

MU Guide

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Cotton Weed Control

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Cotton is a slow-growing plant, and only a limited selection of herbicides can be used for cotton weed control. These two factors sometimes make weed control difficult.

Cotton is a semi-tropical, perennial plant. Although it is grown as an annual crop, cotton's growth habit is more like trees than corn or soybeans. Its growth is especially slow in the northern Cotton Belt, where it is often planted early into cool soils. Early in the season, cotton often seems to "just sit there." Unfortunately, cool weather does not stop the growth of most weeds.

Because herbicides are expensive to develop, most are developed for large-acreage crops such as corn and soybeans. Compared to these crops, cotton acreage is small, which reduces incentive to develop new herbicides for cotton. This limits the available herbicides. Those that are available often have narrow selectivity (safety) margins relative to crop tolerance.

At this time there are no selective, over-the-top, broadleaf herbicides available for cotton. Post-emergence broadleaf control is accomplished with herbicides that can injure cotton but which are applied in a directed spray that misses most of the cotton plant. Because of the availability and good performance of post-emergence grass herbicides, weed control programs should emphasize controlling broadleaf weeds. A selective broadleaf herbicide (Staple), a Buctril (bromoxynil) tolerant cotton variety and a Roundup (glyphosate) tolerant cotton variety may be available soon as over-the-top, broadleaf control options.

As with all crops, the weeds most difficult to control in cotton are the ones most closely related to the crop. Velvetleaf (often called wild cotton), spurred anoda and prickly sida (teaweed) often escape cotton herbicides. Botanists group these weeds and cotton in the Mallow or Malvaceae family.

How to control weeds

This publication provides an overview of standard weed control practices and an explanation of the concepts of cotton weed control. Most weed control practices are eventually customized for individual

Tips for successful cotton weed control

- ✓ Cotton should not be planted into extremely weedy fields.
- ✓ Cotton grows slowly, weeds grow fast. Weeds cannot be allowed to grow taller than cotton.
- ✓ Use a solid soil-applied herbicide program with fluometuron and a grass/small-seeded broadleaf herbicide (Trifluralin, Prowl or Dual).
- ✓ Apply Command or Zorial if velvetleaf, prickly sida or spurred anoda is present.
- ✓ Plan to apply two post-emergence directed applications; adjust as needed.
- ✓ Scout carefully, cultivate often.
- ✓ Consult MU publication MP 575, *Weed Control Guide For Missouri Field Crops* or your state's weed control guide for further details. **Read the herbicide label!**

farms and fields. This publication is intended to serve as a starting point for new cotton growers.

Cotton requires intensive herbicide applications, intensive cultivation and hand hoeing. Because weed control is difficult, cotton should not be planted into extremely weedy fields.

A solid program of pre-plant incorporated and pre-emergence herbicides, followed by post-emergence directed herbicides, is needed for successful cotton weed control. Scouting for weeds the season before can help you plan a weed control program for optimal performance and minimal cost.

Consult Table 1 to compare herbicides for their control of particular weeds. Additional information may be found in MU publication MP 575, *Weed Control Guide for Missouri Field Crops* or an equivalent publication for your state. These Extension guides are updated annually and contain much detailed information regarding herbicide mixtures, effectiveness on individual weeds, effects on rotational crops, adjuvants and rainfall effects. Weed control guides do not substitute for herbicide labels. Always read the label before applying a pesticide. Labels change regularly.

Table 1. Weed response to cotton herbicides.

Herbicide	Barnyardgrass	Bermudagrass	Broadleaf Signalgrass	Crabgrass	Fall Panicum	Foxtails	Goosegrass	Seedling Johnsongrass	Rhizome Johnsongrass	Yellow Nutsedge	Cocklebur	Jimsonweed	Hemp Sesbania	Hophornbean Copperleaf	Common Lambsquarters	Morningglory, Annual	Pigweed	Prickly Sida	Purslane	Common Ragweed	Smartweed	Spotted Spurge	Spurred Anoda	Velvetleaf
Pre-plant incorporated																								
Prowl	9	0	9	9	9	9	9	9	4	0	0	3	0	0	8	2	9	0	9	3	2	2	0	1
Treflan/trifluralin/others	9	0	9	9	9	9	9	9	5	0	0	3	0	0	8	2	9	0	9	3	2	2	0	1
Zorial	9	2	9	9	9	9	9	9	2	4	5	7	3	9	9	6	9	9	9	8	6	7	9	7
Pre-emergence																								
Command*	9	3	9	9	9	10	9	9	2	-	6	9	4	3	9	5	5	9	-	8	7	8	8	10
Cotoran/Meturon	7	0	8	9	8	8	8	7	0	0	7	7	6	9	9	7	9	8	9	9	7	3	6	5
Karmex/others	7	0	8	9	8	8	8	7	0	0	6	6	4	9	9	7	9	7	9	8	7	6	4	5
Zorial	8	1	8	8	8	8	8	7	1	4	4	7	3	9	9	5	9	8	9	8	6	7	9	7
Post-emergence – overtop																								
Assure II	9	-	9	9	9	10	9	10	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fusilade	8	9	8	8	8	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poast/Poast Plus	9	7	10	9	9	10	9	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Select	-	-	10	9	9	9	9	10	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Post-emergence – directed																								
Bladex + MSMA	9	0	9	9	9	9	9	9	6	6	9	9	5	9	9	9	9	9	8	9	6	7	7	7
Caparol/others + MSMA	9	0	9	9	9	9	9	9	6	6	9	9	5	9	9	8	9	8	8	8	6	5	6	6
Cobra	0	0	0	0	0	0	0	0	0	2	9	9	9	9	5	7	10	7	9	9	7	8	7	7
Cotoran/Meturon + MSMA	8	0	8	9	9	8	7	8	6	6	9	9	5	9	9	7	9	7	6	8	8	5	7	6
DSMA or MSMA	8	0	8	8	8	8	5	8	6	6	9	5	2	3	7	3	3	2	3	5	2	0	1	1
Goal	4	0	4	4	4	4	6	4	2	2	8	9	7	9	9	9	9	8	9	9	9	7	5	1
Karmex/others + MSMA	9	0	9	9	9	9	9	9	6	6	9	9	5	9	9	8	9	8	8	8	6	5	5	5
Probe + MSMA	8	0	8	9	9	8	7	8	6	6	9	9	-	9	9	8	9	8	7	8	8	8	8	8
Lorox/others	6	0	6	6	6	7	6	6	1	1	7	7	8	9	9	8	9	8	9	8	7	7	6	7

Weed control: 8 to 10 = Good 6 to 7 = Fair** Less than 6 = Poor -- = No data available

*Command by itself is extremely injurious to cotton. Disyston or Thimet insecticides must be used in-furrow at planting to prevent cotton injury.

**A weed control rating of 6 to 7 indicates partial control or suppression.

Use this table as a guide for comparing the relative effectiveness of herbicides on individual weeds. Herbicides may perform better or worse than indicated due to extreme weather conditions and other variables. If you are obtaining satisfactory results under your growing conditions, changing products as a result of information in this table is not necessarily recommended.

substitute for herbicide labels. Always read the label before applying a pesticide. Labels change regularly.

Incorporated and pre-emergence herbicides

The herbicide fluometuron (Cotoran or Meturon) is essential to a cotton weed control program. Fluometuron in cotton is much like atrazine in corn:

- It is a standard treatment
- It controls many but not all of the weeds in the crop
- It provides excellent control of many broadleaves and provides fair control of grasses.

Fluometuron also supplies some suppression of velvetleaf, spurred anoda and prickly sida. Like most soil-applied herbicides, the fluometuron rate depends upon soil texture. Cotton has fair tolerance to fluometuron, but injury can occur if rates are excessive or if the soil texture is coarse. Injury can be a problem in mixed soils with sandy areas.

It is important to remember that if pre-emergence broadleaf control is inadequate and weeds grow as tall as or taller than the cotton, post-directed herbicide applications will be ineffective. A small amount of fluometuron injury may be preferable to poor weed control. Most cotton growers apply fluometuron pre-emergence, after planting, in a band over the row. Banding reduces herbicide costs but requires early cultivation to control weeds in the row middles.

A pre-plant-incorporated grass/small-seeded broadleaf herbicide is also essential for the weed pressure in most fields. These products include trifluralin (Treflan, Trilin, Tri-4, Trifluralin) and Prowl. Prowl or Dual (metolachlor) may be used pre-emergence for no-till cotton; however, Dual occasionally injures cotton.

If velvetleaf, spurred anoda or prickly sida is present in the field, the herbicides norflurazon (Zorial) or clomazone (Command) should be used in addition to fluometuron. Zorial is most effective in a split application where half is applied pre-plant incorporated and half is applied pre-emergence (typically banded behind the planter). Command by itself can kill cotton. If Command is to be used, either Disyston or Thimet insecticides must be used in-furrow at planting. These insecticides act as an antidote to "safen" cotton and minimize the risk of Command injury. Command may be applied either PPI or PRE. Low Command rates (4 to 8 ounces of product per acre) may be used for velvetleaf control.

Command should be used with caution since it is extremely active on several vegetable, horticultural and ornamental plants and tends to vaporize and

drift from the soil. Because of this problem, incorporation is required in Illinois and the northeastern United States. Consult the Command label for application restrictions. Lower rates and incorporation can be used to reduce the drift problem while still providing excellent velvetleaf control.

With Command or Zorial, it is sometimes possible to forego a dinitroaniline-grass/small-seeded broadleaf herbicide. However, pigweed often escapes such programs. Test strips should be used on a field-by-field basis to determine if the grass/small-seeded broadleaf herbicide can be eliminated.

The insecticides Disyston and Thimet (which safen cotton to Command) can interact with the herbicides fluometuron (Cotoran, Meturon), diuron (Karmex, Direx) and linuron (Lorox, Linex) to injure cotton. This injury is usually slight with fluometuron, but is usually severe with diuron and linuron.

Post-directed herbicides

With favorable environmental conditions, the soil-applied herbicide program will give cotton a two- to four-week head start on weeds, after which the herbicides break down and weeds begin to emerge. Post-emergence directed herbicide applications are made to control the emerging weeds. "Post-directed" sprayers are often mounted on cultivators so that the grower bands the herbicide on the drill and cultivates the row middles at the same time. If post-directed sprays are not applied in a timely manner, weeds can quickly grow too tall and the cotton-to-weed height differential will be lost. Plan to apply directed sprays approximately two weeks after planting, but scout for weeds before spraying. **Beware, an untimely rain can interfere with your spray plans and allow weeds to grow too tall to be controlled!**

Cotton typically is treated with post-emergence directed herbicides at a 3- to 8-inch height and at an 8- to 14-inch height. Sometimes a third "lay-by" application is applied when the row middles are lapping and no further cultivation will be possible.

Most directed treatments act as contact herbicides, although many provide residual control. Cotton leaves that are sprayed will be killed. If cotton terminals are sprayed, delayed maturity and yield loss can occur.

The most important factor for post-emergence directed treatments is the adjustment of the sprayer. Figure 1 shows a diagram and photo of typical directed sprayers. The adjustment must balance good weed coverage (for good weed control) with minimal cotton coverage (for minimal crop injury). Off-center spray tips are often used and tips are aimed so that the spray is higher in the row middle but relatively low on the cotton plant. Aiming the spray tip backwards and down (rather than straight down) also reduces the exposure to cotton.

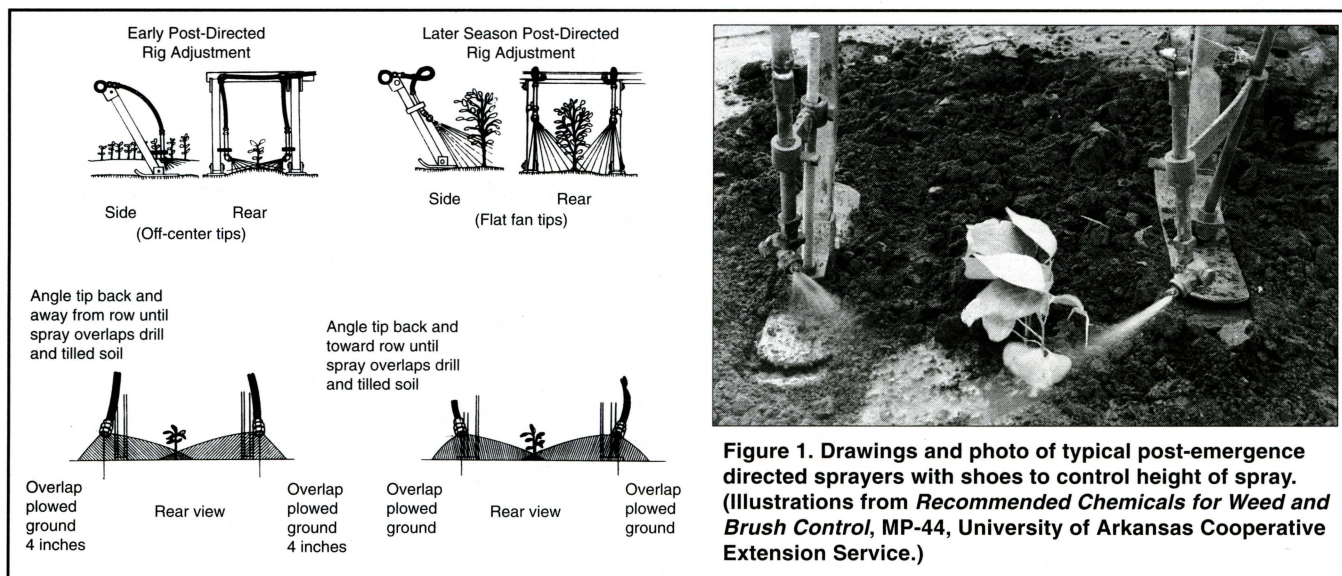


Figure 1. Drawings and photo of typical post-emergence directed sprayers with shoes to control height of spray. (Illustrations from *Recommended Chemicals for Weed and Brush Control, MP-44*, University of Arkansas Cooperative Extension Service.)

Good coverage is important for adequate weed control, but lower pressures (approximately 30 psi) should be used to keep spray mist from blowing into the foliage and causing excessive injury. Taller cotton is more tolerant of directed sprays — the terminal is higher and farther away from the spray and lower leaves are less important. Any variability in cotton height across a field should be considered. Short cotton can be severely injured by a sprayer adjusted for taller cotton.

With cotton 8 inches and taller, directed sprays can be applied as high as 2 to 3 inches up the cotton stalk. When cotton is 3 to 6 inches tall, it is best to keep the spray off of the foliage. However, if weeds are almost as tall as the cotton, a "Sloppy Directed" application may be made. With "Sloppy Directed" applications, herbicides are applied higher and cover more of the cotton plant. MSMA, DSMA and fluometuron are usually used because they cause less injury to cotton, but crop injury will still be significant. "Sloppy Directed" applications should be reserved for cases where the need for weed control will outweigh herbicide damage to the crop. Again, it is important to keep sprays off of cotton terminals.

Most post-directed applications include the herbicide MSMA or DSMA mixed with a "broadleaf" herbicide. MSMA and DSMA provide good grass control and suppress nutsedge and broadleaves. MSMA and DSMA are particularly good for cocklebur control, although MSMA- and DSMA-resistant cocklebur are occasionally found in the Cotton Belt. MSMA and DSMA can be carefully directed under cotton at least 3 inches tall. Most, but not all, formulations contain surfactants which improve the activity of MSMA/DSMA and of tank-mix herbicides. Consult herbicide labels to determine if a surfactant or crop oil is needed.

Directed broadleaf herbicides include Bladex, Cobra, Cotoran/Meturon, Goal and Karmex/Direx Lorox/Linex. They also provide some grass control.

These herbicides all require a weed-crop height differential and all cause injury if applied to cotton foliage or terminals. Cotoran/Meturon may be directed to cotton 3 inches or taller. Bladex, Cobra, and Goal require that cotton be at least 6 inches tall and Karmex/Direx and Lorox/Linex require a minimum cotton height of 8 inches.

Some growers use fewer directed applications than others. Scouting and a well-planned weed control program can optimize the use of directed sprays.

Over-the-top, broadleaf salvage

The importance of good pre-emergence weed control, followed by post-emergence directed applications, cannot be overemphasized. However, unusual weather conditions (lack of activating rainfall or excessive rainfall) can cause failures in pre-emergence broadleaf weed control and can eliminate the crop-to-weed height differential. Cotton has slight tolerance to foliar applications of fluometuron (Cotoran, meturon) and MSMA/DSMA. These materials are occasionally applied over the top of young cotton as a salvage treatment to create a crop-to-weed height differential for directed sprays.

Fluometuron (at 1/2 pound ai per acre) occasionally provides good salvage weed control and no crop injury when applied over the top of cotyledon-stage cotton. However, this treatment occasionally kills cotyledon- and larger-stage cotton and does not always provide good weed control.

MSMA and DSMA are also used regularly for salvage. Cotton is temporarily injured and discolored, although it often recovers from over-the-top applications. MSMA and DSMA provide little control of velvetleaf.

Although salvage treatments are routinely used by some growers, they have the potential to reduce cotton stands and yields. It is up to the individual