Virginia Cooperative Extension
Virginia Tech • Virginia State University

Herbicide Recipes For Pasture

Matt Booher, Extension Agent
Augusta, Rockingham, Rockbridge

Office: 540-245-5750
Cell: 540-416-5339
mrbooher@vt.edu

Revised 4/8/2015

The herbicide recommendations in this guide were generated using the following sources:

1. Priority was given to the herbicide recommendations outlined in Virginia Cooperative Extension's 'Pest Management Guide', and to several VCE publications on controlling specific common pasture weeds.
2. University recommendations from neighboring states
3. Herbicide labels and recommendations from herbicide manufacturers
4. My experiences as a commercial applicator and evaluations of local herbicide trials currently in place.

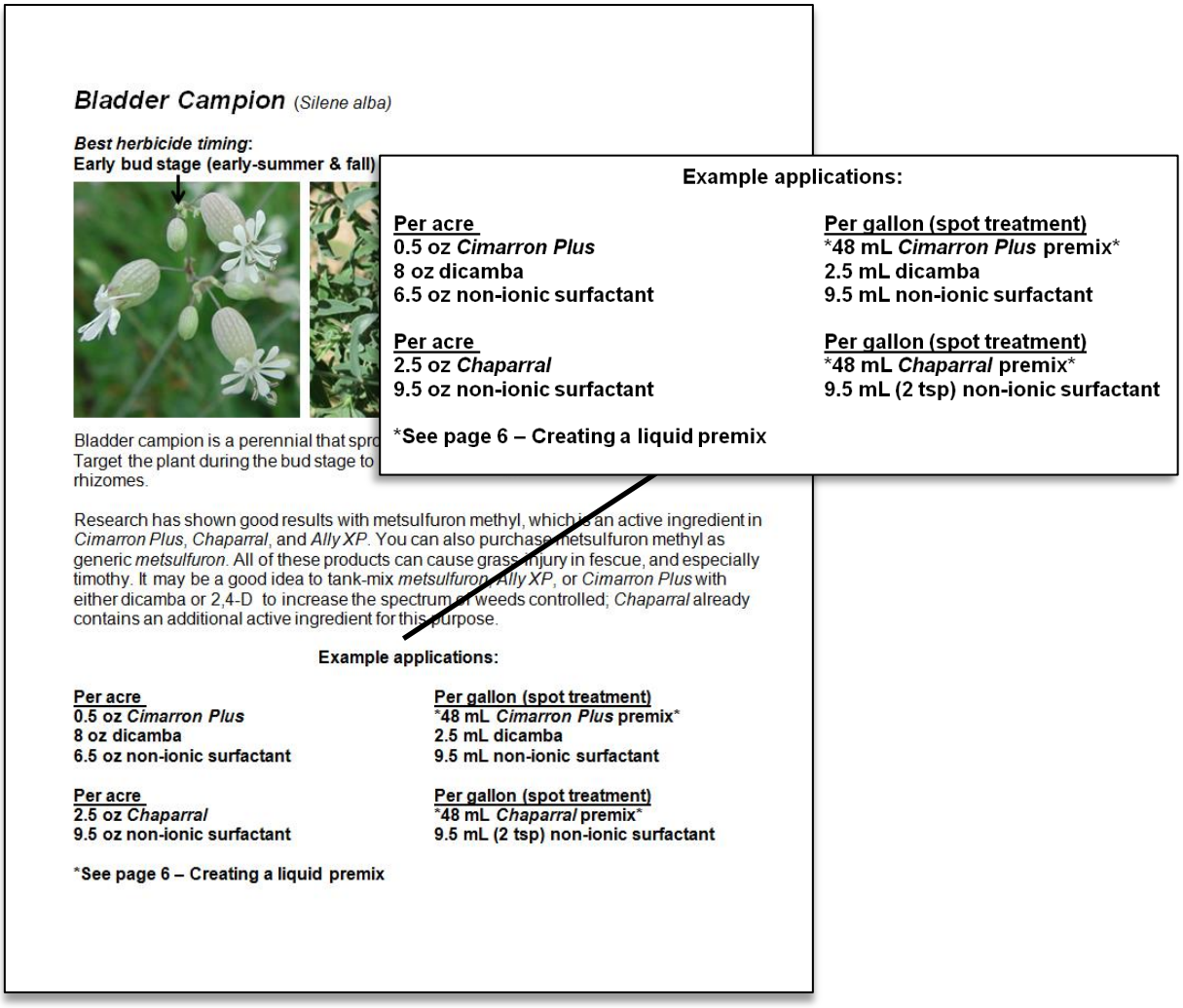
There may be instances where herbicides other than those mentioned may be legal and effective. Virginia Cooperative Extension does not endorse any specific company or product; product names are used when a product represents a unique combination of active ingredients not found elsewhere on the market, 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 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 could result in reduced control by promoting top-kill before herbicide translocation occurs to roots and especially to other underground storage organs.

- The *per gallon* herbicide rates were calculated under the assumption that most people, **when spot spraying by hand, will apply somewhere around 100 gallons/acre of the spray mixture. This is a starting point only, your case may vary dramatically depending on weed density, sprayer type, and individual application technique.**



Bladder Campion *(Silene alba)*

***Best herbicide timing*:**
Early bud stage (early-summer & fall)

Bladder campion is a perennial that spr
Target the plant during the bud stage to
rhizomes.

Research has shown good results with metsulfuron methyl, which is an active ingredient in *Cimarron Plus*, *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*, *Ally XP*, or *Cimarron Plus* 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:

Per acre	Per gallon (spot treatment)
0.5 oz *Cimarron Plus*	*48 mL *Cimarron Plus* premix*
8 oz dicamba	2.5 mL dicamba
6.5 oz non-ionic surfactant	9.5 mL non-ionic surfactant
Per acre	**Per gallon (spot treatment)**
2.5 oz *Chaparral*	*48 mL *Chaparral* premix*
9.5 oz non-ionic surfactant	9.5 mL (2 tsp) non-ionic surfactant

*See page 6 – Creating a liquid premix

Example applications:

Per acre	Per gallon (spot treatment)
0.5 oz *Cimarron Plus*	*48 mL *Cimarron Plus* premix*
8 oz dicamba	2.5 mL dicamba
6.5 oz non-ionic surfactant	9.5 mL non-ionic surfactant
Per acre	**Per gallon (spot treatment)**
2.5 oz *Chaparral*	*48 mL *Chaparral* premix*
9.5 oz non-ionic surfactant	9.5 mL (2 tsp) non-ionic surfactant

*See page 6 – Creating a liquid premix

Herbicide Timing for *Summer Annual Weeds*

SPRAY **SPRAY**

Seedling
spring & summer

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.

Herbicide Timing for *Biennial Weeds*

SPRAY **SPRAY**

Seedling
typically late summer or fall

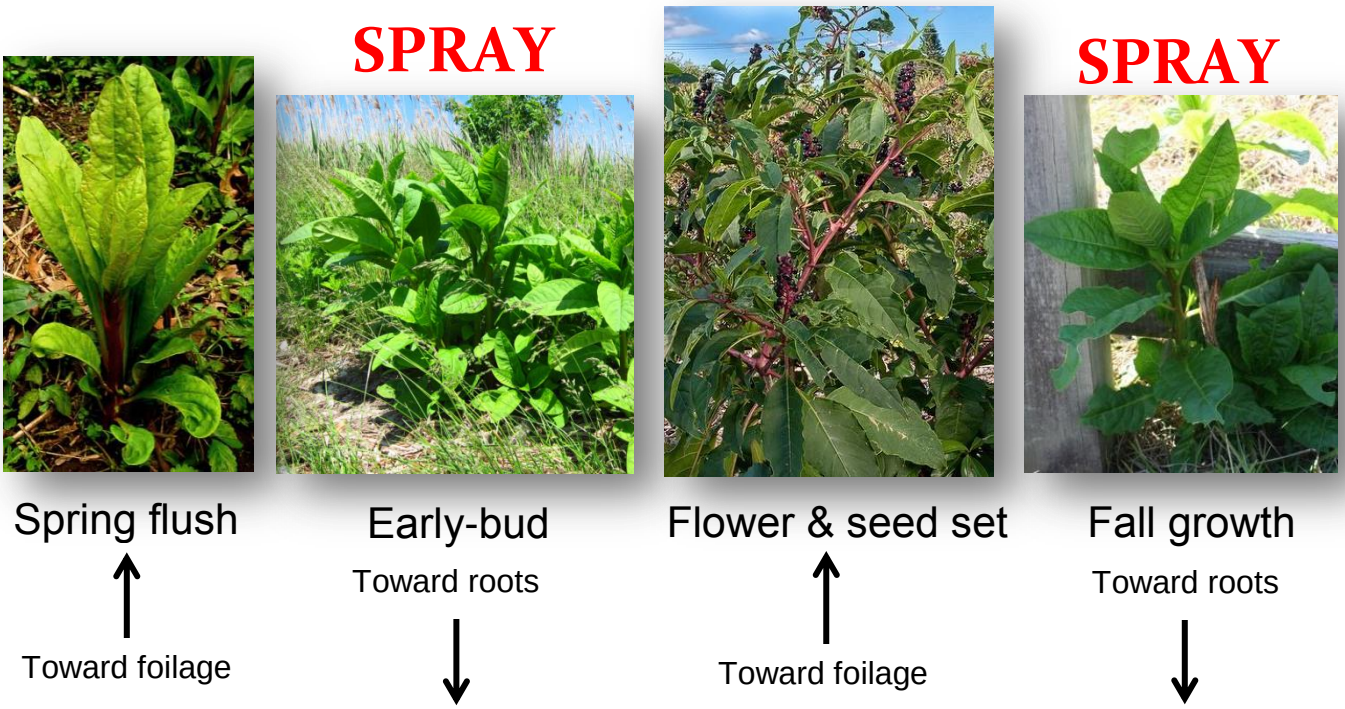
Rosette
fall - early spring

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*



General direction of sugar and herbicide movement

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 dry flowable herbicides that have extremely low use-rates, (e.g. Cimarron Plus and Chaparral) it is helpful to create a pre-mixed liquid solution. Try to pre-mix only as much as you will use within a few days to prevent chemical degradation from long storage. Be sure to keep a label with the container and mix well before use.

To create a *metsulfuron* liquid premix:

*Mix 0**.**10 oz of *Cimarron Plus* with 1 quart (32 oz) of water and mix well. Withdraw 48 mL (1 ½ oz) of this solution and add to one gallon of water to create a gallon of spray. Be sure to mix the solution thoroughly before each use! One quart of premix should make about 20 gallons of spray.

To create a *Chaparral* liquid premix:

*Mix 0**.**5 oz of *Chaparral* with 1 quart (32 oz) of water and mix well. Withdraw 48 mL (1½ oz) of this solution and add to one gallon of water to create a gallon of spray. Be sure to mix the solution thoroughly before each use! One quart of premix should make about 20 gallons of spray.

Contents

Bladder Campion……....8
Horsenettle, Sand Briar……...9
Pokeweed, Pokeberry……....10
Milkweed……...11
Dogbane……. 12
Cedar……....13
Osage Orange, Hedgeapple…….....14
Sumac…….....15
Ailanthus, Tree-of-Heaven……....15
Honey Locust……...16
Black Locust……..16
Multiflora Rose…….....17
Autumn Olive……....18
Black Hawthorn……...19
Sericea Lespedeza……..……20
Buckbrush, Devil's Shoestring……..…21
Queen Ann's Lace, Wild Carrot……..…22
Stickweed……..23
Wingstem……...23
Ironweed……....23
Buckhorn Plantain……...24
Broadleaf Plantain……..……..24
Yucca…….……25
Bull thistle……...26
Musk thistle……....26
Plumeless thistle……26
Canada thistle……...27
Spiny Amaranth, Spiny Pigweed……..……..28
Curly Dock……..……...29
Broadleaf Dock……...29
Burdock……30
Cocklebur……31
Common Mullein…….……...32
Brambles: Dewberry, Blackberry……..……..33

Bladder Campion (*Silene alba)*

***Best herbicide timing*:**
Early bud stage (early-summer & fall)



Bladder campion 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*, *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*, *Ally XP*, or *Cimarron Plus* 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:

Per acre	**Per gallon of water (spot treatment)**
0.5 oz *Cimarron Plus*	***48 mL (1 ½ oz) *Cimarron Plus* premix***
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**

Per acre	**Per gallon of water (spot treatment)**
2.5 oz *Chaparral*	***48 mL (1 ½ oz) *Chaparral* premix***
9.5 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)


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.

Several products are effective on horsenettle when sprayed at high rates, including: 2,4-D+ dicamba, *Grazon*, *Forefront*, and *Surmount*. 2,4-D + dicamba is slightly less expensive than the other options, however, the other herbicides listed contain either picloram or aminopyralid. These chemicals are stronger on perennials and have residual soil activity on existing or germinating weeds for up to several months.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

Pokeweed, pokeberry *(Phytolacca americana)*

***Best herbicide timing*:**
Early bud stage (early-to-mid summer); fall regrowth


Pokeweed is a perennial that sprouts from a large fleshy taprooot. 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*, *Forefront*, or *Milestone*, which are all general-use, over-the-counter products. *Crossbow* is generally too expensive to use as a broadcast application, but a home tankmix of triclopyr (*Remedy*) + 2,4-D would be a more cost-effective option. *Forefront* and *Milestone* contain aminopyralid, which has long-lasting activity on many herbaceous weeds, and may be your best choice if you are targeting these in addition to pokeweed.

Example applications:

<u>Per acre</u>
1.5 pints GrazonNext HL
9.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
7.25 mL (1/3 oz) GrazonNext HL
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per acre</u>
1 quart Remedy Ultra
4 pints 2,4-D LV4
6.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
9.5 mL (1/3 oz) Remedy Ultra
19 mL (3/4 oz) 2,4-D LV4
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
38 mL (1 ¼ 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 products containing the active ingredients aminopyralid and/or fluroxypyr; examples include *Forefront HL* and *Surmount*. A high rate of dicamba (32-64 oz/acre) can also be effective, but can injure grasses during periods of stress. *Surmount* is a restricted-use product. *Surmount* and *Forefront HL* are labeled for pasture only.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
2 pints GrazonNext HL	**9.5 mL (1/3 oz) GrazonNext HL**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
3 pints Surmount	**14.5 mL (1/2 oz) Surmount**
9.5 oz non-ionic surfactant	**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 (picloram + fluroxypry) herbicide has been effective on dogbane in university trials. *Crossbow* has also been moderately effective. When you base your selection on price, the spectrum of weeds controlled, and the persistence of weed control, *Surmount*, is probably a better 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
9.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
14.5 mL (1/2 oz) Surmount
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per acre</u>
1 pint Remedy Ultra
2.5 pints 2, 4-D LV4
6.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
4.5 mL (1/4 oz) Remedy Ultra
12 mL (1/2 oz) 2,4-D LV4
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
38 mL (1 ¼ 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 (medium on soil test).

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 feet tall or larger, less than 50% of trees will be controlled. The following herbicide recipe was shown to be the most effective treatment in a Virginia Tech trial, and similar mixtures are likewise recommended by many agronomy professionals in Virginia.

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

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
1 pint Remedy	**5 mL (1/4 oz) Remedy Ultra**
14 oz non-ionic surfactant	**11 mL (1/2 oz) non-ionic surfactant**

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 or Remedy (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:

<u>Per gallon (*foliar spray*)</u>
38 mL (1 ¼ oz) Remedy Ultra
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per gallon (*cut stump treatment*)</u>
1 part Remedy or generic triclopyr
3 parts diesel fuel or fuel oil
or
Tordon RTU – a "ready to use" product

<u>Per gallon (basal bark treatment on trees <6" diameter)</u>
1 part Remedy or generic triclopyr
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 you must apply to point of runoff, use 1 part Remedy to 20 parts diesel or fuel oil

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 can act as a weed, Ailanthus is well known to be extremely invasive.

Example applications:

<u>Per gallon (*foliar spray*)</u>
38 mL (1 ¼ oz) Remedy Ultra
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per gallon (*cut stump treatment*)</u>
1 part Remedy or generic triclopyr
3 parts diesel fuel or fuel oil
or
Tordon RTU – a "ready to use" product

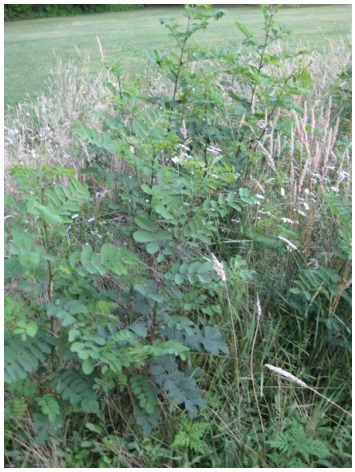
<u>Per gallon (basal bark treatment on trees <6" diameter)</u>
1 part Remedy or generic triclopyr
3 parts diesel fuel or fuel oil
*Apply basal bark treatment to lower 15" of trunk
*Soak trunk until thoroughly wet but not to point of runoff
*If you must apply to point of runoff, use 1 part Remedy to 20 parts diesel or fuel oil

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 *Grazon*, *Forefront HL*, *PastureGard HL*, or *Surmount* are labeled for small locust trees. *Grazon or Forefront 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>
3 pints Grazon P+D
1 pint Remedy
9.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
14.5 mL (1/2 oz) Grazon P+D
4.5 mL (1/4 oz) Remedy Ultra
11 mL (1/2 oz) non-ionic surfactant

<u>Per acre</u>
2 pints GrazonNext HL
1 pint Remedy
9.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
9.5 mL (1/3 oz) GrazonNext HL
4.5 mL (1/4 oz) Remedy Ultra
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per gallon (*cut stump treatment*)</u>
1 part Remedy or generic triclopyr
3 parts diesel fuel or fuel oil
or
Tordon RTU – a "ready-to-use" 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: *Grazon* + *Remedy* tankmix, *Forefront HL*, metsulfuron (a component of *Cimarron Plus*), *Chaparral*, *Surmount*, *PastureGard HL*, and *Crossbow*. For a ***late-summer/fall*** application, metsulfuron is the only herbicide that provides excellent control. The cheapest, most effective herbicide for a spring application is probably *Forefront HL* or *Grazon* + *Remedy*. Additionally, these provide 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: *Cimmaron* will stunt fescue. Similarly, *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:

Per acre	**Per gallon of water (spot treatment)**
2 pints GrazonNext HL	**9.5 mL (1/3 oz) GrazonNext HL**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
1 pint Remedy	**4.5 mL (1/4 oz) Remedy Ultra**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
0.5 oz Cimarron Plus	***48 mL (1 ½ oz) Cimarron Plus premix***
6.5 oz non-ionic surfactant	**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 Virginia Tech trials, multiple herbicides are effective on autumn olive, including: *Grazon* + *Remedy* tankmix, *Surmount*, *PastureGard*, and *Crossbow*. The cheapest, most effective herbicide that will provide control of autumn olive in addition to broad spectrum weed control and residual soil activity is probably *Grazon* + *Remedy*. *Cimarron* was shown to be very ineffective on autumn olive, offering only 30% control 4 months after treatment. *Crossbow* is a popular brushy weed product, but is not a good choice if residual control is desired. It is also relatively expensive at the rate required to control multiflora rose. 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.

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
1 pint Remedy	**4.5 mL (1/4 oz) Remedy Ultra**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
3 pints Surmount	**14.5 mL (1/2 oz) Surmount**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
2 pints PastureGard HL	**9.5 mL (1/3 oz) PastureGard HL**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Higher rates will be needed for plants over 6 feet tall.

Basal bark treatment
1 part Remedy or generic triclopyr
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 you must apply to point of runoff, use 1 part Remedy 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: *Grazon + Remedy*, *Cimarron Plus*, *PastureGard HL*, *Surmount*, and *Crossbow*. *Grazon + Remedy*, *PastureGard HL* 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:

<u>Per acre</u>
3 pints Grazon P+D
1 pint Remedy
9.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
14.5 mL (1/2 oz) Grazon P+D
4.5 mL (1/4 oz) Remedy Ultra
9.5 mL (1/3 oz) non-ionic surfactant

<u>Per acre</u>
3 pints Surmount
9.5 oz non-ionic surfactant

<u>Per gallon of water (spot treatment)</u>
14.5 mL (1/2 oz) Surmount
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

Higher rates will be needed for plants over 6 feet tall.

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*, *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*, *Chaparral*, generic metsulfuron) have been shown to be equally effective when applied in fall (but not in spring).

Example applications:

Per acre	**Per gallon of water (spot treatment)**
1.5 pints PastureGard HL	**7.25 mL (1/4 oz) PastureGard HL**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
Per acre	**Per gallon of water (spot treatment)**
2 pints Surmount	**9.75 mL (1/3 oz) Surmount**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
Per acre	**Per gallon of water (spot treatment)**
0.5 oz Cimarron Plus	***48 mL (1 ½ oz) Cimarron Plus premix***
6.5 oz non-ionic surfactant	**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 *Grazon & Remedy*. 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- *Grazon+ 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, *Forefront* & 2,4-D has shown good results.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
1 pint Remedy	**4.5 mL (1/4 oz) Remedy Ultra**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
4 pints 2,4-D LV4	**19 mL (3/4 oz) 2,4-D LV4**
6.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
2 pints GrazonNext HL	**9.5 mL (1/3 oz) GrazonNext HL**
1 pint 2,4-D LV4	**4.5 mL (1/4 oz) 2,4-D LV4**
9.5 oz non-ionic surfactant	**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, fair results were obtained with multiple herbicides including 2,4-D + dicamba, *Crossbow*, *Redeem*, and *Cimarron Plus*- all providing around 70% control. *Surmount* and *Forefront*, and dicamba (when not tankmixed with 2,4-D) performed poor to fair. *Grazon* performed best, and in most cases would be favored 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	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

Stickweed
(*Verbesina occidentalis*)

Wingstem
(*Verbesina alternifolia*)

Ironweed
(*Vernonia noveboracensis*)

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

***Best herbicide timing*:**
early bud stage (early summer)

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, *Redeem*, *Surmount*, *Milestone*, and *Forefront*. Best results were achieved with *Grazon*. The least expensive option will most likely be 2,4-D + dicamba.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

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 *Cimmaron*, *Crossbow*, *Grazon*, *Redeem*, or 2,4-D alone or with dicamba. Dicamba alone, *Surmount*, *Forefront*, and *Milestone* have shown reduced control when compared to the above-mentioned herbicides.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

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:

<u>(Spot treatment)</u>
2.5 oz Remedy
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. Any broadleaf herbicide is effective on biennial thistles when applied in the rosette stage. Timing is critical as control declines sharply once bolting begins.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
or	***or***
2 pints GrazonNext HL	**9.5 mL (1/3 oz) GrazonNext HL**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

Canada Thistle *(Cirsium arvense)*

***Best herbicide timing*:**
Early-bud stage (June-August) and fall


Jan Samanek


Missouri State Univ.

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 ¾ 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:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
2 pints GrazonNext HL	**9.5 mL (1/3 oz) GrazonNext HL**
1 pint 2,4-D LV4	**4.5 mL (1/4 oz) 2,4-D LV4**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
3 oz Chaparral	***48 mL (1 ½ oz) Chaparral premix***
9.5 oz non-ionic surfactant	**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, namely metsulfuron products such as *Cimarron* or *Chaparral*, dicamba or a dicamba-containing product, or an aminopyralid product like *Forefront* or *Milestone*. 2,4-D alone is generally not effective. Due to the likely necessity of repeated applications, an inexpensive option such as dicamba or *Cimarron* is probably the best choice if other weed issues are not being targeted.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
0.125 oz Cimarron Plus	***48 mL (1 ½ oz) Cimarron Plus premix***
6.5 oz non-ionic surfactant	**9.5 mL (2 tsp) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
16 oz dicamba	**4.5 mL (1/4 oz) dicamba**
6.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

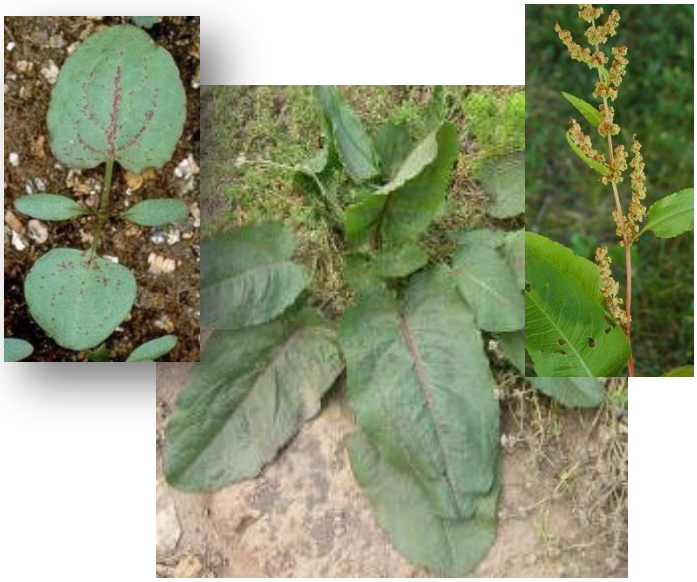
***See page 6 – Creating a liquid premix**

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 of the herbicides including *Cimmaron*, *Crossbow*, *Grazon*, *Forefront*, *Surmount*, dicamba, or 2,4-D plus dicamba. Additionally, *Chaparral* and *PastureGard HL* list control of dock on the label.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
Per acre	**Per gallon of water (spot treatment)**
0.125 oz Cimarron Plus	***48 mL (1 ½ oz) Cimarron Plus premix***
1 pint 2,4-D	**4.5 mL (1/4 oz) 2,4-D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
Per acre	**Per gallon of water (spot treatment)**
2.5 pints 2, 4-D	**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**

***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 *Grazon*. *Forefront HL*, *Milestone*, and *PasturGard HL* are also labeled for burdock.

Example applications:

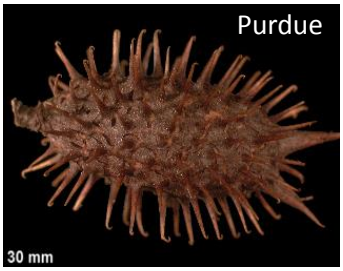
Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
2 quarts Crossbow	**19 mL (3/4 oz) Crossbow**
6.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
2.5 pints 2, 4-D Ester	**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**

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, the only reported exception being metsulfuron (a component of *Cimarron*). 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 *Grazon* or *Forefront HL*, would help to prevent future flushes of cocklebur in-season.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
2 quarts Crossbow	**19 mL (3/4 oz) Crossbow**
6.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
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**

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*), and aminopyralid (*Forefront or Milestone*).

Example applications:

Per acre	**Per gallon of water (spot treatment)**
3 pints Grazon P+D	**14.5 mL (1/2 oz) Grazon P+D**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
Per acre	**Per gallon of water (spot treatment)**
2 pints GrazonNext HL	**9.5 mL (1/3 oz) GrazonNext HL**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**
Per acre	**Per gallon of water (spot treatment)**
0.5 oz Cimarron Plus	***48 mL (1 ½ oz) Cimarron Plus premix***
6.5 oz non-ionic surfactant	**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, the most effective control was achieved with products containing picloram and/or fluroxypry (*Grazon* and *Surmount*). Fair control was achieved with *Cimarron Plus* (a metsulfuron product) and *Crossbow* (triclopyr + 2,4-D). The high rate of *Crossbow* required makes it a very expensive option. Numerous other products are labeled for and claim control of brambles, including: *PastureGard HL*, *Chaparral*, and *Remedy* are also labeled. *PastureGard HL* and *Remedy* are probably the least cost-effective for use on brambles due to the high rates required.

Example applications:

Per acre	**Per gallon of water (spot treatment)**
2 pints Grazon P+D	**9.5 mL (1/3 oz) Grazon P+D**
1 pint Remedy	**4.5 mL (1/4 oz) Remedy**
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
0.625 oz Cimarron Plus	***48 mL (1 ½ oz) Cimarron Plus premix**
6.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

Per acre	**Per gallon of water (spot treatment)**
3.3 oz Chaparral	***48 mL (1 ½ oz) Chaparral premix***
9.5 oz non-ionic surfactant	**9.5 mL (1/3 oz) non-ionic surfactant**

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