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Annual Broadleaf Weed Control in Winter Wheat

This NebGuide discusses preventive, cultural, and chemical weed control in winter wheat. Best weed control is obtained by using a combination of these three methods.

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Winter and summer annual broadleaf weeds are economically important pests of Nebraska winter wheat. They reduce grain yields by competing with winter wheat for water, light and nutrients. Weeds are estimated to reduce Nebraska winter wheat yields 10 percent each year.

The dollar loss, with the wheat price at \$2/bushel, is over \$1.7 million per year. With \$4/bushel wheat, weeds cost about \$3.4 million per year. However, only 10 percent of the winter wheat acres in Nebraska are sprayed with herbicides to control weeds. Effective weed control in winter wheat can eliminate losses due to weeds, making winter wheat production in Nebraska more profitable.

Lower grain yields are not the only problems caused by broadleaf weeds in winter wheat. Large weeds can slow harvest operations and increase combine repair costs. Producers may be docked at the elevator for excessive grain moisture and/or weed seeds in wheat.

Success with reduced and no-till programs is improved with weed-free winter wheat stubble after harvest. In addition, weed seeds produced in the current crop will survive in the soil and cause problems in future crops. These potential problems underscore the importance of broadleaf weed control in winter wheat.

An effective weed control program considers the entire cropping system. This approach involves the use of preventive, cultural, and chemical weed control methods.

Preventive Weed Control

Prevention, or stopping the advancement of weed infestations, is an important part of a total weed control program. It requires diligence on the part of the producer, but offers an effective control measure with low costs. Some rules of preventive weed control are:

1. Use crop seed that is weed free.
2. Clean tractors, implements, and combines before moving them from infested to clean fields.
3. Keep uncropped areas (fencelines and field borders) weed free.
4. Do not allow livestock to move directly from infested to clean areas.
5. Prevent weed seed production in all areas.

Cultural Weed Control

Cultural weed control involves manipulating the crop/weed environment so conditions are favorable for crop plants, but unfavorable for weeds. Crop competition and crop rotation are two important cultural control practices in winter wheat production.

Crop competition involves establishing a vigorous crop which can compete more effectively than weeds for water, light and nutrients. Several factors contribute to competitive crops, including proper seedbed preparation, adequate fertilizer, high quality crop seed, careful variety selection, and proper rate, date, and depth of seeding. These factors also result in high winter wheat yields.

A carefully established, healthy winter wheat crop is difficult for summer annual weeds to invade. In addition, some winter wheat varieties are more competitive with weeds than others.

Crop rotation breaks the life cycle of weeds, and allows the use of tillage practices or herbicides that may not be feasible in a winter wheat monoculture. Adapted rotational grain crops include corn, grain sorghum, proso millet, soybeans and sunflowers, depending on farm location in the state.

Chemical Weed Control

Herbicides are powerful agricultural tools that allow the producer to control broadleaf weeds in the growing winter wheat crop. Several herbicides provide excellent broadleaf weed control with minimal wheat injury; there are some fundamentals that should be considered before selecting a treatment. These include:

1. Identify the problem weed(s).
2. Spray when weeds are small and actively growing. Spray at the proper crop growth stage for the herbicide used.
3. Use proper spray equipment in good condition.
4. Calibrate the sprayer to ensure application accuracy.
5. Read and follow directions on the herbicide label.
6. Know your rotational plans to avoid herbicide carryover problems in sensitive crops.

Commercial herbicide application may be desirable for producers who do not own sprayers or who do not feel their equipment offers the safety and accuracy required.

Herbicides recommended for broadleaf weed control in winter wheat are 2,4-D, Banvel (dicamba), Buctril (bromoxynil), Tordon (picloram), Curtail (clopyralid + 2,4-D), and Ally (metsulfuron). Some of

these products should be used in combination to control a wider spectrum of broadleaf weeds in winter wheat.

Use *Table I* to select herbicide treatments to control your weed problem. Specific use rates for selected herbicides are found in *Table II*.

Table I. Broadleaf weed response to herbicides used in winter wheat.^a

Weed species	Inches: ¹	2,4-D ester		2,4-D+ Banvel		Buctril		2,4-D+ Buctril		Ally + 2,4-D		Curtail	2,4-D + Tordon
		<3	6-12	<3	6-12	<3	6-12	<3	6-12	<3	6-12	<3	<3
Winter Annuals													
lettuce, Prickly		E	G	F	E	G	P	G	F	E	E	E	E
mustard, Blue		E	P	E	F	G	P	G	P	E	G	E	G
mustard, Tansy		E	G	E	F	G	P	E	G	E	E	E	E
pennycress, Field		E	G	E	F	G	F	E	F	E	E	E	E
Shepherdspurse		E	G	E	F	E	G	E	G	E	E	E	E
vetch, Hairy		G	G	G	G	F	P	G	F	F	F	E	G
Early Summer Annuals													
Horseweed		F	P	F	P	G	F	F	P	E	E	E	E
Kochia		G	F	E	F	G	F	G	P	G	G	G	G
knotweed, Erect		F	P	G	F	G	F	E	G	G	G	E	E
lambsquarters, Common		E	E	E	E	G	F	E	F	E	E	E	E
lambsquarters, Slimleaf		E	E	E	E	G	F	E	G	E	E	E	E
ragweed, Common		E	E	E	G	E	F	-	-	G	F	-	-
sunflower, Common		E	E	E	G	E	E	E	G	E	E	E	E
thistle, Russian		G	F	E	G	G	F	E	G	E	E	G	G
Waterpod		E	E	E	E	E	-	E	E	E	E	E	E
Late Summer Annuals^b													
buckwheat, Wild		P	P	E	E	E	G	E	G	G	G	E	E
pigweed, Prostrate		E	E	E	E	G	F	E	G	E	E	E	E
pigweed, Redroot		E	E	E	E	G	F	E	G	E	E	E	E
pigweed, Tumble		E	E	E	E	G	F	E	G	E	E	E	E
sage, Lanceleaf		E	G	P	P	G	F	F	P	E	E	-	E
smartweed, Pennsylvania		G	F	E	G	G	F	E	G	F	F	E	G
¹ Expected control when herbicides are applied to weeds at these heights. ^a Control rating: E = excellent (90-100%), G = good (75-90%), F = fair (50-75%), P = poor (0-50%), - = unknown. ^b Control of late summer annual broadleaf weeds may be reduced because of canopy protection provided by other weeds and winter wheat.													

Many broadleaf weeds commonly found in Nebraska winter wheat fields can be controlled at a modest price with amine or ester formulations of 2,4-D. Both are recommended for use in winter wheat; however, some ester formulations of 2,4-D volatilize more readily in warm weather, and the resulting vapor can injure desirable plants several hundred feet from the point of application. Only low volatile ester formulations should be used.

Generally, ester formulations of 2,4-D provide better broadleaf weed control than amine formulations, because they are oil soluble and readily penetrate plant foliage. Amine formulations are water soluble and do not penetrate foliage as easily, resulting in reduced control of weeds such as kochia and Russian thistle. Ester formulations are more active than amine formulations, and should be applied at lower rates (*Table II*).

Table II. Herbicides recommended for broadleaf weed control in winter wheat.

Herbicides	Product rate/A	Winter wheat growth stage	Remarks and 1990 costs
Ally + 2,4-D LV ester ¹	0.10 oz + 0.5 pt	Fully tillered ²	Apply in spring. Add surfactant 1 quart/100 gallons of spray solution. Cost: \$3.
Banvel + 2,4-D amine ¹	2-4 oz + 0.75 pt-1 pt	Fully tillered ²	Controls most troublesome broadleaf weeds. Cost: \$1.50-\$2.60.
Buctril 2EC + 2,4-D amine ¹	1-1.5 pt + 0.5 pt	Fully tillered ²	Broadleaf weeds must be in the 2 - 4 leaf stage or mustards in early rosette and before canopy covers weeds. Cost: \$6.15-\$9.
Curtail	2 pt	4-leaf to boot stage ³	Cost: \$5.40.
2,4-D amine ¹ or 2,4-DLV ester ¹	1-1.5 pt or 0.5-1 pt	Fully tillered ²	Spray broadleaf weeds as soon as good growing conditions occur. Cost: \$0.65-\$1.50.
2,4-D amine or LV ester ¹ + Tordon 22K	0.5-0.75 pt + 1-1.5 oz	Fuller tillered ²	Use only on fields in continuous cereal or feed grain in the spring after resumption of active growth. Cost: \$1.40-\$2.
¹ 2,4-D acid equivalent is 4 lb/gal. ² Zadok's Scale 26-37 or Feeke's Scale 3-8. ³ Zadok's Scale 14-39 or Feeke's Scale 1.5-9.			

Winter wheat must be well tillered but not jointed when 2,4-D is applied. In Nebraska, winter wheat generally is in the proper growth stage for 2,4-D application in March to early May, depending upon the season and location. Winter wheat planted Sept. 1 should be ready to spray by March 1, but wheat planted Oct. 1 may not be adequately developed until April 1 or later.

Winter wheat is considered fully tillered when it has six to nine tillers. If you need assistance in determining the growth stage of your wheat, check with your extension agent or specialist before using any herbicide -- wheat injury and yield loss can be significant if 2,4-D or other herbicides are misapplied.

Winter wheat yields were reduced more than 20 percent when 2,4-D was applied in the fall to winter wheat with two to four leaves (*Table III*). Winter wheat yields also were reduced 10 percent by 2,4-D

applied at the boot stage in late spring. However, 2,4-D did not significantly reduce wheat yields when applied in early spring to fully tillered wheat.

Table III. Winter wheat yield (bu/A) in response to 2,4-D applied at three growth stages in absence of weeds.

Treatment	Growth stage at application		
	2-4 leaf	Fully tillered	Boot
	------(bu/A)-----		
2,4-D amine	20.2	25.1	23.3
2,4-D LV ester	19.6	24.8	23.1
Untreated	25.7	25.7	25.7

Banvel and 2,4-D can be combined to control a wider spectrum of broadleaf weeds, including wild buckwheat (which is not controlled by 2,4-D alone). Banvel plus 2,4-D must be applied to well tillered winter wheat and before jointing to avoid crop injury.

Buctril (bromoxynil) controls many broadleaf weeds in winter wheat with excellent crop safety. It can be applied to winter wheat from the two-leaf to the boot stage of growth without injury to the crop. However, weeds may be protected from the spray by the crop canopy at later growth stages, or may be too large for effective control.

Buctril is a contact herbicide; it is not translocated through the plant and has little soil activity. Therefore, weeds must be small (two to four leaf stage or 1 inch or less in diameter) at application for optimum control to occur.

Buctril can be tank mixed with 2,4-D amine or low volatile ester to improve performance on larger weeds and to broaden the spectrum of weeds controlled. Tank mixes containing Buctril plus 2,4-D should be applied to well tillered wheat before jointing to avoid crop injury.

Ally has fairly short soil persistence. Ally will control germinating broadleaf weeds for about four weeks after application. A surfactant must be added (at 0.25 percent v/v) to the spray solution whenever Ally is used. Also 2,4-D must be added to improve activity on weeds and to prevent resistant weed buildup.

The weeds that may or have become resistant are kochia, Russian thistle and prickly lettuce. 2,4-D at 1/2 pt/A must be applied with Ally and a surfactant. The addition of more 2,4-D and surfactant may cause injury to the winter wheat.

Ally has rotational restrictions that limit its use in areas where susceptible crops are grown in rotation with wheat. The degradation of Ally in soil is governed by pH.

Ally should not be applied to soils with a pH greater than 8.0 to avoid the risk of rotational crop injury. Producers should follow directions on the Ally label carefully and determine rotational plans before using the product.

Liquid Nitrogen Fertilizers and Herbicides

Producers have combined liquid nitrogen fertilizers (UAN 28 and 32 percent) and herbicides to control weeds and fertilize the crop with one application. In some situations the winter wheat showed evidence of

crop injury. University tests have shown the winter wheat yield sometimes is lowered.

An alternative to this program may be to strip band (20") nitrogen fertilizer, as needed, as soon as field conditions permit in the spring, and apply the herbicide later. The advantages of strip banding over broadcasting nitrogen fertilizer are probably great enough to pay for the second application.

Harvest Aid

Only 2,4-D ester at 1 lb/A is registered for spraying winter wheat prior to harvest. Not all brands are labeled for this use.

Winter wheat must be in the hard dough stage, which would be seven or more days before harvest. Sometimes if winter wheat is sprayed while the wheat nodes are green, there may be breakage of the wheat stem.

In 1989 thousands of acres were sprayed with 2,4-D prior to harvest. Many treated fields had unsatisfactory desiccation of the weeds, plus many complaints were received on drift to susceptible crops including corn. Most of these fields should have been sprayed during the tillering stage. Growers should examine fields early and treat where weed populations justify.

Summary

Weeds cause yield and quality losses in winter wheat in Nebraska. Producers can implement weed control systems that include preventive, cultural, and chemical methods of control to prevent these costly losses. Herbicide treatments are available to control broadleaf weeds in winter wheat at reasonable costs. Producers should read and follow directions on the herbicide label to ensure the safe and effective use of herbicides.

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