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G83-681 Velvetleaf

Fred Roeth
University of Nebraska - Lincoln, fwroeth41@gmail.com

Russell Moomaw
University of Nebraska - Lincoln

Alex Martin
University of Nebraska - Lincoln, amartin2@unl.edu

Orvin Burnside
University of Nebraska - Lincoln

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NebGuide

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Velvetleaf

This NebGuide provides guidelines on how to control velvetleaf by prevention, cultural and mechanical methods, and by use of recommended herbicides.

Fred Roeth, Extension Weeds Specialist
Russ Moomaw, Extension Crops and Weeds Specialist
Alex Martin, Extension Weeds Specialist
Orvin Burnside, Professor of Agronomy (Weed Science)

Velvetleaf (*Abutilon theophrasti* Medic.), a member of the Mallow family, is related to cotton, hollyhocks, and numerous weeds. Other common names include buttonweed, Indian mallow, butterprint, piemarker, velvetweed, and cottonweed. The preferred name, velvetleaf, amply describes its velvety-textured, hairy-surfaced leaves.

A native of China and presumably introduced into the U.S. from India as a fiber crop, this annual weed is adapted to cropland throughout most of the United States. Over the past 10 years, velvetleaf has increased dramatically in Nebraska and is now considered one of our most troublesome weeds.

Characteristics

Seed

Velvetleaf grows only from seeds that germinate throughout the growing season. Triggered by daylength, flowering begins in July and continues until there is a killing frost. Mature seed is present about 3 weeks after flowering. The seed capsule has 13 to 16 sections (called carpels), each containing 2 to 3 seeds. A velvetleaf growing full season in a soybean field produces 30 to 50 capsules; a plant

without competition produces two to four times more.

Figure 1. A maturing velvetleaf plant capable of producing five to ten thousand seeds before a killing freeze.

Velvetleaf seeds exhibit considerable dormancy which can enable them to survive over 50 years in the soil. Scarification of the hard seed coat by microbial action, soil action, or tillage permits water entry and germination. Maximum germination occurs in the top 2 to 3 inches of soil, but ceases below 6 inches.

A study of six velvetleaf-infested, continuous corn fields in Hamilton County, Nebraska, showed that velvetleaf seed population increased 71 percent from August 1977 to November 1978. All fields sampled showed an increase in velvetleaf numbers. In November 1978, fields averaged 27 million seeds per acre, with 67 percent in the top 4 inches of soil. Because of seed dormancy, only one million seeds germinated and decayed per year. Each velvetleaf plant produced an average of 40 seeds. But each field averaged about 150 thousand velvetleaf plants per acre, thus producing about 6 million seeds per acre per year.

Although these fields had velvetleaf as a primary problem before the study began, they probably represent the velvetleaf trend throughout Nebraska. Such population explosions compound the control problem.

Competition

The root growth rate of velvetleaf exceeds that of redroot pigweed, green foxtail, and several other weeds. Although soybeans and corn will outgrow velvetleaf initially, velvetleaf will catch up and often exceed the height of these crops by mid-season. Velvetleaf grows most rapidly about 6 to 8 weeks after emergence. Because velvetleaf produces sugars at a relatively efficient rate in low sunlight, it grows well even when partially shaded. This attribute enables late emergers to produce seed under a crop canopy.

At a density of one plant per foot of row, velvetleaf will reduce soybean yields by 10 to 30 percent over a full season. Losses are probably similar in other crops, except in sugarbeets where one velvetleaf per 16 feet of row reduced beet root yield by 14 percent in Colorado.

Removing velvetleaf by the fourth week after emergence normally prevents crop competition losses. In a Kansas study velvetleaf that emerged more than 20 days after soybeans did not affect crop yield. Such weeds, however, do produce seeds and can interfere with harvest.

Problems with velvetleaf arise from its seed dormancy, robust seedling vigor, variable emergence time, and its ability to produce seed under competition. However, equally important factors are such trends in production practices as herbicide combinations that do not use full rates of atrazine (in corn and sorghum), decreasing postemergence use of 2,4-D in corn and sorghum, and the increasing acreage of soybeans.

Control Practices

Prevention

Multiple control efforts are usually needed for velvetleaf in row crops. Though competition is greatly reduced by early season control, late emergers produce seed and may interfere with harvest operations. Once velvetleaf becomes established in a field, even intensive efforts cannot eradicate it. Therefore, preventive practices to reduce the chances of its introduction into a clean field should receive high priority.

Much velvetleaf seed is spread at harvest, so roguing scattered plants and cleaning the combine are sound practices. Game animals and domestic livestock can also introduce it because velvetleaf seed can pass through these animals intact. Vigilance for any new velvetleaf infestation is rewarded in the long run.

Cultural

Management that favors the crop and its competitive ability is advantageous in reducing the effects of weeds. Quick shading by the crop will help suppress velvetleaf.

Crop rotation varies the cultural, mechanical, and chemical control practices from year to year and prevents the formation of a continuously favorable habitat in which the weed's population can explode. Rotations also aid crop vigor and production.

Mechanical

Seedbed tillage, rotary hoeing, cultivation, and roguing are effective and economical practices. Moldboard plowing has a short- term benefit because it buries more seeds than are brought to the surface. However, burial does not cause rapid destruction of the seed.

Timely rotary hoeing just before velvetleaf emergence will give up to 95 percent control. Shallow cultivation about 3 weeks after planting will uproot seedlings, but use care not to destroy any existing herbicide barrier.

Herbicides

Herbicides can be used to complement other practices and offer the primary means for in-row control. Selecting the proper herbicide is important because many herbicides do not control velvetleaf adequately. The herbicides in *Table I* have performed best for velvetleaf control in Nebraska research, but are not the only choices. Remember, accurate application is essential for best results.

Table I. Herbicides for velvetleaf control.

Crop	Herbicide	Rate Per Acre	Application Time	Remarks
CORN	Atrazine 4L	2 to 3 Qts	PPI, pre, early post	Best VL control at full rate for soil, but consider carryover risk.
	Atrazine 4L + Sencor 4L (with Dual or Lasso for grass control)	0.75 to 1.5 Qts + 0.5 Pt	Pre	For soils with more than 2 percent organic matter only where atrazine carryover may be a problem.
	Bladex 4L + atrazine 4L	1.7 to 2.2 + 0.8 to	Pre or early post	Do not use on soils with less than 1 1/2 percent organic matter. Use Bladex 80W for

		1.1 Qts		post application.
	Atrazine	1.5 Qts	Post	VL less than 4 inches, use with crop oil concentrate.
	2,4-D LV ester	0.5 to 1.0 Pt	Post	Can control VL up to 12 inches tall at higher rate. More effective than other post treatments when VL is stressed. Less corn risk at lower rate when corn is less than 8 inches tall.
	Basagran + atrazine 4L	0.5 + 0.5 Qt	Post	Use with crop oil concentrate when VL is less than 4 inches tall.
	or Laddok	2.5 Pts.	Post	
GRAIN SORGHUM	Atrazine 4L	2 to 2.4 Qts	PPI, pre	Do not use on soils with less than 1 1/2 percent organic matter.
	Atrazine 4L	1.2 Qts	Post	Use with a crop oil concentrate when VL is less than 3 inches tall.
	2,4-D LV ester	0.5 Pt	Post	Use when sorghum is 4 to 12 inches tall and VL is less than 4 inches tall.
SOYBEANS	Sencor/Lexone 4L (combined with Lasso, Dual, Basalin, Prowl, Treflan if needed)	0.75 to 1 Pt	PPI, pre	Do not use on soil with less than 1 1/2 percent organic matter. Reduce rate by 1/3 on calcareous soils.
	Sencor/Lexone 4L (combine with a grass herbicide, if needed)	0.5 + 0.5 Pt	Split-shot	Incorporate the first part and apply second part as a surface application.
	Vernam + Treflan + Sencor/Lexone 4L	3 to 3 1/2 Pts + 1 Pt + 3/4 Pt	PPI	Good where shattercane and VL are both problems.
	Basagran 4 WS	0.75 to 1 Qt	Post	Before VL is 4 inches tall. Use higher rate when VL is 2 to 4 inches tall. Add crop oil concentrate as suggested on label.

In *corn* and *sorghum*, atrazine continues to be the best soil-applied herbicide for velvetleaf control. However, cutting the application rate from 2 1/2 or 3 qts/A to 1 1/2 qts/A or less (as in combinations with grass herbicides) reduces its effectiveness considerably, especially against high velvetleaf populations. In situations where the atrazine rate must be reduced, 1) combine Bladex or Prowl with atrazine, or 2) combine Sencor with atrazine plus Dual or Lasso. These combinations will boost initial control in corn without increasing carryover risk. If atrazine cannot be used, a postemergence herbicide will likely be needed.

Effective postemergence herbicides for velvetleaf control in corn and sorghum are atrazine, Bladex, and 2,4-D. These work best when velvetleaf is less than 4 inches tall; however, since 2,4-D moves within the plant, it can control velvetleaf up to 12 inches tall. Using 2,4-D on short velvetleaf allows use of the minimum rate which enhances crop safety. Atrazine should be used with crop oil. When velvetleaf is under moisture stress, 2,4-D ester has given the best control.

Atrazine or Prowl plus atrazine can be used in corn and sorghum after the last cultivation as a layby treatment to control late-emerging velvetleaf. These treatments have particular merit when velvetleaf populations are high or in seed corn production fields where less crop shading occurs. These late-emerging velvetleaf will contribute significantly to seed production if present in large numbers.

In *soybeans*, Sencor or Lexone (both contain metribuzin as the active ingredient) have given good control of velvetleaf. Use caution when applying metribuzin on sandy soils, low organic soils, or high pH soils because of possible crop injury. On these soils a postemergence herbicide such as Basagran may be better.

Metribuzin application can be split into two parts--preplant incorporated plus preemergence surface--for increased soybean safety and improved velvetleaf control. Referred to as a 'split-shot' application, half of the dosage is incorporated into the soil before planting and the other half is applied to the soil surface after planting. Split-shot allows a slightly higher use rate and may reduce the cost if the surface overlay application is banded over the row only.

Vernam and Prowl also provide some velvetleaf control in soybeans. Both should be used preplant incorporated. Combine Prowl with metribuzin for best results. A three-way combination of Vernam + Treflan + metribuzin can be used effectively where both shattercane and velvetleaf control are needed.

Basagran should be applied early postemergence when the velvetleaf is less than four inches tall. Using a crop oil concentrate as 1 qt/A is helpful, particularly when velvetleaf is drought-stressed or relative humidity is low. Velvetleaf that is over four inches tall will not likely be killed because Basagran is not translocated and thorough spray coverage of rapidly growing plants becomes increasingly difficult. Using several spray nozzles to direct the Basagran into the rows from both sides is helpful when the soybeans shield the velvetleaf.

For tall velvetleaf in soybeans a wiper application of Roundup may be partially successful, but usually the height differential is insufficient to allow adequate coverage. Using 2,4-D instead of Roundup in the wiper has not been advantageous.

Because tall, maturing velvetleaf has extensive tissue in which to dilute any herbicide to an ineffective dosage, late-season herbicide application in any crop is usually not cost effective. Flowering and further seed production may be reduced but seeds already formed are not affected.

Refer to Extension circular *EC130, A Herbicide Use Guide for Nebraska*, for more details on application rates, timing, costs, and current herbicide choices. Copies are available from the Cooperative Extension office in your county.

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