Dalmatian and Yellow Toadflax (*Linaria dalmatica and L. vulgaris*)

Identification Dalmatian and yellow (or common) toadflax are members of the Plantaginaceae (plantain) family, and are easily recognized by their snapdragon-like yellow flowers (right) with a single long spur. Flowers can bloom from early summer until killing frost. Dalmatian ranges in height from 15-60"; yellow is shorter, from 7-32" tall. Dalmatian toadflax's broad, fleshy and heart-shaped leaves clasp the stem (below left); yellow toadflax leaves are long, linear and noticeably less succulent (below).

Impacts

Under ideal conditions, toadflax can form large colonies and crowd out other vegetation. Once established, high seed production and vegetative reproduction allow for rapid dispersal and high persistence. A rhizomatous growth habit makes eradication of toadflax difficult. Yellow toadflax can significantly reduce crop yields; both species can reduce the abundance of grasses and forbs in native communities. In one study, toadflax-free plots produced 2.5 times more grass than plots where it was present.

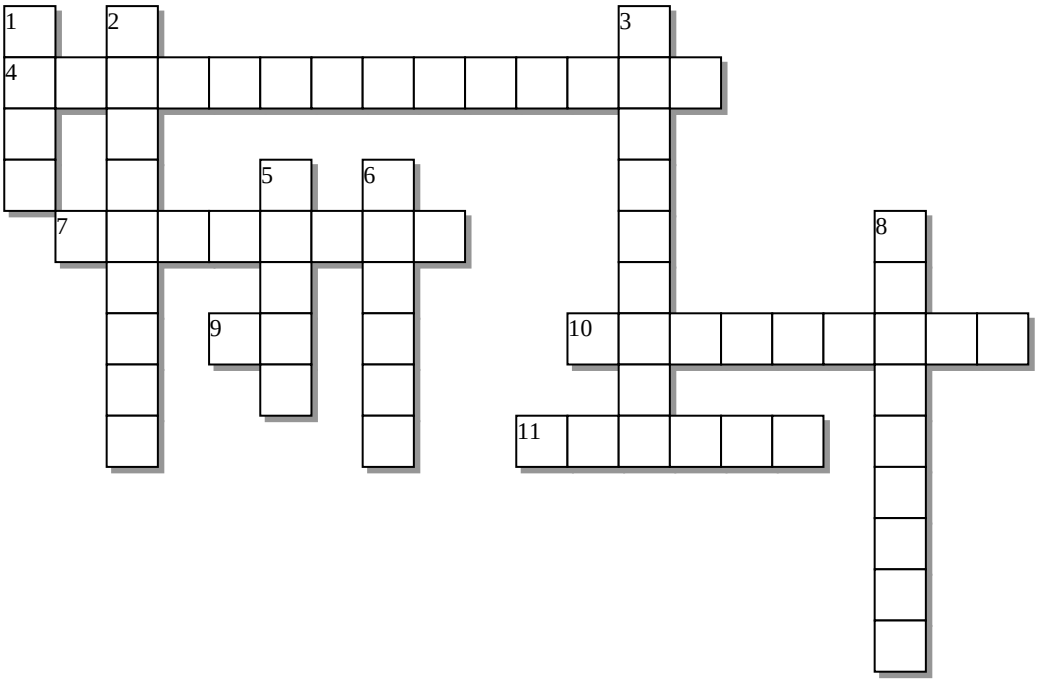
Habitat Plants occur in a variety of open-canopy habitats, from grass- or shrub-lands to forests, in disturbed locations such as roadsides, steep slopes, waste-lands (e.g. mine tailing piles, slash piles), and in cultivated fields. Dalmatian toadflax is more common in dry, coarse-textured soils, while yellow toadflax is associated with moister soils.

Spread Plants reproduce by seed and root buds. Seeds have no appendages to enable wind dispersal or attachment to animals. Most seed is found within five feet of the mother plant. Long distance dispersal occurs when seeds are consumed and eliminated intact by birds or other wildlife or livestock.

Management Priorities The toadflaxes are priority 2B noxious weeds in Montana, meaning management criteria will require eradication or containment. An integrated management approach combining various control strategies is strongly recommended. The efficacy of herbicides for treating toadflax ranges from very good in some applications to nearly no control in other applications of the same treatment. An extensive, deep root system, along with a waxy cuticle on the leaves (inhibiting herbicide uptake) makes mature plants very difficult to control. Control depends on the surrounding plant community. Research on Dalmatian toadflax shows that in areas with high cover of native forbs and low cover of toadflax, herbicides did more harm than good because herbicides decreased competing forbs and toadflax recovered more quickly given the absence of competition. Estimates from other studies suggest that when Dalmatian toadflax flowering density is less than 10 flowering stems/m^2, herbicide applications are likely not justified. If herbicides are used, they are most effective if coupled with reseeding or other actions to reinvigorate the surrounding vegetation. Several biological control species have been released against toadflax, with results varying according to agent and location. The most effective has been the stem mining weevil, *Mecinus janthinus* (on yellow toadflax) and *M. janthiniformis* (on Dalmatian toadflax).

Alert: Dalmatian and yellow toadflax are hybridizing in Montana! Hybrid leaves are intermediate in shape between Dalmatian and yellow, complicating accurate identification (right). Dr. Sharlene Sing (see April 2012 Weed Post for more info) and colleagues are researching the wide-ranging management implications of toadflax hybridization. Preliminary results from Colorado State University and MSU graduate student research projects indicate that hybrid toadflax is not only more fit than either of the parent species, but also that biological control is significantly complicated by target weed hybridization. Field observations suggest that hybrids also differ in their response to herbicide, necessitating follow-up studies that are now underway in Montana and Colorado.

Weed Post Puzzle: Test your knowledge of the toadflaxes



Across:

4 - Toadflax used to belong to the figwort family (Scrophulariaceae); now all *Linaria* belong to this family

7 - Toadflax reproduces vegetatively through root buds on these

9 - Priority level of toadflaxes in Montana

10 - Descriptive attribute of sites where toadflax infestations frequently arise

11 - Like a Dalmatian dog's spots, Dalmatian leaves are typically broad, while yellow toadflax leaves are

Down:

1 - Toadflax's distinctive snapdragon-like flowers are easily recognized by this obvious morphological character

2 - *Mecinus* _____ is the stem mining weevil that feeds on yellow toadflax

3 - This toadflax is more common on dry, coarse-textured soils

5 - With high cover of native _____, and low cover of toadflax, herbicide may do more harm than good

6 - A long nosed insect that loves to eat toadflax

8 - Term to describe what happens when reproduction occurs between two distinct species

Solutions are posted to the MSU Extension Invasive Rangeland Weed website:
http://www.msuextension.org/invasiveplantsMangold/extensionsub.html

MONTANA STATE UNIVERSITY EXTENSION

Montana noxious weed Education Campaign