennial species that spreads by horizontal or creeping rootstocks and by seed. A mature plant can produce up to 500,00 seeds, which are primarily dispersed by wind. Seeds may live up to ten years in the soil (Robocker 1974; Morishita 1991). Most seedlings emerge in the spring when soil temperature reaches 8° C at 2.5 cm. Germination in the fall is probably limited by soil water content, as well as possibly seed dormancy (Robocker 1974).

Response to Cultural Methods: Intensive clean cultivation can effectively control Dalmatian toadflax. A successful approach includes at least a two year effort, with eight to ten cultivations in year one and four to five cultivations in year two (Morishita 1991; Butler and Burrill 1994). Cultivation should begin in early June and be repeated so that there are never more than seven to ten days with green growth visible (Butler and Burrill 1994). Since Dalmatian toadflax seedlings do not compete well for soil moisture against established winter annuals and perennials, control efforts should include attempting to establish and manage desirable species that will compete with toadflax (Morishita 1991; Butler and Burrill 1994).

Response to Herbicides: Picloram, picloram + 2,4-D, and dicamba all provide effective control, although repeated applications of dicamba may be necessary to achieve complete control (Ferrell and Whitson 1988; William et al. 1996).

Bio-Control Potentials: *Calophasia lunula*, a defoliating moth, is well-established in Washington and reportedly provides good control (William et al. 1996).

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**References available from the Washington State Noxious Weed Control Board Office in Kent.*

Rationale for listing: Mature Dalmatian toadflax plants are strongly competitive, especially with shallow-rooted perennials and winter annuals. Because of its competitive ability, Dalmatian toadflax causes negative impacts in pasture, rangelands, and natural areas, where it may outcompete natives or other desirable species. Dalmatian toadflax is still of limited distribution in many parts of Washington. By listing Dalmatian toadflax as a Class B noxious weed, it becomes possible to require control in designated areas, thus preventing its continued spread and decreasing its economic and environmental impacts.