

Identification, Livestock Toxicity and Control of Hoary Alyssum in Christmas Tree Plantations and Forages

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Hoary alyssum (*Berteroa incana*) is an invasive weed in the mustard (Brassicaceae) family. This plant has invaded Christmas tree plantations, hayfields, pastures and other disturbed, non-managed lands in Michigan. Introduced from Europe, hoary alyssum is capable of forming dense stands and outcompeting native vegetation and forages. The range of hoary alyssum in North America is across southern Canada from coast to coast and south to Virginia, Tennessee, New Mexico and Nevada. Hoary alyssum thrives in dry conditions, especially sandy and gravelly soils. Michigan and British Columbia regulate hoary alyssum as a noxious weed. In addition to its invasive and competitive nature, hoary alyssum is toxic to horses – consumption of contaminated forage can lead to death in severe cases.

Horse owners and hay producers should be able to identify and manage hoary alyssum to avoid animal injury. Christmas tree growers need to recognize and control hoary alyssum to improve growth and productivity of their crop.

Biology/Identification

Hoary alyssum can exist as an annual, biennial or short-lived perennial that reproduces only by seed. It emerges early in the spring and is capable of producing seeds until frost. The stems, leaves and fruit of hoary alyssum



Hoary alyssum flowering plant.



Hoary alyssum flowers.

are covered with gray, star-shaped hairs that give the plant a grayish green appearance. The name “hoary” denotes the gray hairs covering all parts of the plant.

Hoary alyssum first forms a basal rosette of leaves, which is followed by erect, stiff, up to 4-foot-tall stems with many

branches near the top. Basal leaves are hairy, oblong and up to 3 inches long with smooth to slightly wavy margins and long stalks. Stem leaves are similar but smaller and alternate and gradually become stalkless toward the top of the plant.

Hoary alyssum produces numerous white flowers with four petals so deeply divided that they resemble eight petals. Flowers are formed in elongated clusters. The fruit is a hairy, oval and slightly flattened, grayish green seed pod with a short beak on the end. Seed pods are usually held close to the stems and yield oblong, rough, narrowly winged, grayish to reddish brown seeds. Seed production is prolific; seeds germinate immediately after maturation and year round.

Clinical Signs/Toxicity

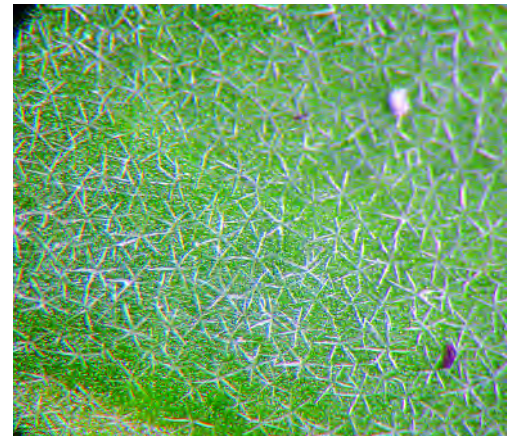
Field reports from veterinarians and feeding studies conducted by university researchers have shown that hoary alyssum can be poisonous to horses. Researchers at the University of Minnesota reported that ingesting hay con-



Hoary alyssum seedling.



Hoary alyssum seed pods.



The stems, leaves and fruit of hoary alyssum are covered with gray, star-shaped hairs.

taining a high level of hoary alyssum can cause horses to experience depression and “stocking up,” swelling of the lower legs. Fever and short-term diarrhea may also follow consumption of this plant. These symptoms are usually observed 12 to 24 hours following ingestion of hoary alyssum in hay or pasture. Symptoms normally subside two to four days after the horses are removed from the source.

In extreme cases, severe swelling of the lower legs, apparent founder, stiffness in joints and death have been observed in horses ingesting hay with high percentages (30 to 70 percent) of hoary alyssum. Results from the ingestion of hoary alyssum are somewhat variable. In one study, only about half of the horses showed any clinical signs of toxicity after ingesting hay with 30 to 70 percent hoary alyssum. The clinical signs are milder when horses ingest lower percentages of this plant. It is recommended that hay containing greater than 30 percent hoary alyssum not be fed to horses.

Management in Christmas Trees

Hoary alyssum management in Christmas trees may be difficult. The weed tends to be fairly tolerant of many herbicides, seeds can germinate throughout the year, and the weed can become established easily in bare soil. Planting ground covers between trees may prevent or reduce hoary alyssum establishment. Mulching may also be an effective non-chemical control, but mowing will only eliminate portions of the plants and will not prevent seed production.

In MSU research trials, several herbicides provided adequate control in the spring, including simazine (Princep) plus oxyfluorfen (Goal 2XL) (with or without glyphosate), flumioxazin (SureGuard) plus glyphosate, triclopyr (Garlon 3A), 2,4-D and hexazinone (Velpar) (Table 1).

Application timing is an important aspect of hoary alyssum control. Flumioxazin (SureGuard) plus glyphosate provides better control when applied in the fall rather than in the spring. However, triclopyr (Garlon) and glyphosate alone provide better control when applied in the spring. Because hoary alyssum germinates year round, fall applications of herbicides without residual activity may control the weeds present at the time of application, but continued germination and emergence will produce new plants. Likewise, residual herbicides

Table 1. Hoary alyssum control in Christmas trees with selected spring-applied herbicides.^{a,b}

Herbicide	Rate	Control ^c	
		1 MAT	4 MAT
		----- % -----	
glyphosate (Roundup Original)	1 qt/A	84	77
glufosinate (Derringer F)	1 gal/A	95	50
bentazon (Basagran T/O)	1 qt/A	53	40
triclopyr (Garlon 3A)	2 qt/A	88	88
2,4-D (Weedar 64)	1.5 qt/A	95	89
atrazine (Aatrex 4L)	1 qt/A	43	40
hexazinone (Velpar DF)	1.3 lb/A	96	90
LSD ^d (0.05)		10	24

^a Treatments applied 4/14/04 near Hart, Mich.

^b Weed control visually rated on 0 to 100 percent scale: 0 = no control and 100 percent = complete control.

^c MAT = months after treatment.

^d LSD = Least significant difference.

will suppress new emergence but may not control emerged weeds. Therefore, residual herbicides or tank mixes with residual herbicides should be applied in the fall, and foliar-applied herbicides provide better control in the spring.

Management in Forages

In addition to its apparently toxic properties, hoary alyssum can reduce the overall quality, palatability and yield of forages. High levels of mature hoary alyssum in hay can decrease the crude protein and digestibility of the forage and may also reduce animal preference for the forage. Hoary alyssum is very competitive with forage growth when the crop is stressed and can result in significant reductions in yield.

Proper hay and pasture management is essential to prevent or minimize the invasion of this weed species.

Hoary alyssum tends to become a problem in pastures

and hayfields following a period of stress, which could be caused by factors such as drought, winterkill, overgrazing or poor soil fertility. Following good crop management practices during establishment and providing the necessary nutrients for maintenance of the forage are the basis of an effective weed control program.

Factors such as proper planting date, seeding rate and variety selection, as well as insect control, adequate soil fertility, controlled grazing and a proper cutting schedule are important management practices that will provide optimum conditions for a vigorous forage crop. When establishing new forages, it is imperative that weeds be controlled before initial seeding. In conventional tillage systems, weeds are often controlled by seedbed preparation; burndown herbicides are used when no-tillage practices are employed. During the seeding year, MCPA and 2,4-DB will provide fair to good control of hoary alyssum (Table 2). MCPA may be used when the forage is seeded with a companion crop.

Table 2. Hoary alyssum response to herbicides in forage legumes and grasses.

Type of forage	Type of application	Crop tolerance ^a	Herbicide formulation/A	Herbicide effectiveness ^b
Seedling legumes				
bromoxynil (Buctril/Moxy ^c)	Postemergence	3	.1 pt 2S	Fair
EPTC (Eptam)	Preplant incorporated	2	3.5 pt 7E	Fair
pronamide (Kerb)	Postemergence	1	1.5 lb 50W	Poor
MCPA ^d	Postemergence	4	.05 pt 4L	Good
imazethapyr (Pursuit ^c)	Postemergence	2	.4 oz 2S 1.4 oz 70DG	Fair/Good
2,4-DB (Butoxone/Butyrac)	Postemergence	2	.2 qt 2L	Fair
Established legumes				
metribuzin (Sencor)	Dormant ^e	3	.1 pt 4L 0.67 lb 75DF	Good
terbacil (Sinbar)	Dormant ^e	3	.125 lb 80W 1 qt 2L	Good
hexazinone (Velpar)	Dormant ^e	3	.066 lb 75DF 0.55 lb 90SP	Excellent
Forage grasses				
dicamba (Banvel/Clarity)	Postemergence	2	.1 qt 4L	Good
2,4-D ester	Postemergence	2	.1 qt 4L	Good

^a Crop tolerance: 1 = Minimal risk of crop injury; 2 = Crop injury can occur under certain conditions (soil-applied – cold, wet; foliar-applied – hot, humid); 3 = Severe crop injury can occur. Follow precautions under Remarks and Limitations in MSU Extension bulletin E-434, “Weed Control Guide for Field Crops,” and on the label; 4 = Risk of severe crop injury is high. Recommended only in rescue situations.

^b The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide’s effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

^c Apply to alfalfa only.

^d Use only when the forage is established with a small grain companion crop.

^e Apply to dormant alfalfa in late fall or early spring.

In established forage legumes, an application of metribuzin (Sencor), terbacil (Sinbar) or hexazinone (Velpar) in late fall or early spring to dormant alfalfa will provide the most effective control of hoary alyssum (Table 1).

Hexazinone (Velpar) may be applied to forage stubble between cuttings. No other effective herbicide options exist beyond these. Be sure to look at the rotation restrictions of hexazinone (Velpar) before planting sensitive crops in areas treated with this herbicide.

In forage grasses, dicamba (Banvel/Clarity) and 2,4-D ester applied in fall or spring should provide good control or suppression of actively growing hoary alyssum.

Warning for southwestern Michigan in areas where grapes are grown (parts of Berrien, Cass, Kalamazoo and Van Buren counties): a 2,4-D and MCPA exclusion zone is enforced by the Michigan Department of Agriculture. In this zone, it is illegal to apply ester formulations of 2,4-D and MCPA from May 1 to October 1. Amine formulations of 2,4-D and MCPA can be applied in this zone with spray pressures not to exceed 40 psi. There are no restrictions on dicamba. However, extreme caution should be used when applying dicamba-containing products in close proximity to grapes – significant injury can occur.

Many pastures and hayfields grown for horse consumption are commonly grass-legume mixtures. Unfortunately, there are no herbicides labeled for control of broadleaf



Hoary alyssum flowers.

weeds in forage mixtures without the possibility of detrimentally affecting the forage legume as well. Consult MSU Extension bulletin E-434, “Weed Control Guide for Field Crops,” and the product label for harvest and rotation restrictions as well as other pertinent information.

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