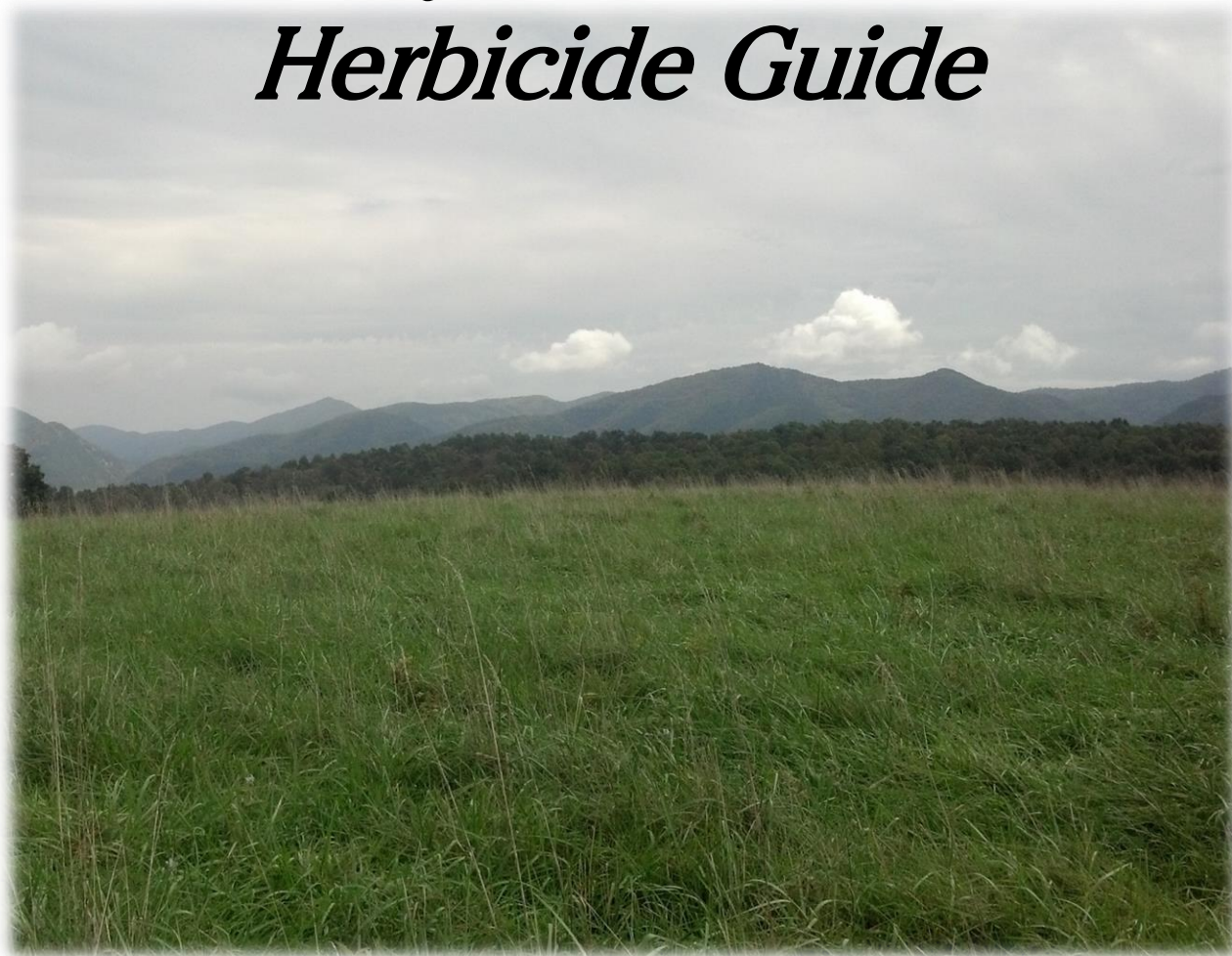




Virginia Cooperative Extension

Virginia Tech • Virginia State University

Hay & Pasture Herbicide Guide



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The herbicide recommendations in this guide were generated using Virginia Cooperative Extension's 'Pest Management Guide', local herbicide trials, label recommendations, and local experience.


There may be instances where herbicides other than those mentioned may be legal and effective. Virginia Cooperative Extension does not endorse any specific company or product; product names are used when a product represents a unique combination of active ingredients not found elsewhere on the market, or if use of a product name clarifies the recommendation. In many cases generic herbicides with active ingredients identical to trade-named herbicides exist, and this guide attempts to highlight some of those options. Be sure to read all labels as generics may differ in concentration from the products listed in this guide.

How to use this guide

- The example applications are given on both a *per acre* basis for calibrated application equipment, and on a *per gallon* basis for spot spraying.
- The example applications are calculated using label specifications for mid-to-high application rates. “Doubling up” on the rate can sometimes result in reduced control by promoting top-kill before herbicide translocation occurs to roots and other underground storage organs.
- The *per gallon* herbicide rates were calculated under the assumption that most people, **when spot spraying by hand, will apply a total volume of somewhere around 75 gallons/acre. It’s also assumed that weeds will be sprayed until thoroughly wet, but not to the point of runoff. This is a starting point only, your case may vary dramatically depending on weed density, sprayer type, and individual application technique.**
- Relative price of the herbicide or mixture is denoted by dollar signs \$\$\$. More dollar signs mean a more expensive herbicide relative to other options listed. **This is meant only to give a general idea of relative costs.**

Horsenettle, Sand Briar (*Solanum carolinense*)

Best herbicide timing:
At first appearance of flowers (July/August)



hiltonpond.org

Horsenettle is a thorny perennial (underground stems) that flowers early-flowering in July through berries containing toxic berries.

Multiple products are effective on Horsenettle. *Cimarron* and *Cimarron Plus* would be the strongest on perennials, but they are stronger on perennials for several months.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$\$	9.75 mL (1/3 oz) GrazonNext HL
9.5 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D LV4	\$	12 mL (1/2 oz) 2,4-D LV4
8 oz dicamba		2.5 mL (1/4 oz) dicamba
6.5 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$\$	9.75 mL (1/3 oz) GrazonNext HL
9.5 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D LV4	\$	12 mL (1/2 oz) 2,4-D LV4
8 oz dicamba		2.5 mL (1/4 oz) dicamba
6.5 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

Herbicide Timing for *Summer Annual Weeds*

SPRAY



Seedling
spring & summer

SPRAY



Vegetative
(less than 10" tall)



Flowering & seeding
Summer

Annuals are relatively simple to kill during the seedling and early vegetative stages. Increased size and age result in significantly reduced control as tissues harden off and the plant becomes reproductive.

Herbicide Timing for *Biennial Weeds*

SPRAY



Seedling

Typically late summer or fall

SPRAY



Rosette

Fall - early spring



Bolting

Late spring

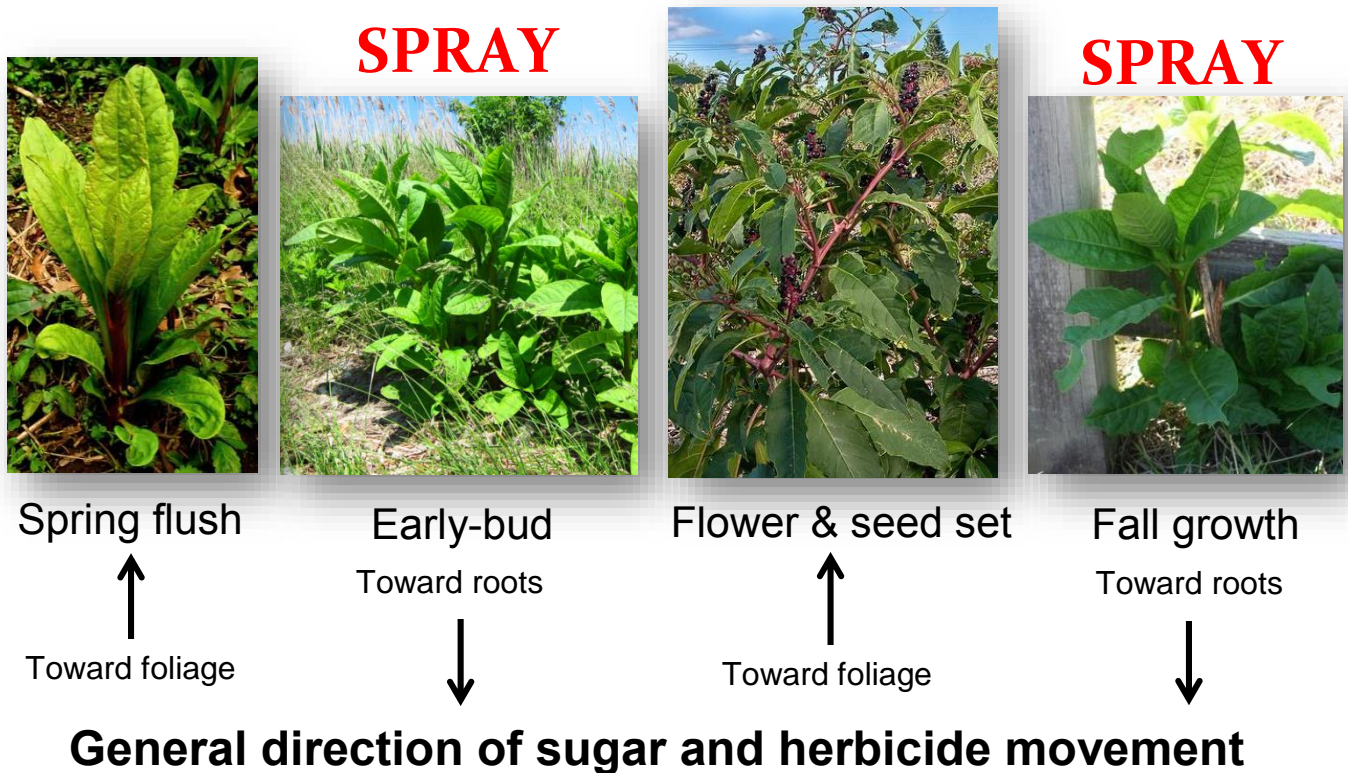


Flowering

Summer

Biennials are relatively simple to kill during the seedling and rosette stage with most broadleaf herbicides. Once biennials begin to bolt in spring, control is significantly reduced.

Herbicide Timing for *Perennial Weeds*



Two periods are ideal for spraying perennials: the early-bud stage (the 2 weeks before flowering), and fall. Why?

1. Sugar direction is moving toward underground perennial structures
2. Plenty of leaf area to take in herbicide
3. Perennial structures at lowest energy level

Directions for making a premix of low-rate herbicides

When working with herbicides that have extremely low use-rates, (e.g. *Cimarron Plus*, *Chisum*, *Chaparral*) it can be helpful to create a pre-mixed liquid solution for spot spraying situations. Try to pre-mix only as much as you will use within a few days to prevent chemical degradation during storage. These pre-mix recipes make enough for about 21-gallons of spray per batch. Be sure to keep a copy of the label with the container, and mix well before use.

To create a *metsulfuron* liquid premix:

*Mix 0.10 oz of *Cimarron Plus*, *Chisum*, or an equivalent generic metsulfuron product with 1 quart (32 oz) of water and mix well to create the premix. Withdraw 48 mL (1 ½ oz) of this premix solution and add to one gallon of water to create a gallon of spray. Be sure to shake the premix solution thoroughly before drawing from it! One quart of premix should make about 21 gallons of spray.

To create a *Chaparral* liquid premix:

*Mix 0.75 oz of *Chaparral* with 1 quart (32 oz) of water and mix well to create the premix. Withdraw 48 mL (1½ oz) of this premix solution and add to one gallon of water to create a gallon of spray. Be sure to shake the premix solution thoroughly before drawing from it! One quart of premix should make about 21 gallons of spray.

Herbicide Products & Active Ingredients

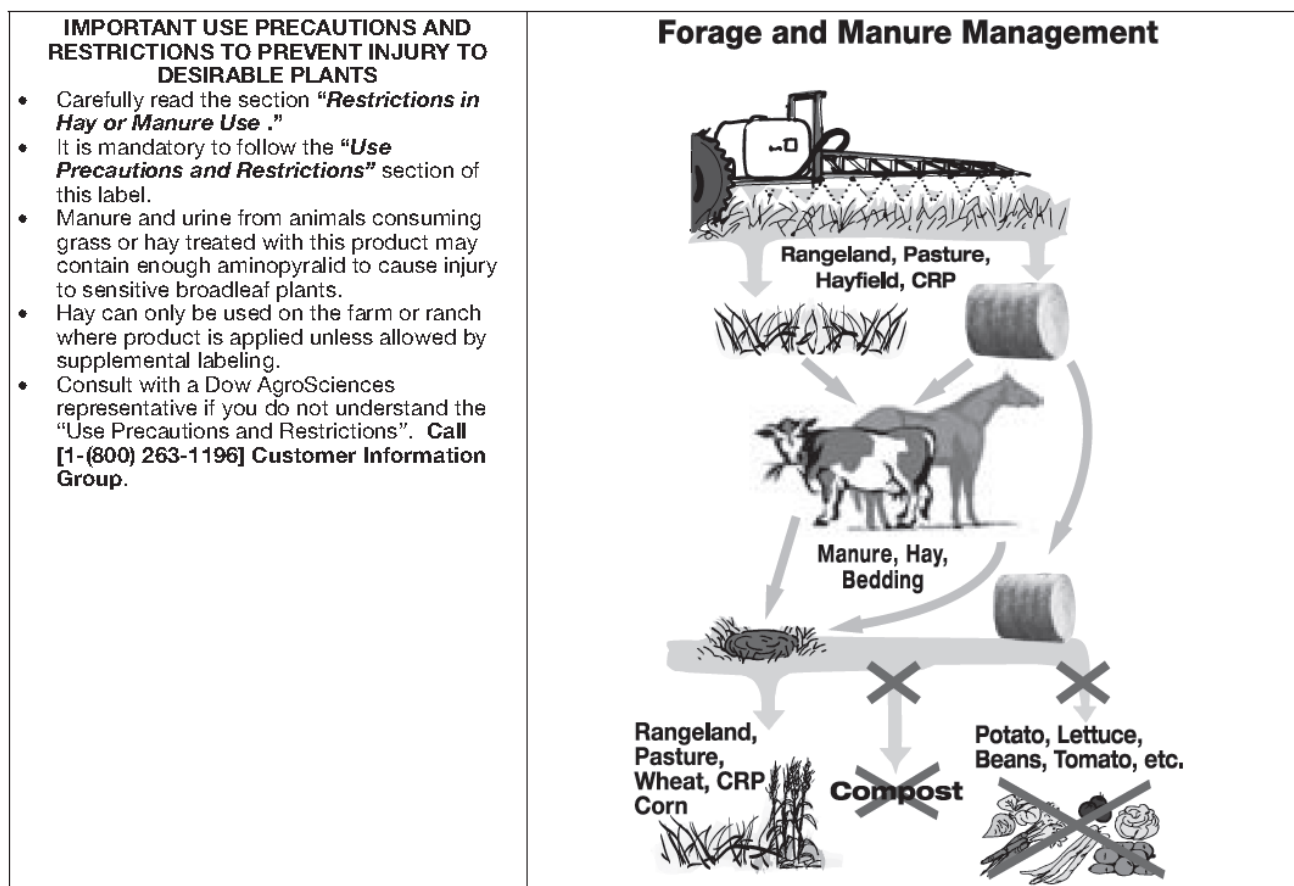
	Active Ingredient	Acid Equivalents		Avg. half-life in soil	General-use or Restricted-use
		%	lbs./gal	Days	
Grazon P+D	picloram	5.70%	0.54	90	Restricted
	2,4-D	21.20%	0.02	7	
Surmount	picloram	13.20%	1.19	90	Restricted
	fluroxypyr	10.60%	0.96	36	
Milestone	aminopyralid	21.10%	2	30	General
GrazonNext HL	aminopyralid	4.28%	0.41	30	General
	2,4-D	34.25%	3.33	7	
Chaparral	aminopyralid	52.50%	0.525	30	General
	metsulfuron methyl	9.45%	0.0945	30	
Remedy Ultra	triclopyr	43.46%	4	46	General
Crossbow	triclopyr	11.90%	1	46	General
	2,4-D	23.70%	2	7	
Cimmaron Plus	metsulfuron methyl	48.00%	dispersible granule	30	General
	chlorsulfuron	15.00%		40	
Chisum	metsulfuron methyl	48.00%	dispersible granule	30	General
	chlorsulfuron	15.00%		40	
Pasture Gard HL	triclopyr	32.40%	1.5	46	General
	fluroxypyr	10.80%	0.5	36	
Overdrive	diflufenzopyr	21.30%	dispersible granule	10	General
	dicamba	55%		21	
Redeem R&P	triclopyr	23.7	2.25	46	General
	clopyralid	7.90%	0.75	30	
2,4-D LV4	2,4-D	45.50%	3.8	7	General
Banvel	dicamba	40.00%	4	21	General
Facet L	quinclorac	18.92%	1.5	20	General
QuinStar	quinclorac	75.00%	dispersible granule	20	General
Prowl H20	pedimethalin	38.70%	3.8	44	General

Precautions with Residual Herbicides

While all herbicides have some persistence in the environment, some active ingredients have a relatively long persistence and are often referred to as “residual” herbicides. This can be good, as it allows for extended control of weeds as plants take up residual chemical over time. It also poses a risk that chemicals could move off site through animal manures or hay. There have been cases where manure from animals grazing or consuming hay from treated fields was used in gardens or commercial vegetable fields, causing catastrophic losses of high-value crops. Lawsuits and bad publicity related to these cases threaten our ability to use these products in the future, so it is critical to follow the precautions and restrictions outline by the manufacturer.

The specific active ingredients mentioned in this guide that pose a risk are picloram, aminopyralid, and clopyralid, which belong to a class of herbicides known as “pyridines”. You will most likely encounter these active ingredients in the products *Milestone*, *GrazonNext HL*, *Chaparral*, and *Surmount*. These products should only be used on sites where manure or hay will remain on-farm in fields where they are acceptable. The practical life-span of these products can vary from several months to a year in an open field setting where chemicals are subject to breakdown by ultraviolet light and microbial organisms. In a closed setting such as stockpiled manure or stored hay, chemicals can retain their integrity for years.

The following illustration is taken from a label, and outlines forage and manure management when using residual herbicides.



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Bladder Champion (*Silene alba*)

Best herbicide timing:

Early bud stage (early-summer & fall)



Bladder champion is a perennial that sprouts from a spreading, underground stem (rhizome). Target the plant during the bud stage to maximize delivery of herbicide to roots and rhizomes.

Research has shown good results with metsulfuron methyl, which is an active ingredient in *Cimarron Plus*, *Chisum*, *Chaparral*, and *Ally XP*. You can also purchase metsulfuron methyl as generic *metsulfuron*. All of these products can cause grass injury in fescue, and especially Timothy. It may be a good idea to tank-mix metsulfuron-containing products with either dicamba or 2,4-D to increase the spectrum of weeds controlled; *Chaparral* already contains an additional active ingredient for this purpose.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
0.5 oz <i>Cimarron Plus</i>	\$\$	*48 mL (1 ½ oz) <i>Cimarron Plus</i> premix*
8 oz dicamba		2.5 mL (1/4 oz) dicamba
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 oz <i>Chaparral</i>	\$\$	*48 mL (1 ½ oz) <i>Chaparral</i> premix*
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Horsenettle, Sand Briar (*Solanum carolinense*)

Best herbicide timing:

At first appearance of flowers (July/August)



hiltonpond.org



backyardnature.net

Horsenettle is a thorny perennial that sprouts from spreading roots or rhizomes (underground stems). Target roots and rhizomes by herbicide applications timed at early-flowering in July or August. It produces many seeds, which are often spread through berries contained in hay, so be sure to prevent it from maturing.

Multiple products are effective on horsenettle when sprayed at high rates, including: 2,4-D+ dicamba, *Cimarron Plus*, *GrazonNext HL*, Chaparral, and *Surmount*. 2,4-D + dicamba or *Cimarron Plus* would be a slightly less expensive than the other options, however, the other herbicides listed contain either picloram or aminopyralid. These chemicals are usually stronger on perennials and have residual soil activity on existing or germinating weeds for up to several months.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$	13 mL (1/2 oz) GrazonNext HL
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D ester	\$	16 mL (1/2 oz) 2,4-D ester
8 oz dicamba		3 mL (1/10 oz) dicamba
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

Pokeweed, pokeberry (*Phytolacca americana*)

Best herbicide timing:

Early bud stage (early-to-mid summer); fall regrowth



Steve Brill



Pokeweed is a perennial that sprouts from a large fleshy taproot. Target the plant and taproot by herbicide applications at the bud stage (early summer & also fall-regrowth). Because pokeweed has a taproot rather than spreading roots or rhizomes, its main strategy for spreading is by seed.

In university testing, the best results were obtained with *Crossbow*, *GrazonNext HL*, and *Surmount*. *Crossbow* is generally too expensive to use as a broadcast application, but a home tankmix of triclopyr (*Remedy Ultra*) + 2,4-D would be an equivalent but more cost-effective option. *GrazonNext HL* and *Surmount* have residual soil activity on many herbaceous weeds, and may be your best choice if you are targeting those in addition to pokeweed. *GrazonNext HL* is general-use while *Surmount* requires a license.

Example applications:

Per acre 2.1 pints GrazonNext HL 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 13 mL (1/2 oz) GrazonNext HL 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 1 pint Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 6.25 mL (1/4 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
\$\$\$\$\$\$		Per gallon of water (spot treatment) 47 mL (1.5 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Milkweed (*Asclepias syriaca*)

Best herbicide timing:

Early bud stage (early-to-mid summer); fall regrowth



Milkweed is a perennial that sprouts from large, fleshy roots and deep, spreading rhizomes (underground stems). Target the roots and rhizomes through herbicide applications at the early-bud stage in early-summer or on fall growth. Milkweed cannot tolerate frequent mowing.

Few herbicides are good on milkweed. In university testing, the best results were obtained with Surmount at 80% control. *Crossbow* (or homemade equivalent of *Remedy* + 2,4-D) and GrazonNext HL are not quite as effective but can provide acceptable control. *Surmount* is a restricted-use product. *Surmount* and *GrazonNext HL* are both labeled for pasture only.

Example applications:

<u>Per acre</u> 2.1 pints GrazonNext HL 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 13 mL (1/2 oz) GrazonNext HL 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 3 pints Surmount 8 oz non-ionic surfactant	\$\$\$\$	<u>Per gallon of water (spot treatment)</u> 19 mL (2/3 oz) Surmount 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 1.5 pints Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$\$	<u>Per gallon of water (spot treatment)</u> 9.5 mL (1/3 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
	\$\$\$\$\$	<u>Per gallon of water (spot treatment)</u> 47 mL (1.5 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Dogbane (*Apocynum cannabinum*)

Best herbicide timing:

Early bud stage (early-to-mid summer); fall regrowth



Dogbane is a perennial that sprouts from a large taproot and spreading root system. Target the plant, taproot, and root system through herbicide application at the early-bud stage in early-summer & again on any fall growth.

Surmount, *Crossbow*, and *PastureGard HL* have been effective on dogbane in university trials. When you base your selection on price, the spectrum of weeds controlled, and the persistence of weed control, *Surmount* is probably the best fit. The presence of fluroxypyr also makes *Surmount* strong on other woody species, so its suitability for fencerow applications is on par with *Crossbow*.

Example applications:

<u>Per acre</u> 3 pints Surmount 8 oz non-ionic surfactant	\$\$\$\$\$	<u>Per gallon of water (spot treatment)</u> 19 mL (2/3 oz) Surmount 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 1 pint Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 6.25 mL (1/4 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
\$\$\$\$\$\$		<u>Per gallon of water (spot treatment)</u> 47 mL (1.5 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Eastern Red Cedar (*Juniperus virginiana*)

Best herbicide timing:

late-spring to early-summer or fall



Cedar is a widespread and troublesome tree that spreads rapidly by seed and proliferates in pastures with poor fertility; especially when the pasture is underutilized. Like other perennial weeds, try to target foliar herbicide applications in late-spring & early-summer, or apply fall basal bark herbicide treatments. Long-term management of cedar is dependent on proper soil pH (>6.0) and adequate soil phosphorous. The long-term effectiveness of foliar herbicide applications on cedars is generally not much better than about 50-75% control. The rate of control decreases as the size of the tree increases; at 10 *inches* tall or larger, less than 50% of trees will be controlled. The following herbicide recipe using Surmount and Remedy will be your best option. If you do not have a private pesticide applicator's license, *Cimarron* is the next best option, but control will likely only approach 40%.

Anecdotal observations have suggested that control of cedar is more effective when using a higher application volume (30+ gallons water/acre) and additional surfactant (as indicated below), with the goal of achieving greater plant coverage and herbicide exposure.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
3 pints Surmount	\$\$\$\$\$	19 mL (2/3 oz) Surmount
1 pint Remedy Ultra		6.25 mL (1/4 oz) Remedy Ultra
12 oz non-ionic surfactant		14 mL (1/2 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
0.5 oz <i>Cimarron Plus</i>	\$\$	*48 mL (1 ½ oz) <i>Cimarron Plus</i> premix*
8 oz dicamba		3 mL (1/10 oz) dicamba
12 oz non-ionic surfactant		14 mL (1/2 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Osage orange, Hedge Apple (*Maclura pomifera*)

Best herbicide timing:
late-spring to early-summer; fall



Osage orange can reproduce by seed or by stump or root suckers. Cutting is the most effective control method for mature trees; re-sprouts from cut stumps can be prevented at time of cutting with a cut-stump herbicide treatment such as picloram or triclopyr. Application of these herbicides to trunks that have been girdled has shown some success, as has basal bark application on small trees. Foliar herbicide applications of PastureGard HL or Remedy Ultra (triclopyr) at a high rate are labeled for osage orange and can be effective as an individual plant treatment on small trees; explore tank-mixing options if spraying additional species. Total coverage of foliage is essential.

Example applications:

Per gallon (foliar spray)

25 mL (3/4 oz) Remedy Ultra \$\$\$\$
9.5 mL (1/3 oz) non-ionic surfactant

Per gallon (cut stump treatment)

1 part Remedy Ultra \$\$\$
3 parts diesel fuel or fuel oil

Per gallon (basal bark treatment on trees <6" diameter)

1 part Remedy Ultra
3 parts diesel fuel or fuel oil \$\$\$

*Apply basal bark treatment to lower 15" of trunk

*Soak trunk until thoroughly wet but not to point of runoff

*If must apply to point of runoff, use 1 part Remedy Ultra to 20 parts diesel or fuel oil

You can also purchase Tordon RTU, a "ready-to-use" cut stump product. \$

Sumac
(*Russ spp.*)



Ailanthus (tree-of-heaven)
(*Ailanthus altissima*)



Best herbicide timing:
late-spring to early-summer; fall

Although often confused, sumac species and ailanthus are separate species. While sumac only sometimes acts as a weed, Ailanthus is well known to be extremely invasive.

Example applications:

Per gallon (foliar spray)

25 mL (3/4 oz) Remedy Ultra
9.5 mL (1/3 oz) non-ionic surfactant

\$\$\$\$

Per gallon (cut stump treatment)

1 part Remedy Ultra
3 parts diesel fuel or fuel oil

\$\$\$

Per gallon (basal bark treatment on trees <6" diameter)

1 part Remedy Ultra
3 parts diesel fuel or fuel oil

\$\$\$

*Apply basal bark treatment to lower 15" of trunk

*Soak trunk until thoroughly wet but not to point of runoff

*If must apply to point of runoff, use 1 part Remedy Ultra to 20 parts diesel or fuel oil

You can also purchase Tordon RTU, a "ready-to-use" cut stump product.

\$

Honey locust (*Gleditsia triacanthos*); **Black locust** (*Robinia pseudoacacia*)

Best herbicide timing:
late-spring to early-summer; fall



Honey locust thorns & pods



Black locust thorns & pods



Locust trees can reproduce by seed or by stump or root suckers. Cutting is the most effective control method for mature trees; re-sprouts from cut stumps can be prevented at time of cutting with a cut-stump herbicide treatment such as *Remedy* (triclopyr) or picloram. A foliar herbicide application with a high rate of *GrazonNext HL*, *PastureGard HL*, or *Surmount* are labeled for small locust trees. Additionally, a 2,4-D + dicamba mixture can be effective. *GrazonNext HL* will probably provide the best combination of locust control and broad spectrum weed control if other problem weeds are present. *Remedy* (triclopyr) can be tank-mixed with either herbicide to increase effectiveness on brushy weeds.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$\$	13 mL (1/2 oz) GrazonNext HL
1 pint Remedy Ultra		6.25 mL (1/4 oz) Remedy Ultra
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per gallon (cut stump treatment)</u>		
1 part Remedy Ultra	\$\$\$	
3 parts diesel fuel or fuel oil		
You can also purchase Tordon RTU, a “ready-to-use” cut stump product. \$		

***Multiflora rose* (*Rosa multiflora*)**

Best herbicide timing:

Spring (before flowering is over); fall



Gary Fewless



Apply herbicide from full leaf emergence through the flowering period, or in late-summer/fall. For a **spring treatment**, multiple herbicides are labeled for and effective, including: GrazonNext HL alone or in a tankmix with *Remedy Ultra* is effective. Metsulfuron (a component of *Cimarron Plus* and *Chisum*, and *Chaparral*) is also effective, along with *Surmount*, *PastureGard HL*, and *Crossbow*. For a **late-summer/fall** application, metsulfuron has shown excellent control. The cheapest, most effective herbicide for a spring application is probably *GrazonNext HL* alone or in combination with *Remedy*. Additionally, *GrazonNext HL* provides broad spectrum weed control and residual soil activity. Metsulfuron works well spring or fall and is fairly inexpensive but high rates are required and it does not offer as much soil residual activity. Caution: *Cimarron* will stunt fescue. *Crossbow* is a popular brushy weed product, but is not a good choice if residual control is desired. If the plant has been mown, wait 9-12 months before applying herbicide in order to maximize leaf area exposure to the treatment.

Example applications:

<u>Per acre</u> 2.1 pints GrazonNext HL 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 13 mL (1/2 oz) GrazonNext HL 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 0.5 oz Cimarron Plus 8 oz non-ionic surfactant	\$	<u>Per gallon of water (spot treatment)</u> *48 mL (1 ½ oz) Cimarron Plus premix* 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 1.5 pints Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 9.5 mL (1/3 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
\$\$\$\$\$		<u>Per gallon of water (spot treatment)</u> 57 mL (2 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

***See page 6 – Creating a liquid premix**

Autumn olive (*Elaeagnus umbellate*)

Best herbicide timing:
Late-spring through summer



Based on VT trials, multiple herbicides are effective on autumn olive including 2,4-D + dicamba, *Surmount*, *PastureGard HL*, and *Crossbow* (2,4-D + triclopyr). An additional option that should provide broad spectrum weed control and residual soil activity is *GrazonNext HL + Remedy*. *Cimarron* has been shown to be very ineffective on autumn olive. *Crossbow* is a popular brushy weed product, but not a good choice if residual control is desired. Apply herbicide from full leaf emergence through the flowering period. If the plant has been mown, wait 9-12 months before applying herbicide in order to maximize leaf area exposure to the treatment. Basal treatments can be effective.

<u>Per acre</u> 2.1 pints GrazonNext HL 1 pint Remedy Ultra 8 oz non-ionic surfactant	\$\$\$	<u>Per gallon of water (spot treatment)</u> 13 mL (1/2 oz) GrazonNext HL 6.25 mL (1/4 oz) Remedy Ultra 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 3 pints Surmount 8 oz non-ionic surfactant	\$\$\$\$	<u>Per gallon of water (spot treatment)</u> 19 mL (2/3 oz) Surmount 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 1.5 pints Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 9.5 mL (1/3 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
	\$\$\$\$\$	<u>Per gallon of water (spot treatment)</u> 57 mL (2 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant
<u>Basal bark treatment</u> 1 part Remedy Ultra 3 parts diesel fuel or fuel oil		
*Spray basal bark treatment to lower 15" of trunk		
*Soak trunk until thoroughly wet but not to point of runoff		
*If must apply to point of runoff, use 1 part <i>Remedy Ultra</i> to 20 parts diesel or fuel oil		

Black Hawthorn (*Crataegus douglasii*)

Best herbicide timing:

Late-spring and early-summer



Multiple herbicides are labeled and effective on hawthorn including: *GrazonNext HL* + *Remedy Ultra*, *Cimarron Plus*, *PastureGard HL*, *Surmount*, and *Crossbow*. *GrazonNext HL* + *Remedy Ultra* or *Surmount* are probably the most economical and multi-purpose in a broadcast situation. Apply herbicide from full leaf emergence through the flowering period. If the plant has been mown, wait 9-12 months before applying herbicide in order to maximize leaf area exposure to the treatment.

Example applications:

Per acre 1.5 pints PastureGard HL 8 oz non-ionic surfactant	\$\$\$\$	Per gallon of water (spot treatment) 9.5 mL (1/3 oz) PastureGard HL 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 2.1 pints GrazonNext HL 1 pint Remedy Ultra 8 oz non-ionic surfactant	\$\$\$	Per gallon of water (spot treatment) 13 mL (1/2 oz) GrazonNext HL 6.25 mL (1/4 oz) Remedy Ultra 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 1.5 pints Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 9.5 mL (1/3 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
	\$\$\$\$\$	Per gallon of water (spot treatment) 57 mL (2 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Sericea Lespedeza (*Lespedeza cuneata*)

Best herbicide timing:

Early bud stage (mid-summer); fall



Sericea lespedeza is a warm-season, perennial legume that sprouts in early-summer from underground crown buds. Frequent mowing, especially including a mowing late in the season, limits carbohydrate storage to reduce stand productivity the following year. Herbicide applications made in early-summer at the flower bud stage target herbicide to the crown and root system and deplete plant energy reserves. Additionally, a fall herbicide application suppresses crown bud formation that is responsible for the following year's growth.

Triclopyr or triclopyr-containing herbicides (e.g. generic triclopyr, *Remedy Ultra*, *PastureGard HL*, *Crossbow*) have been shown to be most effective on *Sericea lespedeza*, resulting in around a 75% reduction in weed density one year after treatment. Metsulfuron-containing products (e.g. *Cimarron Plus*, *Chisum*, *Chaparral*, generic metsulfuron) have been shown to be equally effective when applied in fall (but not in spring).

Example applications:

<u>Per acre</u> 1.5 pints PastureGard HL 8 oz non-ionic surfactant	\$\$\$\$\$	<u>Per gallon of water (spot treatment)</u> 9.5 mL (1/3 oz) PastureGard HL 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 2 pints Surmount 8 oz non-ionic surfactant	\$\$\$	<u>Per gallon of water (spot treatment)</u> 12.5 mL (1/2 oz) Surmount 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 0.5 oz Cimarron Plus 8 oz non-ionic surfactant	\$	<u>Per gallon of water (spot treatment)</u> *48 mL (1 ½ oz) Cimarron Plus premix* 9.5 mL (1/3 oz) non-ionic surfactant

***See page 6 – Creating a liquid premix**

Buckbrush, Devil's shoestring (*Symphoricarpos orbiculatus*)

Best herbicide timing:

Before tender new growth hardens off (spring); fall



Buckbrush is a perennial bush that sprouts from aggressive rhizomes. Target the plant and rhizomes through an early spring or fall herbicide application, followed by spot herbicide applications or mowing of any regrowth. For spring applications, spray after new leaves and stems emerge, but before new growth becomes woody. Because of its rhizomatous nature, it may take several years to get an infestation under control.

In university testing, the best results were obtained with a high rate of 2,4-D alone, or with a tankmix of *GrazonNext HL* + *Remedy Ultra*. Both options gave about 97% control when assessed 3 ½ months after treatment. If you are targeting weeds in addition to buckbrush - especially other perennials - *GrazonNext HL* + *Remedy* is probably the better choice. Because of the effectiveness of 2,4 D on buckbrush when it is young, many common pasture herbicides should be effective when boosted with 2,4-D. For example, *GrazonNext HL* & 2,4-D has shown good results.

Example applications:

<u>Per acre</u> 2.1 pints GrazonNext HL 1 pint Remedy Ultra 8 oz non-ionic surfactant	\$\$\$	<u>Per gallon of water (spot treatment)</u> 13 mL (1/2 oz) GrazonNext HL 6.25 mL (1/4 oz) Remedy Ultra 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 4 pints 2,4-D ester 8 oz non-ionic surfactant	\$	<u>Per gallon of water (spot treatment)</u> 25 mL (3/4 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant

Queen Anne's Lace, Wild Carrot (*Daucus carota*)

Best herbicide timing:

Seedling or rosette stage (spring, summer, & fall of first year)



Queen Anne's Lace is a biennial weed that germinates in *spring*, develops a rosette (shown in middle above) and taproot the first summer, dies back to the taproot over winter, and flowers the following summer before dying. The first leaves to emerge look similar to a grass seedling; followed by leaves that can appear similar to a fern. Target the plant during the seedling and rosette stages the first summer; it is very easy to kill during the rosette stage with any broadleaf herbicide. During the second year it is best to mow-off the flower stalks since there is limited leaf area on mature plants to take in herbicide - you may still need to apply herbicide to control the younger generation of seedling plants. Preventing seed production is an important management tool since each Queen Anne's Lace plant can produce around 4,000 seeds.

In university testing, good results were obtained with 2,4-D + dicamba, *Chaparral*, *Crossbow*, and *Cimarron Plus*- all providing about 85-100% control. *Surmount* and *GrazonNext HL* showed 75-85% control but would do well in most cases to address additional weed species and to control later weed flushes. Hay situations would achieve best results with a 2,4-D + dicamba tankmix.

Example applications:

Per acre 2.1 pints GrazonNext HL 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 13 mL (1/2 oz) GrazonNext HL 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 2.5 pints 2,4-D ester 8 oz dicamba 8 oz non-ionic surfactant	\$	Per gallon of water (spot treatment) 16 mL (1/2 oz) 2,4-D 3 mL (1/10 oz) dicamba 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 2.5 oz <i>Chaparral</i> 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) *48 mL (1 1/2 oz) <i>Chaparral</i> premix* 9.5 mL (1/3 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Stickweed

(*Verbesina occidentalis*)

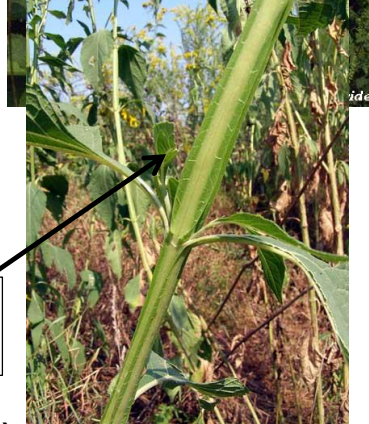


All 3 species possess “wings” that run along the stems

Best herbicide timing:
early bud stage (early summer)

Wingstem

(*Verbesina alternifolia*)



Ironweed

(*Vernonia noveboracensis*)



Stickweed, wingstem, and ironweed are similar species from the same family that are commonly referred to interchangeably. Their life cycle and growth form is very similar, and they are managed similarly as well. All species are large (6- 12 feet tall) perennials that sprout new plants annually from a large, underground crown. Target the plant during the early-bud stage in early-summer. You may spray regrowth following mowing or seasonal fall regrowth after the plant reaches about 2-3 feet in height.

In university testing, good results were obtained with numerous herbicides including: *Crossbow*, 2,4-D + dicamba, *Surmount*, and *GrazonNext HL*. The least expensive option will most likely be 2,4-D + dicamba but the best would be *Surmount* or *GrazonNext HL*.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$	13 mL (1/2 oz) GrazonNext HL
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D ester	\$	16 mL (1/2 oz) 2,4-D ester
8 oz dicamba		3 mL (1/10 oz) dicamba
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

Plantain species

Best herbicide timing: late-spring or fall

Buckhorn (*Plantago lanceolata*)



Broadleaf (*Plantago major*)



Broadleaf and buckhorn plantains are perennial weeds with dense clumps of leaves that grow close to the ground; they also form a taproot. Although the plant itself will send up new shoots from its crown year after year, it spreads mainly by seed. Most of these seeds germinate in spring or early fall, and unlike many seeds that require light as a trigger to germinate, plantains can germinate and establish even in a thick stand of grass. They tend to do well in compacted soils and tolerate close mowing or grazing.

Target the mature plant during spring prior to flowering, or in fall. This will also target seedlings. University testing shows that good results can be obtained with many of the common pasture herbicides including *Cimarron Plus*, *Crossbow*, *Chaparral*, *PastureGard HL*, *Surmount*, and 2,4-D alone or with dicamba. *GrazonNext HL* has shown reduced control when compared to the above-mentioned herbicides.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D ester	\$	16 mL (1/2 oz) 2,4-D ester
8 oz dicamba		3 mL (1/10 oz) dicamba
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 oz <i>Chaparral</i>	\$\$	*48 mL (1 ½ oz) <i>Chaparral</i> premix*
9.5 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Yucca (*Yucca filamentosa*)

Best herbicide timing: Late-spring and early-summer



Yucca is a tall perennial weed with thick underground rootstocks. Effective control can be obtained by spot treatment with a triclopyr + diesel fuel mixture.

Example applications:

(Spot treatment)
2.5 oz Remedy Ultra
1 gallon diesel fuel



Biennial thistles

Best herbicide timing: fall or early-spring (seedling or rosette stage)

Bull thistle
(*Cirsium vulgare*)



Musk thistle
(*Carduus nutans*)



Plumeless thistle
(*Carduus acanthoides*)



There are many thistle species. With the exception of Canada thistle, most are biennial and are managed similarly. The three shown on this page are some of the most common species. Biennial thistles spread only by seed, which can germinate from fall through spring and early summer. The first year is spent as a seedling rosette, the plant then overwinters as a rosette prior to shooting a flowering stalk (bolting) in summer. Target the plant during the rosette stage in fall or spring. Most broadleaf herbicides are effective on biennial thistles when applied in the rosette stage. Timing is critical as control declines sharply once bolting begins.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$\$	13 mL (1/2 oz) GrazonNext HL
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D ester	\$	16 mL (1/2 oz) 2,4-D ester
8 oz dicamba		3 mL (1/10 oz) dicamba
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

Canada Thistle (*Cirsium arvense*)

Best herbicide timing:

Early-bud stage (June-August) and fall



Canada is a thorny perennial that sprouts from spreading rhizomes (underground stems) and can form large colonies. Unlike the biennial thistles which should be sprayed when small, Canada thistle should be targeted after they have reached about $\frac{3}{4}$ of their maximum height- around the early-bud stage. The goal in controlling Canada thistle is to deliver herbicides to roots and rhizomes and to expend energy reserves through subsequent regrowth. Fall can also be a good time to spray Canada thistle as it sends sugars (and herbicides) to belowground storage organs.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$	13 mL (1/2 oz) GrazonNext HL
1 pint 2,4-D ester		6.25 mL (1/4 oz) 2,4-D ester
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
3 oz Chaparral	\$\$	*48 mL (1 1/2 oz) Chaparral premix*
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
1 pint Remedy Ultra	\$\$	6.25 mL (1/4 oz) Remedy Ultra
3 pints 2, 4-D ester		19 mL (2/3 oz) 2,4-D ester
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

	<u>Per gallon of water (spot treatment)</u>
\$\$\$\$\$\$	47 mL (1.5 oz) Crossbow
	9.5 mL (1/3 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Spiny Amaranth, Spiny pigweed (*Amaranthus spinosus*)

Best herbicide timing:

Seedling stage (throughout summer)



Spiny amaranth is a summer annual weed that thrives in bare or high traffic areas of pasture and hay. Each plant is capable of producing over 100,000 seeds per plant, so preventing seed production is an important management tool. Seeds germinate throughout summer. Seeds are sensitive to burial- burial to as little as 1/4" will stop most seeds from germinating.

Target the plant during the seedling stage throughout summer. It is easy to kill with most broadleaf herbicides when less than about 4" tall. Control becomes difficult as plant size increases. Additionally, one application of a residual chemical is not always dependable since seeds can germinate all summer. University testing has shown multiple herbicides to be effective on plants in the 6-20" range including dicamba, *Cimarron Plus*, *Chaparral*, *Surmount*, and *GrazonNext HL*. Applying 2,4-D alone is generally not effective. Due to the likely necessity of repeated applications, an inexpensive option such as dicamba or *Cimarron Plus* is probably the best choice if other weed issues are not being targeted.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>	
0.3 oz Cimarron Plus	\$	*48 mL (1 ½ oz) Cimarron Plus premix*	
8 oz non-ionic surfactant		9.5 mL (2 tsp) non-ionic surfactant	
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>	
1 pint dicamba	\$\$	6.25 mL (1/4 oz) dicamba	
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant	
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>	
2.5 pints 2,4-D ester	\$	16 mL (1/2 oz) 2,4-D ester	
8 oz dicamba		3 mL (1/10 oz) dicamba	
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant	

*See page 6 – Creating a liquid premix

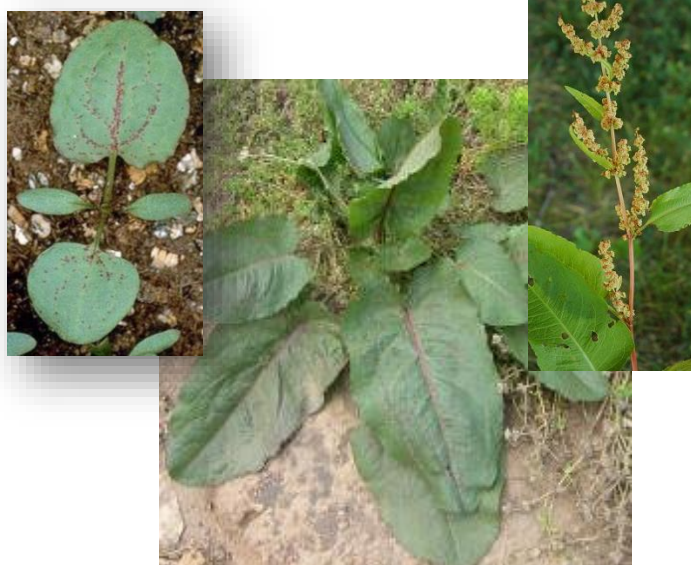
Dock species

Best herbicide timing: late-spring or fall

Curly (*Rumex crispus*)



Broadleaf (*Rumex obtusifolius*)



These are taprooted perennials that form dense rosettes. Although the plant will send up new shoots every year, it spreads mainly by seed. Most seeds germinate spring through fall.

Target the mature plant during late spring prior to flowering, or in fall. This will also target seedlings. University testing shows that good results can be obtained with many herbicides including *Cimarron Plus*, *Crossbow*, *GrazonNext HL*, *Surmount*, dicamba, or 2,4-D + dicamba. Additionally, *Chaparral* and *PastureGard HL* list control of dock on the label.

Example applications:

<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.1 pints GrazonNext HL	\$\$	13 mL (1/2 oz) GrazonNext HL
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
0.3 oz Cimarron Plus	\$	*48 mL (1 ½ oz) Cimarron Plus premix*
1 pint 2,4-D ester		6.25 mL (1/4 oz) 2,4-D ester
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u>		<u>Per gallon of water (spot treatment)</u>
2.5 pints 2,4-D ester	\$	16 mL (1/2 oz) 2,4-D ester
8 oz dicamba		3 mL (1/10 oz) dicamba
8 oz non-ionic surfactant		9.5 mL (1/3 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Burdock (*Arcticum minus*)

Best herbicide timing: fall or early spring (seedling or rosette stage)



Burdock is a biennial that forms a large rosette the first year and a large upright plant the second year. Although technically a biennial, it may take more than two years to flower. It has a large, fleshy taproot. Reproduction is by seed that usually germinates in early-spring.

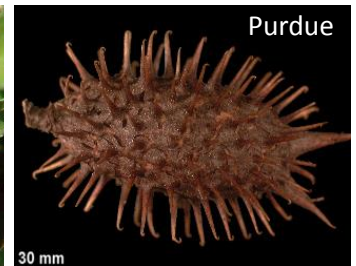
Target the plant during the first year rosette stage, or the following year prior to bolting (emergence of reproductive stem). Herbicides that have been shown to be effective on burdock include: *Crossbow*, 2,4-D alone or with dicamba, and *GrazonNext HL*. *PastureGard HL*, *Surmount*, and *Chaparral* are also labeled for burdock.

Example applications:

Per acre 2.1 pints GrazonNext HL 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 13 mL (1/2 oz) GrazonNext HL 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 2.5 pints 2,4-D ester 8 oz dicamba 8 oz non-ionic surfactant	\$	Per gallon of water (spot treatment) 16 mL (1/2 oz) 2,4-D ester 3 mL (1/10 oz) dicamba 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 1 pint Remedy Ultra 2.0 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$\$	Per gallon of water (spot treatment) 6.25 mL (1/4 oz) Remedy Ultra 12.5 mL (1/2 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
\$\$\$		Per gallon of water (spot treatment) 19 mL (3/4 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Cocklebur (*Xanthium strumarium*)

Best herbicide timing: spring & summer (seedling stage)



Cocklebur is a summer annual with a thick, woody taproot. Reproduction is by seed that germinate in early-spring through summer.

Target the plant during the seedling stage – the smaller the plant, the easier it is to kill. Most common broadleaf herbicides are reported to be highly effective on cocklebur. Crossbow, 2,4-D alone or with dicamba will probably be the most practical to select, since cocklebur usually occurs in isolated patches conducive to spot-spraying. The use of products with residual activity such as *GrazonNext HL* would help to prevent future flushes of cocklebur in-season.

Example applications:

Per acre 2.1 pints GrazonNext HL 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 13 mL (1/2 oz) GrazonNext HL 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 2.5 pints 2,4-D ester 8 oz dicamba 8 oz non-ionic surfactant	\$	Per gallon of water (spot treatment) 16 mL (1/2 oz) 2,4-D ester 3 mL (1/10 oz) dicamba 9.5 mL (1/3 oz) non-ionic surfactant
Per acre 1 pint Remedy Ultra 2.0 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	Per gallon of water (spot treatment) 6.25 mL (1/4 oz) Remedy Ultra 12.5 mL (1/2 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
\$\$\$		Per gallon of water (spot treatment) 19 mL (3/4 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Common Mullein (*Verbascum thapsus*)

Best herbicide timing: fall or early spring (seedling or rosette stage)



Common mullein is a biennial that forms a large rosette the first year and a tall upright stem the second year. It has a large taproot. Reproduction is by seed that usually germinates in late-summer, early-fall, or spring.

Target the plant during the first year rosette stage, or the following year prior to bolting (emergence of reproductive stem). Mullein is difficult to kill. University testing has shown best control with metsulfuron (*Cimarron*) followed by picloram (*Grazon P+D*), and aminopyralid (*GrazonNext HL* or *Milestone*).

Example applications:

<u>Per acre</u> 0.5 oz Cimarron Plus 8 oz non-ionic surfactant	\$	<u>Per gallon of water (spot treatment)</u> *48 mL (1 ½ oz) Cimarron Plus premix* 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 2.5 oz Chaparral 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> *48 mL (1 ½ oz) Chaparral premix* 9.5 mL (1/3 oz) non-ionic surfactant

*See page 6 – Creating a liquid premix

Brambles: dewberries, blackberries, etc. (Rubrus spp.)

Best herbicide timing:

Pre bloom & early bloom, or after fruit drop



Assorted species are referred to as brambles. They are perennial, spreading by root sprouts, rhizomes, or rooting aboveground stems, in addition to seed. All species are difficult to control. Plants should be sprayed in the pre-bloom to early-bloom stages, or after fruit drop. The best control is achieved when applications are made to unmowed plants.

In university testing, *Crossbow*, *Surmount*, and metsulfuron-containing (e.g. *Cimarron Plus*, *Chaparral*) products achieved 75-80% control. GrazonNext HL has shown less than 55% control. *PastureGard HL* should provide acceptable control but is probably less cost-effective for use on brambles due to the high rates required.

Example applications:

<u>Per acre</u> 2 pints 2,4-D ester 1 pint dicamba 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 12.5 mL (1/2 oz) 2,4-D ester 6.25 mL (1/4 oz) dicamba 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 3 pints Surmount 8 oz non-ionic surfactant	\$\$\$	<u>Per gallon of water (spot treatment)</u> 19 mL (2/3 oz) Surmount 9.5 mL (1/3 oz) non-ionic surfactant
<u>Per acre</u> 1.5 pints Remedy Ultra 3 pints 2, 4-D ester 8 oz non-ionic surfactant	\$\$	<u>Per gallon of water (spot treatment)</u> 9.5 mL (1/3 oz) Remedy Ultra 19 mL (2/3 oz) 2,4-D ester 9.5 mL (1/3 oz) non-ionic surfactant
\$\$\$\$\$		<u>Per gallon of water (spot treatment)</u> 57 mL (2 oz) Crossbow 9.5 mL (1/3 oz) non-ionic surfactant

Foxtails: yellow, giant, green. (*Setaria* spp.)

Best herbicide timing:
Immediately after 1st cut hay



Yellow foxtail



Green foxtail



Giant foxtail

Yellow, giant, and green foxtail are all common in Virginia. They are all clump forming summer annuals, spreading only by seed. Seeds germinate from late-May through mid-summer, often seeming to take over pasture and hay fields in August and September when they bloom and set seed.

The premier chemical for control of foxtail is quinclorac, marketed as *Facet L*, or as the generic *QuinStar*. Quinclorac offers in-season preemergence and postemergence control of foxtails, as well as other summer annuals including fall panicum, crabgrass, barnyardgrass, and ragweed. Postemergence activity, however, is only effective on seedlings up to 3 or 4" tall. Even though most summer annual weeds like foxtail are not noticed until late in summer, they actually begin germinating in mid-May through June. Consequently, an application of quinclorac in late-May or early-June works well to kill emerged grasses when they are small and to control seeds that have not yet germinated. Because quinclorac's effectiveness depends heavily on preemergence control, it is important that it be applied in situations that allow the spray to contact the ground (i.e. hay or thick pasture removed). It is advisable to make first cutting hay as usual, and plan to apply quinclorac as soon as hay is off the field.

Quinclorac is not recommended to be mixed with liquid fertilizer, but it can be easily tankmixed with 2,4-D or dicamba. ***It must be mixed with a crop oil concentrate or methylated seed oil.*** There are no grazing restrictions with quinclorac; the only restriction is that you must wait at least 7 days after an application **before** you can cut it again for hay. Recently pendimethalin (*Prowl H20*) received a supplemental label to allow its use in hay and pasture. Pendimethalin is strictly a preemergent herbicide, meaning it will have no effect on weeds that have already germinated. Good ground coverage must be achieved to obtain effective preemergence activity, therefore restricting applications to

early spring or after hay removal. An early-spring application could lose efficacy by the time many weeds begin emerging. At the same time, an application after the first hay harvest will likely miss large flushes of summer annuals that have already emerged. There is no preharvest or pregrazing interval for *Prowl H2O*. It can be mixed with other herbicides such as 2,4-D or dicamba to control emerged broadleaf weeds. One last strike against *Prowl H2O* is that it stains everything it touches a mustard yellow color, making mixing and loading interesting. In summary, pendamethalin is an option but it is much more dependent on timing of application than quinclorac.

Example applications:

<u>Per acre</u> 2 quarts Prowl H ₂ O (no surfactant required)	\$\$\$
<u>Per acre</u> 1 quart Facet L (a liquid formulation) 1 pint of methylated seed oil (MSO)	\$\$\$\$\$
<i>*Can be tank-mixed with 2,4-D, dicamba, or Prowl H₂O if desired</i>	
<u>Per acre</u> 16 oz QuinStar (a dispersible granule) 1 pint of methylated seed oil (MSO)	\$\$\$
<i>*Can be tank-mixed with 2,4-D, dicamba, or Prowl H₂O if desired</i>	