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# Dyer's Woad (*Isatis tinctoria*)

## Provincial Designation: Prohibited Noxious



Photos: Steve Dewey, Utah State University, Bugwood.org

### Habitat:

Dyer's Woad thrives in light sandy to gravelly soils and will even grow in rocky soil.<sup>5</sup> Unlike other mustards, it does not require disturbance to become established. Infestations often begin along roadsides or in gravel pits and then spread into crops, rangeland and open forests.<sup>4</sup> Seeds from plants growing along waterways can float downstream and become established on sandbars or riverbanks.<sup>6</sup>

### Identification:

**Stems:** Erect, somewhat woody, ranging in height from 60-120 cm<sup>4</sup>, and often heavily branched in the upper portion.<sup>7</sup> Often 5-8 stems will emerge from a single crown.<sup>2</sup>

**Leaves:** Rosette leaves are stalked and elongated, with the widest portion near the tip.<sup>6</sup> Margins range from smooth to slightly hairy.<sup>8</sup> They are bluish-green and covered with soft

hairs.<sup>2</sup> Key identifying features are the distinct cream-colored midrib and powdery white film on the upper leaf surface. Upper stem leaves are alternate, clasping and hairless.<sup>7</sup>

**Flowers:** Tiny yellow flowers (3mm in width) are located in dense, flat-topped racemes.<sup>7</sup> Each flower has the four petals in a cross-shape characteristic of the mustard family.

**Fruits and Seeds:** Fruits are purplish-brown, tear-drop shaped, winged and pendulous.<sup>2</sup> Each seedpod produced one or two brownish-yellow, cylindrical seeds.<sup>5</sup>

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### Overview:

Dyer's Woad is a winter annual, biennial or short-lived perennial in the mustard family that is native to southeast Russia. It was introduced to the eastern United States in the 17th century as a source of indigo dye and as a medicinal herb.<sup>1</sup> Dyer's Woad failed to naturalize in the east but became established in the drier regions of Utah, Idaho, Wyoming, California, Oregon, Nevada and Montana. There is some evidence to suggest that it also entered the western U.S. as a contaminant of alfalfa seed.<sup>2</sup>

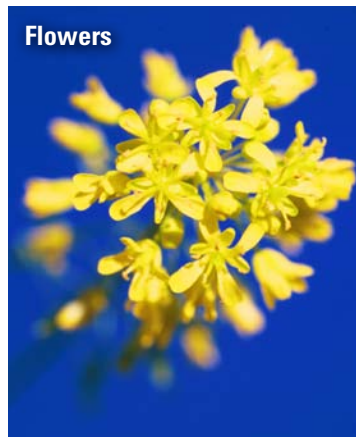
Once introduced, Dyer's Woad can spread rapidly. A single infestation in Montana increased from 0.8 to 40.5 ha in two years.<sup>3</sup> Annual losses in crop yield and range production of \$2 million are attributed to the plant in northern Utah.<sup>1</sup>

Plants of Dyer's Woad can produce as many as 10,000 seeds per year.<sup>4</sup> The fruits contain a water soluble compound that inhibits germination and root growth of its own seedlings and those of competing plants until leached away by rainwater. The result is that large numbers of viable seeds may enter the seedbank waiting for favorable moisture levels to occur.<sup>1</sup>



Photo: Keith Weller, USDA Agricultural Research Service, Bugwood.org

# Dyer's Woad (continued)



Photos: Steve Dewey, Utah State University, Bugwood.org

## Prevention:

Early recognition and immediate action are the most important control measures for Dyer's Woad. Once detected, hand-pulling can be very effective. For best results, plants should be removed by flowering and the area checked once again 2-3 weeks later for any that might have been missed.<sup>6</sup> Plants in flower should be bagged and burned when fully dry.<sup>5</sup>

## Control:

**Mechanical:** Cultivation of the rosettes prior to bolting and flowering can eliminate newly established populations.<sup>2</sup> Mowing is less effective due to the woody stems and the ability of the plants to resprout from the crown.<sup>9</sup>

**Grazing:** Dyer's Woad is unpalatable but not toxic. Cattle refuse to graze it which enhance its spread in pastures or rangeland.<sup>1</sup> Sheep readily consume the shoots up to flowering and thus may be suitable for control in these areas.

**Chemical:**<sup>11</sup> Dyer's Woad in the U.S. has been effectively controlled with the use of specific herbicides.<sup>2,5</sup> Picloram and dicamba provide relatively poor control of Dyer's Woad.<sup>6</sup>

Product labels should be checked carefully to ensure use is approved. Consult the Ag-Info Centre: 310-FARM (3276), or your local Agricultural Fieldman or IPM Specialist for more information.

**Biological:** A native rust pathogen, *Puccinia thlaspeos*, readily infects the rosettes of Dyer's Woad. However symptoms are rarely obvious until the second year. The bolted stalks have yellowish, malformed leaves and flowers are rarely produced.<sup>10</sup> In Utah and Idaho, patches have been successfully controlled when chopped, rust infected plants were distributed as mulch over infestations from planes, helicopters and ground rigs.<sup>2</sup>

## REFERENCES

- 1 [http://www.nwcb.wa.gov/weed\\_info/written.findings/Isatis\\_tinctoria.html](http://www.nwcb.wa.gov/weed_info/written.findings/Isatis_tinctoria.html)
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- 3 Pokerny, M.L. and J.M. Krueger-Mangold. 2007. Evaluating Montana's Dyer's Woad (*Isatis tinctoria*) Cooperative Eradication Project. *Weed Tech.* 21: 262-269
- 4 <http://www.whitman.wsu.edu/weeds/dyerswoad.html>
- 5 <http://www.colorado.gov/ag/weeds>
- 6 Kedzie-Webb, S., R. Sheley and S. Dewey. Dyer's Woad: A Threat to Rangeland in Montana. Montguide MT9614
- 7 Belt, J., D. LaFleur and M. Sladek 2009. Invasive Plants of the Crown of the Continent. Crown of the Continent Research Learning Center
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- 9 [http://www.na.fs.fed.us/fhp/invasive\\_plants](http://www.na.fs.fed.us/fhp/invasive_plants)
- 10 Stirk, W.A., S.V. Thursen, J. van Stander. 2006. Effect of rust-causing pathogen (*Puccinia thlaspeos*) on auxin-like and cytokinin-like activity in dyer's woad. *Weed Sci.* 54: 815-820
- 11 Always follow the product labels. The use of pesticides in any manner not published on the label or registered under the *Minor Use of Pesticides* regulation constitutes an offence under both the *Federal Pest Control Products Act* and *Alberta's Environmental Protection and Enhancement Act*.