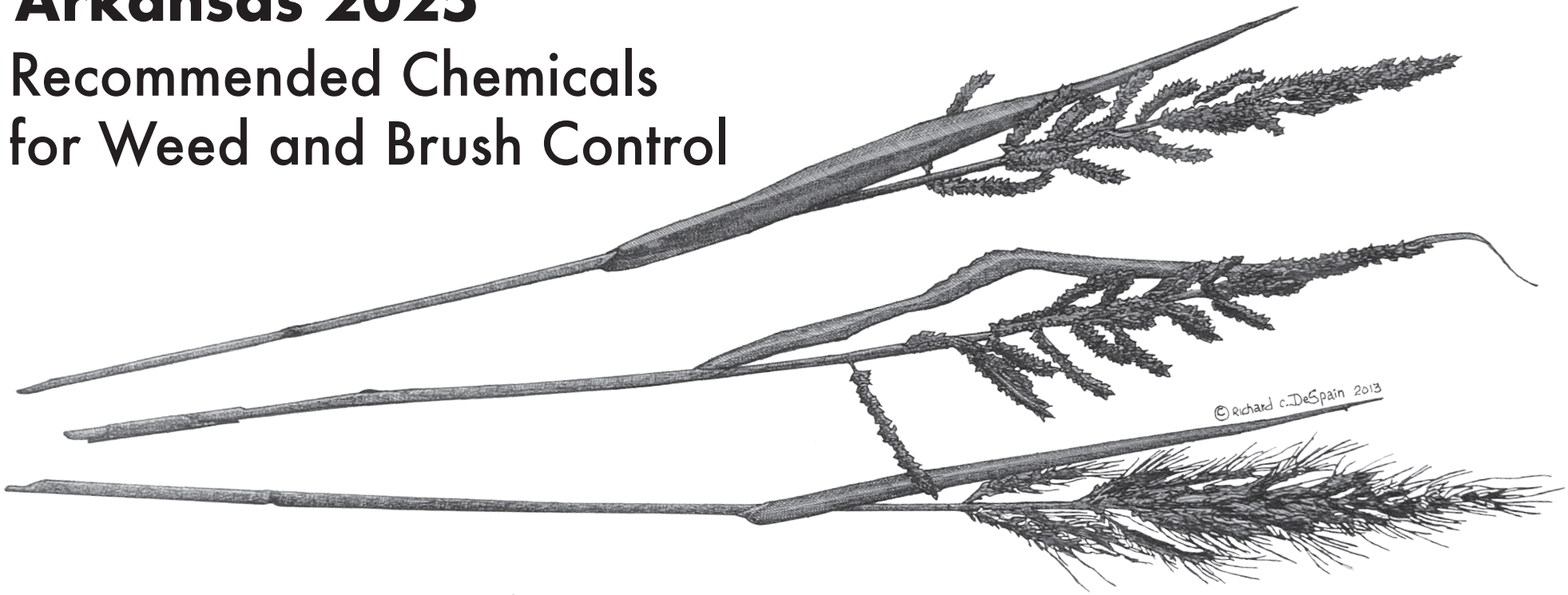
MP44

Arkansas 2025

Recommended Chemicals for Weed and Brush Control



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University of Arkansas System

AR WEED SCIENCE

cotton

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ARKANSAS RICE CHECK-OFF

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Arkansas Corn & Grain Sorghum Board

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Cooperative Extension Service, University of Arkansas System, U.S. Department of Agriculture and County Governments Cooperating

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Should the registration of a herbicide or certain uses of a herbicide be canceled by federal or state agencies, recommendations thus affected herein are no longer applicable after such action is taken. For herbicides such as MSMA, 2,4-D, diuron, etc., where several manufacturers and formulations exist, not all formulations may be labeled for the same uses. Use only a herbicide which has the intended use on the label. Use of products and trade names in this handbook does not constitute a guarantee or warranty of the products named and does not signify that these products are approved to the exclusion of comparable products. Some tank mix treatments are listed "grower's risk." This indicates the two herbicides are not labeled for the tank mix, but research has shown them to be effective. To tank mix is not a violation of law, but it is done at the grower's own risk.

UNIVERSITY OF ARKANSAS SYSTEM DIVISION OF AGRICULTURE, COOPERATIVE EXTENSION SERVICE

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This publication printed with soybean ink on recycled paper.

RECOMMENDED CHEMICALS FOR WEED AND BRUSH CONTROL

Prepared By

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The control of weeds and brush is essential for the economical production of crops. The high cost and decreasing availability of labor make it necessary to fit the use of herbicides into the production practices already in use on many crops.

This publication is a summary of the latest recommendations for the use of herbicides in Arkansas and conforms with federal and state regulations. Supplemental leaflets giving more detailed information on herbicide usage for specific crops are listed in this book. A herbicide should be tried on a limited acreage until one is experienced with it. Because of volatility and drift hazards to sensitive crops, 2,4-D and dicamba related compounds must be applied according to the Arkansas State Plant Board and regulations listed in the Arkansas Regulations on Pesticide Classification document which is available online at: https://www.aad.arkansas.gov/laws-regulations, or from your local county Extension agent. It is important that the user of a herbicide **carefully read and follow the label directions for use and precautions** on the container. Grazing restrictions should be followed per label recommendations.

Endangered Species Act and Bulletins Live Two

Before applying herbicides, you must obtain any applicable Endangered Species Protection Bulletins within six months prior to or on the day of application. Product use restrictions and mitigation measures should be followed to protect listed species and their designated critical habitats, including geographical use limitations; consulting with the Endangered Species Protection Bulletin (Bulletins Live! Two) and mitigation menu web site (https://www.epa.gov/pesticides/mitigation-menu); spray drift and nozzle selection; buffer requirements; runoff mitigation measures including selection of practices and determination of soil types. All farmers and applicators are required to follow restrictions provided on the Bulletins Live! Two website in addition to all other labeled requirements.

For more information on and locations of endangered species bulletins, please scan the QR code to visit the Bulletins Live! Two website.

Mitigation menu website.

NOTE:

Herbicide rates recommended are all on a broadcast basis unless specified. When a herbicide is applied as a band over the row, reduce the rate of material accordingly.

$$\text{i.e. } \frac{\text{Band width}}{\text{Row width}} \text{ X Broadcast rate = Band rate}$$

For example, where the material is applied in 19” bands on 38” rows, the rate of material should be decreased to 19⁄38 or ½ of the amount suggested for broadcast spray. Refer to herbicide application section for specific examples.

Conversion Table

1 tablespoon = 3 teaspoons (0.5 oz)
1 oz = 2 tablespoons
1 cup (½ pint) = 16 tablespoons (8 oz)
1 pint (2 cups) = 32 tablespoons (16 oz or 1 lb) (473 ml)
1 gallon (16 cups) = 8 pints or 4 quarts (8.4 lb water)
1 cu ft = 7.48 gal (62.4 lb)
1 acre = 43,560 sq ft
1 ppm = 3.6 oz/A inch = 0.0038 grams/gal
1 cfs = 450 gal/min
1 mph = 88 ft/min

$$\text{Acres} = \frac{\text{Length (ft) x width (ft)}}{43{,}560}$$

$$\text{Number of Rows/A} = \frac{43{,}560}{\text{Row width (ft) x row length (ft)}}$$

Rating Tables

The rating tables preceding the recommendations for each crop give the performance the University of Arkansas Research and Extension personnel expect under optimum conditions, which include such factors as proper incorporation, adequate moisture for activation, proper timing, spray coverage for postemergence herbicides, etc.

Since many factors may cause a herbicide to vary in performance, the University of Arkansas in no way guarantees these estimates. In addition, a high rating on a weed that is not listed on a herbicide label does not constitute a recommendation for that particular herbicide on that particular weed. Rating scale is 0-10, where 10 equals excellent control and 0 equals no control. A “–” indicates no data.

Herbicide Spray Additives

The addition of an adjuvant (surfactant, oil, etc.) to a postemergence herbicide spray mixture in many cases increases its effectiveness. Where an adjuvant is called for, use the herbicide manufacturer’s label recommendations.

HERBICIDE APPLICATION

Tips for Proper Mixing

1. See that **equipment is clean and in good running condition,** free of oil, grease or residue.
2. Always **follow label instructions** about mixtures.
3. If there's any question about compatibility, **do a jar test first.**
4. Add chemicals in W-A-L-E sequence.

   Wettable powders or water dispersible granules
   Agitation
   Liquids (flowable liquids)
   Emulsifiable concentrates
5. Start with **tank ¼ full** of carrier, and add **all** W or WDG chemicals first.
6. Get good, strong agitation with a rolling effect on the surface of the carrier. Allow time for good dispersal.
7. Have a shut-off valve installed in the bottom of each tank.
8. Use a 16-mesh suction screen to allow chemicals to circulate through the pump.
9. Empty the tank as much as possible before mixing a new batch.

Compatibility Test: Since liquid fertilizers can vary, even within the same analysis, always **check compatibility with herbicide(s) each time before use.** Be especially careful when using complete suspension or fluid fertilizers as serious compatibility problems are more likely to occur. Commercial application equipment may improve compatibility in some instances. The following test assumes a spray volume of 25 gallons per acre (GPA). For other spray volumes, make appropriate changes in the ingredients. Check compatibility using this procedure:

1. Add 1 pint of fertilizer to each of 2 one-quart jars with tight lids.
2. To **one** of the jars add ¼ teaspoon or 1.2 milliliters of a compatibility agent approved for this use, such as Compex or Unite (¼ teaspoon is equivalent to 2 pints per 100 gallons of spray). Shake or stir gently to mix.
3. To **both** jars add the appropriate amount of herbicide(s). If more than one herbicide is used, add them separately with dry herbicides first, flowables next and emulsifiable concentrates last. After each addition, shake or stir gently to thoroughly mix. The appropriate amount of herbicides for this test follows:

   Dry herbicides: For each pound to be applied per acre, add 1.5 level teaspoons to each jar.

   Liquid herbicides: For each pint to be applied per acre, add 0.5 teaspoon or 2.5 milliliters to each jar.
4. After adding all ingredients, put lids on and tighten, and invert each jar ten times to mix. Let the mixtures stand 15 minutes and then look for separation, large flakes, precipitates, gels, heavy oily film on the jar or other signs of incompatibility. Determine if the compatibility agent is needed in the spray mixture by comparing the two jars. If either mixture separates but can be remixed readily, the mixture can be sprayed as long as good agitation is used. If the mixtures are incompatible, test the following methods of improving compatibility: (A) slurry the dry herbicide(s) in water before addition, or (B) add ½ of the compatibility agent to the fertilizer and the other ½ to the emulsifiable concentrate or flowable herbicide before addition to the mixture.

Checklist for Proper Spray Application

If you cannot check all the following (where applicable), perhaps you have a weakness in your weed control program that can be corrected.

( ) 1. Use flat fan or other nozzle designed for uniform distribution when making broadcast applications.
( ) 2. Use "E" (even-spray) nozzles for banding behind press wheel.
( ) 3. Use flat fan or OC nozzles for postdirected.
( ) 4. Use a minimum screen size of 50 mesh for wettable powders or flowables.
( ) 5. Use stainless steel, ceramic or nylon tips for wettable powders or flowables.
( ) 6. Accurately measure band width.
( ) 7. Convert broadcast rates for band.
( ) 8. Accurately calibrate sprayer.
( ) 9. Refer to label and precautions in this publication to choose proper spray volume and pressure for herbicide used.
( ) 10. Have proper equipment for the herbicide.
( ) 11. Have proper agitation (not just bypass) for powders and flowables.

Herbicide Application

The success of any herbicide treatment depends upon proper application. The following information should provide some guidelines for proper application. This material lacks detail in several areas such as nozzle selection, agitation, etc. However, detailed information on most aspects of spray application is available from your county Extension agent.

Spray Volumes

In general, spray volumes should be in the 5 to 20 GPA range (ground application) for broadcast, soil-applied herbicides. For band applications, a volume equivalent to ½ gallon per inch of band is sufficient (i.e., 10 gpa on a 20-inch band). These volumes are usually adequate for postemergence herbicides, but there are exceptions. Refer to the comments on each herbicide to note any specific application instructions.

Sprayer Tank Agitation

The type of pesticide formulation dictates the need for agitation. Soluble liquids, soluble powders and emulsifiable concentrates require little agitation. Usually the flow from the bypass hose maintains a uniform mixture.

Wettable powder and flowable formulations are only in suspension, and they require vigorous agitation to prevent settling out. Every year, many instances can be cited where insufficient agitation has resulted in excessive crop injury, loss of crop and/or lack of weed control.

Jet Agitation in a Nutshell

1. Insufficient agitation can cost more than the entire sprayer cost.
2. Running a bypass hose into the tank is not agitation.
3. Agitation can be expected to use more pump capacity than the nozzles require.
4. Pre-mixing wettable powders will get pesticides into suspension; insufficient agitation allows them to drop out. Continue agitation until all the spray is distributed.

Nozzle Tips

Herbicides are best applied with the proper nozzle tip design. For broadcast application of soil- or foliar-applied herbicides, use a flat fan tip such as an 8003, LF3-80°, etc. The tip size will depend on the pressure and speed. For postemergence directed herbicides, use a **flat fan** tip such as 8002 and LF2-80° or an **off center** tip such as an OC-02. For band application behind the planter, use an **even spray** tip such as 8003-E or LE3-80°. Note the band application behind the planter is the only use for the even spray tips.

For wettable powder application, use stainless steel, ceramic or nylon tips and a 50-mesh screen. For more information on nozzle selection and special applications, refer to manufacturers' catalogs.

Nozzle Selection

Manufacturers of spray nozzles provide a wealth of information about the selection, setup and use of their products in their catalogs. These include such things as hose flow information and nozzle selection guides. It would be impractical to reprint all that information here. Manuals or catalogs for the type of product you are using are obtained from dealers. If you cannot locate a personal copy, each county Extension office usually keeps at least one copy of popular brand item catalogs.

Nozzle manufacturers continue to offer more types of tips to improve spray applications. Most nozzle tips are now color coded to improve size distinction. Nozzle caps are now designed for easy on/off to facilitate cleaning when necessary. Most nozzle tips have a code stamped on them somewhere. These codes describe the nozzle characteristics, size and material type. Examples – 8002VK is an eighty degree flat fan, size number 2, ceramic tip, and a LFR80-3 Thermoplastic is an eighty degree extended range flat fan tip in size 3 made of thermoplastic material. Tips are available in a number of materials. Stainless steel, nylon and ceramics offer the best wear characteristics. Most manufacturers offer an extended range type flat fan nozzle which helps eliminate some drift potential if operated at lower pressures. Low operation pressures also extend tip life.

Many nozzle manufacturers now utilize air induction chambers to help control the droplet spectrum. This helps avoid the development of so many fine spray particles. Nozzle chambers also help stabilize the droplet spectrum over a wider pressure range.

A good tool of any spray operation is a current manufacturer's catalog. Obtain one for the type of spray components you are using and read it carefully to improve your spray accuracy. Several nozzle manufacturer addresses and web pages are listed here. Most have excellent web pages with a wealth of information. Web pages and catalogs should be studied carefully for nozzle selection, setup and operation. There are also numerous phone apps to provide nozzle information and assist with selection.

Spray Equipment Addresses:

Teejet Technologies, Inc.
P.O. Box 7900
Wheaton, IL 60187
Phone: 630-665-5000
http://www.teejet.com

Pentair Hypro
375 Fifth Avenue NW
New Brighton, MN 55112
Phone: 800-424-9776
www.pentair.com/en/brands/hypro.html

Greenleaf Technologies
P. O. Box 1767
Covington, LA 70434
Phone: 800-881-4832
sales@turbodrop.com
www.greenleaftech.com

Wilger, Inc.
255 Seahorse Drive
Lexington, TN 38351
Phone: 877-968-7695
wilgeresc@wilgeresc.com
www.wilger.net

Wind Compensation

When wind velocity is too high to be practical, the best solution is to park the sprayer. However, there are approaches to compensate for some wind. One solution is to change tips. Use a larger tip (i.e., an 8005 instead of an 8003), and lower the spray pressure (i.e., go up on the nozzle size and down on the pressure). Also, consider a wider angle tip such as a 9503 instead of an 8003. This allows the nozzle to be adjusted closer to the ground without changing the width of the spray pattern where it impacts on the ground. Properly used low pressure tips and Raindrop nozzles will reduce the drift possibility. Low pressure nozzles will substitute for flat fans. Raindrop nozzles (RA series) should be angled either 45° forward or back. Follow the manufacturer's recommendations. The new air induction style nozzles emit fewer fines and may be a very good tool to avoid drift potential. Air induction tips are typically not as sensitive to droplet size changes as operating pressures increase. This helps avoid small droplet formations when the sprayer is operating at higher speeds and the flow control is increasing pressure to ensure the correct dosage.

Band Application

All rates are given as broadcast rates. For band application, you **must** adjust the rate by the following formula:

$$\frac{\text{Band width}}{\text{Row width}} \text{ X Broadcast Rate} = \text{Band Rate}$$

Refer to calibration examples on following pages.

Sprayer Calibration

Useful Formulas

$$\text{GPM (Per Nozzle)} = \frac{\text{GPA x mph x W}}{5{,}940}$$

$$\text{GPA} = \frac{5{,}940 \text{ x GPM (Per Nozzle)}}{\text{mph x W}}$$

GPM – gallons per minute
GPA – gallons per acre
mph – miles per hour
W – nozzle spacing (in inches) for broadcast spraying
– spray width (in inches) for single nozzle, band spraying or boomless spraying
– row spacing (in inches) divided by the number of nozzles per row for directed spraying

Measuring Travel Speed

Measure a test course in the area to be sprayed or in an area with similar surface conditions. Minimum lengths of 100 and 200 feet are recommended for measuring speeds up to 5 and 10 mph, respectively. Determine the time required to travel the test course. To help ensure accuracy, conduct the speed check with a loaded sprayer and select the engine throttle setting and gear that will be used when spraying. Repeat the above process and average the times that were measured. Use the following equation or the table on 6 to determine ground speed.

$$\text{Speed (mph)} = \frac{\text{Distance (ft) x 60}}{\text{Time (seconds) x 88}}$$

Miscellaneous Conversion Factors

One acre = 43,560 square feet = 0.405 hectares

One hectare = 2.471 acres

One gallon per acre = 9.35 liters per hectare

One mile = 5,280 feet = 1,610 meters = 1.61 kilometers

One gallon = 128 fluid ounces = 8 pints = 4 quarts = 3.79 liters = 0.83 imperial gallons

One pound per square inch = 0.069 bar = 6.896 kilopascal

One mile per hour = 1.609 kilometers per hour

No single aspect of spray application is as important and so abused as sprayer calibration. There is no way to accurately apply a herbicide without accurately calibrating the sprayer and figuring the tank mix. Using the following method and examples, you can calibrate quickly, so do it!

Determining Gallons Per Acre (ounce method)

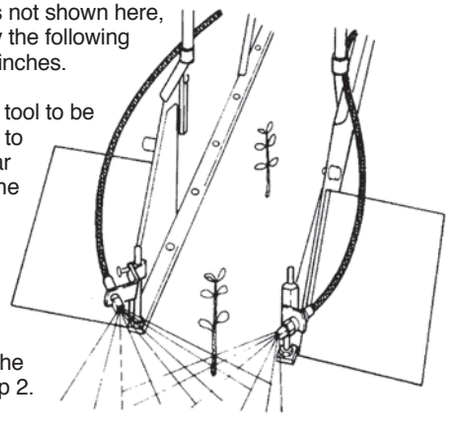
1. Check the table below for the proper distance related to the row or nozzle spacing on your sprayer. For broadcast, use nozzle spacing; for band application such as post directed or band behind press wheel, use row spacing. Mark off this distance in the field you will be spraying.

Row or Nozzle Spacing (Inches)	Calibration Distance (Feet)
40	102
38	107
36	113
34	120
32	127
30	136
28	146
26	157
24	170
22	185
20	204
18	227

   For row or nozzle spacings and calibration distances not shown here, any calibration distance (feet) may be determined by the following equation: 4080 / (average row or nozzle spacing) in inches.

2. Attach row conditioner, Triple-K, planter or whatever tool to be pulled by the tractor when spraying. Engage the tool to the proper depth and use the throttle setting and gear that will be used for spraying. Note on a stopwatch the time in seconds that it takes to drive the calibration distance measured.

3. Catch the nozzle discharge for the noted time in Step 2 in a container graduated in ounces (plastic measuring cup, baby bottle, etc.). If you are using a broadcast boom with nozzles spaced evenly, catch the output from one nozzle for the time measured in Step 2.



   If more than one nozzle per row is used (directed, insecticide or fungicide rig), catch the spray from each nozzle for the time noted in Step 2. Then combine the amount from all nozzles spraying on a single row.

4. The total discharge measured in ounces is equal to the gallons per acre applied. With a broadcast boom, this is the amount caught from one nozzle. Where you have used row spacing in Step 1, all nozzles directed to that row must be measured to determine the gallons per acre.

5. Check each nozzle to assure equal spray distribution across the width of the sprayer. Repeat Steps 3 and 4 to assure that nozzles do not vary more than 10 percent across the width of the sprayer.

Determining Tank Mix

Divide tank refill capacity by the calibrated gallons per acre (determined in Step 4). This is the number of acres the sprayer will cover per refill. Multiply the broadcast rate of herbicide (or band rate) times the acreage per refill to get the amount of herbicide (commercial product) to be put in the tank.

Example 1 – Broadcast Application

A grower will apply Anychem 1 with a broadcast boom having nozzles spaced 20 inches apart while pulling a disk for incorporation.

Step 1 The distance to travel for 20-inch **nozzle** spacing is 204 feet. Measure 204 feet in the field to be sprayed.

Step 2 Select the desired gear and throttle setting with the disk down. Let's say it takes 20 seconds to cover the 204 feet.

Step 3 Set the pressure to be used and catch one nozzle's output for 20 seconds (the time required to travel the 204 feet).

Step 4 The output in ounces is the amount applied in gallons per acre. If the nozzle output was 15 ounces in 20 seconds, the sprayer applies 15 gpa.

Step 5 Repeat Step 4, checking each nozzle.

Let's assume you have a 200-gallon tank and wish to apply one pint of Anychem 1 per acre.

$$\frac{\text{200 gal/refill}}{\text{15 gpa}} = \text{13.3 acres covered per tank (or refill)}$$

Since you wish to use 1 pt/A, you would use 13.3 pints of Anychem 1 per refill, i.e., 1 pt/A x 13.3 acres = 13.3 pints.

[See Note in Example 2]

Example 2 – Band Behind Planter

A grower will apply Anychem 2 behind his planter with a 14-inch spray band on a 38-inch row.

Step 1 The distance to travel for a 38-inch row is 107 feet.

Step 2 Select the planting speed and travel the measured 107 feet with planter down. Let's say it takes 18 seconds in this example.

Step 3 Set the pressure and catch one nozzle's output for 18 seconds (the time required to travel 107 feet).

Step 4 The output in ounces is the amount applied in gallons per acre. If the nozzle output was 10 ounces in 18 seconds, the sprayer applies 10 gpa. (This is all on a band.)

Step 5 Repeat Step 4, checking each nozzle.

Let's assume a 400-gallon tank (two 200-gallon saddle tanks) refill capacity and the rate of Anychem 2 50W for your soil is 1 lb/A **broadcast**. Reduce this rate to a 14-inch band.

$$\frac{14\text{" band}}{38\text{" row}} \times 1 \text{ lb/A} = 0.37 \text{ lb/A to be applied on the band}$$

$$\frac{400 \text{ gal/refill}}{10 \text{ gpa}} = 40 \text{ acres per tank refill}$$

40 acres x 0.37 lb/A = 14.8 lbs of Anychem 2 50W per tank refill; i.e., 7.4 lbs in each 200-gallon saddle tank.

NOTE: Plan on the amount of water required to refill the tank, **not** the capacity of the tank itself. For example, if you have the above 200-gallon saddle tanks but you have 50 gallons of spray left in each when you refill, it only takes 300 gallons to refill them.

Therefore:

$$\frac{300 \text{ gal/refill}}{10 \text{ gpa}} = 30 \text{ acres per refill}$$

30 A/refill x 0.37 lb/A = 11 lbs of Anychem 2 50W per refill (5.5 lbs in each of the two tanks).

Example 3 – Directed Spray

A grower will apply Anychem 3 + Anychem 4 on a 16-inch band on a 32-inch row using 2 OC-02 nozzles per row (one on each side).

Step 1 The distance to travel for a 32-inch row is 127 feet.

Step 2 Select speed and drive the 127 feet. Assume it takes 15 seconds.

Step 3 Set the pressure and catch each of the 2 nozzles per row for 15 seconds or time determined in Step 2.

Step 4 Add the quantity from the two tips. The amount in ounces is the gallons per acre.

Assume 5 ounces per tip for a total of 10; therefore, a 10 gpa output.

Step 5 Repeat Step 4, checking the nozzles on each row.

Let's assume two 200-gallon saddle tanks and the **broadcast** rate is 1 lb Anychem 3 50W + 1 pt Anychem 4 per acre. Reduce the rates for the 16-in band:

$\frac{16}{32}$ x 1 lb = ½ lb Anychem 3 $\frac{16}{32}$ x 1 pt = ½ pt Anychem 4/A

$$\frac{400 \text{ gal tank capacity}}{10 \text{ gpa}} = 40 \text{ acres per refill}$$

40 acres x ½ lb Anychem 3 = 20 lb Anychem 3
40 acres x ½ pt Anychem 4 = 20 pts Anychem 4
Put ½ this amount (10 lb Anychem 3 + 10 pt Anychem 4) in **each** tank.

Postemergence Spray Application

Following are some guidelines and diagrams for properly applying postemergence directed herbicides and for ground application of contact/systemic materials.

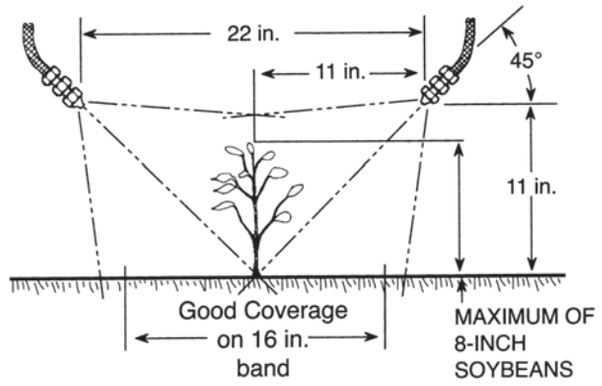
Nozzle Arrangements for Row Banding Overtop Herbicides

Guidelines

Adjust sprayer to apply a minimum of 20 gal/A broadcast at 20-60 psi.
Two-nozzle arrangements effective on 6-inch tall or smaller weeds.
Keep nozzles a minimum of 10 inches from soybean canopy to develop pattern width.
Nozzles should never be angled less than 45° to horizontal because part of the spray will be aimed upward.
Spray should overlap cultivated ground at least 4 inches to assure weed-free row shoulders.
Coverage is essential (contact herbicide).

Soybeans Up to 8 Inches Tall

TWO NOZZLE ARRANGEMENT



proper herbicide tank mix.

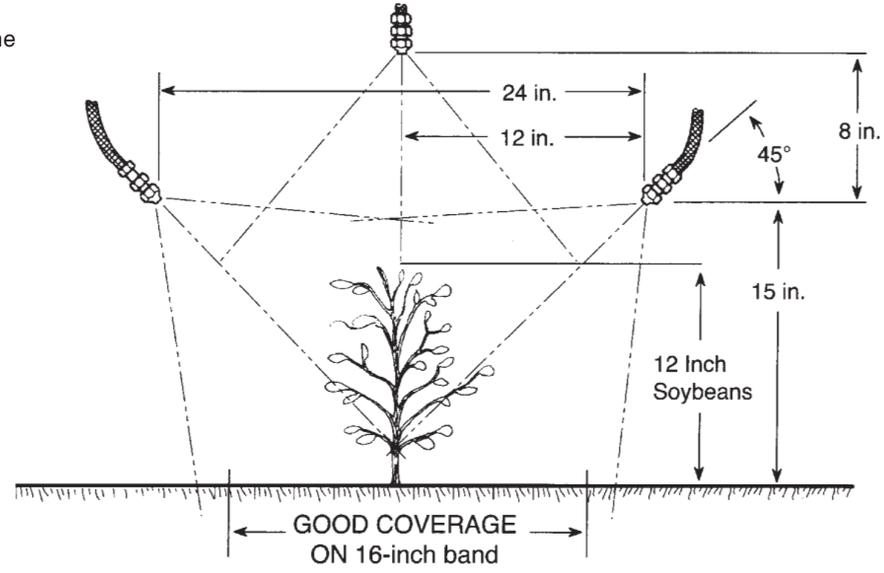
Nozzle Tip Options
(two nozzles on 38-inch row)*

Speed (mph)	Flat Fan (50 psi)
4	LF2-80°, 8002 (17 gpa)
6	LF2-80°, 8002 (12 gpa)
8	LF3-80°, 8003 (13 gpa)

*EXAMPLE ONLY – lower pressures may be selected and corresponding rate determined.

THREE NOZZLE ARRANGEMENT

The



three nozzle arrangement is better if weed pressure is heavy and if cocklebur and soybeans are the same height and good coverage is needed in terminal region.

If weeds beside the drill are the primary cause for spraying, maintain the center nozzle height 10 inches above the soybeans. Increase the rate on the shoulders by increasing the 45° angle slightly and lowering the side nozzles (but no lower than 10 inches from the ground).

If weeds in the canopy are the primary cause for spraying, but they are no more than 4 inches above the canopy, maintain the dimensions shown. Raise all nozzles equally if larger weeds are a problem. For example, when weeds are 7 inches above the canopy, raise all nozzles 3 inches (7 – 4 = 3 inches).

Always measure the band width to determine proper herbicide tank mix.

Nozzle Tip Options*
(three nozzles on 38-inch row)

Speed (mph)	Flat Fan (50 psi)
4	LF2-80°, 8002 (27 gpa)
6	LF2-80°, 8002 (17 gpa)
8	LF3-80°, 8003 (13 gpa)

*EXAMPLE ONLY – lower pressures may be selected and corresponding rate determined.

Directed Spray Nozzle Arrangements for Cultivator-Mounted and Shoe-Mounted Nozzles

Guidelines

One-half to one gallon per inch of band is adequate.

Nozzles should not spray higher on the crop than the herbicide label allows, but positioning is largely dependent on the primary weed problem. One-third up the soybean stem is a good rule of thumb.

Two nozzles per row are generally sufficient. Two are much easier to adjust and maintain than four nozzles. Spray weeds early so herbicides are more effective and crop competition is eliminated.

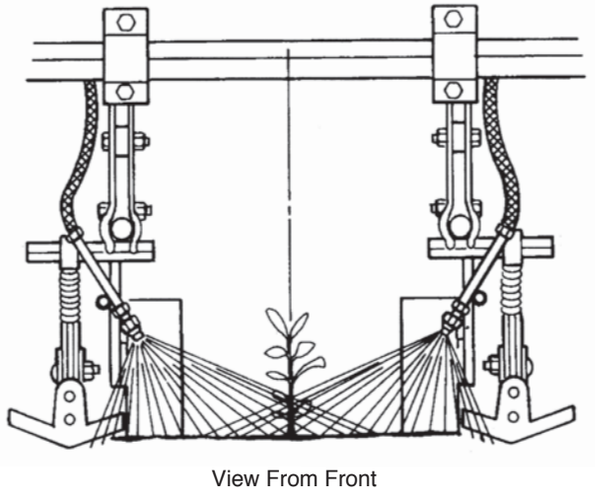
These rigs can be used carefully on 6-inch or taller soybeans, but the height differential is essential.

Thorough coverage is necessary.

Nozzle Tip Options
(two nozzles on 38-inch row)

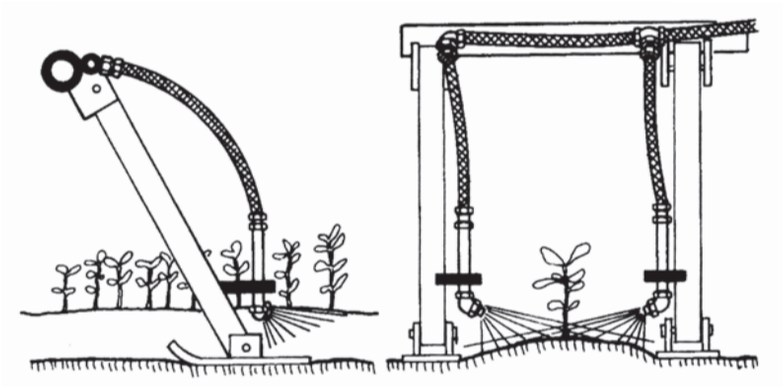
Speed (mph)	Flat Fan Tips (30 psi)	Off Center Tips (30 psi)	Volume of Spray (gpa)
4	8002, LF2-80°	OC-02, LX-2	14
6	8003, LF3-80°	OC-03, LX-3	13

Early Postdirected Spray on Cultivator



View From Front
(Flat Fan Tips)

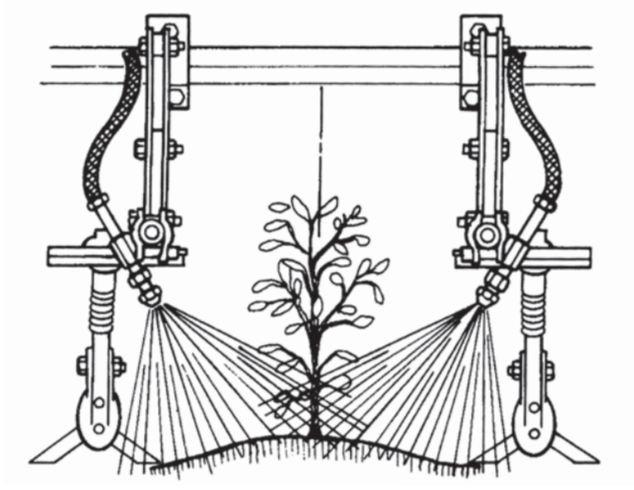
Early Postdirected Rig Adjustment



Side Rear

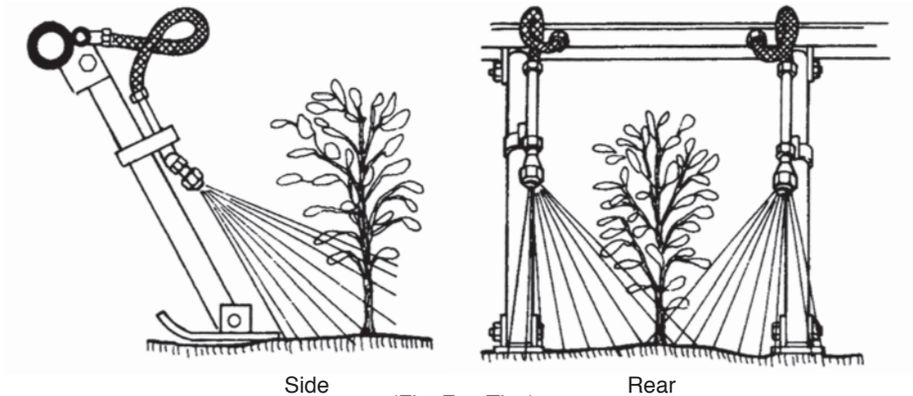
(Off-Center Tips)

Later Season Cultivator Mount



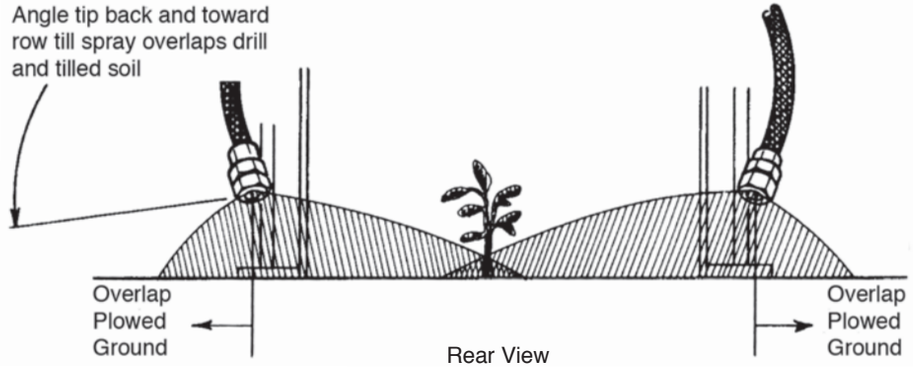
View From Rear
(Flat Fan Tips)

Later Season Postdirected Rig Adjustment



Side Rear

(Flat Fan Tips)



Rear View

Summary

If postdirected application is a new concept, it is certainly worth considering. For very little investment, directed spray can solve morningglory, cocklebur and weedy rice problems in soybeans. In fact, one of the rigs pictured is the only postdirected sprayer needed for many chemicals, if operated properly.

Nozzle Tip Options
(two nozzles on 38-inch row)

Speed (mph)	Flat Fan Tips (30 psi)	Off Center Tips (30 psi)	Volume of Spray (gpa)
3	9502 or 8002	OC-02	18
4	9502 or 8002	OC-02	14
5	9502 or 8002	OC-02	11

(LF2-80° is nearly the same as 8002; LF2-95° is nearly the same as 9502; and LX-2 is nearly the same as OC-02.)

NOTE: Early postemergence is an excellent application of the special 95° flat fan tips (9502) because the spray pattern taps the drill and shoulder when mounted low.

Nozzle Arrangements for Precision Postemergence [Fenders]

Guidelines

One-half gallon per acre per inch of band is desirable.

Position nozzle about as high as the crop is tall.

Spray should overlap cultivated ground at least 4 inches to assure weed-free row shoulders.

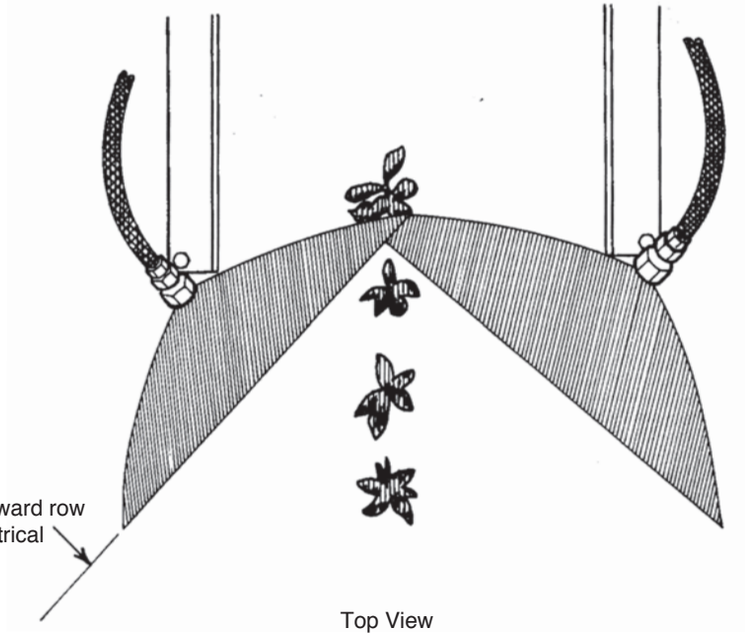
Position nozzles so spray intersects crop no higher than the label of the herbicide permits. Consider bed height and field roughness.

Attempt to obtain uniform distribution of spray where pattern strikes the soil.

Two nozzles per row is adequate when nozzles provide uniform coverage from drill to 4-inch "plow" overlap.

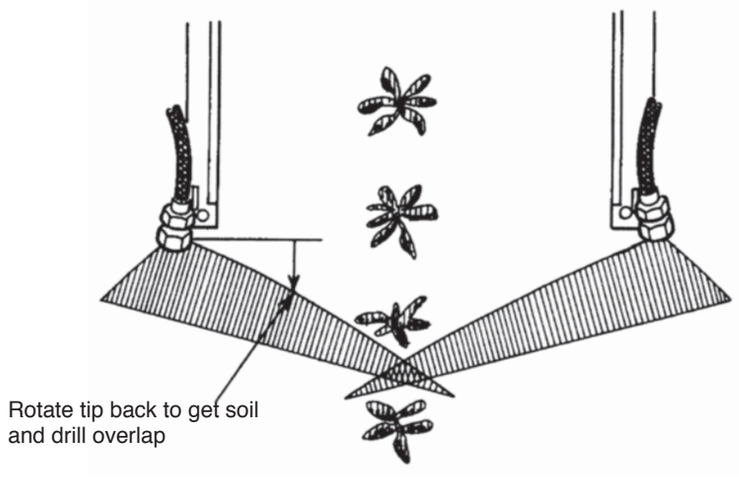
Coverage is essential (contact herbicide), but crop must be taller than weeds to use equipment to an advantage.

Flat Fan Tips

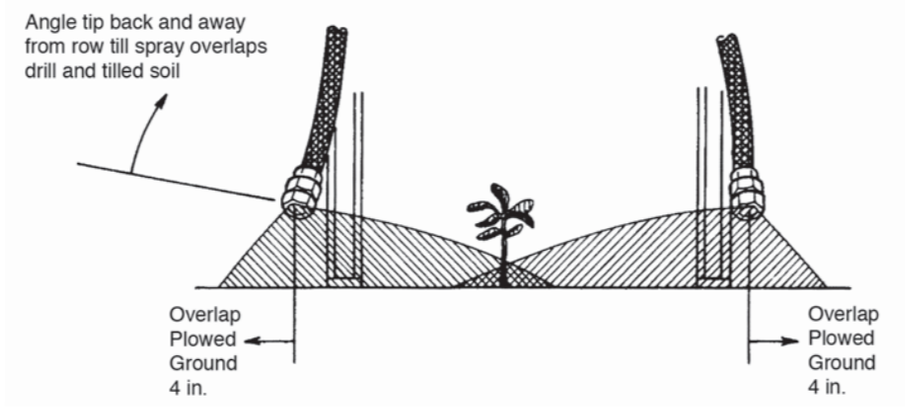


Top View

Off-Center Tips



Top View



Rear View

HERBICIDE CLASSIFICATION ACCORDING TO PRIMARY SITE OF ACTION

Resistance Group WSSA	Site of Action	Herbicide Families in Group
0	Nucleic acid inhibitors	Organoarsenical
1	ACCase (acetyl CoA carboxylase) inhibitor	Aryloxyphenoxy propionate Cyclohexanedione Phenylpyrazoline
2	ALS (acetolactate synthase) or AHAS (acetohydroxyacid synthase) inhibitor	Imidazolinone Pyrimidinylthio-benzoate Sulfonylamino-carbonyltriazolinone Sulfonylurea Triazolopyrimidine
3	Inhibitor of microtubule assembly	Benzoic acid Benzamides Dinitroanilines Phophoroamidates Pyridines
4	Synthetic auxins	Arylpicolinate Benzoic acid Phenoxy-carboxylic acid Pyridine-carboxylic acid Quinoline carboxylic acid
5	Inhibitor of photosynthesis at photosystem II site A Serine 264 binders	Amide Phenyl-carbamate Pyridazinone Triazine Triazinone Triazolinone Uracil Urea
6	Inhibitor of photosynthesis at photosystem II site B Histidine 215 binders	Benzothiadiazinone Nitrile Phenyl-pyridazine
9	EPSP synthase inhibitor	Glycine*
10	Glutamine synthetase inhibitor	Phosphinic acids*
11	Carotenoid biosynthesis inhibitor (bleaching)	Triazole
12	PDS (phytoene desaturase) inhibitor (bleaching)	Pyridazinone Pyridinecarboxamide Other
13	DOXP (1-deoxy-D-xyulose 5-phosphate synthetase) inhibitor (bleaching)	Isoxazolidinone
14	Protox (protoporphyrinogen oxidase) inhibitor	Diphenylether *N*-phenylphthalimide Oxadiazole Oxazolidinedione Phenylpyrazole Pyrimidindione Triazolinone
15	Inhibition of lipid synthesis	Acetamide Benzofuran Chloroacetamide Oxyacetamide Tetrazolinone Thiocarbamate Phosphorodithioate*
18	DHP (7,8-dihydro-pteroate) synthetase inhibitor	Carbamate
19	Inhibitor of indoleacetic acid transport	Phthalamate Semicarbazone
22	Photosystem I electron diverter	Bipyridylium
23	Mitosis inhibitor	Carbamate
24	Membrane disruptor (uncouplers)	Dinitrophenol
27	Inhibitor of 4-HPPD (4-hydroxy-phenyl-pyruvate dioxygenase) (bleaching)	Isoxazole Pyrazole Triketone
29	Inhibition of cellulose synthesis	Alkylazine Benzamide Nitrile

HERBICIDE TRADE NAME, COMMON NAME, FORMULATION, AND MANUFACTURER, ORDERED BY WSSA GROUP

Trade Name	Common Name	Formulation[1]	Resistance Management WSSA Group # [2]	Manufacturer
Betasan	bensulide	4 EC	0	Platte
Betamec	bensulide	4 EC	0	PBI Gordon
Lescosan	bensulide	4 L (others)	0	Lesco
Prefar	bensulide	4 E	0	Gowan
Pre-san	bensulide	7 G	0	PBI Gordon
Acclaim Extra	fenoxaprop	0.57 E	1	Bayer
Assure II	quizalofop	0.88 EC	1	AMVAC
Axial	pinoxaden	0.83 EC	1	Syngenta
Clethodim 2E	clethodim	2 lb/gal	1	Albaugh, LLC
Clincher SF	cyhalofop	2.38 L	1	Corteva
Envoy	clethodim	0.94 EC	1	Valent
Fusilade DX	fluazifop	2 EC	1	Syngenta
Illoxan	diclofop	3 EC	1	Bayer
Ornamec	fluazifop-P	0.5 EC	1	PBI Gordon
Manuscript	pinoxaden	0.42 EC	1	Syngenta
Poast	sethoxydim	1.5 EC	1	Microflo
Poast Plus	sethoxydim	1 EC	1	Microflo
Provisia	quizalofop	0.88 EC	1	BASF
Quiz	quizalofop	1 EC	1	HELM
Ricestar HT	fenoxaprop	0.58 EW	1	Gowan
Select	clethodim	2 EC	1	Valent
TapOut	clethodim	1 EC	1	Helena
Targa	quizalofop	0.88 EC	1	Gowan
Vantage	sethoxydim	1 EC	1	BASF; Microflo
Accent Q	nicosulfuron	54.5 DF	2	Corteva
Ally XP	metsulfuron	60 DF	2	FMC
Arsenal A.C.	imazapyr	4 AC	2	BASF
Beacon	primisulfuron	75 DF	2	Syngenta
Beyond Xtra	imazamox	1 S	2	BASF
Cadre	imazapic	70 DG	2	BASF
Certainty	sulfosulfuron	75 DF	2	Valent
Chopper	imazapyr	2 SL	2	BASF
Cimarron Plus	metsulfuron + chlor-sulfuron (48% + 15%)	63 DF	2	Bayer
Classic	chlorimuron	25 DF	2	AMVAC
Corsair	chlorsulfuron	75 WDG	2	Nufarm
Crusher	rimsulfuron + thifensulfuron	50 DF	2	Cheminova
Defendor	florasulam	0.42 SC	2	Corteva
Envoke	trifloxysulfuron	75 DG	2	AMVAC
Escort	metsulfuron	60 DF	2	Bayer
Express	tribenuron	50 SG	2	FMC
FirstRate	cloransulam	84 DF	2	AMVAC
Grasp	penoxsulam	2 EC	2	Corteva
Habitat	imazapyr	2.0 lb/gal	2	BASF
Halo Max 75	halosulfuron	75 WG	2	Aceto
Harmony SG	thifensulfuron	50 DF	2	FMC
Image	imazaquin	1.5 EC	2	BASF
League	imazosulfuron	75 WG	2	Valent
Katana	flazasulfuron	25 DF	2	PBI Gordon
Londax	bensulfuron	60 DF	2	UPL-NA
Manor	metsulfuron	60 WDG	2	Nufarm; Riverdale
Matrix	rimsulfuron	25 DF	2	Corteva
Monument	trifloxysulfuron	75 WG	2	Syngenta
Newpath	imazethapyr	2 AS	2	BASF
Osprey	mesosulfuron	4.5 DF	2	Bayer
Oust	sulfometuron	75 WDG	2	Bayer
Outrider	sulfosulfuron	75 WDG	2	Valent
Peak	prosulfuron	57 DG	2	Gowan
Patriot	metsulfuron	60 DF	2	Nufarm
Permit	halosulfuron	75 DG	2	Gowan
Plateau	imazapic	70 DG	2	BASF
Preface	imazethapyr	2 AS	2	ADAMA
Postscript	imazamox	1 S	2	ADAMA
PowerFlex HL	pyroxsulam	13 WG	2	Corteva
Pursuit	imazethapyr	2 AS; 70 DG	2	BASF
Polaris	imazapyr	2 SL	2	Nufarm
Python	flumetsulam	80 WDG	2	AMVAC
Regiment	bispyribac	80 DF	2	Valent
Resolve Q	rimsulfuron	25 DF	2	Corteva
Revolver	foramsulfuron	0.19 L	2	Bayer
Sandea	halosulfuron	75 DF	2	Gowan
Scepter	imazaquin	70 DG	2	AMVAC
Sedgehammer	halosulfuron	75 DF	2	Gowan
Stalker	imazapyr	2 SL	2	BASF
Staple LX	pyrithiobac	3.2 SL	2	Corteva
Strada	orthosulfamuron	50 WG	2	Nichino America
Strongarm	diclosulam	0.84 L	2	Corteva
Synchrony XP	chlorimuron + thifensulfuron	28.4 XP (21.5 + 6.9%)	2	Corteva
Telar	chlorsulfuron	75 DF	2	Bayer
Thunder	imazethapyr	2 lb/gal	2	Albaugh, LLC
Zest	nicosulfuron	75 WDG	2	Corteva
Treaty	thifensulfuron	75 DF	2	Nufarm
Balan	benefin	60 DF	3	Corteva
Barricade	prodiamine	65 WG	3	Syngenta
Curbit	ethalfluralin	3 EC	3	Platte Chemical
Dimension	dithiopyr	2 EC	3	Corteva
Endurance	prodiamine	65 WDG	3	Syngenta
Factor	prodiamine	65 WSG	3	Syngenta
Kerb	pronamide	50 W	3	Corteva
Lesco PRE-M	pendimethalin	50 WP (others)	3	Lesco
Pendimax	pendimethalin	3.3 EC	3	Sterling
Pendulum	pendimethalin	3.3 EC; 2 G; 60 WDG	3	BASF
Pendulum AquaCap	pendimethalin	3.8 lb/gal	3	BASF

(Continued on page 13)

HERBICIDE TRADE NAME, COMMON NAME, FORMULATION, AND MANUFACTURER, ORDERED BY WSSA GROUP # [cont.]

Trade Name	Common Name	Formulation[1]	Resistance Management WSSA Group # [2]	Manufacturer
Preen	trifluralin	1.47 G	3	Lebanon Seaboard
Prowl	pendimethalin	3.3 EC	3	BASF
Prowl H_2O	pendimethalin	3.8 CS	3	BASF
Regalkade	prodiamine	0.5% G	3	Regal
Satellite Hydrocap	pendimethalin	3.8 ME	3	UPL-NA
Sonalan	ethalfluralin	3 EC	3	Gowan
Surflan	oryzalin	4 EC	3	UPL-NA
Treflan TR-10	trifluralin	10 G	3	Gowan
Treflan HFP	trifluralin	4 EC	3	Gowan
2,4-D amine or ester	2,4-D	several	4	several
2,4-DB	2,4-DB	several	4	several
Banvel	dicamba	4 SL	4	Microflo
Banvel II	dicamba	2 SL	4	Microflo
Barrage HF	2,4-D ester	4.7 EC	4	Helena
Butoxone 200	2,4-DB	2 SL	4	Cedar Chemical
Butyrac 175	2,4-DB	1.75 lb/gal	4	Albaugh, LLC
Butyrac 200	2,4-DB	2 lb/gal	4	Albaugh, LLC
Clarity	dicamba	4 S	4	BASF
Clean Slate	clopyralid	3 SL	4	Nufarm
Clash	dicamba	4 SL	4	Nufarm
Drive	quinclorac	75 DF	4 / 29	BASF
Diablo	dicamba	4 SL	4	Nufarm
Elevore	halauxifen-methyl	0.572 SL lb ae/gal	4	Corteva
Engenia	dicamba	5 lb ae/gal	4	BASF
Enlist One	2,4-D choline	3.8 SL	4	Corteva
Facet, Facet L	quinclorac	75 DF, 1.5 L	4 / 29	BASF
Forestry Garlon 4	triclopyr	4 SL	4	Corteva
Formula 40	2,4-D	3.8 SL	4	Aventis
Garlon	triclopyr	4 L; 3 L	4	Corteva
Grandstand R	triclopyr	3 SL	4	Corteva
GrazonNext HL	aminopyralid + 2,4-D	3 lb/gal (0.33 + 2.67 lb/gal)	4	Corteva
Latigo	2,4-D acid + dicamba acid	2.4 lb/gal + 1.8 lb/gal	4	Helena
Lontrel	clopyralid	3 L	4	Corteva
Loyant	florpyauxifen-benzyl	0.21 EC	4	Corteva
MCP amine	MCPA	4 SL	4	Loveland; Platte
MCPP	MCPP	4 L	4	Verdicon
Mecomec	mecoprop	2.5 L	4	PBI Gordon
Milestone	aminopyralid	2 lb/gal	4	Corteva
Opti-Amine	2,4-D	3.8 EC	4	Helena
Opti-DGA	dicamba	4 SL	4	Helena
PastureGard HL	triclopyr + fluroxypyr	1.5 + 0.5	4	Corteva
Pathfinder II	triclopyr	0.75 SL	4	Corteva
Remedy Ultra	triclopyr	4 SL	4	Corteva
Renovate	triclopyr	3.0 lb/gal	4	SePro
Quinstar	quinclorac	4 L	4 / 29	Albaugh, LLC
Status	dicamba	40% SL	4	BASF
Stinger	clopyralid	3 SL	4	Corteva
Surmount	picloram + fluroxypyr	1.19 + 0.96	4	Corteva
Tahoe 3A	triclopyr amine	3 SL	4	Nufarm
Tordon 22K	picloram	2 SL	4	Corteva
Tordon K	picloram	2 SL	4	Corteva
Transline	clopyralid	3 L	4	Corteva
Turflon Ester	triclopyr	4 L	4	Corteva
Unison	2,4-D	1.74 EC	4	Helena
Vanquish	dicamba	4 SL	4	Syngenta
Weedar 64	2,4-D	3.8 SL	4	Nufarm
Vista	fluroxypyr	2.8 SL	4	Corteva
Xtendimax	dicamba	2.9 lb ae/gal	4	Bayer
AAtrex	atrazine	4 L, 90 DF	5	Syngenta
Caparol	prometryn	80 DF; 4 L	5	Syngenta
Cotoran	fluometuron	4 L; 80 DF	5	ADAMA
Direx	diuron	4 L	5	ADAMA
Hyvar X	bromacil	80 WP	5	Bayer
Karmex	diuron	4 L; 80 DF	5	ADAMA
Linex	linuron	4 L	5	NovaSource
Pramitol	prometon	25 E (25% active liquid)	5	Agriliance
Princep	simazine	4 L; 90 DG	5	Syngenta
Pronone	hexazinone	10 G; 2.5 G	5	Proserve
Pyramin	pyrazon	65 DF	5	Microflo
Spike	tebuthiuron	80 DF; 20 P	5	Corteva
Spin-Aid	phenmedipham	1.3 L	5	Bayer
Stam M4	propanil	4 L; 80 DF	5	UPL-NA
Super Wham	propanil	4 EC	5	UPL-NA
Tricor DF	metribuzin	75 DF	5	UPL-NA
Tupersan	siduron	50 WP	5	PBI Gordon; Gowan
Velpar	hexazinone	75 DF; 2 L	5	Bayer
Basagran	bentazon	4 SL	6	Microflo
Buctril	bromoxynil	4 EC; 2 EC	6	Bayer
Tough	Pyridate	5 EC	6	Belchim

(Continued on page 14)

HERBICIDE TRADE NAME, COMMON NAME, FORMULATION, AND MANUFACTURER, ORDERED BY WSSA GROUP # [cont.]

Trade Name	Common Name	Formulation[1]	Resistance Management WSSA Group # [2]	Manufacturer
Accord Concentrate	glyphosate	4 SL (acid eq.)	9	Corteva
glyphosate formulations	glyphosate	various	9	various
Credit Xtreme	glyphosate	4.5 SL (acid eq.)	9	Nurfarm
Roundup formulations	glyphosate	various	9	Bayer
Touchdown HiTech	glyphosate	5 SL (acid eq.)	9	Syngenta
Touchdown IQ	glyphosate	3 SL (acid eq.)	9	Syngenta
Touchdown Total	glyphosate	4.17 SL (acid eq.)	9	Syngenta
Cheetah	glufosinate	2.34 SL	10	Nufarm
Finale	glufosinate	1 SL	10	Bayer
Interline	glufosinate	2.34 SL	10	UPL-NA
Liberty	glufosinate	2.34 SL	10	BASF
Liberty ULTRA	glufosinate-L	1.6 lb/gal	10	BASF
Rely	glufosinate	2.34 SL	10	BASF
Surmise	glufosinate	2.34 lb/gal	10	Albaugh, LLC
Surmise 5	glufosinate	4.6 lb/A	10	Albaugh, LLC
Brake	fluridone	1.2 lb/gal	12	SePRO
Predict	norflurazon	78.6 DF	12	Syngenta
Solicam	norflurazon	78.6 DF	12	Syngenta
Caravel	clomazone	3 ME	13	Sipcam Agro
Command	clomazone	3 ME	13	FMC
Aim	carfentrazone	2 EC	14	FMC
Battle Star	fomesafen	1.88 lb/gal	14	Albaugh, LLC
BroadStar	flumioxazin	51% WDG	14	Valent
Cadet	fluthiacet methyl	0.91 EC	14	FMC
Cobra	lactofen	2 EC	14	Valent
Delta Goal	oxyfluorfen	4 EC	14	Corteva
Dismiss	sulfentrazone	4 L	14	FMC
Zone	sulfentrazone	4F	14	HELM
Flexstar, Rhythm	fomesafen	1.88 ME	14	Syngenta; Cheminova
Goal 2XL	oxyfluorfen	2 EC	14	Corteva
Marvel	fomesafen + fluthiacet-methyl	35 C (2.88 + 0.12 lb/gal)	14	FMC
Quicksilver	carfentrazone	1.9 L	14	FMC
Reflex, Dawn	fomesafen	2 LC	14	Syngenta; Cheminova
Resource	flumiclorac	0.86 EC	14	Valent
Ronstar	oxadiazon	50 SP; 2 G	14	Bayer
Sharpen	saflufenacil	2.85 SC	14	BASF
Sinister	fomesafen	2.87 lb/gal	14	Helena
Spartan	sulfentrazone	4 F	14	FMC
Spartan Charge	carfentrazone + sulfentrazone	4.5L (0.35 + 3.15 lb/gal)	14	FMC
Sureguard	flumioxazin	0.25% G	14	Valent
Ultra Blazer	acifluorfen	2 SL	14	UPL-NA
Reviton	tiafenacil	2.83 SC	14	HELM
Valor	flumioxazin	51 WDG	14	Valent
Bolero	thiobencarb	8 EC	15	Valent
Cinch	*S*-metolachlor	7.64 EC	15	Corteva
Degree	acetochlor	3.8 SL	15	Bayer
Devrinol	napropamide	2 G; 2 EC	15	UPL-NA
Dual II Magnum	*S*-metolachlor	7.64 EC	15	Syngenta
Dual Magnum	*S*-metolachlor	7.62 EC	15	Syngenta
Eptam	EPTC	7 EC	15	Gowan
Fearless	acetochlor	7 EC	15	HELM
Harness, Warrant	acetochlor	7 EC	15	Bayer
Helmet	metolachlor	7.8 EC	15	HELM
Moccasin II Plus	*S*-metolachlor	7.64 EC	15	UPL-NA
Outlook	dimethenamid-p	6 EC	15	BASF
Parrlay	metolachlor	8 EC	15	Bayer
Pennant Magnum	*S*-metolachlor	7.62 EC	15	Syngenta
Ro-Neet	cycloate	6 E	15	Helm
Tower	dimethenamid	6 lb/gal	15	BASF
Zidua	pyroxasulfone	4.17 SC	15	BASF
Prograss	ethofumesate	1.5 EC	16	Bayer
DSMA Plus	DSMA	3.8 SL	17	UAP-Loveland
MSMA (others)	MSMA	6 SL; 6.6 SL	17	several
Alanap	naptalam	2 L	19	Crompton Uniroyal
Asulox	asulam	3.34 L	18	UPL
Casoron	dichlobenil	2 G; 4 G	20	Crompton
Dyclomec	dichlobenil	4 G	20	PBI Gordon
Norosac	dichlobenil	4 G	20	PBI Gordon
Gallery	isoxaben	75 DF	21	Corteva
Gramoxone	paraquat	3 SL	22	Syngenta
Quick-Quat	paraquat	3 SL	22	ADAMA
Helmquat	paraquat	3 SL	22	HELM
Reward	diquat	2 SL	22	Syngenta
Basamid Granular	dazomet	99 G	26	BASF
Krenite S	fosamine	4 S	26	Corteva
Argos	mesotrione	4 L	27	HELM
Balance Flexx	isoxaflutole	2.05 L	27	Bayer
Callisto	mesotrione	4 L	27	Syngenta
Impact, Armezon	topramezone	2.8 L	27	AMVAC; BASF
Laudis	tembotrione	3.5 L	27	Bayer
Motif	mesotrione	4 SL	27	UPL-NA
Rogue	benzobicyclon	3.4 SC	27	Gowan
Shieldex	tolpyralate	3.33 SC	27	Summit Agro
Rezilon	indaziflam	1.67 lb/gal	29	Bayer

(Continued on page 15)

HERBICIDE TRADE NAME, COMMON NAME, FORMULATION, AND MANUFACTURER, ORDERED BY WSSA GROUP # [cont.]

Trade Name	Common Name	Formulation [1]	Resistance Management WSSA Group # [2]	Manufacturer
Goosegrass/Crabgrass Control	bensulide + oxadiazon	5.25 G	0, 14	Scott's
Fusion	fluazifop + fenoxaprop	2.56 EC (2 + 0.56 lb/gal)	1, 1	Syngenta
Exceed	primisulfuron + prosulfuron	57 DF (28.5 + 28.5%)	2, 2	Syngenta
Finesse Cereal and Fallow	chlorsulfuron + metsulfuron	75 DF (62.5 + 12.5%)	2, 2	FMC
FirstShot SG	thifensulfuron + tribenuron	50% SG (25% + 25%)	2, 2	FMC
Frontrow	cloransulam + flumetsulam	co-pack 84% + 80%	2, 2	Corteva
Gambit	halosulfuron + prosulfuron	79 WDG (50 + 29%)	2, 2	Gowan
Harmony Extra SG	thifensulfuron + tribenuron	50 SG (33.3 + 16.7%)	2, 2	FMC
Landmark II MP	sulfometuron + chlorsulfuron	75 DG (56.25 + 18.75%)	2, 2	Corteva
LeadOff	rimsulfuron + thifensulfuron	33.4 SG (16.7 + 16.7%)	2, 2	Corteva
Lightning	imazethapyr + imazapyr	70 DG (52.5 + 17.5%)	2, 2	BASF
Permit Plus	halosulfuron + thifensulfuron	75 DF (67 + 8%)	2, 2	Gowan
Resolve Q	rimsulfuron + thifensulfuron-methyl	22.4 DG (18.4 + 4%)	2, 2	Corteva
Steadfast Q	nicosulfuron + rimsulfuron	38 DG (25 + 13%)	2, 2	Corteva
Afforia	thifensulfuron + tribenuron + flumioxazin	50.8 DG (5 + 5 + 40.8%)	2, 2, 14	Corteva
Chaparral	aminopyralid + metsulfuron	72 DF (62 + 9%)	2, 4	Corteva
FullScript	imazamox + quinclorac	3.3 L (0.3 + 3.0 lb/gal)	2, 4/29	ADAMA
Novixid	florpyrauxifen-benzyl + penoxsulam	0.27 SC (0.10 + 0.17 lb/gal)	2, 4	Corteva
Rinde	bispyribac + quinclorac	1.62 L (0.12 + 1.5 lb/gal)	2, 4/29	AMVAC
Yukon	halosulfuron + dicamba	67.5 WSG (12.5 + 55%)	2, 4	Gowan
Cimarron Max	two-part mix: metsulfuron and 2,4-D + dicamba	60 DF and 1.87 + 1 lb/gal	2, 4, 4	Corteva
SureStart II	flumetsulam + clopyralid + acetochlor	4.25 EC (0.12 + 0.38 + 3.75 lb/gal)	2, 4, 15	Corteva
Oustar	sulfometuron + hexazinone	75 DG (11.8 + 63.2%)	2, 5	Corteva
Envive	chlorimuron + flumioxazin + thifensulfuron	41.3 WDG (9.2% + 29.2% + 0.9%)	2, 14, 2	Corteva
Enlite	chlorimuron + flumioxazin + thifensulfuron	47.9 WDG (2.85 + 36.21 + 8.8%)	2, 14, 2	Corteva
Trivence	chlorimuron + flumioxazin + metribuzin	61.3 DG (3.9 + 12.8 + 44.6%)	2, 14, 5	Corteva
Realm Q	rimsulfuron + mesotrione	38.75 DG (7.5 + 31.25%)	2, 27	Corteva
RiceOne CS	pendimethalin + clomazone	3.69 CS (2.61 + 1.08 lb/gal)	3, 13	UPL-NA
Tripzin ZC	pendimethalin + metribuzin	4 ZC (2.9 + 1.1 lb/gal)	3, 5	UPL-NA
Strategy	ethalfluralin + clomazone	2.1 EC (1.6 + 0.5 lb/gal)	3, 13	Platte; Loveland
Ornamental Herbicide II	pendimethalin + oxyfluorfen	3 G (1 + 2%)	3, 14	Scott's
Rout	oryzalin + oxyfluorfen	3 G (1 + 2%)	3, 14	Scott's Sierra
Snapshot 2.5 TG	trifluralin + isoxaben	2.5 G (2 + 0.5%)	3, 21	Corteva
Showcase	trifluralin + isoxaben + oxyfluorfen	2.5 G	3, 21, 14	Corteva
Confront	triclopyr + clopyralid	3 L (2.25 + 0.75 lb/gal)	4, 4	Corteva
Crossbow	2,4-D + triclopyr	3 S (2 + 1 lb/gal)	4, 4	Corteva
Grazon P + D	picloram + 2,4-D	2.54 L (0.54 + 2 lb/gal)	4, 4	Corteva
Outlaw	2,4-D + dicamba	2.55 EC (1.45 + 1.1 lb/gal)	4, 4	Helena
Overdrive	dicamba + diflufenzopyr	0.7 L (0.5 + 0.2 lb/gal)	4, 4	Helena
Chaser	2,4-D + triclopyr	3 S (2 + 1 lb/gal)	4, 4	Loveland
Pathway	picloram + 2,4-D	ready-to-use liquid (3 + 11.2% active)	4, 4	Corteva
Redeem R & P	triclopyr + clopyralid	3 L (2.25 + 0.75 lb/gal)	4, 4	Corteva
Status	dicamba + diflufenzopyr	56% EC (40 + 16%)	4, 4	BASF
Weedmaster	dicamba + 2,4-D	3.87 SL (1 + 2.87 lb/gal)	4, 4	Nufarm
Trimec, Endrun	2,4-D + mecoprop + dicamba	various	4, 4, 4	various
DuraCor	aminopyralid + florpyrauxifen-benzyl	0.667 + 0.067 lb/gal	4, 4	Corteva

(Continued on page 16)

HERBICIDE TRADE NAME, COMMON NAME, FORMULATION, AND MANUFACTURER, ORDERED BY WSSA GROUP # [cont.]

Trade Name	Common Name	Formulation [1]	Resistance Management WSSA Group # [2]	Manufacturer
Trimec Ester, Triamine	2,4-D + MCPA + dicamba	3.96 SL (2.44 + 1.3 + 0.22 lb/gal)	4, 4, 4	Various
Enlist Duo	2,4-D choline + glyphosate	3.3 SL (16 lb/gal + 1.7 lb/gal)	4, 9	Corteva
Tavium	dicamba + *S*-metolachlor	3.38 CS (1.12 + 2.26 lb/gal)	4, 15	Syngenta
Suprend	prometryn +trifloxysulfuron	80 WG (79.3 + 0.7%)	5, 2	Syngenta
Cloak	metribuzin + chlorimuron	75 DG (64.3 + 10.7%)	5, 2	Nufarm
Duet	propanil + bensulfuron	60 DF (60 + 0.46%)	5, 2	UPL-NA
Krovar	bromacil + diuron	80 DF (40 + 40%)	5, 5	Corteva
RiceBeaux	propanil + thiobencarb	6 SL (35% + 31%)	5, 8	UPL-NA
Intimidator	metribuzin + fomesafen + *S*-metolachlor	4.81 SL (0.75 + 0.67 + 3.39 lb/gal)	5, 14, 15	Loveland
Prompt	bentazon + atrazine	5 L (2.5 + 2.5 lb/gal)	6, 5	Microflo
Storm	bentazon + acifluorfen	4 SL (2.67 + 1.33 lb/gal)	6, 14	UPL-NA
Journey	glyphosate + imazapic	1.5 + 0.75 SL	9, 2	BASF
OneStep	glyphosate + imazapyr	2.16 L (1.53 + 0.637 lb/gal)	9, 2	BASF
Costarr	glyphosate + dicamba	2.1 EC (1.5 + 0.6 lb/gal)	9, 4	Albaugh
Landmaster	glyphosate + 2,4-D	3.1 EC (1.2 + 1.9 lb/gal)	9, 4	Albaugh
Sequence	glyphosate + *S*-metolachlor	5.25 F (2.25 + 3 lb/gal)	9, 15	Syngenta
Authority First	sulfentrazone + cloransulam	0.7 DF (0.62 + 0.08 lb/lb)	14, 2	FMC
Authority Maxx	sulfentrazone + chlorimuron ethyl	66 DF (0.62 + 0.04 lb/lb)	14, 2	FMC
Authority XL	sulfentrazone + chlorimuron	0.7 DG (0.62 + 0.08 lb/lb)	14, 2	FMC
OpTill	saflufenacil + imazethapyr	68 WG (17.8 + 50.2)	14, 2	BASF
Surveil	flumioxazin + cloransulam	48 WDG (36% + 12%)	14, 2	Corteva
Valor XLT	flumioxazin + chlorimuron	40.3 WDG (30% + 10.3%)	14, 2	Valent
Zone Maxx	sulfentrazone + chlorimuron ethyl	66 DF (0.62 + 0.04 lb/lb)	14, 2	HELM
Zidua Pro	saflufenacil + imazethapyr + pyroxasulfone	4.09 SC (0.48 + 1.33 + 2.28 lb/gal)	14, 2, 15	BASF
Echelon	sulfentrazone + prodiamine	4 SC	14, 3	FMC
Avenue South	sulfentrazone + penoxsulam + 2,4-D + dicamba	0.8 EC (0.06 + 0.06 + 0.53 + 0.15 lb/gal)	14, 2, 4, 4	PBI Gordon
Power Zone	carfentrazone + MCPA + mecoprop + dicamba	2.9 EC (0.04 + 2.21 + 0.44 + 0.22 lb/gal)	14, 4, 4, 4	PBI Gordon
Speed Zone	carfentrazone + mecoprop + 2,4-D + dicamba	2.2 EC (0.05 +1.53 + 0.48 + 0.14 lb/gal)	14, 4, 4, 4	PBI Gordon
Surge	sulfentrazone + 2,4-D + MCPP + dicamba	2.2 EC (1.4 + 0.5 + 0.2 + 0.06 lb/gal)	14, 4, 4, 4	PBI Gordon
Authority MTZ	sulfentrazone + metribuzin	45 DG (18 + 27%)	14, 5	FMC
Battle Star GT	fomesafen + glyphosate	2.8L (0.54 + 2.26)	14, 9	Albaugh, LLC
Flexstar GT 3.5	fomesafen + glyphosate	2.8 L (0.56 + 2.26 lb/gal)	14, 9	Syngenta
Display	carfentrazone + fluthiacet-methyl	4.3 SE (4.174 + 0.126 lb/gal)	14, 14	FMC
Zone Defense	sulfentrazone + flumioxazin	77 WDG (62 + 15%)	14, 14	HELM
Anthem Maxx	pyroxasulfone + fluthiacet-methyl	2.15 SE (2.087 + 0.063 lb/gal)	14, 15	FMC
Authority Edge	sulfentrazone + pyroxasulfone	4.25 SC (2.73 + 1.52 lb/gal)	14, 15	FMC
Authority Elite, BroadAxe XC	sulfentrazone + *S*-metolachlor	7 EC (0.7 + 6.3 lb/gal)	14, 15	FMC/Syngenta

(Continued on page 17)

HERBICIDE TRADE NAME, COMMON NAME, FORMULATION, AND MANUFACTURER, ORDERED BY WSSA GROUP # [cont.]

Trade Name	Common Name	Formulation [1]	Resistance Management WSSA Group # [2]	Manufacturer
Zone Elite	sulfentrazone + metolachlor	7 EC (0.7 + 6.3 lb/gal)	14, 15	HELM
Authority Supreme	sulfentrazone + pyroxasulfone	4.16 SC (2.08 + 2.08 lb/gal)	14, 15	FMC
Perpetuo	flumiclorac + pyroxasulfone	2.3 SC (0.59 + 1.71 lb/gal)	14, 15	Valent
Prefix	*S*-metolachlor + fomesafen	Co-Pak (7.62 EC/2 LC)	14, 15	Syngenta
Verdict	saflufenacil + dimethenamid	5.57 EC (0.57 + 5.0)	14, 15	BASF
Freehand	dimethenamid + pendimethalin	1.75 G	15, 3	BASF
Axiom	flufenacet + metribuzin	68 DF (54.4 + 13.6%)	15, 5	Bayer
Bicep II Magnum	*S*-metolachlor + atrazine	5.5 L (3.1 + 2.4 lb/gal)	15, 5	Syngenta
Bicep Lite II Magnum	*S*-metolachlor + atrazine	6 L (3.33 + 2.67 lb/gal)	15, 5	Syngenta
Boundary	*S*-metolachlor + metribuzin	7.8 EC (6.3 + 1.5 lb/gal); 6.5 EC (5.25 + 1.25 lb/gal)	15, 5	Syngenta
Cinch ATZ	*S*-metolachlor + atrazine	5.5 F (3.1 + 2.4 lb/gal)	15, 5	Corteva
Degree Xtra	acetochlor + atrazine	4 SL	15, 5	Bayer
Fearless Xtra 5.6	acetochlor + atrazine	5.6 L (3.1 + 2.5 lb/gal)	15, 5	HELM
Harness Extra	acetochlor + atrazine	5.6 L (3.1 + 2.5 lb/gal); 6 L (4.3 + 1.7 lb/gal)	15, 5	Bayer
Keystone	acetochlor + atrazine	5.5 L (3 + 2.5 lb/gal)	15, 5	Corteva
Lariat	alachlor + atrazine	4 L (2.5 + 1.5 lb/gal)	15, 5	Bayer
Tendovo	*S*-metolachlor + metribuzin + cloransulam-methyl	4.18 ZC (3.47 + 0.642 + 0.065 lb/gal)	15, 5, 2	Syngenta
Resicore XL	acetochlor + mesotrione + clopyralid	3.26 ZC (2.8 + 0.27 + 0.19 lb/gal)	15, 27, 4	Corteva
Acuron	*S*-metolachlor + atrazine + bicyclopyrone + mesotrione	3.44 L (2.14 lb + 1.0 lb + 0.06 lb + 0.24 lb)	15, 5, 27	Syngenta
Helmet Maxx	metolachlor + atrazine + mesotrione	3.578 L (1.7 + 1.66 + 0.218 lb/gal)	15, 5, 27	HELM
Acuron GT	*S*-metolachlor + glyphosate + mesotrione + bicyclopyrone	4.3 ZC (2 + 2 + 0.2 + 0.095 lb/gal)	15, 9, 27	Syngenta
Anthem Flex	pyroxasulfone + carfentrazone	4 SE (3.733 + 0.267 lb/gal)	15, 14	FMC
Fierce	pyroxasulfone + flumioxazin	76 WDG	15, 14	Valent
Surtain	pyroxasulfone + saflufenacil	1.628 ZC	15, 14	BASF
Armezon PRO	dimethenamid + topramezone	5.35 EC (5.25 + 0.1 lb/gal)	15, 27	BASF
Coyote	*S*-metolachlor + mesotrione	3.67 SC (3.34 + 0.33 lb/gal)	15, 27	UPL-NA
Harness MAX	acetochlor + mesotrione	3.85 L (3.52 + 0.33 lb/gal)	15, 27	Bayer
Restraint	acetochlor + tolpyralate	6.50 EC (6.404 + 0.094 lb/gal)	15, 27	Summit Agro
Moccasin MTZ	*S*-metolachlor + metribuzin	4.46 EC (3.35 + 1.11 lb/gal)	15, 5	UPL-NA
Corvus	isoxoflutole + thiencarbazone	2.63 SC (0.75 + 1.88)	27, 2	Bayer
Trivolt	isoxaflutole + thiencarbazone + flufenacet	3.65 SC (0.57 + 0.23 + 2.85 lb/gal)	27, 2, 15	Bayer
ImpactZ	topramezone + atrazine	4.26 L (0.26 + 4 lb/gal)	27, 5	AMVAC
Sinate	topramezone + glufosinate	2.57 L (0.1 + 2.47 lb/gal)	27, 10	AMVAC
Impact Core	topramezone + acetochlor	7.15 L (0.07 + 7.08 lb/gal)	27, 15	AMVAC
Halex GT	mesotrione + *S*-metolachlor + glyphosate	4.4 L (0.209 + 2.09 + 2.09)	27, 15, 9	Syngenta
Storen	S-metolachlor + mesotrtione + pyraxasulfone + bicylcopyrone	3.23 ZC (2.69 + 0.31 + 0.15 + 0.075 lb/gal)	27+15	Syngenta

[1] Liquid formulations include AC, applicator's concentration; CS, aqueous capsule suspension; E, EC or EW, emulsifiable concentrate; F, flowable; L, liquid; ME, micro-encapsulated; SL, soluble liquid; S, suspension. **Dry** formulations include DF, dry flowable; DG, dispersible granules; G, granules; SP, soluble powder; W, WG or WDG, wettable dispersible granules; WP, wettable powder; WSG, wettable soluble granule.

[2] Herbicide classification according to primary site of action as described by Weed Science Society of America (WSSA) (numberdesignation) and Herbicide Resistance Action Committee (HRAC) (letter designation). *From Mallory-Smith and Retzinger.*

Rotating herbicides so plants are not exposed to a single herbicidal mode of action for several seasons or plant generations is highly recommended as part of a resistance-management program. The classification presented here can be used as a tool to choose herbicides in different site-of-action groups so that mixtures or rotations of active ingredients can be planned. An attempt should be made to rotate herbicides designated with the same number or letter to those with different numbers or letters (i.e., different sites or modes of action). See table on page 19 for sites of action associated with each classification.

WEED RESISTANCE TO HERBICIDES

In Arkansas, many weeds have become resistant to herbicides that once provided excellent control. Palmer amaranth (pigweed) populations in certain areas of the state have become resistant to 6 different herbicide groups. The maps below shows the spread of pigweed populations that have become resistant to PPO herbicides (WSSA Group 14), metolachlor and acetochlor herbicides (WSSA Group 15), and HPPD herbicides (WSSA Group 27).

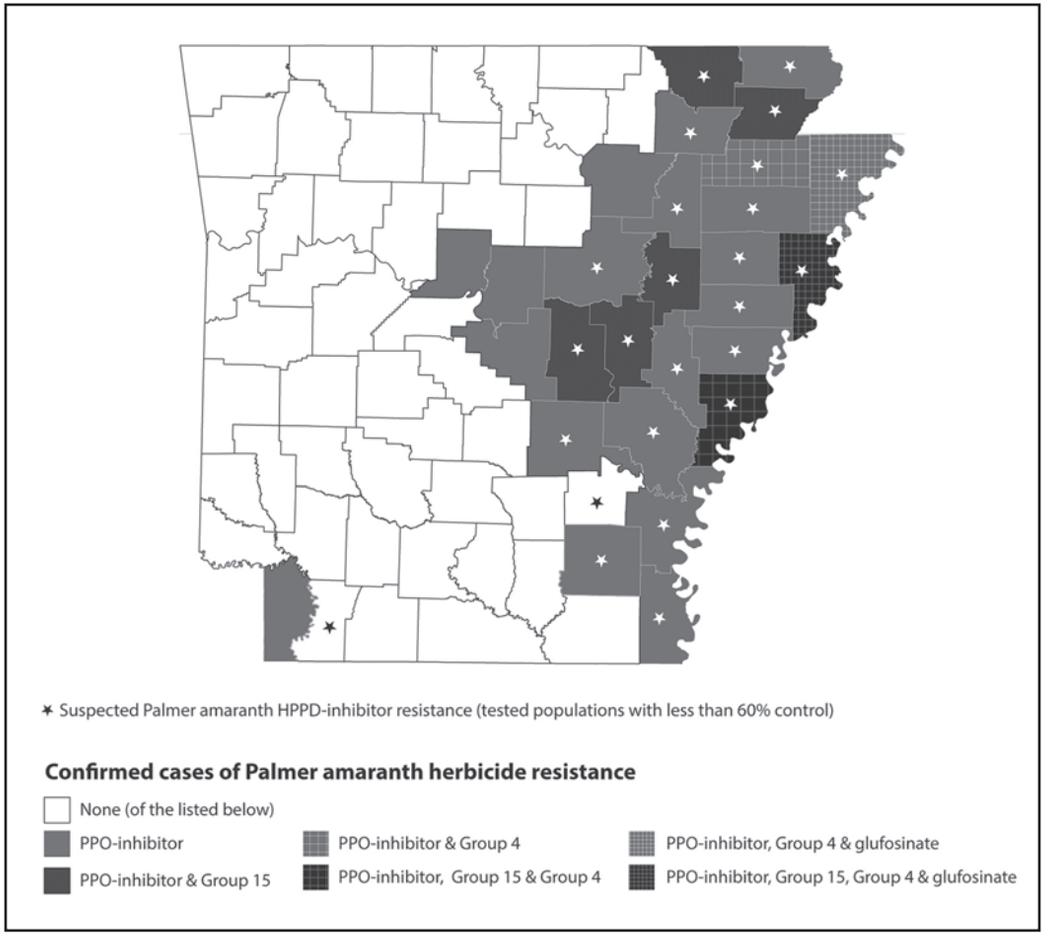
Things That Promote Resistance

1) Overdependence on herbicides.
2) Relying on a single herbicide mode of action year after year.
3) Multiple applications of the same herbicides within a year.
4) Applying sub-lethal rates of herbicides.
5) Continuous cropping systems.

In order to manage herbicide-resistant weeds and to prevent the widespread development of resistance, the University of Arkansas recommends the following strategies:

General Resistance Management Strategies

1) Rotate crops.
2) Plant a winter cover crop such as cereal rye.
3) Rotate herbicides using different modes of action.
4) Use deep tillage, cultivation and other cultural practices in rotation, when possible.
5) Use tank-mixtures at effective rates with different modes of action.
6) Avoid using sequential applications of the same single herbicide over and over again.
7) Control weeds on fallow ground or set aside land to prevent spreading (glyphosate-resistant horseweed is a good example).
8) **If you suspect resistance after a herbicide application: Attempt to eradicate escapes with alternative herbicides or cultural methods. Do not let them go to seed! Collect seed samples from suspect plants and take them to your county Extension agent who will have them tested at the University of Arkansas or can let you know if resistant populations are known to exist.**



CONFIRMED HERBICIDE-RESISTANT CASES (WEED SPECIES AND HERBICIDES) PRESENT IN ARKANSAS

	RESISTANCE		
Weed Species	**Site-Of-Action**	**Group Number**	**Example Herbicides**
Palmer amaranth *(Amaranthus palmeri)*	ALS inhibitor	2	Classic, FirstRate, Pursuit, Scepter
	Microtubule inhibitor	3	Prowl, Treflan, Sonalan
	Synthetic auxins	4	2,4-D, Dicamba, Loyant
	EPSPS inhibitor	9	Roundup
	Glutamine Synthetase inhibitor	10	Liberty, Interline
	PPO inhibitor	14	Flexstar, Sharpen, Valor
	LCFA inhibitor	15	Dual Magnum, Warrant, Zidua
	HPPD inhibitor	27	Callisto, Laudis
Waterhemp *[Amaranthus tuberculatus (Moq.) J.D. Sauer]*	EPSPS inhibitor	9	Roundup
Redroot pigweed *(Amaranthus retroflexus)*	ALS inhibitor	2	Classic, FirstRate, Pursuit, Scepter
Barnyardgrass/junglerice *(Echinochloa spp.)*	ACCase inhibitor	1	Clincher, Ricestar, Provisia, Highcard
	ALS inhibitor	2	Newpath, Beyond Xtra, Preface, Postscript, Grasp, Regiment
	Synthetic auxins	4	Loyant
	Photosystem II inhibitor	5	Propanil
	DOXP inhibitor	13	Command
	Cellulose synthesis inhibitor	29	Facet
Italian ryegrass *(Lolium multiflorum)*	ACCase inhibitor	1	Axial, Select
	ALS inhibitor	2	Finesse, FirstShot, Harmony, Scepter
	EPSPS inhibitor	9	Roundup
Rice flatsedge *(Cyperus iria)*, **smallflower umbrella sedge** *(Cyperus difformis)* **and yellow nutsedge** *(Cyperus esculentus)*	ALS inhibitor	2	Classic, Grasp, Newpath, Permit
Annual bluegrass *(Poa annua)*	EPSPS inhibitor	9	Roundup
Horseweed *(Conyza canadensis)*	EPSPS inhibitor	9	Roundup
Cocklebur *(Xanthium strumarium)*	ALS inhibitor	2	Classic, FirstRate, Pursuit, Scepter
	Nucleic acid inhibitor	17	MSMA
Giant ragweed *(Ambrosia trifida)*	EPSPS inhibitor	9	Roundup
Common ragweed *(Ambrosia artemisiifolia)*	EPSPS inhibitor	9	Roundup
Johnsongrass *(Sorghum halepense)*	ACCase inhibitor	1	Assure, Fusilade, Clincher, Ricestar
	ALS inhibitor	2	Pursuit, Scepter
	EPSPS inhibitor	9	Roundup
Goosegrass *(Eleusine indica)*	Microtubule inhibitor	3	Prowl, Treflan, Sonalan
Weedy rice *(Oryza sativa)*	ACCase inhibitor	1	Provisia, Highcard
	ALS inhibitor	2	Newpath, Beyond Xtra, Preface, Postscript
Pennsylvania smartweed *(Persicaria pensylvanica)*	ALS inhibitor	2	Newpath, Preface, Regiment, Gambit
Mayweed *(Anthemis cotula)*	ALS inhibitor	2	FirstShot, Leadoff, Harmony Extra, Express

RESISTANT WEED MANAGEMENT IN ARKANSAS

Palmer amaranth (pigweed) has been found resistant to 8 herbicide modes of action in certain populations, especially in Northeast Arkansas. The latest sampling has revealed populations that are not only resistant to the Group 9 herbicide glyphosate (Roundup) but also PPO-inhibitors (Group 14) such as Reflex (fomesafen) and Valor (flumioxazin) as well as very-long-chain fatty acid inhibitors (Group 15) such as metolachlor (Dual) and acetochlor (Warrant) and POST applications of HPPD-inhibitors (Group 27) such as mesotrione (Callisto) and tembotrione (Laudis). Other Palmer amaranth populations have now also been confirmed resistant to the Group 10 herbicide glufosinate (Liberty) and Group 4 synthetic auxins (2,4-D, dicamba). Additional herbicide modes of action to which pigweed has shown resistance are the ALS-inhibitors (Group 2) such as Pursuit, Staple and the DNAs (Group 3) such as Prowl. Crop rotation and inclusion of cultural management programs are the best ways to break the herbicide resistance cycle. If cotton or soybean has been grown consistently on the acre then rotating to either corn or grain sorghum where atrazine can be used at full rates or rice where Loyant and flooded paddies are implemented can reduce pigweed numbers the following year. Cultural practices such as deep tillage using moldboard or breaking plows in the fall can bury pigweed seed to depths that reduce emergence the next year. The use of deep tillage needs to occur every 4 years to realize full benefits. Use of a cereal rye cover crop can also reduce emergence of pigweed populations in the spring if managed correctly. Wait to terminate cereal rye cover crops after April 1st so maximum biomass can be produced. Terminate cereal rye 2 weeks prior to planting. One or both methods should be utilized on fields heavily infested with pigweed. Removing escapes prior to seed set is crucial to reduce soil seedbank numbers. **Cleaning equipment can reduce the spread of these resistant populations from one field to the next.**

IN SOYBEAN:

1. **Start clean** with paraquat (Gramoxone) at planting.
2. **Plant soybean in narrow rows**, 15-inch or less for quicker canopy.
3. **Plant a variety that is tolerant to metribuzin and a technology that can be used full season**. If XtendFlex varieties are planted, take note of current federal regulations on dicamba applications. At time of publication there is no labeled dicamba herbicide for XtendFlex varieties. The Enlist technology which enables both Enlist One plus glufosinate (Liberty/ Interline) postemergence has resulted in the best success of these multiple-resistant populations.
4. **Use residual herbicides containing multiple modes of action at planting**. Metribuzin at 6 to 8 oz/A (dry) plus a Group 15 such as S-metolachlor, Zidua or Outlook should be applied.
5. **MAKE TIMELY POST APPLICATIONS REGARDLESS OF HERBICIDE USED**.
6. **Overlap residual herbicide** at 3 weeks after planting utilizing Outlook or Anthem/Zidua with POST applications.
7. **Repeat residual AND POST application 2 weeks following the first application** (may not need with narrow-row system).
8. **Control or remove** escapes prior to seed production.

IN COTTON:

1. **Start clean** with paraquat (Gramoxone at planting.
2. **Plant a variety that is tolerant to glufosinate (Liberty) or Enlist** which enables both Enlist One (2,4-D) plus glufosinate POST which has resulted in the best success with these difficult-to-control populations. If XtendFlex varieties are planted, take note of current federal regulations on dicamba applications. At time of publication there is no labeled dicamba herbicide for XtendFlex varieties.
3. **Use Brake plus Cotoran, Caparol, or Diuron PRE**, especially in heavily infested fields. Apply rates based on soil type. Poor results have been found with Brake applied to soils high in clay content.
4. **Overlap with residual herbicide** at 3 to 4 weeks after planting utilizing Outlook, Dual Magnum, or Warrant with POST applications.
5. **Repeat residual with POST** application 2 weeks following the first application.
6. **Post-direct or layby with diuron (1 qrt/A)** plus Anthem Flex or Zidua plus crop oil.
7. **Control or remove escapes prior to seed production**.

IN CORN:

1. **Start clean and use residual at planting** to control emergence until an early postemergence window (V3-V4)
2. **Make a timely POST application utilizing atrazine 1.5-2 qrts/A with postemergence program**. Atrazine has been found to synergize HPPD herbicides such as mesotrione (Halex GT), tembotrione (Capreno, Laudis), topramazone (Armezon), and tolpyralate (Shieldex) making them more effective.
3. **Control escapes and new flushes following corn harvest.** Accomplish this with tillage or non-selective herbicide, and if pig weed are large, it will likely take both. If pigweed produce seed in the field, control will be more difficult the following season.

IN PEANUT:

1. **Start clean, plant twin-rows on 38-inch or** narrow rows to 30-inch if possible.
2. **Utilize Valor or Brake plus Valor or a labeled Group 15 PRE** such as Outlook at planting.
3. **Make timely POST** with Gramoxone + Storm + Zidua from cracking to 28 DAP.
4. **Remove escapes** prior to harvest.

IN RICE:

1. **Sharpen 2-3 oz/A PRE** provides best residual control. Control will be reduced in PPO-resistant populations.
2. **Loyant POST** – 8-10 oz/A provides excellent control
3. **Flood the field to prevent new flushes.**
4. **An additional application will be necessary for levees and furrow-irrigated rice**.

Barnyardgrass/Junglerice populations have been identified with resistance to 5 herbicide modes of action in Arkansas, with the latest being ALS (Newpath), clomazone (Command), and ACCase (Clincher) herbicides. Producers should consider crop rotation to soybean for at least 2 years as one of the most effective long-term options to reduce problematic barnyardgrass populations. In soybean rotations, use higher rates of herbicides such as glyphosate plus a residual such as Dual Magnum (S-metolachlor), Outlook, or other Group 15 to reduce populations. Anthem Maxx or Zidua have not been as effective controlling barnyardgrass in our research plots.

1. **Know resistant levels** in the population of barnyardgrass/junglerice you have on a field-by-field basis. The University of Arkansas screens barnyardgrass samples for resistance each winter. Submit samples from fields where failure occur.
2. **Start Clean with glyphosate plus clomazone (Command) plus Facet (quinclorac) at planting**. Use highest rates possible dependent on soil type.
3. **Overlap residuals** utilizing Prowl (pendimethalin) plus Bolero (thiobencarb) delayed-pre, or once a stand is established.
4. **USE AN EFFECTIVE EARLY POST OPTION FOR BARNYARDGRASS.** If escapes occur, secondary control is unlikely. If you know propanil, Facet, or Newpath haven't worked in the past, don't use them first. In general, Ricestar @ 24 oz/A may be the best early POST option.
5. **Overlap residuals** such as clomazone plus pendimethalin (RiceOne) with early POST (1-4 leaf rice).
6. **Use an effective pre-flood herbicide for grass control.** Regiment, Rebel EX, Clincher for grass. When considering a tankmix, remember some broadleaf materials cause antagonism.
7. **Flood the field timely** to prevent new flushes. In row-rice culture, more residual applications will be necessary until crop canopy is achieved. Research has shown at least one additional herbicide application will be required in row-rice production

Red rice and/or weedy rice has become problematic in many areas. All (100%) samples submitted to the herbicide screening program the last two years have been confirmed ALS resistant. Quizalofop-resistant (Provisia, Highcard) weedy rice has been documented in four fields in the state over the past two years. If infestations are light, producers should rotate to soybean for at least one year. In fields that have heavy infestations, soybean should be grown for a minimum of 2 years. If planting rice in fields without resistance to Provisia or Highcard, Provisia or Max-Ace varieties/hybrids should be used, but neither of these technologies should be grown for consecutive years. Rotating Provisia with Max-Ace or vice versa does nothing to protect against the occurrence of quizalofop-resistant weedy rice. When applying Provisia or Highcard try to establish the flood in as few days as possible following the preflood application. In zero-grade or side-inlet fields, the use of Rogue herbicide may provide some suppression of weedy rice, especially if applications are made to small plants beneath the flood.

Glyphosate- and ACCase- (clethodim) resistant Italian ryegrass populations are also on the increasing throughout the state. Producers should apply a fall Group 15 residual (Dual Magnum, Zidua) to keep populations from emerging throughout the winter if crops other than rice will be planted the subsequent spring. If planning rice in the spring apply Command in the fall at 12-24oz/A depending on soil type. Delaying applications until the last two weeks of October through early November when temperatures cool will help to control multiple flushes. Multiple applications of paraquat will be necessary prior to planting spring crops if no fall residual herbicides are applied.

Glyphosate-resistant horseweed (horseweed) continues to cause problems in years where springs are unseasonably cool through May. Dicamba 8 oz/A or Elevore 1 oz/A have been the best options in research the last several years for emerged horseweed control. Producers should consider a residual such as Valor (flumioxazin) 2 oz/A with the initial burndown application to reduce horseweed emergence in the spring. Check plant-back restrictions based on crop that is to be planted in the spring.

WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES – ALL CROPS

(See Explanation of Rating Tables on Page 3.)

		GRASSES									BROADLEAVES																				COVER CROP TERMINATION						
HERBICIDE[1]	WSSA Group #	Annual Bluegrass	Barnyardgrass	Broadleaf Signalgrass	Crabgrass	Giant Foxtail	Little Barley	Weedy rice	Ryegrass[9,10]	Buttercup	Carolina Geranium	Chickweeds	Common Lambsquarters	Common Ragweed	Coreopsis	Curly Dock	Cutleaf Eveningprimrose	Henbit[9]	Horseweed, Glyphosate-Resistant[9,11]	Mayweed[11]	Morningglory spp.	Mustards	Palmer Amaranth, Glyphosate-Resistant	Prickly Lettuce	Smartweed spp.	Sow Thistle spp.	Swinecress	Virginia Pepperweed	Yellow Nutsedge	Austrian Winter Pea	Cereal Rye	Clover	Rapeseed	Tillage Raddish	Hairy Vetch	Wheat Cover
2,4-D (labeled formulations)	4	0	0	0	0	0	0	0	0	8	5	0	2	9	7	9	8	5	8	8	9	6	9	8	6	7	6	2	4	6	0	6	5	5	9	0
dicamba[2]	4	0	0	0	0	0	0	0	0	6	7	8	4	9	7	8	8	6	9	6	9	7	8	7	6	8	7	3	0	7	0	7	5	5	9	0
Elevore[3]	4	0	0	0	0	0	0	0	0	-	0	6	-	-	-	-	5	7	9	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	6	-
Glyphosate[4]	9	10	9	8	10	8	10	8	3	5	7	10	8	9	4	7	6	7	2	7	6	10	0	9	8	8	6	10	4	6	10	6	4	5	6	9
Glyphosate + dicamba or 2,4-D[5]	9, 4	10	10	8	10	8	10	8	3	10	9	10	10	10	7	9	9	10	9	9	10	10	8	10	9	9	8	10	4	7	10	8	6	6	10	9
Glyphosate + Elevore	9, 4	10	9	8	10	8	10	8	3	5	7	10	8	9	4	7	6	9	10	7	6	10	0	9	8	8	6	10	4	6	10	6	4	5	7	9
Glyphosate + FirstShot	9, 2	10	7	8	8	8	10	8	3	8	9	10	10	9	4	10	7	9	5	8	7	10	4	10	10	8	6	10	4	6	10	8	5	6	8	9
Glyphosate + Glufosinate	9, 10	10	9	9	10	10	10	9	7	10	8	10	9	10	7	8	8	10	9	8	10	10	9	10	9	9	7	10	7	8	10	10	6	7	10	10
Glyphosate + Goal	9, 14	10	8	8	9	8	10	8	6	9	9	10	8	9	4	7	7	10	8	7	7	10	7	9	10	8	6	8	4	-	10	-	-	-	7	9
Glyphosate + LeadOff[6]	9, 2	10	8	8	8	8	10	8	8	9	9	10	10	9	6	10	7	9	6	9	7	10	5	10	9	8	8	9	6	7	10	9	6	7	8	9
Glyphosate + Reviton	9, 14	10	10	9	9	9	10	9	6	10	9	10	9	10	-	8	8	9	7	7	9	9	9	9	9	8	7	10	7	8	10	9	-	7	10	9
Glyphosate + Sharpen	9, 14	10	10	9	9	9	8	9	5	10	8	8	10	10	6	7	7	8	8	8	8	9	8	8	9	9	7	9	7	8	10	9	6	7	9	10
Glyphosate + Sharpen + 2,4-D	9,14,4	10	10	9	9	9	10	9	5	10	10	10	10	10	9	10	8	10	10	10	10	10	10	10	10	10	9	10	7	9	10	10	7	8	10	9
Glyphosate + Valor[7]	9, 14	10	9	8	10	8	10	8	5	6	8	10	9	9	6	7	9	9	2	7	9	10	4	9	9	-	-	10	6	8	10	9	6	7	8	9
Clethodim (Select Max)[8]	1	6	9	10	9	9	7	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	9
Glufosinate + 2,4-D	10, 4	6	7	7	7	8	7	7	5	10	8	10	9	10	7	8	8	10	9	10	10	10	10	9	8	8	8	10	7	8	7	9	5	7	10	5
Paraquat[9]	22	9	7	8	8	8	9	7	6	7	9	10	9	8	3	5	7	8	5	7	8	10	9	6	6	6	4	0	4	8	7	9	5	8	8	7
Paraquat + PSII[9]	22, 5	9	9	9	9	9	10	8	8	8	9	10	9	8	8	6	7	9	6	7	9	10	10	6	6	6	4	0	7	9	10	10	7	9	9	9

[1] Herbicide rates are: Glyphosate (4 lb/gal) 1 qt/A; paraquat 40 oz/A. Add 0.25% v/v surfactant with paraquat.

[2] Check the Arkansas State Plant Board website (www.aad.arkansas.gov) for updated regulations on dicamba.

[3] Elevore is a slow-acting herbicide. It may take 3 weeks or longer to reach maximum control.

[4] Increasing glyphosate rates to 1.5 lb ai or 3 pt/A of 4 lb/gal will increase efficacy on non-resistant weeds.

[5] Glyphosate (4 lb/gal) 1 qt + 2,4-D 1.5 pt/A.

[6] Add 2,4-D or dicamba for improved control of cutleaf eveningprimrose and horseweed.

[7] Adding Valor or other flumioxazin products like Afforia will provide residual control of horseweed and pigweed, but no postemerge control.

[8] Clethodim activity on grass weeds will be reduced when tankmixed with an auxin such as 2,4-D or dicamba and when applied during cold temperatures.

[9] Adding a PSII-inhibiting herbicide such as metribuzin in beans, atrazine in corn or Cotoran in cotton will greatly increase weed control with paraquat.

[10] **For glyphosate-resistant ryegrass and henbit, fall applications may be more effective than typical burndown applications applied in the spring. Apply 3.25 oz/A Zidua, 2pt/A Boundary or 1.33 pints per acre of Dual Magnum or equivalent in the fall prior to weed emergence. Valor is effective for broadleaves such as henbit, but not for ryegrass. All crops on the Dual label can be planted the following spring. POST applications of paraquat tank-mixed with a photosystem II inhibitor (metribuzin, diuron or atrazine) have also been effective for ryegrass. Select or Select MAX has also been effective at controlling smaller ryegrass; however, it has failed as a late spring salvage in University trials.**

[11] ALS-resistant populations of horseweed, mayweed, weedy rice and ryegrass have been documented.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Glyphosate-resistant Italian Ryegrass Preemergence – October 15 - November 30				
S-metolachlor @ 0.75 to 1.3 lb/A	Italian ryegrass and other small seeded grasses and broadleaves.	**Dual Magnum** 7.62 EC 1.33 to 1.67 pt/A	Apply in the fall by December 1.	Prior to ryegrass emergence. If ryegrass is emmerged apply with Select Max 24 oz/A or paraquat 32 oz/A. **Do not plant rice following spring.**
pyroxasulfone @ 0.08 to 0.15 lb/A	Italian ryegrass and other small seeded grasses and broadleaves.	**Zidua** 4.17 SC 2.5 to 4.5oz/A	Apply in the fall by December 1.	Prior to ryegrass emergence. If ryegrass is emmerged apply with Select Max 24 oz/A or paraquat 32 oz/A. **Do not plant rice following spring.**
pyroxasulfone plus carfentrazone @ 0.08 to 0.15 lb/A plus 0.006 to 0.010 lb/A	Italian ryegrass and other small seeded grasses and broadleaves.	**Anthem Flex** 4 SC 2.75 to 5.0 oz/A	Apply in the fall by December 1.	Prior to ryegrass emergence. If ryegrass is emmerged apply with Select Max 24 oz/A or paraquat 32 oz/A. **Do not plant rice following spring.**
S-metolachlor plus metribuzin @0.98 to 1.31 lb/A plus 0.23 to 0.31 lb/A	Italian ryegrass and other small seeded grasses and broadleaves.	**Boundary** 6.5 EC 1.5 to 2.0 pts/A	Apply in the fall by December 1.	Prior to ryegrass emergence. If ryegrass is emmerged apply with Select Max 24 oz/A or paraquat 32 oz/A. **Only soybean can be planted in the spring.**
clomazone @ 0.375 to 0.56 lb/A	Italian ryegrass and other small seeded grasses and broadleaves.	**Command** 3ME 16 to 24 oz/A	Apply in the fall by December 1.	Prior to ryegrass emergence. If ryegrass is emmerged apply with Select Max 24 oz/A or paraquat 32 oz/A. Use lower rate on lighter soil types such as silt loams. **Only rice, soybean and cotton can be planted in the spring.**
Glyphosate-resistant Italian Ryegrass Postemergence				
clethodim @ 0.18 to 0.242 lb/A	Ryegrass and other grass weeds.	**Select Max** 0.97 EC 24 to 32 oz/A	Postemergence. Add 1% crop oil concentrate.	For best control of ryegrass, spray prior to reproductive stages with temperatures in the 50's.Tankmixtures with auxin herbicides such as dicamba and 2,4-D can cause antagonism and result in reduced control.
paraquat @ 0.47 to 0.94 lb/A	Ryegrass and other emerged weeds.	**Paraquat** (3 lb formulations) 32-40 oz/A	Postemergence. Add a surfactant.	For best control of ryegrass, spray prior to reproductive stages with temperatures in the 50's. Two appliations may be necessary if applied later in the spring.
paraquat plus PSII inhibitor @ 0.47 to 0.94 plus 0.25 - 5.0 lb/A	Ryegrass and other emerged weeds.	**Paraquat** (3 lb formulations) 32-40 oz/A **+ PSII Inhibitor** 0.25 - 1.0 lb ai/A)	Postemergence. Add a surfactant. Better control than paraquat alone.	Use metribuzin @ 0.25 - 0.375 lb ai/A prior to planting soybean atrazine @ 0.5 - 1.0 lb ai/A prior to planting corn, Cotoran 0.75-1.0 lb ai/A prior to planting cotton.
CORN For additional information on burndown herbicides see page 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES. Preplant–Burndown				
glyphosate @ 1.0 lb/A	Emerged weeds.	**Glyphosate** (4 lb/gal formulations) 32 oz/A.	Apply at least 7 days before seedbed preparation.	Field must be free of standing water.
2,4-D amine @ 0.5 to 1 lb/A	Emerged broadleaf weeds.	**2,4-D Various formulations** 1 to 2 pt/A. Add 0.25% v/v nonionic surfactant.	See label for plant-back intervals.	Some plants are sensitive to off-target movement. Therefore, avoid drift. May be tank-mixed with glyphosate.
glyphosate + halauxfen-methyl @ 1 lb/A + 0.004 1lb/A	Annual grass and broadleaf weeds including horseweed.	**Glyphosate** (4 lb/gal formulations) **+ Elevore** 2 pt/A + 1 oz/A.	At least 14 days prior to planting corn.	Good option for glyphosate-resistant horseweed.
glyphosate + thifensulfuron + tribenuron @ 1.0 + 0.016 to 0.025 lb/A	Improved control of curly dock, smartweed, henbit and garlic.	**Glyphosate** (4 lb/gal formulations**) + FirstShot** 50 SG 32 oz/A + 0.5 to 0.8 oz/A.	Prior to planting.	Field must be free of standing water.
glyphosate plus tiafenacil @ 1lb/A plus 0.022 to 0.044 lb/A	Control of grass and broadleaf weeds.	**Glyphosate** (4lb/gal formulations) 2pt/A **+ Reviton** 2.83 SC 1-2 oz/A.	cotton planting is 7 days following 1 oz/A and 14 days for 2oz/A and above.	Postemergence burndown of winter annuals. No residual control provided.
glyphosate + halosulfuron + thifensulfuron @ 1.0 + 0.065 lb/A or 1.0 + 0.031 + 0.004 lb/A	Emerged weeds + enhanced sedge control. Will suppress other broadleaves.	**Glyphosate** (4 lb/gal formulations) **+ Permit 75 WG or Permit Plus** 32 oz/A + 1 oz/A or 0.75 oz/A.	Apply prior to planting Pioneer IR corn hybrids or 1 month prior to planting other hybrids.	Field must be free of standing water. Soil pH must be less than 8.0.
glyphosate + 2,4-D + rimsulfuron/thifensulfuron @ 1 + 1 + 0.25/0.25 lb/A	Henbit, grasses and broadleaves.	**Glyphosate** (4 lb/gal formulations) **+ 2,4-D + Leadoff** 2 pt/A + 1.5 pt/A + 1.5 oz/A.	Can plant corn immediately. Hybrids that have increased sensitivity to ALS herbicides may be injured or stunted. Check hybrid seed tags or manufacturer for tolerance.	For horseweed, substitute dicamba 8 oz/A for 2,4-D. See label for specific plant-back intervals to soybean.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
saflufenacil + dimethenamid @ 0.022 to 0.044 + 0.2 to 0.4 lb/A	Horseweed burndown and residual control.	**Verdict 5.57 EC** 5 to 10 oz/A.	Prior to corn emergence	Tank mix with glyphosate, 1% MSO and 2% v/v of AMS or UAN for best activity.
saflufenacil @ 0.022 - 0.044 lb/A	Pigweed, horseweed, morning-glory and small-seeded broad-leaves.	**Sharpen** 1 to 2 oz/A. Must use a minimum of 1% v/v MSO + AMS.	Prior to corn emergence. Timing to small weeds or prior to weed emergence.	Tank mix with glyphosate or paraquat. Use high water volumes for best coverage. See label for crop specific restrictions and limitations.
clethodim @ 0.18 to 0.242 lb/A	Ryegrass and other grass weeds.	**Select Max 0.97 EC** 24 to 32 fl oz/A	Postemergence. Add 1% crop oil concentrate. **30 day plant-back to corn.**	For best control of ryegrass, spray prior to reproductive stages with temperatures in the 50's. Tank-mixtures with auxin herbicides such as dicamba and 2,4-D can cause antagonism and result in reduced control.
paraquat @ 0.75 lb/A	Emerged weeds.	**Paraquat** (3 lb/gal formulations) 32-40 oz/A. Add 0.25% v/v nonionic surfactant.	Use high rate on weeds larger than 2 inches.	Provides rapid desiccation of existing vegetation. Paraquat is sensitive to off-target movement; there-fore, drift control is necessary. Refer to label for precautions and tank-mix instructions.
paraquat + atrazine @ 0.75 lb/A + 1.0 lb/A	Emerged weeds.	**Paraquat** (3 lb/gal formulations) 32-40 oz/A. Add 0.25% v/v nonionic surfactant. **+ AAtrex 4 L** 1 qrt/A	Use high rate on weeds larger than 2 inches.	Provides rapid desiccation of existing vegetation. Paraquat is sensitive to off-target movement; there-fore, drift control is necessary. Refer to label for pre-cautions and tank-mix instructions. Control is increased with atrazin added to tank.
COTTON For additional information on burndown herbicides see p. 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES. Preplant–Burndown				
paraquat @ 0.47 to 0.94 lb/A	Most emerged broadleaf weeds and grasses.	**Paraquat** (3 lb/gal formulations) 32 to 40 oz/A. or 1.25 to 2.5 pt/A. Use high rate on weeds larger than 2 inches. Add a surfactant (p. 3).	After beds are formed but prior to planting.	Apply for knockdown of existing vegetation prior to planting. Not dependent upon temperature for activity. Add 2,4-D or Clarity for improved control of horse-weed. Add Cotoran or Diuron for improved control.
paraquat + cotoran or diuron @ .75 lb/A + 0.75 to 1 lb/A or 0.5 to 0.75 lb/A	Postemergence control of existing annual weeds.	**Paraquat** (3 lb/gal formulations) + **Cotoran or Direx** 32 oz/A + 24-32 oz/A or 16-24oz/A	Preplant, at planting or before crop emergence	Adjust Cotoran and Direx rates based on soil type.
glufosinate @ 0.73 lb/A	Most emerged broadleaf and grass weeds.	**Glufosinate** (280 SL formulations) 40 oz/A. Follow label for surfactant use.	Prior to planting.	Add 2,4-D or Clarity for improved control of horse-weed if preplant interval can be achieved. Use nozzles and pressure that create medium spray droplets. Use 10 gpa.
L-glufosinate @ 0.36 lb/A	Postemergence control of existing annual weeds.	**Liberty Ultra** 29 oz/A Can add AMS, no additional surfactant needed.	Preplant, at planting or before crop emergence.	Maximum allowable rate per year is 58 oz/A. Read label for additional restrictions.
glyphosate @ 1 lb/A	Annual grasses and broadleaf weeds. Does not control entire-leaf and ivyleaf morningglories.	**Glyphosate** (4 lb/gal formulations) 2 pt/A.	Use prior to planting for vegetation knockdown.	Add 2,4-D or Clarity for control of horseweed.
glyphosate + carfentrazone @ 1 lb/A + 0.016 lb/A	Improved control of morning-glory and henbit.	**Glyphosate** (4 lb/gal formulations) **+ Aim 2EC** 2 pt/A + 1.0 oz.	Use prior to planting for vegetation knockdown.	Add surfactant if glyphosate formulation does not contain one. Add 2,4-D or Clarity for improved control of horseweed.
glyphosate plus tiafenacil @ 1lb/A plus 0.022 to 0.044 lb/A	Control of grass and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) 2pt/A **+ Reviton** 2.83 SC 1-2 oz/A	Cotton planting is 7 days following 1 oz/A and 14 days for 2oz/A and above.	Postemergence burndown of winter annuals. No residual control provided.
glyphosate + 2,4-D @ 1 lb/A + 1 lb/A	Annual grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ 4 SL 2,4-D Amine** 2 pt/A + 2 pt/A.	At least 28 days prior to planting.	Adding residual herbicide such as Caparol, Valor, Cotoran or Direx provides residual control of horseweed.
glyphosate + 2,4-D + rimsulfuron/thifensulfuron @ 1 + 1 + 0.25/0.25 lb/A	Annual grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ 2,4-D + LeadOff/Crusher** 2 pt/A + 1.5 pt/A + 1.5 oz/A.	At least 30 days prior to planting. Some injury from LeadOff has been observed.	For horseweed use 8 oz/A dicamba.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
COTTON For additional information on burndown herbicides see page 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES. Preplant–Burndown [cont.]				
glyphosate + dicamba @ 1 lb/A + 0.25 lb/A	Annual grasses and broadleaf weeds including horseweed.	**Glyphosate** (4 lb/gal formulations) **+ dicamba** 2 pt/A + 8 oz/A.	At least 21 days following 1-inch of rainfall prior to planting non-Xtend varieties.	Good option for glyphosate-resistant horseweed. Adding residual herbicide such as Valor, Caparol, Cotoran or Direx provides residual control of horseweed. Check plantboard rules prior to application.
glyphosate + halauxifen-methyl @ 1 lb/A + 0.004 lb/A	Annual grasses and broadleaf weeds including horseweed.	**Glyphosate** (4 lb/gal formulations) **+ Elevore** 2 pt/A + 1 oz/A.	At least 30 days prior to planting cotton.	Good option for glyphosate-resistant horseweed. Add 2,4-D for control of primrose.
glyphosate + flumioxazin @ 1 lb/A + 0.032 to 0.063 lb/A	Annual grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Valor 51 WDG** 2 pt/A + 1 to 2 oz/A.	At least 14 days for 1 oz/A or 21 days for 2 oz/A + 1-inch of rain prior to planting.	Valor is rainfast in 1 hour. Provides residual control of horseweed. Add Clarity for resistant horseweed.
glyphosate + fomesafen @ 1 lb/A + 0.25 lb/A	Broadleaf weeds including Palmer pigweed.	**Glyphosate** (4 lb/gal formulations) **+ Reflex 2 EC** 2 pt/A + 1 pt/A.	Apply 14-21 days preplant + 0.5-inch rainfall prior to planting.	Provides residual control of horseweed and pigweed for 6 weeks after application. Knocking or dragging top of beds prior to planting will remove herbicide and allow weed infestation.
glyphosate + flumioxazin + dicamba @ 1 lb/A + 0.063 lb/A + 0.25 lb/A	Annual grass and broadleaf weeds including horseweed.	**Glyphosate** (4 lb/gal formulations) **+ dicamba + Valor 51 WDG or Afforia** 2 pt/A + 8 oz/A + 2 oz/A or 2.5 oz/A.	At least 30 days following 1-inch of rainfall prior to planting.	Provides residual control of horseweed and pigweed up to 4 weeks after application.
glyphosate + oxyfluorfen @ 1 lb/A + 0.25 lb/A	Annual grass and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Goal 2XL** 2 pt/A + 1 pt/A.	Apply late February to mid-March.	If planting directly into the stale seedbed, application of Goal requires at least 30 days prior to planting **and** at least three ¼-inch rainfalls. If these conditions are not met, a 2-inch surface incorporation is required before planting.
clethodim @ 0.18 to 0.242 lb/A	Ryegrass and other grass weeds.	**Select Max 0.97 EC** 24-32 fl oz/A.	Postemergence. Add 1% crop oil concentrate.	For best control of ryegrass, spray prior to reproductive stages with temperatures in the 50's. Tank-mixtures with auxin herbicides such as dicamba and 2,4-D can cause antagonism and result in reduced control.
SOYBEANS For additional information on burndown herbicides see page 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES. Preplant–Burndown				
paraquat @ 0.47 to 0.94 lb/A	Annual broadleaf and grass weeds (existing vegetation).	**Paraquat** (3 lb/gal formulations) **32 to 40 oz/A.** Use high rate on weeds larger than 2 inches. Add a surfactant (p. 3).	Use prior to planting on seedbeds that are not to be disturbed before planting. Use higher rate on weeds larger than 2 inches.	Good spray coverage is essential. Adding metribuzin will increase activity.
glyphosate @ 1 lb/A	Annual grasses and broadleaf weeds (existing vegetation). Weak on morningglories.	**Glyphosate** (4 lb/gal formulations) 2 pt/A. Use high rate on all but very small weeds.	Use prior to planting for vegetation knockdown.	Best results when applied in lower spray volumes, i.e., 5 to 10 gpa.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
glufosinate @ 0.64 lb/A	Good option for glyphosate-resistant horseweed. Annual grasses and broadleaf weeds (existing vegetation).	**Glufosinate** (280 SL formulations) 36 oz/A.	Use prior to planting for vegetation knockdown.	Good coverage and warm weather will increase efficacy. Do not use prior to planting LibertyLink soybeans.
L-glufosinate @ 0.36 lb/A	Postemergence control of existing annual weeds.	**Liberty Ultra** 29 oz/A Can add AMS, no additional surfactant needed.	Preplant, at planting or before crop emergence.	Maximum allowable rate per year is 58 oz/A. Read label for additional restrictions.
paraquat + metribuzin @ 0.75 to 0.94 lb/A + 0.25 to 0.75 lb/A	Postemergence control of existing annual weeds. See rating table for preemergence control with metribuzin.	**Paraquat** (3 lb/gal formulations) **+ Metribuzin 75DF** 32 to 40 oz/A or 1.8 to 3 pt/A + 0.33 to 1 lb/A DF. Add 0.25% surfactant.	At planting or prior to crop emergence. See Soybean Update for a list of tolerant varieties.	Tank mix. Apply as above. Do not use on sensitive varieties listed on label. A list of metribuzin-tolerant varieties is available at uaex.uada.edu. Avoid use on high pH soils.
paraquat + sulfentrazone/ cloransulam @ 0.75 to 0.94 + 0.13 to 0.26 lb/A	Annual broadleaf and grass weeds. Improved control of cocklebur, morningglories, smartweed and horseweed. Additional residual control of many broadleaf weeds, including Palmer amaranth.	**Paraquat** (3 lb/gal formulations) **+ Sonic** 32 to 40 oz/A or 1.8 to 3 pt/A + 3 to 6 oz/A.	Prior to planting.	Tank mix. Good program for burndown with residual broadleaf control.
glyphosate + oxyfluorfen @ 1 lb/A + 0.25 lb/A	Annual grass and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Goal 2XL** 2 pt/A + 1 pt/A.	Apply late February to mid March.	If planting directly into the stale seedbed, application of Goal requires at least 30 days prior to planting **and** at least three ¼-inch rainfalls. If these conditions are not met, a 2-inch surface incorporation is required before planting.
glyphosate or paraquat + 2,4-D or dicamba + flumioxazin @ 1 lb/A or 0.47 to 0.94 + 1 lb/A or 0.25 lb/A + 0.063 lb/A	Horseweed and other broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **or Paraquat** (3 lb/gal formulations) **+ 2,4-D or dicamba + Valor** (or other Valor-containing premixes) 2 pt/A or 32 to 40 oz/A or 1.8 to 3 pt/A + 2 pt/A or 8 oz/A + 2 oz/A.	For dicamba and 2,4-D, 21 days after 1.0-inch rainfall, prior to planting.	Burndown plus enhanced control of broadleaf weeds. If horseweed is present, use at least 8 oz/A of dicamba. See Arkansas State Plant Board regulations regarding dicamba restrictions and cutoff date.
glyphosate + haluxifenmethyl @ 1 lb/A + 0.004 lb/A	Annual grasses and broadleaf weeds including horseweed.	**Glyphosate** (4 lb/gal formulations) **+ Elevore** 2 pt/A + 1 oz/A.	At least 14 days prior to planting soybean.	Good option for glyphosate-resistant horseweed. Add 2,4-D for control of primrose. Visit elevore-tankmix.com for approved tankmix partners.
glyphosate + thifensulfuron/ tribenuron @ 1 lb/A + 0.016 to 0.025 lb/A	Improved control of garlic, curly dock, smartweed and henbit.	**Glyphosate** (4 lb/gal formulations) **+ FirstShot SG** 2 pt/A + 0.5 to 0.8 oz/A.	Immediately prior to planting. Label requires application be made at least 7 days prior to planting.	Burndown plus enhanced control of broadleaf weeds.
glyphosate + carfentrazone @ 1 lb/A + 0.016 lb/A	Improved control of morningglories.	**Glyphosate** (4 lb/gal formulations) **+ Aim 2 EC** 2 pt/A + 1 oz/A.	At planting or prior to crop emergence.	Good spray coverage is essential.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN For additional information on burndown herbicides see page 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES. **Preplant–Burndown [cont.]**				
glyphosate plus tiafenacil @ 1lb/A plus 0.022 to 0.067 lb/A	Control of grass and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) 2pt/A plus **Reviton 2.83 SC** 1-3 oz/A	0-7 days prior to planting depending on rate and soil type. Check product label.	Postemergence burndown of winter annuals. No residual control provided. Can be tank-mixed with group 5,14 or 15 herbicides for better control of larger or harder to control weeds.
glyphosate + 2,4-D + rimsulfuron/thifensulfuron @ 1 + 1 + 0.25/0.25 lb/A	Henbit, grasses and broadleaves.	**Glyphosate** (4 lb/gal formulations) **+ 2,4-D + Leadoff** 2 pt/A + 1.5 pt/A + 1.5 oz/A.	At least 30 days prior to planting. Recommend planting STS or BOLT soybeans to avoid risk of injury.	For horseweed, substitute dicamba 8 oz/A for 2,4-D. See label for specific plant-back intervals to soybean.
glyphosate + halsulfuron + thifensulfuron @ 1 + .031 to .062 + .004 to .008 lb/A	Sedges and smartweed.	**Glyphosate** (4 lb/gal formulations) **+ Permit Plus 75 WG** 2pt + 0.75 to 1.5 oz/A	Up to 21 days prior to planting.	*STS/BOLT soybean varieties only!
clethodim @ 0.18 to 0.242 lb/A	Ryegrass and other grass weeds.	**Select Max 0.97 EC** 24 - 32 oz/A.	Postemergence. 1% crop oil concentrate.	For best control of ryegrass, spray prior to reproductive stages with temperatures in the 50's. Tank-mixtures with auxin herbicides such as dicamba and 2,4-D can cause antagonism and result in reduced control.
sulfentrazone + metribuzin @ 0.225 + 0.2 lb/A	Broadleaf weeds.	**Authority MTZ** 12-16 oz/A. Add 1% COC.	Up to 14 days prior to planting.	Add glyphosate or paraquat for existing vegetation. See soil texture chart on page 45. For higher rates, use tolerant varieties. Use 16 oz/A on clay soils.
flumioxazin @ 0.063 lb/A	Residual horseweed control. No post horseweed activity.	**Valor 51 WDG** 2 oz/A.	Prior to soybean emergence.	Apply to clean ground or tank-mix for post weed control. Rainfall at emergence may result in injury, mainly cosmetic.
flumetsulam @ 0.05 to 0.066 lb/A	Horseweed and other broadleaves.	**Python 80 WDG** 1 to 1.33 oz/A.	Prior to planting wheat-beans.	Contact and residual for horseweed. Good tank mix with glufosinate. Good option where horseweed is present less than 14 days prior to planting.
flumioxazin + chlorimuron/ thifensulfuron	Residual horseweed control.	**Envive or Enlite WDG** 3.5 or 2.8 oz/A.	Prior to soybean emergence.	Use 2.8 oz/A Enlite on high pH soils.
saflufenacil @ 0.022 to 0.044 lb/A	Horseweed rapid burndown – regrowth will occur.	**Sharpen 2.85 SC** 1 to 2 oz/A.	Prior to soybean emergence. 30 days prior to plant depending on rate applied and soil type.	Tank mix with glyphosate, 1% MSO and 2% v/v of AMS or UAN for best activity. 30-day plant back on coarse soils.
saflufenacil + dimethenamid @ 0.022 to 0.044 + 0.2 to 0.4 lb/A	Horseweed burndown and residual control.	**Verdict 5.57 EC** 5 to 10 oz/A.	Prior to planting to preplant. 30 days prior to plant depending on rate applied and soil type.	Tank mix with glyphosate, 1% MSO and 2% v/v of AMS or UAN for best activity.
flumioxazin + thifensulfuron + tribenuron@ 0.063 + 0.008 + 0.008 lb/A	Residual horseweed control. No post horseweed activity. Post activity of winter annuals and smartweed.	**Afforia 50.8 WDG** 2.5 oz/A.	Prior to soybean emergence. Up to 3 days after planting.	Apply to clean ground or tank-mix for post weed control. Rainfall at emergence may result in injury, mainly cosmetic.
flumioxazin + chlorimuron + metribuzin @ 0.063 + 0.02 + 0.223 lb/A	Residual horseweed, pigweed and morningglory control.	**Trivence 61.3 DG** 8 oz/A.	Prior to soybean emergence.	Use 6 oz/A on high pH soils.
RICE **For additional information on burndown herbicides see p. 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES.** **Preplant-Vegetation Knockdown**				
2,4-D amine @ 0.5 to 1 lb/A	Emerged broadleaf weeds.	**2,4-D Various formulations** 1 to 2 pt/A. Add 0.25% v/v nonionic surfactant.	See label for plant-back intervals.	Some plants are sensitive to off-target movement. Therefore, avoid drift. May be tank-mixed with glyphosate.
glyphosate @ 1.0 lb/A	Emerged weeds.	**Glyphosate** (4 lb/gal formulations) 32 oz/A.	Apply at least 7 days before seedbed preparation.	Field must be free of standing water.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
glyphosate + halsulfuron + prosulfuron @ 1 + 0.031 to 0.062 + 0.018 to 0.036 lb/A	Grasses, sedges, smartweed and other broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Gambit 79 WG** 2 pt + 1 to 2 oz/A	Prior to planting	Applications at or immediately following planting may result in rice injury. Do not apply if soil pH > 8.0.
glyphosate + halosulfuron + thifensulfuron @ 1.0 + 0.065 lb/A or 1.0 + 0.031 + 0.004 lb/A	Emerged weeds + enhanced sedge control. Will suppress other broadleaves.	**Glyphosate** (4 lb/gal formulations) **+ Permit 75 WG or Permit Plus** 32 oz/A + 1 oz/A or 0.75 oz/A.	Up to 14 days prior to planting.	Field must be free of standing water. Soil pH must be less than 8.0.
glyphosate + bensulfuron @ 1.0 + 0.023 lb/A	Improved control of yellow nutsedge, morningglory and hemp sesbania.	**Glyphosate (4 lb/gal formulations) + Londax 60 DF** 32 oz/A + 0.5 oz/A.	Apply at least 7 days before seedbed preparation or planting.	Field must be free of standing water.
glyphosate + clomazone @ 1.0 lb + 0.3-0.6 lb/A	Emerged weeds plus residual grass.	**Glyphosate** (4 lb/gal formulations) 32 oz **+ Clomazone 3 ME** 0.8-1.6 pt/A Medium (Silt Loam) 0.8-1.1 pt/A Fine (Clay) 1.3-1.6 pt/A Research has shown very little difference in grass control among rates within each soil type. **Note: On thin soils, especially those that have been leveled, consider rates as low as 0.5 pt/A.**	Up to 14 days prior to planting.	Field must be free of standing water. Antagonism on barnyardgrass has been documented with this tank mix. Always use full rate of glyphosate.
clethodim @ 0.18 to 0.242 lb/A	Ryegrass and other grass weeds	**Select Max** 0.97 EC 24 - 32 oz/A	Postemergence prior to ryegrass jointing. 1% crop oil concentrate. **Apply 30 days prior to planting rice.**	For best control of ryegrass, spray prior to reproductive stages with temperatures in the 50's.Tankmixtures with auxin herbicides such as dicamba and 2,4-D can cause antagonism and result in reduced control.
paraquat @ 0.75 lb/A	Emerged weeds.	**Paraquat** (3 lb/gal formulations) 32-40 oz/A. Add 0.25% v/v nonionic surfactant.	Use high rate on weeds larger than 2 inches.	Provides rapid desiccation of existing vegetation. Paraquat is sensitive to off-target movement; therefore, drift control is necessary. Refer to label for precautions and tank-mix instructions.
saflufenacil @ 0.022 - 0.088 lb/A	Pigweed, horseweed, morningglory and small-seeded broadleaves.	**Sharpen** 1 to 4 oz/A. Must use a minimum of 1% v/v MSO + AMS.	Prior to planting. Timing to small weeds or prior to weed emergence.	Tank mix with glyphosate or paraquat. Use high water volumes for best coverage. See label for crop specific restrictions and limitations.
glyphosate + thifensulfuron + tribenuron @ 1.0 + 0.016 to 0.025 lb/A	Improved control of curly dock, smartweed, henbit and garlic.	**Glyphosate** (4 lb/gal formulations) **+ FirstShot 50 SG** 32 oz/A + 0.5 to 0.8 oz/A.	Prior to planting.	Field must be free of standing water.

PLANT-BACK RECOMMENDATIONS FOR BURNDOWN HERBICIDES[1]

See MP519 for more information

HERBICIDE	Grain Sorghum	Corn	Wheat	Soybean	Cotton	Rice	Peanut
2,4-D[2]	7d[3]	7d	7d	14d	28d	21d	–[9]
Afforia	30d	30d	30d	I	30d	30d	45d
Dicamba[3] (8 oz)	15d	I	22d	14d	21d	22d	14
Diuron	6m	I	6m	6m	I	6m	6m
Elevore	14d	14d	14d	14d	30d	14d	9m
Express	14d	14d	I[4]	14d	14d	I	–[9]
FirstShot	14d	14d	I	7d	14d	I	–[9]
Gambit	2m	1m	2m	10m	10m	I	10m
Goal	10m	30d	10m	7d	7d	10m	60d
Glyphosate	I	I	I	I	I	I	I
Paraquat	I	I	I	I	I	I	I
Glufosinate	I	I	I	I	I	I	I
Harmony GT	I	I	I	I	7d	I	I
LeadOff/Crusher	10m	I	3m	30d[5]	30d	10m	45d
Metribuzin	18m	0-4m[1]	4m	I	18m	12m	18m[9]
Permit	2m	1m	2m	9m	4m	I	6m
Python	12m	I	4m	I	18m	6m	–[9]
Reviton	120d	I	I	0-7d	7-14d[8]	120d	120d
Select Max[6]	30d	30d	30d	I	I	30d	I
Sharpen[7]	I	I	I	1m	3m	I	5m
Valor	30d	30d	30d	I	30d	30d	I
Verdict[8]	I	I	4m	I-4m	1.5m	FY	4m
Zidua[8] (3.25 fl oz)	6m	I	30d	I	2m	12m	2m

[1] Always read and follow the label.

[2] Most 2,4-D labels state rotation to all crops after 90 days or until sufficiently dissipated.

[3] Days listed are based on University data and after receiving 1.0 inches or more rainfall – 8 oz 14d and 16 oz 28d to beans.

[4] I = immediately, d = days, m = months.

[5] Labeled plant-back to soybean is 30d for 1.5 oz/A and 60d for 2.0 oz/A – plant STS or BOLT beans to avoid potential injury.

[6] Rotational interval can be reduced to 7 days if 6oz/A Select Max rate is used.

[7] Rotational intervals are determined by rate – see label. Intervals shown are for 2.0 oz/A.

[8] Rotational intervals increase with rate.

[9] No information provided on label.

For more information on plant-back intervals, please scan the QR code to download the MP519, 2021 Row Crop Plant-Back Intervals for Common Herbicides.

SENSITIVITY[1] OF MAJOR ARKANSAS FIELD CROPS TO COMMONLY USED HERBICIDES

HERBICIDE	Soybean[2]	Corn	Cotton	Grain Sorghum	Rice	Peanuts	Wheat
2,4-D	S	T	VS	T	T	S	T
Aim	M	M/S	M/S	M/S	T	S	T
Armezon	S	T	S	M/S	T	M/S	M/S
Blazer/Storm	T	M/S	M	M/S	T	T	M
Bolero	S/T[4]	M/S	M/S	S	T	T	M/S
Brake	MT	MT	MT	MT	T	MT	-
Clincher	T	VS	T	VS	T	T	S
Clomazone	T	M	M	M	T	T	M
Dicamba	VS	T	S	T	M	VS	T
Facet	M	M	S	T	T	M	S
FirstRate[2]	T	M	S	M	S	T	T
Flexstar	T	S	M	VS	M/S	M/S	M/S
Gambit[2]	VS	T	VS	T	T	VS	M
Grandstand	S	M	S	M	T	S	T
Grasp	VS	T	S	T	T	VS	T
League[2]	VS	T	S	S	T	S	S
Liberty[3]	VS/T*	S/T*	S/T*	VS	M/S	S	S
Londax	VS	S	S	S	T	VS	-
Loyant	VS	S	S	M/S	T	S	M/S
Newpath/ Beyond Xtra	T	S	S	S	T*/VS	T	S*
Permit[2]	VS	T	S	T	T	VS	M
Propanil	M/S	M/S	M/S	M/S	T	M/S	M/S
Prowl	T	T	T	M	T	T	T
Python	T	T	S	T	M	M	M
Regiment	VS	S	S	S	T	VS	S
RiceStar	T	VS	T	VS	T	T	S
Roundup	VS/T*	VS/T*	S/T*	VS	VS	VS	VS
Sharpen	S	M	M	S	T	M/S	M
Strada[2]	VS	S	S	S	T	VS	-
Valor	M/S	M	S	S	M/S	M	M

[1] T=Tolerant, M=Moderately Tolerant, M/S=Moderately Sensitive, S=Sensitive, VS=Very Sensitive; T* Some crops are available with herbicide tolerance to these herbicides. These ratings are based on the best available information to date and on foliar application or drift.

[2] Some soybeans are available with tolerance to ALS herbicides, STS or BOLT Soybeans; this tolerance varies for rice ALS herbicides, particularly Grasp, Regiment, and Gambit.

[3] Smart Stack and Herculex are tolerant to glyphosate and glufosinate.Tolerance does not imply that this herbicide is labeled for a specific crop.

[4] Soybean is sensitive to Bolero if a full rate were to be applied prior to soybean emergence. Once soybean is emerged, it is tolerant to Bolero.

WEED RESPONSE RATINGS FOR COTTON HERBICIDES

(See explanation of rating tables on page 3.)

HERBICIDES	WSSA GROUP #	GRASSES									BROADLEAVES																SEDGES		
		Barnyardgrass	Bermudagrass	Broadleaf Signalgrass	Crabgrass	Fall Panicum	Foxtail	Goosegrass	Rhizome Johnsongrass	Seedling Johnsongrass	Bigroot Morningglory	Cocklebur	Common Ragweed	Entireleaf Morningglory	Hophornbeam Copperleaf	Lambsquarters	Palmer Amaranth[4]	Pitted Morningglory	Prickly Sida (Teaweed)	Purslane	Redvine	Sicklepod	Smartweed	Spotted Spurge	Spurred Anoda	Velvetleaf (Wild Cotton)	Flatsedges	Yellow Nutsedge	Crop Tolerance G – Good F – Fair
Preplant																													
Reflex	14	6	0	6	6	6	6	6	4	6	0	-	-	6	-	-	10	6	-	-	0	0	-	-	-	-	-	7	G
Treflan + Cotoran/Meturon	3, 5	9	0	9	9	9	9	9	3	9	0	7	9	7	9	9	9	7	7	9	0	6	7	3	6	5	9	0	G
Treflan or Prowl	3	9	0	9	9	9	9	6	3	9	0	0	3	2	0	8	6	2	0	9	0	0	2	2	0	2	3	0	G
Preemergence																													
Cotoran + Brake	5, 12	8	0	9	7	9	8	7	2	9	-	8	9	8	9	9	9	9	9	9	0	6	7	6	7	6	9	3	G
Cotoran	5	8	0	8	9	9	8	8	0	7	0	8	9	8	9	9	8	8	8	9	0	6	7	6	7	6	9	0	G
Direx	5	9	0	9	9	9	9	9	0	7	0	7	8	8	9	9	8	8	7	9	0	5	7	6	6	5	9	0	G
Engenia/Xtendimax[1]	4	2	2	2	2	2	2	2	0	2	-	-	-	7	-	-	8	7	2	-	2	7	-	0	6	6	0	0	G
Staple LX + Cotoran	2, 5	7	0	8	9	8	8	8	0	7	0	8	9	8	9	9	8	8	9	9	0	6	7	9	8	8	9	5	G
Postemergence (over-the-top)																													
Assure II / Targa	1	8	8	9	9	9	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Dual Magnum[5]	15	9	0	8	9	9	9	9	0	5	0	0	-	5	5	7	8	2	3	-	0	0	4	3	3	3	8	6	F/G
Engenia/Xtendimax	4	0	0	0	0	0	0	0	0	0	-	8	9	9	-	-	9	9	6	-	8	8	-	0	-	-	0	0	G
Enlist Duo	4, 9	9	6	10	10	10	10	10	10	10	7	10	10	10	9	10	9	10	9	10	6	9	7	9	9	9	8	5	G
Enlist One	4	0	0	0	0	0	0	0	0	0	3	9	9	9	8	9	9	9	8	9	-	8	5	8	8	8	0	0	G
Enlist One + Glufosinate	4, 10	8	4	8	8	-	-	6	8	9	-	10	9	10	-	9	10	10	8	10	6	8	8	9	9	10	2	3	G
Envoke	2	7	0	5	5	-	-	6	1	5	-	-	-	9	-	-	3	9	2	-	-	9	-	-	5	9	9	9	F/G
Glufosinate[3]	10	8	4	8	8	-	-	6	8	9	-	9	-	10	-	7	9	10	7	-	5	7	8	-	-	10	2	3	G
Glyphosate[2]	9	9	6	10	10	10	10	10	10	10	7	10	9	8	8	9	3	8	8	10	6	8	7	8	7	8	8	5	G
Envoke + Glyphosate	2, 9	9	6	10	9	10	10	10	10	10	8	9	9	9	8	9	4	9	8	10	5	9	8	8	9	9	9	8	G
Glyphosate + Glufosinate	9, 10	9	6	10	10	10	10	10	10	10	7	10	9	10	9	9	9	10	8	9	6	9	8	8	9	10	7	7	F
Staple + Glyphosate	2, 9	9	6	10	10	10	10	10	10	10	8	9	9	9	8	9	4	9	9	10	6	8	8	8	9	9	9	7	G
Outlook[5]	15	9	0	7	9	9	9	9	0	5	0	0	4	0	0	5	8	0	3	0	0	0	4	3	3	2	9	7	F/G
Poast Plus	1	8	7	9	9	9	8	9	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Select	1	8	8	9	9	9	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Staple LX	2	2	0	2	2	2	2	2	2	6	-	8	4	9	0	0	3	8	7	-	-	6	8	6	9	9	7	6	G
Warrant[5]	15	6	0	6	6	6	6	6	0	2	0	0	2	0	-	-	8	0	2	-	0	0	-	3	2	2	7	4	F
Postemergence (directed)																													
Aim	14	0	0	0	0	0	0	0	0	0	2	7	7	10	-	-	7	10	7	9	0	4	8	-	-	9	0	2	G
Anthem Flex/Zidua	15	8	0	8	9	8	9	7	0	5	0	-	-	4	-	5	9	6	7	-	0	-	-	-	5	5	9	7	G
Envoke + Caparol	2, 5	9	0	8	8	-	-	7	-	8	-	10	8	9	-	-	8	10	9	-	-	9	8	9	-	9	10	9	G
Caparol + MSMA	5, 0	9	0	9	9	9	9	9	6	9	2	9	8	8	9	9	9	8	8	8	0	7	7	5	7	6	8	6	G
Cheetah Max	10, 14	8	4	8	8	-	-	6	1	5	-	9	9	9	9	-	9	10	7	-	-	7	9	-	7	10	2	6	G
Cotoran + MSMA	5, 0	8	0	8	9	9	8	8	6	8	2	9	8	8	9	9	9	8	7	6	0	7	8	5	7	6	8	6	G
DSMA or MSMA	0	8	0	8	8	8	8	5	6	8	1	9	5	3	3	5	5	3	2	3	0	3	2	0	1	1	6	6	G
Fierce + MSMA (layby)	14, 15, 0	9	0	8	9	8	9	9	6	4	3	10	9	10	9	9	9	10	9	10	2	8	9	9	9	9	9	7	G
Karmex + MSMA	5, 0	9	0	9	9	9	9	9	6	9	2	9	8	8	9	9	9	8	8	8	0	7	7	5	6	6	8	6	G
Linex	5	7	0	7	8	7	7	7	0	7	2	7	8	8	9	9	7	8	8	9	0	7	7	7	7	7	7	2	G
Valor (layby) + MSMA	14	9	0	8	8	8	8	5	6	8	3	10	9	10	9	9	9	10	9	10	2	-	9	9	9	9	-	4	G

Rating scale – 0 = No Control 10 = 100% Control. Dash means insufficient data.

[1]Engenia/Xtendimax provide residual control under dry conditions, once rainfall occurs control is rapidly reduced.
[2]Glyphosate-resistant populations of Palmer amaranth, horseweed and johnsongrass have been found in Arkansas.
[3]Glufosinate in-crop rating on glyphosate-resistant horseweed is an 8.
[4]Populations of Palmer Amaranth have been found resistant to herbicide modes of action 2, 4, 9, 10, 14 and 15.
[5]Residual control only

CROP REPLANT AND ROTATION GUIDE FOR COTTON HERBICIDES*

Herbicide	Replant/ Crop Rotation	Time Interval	Precautions
Aim 2 EC	C,CT,S,R,GS All	I 30 days	
Anthem Flex	S,C R SG W CT,P,SF	I 10 months 11 months I 4 months	
Assure II	CT,S All	I 4 months	
Brake 16 oz or less	CT S R,P,W,B C,GS All	I 2 months 8 months 10 months 18 months	No restrictions.
Caparol/others	CT SG,GS, as cover crops. All	I I† FY	† Must be plowed and not used for food or feed.
Cotoran	CT All	I 6 months	
Direx	CT† All	I FY	† Do not retreat with second application in same year.
Dual Magnum	S,C,CT,GS† SG Rice All	I 4.5 months Next spring 18 months	† Use Concep-treated grain sorghum seed.
Envoke	C,GS,S,R CT W All	7 months 30 days 3 months 18 months	Cotton rotation increases with higher rates.
Fierce	CT C GS R S W	45 days 30 days 12 months 10 months I 1 month	
Fusilade/Fusion	CT,S All	I 2 months	
Glufosinate	CT,C,S,R W GS	I 70 days 180 days	
Glyphosate	All	I	
Linex	C,GS,S All	I 4 months	Thoroughly rework soil before replanting. Do not retreat with second application. Plant corn at least 1.75 inches deep and grain sorghum at least 1-inch deep.
MSMA, DSMA	All	I	Research has shown arsenical herbicides (MSMA/DSMA) can cause straighthead in rice. Precautions for straighthead should be taken when rice is grown following cotton.
Paraquat			No restrictions.
Poast Plus			No restrictions.
Prowl, Pendimax	CT,S W,B All	I 4 months FY	Do not rework soil deeper than treated zone.
Prowl, Pendimax (2X rate)	CT,S All	I FY	Do not rework soil deeper than treated zone.
Reflex//Flexstar/ Cheetah Max/Sinister	S,CT W,SG C,R,GS SF	I 4 months 10 months 18 months	
Select Max, Tapout	C	30 days	
Staple LX	CT S R GS C	I 10 months 9 months Do not rotate the following season. IMI-resistant corn – 9 months. Any other variety – 10 months if not more than 3.8 oz Staple XL was applied.	
Suprend	W CT,C,GS,R,S	3 months 7 months	
Treflan/others	CT,S W,B All	I Fall FY	
Treflan/others (2X rate)	CT,S Rice All	I FY 2 years	
Valor	C,CT,R,GS, W,SF S All others	 30 days I 12 months	Must receive 1-inch of rain.
Zidua (3.25 oz/A)	C,S CT, P R W GS others	I 2 months 12 months 70 days 6 months FY	

*This table applies to the major field and forage crops. Refer to the herbicide labels for the latest recrop and rotation information for horticultural crops. These are written as best we could interpret the labels. We regret any omissions or errors. Always refer to product labels before using a pesticide or replanting into treated fields.

KEY

Crop

C = Corn
CT = Cotton
B = Barley
GS = Grain Sorghum
R = Rice
S = Soybeans
SF = Sunflowers
SG = Small Grains
W = Wheat

Timing

All = All crops not specified
I = Immediately
FY = Following year (usually spring)

COTTON POSTEMERGENCE HERBICIDE
PREHARVEST APPLICATION INTERVALS (PHI)

Herbicide	PHI
Aim	7 days
Anthem Flex	7 days
Assure II	80 days
Brake	60 days
Caparol/Cotton Pro	No restrictions
Cotoran	60 days
Direx	No restrictions
DSMA	1st bloom
Dual Magnum	80 days after directed 100 days after POST
Enlist Duo	30 days
Enlist One	30 days
Envoke	60 days
Fusilade DX	90 days
Glufosinate	70 days
Glyphosate	7 days
Linex	No restrictions
MSMA	1st bloom
Poast Plus	40 days
Reflex	70 days
Select	60 days
Staple	60 days
Valor LX	60 days

These intervals are the number of days that must be allowed between herbicide application and harvest. Applications made after these interval restrictions could cause illegal herbicide residues to be present in the harvested seed or fiber.

LABELED SOIL-APPLIED HERBICIDE RATES FOR COTTON
SOIL TEXTURE

Herbicide	Coarse (light)	Medium	Fine (heavy)
Preplant Herbicides			
Cotoran 4L or 80DF	1.6 pt or 1 lb	2.4-3.2 pt or 1.5-2 lb	3.2-4 pt or 2-2.5 lb
Prowl or Pendimax 3.3 EC	1.2-1.8 pt	1.8-2.4 pt	2.4-3.6 pt
Prowl H_2O	2 pt	2-2.2 pt	3 pt
Treflan 4E	1 pt	1.5 pt	2 pt
Treflan + Cotoran 4L	1 pt + 1 lb or 1.6 pt	1.5 pt + 1.25-2 lb or 2-3.2 pt	2 pt + 2-2.4 lb or 3.2-4 pt
Preemergence Herbicides			
Brake	16-32 oz	16-32 oz	Not recommended
Caparol 4L	1.0-1.5 pt	1.5-2.0 pt	2.0-2.5 pt
Cotoran 4L or 80DF	1.6 pt or 1 lb	2.4-3.2 pt or 1.5-2 lb	3.2-4 pt or 2-2.5 lb
Direx 80DF or 4L	0.63 lb or 1 pt	1.25 lb or 2 pt	2 lb or 3 pt
Staple LX	1.3-2.1 oz/A	1.3-2.1 oz/A	1.3-2.1 oz/A

All rates are **broadcast rates.** Reduce rate for appropriate band width. See Example 2 on page 6.

COTTON HERBICIDE
COMPATIBILITY WITH FERTILIZERS AS APPLICATION CARRIERS

	Fertilizer	
	Fluid	Dry
Aim	N	N
Anthem Flex	Y	Y
Assure II	N	N
Caparol 4L	N	N
Cotoran 4L, 80W (preemergence only)	Y	N
Direx	N	N
DSMA	N	N
Dual Magnum	Y	Y
Fusilade DX	N	N
Glufosinate	Y	N
Glyphosate	Y	N
Linex 50DF	N	N
MSMA	N	N
Poast Plus	N	N
Prowl 3.3EC	Y	Y
Select	N	N
Treflan 4EC	Y	Y
Zidua	Y	Y

Y = Yes, N = No

There are many specific fertilizer incompatibilities and restrictions with most herbicides. Be sure to read the herbicide label for specific mixing or impregnation instructions. Compatibility agents are required for many mixes. A typical compatibility test procedure for mixing herbicides in fluid fertilizers is given on page 4. NOTE: Compatibility with dry fertilizer is listed here from a labeling standpoint. The University of Arkansas only recommends herbicide application on dry fertilizer as a third alternative to spraying in water or in liquid fertilizer.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
COTTON **Preplant Incorporated**				
pendimethalin @ 0.5 to 1.4 lb/A	Annual grasses, seedling johnsongrass, pigweed and suppression of morningglories.	**Prowl** 1.2 to 3.6 pt/A. or **Prowl H_2O 3.8 CS** 1.0 to 3 pt/A.	Immediately prior to planting.	**All preplant herbicides on cotton are recommended to be applied during final seedbed preparation, after bed knockdown, and incorporated immediately. The rolling cultivator or a similar implement does an excellent job of incorporating the herbicide in the top 2 inches and leaves the soil intact on the bed. A Do-All tends to drag treated soil from the bed but can be used with care.**
trifluralin @ 0.5 to 1 lb/A	Same as above.	**Treflan 4 EC** 1 to 2 pt/A.	Same as above.	NOTE: Where rhizome johnsongrass is a severe problem, the herbicide should be disked in prior to bedding to get the herbicide deeper.
Preplant				
fomesafen @ 0.25 lb/A	Pigweed and morningglory.	**Reflex 2L** 1 pt/A.	Do not plant until 0.5-inch rainfall occurs.	Do not disturb beds after application. Follow up with a preemergence herbicide.
fomesafen + glyphosate @ 0.25 lb/A + 1 lb/A	Same as above with additional control of grasses and other broadleaves.	**Flexstar GT** 3.5 pt/A.	Do not plant until 0.5-inch rainfall occurs.	Do not disturb beds after application. Follow up with a preemergence herbicide.
Preemergence – All preemerge herbicides should include 2 pt/A paraquat unless tillage is done immediately prior to planting.				
diuron @ 0.5 to 1 lb/A	Most annual grasses and small-seeded broadleaf weeds. Good option for pigweed.	**Direx 4L** 1 to 2 pt/A. Be sure to check label for formulation.	At planting.	Use the lowest rate on low organic sandy loam and silt loam soils. Can cause more injury than fluometuron. **Crop injury may occur with diuron or fluometuron when organophosphate insecticides are used.**
prometryn @ 0.75 to 1.25 lb/A	Most annual grasses and small-seeded broadleaf weeds. Good option for pigweed.	**Caparol 4L** 1.5 to 2.5 pt/A.	At planting.	Use rate based on soil type. More injury can be expected on lighter soils following heavy rainfall.
fluometuron @ 0.8 to 1 lb/A	Same as above but more effective on hard-to-kill weeds such as prickly sida (teaweed), cocklebur and morningglory.	**Cotoran 4L** 1.6 to 2 pt/A 4L.	At planting.	**Crop injury may occur with diuron or fluometuron when organophosphate insecticides are used.**
fluridone @ 0.15 to 0.3 lb/A	Most annual grasses and small-seeded broadleaf weeds. Good tank mix partner for pigweed.	**Brake** 16 to 32 oz/A.	At planting.	Requires increased moisture for activation. Loss of moisture will result in decreased activity. Activity will be reduced on clay soils. Must be tank mixed with fomesafen, Cotoran, Caparol or diuron for best results. Do not apply to the same field more than two years in a row.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
pyrithiobac @ 0.032 to 0.070 lb/A	Morningglory, prickly sida, spurge, spurred anoda and velvetleaf.	**Staple 3.2 LX** 1.3 to 2.1 oz/A.	At planting.	Temporary leaf yellowing or stunting may occur following preemergence treatments – especially in wet, cool conditions. Some pigweed species are known to be resistant to ALS herbicides.
pyrithiobac + fluometuron or diuron 0.032 lb/A + 0.5 to 0.75 lb/A	Most annual grasses and small-seeded broadleaf weeds with improved control of spurge, prickly sida and pigweed over Cotoran alone.	**Staple 3.2 LX + Cotoran 4L or Direx** Add 1.3 oz/A broadcast rate of Staple LX to labeled rate of Cotoran or Direx, 1.0 to1.5 pt/A.	At planting.	Addition of Staple LX may not improve control of morningglory and cocklebur over Cotoran alone.
REPLANTING–It is recommended that an additional preemergence surface herbicide not be applied at time of planting. However, if only an incorporated material has been used, a surface-applied herbicide can be used if weeds remain uncontrolled.				
COTTON **Postemergence – Over the top – XtendFlex Cotton Only**				
At the time of publication there was no labeled dicamba formulation for in-season use with XtendFlex technology.				
COTTON **Postemergence – Over the Top** **Glytol + LibertyLink or XtendFlex or Enlist Varieties**				
Cotton varieties containing the "Widestrike" insecticide gene have shown some tolerance to glufosinate. The level of tolerance is lower and less consistent than in the LibertyLink varieties, especially with higher rates of Liberty (glufosinate). In addition, XtendFlex cotton varieties appear to be more sensitive to glufosinate than LibertyLink varieties especially with tank mixtures.				
glyphosate @ 1 lb/A	Emerged annual grasses, johnsongrass, cocklebur, sicklepod, morningglories, prickly sida, velvetleaf, eclipta, spurge, hemp sesbania, northern jointvetch and smartweed. See table for other species.	**Glyphosate** (4 lb/gal formulations) 2 pt/A per application. Sequential applications are needed for difficult-to-control weeds.	Application timing is important. Apply to actively growing weeds. Application should be made before morningglories produce runners. Maximum of 175 ounces of 4 lb/gal or equivalent glyphosate per season. Maximum of 60 ounces of 4 lb/gal or equivalent glyphosate between layby and 60% open bolls.	**For use on Roundup Flex varieties only.** **Check labels of glyphosate products to insure that they are approved for use on Roundup Flex cotton.** **Properly used residual herbicides will help control and prevent development and spread of glyphosate-resistant weeds.**
glyphosate + acetochlor @ 1 lb/A + 0.94 to 1.5 lb/A	Same as above but expect less control of grass and broadleaf weeds. See table for weed ratings.	**Glyphosate** (4 lb/gal formulations) **+ Warrant 3ME** 2 pt/A + 1.25 to 2 qt/A.	May be slower to activate, especially in cooler temperatures. Weed control may be inconsistent.	Some leaf injury may occur. Sequential applications are needed for optimum pigweed control and should be spaced 14-21 days apart.
glyphosate + pendimethalin 1lb/A + 0.95 lb/A	Annual grasses and broadleaf weeds residual control of Texas panicum.	**Glyphosate** (4 lb/gal formulations) **+ Prowl H2O** 2 pt/A + 2 pt/A	Rainfall or irrigation needs to occur 1-2 days following application for best residual control.	Only POST option for residual control of Texas panicum. Some cotton leaf yellowing may occur. Some pigweed populations are resistant to Prowl herbicide.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
glyphosate + *S*-metolachlor @ 1 lb/A + 0.95 to 1.25 lb/A	Emerged annual grasses, johnsongrass, cocklebur, sicklepod, morningglories, prickly sida, velvetleaf, eclipta, spurge, hemp sesbania, northern jointvetch and smartweed plus residual on pigweed and grass. See table for other species.	**Glyphosate** (4 lb/gal formulations) **+ Dual Magnum 7.62 EC or metolachlor 8 EC** 1.0 to 1.3 pt/A. **or** **Sequence 5.25 L** 1-4 leaf cotton 2.5 pt/A. 5-10 leaf cotton 2.5-3.0 pt/A.		University data suggests that 1.3X metolachlor product rate is needed to provide equal weed control to the S-isomer Dual Magnum (*S*-metolachlor) product in Sequence.
glyphosate + dimethenamide @ 1lb/A + 0.56 lb/A to 0.75 lb/A	Emerged annual grasses, johnsongrass, cocklebur, sicklepod, morningglories, prickly sida, velvetleaf, eclipta, spurge, hemp sesbania, northern jointvetch and smartweed plus residual on pigweed and grass. See table for other species.	**Glyphosate** (4 lb/gal formulations) **+ Outlook** 2pt/A + 12-16oz/A	Early POST until 2 weeks after bloom.	Some leaf injury will occur. Additional tank mixes can increase injury.
glufosinate @ 0.78 lb/A	Emerged annual grasses, seedling johnsongrass, annual broadleaf weeds.	**Glufosinate** (280 SL formulations) (2.34 lb ai/gal) 43 oz/A.	May be used for salvage situations.	Slight cotton stunting may occur when higher rates are used. Research indicates that two applications of 29 ounces ten days apart are superior to single 43-ounce rate. Cotton injury is likely under prolonged cloudy conditions.
L-glufosinate @ 0.24 to 0.36 lb/A	Emerged annual grasses, seedling Johnsongrass, broadleaf weeds.	**Liberty Ultra** 19 to 29 oz/A Can add AMS, no additional surfactant needed	Can make up to 3 in-crop applications, minimum 10 days apart, from emergence to early bloom.	19 oz rate is equivalent to 29oz rate of standard glufosinate. Maximum allowable rate per year is 58 oz/A. Read label for additional restrictions.
pyrithiobac + glufosinate @ 0.032 to 0.067 lb/A + 0.93 lb/A	Same as above with increased control of morningglory and yellow nutsedge.	**Staple LX + glufosinate** 1.3 to 2.7 oz + 32 oz/A.	Small actively growing weeds.	Same as above. The addition of Staple may cause brief injury and stunting.
pyrithiobac + glyphosate @ 0.032 to 0.095 + 1 lb/A	Emerged annual grasses, johnsongrass, cocklebur, sicklepod, morningglories, prickly sida, velvetleaf, eclipta, spurge, hemp sesbania, northern jointvetch and smartweed. Better control of yellow nutsedge, morningglory. Adds residual control of some weeds. See table for other species.	**Staple LX 3.2 + Glyphosate** (4 lb/gal formulations) 1.3 to 3.8 oz/A + 2 pt/A.		Staple LX may cause temporary yellowing and stunting. Do not tank mix with Dual for postemergence applications.
glufosinate @ 0.58 lb/A	Emerged annual grasses, seedling johnsongrass, annual broadleaf weeds.	**Glufosinate** (280 SL formulations) (2.34 lb ai/gal) 32 oz/A.	Apply over the top to small, actively growing weeds. From cotton emergence to early bloom stage. Apply between hours of 9 a.m. to 6 p.m.	Complete coverage of weeds is crucial. Air induction spray tips and low water volumes may reduce effectiveness. See label for restrictions. **Do not apply more than 87 ounces per season. For best results, apply in warm, humid conditions, adequate soil moisture and 2 hours after sunrise or prior to sunset.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
glufosinate + *S*-metolachlor @ 0.53 + 0.95 or 1.25 lb/A	Improved residual on pigweeds and grasses.	**Glufosinate** (280 SL formulations) **+ Dual Magnum 7.62 EC** 32 oz/A + 1 pt or 1.3 pt.	Apply over the top prior to 12-leaf cotton.	Some leaf burn may occur, but it normally is only temporary.
glufosinate + dimethenamid @ 0.53 lb/A + 0.56 lb/A to 0.75 lb/A	Post control of most grasses and broadleaf weeds. Improved residual control of group 15 resistant pigweed.	**Glufosinate** (280 SL formulations) **+ Outlook** 32 oz/A + 12 to 16 oz/A	Small actively growing weeds from first true leaf until 2 weeks after bloom.	Some leaf burn will occur. Additional tank-mixes can increase this injury.
glufosinate + pendimethalin @ 0.53lb/A + 0.95 lb/A	Same as above with added residual control of Texas panicum.	**Glufosinate** (280 SL formulations) **+ Prowl H2O** 32oz/A + 32oz/A	Rainfall or irrigation needs to occur 1-2 days following application for best results.	Only POST option for residual control of Texas Panicum. Some leaf injury will occur.
glyphosate + glufosinate @ 1 lb + 0.53 lb/A	Broad-spectrum control of grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Glufosinate** (280 SL formulations) 2 pt/A + 32 oz/A.	Apply to small, actively growing weeds. From cotton emergence to early bloom stage.	Complete coverage of weeds is crucial. Cotton injury is likely under prolonged cloudy conditions.
glyphosate + glufosinate + *S*-metolachlor @ 1 + 0.53 + 0.95 lb/A	Broad-spectrum control of grasses and broadleaf weeds, with added residual for grasses and glyphosate-resistant pigweed.	**Glyphosate** (4 lb/gal formulations) **+ Glufosinate** (280 SL formulations) **+ Dual Magnum 7.62 EC** 2 pt/A + 32 oz/A + 1 pt/A.	Apply over the top prior to 12-leaf cotton.	Complete coverage of weeds is crucial. Cotton injury is likely under prolonged cloudy conditions. Increased injury/leaf burn is possible with addition of metolachlor products.
Roundup Flex, LibertyLink, XtendFlex, Enlist and Conventional Varieties				
pyrithiobac @ 0.065 to 0.095 lb/A	Morningglories, cocklebur, velvetleaf, smartweed and suppression of prickly sida and spurge.	**Staple 3.2 LX** 2.6 to 3.8 oz/A. Add 0.25% nonionic surfactant.	Apply to small, actively growing weeds. Cotyledon or larger cotton.	Rainfall after application aids in prickly sida and spurge control. Avoid drift to corn or grain sorghum. Some pigweed species are known to be resistant to ALS herbicides.
trifloxysulfuron @ 0.0047 to 0.007 lb/A	Sicklepod, nutsedge, good on morningglory.	**Envoke 75 DG** 0.10 to 0.15 oz/A. Use 0.25% v/v nonionic surfactant.	After 5-leaf stage. Post direct on large cotton to improve coverage and soil contact.	Crop response in the form of temporary chlorosis and stunting may be observed. Do not apply within 24 hours of a malathion application. Some pigweed species are known to be resistant to ALS herbicides (Group 2). Do not apply within 60 days of harvest.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
sethoxydim @ 0.188 to 0.25 lb/A	Annual grasses, johnsongrass.	**Poast Plus 1 EC** 1.5 to 2 pt/A. Add 1 qt/A crop oil concentrate. Use 1 pt rate only on small annual grasses. Bermudagrass may require repeat treatment of 1 pt/A following initial 1.5 pt treatment. For spot treatment, use 1% solution of Poast + 1% crop oil concentrate. Spray to wet but not to runoff.	Before annual grasses exceed 14 days after emergence. Timing very critical. Johnsongrass–15" to 20".	Apply only under conditions of active growth. Thorough coverage required. Do not tank mix with other pesticides. Do not cultivate 7 days before or after treatment. However, cultivation soon after 7 days will be helpful.
fluazifop @ 0.188 lb/A	Bermudagrass, johnsongrass, annual grasses.	**Fusilade DX 2 EC** 0.75 pt/A. Add 1% crop oil concentrate or 0.25% nonionic surfactant. For spot treatment use 2 qt Fusilade/100 gal. Add 1% oil or 1% nonionic surfactant.	Before annual grasses exceed 14 days after emergence. Timing very critical. Johnsongrass–12" to 18". Bermudagrass–3" ht or 6" to 12" runner length maximum.	Apply only under conditions of active growth. Somewhat less effective than Poast on annual grasses, more effective on bermudagrass. Repeat if necessary. Thorough coverage required. Do not tank mix. Do not cultivate 7 days before or after treatment. However, cultivation soon after 7 days will be helpful. See label for details.
fluazifop @ 0.094 to 0.188 lb/A + fenoxaprop @ 0.026 to 0.053 lb/A	Bermudagrass, johnsongrass, annual grasses.	**Fusion 2.56 EC** 6 to 12 oz/A most annual grasses. 10 oz/A weedy rice. 12 oz/A bermudagrass and johnsongrass and repeat with 8 oz/A for regrowth. Add 1% crop oil concentrate or 0.25% nonionic surfactant. For spot treatment use 2 qt Fusion per 100 gal. Add 1% crop oil concentrate or 1% nonionic surfactant.	Apply to most annual grasses at 2" to 4". Johnsongrass–8" to 18". Bermudagrass–4" to 8" runner.	Apply only under conditions of active growth. Somewhat less effective than Poast on annual grasses, more effective on bermudagrass. Repeat if necessary. Thorough coverage required. Do not tank mix. Do not cultivate 7 days before or after treatment. However, cultivation soon after 7 days will be helpful. See label for details.
quizalofop p-ethyl @ 0.031 to 0.063 lb/A	Annual grasses, bermudagrass, johnsongrass, weedy rice.	**Assure II 0.88 EC** 5 oz/A volunteer corn and milo, 8 oz/A most annual grasses, 9 oz/A weedy rice. Repeat if needed. 10 oz/A rhizome johnsongrass and bermudagrass. Add crop oil concentrate at 1% ground application or 0.5% for aerial application or nonionic surfactant at 0.25%.	Before annual grasses exceed 14 days after emergence. Timing very critical. Johnsongrass – 10" to 24". Weedy rice – 1st 14 days after emergence or 1 to 4 leaf. Timing for annual grass and weedy rice is very critical.	See above comments for Poast and Fusilade on cultivation and tank mixing. Performance comparable to Poast on annual grasses and Fusilade on rhizome johnsongrass. Better than either on small weedy rice.
clethodim @ 0.094 to 0.25 lb/A	Annual grasses, bermudagrass, johnsongrass.	**Select Max** 12 to 16 oz/A most annual grasses. 16 to 20 oz/A rhizome johnsongrass. Repeat application with 12 to 16 oz/A for regrowth. 16 to 32 oz/A bermudagrass. Repeat application with 12 to 16 oz/A for regrowth. Add 1% crop oil concentrate.	Before annual grasses exceed 14 days after emergence. Johnsongrass–2" to 24" Bermudagrass–3" height or 6" runner length maximum	See above comments for Poast and Fusilade on cultivation and tank mixing. Performance comparable to Assure II for annual grasses and johnsongrass.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Cotton Postemergence Enlist Cotton Only				
2,4-D choline @ 0.71 to 0.95 lb/A	Annual broadleaf weeds.	**Enlist One** 1.5 to 2.0 pt/A. Check website, EnlistTankmix.com, for approved adjuvants/tank mixtures.	Emergence to first bloom.	Apply **only** to Enlist cotton. – Non-Enlist **cotton** is very sensitive to 2,4-D. Read the label and follow all directions regarding nozzles, buffers, wind speed and direction. – At the time of application, the wind cannot be blowing toward adjacent tomatoes, other fruiting vegetables, cucurbits, grapes and **cotton**. – Physical drift has been found to be the primary cause of off-target movement. Using a hooded sprayer can reduce physical drift. – Applicators must take required training.
glyphosate + 2,4-D choline @ 0.74 to 1.0 + 0.7 to 0.95 lb/A	Annual grasses and broadleaf weeds.	**Enlist Duo** 3.5 to 4.75 pt/A. Check website, EnlistTankmix.com, for approved adjuvants/tank mixtures.	Emergence to first bloom.	Apply **only** to Enlist cotton. – Non-Enlist **cotton** is very sensitive to 2,4-D. Read the label and follow all directions regarding nozzles, buffers, wind speed and direction. – At the time of application, the wind cannot be blowing toward adjacent tomatoes, other fruiting vegetables, cucurbits, grapes and **cotton**. – Physical drift has been found to be the primary cause of off-target movement. Using a hooded sprayer can reduce physical drift. – Applicators must take required training.
2,4-D choline + glufosinate @ 0.71 to 0.95 + 0.53 lb/A	Most annual grasses and broadleaves. Best treatment for emerged pigweed.	**Enlist One** 1.5 to 2.0 pt/A + **Glufosinate (280)** 32 oz/A.. – Other glufosinate products may be labeled for mixing. – Check EnlistTankmix.com for all approved tank mix products.	Apply over the top from emergence through early bloom.	Apply **only** to Enlist cotton. – Non-Enlist **cotton** is very sensitive to 2,4-D. Read the label and follow all directions regarding nozzles, buffers, wind speed and direction. – At the time of application, the wind cannot be blowing toward adjacent tomatoes, other fruiting vegetables, cucurbits, grapes and **cotton**. – Physical drift has been found to be the primary cause of off-target movement. Using a hooded sprayer can reduce physical drift.
Postemergence Fertilizer Impregnation or Coating				
pyroxasulfone @ 0.08 to 0.11 lb/A	Residual control of pigweed and other small seed grasses / broadleaves	**Zidua 4.17 SC** 2.5 to 3.5 oz/A impregnated on 200-700 lbs/A of dry fertilizer	Postemergence 5 leaf to bloom	See label for impregnation instructions. Do not apply more than 3.5 oz of Zidua in single application Do not apply Zidua impregnated onto ammonium or potassium nitrate
Postemergence – Directed, Any Technology				
carfentrazone @ 0.025 lb/A	Morningglory, hemp sesbania and prickly sida.	**Aim 2 EC** 1.6 oz/A. Add crop oil concentrate at 1 pt/A.	After cotton plants are 8 inches or more. Extreme care must be taken to avoid contact with foliage.	Must be mixed with another product for residual control. Do not mix with MSMA. Direct to base of cotton. Avoid fine spray droplets.
glufosinate + fomesafen @ 0.53 + 0.25 lb/A	Emerged annual grasses, seedling johnsongrass, annual broadleaf weeds.	**Cheetah Max** 32 oz/A.	6-inch cotton through layby in cotton tolerant to glufosinate.	Use a directed spray or under row-hoods. Direct in a way to obtain maximum coverage with minimum contact to cotton foliage.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
glyphosate @ 0.75 to 1 lb/A + prometryn @ 0.5 to 0.8 lb/A	Emerged annual grasses, johnsongrass, cocklebur, sicklepod, morningglories, prickly sida, velvetleaf, eclipta, spurge, hemp sesbania, northern jointvetch and smartweed. See table for other species. Improved morningglory control and improved pigweed control.	**Glyphosate** (4 lb/gal formulations) 2 pt/A plus **Caparol 4L** or **Cotton Pro 4L** 1 to 1.6 pt/A.	After cotton is 6 inches or more high.	Avoid contacting foliage with spray.
glyphosate @ 0.75 to 1 lb/A + fluometuron @ 0.8 lb/A	Same as glyphosate with improved residual control of morningglory and pigweed.	Same as glyphosate above + **Cotoran 4L** 1.6 pt/A.	After cotton is 6 inches or more high.	Avoid contacting foliage with spray.
pyroxasulfone @ 0.065 to 0.13 lb/A	Residual control of grasses and pigweed.	**Zidua 4.17 SC** 2 to 4 oz/A	Post directed to cotton between 5th leaf stage and bloom.	Provides residual control only; for control of emerged weeds, all MSMA, glyphosate or glufosinate.
pyroxasulfone + carfentrazone @ 0.065 to 0.13 lb/A + 0.0042 to 0.0094 lb/A	Residual control of grasses and pigweed.	**Anthem Flex 4SE** 2 to 3.8 oz/A.	Post directed to cotton that is at least 6 inches tall.	Provides mostly residual control; for increased control, spike with 0.5 to 0.75 oz/A Aim or add MSMA or glyphosate.
flumioxazin + pyroxasulfone @ 0.06 + 0.08 lb/A	Annual grasses and small-seeded broadleaves.	**Fierce 76 WDG** 3 oz/A.	Under row-hoods or layby after cotton has reached 16 inches in height.	For increased control of emerged weeds, add MSMA, glyphosate or glufosinate.
MSMA @ 2 lb/A	Small grasses and seedling cocklebur. Suppression of nutsedge and small johnsongrass.	**MSMA** Many formulations exist. Refer to label on specific material to be used.	After cotton is 3 inches tall and before first bloom.	Use as a directed spray. Combination with other herbicides more effective if a broad-spectrum of weeds is present.
fluometuron + MSMA @ 0.8 lb/A + 1.5 to 2 lb/A	Most small-seeded annual and perennial weeds in the seedling stage of growth.	**Cotoran 4L + MSMA** Tank mix at 1 lb/A Cotoran + 1 qt of 6.6 b/gal MSMA or equivalent.	After cotton plants are 6 or more inches.	Direct in manner to obtain maximum coverage of weeds with minimum contact to cotton foliage.
prometryn + MSMA @ 0.5 + 2 lb/A	Same weed spectrum as Cotoran but more active.	**Caparol 4L or Cotton Pro 4L + MSMA** 1 pt/A Caparol or Cotton Pro + MSMA at rates shown above.	After cotton plants are 6 or more inches.	Same as above.
trifloxysulfuron @ 0.0047 to 0.007 lb/A	Sicklepod, nutsedge, good on morningglory.	**Envoke 75 DG** 0.10 to 0.15 oz/A (0.0047-0.007 lb ai/A) + NIS, 0.25% v/v.	After 5-leaf stage. Post direct on large cotton to improve coverage and soil contact.	Crop response in the form of temporary chlorosis and stunting may be observed. Do not apply within 24 hours of a malathion application. Some pigweed species are known to be resistant to ALS herbicides (Group 2). Do not apply within 60 days of harvest.

NOTE: The herbicide combinations with MSMA should not need an additional surfactant if the MSMA used contains one. If the MSMA does not contain a surfactant, add it according to herbicide label directions. All MSMA rates listed are average rates. Refer to specific label on product to be used for exact rate. NOTE: Research has shown arsenical herbicides can cause straighthead in rice. Precautions for straighthead should be taken when rice is grown following cotton.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
COTTON				
Postemergence – Directed, Any Technology [cont.]				
trifloxysulfuron + prometryn @ 0.007 to 0.015 lb/A + 0.79 to 1.19 lb/A	Morningglories, sicklepod, yellow nutsedge.	**Suprend 80 WG** 1 to 1.5 lb/A. Add 0.25% v/v nonionic surfactant.	After cotton plants are 6 or more inches.	Avoid contact with foliage.
diuron + MSMA @ 0.4 lb/A + 1.5 to 2 lb/A	Same as above.	**Direx 4L + MSMA** 1 pt/A + MSMA at rates shown previously.	After cotton plants are 6 or more inches.	Direct spray to lower ⅓ of cotton stem.
prometryn @ 1.2 to 1.6 lb/A	Cocklebur, prickly sida and spurge, but more effective on morning-glory, grasses and cocklebur.	**Caparol or Cotton Pro 4L** Coarse Soil 2.4 pt/A Medium Soil 2.8 pt/A Fine Soil 3.2 pt/A Add a surfactant.	After cotton is 15 inches tall.	Do not plant rotational crops other than cereal cover crops until the following year.
diuron @ 0.4 to 1.2 lb/A	Most small-seeded annual grasses and broadleaf weeds.	**Direx 4L** Coarse Soil (light) - 0.8 pt/A Medium Soil - 1.6 pt/A Fine Soil (heavy) - 2.4 pt/A Add a surfactant if emerged weeds present.	After cotton is 15 inches tall.	Provide longest residual and greatest potential for carryover to sensitive crops. Less burn on emerged weeds.
linuron @ 0.5 to 1.5 lb/A	Most small-seeded annual grasses and broadleaf weeds.	**Linex 4L** Coarse Soil - 1 pt/A Medium Soil - 2 pt/A Fine Soil - 3 pt/A Add a surfactant if emerged weeds present.	After cotton is 15 inches tall.	Intermediate residual period. Fall-seeded cereal crops may be planted.
flumioxazin @ 0.063 lb/A	Most annual broadleaves and small grasses.	**Valor 51 WDG** 2 oz/A. Add 0.25% NIS.	After cotton has 4 inches of bark. Good residual control of pigweed and morningglory.	Minimize contact with foliage. Adding glyphosate, glufosinate or MSMA will improve control of larger grasses. If emerged pigweed is present, use diuron (Direx) for PPO resistance management and increased pigweed control.
fomesafen @ 0.25 to 0.375 lb/A	Most annual broadleaves and small grasses.	**Reflex 2L** 1 to 1.5 pt/A. Add 0.25% NIS.	After cotton has 4 inches of bark. Good residual control of pigweed and morningglory.	Minimize contact with foliage. Adding glyphosate, glufosinate or MSMA will improve control of larger grasses. Do not apply more than 0.375 lb fomesafen per acre per year. If emerged pigweed is present, use diuron (Direx) for PPO resistance management and increased pigweed control.
S-metolachlor + fomesafen @ 1.09 to 1.26 + 0.24 to 0.28 lb/A	Pigweed and residual control of grass and small-seeded broadleaf weeds.	**Prefix** 2 to 2.33 pt/A.	6-inch cotton through layby. Avoid contact with foliage.	Minimize contact with foliage. Adding glyphosate, glufosinate or MSMA will improve control of larger grasses. Do not apply more than 0.375 lb fomesafen per acre per year. 80-day PHI. If emerged pigweed is present, use diuron (Direx) for PPO resistance management and increased pigweed control.
fomesafen plus acetochlor @ 0.24 to 0.32 lb/A plus 1.06 to 1.43 lb/A	Control of grass and broadleaf weeds	**Warrant Ultra** 48 - 65 oz/A.	Hooded application to cotton 6-12 inches tall. Post-directed spray to base of cotton plant with minimum 4 inches bark.	Do not exceed 3lbs ai/A acetochlor per season.
glyphosate + fomesafen @ 1.0 + 0.25 lb/A	Pigweed, grasses and other broadleaf weeds.	**Flexstar GT 3.5** 3.5 pt/A.	6-inch cotton through layby. Avoid contact with foliage.	Minimize contact with foliage. Adding glyphosate, glufosinate or MSMA will improve control of larger grasses. Do not apply more than 0.375 lb fomesafen per acre per year. 70-day PHI. If emerged pigweed is present, use diuron (Direx) for PPO resistance management and increased pigweed control.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Spot Treatment Also see Poast and Fusilade above.				
glyphosate	Johnsongrass, bermudagrass, purple nutsedge, trumpetcreeper and most other annual and perennial grasses.	**Glyphosate** (4 lb/gal formulations) 2% solution. Add 1% surfactant.	Anytime before boll opening.	Treatment most effective on large, actively growing weeds. Cotton in area will be severely injured or killed. Avoid windy conditions and high pressure. Follow label directions.
Postemergence – Speciality Treatments Conventional Cotton				
glyphosate wipe-on	Johnsongrass emerged above canopy.	**Glyphosate** (4 lb/gal formulations) 33% solution in Ropewick or other wipe-on applicator.	Anytime before boll opening. Ropewick applicator.	Cotton will not tolerate accidental crop contact. Even though vegetative effects are not obvious, yield reduction may occur.
paraquat + diuron @ 0.5 + 0.5 lb/A	**Pigweed** and small grasses.	**Paraquat** (2 or 3 lb/gal formulations) **+ Direx 4L** 32 or 21 oz/A + 1 pt.	Apply in middles with **hooded sprayer**. Do not allow any spray particles to escape from under the hood.	May be used in salvage situations to remove pigweed from middles and reduce hand chopping labor. Apply under hoods only!
Between Cropping Application				
dicamba @ 2 lb/A	Redvine.	**Banvel SGF 2 SL** 1 gal/A + 0.25% nonionic surfactant. **Clarity 4 SL** 2 qt/A + 0.25% nonionic surfactant.	After harvest and at least 1 week prior to killing frost.	Apply when redvine has recovered from defoliants/desiccants and is actively growing.
glyphosate @ 1 to 2 lb/A	Trumpetcreeper, johnsongrass.	**Glyphosate** (4 lb/gal formulations) 2 to 4 pt/A.	Can be applied with defoliant at 60% open bolls or after harvest but at least 1 week prior to killing frost.	Good coverage is essential; for trumpetcreeper control, good coverage will usually be achieved after harvest.

WEED RESPONSE RATINGS FOR SOYBEAN HERBICIDES

(See Explanation of Rating Tables on Page 3.)

HERBICIDES	WSSA GROUP #	GRASSES								BROADLEAVES																				SEDGES	
		Barnyardgrass	Broadleaf Signalgrass	Crabgrass	Giant Foxtail and Fall Panicum	Goosegrass	Weedy rice	Rhizome Johnsongrass[1]	Seedling Johnsongrass[1]	Balloonvine	Cocklebur	Cutleaf Groundcherry	Entire and Ivyleaf Morningglories	Giant Ragweed	Hemp Sesbania (Coffeebean)	Hophornbeam Copperleaf	Horseweed[1]	Northern Jointvetch (Curly Indigo)	Palmer Amaranth[1,2,3,4]	Palmleaf Morningglory	Pitted Morningglory	Prickly Sida (Teaweed)	Sicklepod	Smartweed spp.	Spurge	Spurred Anoda	Texas Gourd/ Smellmelon	Velvetleaf	Annual Flatsedge	Yellow Nutsedge
Preemergence																															
Python	2	6	6	6	6	6	4	0	6	3	9	9	7	9	2	7	9	0	6	7	7	9	7	9	9	9	-	8	-	-
Scepter	2	6	6	6	6	6	5	3	6	5	9	9	6	9	4	6	8	0	7	9	9	7	8*	9	9	7	9	6	9	5
Trivence	2, 5, 14	7	7	7	7	7	6	4	6	7	9	9	8	8	9	9	10	8	10	10	10	9	9	10	9	9	8	9	9	8
Envive, Enlite	2, 14	7	7	7	7	7	6	4	6	7	9	9	8	8	9	9	10	8	10	10	10	9	9	10	9	9	8	9	9	5
Sonic, Authority First	2, 14	4	4	4	-	-	-	-	-	-	8	8	9	9	6	-	9	6	7	8	9	-	5	9	-	8	8	8	-	7
Surveil	2, 14	7	7	7	6	7	5	4	6	-	9	-	8	8	9	9	10	8	9	10	10	9	9	9	-	-	-	9	9	4
Engenia/Xtendimax	4	2	2	2	2	2	-	0	2	-	-	-	7	-	-	-	-	-	8	7	7	2	7	-	0	6	-	6	0	0
Metribuzin	5	6	6	6	6	6	4	0	5	7	6	9	2	9	9	9	8	7	8	7	7	7	8*	9	9	9	7	7	8	2
Valor	14	7	7	7	6	7	5	4	6	-	9	-	8	8	9	9	10	8	9	10	10	9	9	9	-	-	-	9	9	4
Authority MTZ	5, 14	6	6	6	6	-	-	0	-	-	6	-	9	7	6	-	8	7	9	-	9	8	-	9	-	-	-	6	-	6
Dual Magnum	15	9	8	9	9	9	9	0	5	1	0	5	0	5	0	5	8	0	8	0	0	3	0	4	3	0	3	3	9	8
Outlook	15	9	7	9	9	9	5	0	5	1	0	5	0	5	0	5	8	0	8	0	0	3	0	4	3	0	3	3	9	7
Warrant	15	6	4	5	5	5	5	0	2	0	0	-	0	0	7	-	7	-	8	0	0	3	0	2	3	-	3	3	7	5
Zidua/Anthem Maxx/Anthem Flex	15,15/14	8	8	8	8	7	4	0	5	1	0	4	4	0	8	0	8	0	9	-	6	-	0	3	4	0	3	2	9	5
Dual Magnum + Metribuzin, Boundary	5, 15	9	9	9	9	9	7	0	7	7	7	10	2	9	9	9	8	7	8	7	7	7	8*	9	9	9	7	8	9	8
Authority Elite/Broadaxe XC	14, 15	9	9	9	10	9	6	0	8	0	4	8	8	8	9	8	8	7	8	7	7	8	4	7	8	-	4	7	9	5
Authority Edge/Authority Supreme	14, 15	9	8	8	8	7	5	0	-	-	4	8	8	8	9	8	8	7	9	7	7	8	-	7	8	-	-	7	9	5
Prefix, Fierce	14, 15	9	9	10	10	10	7	5	9	0	4	9	8	5	3	5	8	3	10	-	8	8	-	7	3	-	-	7	8	5
Verdict	14, 15	8	8	8	8	8	6	0	7	7	7	7	3	8	8	8	7	6	8	7	7	9	8	8	8	8	6	7	8	4
Postemergence-OT																															
Assure II/Targa	1	8	9	9	9	9	8**	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fusilade DX/Fusion	1	7	8	7	8	9	6**	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poast Plus/Select (clethodim)	1	8	9	9	9	9	7**	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Classic	2	0	0	0	0	0	0	0	0	5	9	-	8	9	10	-	0	6	1	8	9	0	7	9	0	0	6	7	-	6
FirstRate	2	0	0	0	0	0	0	0	0	-	9	-	8	-	5	5	8	0	0	9	9	4	6	-	4	9	-	8	8	6
Pursuit	2	7	7	7	8	5	8	7	8	4	7	-	7	5	0	5	3	0	2	8	9	6	0	7	9	6	4	7	7	8
Scepter	2	0	0	0	0	0	6	3	6	0	9	0	0	8	0	0	3	0	2	10	7	3	4	7	0	0	7	0	0	0
Scepter + Ultra Blazer	2, 14	2	2	2	2	2	0	3	6	8	9	9	8	9	9	9	4	4	4	9	9	4	4	9	5	0	9	4	0	0
Enlist One	4	0	0	0	0	0	0	0	0	-	9	8	9	9	9	8	7	9	9	9	9	8	8	5	8	8	-	8	7	6
Enlist Duo	4, 9	9	10	10	10	10	10	10	10	-	10	9	10	10	10	9	9	10	9	10	10	9	9	7	9	9	-	9	8	5
Enlist One + glufosinate	4, 10	8	8	8	-	6	9	8	9	-	10	9	10	10	10	-	9	10	10	10	10	8	8	8	9	9	-	10	9	8
Basagran	6	0	0	0	0	0	0	0	0	8	9	0	3	8	4	0	0	0	4	8	7	9	0	9	0	8	0	8	8	6
Glyphosate, Single	9	9	9	9	9	8	8	9	10	6	9	7	6	9	4	6	3	7	3	7	6	6	8	5	8	5	-	6	7	4
Glyphosate, Split	9	10	10	10	10	10	9	10	10	8	10	9	8	9	7	8	4	9	3	9	8	8	9	7	8	7	-	8	8	5
Glufosinate, Single	10	7	9	9	-	6	10	7	10	-	9	7	10	8	10	-	6	10	7	10	10	7	7	6	-	-	9	8	3	6
Glufosinate, Split	10	9	10	10	-	8	10	9	10	-	10	8	10	9	10	-	8	10	9	10	10	9	8	8	-	-	10	10	4	7
Glyphosate + glufosinate	9, 10	8	9	9	9	7	10	9	10	-	10	8	10	9	10	-	7	10	8	10	10	8	8	8	9	6	9	9	8	6
Cobra[2]	14	0	0	0	0	0	0	0	0	9	8	9	6	9	9	9	5	6	6	8	8	8	5	7	8	7	9	8	2	2
Flexstar[2]	14	0	0	0	0	0	0	6	7	8	9	9	8	9	9	9	5	7	8	9	9	6	2	9	-	6	-	7	-	6
Ultra Blazer[2]	14	2	2	2	6	0	2	0	4	8	7	9	8	9	9	9	3	4	7	9	9	2	0	9	5	2	9	4	7	3
Ultra Blazer + Basagran or Storm	14, 6	2	2	2	6	4	0	0	4	8	9	9	8	9	9	9	3	4	7	9	9	8	0	9	5	8	9	7	8	4

[1]Glyphosate-resistant populations of Palmer amaranth, horseweed, johnsongrass, giant ragweed, common ragweed and ryegrass have been found in Arkansas.
[2]Group 14 (PPO) – resistant populations of pigweed have been identified in Arkansas. Expect reduced control with most PPO herbicides containing flumioxazin (Valor), sulfentrazone (Authority) or fomesafen (Reflex) when used alone.
[3]Group 15 (VLCFA inhibitor) resistant populations of pigweed have been identified in Arkansas. Expect reduced control with most Group 15 herbicides containing *S*-metolachlor (Dual Magnum), acetochlor (Warrant), dimethenamid (Outlook), or pyroxasulfone (Zidua) when used alone.
[4]Group 10 (glufosinate) and Group 4 (synthetic auxins) resistant populations of pigweed have been identified in Arkansas. Expect reduced control with Liberty (and other glufosinate products), dicamba (Engenia, Xtendimax), and 2,4-D (Enlist One) when used alone.

* Follow-up postemergence spray will be necessary to achieve these ratings.
** Weedy rice ratings with Poast, Fusilade and Assure can be increased if repeat applications used.
*** Rhizome johnsongrass ratings with Treflan and Prowl increased to 7 if 2x rate used.

Rating Scale: 0 = No Control 10 = 100% Control
Dash = insufficient data

Crop Replant and Rotation Guide for Soybean Herbicides*

Herbicide	Replant/Crop Rotation	Time Interval	Precautions
Anthem Maxx	S,C CT,P,SF,W AL,R SG	I 4 months 10 months 11 months	See label for rotational intervals based on rates applied.
Assure II/Targa	S,C All	I 120 days	
Authority MTZ	S B,W,SG R AL,CT,GS,P,SF	I 4 months 10 months 12 months	See label for pH restrictions. High pH = longer rotations.
Authority Edge/ Authority Supreme	S, SF C,P,W GS,R B AL,CT,O	I 4 months 10 months 11 months 12 months	See label for pH, rate restrictions. High pH rates have longer rotational intervals.
Authority XL	B,RY,W AL,CL,CT, FC,GS,O, P,R,SC,SF All	4 months 18 months 36 months	See label for pH, rate restrictions.
Basagran	All	I	
Broadaxe XC or Authority Elite	S,SU,DSP P W FC,R,GS O,CT* SC,PC	I 4 months 4.5 months 10 months 12 months 18 months	
Butyrac/Butoxone (2,4-DB)			No restrictions.
Cadet	All	I	
Classic	S SG,RG P C,CT CL,GS,R All	I 3 months 6 months 8 months 9 months 18 months†	If applied after Aug. 1, extend recrop interval for C, CT, R and GS 2 months. † Successful field bioassay must be completed prior to planting. Wait 9 months before trying a bioassay.
Cobra			No restrictions.
Dual Magnum or Sequence	S,C,CT,GS† SG,W Rice All	I 4.5 months Next spring 18 months	†Use Concep-treated grain sorghum seed.
Enlist One	S, C CT All	7-14 days 1 month 1 month	Rotation intervals based on rate – see label. Enlist corn, cotton, and soybean can be planted immediately.
Enlist Duo	S, C, CT All	1 month 1 month	Enlist corn, cotton, and soybean can be planted immediately.
Engenia	C GS, S, SG All	I 14-28 days 120 days	Rotation intervals based on rate – see label. Dicamba-tolerant soybean and cotton can be planted immediately.
Enlite	W CT,C,R,SF AL,CL	4 months 9 months 12 months	
Envive	W CT,C,GS,R,AL,CL SF,CA	4 months 10 months 18 months	See label for pH and geographical restrictions. High pH soils have longer rotational intervals.
FirstRate	W C,CT,P,R,GS	3 months 9 months	All others – 30 months plus bioassay.
Flexstar GT 3.5	CT,S W C,P,R,GS Other	0 months 4 months 10 months 18 months	See Reflex.
Fusilade DX or Fusion	S, CT All	I 2 months	
Glufosinate	C,S,CT,R,CA W,B,O GS	I 70 days 180 days	No restrictions.
Glyphosate	All	I	
Intimidator	S B, W C, R CT, RY GS All	I 4.5-8 months 10 months 12 months 18 months 18 months	
Metribuzin	S† AL,C,FG,W,B CT,R All (except root crops)†† Root crops	I 4 months 8 months 12 months 18 months	† Waiting period for replanting soybeans depends on the rate of metribuzin used. See specific label for more information. Add 2 months to time intervals if pH of soil is above 7.5. †† Cover crops may be planted any time, but stand reductions may occur.

For more information on soybean variety characteristics and metribuzin tolerance, please scan the QR code to download the latest Division of Agriculture Soybean Update.

*This table applies to the major field and forage crops. Refer to the herbicide labels for the latest recrop and rotation information for horticultural crops. These are written as best we could interpret the labels. We regret any omissions or errors. Always refer to product labels before using a pesticide or replanting into treated fields.

NOTE: See page 43 for key to abbreviations.

(continued on page 43)

Crop Replant and Rotation Guide for Soybean Herbicides* [cont.]

Herbicide	Replant/Crop Rotation	Time Interval	Precautions
Outlook	C,S SG All	I 4 months FY	Do not retreat field with second application.
Paraquat			No restrictions.
Poast/Poast Plus			See label.
Prefix	S CT AL,W,O,R,RY,B GS,R,C	I 1 month 4.5 months 10 months	Use Concep-treated grain sorghum seed. Do not use Reflex or Flexstar in-season.
Prowl	S,CT W,B All	I 4 months† FY	Do not rework soil deeper than treated zone. † Cannot replant using no-tillage practices.
Pursuit	S B,W C Rice All	I† 4 months 9.5 months 18 months 18 months	† Do not rework soil deeper than 2 inches. Do not apply Classic, Lorox Plus, Scepter, Squadron or Tri-Scept the same year as Pursuit or injury to following crops may occur.
Python	AL,P,B,W,RY,O R C GS CT, Sunflower	4 months 6 months 1 month 12 months 18 months	Requires successful bioassay.
Reflex or Flexstar	S SG, W C,CT,R,P,GS All	I 4 months 10 months 18 months	
Resource	SG S,C All	120 days I 30 days	
Reviton	C, W S, P, GS CT All	I 3 to 7 days 7 to 14 days 120 to 150 days	See label.
Select Max			See label.
Sharpen	C,GS,SG,S,R CT SF, others	I 1.5 months 4 months	† Rotation intervals based on rate – see label.
Sonic/Authority First	W C,R CT,AL,B,O, RY,GS	4 months 10 months 12 months	See label for pH restrictions.
Storm	All	Fall	
Surveil	S W C,P,R,GS SF	I 3 months 9 months 30 days	
Tavium	S CT C B, O, RY, W AL, DSP, GS, P, SF CL R All	28 days 42 days 4 months 4.5 months 6 months 9 months Next spring 12 months	Dicamba-tolerant soybean and cotton can be planted immediately.
Tendovo	S W FC, PC, AL, R B, CT, P, GS SC, All SF	I 4.5 months 9 months 12 months 18 months 30 months	Cover crops for soil building or erosion control may be planted any time but do not graze or harvest for food or feed.
Treflan/others	S,CT W,B All	I Fall FY	
Treflan (2X rate)	S,CT R All	I FY 2 years	
Trivence	S W C R CT All	I 4 months 10 months 12 months 18 months 18 months	Rotational intervals based on pH and rates – see label.
Typhoon	W C,CT,R GS and all others	4 months 10 months 18 months	
Ultra Blazer	S All	I Fall	
Valor	S,P W,C,R,GS CT B AL,O,CL,CA	I 30 days 21 days 4 months 8 months	Pre-emerge treatments may injure soybeans.
Verdict	C,S, GS CT,R W	I FY 4 months	† Rotation intervals based on rate – see label.
Warrant	CT,C,GS,S W R, others	I 4 months FY	Do not use more than 3.0 lb/A/year.
Xtendimax	C, S GS CT SG R All	14-28 days 15 days 21 days 22-45 days 120 days 120 days	Rotation intervals based on rate – see label. Dicamba-tolerant soybean and cotton can be planted immediately.
Zidua	C,S W CT GS R, others	I 1 month 2 months 6 months FY	
Zidua Pro	S P, W C AL B, RY CT, GS, SF All	I 4 months 8.5 months 10 months 11 months 18 months 40 months	Following 40 months, before planting any crop not listed on the label, a field bioassay must be completed. See label for Clearfield crop rotation intervals.

KEY

Crop

All = All crops not specified
AL = Alfalfa
B = Barley
C = Corn
CA = Canola
CL = Clovers
CT = Cotton
DSP = Dry Shelled Peas
FC = Field Corn
FG = Forage Grasses
FL = Forage Legumes
GS = Grain Sorghum
O = Oats
P = Peanuts
PC = Popcorn
R = Rice
RG = Ryegrass
RY = Rye
S = Soybean
SC = Sweet Corn
SF = Sunflower
SG = Small Grain
W = Wheat

Timing

I = Immediately
FY = Following year (usually spring or following fall - 11 to 16 months)

*This table applies to the major field and forage crops. Refer to the herbicide labels for the latest recrop and rotation information for horticultural crops. These are written as best we could interpret the labels. We regret any omissions or errors. Always refer to product labels before using a pesticide or replanting into treated fields.

Soybean Herbicide
Compatibility with Fertilizers as Application Carriers

Herbicide	Fertilizer	
	Fluid	Dry
Anthem Maxx	Y	Y
Assure II/Targa	N	N
Authority Elite/Broadaxe	Y	Y
Authority Edge/Authority Supreme	Y	Y
Broadstrike + Dual or Treflan	Y	Y
Dual Magnum	Y	Y
FirstRate	Y	Y
Glyphosate	N	N
Liberty/Cheetah	N	N
Metribuzin	Y	Y
Outlook	Y	Y
Paraquat	Y	N
Prowl	Y	Y
Pursuit	Y	N
Python	Y	Y
Reviton	Y	N
Select Max	N	N
Sharpen	Y	Y
Synchrony XP	N	N
Treflan/Trilin/trifluralin	Y	Y
Turbo	Y	Y
Valor	Y	Y
Warrant	N	Y
Zidua	Y	Y

Y = Yes, N = No

There are many specific fertilizer incompatibilities and restrictions with most herbicides. Be sure to read the herbicide label for specific mixing or impregnation instructions. Compatibility agents are required for many mixes. A typical compatibility test procedure for mixing herbicides in fluid fertilizers is given on page 4. NOTE: Compatibility with dry fertilizer is listed here from a labeling standpoint. The University of Arkansas only recommends herbicide application on dry fertilizer as a third alternative to spraying in water or in liquid fertilizer.

Rainfall-free Periods for Postemergence Herbicides

Herbicide	Time Before Rainfall
2,4-DB	4 hrs
Assure II/Targa	1 hr
Basagran	8 hrs
Classic	4 hrs
Cobra	30 min
Enlist One	4 hrs
Enlist Duo	4 hrs
FirstRate	2 hrs
Fusilade, Fusion	1 hr
Glyphosate	4-6 hrs
Liberty/Cheetah	4 hrs
Paraquat	30 min
Poast/Poast Plus	1 hr
Pursuit	1 hr
Python	4 hrs
Reflex, Flexstar, Typhoon	4 hrs
Resource	1 hr
Reviton	1 hr
Select Max	1 hr
Sharpen	1 hr
Storm	8 hrs
Synchrony XP	4 hrs
Ultra Blazer	6 hrs
Valor	1 hr

These are intervals that must occur between application and the first rainfall event in order for no loss in herbicide activity to occur.

Soybean Postemergence Herbicide
Preharvest Application Intervals (PHI)

Herbicide	PHI
2,4-DB	60 days
Assure II/Targa	80 days
Basagran	No restrictions
Classic	60 days
Cobra	90 days
Enlist One	R2
Enlist Duo	R2
Dual Magnum	75 days
FirstRate	65 days
Fusilade DX	1st bloom / R1
Glyphosate	After flowering / R3
Liberty/Cheetah	70 days
Poast/Poast Plus	90 days
Pursuit	85 days
Python	85 days
Reflex, Flexstar, Typhoon	1st bloom / R1
Resource	60 days
Select Max	60 days
Sharpen	3 days
Storm	50 days
Synchrony XP	60 days
Ultra Blazer	50 days
Valor	60 days

These intervals are the number of days that must be allowed between herbicide application and harvest. Applications made after these interval restrictions could cause illegal herbicide residues to be present in the harvested grain.

Soil-Applied Herbicide Rates for Soybean
Soil Texture

Herbicide	Coarse (light)	Medium	Fine (heavy)
	Broadcast Rates Per Acre		
Preplant (Normal Rates)			
Afforia	2.5 oz	2.5 oz	2.5 oz
Dual Magnum	1 pt	1.5 pt	2.00 pt
Dual Magnum + metribuzin 75DF	0.8 pt + 0.33 lb	1 pt + 0.5 lb	1.33 pt + 0.67 lb
Prowl 3.3EC	1.2-1.8 pt	1.8-2.4 pt	2.4-3.6 pt
Prowl H_2O 3.8 CS	1.0-1.6 pt	1.6-2.1 pt	2.1-3.2 pt
Sonic	3-6 oz	3-6 oz	3-6 oz
Synchrony XP	1.5 oz	1.5 oz	1.5 oz
Treflan, Trilin, Trifluralin 4EC	1 pt	1.5 pt	2 pt
Valor	2 oz	2 oz	2 oz
Preemergence			
Afforia	2.5 oz	2.5 oz	2.5 oz
Anthem Flex	2.25-2.75 oz	2.75-5.55 oz	4.0-5.5 oz
Anthem Maxx	2-3.25 oz	2.5-4.75 oz	3.5-5.5 oz
Authority Edge	5.9-7.9 oz	7.0-10.0 oz	9.0-12.0 oz
Authority Elite	19-23 oz	24-26 oz	27-32 oz
Authority MTZ	10-12 oz	12-14 oz	14-18 oz
Authority Supreme	6-6.9 oz	6-9.8 oz	7-11.5 oz
Boundary	1.2-1.5 pt	1.5-2 pt	1.75-2.25 pt
BroadAxe XC	19-25 oz	25-32 oz	25-32 oz
Dual Magnum	1 pt	1.33-1.67 pt	1.5 pt
Dual Magnum + metribuzin 75DF	1.0 pt + 0.33 lb	1.33 pt + 0.5 lb	1.5 pt + 0.67 lb
Enlite	2.8 oz	2.8 oz	2.8 oz
Envive	3.5 oz	3.5 oz	3.5 oz[1]
Metribuzin 75DF[1]	0.33-0.5 lb	0.5-0.67 lb	0.67-1 lb
Outlook	10-14 oz	14-16 oz	16-18 oz
Prefix	2 pt	2-2.5 pt	2-3 pt
Python	1 oz	1.1 oz	1.3 oz
Sharpen	--	1 oz	1 oz
Sonic/Authority First	3-6 oz	3-6 oz	3-6 oz
Surveil (co-pack)	3 oz	3 oz	3 oz
Tendovo	1.2-1.5 qt	1.35-2.1 qt	1.75-2.35 qt
Trivence[2]	6 oz	6-8 oz	8-10 oz
Valor	2 oz	2 oz	2 oz
Verdict	--	5 oz	5 oz
Warrant	1.25 qt	1.5 qt	1.9 qt
Zidua SC	2.5-3.5 oz	3.25-5	4-5.75 oz
Zone Defense	3.5-5.0 oz	4.5-5.0 oz	5.0 oz

[1]See label for pH restrictions.
[2]Use metribuzin tolerant varieties (www.uaex.uada.edu).

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN				
For information on burndown herbicides see page 21, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES.				
Wheat - Stubble Planted or Reduced Tillage or Stale Seedbed Soybean Culture				
Important factors to consider in stale seedbed and reduced tillage soybean culture. 1. If your goal is to conserve moisture at planting time and heavy vegetation is present, moisture reserves may already be depleted and establishing soybean stands may not be feasible without rainfall. 2. In a dry year, failure to obtain good control of existing vegetation will result in failure to obtain a stand of soybeans because the weeds will deplete the soil moisture before the seedling soybeans can become established. 3. Spray volume for herbicides should be in the 10 to 20 gallon per acre range for best results. 4. Thorough and uniform coverage is necessary for good "burndown" results. Coverage more dependent on droplet size and number of droplets (orifice size-pressure relationship) than on total volume. 5. Timely postemergence herbicide applications and, in some cases, cultivation will be necessary for full-season weed control. 6. **Compared to the burndown and residual mixtures below, a burndown herbicide such as glyphosate, paraquat, paraquat + metribuzin followed by a total postemergence program has been cheaper and more consistent in no-till, stubble-planted soybeans.**				
Preplant–Incorporated				
trifluralin @ 0.5 to 1 lb/A	Annual grass weeds and johnsongrass from seed.	**Treflan 4 EC** 1 to 2 pt/A.	From 6 weeks prior to planting to time of planting.	**APPLICATION RECOMMENDATIONS FOR ALL FOLLOWING PREPLANT TREATMENTS** Although Treflan and Prowl are labeled for use up to 6 weeks (or 60 days for Prowl) prior to planting, poor results are often obtained with early applications of both 1 and 2X rates if extended periods of wet weather occur before planting. For this reason, apply as near to planting as practical. The following summary is taken from **Equipment and Methods for Soil Incorporation of Herbicides,** a paper by Bode, Newberg, Butler and Wax at the American Society of Agricultural Engineers meeting in 1977. Note section on large disks. Tillage from tandem disk harrows is such that the soil is inverted, and herbicides are mixed deeper in the soil than with any other incorporation tool tested. A single pass with tandem disks results in areas of low concentration, where weed streaking can occur. A second pass will help to level out the areas of high and low concentrations, but there seems to be very little difference whether the second pass is parallel, perpendicular or at any angle with the first pass. *[continued]*
pendimethalin @ 0.5 to 1.5 lb/A	Annual grass weeds and johnsongrass from seed.	**Prowl 3.3 EC** 1.2 to 3.6 pt/A or **Prowl H_2O 3.8 CS** 1 to 3.2 pt/A.	From 60 days prior to planting until immediately prior to planting.	
S-metolachlor @ 0.95 to 1.6 lb/A	Weedy rice, annual grasses and yellow nutsedge.	**Dual Magnum 7.62 EC** 1 to 2.0 pt/A.	During final seedbed preparation (within 7 days of planting).	

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
pendimethalin or trifluralin + metribuzin @ 0.5 to 1 + 0.25 to 0.5 lb/A	Annual grasses, johnsongrass from seed, annual broadleaf weeds including hemp sesbania (coffeebean), prickly sida (teaweed), pigweed and smartweed. Poor control of cocklebur, entireleaf morningglory and sicklepod.	**Prowl or Treflan + Metribuzin 75 DF or Tricor 4F** 1.2 to 2.4 pt/A Prowl 3.3 EC or 1 to 2 pt/A Treflan 4 EC + 0.33 to 0.67 lb/A DF or 0.75 to 2 pt/A 4F. Tank mix. or **Tripzin ZC** 1.8 to 3.6 pt/A.	During final seedbed preparation before planting.	Large disks with blades spaced (9 inches or wider) will not give adequate soil mixing when operated at shallow depths of 4 inches or less. When large disks are operated at a 6-inch depth or more to obtain soil inversion, some of the chemical is incorporated deeper than desired, There is also some loss of horizontal uniformity with the large disk. Spacing of disk blades and depth of operation seem to be more important than blade diameter in determining the amount of soil mixing. Disks with 7-inch blade spacings gave more uniform incorporation at the desired (2- to 3-inch) depth than disks with 9-inch spacings. The field cultivator also requires two passes to obtain adequate incorporation. Better soil mixing is obtained when sweeps are used at travel speeds of 5 to 7 mph. To avoid areas of low chemical concentration which would result in strips of weeds, the second pass should be at some angle to the first pass rather than parallel to it. The rear row of shanks should not be allowed to operate deeper than the forward rows because untreated soil may be brought to the surface, and weed control would be reduced. A drag harrow mounted behind the cultivator to level the ridges will improve herbicide distribution in the top inch of soil. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.**
S-metolachlor + metribuzin @ 0.95 to 1.6 lb/A + 0.375 to 0.5 lb/A	Annual grasses, johnsongrass from seed, annual broadleaf weeds including hemp sesbania (coffeebean), prickly sida (teaweed), pigweed and smartweed. Poor control of cocklebur, entireleaf morningglory and sicklepod. Better on weedy rice, weak on seedling johnsongrass.	**Dual Magnum + Metribuzin 75 DF or Tricor 4F** 1.0 to 2.00 pt/A or 0.5 to 0.67 lb/A DF or 0.75 to 2 pt/A 4F or **Moccasin MTZ** 1.75 to 2.67 pt/A.	During final seedbed preparation (within 7 days of planting).	
pendimethalin or trifluralin + imazaquin @ 0.5 to 1 + 0.094 to 0.125 lb/A	Most annual grass, and broadleaf weeds except hemp sesbania. Sicklepod if followed by Classic.	**Prowl or Treflan + Scepter 70 DF** 1.2 to 2.4 pt/A Prowl 3.3 EC or 1 to 2 pt/A Treflan 4 EC + 1.4 to 2.8 oz/A 70 DF. If incorporating 2 to 4 weeks prior to planting, use labeled rates of Scepter. If incorporating from 0 to 2 weeks prior to planting, the University of Arkansas recommended rate is 1.4 oz/A 70 DF. See comments at right.	Up to 4 weeks prior to planting. Incorporate immediately after application. Poor weed control may occur if incorporated into dry soils unless rainfall occurs for activation.	Incorporate thoroughly in the top 2 to 3 inches of seedbed. **When applied from 0 to 2 weeks prior to planting, University of Arkansas research has shown near equal results from rates ranging from 1.4 to 2.8 oz/A – regardless of soil texture. The most consistent programs with Scepter are those that use the rate of 1.4 oz/A 70DF followed by a postemergence herbicide, if needed.**
flumetsulam @ 0.05 to 0.066 lb/A	Cocklebur, horseweed, smooth pigweed, velvetleaf, prickly sida, spurge, eclipta. Suppression of morningglories. Sicklepod if followed by Classic.	**Python 80 WDG** 1 to 1.33 oz/A + labeled rate of grass herbicide.	Apply from 0 to 30 days before planting.	Incorporate thoroughly into the top 2 inches of the seedbed. Control of cocklebur, morningglory and sicklepod may be enhanced by using the higher end of the rate range for each soil textural class. Do not use on soils with pH above 7.8. Do not rotate with cotton for 18 months or sorghum for 12 months following application.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN				
Preplant–Incorporated [cont.]				
dimethenamid @ 0.56 to 0.98 lb/A	Weedy rice, annual grasses, yellow nutsedge and pigweeds. Will also reduce competition from tea-weed, hophornbeam copperleaf, groundcherry and other small-seeded broadleaf weeds.	**Outlook 6E** 12 to 21 oz/A.	From 45 days prior to planting to fifth trifoliate.	Disk incorporation is not recommended. A field cultivator or similar type implement should be used to incorporate in the top 2 to 3 inches. Rate dependent on percent organic matter. See label.
SOYBEAN SEE HERBICIDE RESISTANCE STATEMENTS ON PAGES 18 – 20. (Use 2 effective residual active ingredients in the PRE program.)				
Preemergence				
S-metolachlor @ 0.9 to 1.5 lb/A	Annual grasses, weedy rice, nutsedge and small-seeded broadleaves.	**Dual Magnum 7.62EC** 1 to 1.5 pt/A.	At planting, up to 90 days PHI.	Rainfall needed for activation. University data suggests that 1.3 x the metolachlor product rate (equal R- and *S*-isomers) is needed to provide equal weed control to the *S*-isomer (*S*-meto-lachlor) products such as Dual Magnum.
metribuzin @ 0.25 to 0.75 lb/A	Hemp sesbania, prickly sida, common cocklebur, pigweed, spurred anoda, common rag-weed, smartweed and sicklepod.	**Metribuzin 75 DF or Tricor 4F** 0.33 to 1 lb/A DF or 0.75 to 2 pt/A 4F.	At planting.	Do not apply to sandy soils or to sandy loam or loamy sand soils with less than 2% organic matter. Some stunting and stand reduction may occur from Sencor if heavy rains closely follow treatment. Do not apply more than once per season. Do not use treated vines for feed or forage. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.** Do not use on soils pH 7.5 or above. Weak on grass weeds. Do not use 1.5 pt/A 4L or 1 lb/A DF rates on any soils except Mississippi Delta heavy clay.
acetochlor @ 0.94 to 1.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Warrant 3ME** 2.5 to 4 pt/A.	At planting.	Rainfall needed for activation. Most PRE applications of Warrant should be applied in combination with a Valor or Authority product.
S-metolachlor + metribuzin @ 0.8 to 1.3 + 0.25 to 0.75 lb/A	Same as above with improved annual grass control. Improved control of pigweed and sicklepod compared to above. Good choice for pigweed.	**Dual Magnum 7.62EC + Metribuzin 75 DF or Tricor 4F** 1.0 to 1.5 pt/A Dual Magnum + 0.33 to 1 lb/A 75 DF or 0.75 to 2 pt/A 4F or **Boundary 6.5 EC** 1.2 to 2.25 pt/A or **Moccasin MTZ** 1.75 to 2.67 pt/A.	At planting.	Tank mix. Apply only once per season. Do not use on sand or loamy sand soils with less than 2% organic matter. Do not plant crops other than soybeans within 4 months after treatment. Do not use treated vines for feed or forage. Do not apply to sensitive varieties, exceed 4 qt/A/year or use with liquid fertilizer. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.**
flumioxazin @ 0.063 lb/A	Residual broadleaf control. No post horseweed activity. Good option for pigweed.	**Valor 51 WDG** (or appropriate rate of Valor-containing premixes such as Enlite, Envive, Valor XLT, etc.) 2 oz/A.	Prior to soybean emergence. Apply immediately after planting.	Apply to clean ground or tank-mix for post weed control. Rainfall at emergence may result in injury, mainly cosmetic.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
dimethenamid + saflufenacil @ 0.156 to 0.31 + 0.022 to 0.044 lb/A	Annual grasses, pigweed, velvetleaf, morningglory and horseweed.	**Verdict** 5 oz/A.	Burndown to preemergence. **Do not** apply Verdict over the top of cracking or emerged soybeans. 5 oz/A of Verdict can be applied up to preemergence on medium and fine soils. 7.5 oz/A of Verdict can be applied upto 14 days before planting on medium to fine soils. 10 oz/A of Verdict can be applied up to 30 days before planting on medium to fine soils. Apply immediately after planting.	For best burndown results, tank mix with glyphosate or paraquat. An MSO and AMS must be used for burndown. On coarse soils with less than 2% organic matter, the plant back to soybeans is 30 days at 5 to 7.5 ounces and 44 at 10 ounces. See label for further recommendations and restrictions.
pyroxasulfone @ 0.081 to 0.187 lb/A or pyroxasulfone + fluthiacet-methyl @ 0.081 + 0.002 to 0.179 + 0.005 lb/A or pyroxasulfone + carfentrazone @ 0.066 + 0.005 to 0.187 + 0.013 lb/A	Annual grasses and small-seeded broadleaves.	**Zidua 4.17 SC** 2.50 to 5.75 oz/A or **Anthem Maxx 4.3 SE** 2.5 to 5.5 oz/A or **Anthem Flex 4 SE** 2.25 to 6.4 oz/A.	At planting.	Rainfall required for activation.
pyroxasulfone + flumioxazin @ 1.28 + 1 oz/A	Annual grasses and small-seeded broadleaves.	**Fierce 76 WDG** 3 oz/A.	At planting. Apply immediately after planting.	Rainfall required for activation. Do not apply if soybeans are cracking. Injury may be worse than expected with Valor alone. Cool, wet conditions may result in delayed recovery and growth.
saflufenacil @ 0.022 to 0.044 lb/A	Pigweed, velvetleaf, morningglory and horseweed.	**Sharpen 2.85 SC** 1 to 2 oz/A. Add surfactant.	Burndown to preemergence. **Do not** apply Sharpen over the top of cracking or emerged soybeans. 1 oz/A of Sharpen can be applied up to preemergence on medium and fine soils. 1.5 oz/A of Sharpen can be applied up to 14 days before planting on medium to fine soils. 2 oz/A of Sharpen can be applied up to 30 days before planting on medium to fine soils.	For best burndown results, tank mix with glyphosate or paraquat. An MSO and AMS must be used for burndown. On coarse soils with less than 2% organic matter, the plant back to soybeans is 30 days at 1 to 1.5 ounces and 44 at 2 ounces. See label for further recommendations and restrictions.
sulfentrazone + flumioxazin @ 0.136 to 0.194 + 0.033 to 0.047 lb/A	Control of broadleaves.	**Zone Defense 77 WDG** 3.5 to 5.0 oz/A.	Preemergence.	Do not exceed 9.6 oz/A per year. Do not make more than 2 applications per year and do not apply following crop emergence as severe injury will occur.
sulfentrazone + *S*-metolachlor @ 0.106 + 1.75 to 0.94 + 1.57 lb/A	Grass and broadleaf weeds.	**Authority Elite 7 EC or BroadAxe XC** 19 to 32 oz/A.	At planting.	Rainfall required for activation. Rate depends on soil type.
sulfentrazone + metribuzin @ 0.225 + 0.2 lb/A	Broadleaf weeds.	**Authority MTZ** 12 to 16 oz/A.	No later than three days after planting.	Make sure seed furrow is closed. See soil texture chart on page 45. For higher rates, use tolerant varieties. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.**
S-metolachlor + fomesafen @ 1.08 to 1.6 + 0.24 to 0.36 lb/A	Grass and broadleaf weeds.	**Prefix** 2 to 3 pt/A.	At planting.	Do not use PRE if you plan to use Flexstar POST for pigweed. Rainfall required for PRE activity. With widespread PPO-inhibitor resistance, the addition of metribuzin may be required for effective pigweed control.
acetochlor + fomesafen @ 1.06 to 1.54 + 0.24 to 0.34 lb/A	Grass and broadleaf weeds.	**Warrant Ultra** 48 to 70 oz/A	At planting.	Do not use PRE if you plant to use Flexstar POST for pigweed. Only 1 application allowed per year. Rainfall required for PRE activity. With widespread PPO-inhibitor resistance, the addition of metribuzin may be required for effective pigweed control.
sulfentrazone + pyroxasulfone @ 0.098 + 0.098 to 0.186 + 0.186 lb/A or 0.126 + 0.07 to 0.334 + 0.186 lb/A	Annual grasses and small-seeded broadleaves.	**Authority Supreme** 6 to 11.5 oz/A or **Authority Edge** 5.9 to 15.7 oz/A.	At planting.	Rainfall required for activation. Rate depends on soil type. Do not apply POST.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN Preemergence [cont.]				
cloransulam-methyl @ 0.016 to 0.026 lb/A	Cocklebur, morningglory, ragweeds, sicklepod prickly sida (teaweed), and horseweed. Suppression of yellow nutsedge.	**FirstRate 84 DG** 0.3 to 0.5 oz/A. Add 1% v/v crop oil concentrate.	Preemergence.	Do not exceed 0.6 oz/A per year (PRE and POST combined). Erratic on sicklepod.
flumetsulam @ 0.05 to 0.066 lb/A	Cocklebur, horseweed, smooth pigweed, eclipta, velvetleaf, spurge, and prickly sida. Suppression of morningglories. Sicklepod if followed by Classic.	**Python 80 WDG** 1 to 1.33 oz/A + labeled rate of Dual or other preemergence grass herbicide.	At planting.	Rainfall required for activation. Control of cocklebur, morningglory and sicklepod may be enhanced by using higher end of rate range for each soil textural class. Do not plant cotton for 18 months or sorghum for 12 months following application. Do not use on soils with pH above 7.8.
dimethenamid @ 0.56 to 0.98 lb/A	Most small-seeded annuals.	**Outlook 6E** 12 to 21 oz/A.	At planting.	Rainfall needed for activation.
sulfentrazone + cloransulam @ 0.25 + 0.03 lb/A	Cocklebur, Palmer amaranth, morningglories, smartweed, and grass suppression.	**Sonic or Authority First** 6.45 oz/A.	PPI, preplant surface applied or pre-emergence (within 3 days of planting).	Rainfall required for activation.
flumioxazin + cloransulam methyl @0.063 + 0.021 lb/A	Small-seeded broadleaves.	**Surveil 48 WDG** 2.8 oz/A.	Preemergence.	Add Zidua or metribuzin for PPO-resistant pigweed.
saflufenacil + imazethapyr + pyroxasulfone @ 0.017 + 0.047 + 0.080 to 0.023 + 0.062 + 0.107 lb/A.	Broad spectrum POST and residual weed control.	**Zidua Pro 4.09 SC** 4.5 to 6 oz/A.	Preemergence.	Add 1% v/v MSO plus 8.5 lbs/100 gal AMS if burning down existing vegetation. DO NOT apply after soybeans have reached the cracking stage or severe crop injury will result. **If rotating to rice the following year, a Clearfield or Full-Page rice variety must be planted.**
S-metolachlor + metribuzin + fomesafen @ 0.805 + 0.178 + 0.159 to 1.900 + 0.42 + 0.375 lb/A.	Broad spectrum residual weed control.	**Intimidator 4.81 EC** 1.9 to 4.48 pt/A.	Preemergence.	Maximum application rate from all products containing fomesafen must not exceed 0.375 lb ai/A per year.Do not exceed a total of 2.5 lb/A *S*-metolachlor from all containing products per year. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.**
flumioxazin + chlorimuron + metribuzin @ 0.063 + 0.02 + 0.223 lb/A	Residual horseweed, pigweed, morningglory, and prickly sida control.	**Trivence 61.3 DG** 8 oz/A.	Prior to soybean emergence.	Use 6 oz/A on high pH soils. Addition of a Group 15 may be necessary for PPO-resistant pigweed control. Check label for approved Group 15 tank-mix partners. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.**
flumioxazin + metribuzin + pyroxasulfone @ 0.06 + 0.19 + 0.08 to 0.09 + 0.28 + 0.12 lb/A	Broad-spectrum residual weed control.	**Fierce MTZ** 1 to 1.5 pt/A	Preemergence.	Use rate dependent on soil type. Do not make more than 1 application per year and do not exceed 1.5 pt/A. Greater risk for injury results when: soils have a pH of or greater than 7.5, less than 0.5% organic matter, soybean is planted less than 1.5 inches deep, or heavy rains occur soon after application. **See Soybean Update (scan QR code at beginning of soybean section) for list of metribuzin-sensitive varieties.**
S-metolachlor + metribuzin + cloransulam-methyl @ 1.30 to 1.82 + 0.24 to 0.34 + 0.02 to 0.03 lb/A	Control of grasses and broad-leaves.	**Tendovo** 1.5 to 2.1 qt/A.	May be applied up to 45 days before planting through planting, but must be applied before crop emergence.	If weeds are present at the time of application, a burndown herbicide may be added to the mix.

Illustrations courtesy of Chris Meux,
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VC
Fully developed leaves at unifoliate nodes

V1
Fully developed trifoliate leaf at the node above the unifoliate nodes.

V2
Two fully developed trifoliate leaves above the unifoliate nodes.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN				
Postemergence – All Systems				
bentazon @ 0.75 to 1 lb/A	Emerged common cocklebur, jimsonweed, smartweed, velvetleaf, prickly sida and common ragweed.	**Basagran** 1.5 to 2 pt/A. A surfactant is optional. Research has shown no advantage to adding a surfactant for cocklebur. Use two applications for morningglory control. The addition of 2 fl oz/A of **2,4-DB** may improve morningglory control somewhat and may also improve control of cocklebur slightly larger than those listed on Basagran label. Rate may be reduced with band application.	Postemergence when soybeans are in 1 (V2) to 4 (V5) trifoliate stage. If a second flush of cocklebur emerges, repeat treatment or follow with another material as a directed spray. Most effective on cocklebur 6 inches or less.	Overtop or semi-directed. Excellent spray coverage is necessary for results. If the crop canopy shelters small weeds, use a semi-directed spray. Use high rate on cocklebur larger than 6-leaf stage. Do not apply to soybeans growing under stress. Do not apply more than 2 lb bentazon per acre in one season. **Do not add 2,4-DB unless good soil moisture is present and soybeans are actively growing. Refer to label for precautions and disclaimers.**
acifluorfen @ 0.375 to 0.5 lb/A	Emerged hemp sesbania, crotolaria, morningglory, Texas gourd, common ragweed, copperleaf, woolly croton and several other broadleaf weeds. (See rating table.)	**Ultra Blazer 2L** 1 to 2 pt/A. 1 pt rate on hemp sesbania and showy crotolaria. Use 2 pt rate on all but very small jimsonweed, purple moonflower, pitted morningglory or common ragweed. Add a surfactant. Refer to label. The addition of 2 fl oz/A of **2,4-DB** may improve cocklebur control somewhat and may also improve control of morningglory slightly larger than those listed on Ultra Blazer label. Rate may be reduced with band application.	Postemergence when soybeans are small. Ivyleaf and entireleaf morningglories must be controlled before they are beyond the 2 true leaf stage. Pigweed must be controlled first 7 to 10 days after emergence. Refer to label for specific weed sizes. For hemp sesbania (coffeebean) only, best control obtained between 12" and bloom stage.	Overtop or semi-directed. Weeds should be actively growing. Excellent spray coverage is necessary. Crop injury symptoms are foliar burn, leaf speckling and leaf crinkling. The symptoms are usually cosmetic in nature only. Notice, for successful results, labeled rates and timing of application must be strictly adhered to. **Do not add 2,4-DB unless good soil moisture is present and soybeans are actively growing. Refer to label for precautions and disclaimers. Cutoff date is 50 days prior to harvest (PHI). May be applied to soybeans in bloom stage if within the PHI.**
acifluorfen + bentazon @ 0.25 to 0.5 + 0.5 lb/A	Pigweed, cocklebur, prickly sida, hemp sesbania; pitted, purple, palmleaf and entireleaf morningglories, Texas gourd and woolly croton.	**Ultra Blazer + Basagran** 1 to 2 pt/A + 1 pt/A. Add a surfactant according to Ultra Blazer label. Rate may be reduced with band application. **or** **Storm 4L** 1.5 pt/A. Add a surfactant. Note: Storm rate of 1.5 pt/A equivalent to 1 pt/A Basagran + 1 pt/A Ultra Blazer.	Postemergence when soybeans are small. Ivyleaf and entireleaf morningglories must be controlled before they are beyond the 2 true leaf stage. Pigweed must be controlled first 7 to 10 days after emergence. Refer to label for specific weed sizes. For hemp sesbania (coffeebean) only, best control obtained between 12" and bloom stage.	Same as above. If prickly sida is larger than 2", increase Basagran rate to 1½ pt/A. Use high Ultra Blazer rate for entireleaf and ivyleaf morningglory.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
lactofen @ 0.2 lb/A	Balloonvine, cocklebur, pitted morningglory, prickly sida, spurge, hemp sesbania, woolly croton and others. See rating table. Weak on entireleaf morningglory.	**Cobra 2E** 0.8 pt/A. Add a nonionic surfactant or crop oil concentrate. (See label.) University of Arkansas research has often shown an increase in soybean injury with little or no increase in weed control with COC compared to surfactant.	Between 10 and 14 days after weed emergence.	Weed control rapidly diminishes as weeds exceed 14 days after emergence or if environmental conditions are poor. Timing is very critical on cocklebur or regrowth will occur. Expect 30% to 40% initial crop burn. Research has shown this does not lower yield in weed-free soybeans planted at recommended planting dates. Not recommended on soybeans planted beyond the recommended planting date. Less dependent than other herbicides on environmental conditions.
fomesafen @ 0.235 to 0.35 lb/A	Cocklebur, morningglories, pigweed, hemp sesbania, woolly croton and others. See rating table.	**Flexstar 1.88L** 1 to 1.5 pt/A. See comments at right.	Between 10 and 14 days after weed emergence. 2” to 3” pigweed.	Weed control rapidly diminishes as weeds exceed 14 days after emergence or if environmental conditions are poor. Good residual control of Palmer amaranth has been observed if rainfall occurs shortly after application. Do not plant crops other than wheat, corn, cotton, peanuts, soybeans or rice for 18 months after application.
chlorimuron @ 0.008 to 0.012 lb/A	Cocklebur, hemp sesbania, pitted, entireleaf and ivyleaf morningglories, northern jointvetch and sicklepod. Some suppression of yellow nutsedge.	**Classic 25DF** 0.5 to 0.75 oz/A. Add a nonionic surfactant.	7 to 12 days after weed emergence.	Timing is critical. Control of sicklepod and entireleaf-ivyleaf morningglories may be erratic. Weeds must be actively growing. Avoid drift. Crop injury in forms of yellowing and leaf malformation may occur but should be quickly outgrown. Avoid drift to cotton or rice. Tank mixing with other herbicides may reduce activity.
imazethapyr @ 0.063 lb/A	Yellow nutsedge, pitted, entireleaf and ivyleaf morningglories, spotted spurge and smartweed. Suppression of annual grass, weedy rice and johnsongrass.	**Pursuit 70 DG** 1.45 oz/A. Add a nonionic surfactant.	Within first 10 days after weed emergence. Can tank mix with glyphosate for improved nutsedge control.	Timing is extremely critical. Weeds must be very small. Can give excellent residual control if rain occurs within 5 days. **40 month rotation to non-Clearfield rice.**
cloransulam-methyl @ 0.016 to 0.026 lb/A	Cocklebur, morningglory, ragweeds, sicklepod and horseweed.	**FirstRate 84 DG** 0.3 to 0.5 oz/A. Add 1% v/v crop oil concentrate. Do not exceed 0.6 oz/A per year.	10 to 14 days after weed emergence. Cotyledon to 1 true leaf sicklepod. Up to R2 soybean.	Timing is critical. Erratic on sicklepod. Has been a good tank mix partner with glyphosate in research. **Best POST option for horseweed.** PHI = 70 days.
flumetsulam @ 0.0062 lb/A	Prickly sida and other broadleaf weeds.	**Python 80 WDG** 0.125 oz/A. Add 0.5% crop oil concentrate.	10 to 14 days after weed emergence. (2- to 3-leaf sida).	Good tank mix with FirstRate in conventional soybeans. Can be tank mixed with glyphosate.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN				
Postemergence – All Systems [cont.]				
fluthiacet @ 0.0035 to 0.006 lb/A	Morningglory, velvetleaf, smartweed and hophornbeam copperleaf.	**Cadet 0.91 EC** 0.5 to 0.9 oz/A.	2- to 4-inch weeds.	Add to glyphosate for improved control of velvetleaf and morningglories.
sethoxydim @ 0.2 to 0.3 lb/A	Annual grasses, johnsongrass, bermudagrass and weedy rice.	**Poast Plus 1E** 1 to 1.5 pt/A. Add 1 qt/A crop oil concentrate. Use 1 pt rate only on small annual grasses. Weedy rice may require repeat treatment of 1 pt/A following initial 1½ pt treatment. For spot treatment, use 1% solution of Poast Plus + 1% crop oil concentrate. Spray to wet but not to runoff.	Best control before annual grasses exceed 14 days after emergence. Johnsongrass - 15" to 20." Bermudagrass - 1" ht or 6" runner length max. Weedy rice - first 7 days after emergence and before exceeds 4". **Timing for annual grass and weedy rice very critical.**	[Most effective grass herbicide on large annual grasses.] Apply only under conditions of active growth. Thorough coverage required. Do not cultivate 7 days before or after treatment. However, cultivation soon after 7 days will be helpful. Repeat treatments may be required if regrowth occurs. If a herbicide is needed for broadleaf weed control, apply Poast Plus first and follow with broadleaf herbicide at least 1 day later. If broadleaf weeds form canopy over small grass, apply broadleaf herbicide, and wait 7 days before applying Poast Plus.
flumiclorac @ 0.027 lb/A	Volunteer cotton, velvetleaf and other broadleaf weeds.	**Resource 0.86 EC** 6 oz/A. Add 1% crop oil concentrate.	10 to 14 days after weed emergence. Do not apply within 60 days of harvest.	Effective tank-mix partner with glyphosate for controlling volunteer Roundup Ready cotton. Do not apply more than 16 oz/year.
fluazifop @ 0.188 lb/A	Bermudagrass, johnsongrass and annual grasses.	**Fusilade DX 2E** 0.75 pt/A. Add 1% crop oil concentrate or 0.25% nonionic surfactant. Weedy rice may require repeat treatment. For spot treatment, use 2 qt Fusilade/100 gal. Add 1 gal crop oil or 1 qt nonionic surfactant/100 gal.	Before annual grasses exceed 14 days after emergence. Johnsongrass - 12" to 18." Bermudagrass - 3" height or 6" to 12" runner maximum. Weedy rice - first 7 days after emergence and before exceeds 2." **Timing for annual grass very critical.**	Apply only under conditions of active growth. Less effective than Poast Plus on annual grasses, more effective on bermudagrass and johnsongrass. Repeat if necessary. Thorough coverage required. Do not tank mix. Do not cultivate 7 days before or after treatment. However, cultivation soon after 7 days will be helpful. See label for details. Repeat treatment may be needed if regrowth occurs. No-till johnsongrass control will require two applications. If a herbicide is needed for broadleaf weed control, apply Fusilade first and follow at least 1 day later. If broadleaf weeds form canopy over small grass, apply broadleaf herbicide, and wait 7 days before applying Fusilade. Do not apply after bloom stage of soybeans.
fluazifop/fenoxaprop @ 0.166 + 0.25 lb/A	Annual grasses, johnsongrass and bermudagrass.	**Fusion 2.66 EC** 0.5 pt/A annual grasses 0.75 pt/A perennial grasses Add crop oil concentrate at 1% or 0.25% nonionic surfactant. See other comments on Fusilade above.	See above comments for Fusilade.	See above comments for Fusilade. Do not apply more than 24 fl oz/season.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
quizalofop p-ethyl @ 0.031 to 0.063 lb/A	Annual grasses, bermudagrass, johnsongrass and weedy rice.	**Assure II or Targa 0.88 EC** 5 oz/A volunteer corn and milo, 8 oz/A most annual grasses, 9 oz/A weedy rice. Repeat if needed. 10 oz/A rhizome johnsongrass and bermudagrass. Add crop oil concentrate at 1% for ground application or 0.5% for aerial application or nonionic surfactant at 0.25%.	Before annual grasses exceed 14 days after emergence. Johnsongrass - 10" to 24". Weedy rice - first 14 days after emergence or 1 to 4 leaf. **Timing for annual grass and weedy rice is very critical.**	See above comments for Poast Plus and Fusilade on cultivation and tank mixing. Performance comparable to Poast Plus on annual grasses and Fusilade on rhizome johnsongrass. Better than either on small weedy rice. **Will not control volunteer Enlist corn.**
clethodim @ 0.25 lb/A	Annual grasses, bermudagrass and johnsongrass. **Weedy rice seedhead suppression.**	**Select 2E or Select Max 0.97 EC** 8 or 16 oz/A. Add 1% crop oil concentrate + AMS.	Before annual grasses exceed 14 days after emergence. Johnsongrass - 12" to 24". Bermudagrass - 3" height or 6" runner length maximum. For weedy rice seedhead suppression, apply at internode elongation stage of weedy rice.	See above comments for Poast Plus and Fusilade on cultivation and tank mixing. Performance comparable to Assure II for annual grasses and johnsongrass.
GENERAL STATEMENT ON TANK MIXING POSTEMERGENCE GRASS AND BROADLEAF HERBICIDES Results from tank mixing these herbicides has been variable among locations, years and persons conducting the studies. As a general statement, under optimum growing conditions and weed sizes, antagonism from Ultra Blazer, Reflex and Cobra has been very slight or not at all. When tank mixing with Basagran, increase the grass herbicide rate by 50%. Do not tank mix the grass herbicide with Scepter, Classic or Pursuit. Not all combinations are labeled. Refer to label. To eliminate any possibility of antagonism (loss of grass activity), apply grass herbicide first followed by the broadleaf herbicide 1 or more days later.				
S-metolachlor @ 1.24 to 1.6 lb/A	Residual control of grass and small-seeded broadleaf weeds.	**Dual Magnum 7.62 EC** 1.3 pt/A.	Up to 90 days PHI.	Residual pigweed and grass control. No post activity.
acetochlor @ 1.13 lb/A	Residual control of grass and small-seeded broadleaf weeds.	**Warrant 3ME** 3 pt/A.	Up to R2.	Do not exceed 4 qt/A/year. Do not use liquid fertilizer.
dimethenamid @ 0.56 to 0.98 lb/A.	Residual control of small-seeded grass and broadleaf weeds.	**Outlook 6 EC** 12 to 21 oz/A.	Up to fifth trifoliate leaf stage (V6).	Residual pigweed and grass control, no POST activity. Do not exceed 24 oz/A per year.
pyroxasulfone @0.09 to 0.12 lb/A	Residual control of small-seeded grass and broadleaf weeds.	**Zidua 4.17 SC** or **Anthem Maxx 4.3 SC** 3.0 to 5.75 oz/A or 3.0 to 5.5 oz/A	Up to V6.	Residual pigweed and grass control. No post activity.
S-metolachlor + fomesafen @ 1.09 to 1.26 + 0.24 to 0.28 lb/A	Early POST broadleaf with residual grass and broadleaf control. Apply to 2- to 3-inch pigweed.	**Prefix** 2 to 2.33 pt/A.	Early POST for best results up to 90 days PHI.	Temporary injury will occur. 90-day PHI.
acetochlor + fomesafen @ 1.06 to 1.54 + 0.24 to 0.34 lb/A	Early POST broadleaf with residual grass and broadleaf control. Apply to 2- to 3-inch pigweed.	**Warrant Ultra** 48 to 70 oz/A	Early POST for best results, up to R2 growth stage.	Temporary injury will occur. Only 1 application allowed per year.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEAN				
Postemergence – Glyphosate-Resistant Varieties (Roundup Ready, Xtend, XtendFlex, Enlist E3)				
glyphosate @ 1 lb/A (two applications)	Emerged annual grasses, johnsongrass, weedy rice, cocklebur, sicklepod, pigweed morningglories, prickly sida, velvetleaf, eclipta, spurge, hemp sesbania, northern joint-vetch and smartweed. **See rating table for other species.**	**Glyphosate (4 lb/gal formulations)** Repeat application 2 pt/A each application. See instructions at right for timing of application.	Make first application when soybeans and weeds are 10 to 14 days after emergence and repeat in 7 to 14 days. On the timing of the second application, University of Arkansas research has shown that a 14 DAE application followed by a second application 7 days later is the standard to which other programs must be compared. However, there can be exceptions depending upon environmental conditions. If repeating the application for control of regrowth on tough weeds such as morningglory, nutsedge or hemp sesbania, repeat in 7 to 10 days after the first. If applying for a second flush of weeds, repeat when second flush weeds are 10 to 14 days old.	Research to date has shown much more consistent results with split applications compared to single treatments. The second application improves control of the more tolerant weeds, such as morningglory, hemp sesbania and prickly sida, and provides control of second flush weeds. When the recommended timing of both applications is strictly adhered to in research, there has been little difference in control from 16 oz/A compared to 32 oz/A each. However, if the timing is missed, increase the rates. Soil moisture is very critical for activity. If no soil-applied herbicides are used and the soybeans do not form a dense canopy, a third application may be required. Cultivation is recommended if soybeans are planted in wide rows.
glyphosate @ 1 lb/A	Emerged annual grasses, weedy rice, johnsongrass, cocklebur, pigweeds, sicklepod, common ragweed and spurge. Weak on entireleaf and pitted morningglory, prickly sida and hemp sesbania. **See rating table for other species.**	**Glyphosate** (4 lb/gal formulations) 2.0 pt/A.	14 days after soybean emergence. For rhizome johnsongrass: 12” to 15” johnsongrass.	This treatment is primarily intended for use where a soil-applied herbicide has been used to control difficult species such as the morningglories, hemp sesbania (coffeebean) and prickly sida (teaweed)It is neither as effective on these species nor as broad spectrum as the split application recommended above. Repeat the treatment if reinfestation occurs before canopy closure. Cultivation is recommended if soybeans are planted in wide rows.
glyphosate + *S*-metolachlor @ 0.7 to 0.84 + 0.94 to 1.12 lb/A	Same as above plus residual grass and pigweed control.	**Sequence 5.25 F** 2.5 to 3.5 pt/A.	Preplant through post.	Same as above. 90-day PHI.
glyphosate + chlorimuron @ 1 + 0.005 lb/A	Same as above with increased control of hemp sesbania, morningglories and yellow nutsedge.	**Glyphosate** (4 lb/gal formulations) **+ Classic 25 DF** 2 pt/A + 0.33 oz/A.	After first trifoliate leaf expanded. Small weeds.	
glyphosate + cloransulam-methyl @ 1.0 + 0.016 to 0.026 lb/A	Same as glyphosate above but increased control of morningglories, horseweed and giant ragweed.	**Glyphosate** (4 lb/gal formulations) **+ FirstRate 84DG** 2 pt/A + 0.3 to 0.5 oz/A FirstRate. Add 0.25% nonionic surfactant.	After first trifoliate leaf expanded. Small weeds.	
glyphosate + fomesafen or *S*-metolachlor + fomesafen @ 1.0 + 0.235 lb/A or 1.09 + 0.24 lb/A	Same as glyphosate above but increased control of morningglories, giant ragweed and Palmer pigweed.	**Glyphosate** (4 lb/gal formulations) **+ Flexstar or Prefix** 2 pt/A + 16 oz/A or 2 pt/A.	After first trifoliate leaf expanded. Small weeds.	
glyphosate + fomesafen @ 1.13 + 0.28 lb/A.	Same as glyphosate above but increased control of morningglories, giant ragweed and Palmer pigweed (use full rate of Flexstar).	**Flexstar GT 3.5** 4 pt/A.	After first trifoliate leaf expanded. Small weeds.	

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Postemergence–LibertyLink Soybean				
University data has shown that a solid residual program applied after planting, followed by a timely application of glufosinate, is the best program approach to weed control in LibertyLink soybeans. This is especially true for glyphosate-resistant pigweed programs. In wider row spacing, a residual at planting followed by a POST residual is different.				
glufosinate @ 0.59 fb. 0.59 lb/A	Grass and broadleaf weeds. Will control glyphosate-resistant weeds.	**Glufosinate 280 SL** 32 oz/A fb. 32 oz/A. (A single application of 43 oz/A is labeled.) Do not exceed 87 oz/year.	7 to 10 days after soybean emergence. 2- to 3-inch weeds. Followed by sequential application 10 to 14 days later. Apply prior to bloom (R1).	Do not apply to non LibertyLink soybeans. **The LibertyLink soybean system works best in combination with a well planned residual herbicide applied at burndown or at planting.** Abortion of blooms occurs with later than labeled applications.
L-glufosinate @ 0.24 to 0.36 lb/A	Emerged annual grasses, seedling Johnsongrass, broadleaf weeds.	**Liberty Ultra** 19 to 29 oz/A Can add AMS, no additional surfactant needed.	7 to 10 days after soybean emergence. 2- to 3-inch weeds. Followed by sequential application 10 to 14 days later. Apply prior to bloom (R1).	19 oz rate is equivalent to 29oz rate of standard glufosinate. Maximum allowable rate per year is 58 oz/A. Read label for additional restrictions.
glufosinate + *S*-metolachlor @ 0.59 lb/A + 0.95 to 1.2 lb/A	Grass and broadleaf weeds. Will control glyphosate-resistant weeds. Adds residual control of grass and small-seeded broadleaves.	**Glufosinate 280 SL + Dual Magnum 7.62 EC** 32 oz/A + 1 to 1.33 pt/A fb 32 oz/A.	2- to 3-inch weeds. Follow with a second Liberty application as needed. Apply prior to bloom (R1).	Good option where no residual was used at burndown or at planting. Expect some leaf burn.
glufosinate + pyroxasulfone @ 0.53 + 0.053 to 0.12 lb/A	Adds residual control of small-seeded grass and broadleaf weeds.	**Glufosinate 280 SL + Zidua 4.17 SC** or **Anthem Maxx** 32 oz/A + 1.75 to 5.75 or 2.0 to 5.5 oz/A.	Up to V6.	Good option where no residual was used at burndown or at planting. Expect some leaf burn.
glufosinate + acetochlor @ 0.59 + 1.13 lb/A	Adds residual control of small-seeded grass and broadleaf weeds.	**Glufosinate 280 SL + Warrant 3ME** 32 oz/A + 3 pt/A.	Apply prior to bloom (R1).	Good option where no residual was used at burndown or at planting. Expect some leaf burn.
glufosinate + *S*-metolachlor @ + fomesafen @ 0.59 +1.09 lb/A + 0.24 lb/A	Grass and broadleaf weeds. Will control glyphosate-resistant weeds. Adds residual control of grass and small-seeded broadleaves.	**Glufosinate 280 SL + Prefix 5.3 EC** or **Cheetah Max** 32 oz/A + 2 pt/A or 32 oz/A.	2- to 3-inch weeds. Follow with a second Liberty application as needed.	Good option where no residual was used at burndown or at planting. Expect some leaf burn.
glufosinate + clethodim @ 0.59 + 0.25 lb/A	Enhanced grass control in LL soybean.	**Glufosinate 280 SL + Select Max 0.97 EC** 32 + 16 oz/A.	14 to 21 days after grass emergence.	Do not add other tank-mix partners.
Postemergence-XtendFlex or Enlist E3 Soybean				
Similar overlapping residual herbicide programs to those presented in the Postemergence-Overtop and LibertyLink Soybean Sections can be used in this soybean technology and are required for season-long control of weeds, especially Palmer amaranth.				
glyphosate + glufosinate @ 1.0 + 0.59 lb/A.	Broad spectrum control of grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Glufosinate** (280 SL formulations) 32 + 32 oz/A.	Apply to small, actively growing weeds. Apply prior to bloom (R1).	Complete coverage of weeds is crucial.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Postemergence-Enlist E3 Soybean Similar overlapping residual herbicide programs to those presented in the Postemergence-Overtop and LibertyLink Soybean Sections can be used in this soybean technology and are required for season-long control of weeds, especially Palmer amaranth.				
glyphosate + glufosinate @ 1.0 + 0.59 lb/A.	Broad spectrum control of grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Glufosinate** (280 SL formulations) 32 + 32 oz/A.	Apply to small, actively growing weeds. Apply prior to bloom (R1).	Complete coverage of weeds is crucial.
2,4-D choline @ 0.95 lb/A.	Annual broadleaf weeds.	**Enlist One** 2.0 pt/A.	Emergence to full flowering stage (R2).	Apply only to Enlist E3 soybean. Check website, www.EnlistTankmix.com, for approved adjuvants/tank mixtures. - Some crops and plant species are very sensitive to 2,4-D. Read the label and follow all directions regarding nozzles, buffers, wind speed and direction. - At the time of application, the wind cannot be blowing toward adjacent tomatoes, other fruiting vegetables, cucurbits, grapes, and cotton. - Physical drift has been found to be the primary cause of off-target movement. Use sound drift mitigation practices during the application. - Applicators must take required training.
2,4-D choline + glyphosate @ 0.71 + 0.74 to 0.95 + 1.0 lb/A.	Annual grasses and broadleaf weeds.	**Enlist Duo** 3.5 to 4.75 pt/A.	Emergence to full flowering stage (R2).	See above comments.
2,4-D choline + glufosinate @ 0.95 + 0.59 lb/A.	Most annual grasses and broadleaves. Best treatment for emerged pigweed.	**Enlist One + Liberty** 2 pt/A + 32 oz/A.	Emergence through beginning bloom (R1).	See above comments. Other glufosinate products may be labeled for tank-mixing.
Postemergence–STS or BOLT Soybean				
glyphosate + chlorimuron/ thifensulfuron @ 1.0 + 0.013 to 0.02 lb/A	Hemp sesbania, morningglory and yellow nutsedge plus some residual.	**Glyphosate** (4 lb/gal formulations) **+ Synchrony XP** 2.0 pt/A + 0.75 to 1.125 oz/A.	After first trifoliate leaf (V1).	Apply only to STS or BOLT/RR soybean varieties. Use Sequence or add Dual for residual grass component. The addition of Dual or Zidua may increase crop response from Permit Plus on STS soybean. Good choice where potential ALS herbicide drift from rice may occur. There are STS LibertyLink varieties available also.
glyphosate + halosulfuron + thifensulfuron @ 1.0 + 0.031 + 0.004 lb/A	Same as above with enhanced nutsedge and smartweed control.	**Glyphosate** (4 lb/gal formulations) **+ Permit Plus** 2.0 pt/A + 0.75 oz/A.	From 21 days prior to planting up to 88 days prior to harvest. Brief chlorosis may occur on some STS varieties.	Apply only to STS or BOLT/RR soybean varieties. Use Sequence or add Dual for residual grass component. The addition of Dual or Zidua may increase crop response from Permit Plus on STS soybean. Good choice where potential ALS herbicide drift from rice may occur. There are STS LibertyLink varieties available also.
Postemergence-Directed				
2,4-DB @ 0.2 lb/A	Common cocklebur, morningglory.	**Butyrac, Butoxone** 0.8 pt/A of 2 lb/gal 2,4-DB (Butyrac 200) or 1 pt/A of 1.75 lb/gal 2,4-DB.	Direct spray to soybeans at V4 (8-inch) stage and repeat 5 to 7 days later.	Apply directed spray treatment no higher than one-third up the soybean stem. Cover weeds thoroughly. ROOT ROT OR POOR GROWING CONDITIONS FOLLOWING THE APPLICATION MAY RESULT IN SOYBEAN INJURY. USE SAME PRECAUTIONS IN APPLYING 2,4-DB AS ARE USED IN APPLYING 2,4-D. AVOID DRIFT. DO NOT APPLY WITHIN 60 DAYS OF HARVEST.
NOTE–Many producers are reluctant to apply 2,4-DB with directed spray equipment used in cotton. This can be done successfully, and many producers do so. The following procedure has been shown to be effective in cleaning 2,4-DB from a sprayer system. (1) Replace any cracked or badly worn hoses. (2) Flush system completely with detergent water; drain.		(3) Flush system with ammonia solution (1 quart ammonia per 25 gallons water); drain. (4) Fill system with above concentration ammonia solution; let stand overnight. (5) Drain system next day; flush with excess water. (6) Flush system the day before next use. (7) Clean outside of equipment and nozzle assemblies in above manner.		

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
SOYBEANS Preharvest				
paraquat @ 0.25 lb/A	Desiccation of green weed foliage and soybean defoliation.	**Paraquat** (3 lb/gal) Add a surfactant. 10.67 oz/A.	When ½ of soybean leaves have dropped and the other ½ are yellow. Apply 15 days prior to harvest or 3 days prior to harvest for seed production.	For indeterminate soybeans, apply when 65% of pods are brown and remaining pods are turning yellow. Do not pasture livestock within 15 days of treatment and remove 30 days before slaughter.
sodium chlorate @ 6 lb/A	Desiccation of green weed foliage and soybean defoliation.	**Sodium Chlorate** Several brands and trade names available. 2 gal/A of 3 lb/gal or 1 gal/A of 6 lb/gal.	When ½ of soybean leaves have dropped and the other ½ are yellow.	See label for details. More dependent on environmental conditions for activity than paraquat.
paraquat + sodium chlorate @ 0.167 + 3 lb/A	Desiccation of green weed foliage and soybean defoliation.	**Paraquat** (3 lb/gal) 10.67 oz/A + **sodium chlorate** 3 lb ai/A (1 gal of 3 lb/gal or 0.5 gal of 6 lb/gal). Add a surfactant.	When ½ of soybean leaves have dropped and the other ½ are yellow. Apply 15 days prior to harvest. 3 days prior to harvest for seed production.	For indeterminate soybeans, apply when 65% of pods are brown and remaining pods are turning yellow. See label for details. More dependent on environmental conditions for activity than paraquat.
glyphosate @ 1 lb/A	Desiccation of green weed foliage.	**Glyphosate** (4 lb/gal formulations) 2 pt/A.	After soybean pods have lost all green color.	See label for details. Much slower than paraquat.
carfentrazone @ 0.025 lb/A	Desiccation of morningglory foliage.	**Aim 2EC** 1.5 oz/A. Add 0.25% nonionic surfactant or 0.5% crop oil concentrate.	After soybean pods have lost all green color. 3-day pre-harvest interval.	Excellent coverage is required. Add glyphosate or paraquat for best results.
saflufenacil @ 0.044 lb/A	Desiccation of green foliage.	**Sharpen** 2.0 oz/A. Add 1% v/v MSO.	At least 3 days prior to harvest.	Excellent coverage is required.
Spot Treatment				
2,4-DB	Common cocklebur.	**Butyrac, Butoxone, etc.** 1/2 gal in 100 gal water.	Spot treat individual weeds.	Spray terminal area and upper leaves of cocklebur. Spray in manner similar to boom spraying with 20 gpa nozzle output.
glyphosate	Bermudagrass.	**Glyphosate** (4 lb/gal formulations) 1 to 2 gal per 100 gal water. Add surfactant.	Spot treat emerged weeds before pod set of soybeans.	More effective on large, actively growing weeds.
clethodim	Johnsongrass.	**Select 2 EC** or **Select Max 0.97 EC** 8 or 16 oz/A + 1% COC/A.	Spot treat emerged weeds before pod set of soybeans.	If field treated with glyphosate previously, this is the preferred spot treatment.
Postemergence johnsongrass emerged above canopy				
glyphosate wipe-on	Johnsongrass.	**Glyphosate** (4 lb/gal formulations) 33% solution in ropewick or other wipe-on applicator.	After there is sufficient height difference between crop and weed.	Use in conjunction with other good johnsongrass control practices.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
EDAMAME (edible vegetable bean)				
Preplant Burndown				
paraquat @ 0.47 to 0.94 lb/A	Annual broadleaf and grass weeds (existing vegetation).	**Paraquat** (3 lb/gal) 1.88 to 3 pt/A in at least 20 gal water per acre for ground application. 5 to 10 gal for aerial application. Add 0.25% surfactant.	Use prior to planting on seedbeds that are not to be disturbed before planting. Use higher rate on weeds larger than 2 inches.	Good spray coverage is essential.
glyphosate @ 1 lb/A	Annual grasses and broadleaf weeds (existing vegetation). Weak on morningglories.	**Glyphosate** (4 lb/gal formulations) 2 pt/A. Use high rate on all but very small weeds.	Use prior to planting for vegetation knockdown. Can be tank mixed with Pursuit or Spartan Charge for improved control of some species and residual activity.	Best results when applied in lower spray volumes, i.e., 5 to 10 gpa.
Preplant Incorporated				
trifluralin @ 0.5 to 1 lb/A	Annual grass weeds and johnsongrass from seed.	**Treflan 4 EC** 1 to 2 pt/A.	From 6 weeks prior to planting to time of planting.	See Treflan recommendations in Soybean section.
S-metolachlor @ 0.95 to 1.6 lb/A	Weedy rice, annual grasses and yellow nutsedge.	**Dual Magnum 7.62 EC** 1 to 1.67 pt/A.	During final seedbed preparation (within 7 days of planting). Can be applied up to third trifoliate.	See Dual Magnum recommendations in Soybean section.
imazethapyr @ 0.063 lb/A	Yellow nutsedge, pitted, entire-leaf and ivyleaf morningglories, spotted spurge and smartweed. Suppression of annual grass, weedy rice and johnsongrass.	**Pursuit 2EC** 4 oz/A.	During final seedbed preparation up to 7 days before planting. Can be tank-mixed with Dual. Can also be tank-mixed with glyphosate for preplant burndown to improve nutsedge control.	Can give excellent residual control if rain occurs within 5 days. **40 month rotation to non Clearfield rice.**
Preemergence				
S-metolachlor @ 0.9 to 1.5 lb/A	Annual grasses, weedy rice, nutsedge and small-seeded broadleaves.	**Dual Magnum 7.62 EC** 1 to 1.67 pt/A.	At planting, up to third trifoliate.	Rainfall needed for activation.
linuron @ 0.5 to 1.0 lb/A	Small-seeded broadleaf weeds.	**Lorox 50 DF** 1 to 2 lb/A.	Apply immediately after planting – before soybean emergence.	See supplementary label.
carfentrazone + sulfentrazone @ 0.008 to 0.02 + 0.075 to 0.175 lb/A	Small-seeded broadleaf weeds.	**Spartan Charge 3.45 SL** 3 to 7 oz/A.	Apply immediately after planting – before soybean emergence.	See AR 24(c) label.
clomazone @ 0.5 lb/A	Annual grass. See soybean and rice tables.	**Clomazone 3ME** 1.3 pt/A.	Apply immediately after planting – before soybean emergence.	See soybean and rice tables. One application per year.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
EDAMAME (edible vegetable bean)				
Postmergence				
imazamox @ 0.032 lb/A	Some grasses and broadleaf weeds.	**Beyond Xtra 1 EC** 4 oz/A. Add 0.25% v/v NIS.	Apply to 2" to 4" weeds.	See supplementary label.
imazethapyr @ 0.063 lb/A	Yellow nutsedge, pitted, entire-leaf and ivyleaf morningglories, spotted spurge and smartweed. Suppression of annual grass, weedy rice and johnsongrass.	**Pursuit 2 EC** 4 oz/A. Add a nonionic surfactant.	Within first 10 days after weed emergence.	Timing is extremely critical. Weeds must be very small. Can give excellent residual control if rain occurs within 5 days. **40-month rotation to non Clearfield rice.**
clethodim @ 0.25 lb/A	Annual grasses, bermudagrass and johnsongrass. **Weedy rice seedhead suppression.**	**Select 2E or Select Max 0.97 EC** 8 or 16 oz/A. Add 1% crop oil concentrate + AMS.	Before annual grasses exceed 14 days after emergence. Johnsongrass - 12" to 24". Bermudagrass - 3" height or 6" runner length maximum. For weedy rice seedhead suppression, apply at internode elongation stage of weedy rice.	See comments (p. 57) for Poast Plus and Fusilade on cultivation and tank mixing. Performance comparable to Assure II for annual grasses and johnsongrass.
fomesafen @ 0.25 lb/A	Broadleaf weeds.	**Reflex 2 EC** 1 pt/A.	Up to three trifoliate.	Do not apply late – will burn pods and blooms.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
PEANUT–Preplant				
pendimethalin @ 0.75 to 1 lb/A	Annual grass and small-seeded broadleaf weeds.	**Prowl 3.3 EC** 1.8 to 2.4 pt/A. or **Prowl H2O 3.8 CS** 1.8 to 2.4 pt/A.	Incorporate in top 1" to 2" of final seedbed.	See label for details.
ethalfluralin @ 0.56 to 1.12 lb/A	Annual grass and small-seeded broadleaf weeds.	**Sonalan 3 HFP** 1.5 to 3 pt/A.	Incorporate in the top 2" to 3" after application.	See label.
Preplant or Preemergence				
fluridone @ 0.11 to 0.15 lb/A	Control of small-seeded grasses and broadleaves. Good tankmix partner for pigweed	**Brake** 12 to 16 oz/A Use lighter rate on sands	Preplant, at planting or before crop emergence.	**Do not apply to Spanish or Valencia type peanut**. Plant peanut at least 1.5 in deep.
S-metolachlor @ 0.9 to 1.8 lb/A	Most small-seeded annuals, yellow nutsedge and pigweed.	**Dual Magnum 7.62 EC** 1 to 2 pt/A.	Preplant within 7 days before planting and incorporate 1½ to 2 inches deep or immediately after planting with or without soil incorporation.	If incorporating after planting, do not disturb seed. Incorporation may be helpful under dry soil conditions. Can be applied post up to 90 days prior to harvest.
dimethenamid @ 0.56 to 0.98 lb/A	Small-seeded annuals and better control group 15 resistant pigweed.	**Outlook 6 EC** 12 to 21 oz/A.	Preplant within 7 days before planting and incorporate 1½ to 2 inches deep or immediately after planting with or without soil incorporation.	If incorporating after planting, do not disturb seed. Incorporation may be helpful under dry soil conditions. Can be applied post up to 90 days prior to harvest.
diclosulam @ 0.024 lb/A	Copperleaf, eclipta, cocklebur, morningglories, other small-seeded broadleaf weeds and yellow nutsedge. Post control of horseweed.	**Strongarm 84 DG** 0.45 oz/A.	Preplant incorporated or pre-emergence.	See label for rotation restrictions and precautions. Cotton rotation 10 months.
carfentrazone + sulfentrazone @ 0.008 to 0.014 + 0.08 to 0.12 lb/A	Pigweed, smartweed, morningglory and nightshade.	**Spartan Charge 3.5L** Coarse soil 3.0 oz Medium soil 4.0 oz Fine soil 5.0 oz	Pre or pre-plant burndown.	Do not apply to sandy soils with less than 1% OM. Do not apply after crop emerges or irrigate during "cracking."
flumioxazin @ 0.063 to 0.096 lb/A	**Pigweed**, eclipta, copperleaf, morningglory.	**Valor 51 WDG** 2 to 3 oz/A.	Preemerge immediately after planting.	Do not apply after cracking. Do not irrigate while peanut are cracking.
imazethapyr @ 0.063 lb/A	Nutsedge suppression plus broadleaves.	**Pursuit 70 DG** 1.44 oz/A.	Shallow incorporation through at-crack.	May be tank mixed with Dual.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
PEANUT **Postemergence**				
pyroxasulfone @ 0.065 to 0.11 lb/A	Residual control of grasses and small-seeded broadleaves, pigweed.	**Zidua 4.17 SC** 2.5 to 3.25 oz/A.	Zidua may be applied at cracking or early post. 14 days after last application.	Be aware of potential varietal issues. Do not exceed 8.25 fl oz/A per year. Do not exceed 3.25 fl oz/A per application!
pyroxasulfone + carfentrazone @ 0.086 to 0.11 lb/A + 0.006 to 0.0151 lb/A	Residual control of grasses and small-seeded broadleaves, pigweed.	**Anthem Flex 4SC** 2.9 to 4.0 oz/A.	Anthem Flex may be applied from at cracking to first leaf stage through beginning pod development.	Be aware of potential varietal issues. Do not exceed 4.0 fl oz per application.
2,4-DB @ 0.2 lb/A	Common cocklebur, morningglory.	**Butyrac, Butoxone** 0.8 pt/A of 2 lb/gal, 2,4-DB or 1 pt/A of 1.75 lb/gal 2,4-DB.	Overtop. 2 to 12 weeks after planting.	See label for description. Cutoff is 12 weeks after planting. Do not apply if peanut are drought stressed.
metolachlor @ 0.9 to 1.8 lb/A	Small-seeded grass and broadleaf weeds.	**Dual Magnum 7.62 EC** 1 to 2 pt/A.	3- to 4-leaf up to flowering.	Will not kill emerged weeds.
bentazon @ 0.75 to 1 lb/A	Common cocklebur, prickly sida, spurred anoda, velvetleaf, smartweed, common ragweed. Refer to soybean rating table.	**Basagran** 1.5 to 2 pt/A.	Overtop to small weeds.	Do not apply to peanut in stress condition. See label for details.
acetochlor @ 1.13 lb/A	Small-seeded broadleaf and grass weeds.	**Warrant 3ME** 3 pt/A.	3- to 4-leaf up to flowering.	Will not kill emerged weeds.
dimethenamid @ 0.56 to .98 lb/A	Improved residual control of grasses and group 15 resistant pigweed.	**Outlook** 12 to 16 oz/A.	From emergence until 80 days prior to harvest.	Will not kill emerged weeds.
acifluorfen @ 0.375 to 0.5 lb/A	Pigweed, morningglory, prostrate spurge, hophornbeam, copperleaf and many other broadleaf weeds. Refer to soybean rating table.	**Ultra Blazer 2L** 1.5 to 2 pt/A. For most weeds, use 2 pt rate. Refer to label.	Overtop when weeds are in 2- to 4-leaf stage.	Do not apply within 75 days of harvest. Refer to label for other restrictions and precautions.
bentazon + acifluorfen @ 0.5 + 0.25 lb/A	See Basagran and Ultra Blazer comments above. Refer to soybean rating table.	**Storm 4L** 1.5 pt/A. Add 1 pt/A crop oil concentrate.	Over top to small weeds.	See Basagran and Ultra Blazer comments above.
paraquat @ 0.125 to 0.25 lb/A	Most annual grasses and broadleaf weeds.	**Paraquat** (3 lb/gal) 5.3 to 10.67 oz/A.	At planting or prior to crop emergence through postemergence (up to ground crack + 28 days).	Some crop injury will occur in the form of browning and leaf crinkling but will recover and develop normally. The addition of Basagran to paraquat may reduce peanut foliar burn. Do not apply more than 0.125 lb/A per year.
imazethapyr @ 0.063 lb/A	Morningglory, common cocklebur, spotted spurge, yellow and purple nutsedge, velvetleaf, ragweeds, pigweeds, smartweed and nightshades.	**Pursuit 70 DG** 4 oz/A 2SL or 1.44 oz/A 70 DG. Add a surfactant.	At cracking or early postemergence to small weeds.	Refer to label for crop rotation restrictions. Weed control with Pursuit will be slow.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
sethoxydim @ 0.2 to 0.3 lb/A	Annual grasses and johnsongrass.	**Poast Plus 1E** 1 to 1.5 pt/A. Add 1 qt/A crop oil concentrate. Use 1 pt rate for small annual grasses.	Before annual grasses exceed 14 days after emergence. Johnsongrass - 15" to 20"	See comments for Poast Plus in soybean section. Do not apply more than 2.5 pt/A per year.
clethodim @ 0.125 to 0.156 lb/A	Annual grasses and johnsongrass.	**Select 2 EC or Select Max** 8 or 16 oz/A. Add 1% crop oil concentrate + AMS.	Before annual grasses exceed 14 days after emergence. Johnsongrass - 15" to 20"	See comments for Select in soybeans.
imazapic @ 0.063 lb/A	Most broadleaf and grass weeds, nutsedge and johnsongrass. Sicklepod.	**Cadre 2 AS** 4 oz/A. Add a nonionic surfactant or crop oil concentrate.	Early postemergence to small weeds.	See label for details, precautions and plant-back intervals. For sicklepod, apply in combination with 2,4-DB.
lactofen @ 0.195 lb/A	Most broadleaf weeds.	**Cobra 2 EC** 12.5 oz/A + 1% v/v crop oil concentrate.	After 6-leaf stage. 45 days prior to harvest.	Rain-free period is 30 minutes.
acetochlor @ 1.13 lb/A	Small-seeded broadleaf and grass weeds.	**Warrant 3 ME** 3 pt/A.	3- to 4-leaf up to flowering.	Will not kill emerged weeds.
Harvest Aid				
carfentrazone @ 0.031 lb/A	Morningglory desiccation.	**Aim 2 EC** 2 oz/A + 1% v/v crop oil concentrate.	7 days prior to harvest.	Do not feed peanut hay only. One application per season. 6 to 8 hours required prior to rain or irrigation for digging.
pyraflufen ethyl @0.02 lb/A	General harvest aid – broadleaf weeds.	**E.T. 0.2 EC** 1.5 oz/A.	1 week prior to digging.	Do not feed peanut hay only. One application per season. 6 to 8 hours required prior to rain or irrigation for digging.

ALS-Resistant Pigweed Programs*

Program 1: Prowl preplant incorporated, followed by Valor, followed by Cobra or Ultra Blazer + Dual or Warrant + 2,4-DB on 3" or smaller pigweed.

Program 2: Prowl preplant incorporated, followed by paraquat + Storm + Zidua or Dual at cracking, followed by Cobra or Ultra Blazer + 2,4-DB + Outlook or Zidua on 3" or smaller pigweed.

***ALS peanut herbicides include Cadre, Pursuit and Strongarm.**

For PPO-Resistant pigweed

Program 3. Valor (3 oz) or Brake (12 oz) plus 16 oz Outlook or 1.3 pt/A Dual Magnum PRE followed by paraquat + Storm + Zidua 21-28 DAP followed by either Anthem Flex, Warrant, or Outlook at 14-21 days after previous application. Add Ultra Blazer or Storm plus 2,4-DB if necessary, for morninglories and clethodim for grasses.

WEED RESPONSE RATINGS FOR CORN HERBICIDES

(See Explanation of Rating Tables on Page 3.)

HERBICIDES	WSSA GROUP #	GRASSES											BROADLEAVES													SEDGES
		Barnyardgrass	Broadleaf Signalgrass	Crabgrass	Fall Panicum	Foxtail	Goosegrass	Weedy rice	Rhizome Johnsongrass	Ryegrass	Seedling Johnsongrass	Shattercane	Bigroot Morningglory	Cocklebur	Common Ragweed	Honeyvine Milkweed	Horsenettle	Lambsquarters	Morningglory	Pigweed sp.	Prickly Sida	Purslane	Sicklepod	Smartweed	Velvetleaf	Yellow Nutsedge
Preemergence																										
Atrazine	5	6	4	7	3	6	6	8	0	-	2	0	4	9	9	6	5	9	8	9	9	9	8	9	8	0
Anthem Flex, Maxx / Zidua	15	8	8	8	8	8	7	4	0	9	5	-	-	-	-	-	-	5	6	9	7	-	0	3	2	5
Callisto	27	7	7	9	-	7	-	7	0	-	0	0	-	8	7	8	7	9	9	9	9	-	5	9	9	5
Atrazine + Dual II Magnum	5, 15	9	8	9	9	9	9	9	0	9	4	7	4	8	9	6	3	9	8	9	9	9	8	4	7	7
Trivolt	2, 15, 27	9	8	9	-	-	9	-	7	7	7	-	-	8	7	-	7	8	7	7	8	-	-	-	8	2
Atrazine + Degree	5, 15	9	7	9	9	9	9	8	0	8	6	7	4	8	9	6	3	9	8	9	9	9	8	4	7	7
Lexar	5, 15, 27	9	9	9	8	8	7	8	0	9	3	5	4	9	9	7	3	9	9	10	9	9	9	9	10	7
Atrazine + Outlook	5, 15	9	8	9	9	9	9	8	0	8	6	7	4	8	9	6	3	9	8	9	9	9	8	6	6	7
Prowl + Atrazine	3, 5	9	6	9	9	9	9	8	0	-	7	7	3	8	9	5	2	9	8	9	9	9	7	9	6	4
Surestart II	2, 4, 15	9	7	9	9	9	9	8	0	8	6	7	-	-	8	-	-	9	9	8	9	9	8	7	7	6
Verdict	14, 15	8	7	8	7	8	8	7	0	-	-	-	5	-	-	-	-	7	8	9	7	-	5	-	-	-
Postemergence																										
2,4-D	4	0	0	0	0	0	0	0	0	0	0	0	3	9	9	9	4	8	9	8	8	9	8	5	8	0
Accent Q	2	8	8	7	7	8	7	-	8	6	9	9	7	5	6	2	2	3	6	0	-	-	7	7	6	3
Acuron	5, 15, 27	9	9	9	8	8	7	7	0	7	3	5	4	9	9	7	3	9	9	9	9	9	9	9	10	6
Acuron GT/Halex GT	9, 15, 27	9	9	9	9	9	9	9	9	5	10	8	9	9	9	-	7	9	8	9	9	9	9	9	9	7
Atrazine + oil	5	6	6	6	5	7	6	9	0	5	3	0	4	9	8	6	4	8	8	9	8	9	8	9	7	5
Basagran	6	0	0	0	0	0	0	0	0	0	0	0	3	9	8	5	0	5	4	0	7	7	0	9	8	7
Buctril	6	0	0	0	0	0	0	0	0	0	0	0	7	9	7	7	4	8	7	5	-	-	3	9	7	0
Callisto	27	7	7	9	7	7	7	7	0	5	0	0	-	8	7	8	-	9	8	8	9	-	5	9	9	5
Capreno	2, 27	9	8	9	-	-	9	-	7	6	7	-	-	8	7	-	7	9	8	9	9	-	5	-	9	5
Capreno + Atrazine	2, 27, 5	9	8	9	8	-	9	9	8	6	10	-	5	9	8	6	8	9	9	9	9	9	8	9	9	5
Trivolt + Atrazine	2, 15, 27, 5	9	8	9	8	-	9	9	8	8	8	-	5	9	8	6	8	9	9	9	9	9	8	9	9	5
Dicamba	4	0	0	0	0	0	0	0	0	0	0	0	8	8	9	9	6	9	9	9	6	-	8	9	8	0
Gambit	2, 3	0	3	0	3	-	3	-	-	-	3	-	-	9	8	-	-	8	7	3	8	8	8	8	9	9
Glufosinate 1 application	10	8	9	8	9	-	5	9	8	6	9	-	-	9	9	-	7	-	8	8	8	-	9	9	5	6
Glyphosate (4 lb/gal) (1 qt/A once)	9	9	9	9	9	9	9	8	9	6	10	8	-	9	9	7	6	9	7	9	8	9	9	7	7	4
Laudis	27	7	8	8	-	-	7	-	5	4	-	-	-	8	-	-	-	9	8	8	7	-	7	-	-	-
Paraquat directed or Hood	22	9	9	9	8	8	9	9	0	7	8	0	-	4	8	-	7	9	4	9	3	8	9	5	7	3
Permit	2	0	3	3	3	0	3	0	3	-	3	0	-	-	5	-	-	5	5	0	7	7	4	6	6	9
Permit Plus/Permit	2	0	3	3	3	0	3	0	3	-	3	0	-	-	5	-	-	5	5	0	7	7	4	6	6	9
Realm Q	2, 27	8	7	8	8	8	8	-	7	6	9	9	-	9	9	-	7	8	8	8	9	8	7	9	9	7
Resolve Q	2	8	9	8	8	8	8	-	7	5	9	9	-	6	7	-	5	8	8	7	7	8	7	7	8	7
Steadfast Q	2	8	9	8	8	9	8	6	8	7	9	9	8	6	7	3	3	8	8	7	6	-	7	8	9	6

*Rating will be 0 on ALS inhibitor-resistant weeds (Group 2).

**Repeat application may be needed to achieve these ratings.

Rating scale – 0 = No Control 10 = 100% Control.

Soil-Applied Herbicide Rates for Corn

Soil Texture

Herbicide	Coarse (light)	Medium	Fine (heavy)
AAtrex Nine-0	2.2 lb	2.2 lb	2.2 lb
Acuron*	2.5 qt	2.5 qt	3 qt
Anthem Flex	2.75-5 oz/A	3-6 oz/A	3.5-7.28 oz/A
Anthem Maxx	2.5-3.5 oz	3-4 oz	4-5 oz
Atrazine 4L	2 qt	2 qt	2 qt
Bicep II Magnum	1.3 qt	1.5 qt	2 qt
Callisto	6 oz	6 oz	7.7 oz
Cinch	1 pt	1.33 pt	1.67 pt
Cinch ATZ	1.3 qt	1.5 qt	2 qt
Degree	2.75-3.75 pt	4.25-5 pt	5-5.5 pt
Degree Xtra	2.9 qt	2.9-3.7 qt	3.2-3.7 qt
Dual II Magnum	1 pt	1.33 pt	1.67 pt
Harness MAX	55-64 oz	64-75 oz	75-95 oz
Keystone NXT	1.5-2 pt	1.5-2.5 pt	2-3 pt
Lexar EZ	3 qt	3 qt	3 qt
Outlook	12-14 oz	14-21 oz*	14-21 oz*
Prowl 3.3EC + Atrazine 90	1.8 pt + 1.1 lb	2.4 pt + 1.7 lb	2.4 pt + 2.2 lb
Sharpen	2-2.5 oz	2.5-3 oz	3-3.5 oz
Surestart II	1.5-2 pt	1.5-2.5 pt	2-3 pt
Verdict	10-12 oz	13-15 oz	16-18 oz
Zidua SC	2.5-4.5 oz	3.5-5 oz	4-6.5 oz

NOTE: It is impossible to list all of the combinations possible considering the different formulations of glyphosate, Atrazine, Micro-Tech, Dual and mesotrione. Refer to the label of the products in question for the correct rates.

*The use rate of Acuron is based more on organic matter than soil texture.
All soil types < 3% OM = 2.5 qt/A
All soil types > 3% OM = 3 qt/A

Soil-Applied Herbicide Rates for Grain Sorghum

Soil Texture

Herbicide	Coarse (light)	Medium	Fine (heavy)
Preplant Herbicides			
Dual II Magnum	1 pt	1.33 pt	1.67 pt
Micro-Tech	---	3 qt	3 qt
Outlook	0.75 pt	0.87 pt	1 pt
Preemergence Herbicides			
AAtrex Nine-0	---	1.1 qt	1 qt
Atrazine 4L	---	1 qt	1 qt
Atrazine 80W	---	1.25 lb	1.25 lb
Bicep II Magnum	1.3 qt	1.5 qt	2 qt
Dual II Magnum	1 pt	1.33 pt	1.67 pt
Lexar	---	3 qt	3 qt
Sharpen	2 oz	2 oz	2 oz
Verdict	10 oz	10-12 oz	12-18 oz

All rates are broadcast rates. Reduce rates for appropriate band width.
See example 2 on page 6.

Crop Replant and Rotation Guide for Corn and Grain Sorghum Herbicides*

Herbicide	Replant/Crop Rotation	Time Interval	Precautions
2,4-D	All	90 days	90 days or until sufficiently dissipated.
Accent Q/Zest	C W S CT	I 4 months 15 days 10 months	Sweet corn and popcorn - 10 months. All crops not specified - 10 months if pH < 6.5 or 18 months if pH > 6.5. Grain sorghum - 10 months if pH < 7.5 or 18 months if pH > 7.5.
Acuron	C SG, B, W CT, P, R, S, GS All	I 4 months 10 months 18 months	
Anthem Maxx/ Anthem Flex	S, C R SG W CT, P, SF	I 10 months 11 months 4 months 4 months	See label for rotational intervals by rate applied.
Atrazine	C, GS All	I FY	If applied after June 10, only corn and grain sorghum can be planted the following year.
Basagran	All	I	
Bicep II Magnum Cinch ATZ	C, GS† S, CT SG All	I FY 15 months 18 months	† Use Concep-treated seed. If applied after June 10, only corn and grain sorghum can be planted the following year.
Buctril	C, GS SG All	I Fall FY	
Buctril + atrazine	C, GS S CT, FG, FL, R SG All others	I FY Do not plant the year following application.	If applied after June 15, plant only corn or grain sorghum the next year.
Callisto/Harness MAX	C, GS SG All	I 4 month 10 months	Do not apply post if soil was treated with Counter or Lorsban.
Dicamba	C, GS W All	I 45 days/pt† Following normal harvest of C, G, W, GS	† Wheat planting must be delayed 45 days after application per pint of Banvel used.
Dual II Magnum Cinch	C, S, GS† SG R All	I 4.5 months Next spring 18 months	† Use Concep-treated seed.
Gambit	R C W, GS, SG CT, P, S	I 1 month 2 months 10 months	See label for other rotational crop restrictions.
Glyphosate			No restrictions.
Guardsman Max	GS, S, CT All	FY Do not plant the year following application.	
Halex GT	C, GS† SG CT, S	I 4 months 10 months	† Use Concep-treated grain sorghum seed.
Huskie	CT SF, C GS R S W	FY 9 months 4 months FY 4 months 1 month	
Keystone NXT	C GS, S. R A, SG, SF, W	I Following spring 15 months	
Lexar EZ	C, GS CT, SG, S, P All	I Next spring 18 months	Use Concep-treated grain sorghum seed.
Glufosinate	CT, C, R, S SG, W All other	I 70 days 180 days	
Outlook	C, S SG All	I 4 months Next spring	
Paraquat			No restrictions.
Peak	IR Corn, SG C, GS R, FG, S, CT, P A, SF	I 1 month 10 months 22 months	Do not replant any broadleaf crop if less than 10 inches of rainfall or irrigation has occurred since the application of Peak.
Permit	W S	3 months 10 months	
Prowl	CT, S W, B All	I 120 days† FY	† 90 days after post-incorporated application, cannot plant using no-tillage practices.
Realm Q	C SG W CT, GS, S	I 9 months 4 months 10 months	
Resicore	C W A, B, R, GS, S, SF CT	I 4 months 10.5 months 12 months	
Resolve Q	C W A, R, GS, S, SF All other CT	I 3 months 10 months 18 months 1 month	If at least 15 inches of rainfall has not occurred since application, CT, GS, SF, A rotations are extended to 18 months. Do not replant rice on soils with greater than pH 6.5.
ShieldEx	B, W, FG A, CA, CT P, R, ES, S SF	3 months 9 months	
Surestart II	C W A, B, S GS SF CA, CT	I 4 months Following spring 12 months 18 months 26 months	
Surtain 14 oz/A	C, SC W S CT, P R GS, SF SG	I 1 month 3 months 4 months 7 months 12 months 6 months 11 months	Rotation intervals will decrease and increase depending on rate
Storen	C, SC W CT, S, P, GS SG R All	I 4.5 months 10 months 11 months 12 months 30 months	Cover crops for soil building or erosion control may be planted any time but do not graze or harvest for food or feed
Zidua (3.25 oz)	C, S W CT, P, SF, W R All	I 4 months 10-18 months 18 months	Depending on rate used.

*This table applies to the major field and forage crops. Refer to the herbicide labels for the latest recrop and rotation information for horticultural crops. These are written as best we could interpret the labels. We regret any omissions or errors. Always refer to product labels before using a pesticide or replanting into treated fields.

KEY

Crop

All = All crops not specified
A = Alfalfa
B = Barley
C = Corn
CA = Canola
CT = Cotton
FG = Forage Grasses
FL = Forage Legumes
GS = Grain Sorghum
P = Peanuts
R = Rice
S = Soybeans
SF = Sunflowers
SG = Small Grains
W = Wheat

Timing

I = Immediately
FY = Following year (usually spring)

Corn and Grain Sorghum Herbicide

Compatibility with Fertilizers as Application Carriers*

Herbicide	Fertilizer	
	Fluid	Dry
Atrazine 4L, 80W, DF	Y	N
Banvel	Y	N
Bicep	Y	Y
Callisto	Y	N
Degree Xtra	Y	Y
Dual II Magnum	Y	Y
Exceed	Y	N
Gambit	Y	N
Glyphosate	N	N
Harness MAX	Y	Y
Paraquat	Y	N
Permit, Permit Plus	Y	N
Prowl	Y	Y
Surtain	Y	Y
2, 4-D amine	N	N

Y = Yes, N = No

*There are many specific fertilizer incompatibilities and restrictions with most herbicides. Be sure to read the herbicide label for specific mixing or impregnation instructions. Compatibility agents are required for many mixes. A typical compatibility test procedure for mixing herbicides in fluid fertilizers is given on page 4. NOTE: Compatibility with dry fertilizer is listed here from a labeling standpoint. The University of Arkansas only recommends herbicide application on dry fertilizer as a third alternative to spraying in water or in liquid fertilizer.

Rainfall-free Periods for Postemergence Corn and Grain Sorghum Herbicides

Herbicide	Time Before Rainfall*
Accent	4 hr
Atrazine	1 to 2 hrs
Banvel	6 to 8 hrs
Basagran	8 hrs
Beacon	4 hrs
Buctril	1 hr
Buctril/Atrazine	1 hr
Callisto	1 hr
Capreno	1 hr
Corvus	1 hr
Gambit	4 hr
Glufosinate	4 hrs
Glyphosate	6 hrs
Halex GT	1 hr
Paraquat	30 min
Permit, Permit Plus	4 hrs
ShieldEx	1 hrs
2,4-D amine or other	6 to 8 hrs

*This is the interval that must occur prior to a rainfall event in order to maintain maximum weed control.

ATRAZINE AND WATER QUALITY

Atrazine label restrictions regarding mixing, loading and application are discussed below. These restrictions are part of the overall ground and surface water contamination risk reduction measures. Atrazine users are strongly encouraged to follow these guidelines to comply with the label, and to share in the responsibility of preserving the future of this extremely valuable corn herbicide. **These restrictions, and the Restricted Use Pesticide designation, apply to all formulations of atrazine, and all package mix products which contain atrazine.**

Mixing, Loading and Application – Atrazine may not be mixed/loaded or used within 50 feet of all wells, including abandoned wells, drainage wells and sink holes. Atrazine may not be mixed or loaded within 50 feet of intermittent streams and rivers, natural or impounded lakes and reservoirs. Atrazine may not be applied aerially or by ground within 66 feet of the points where field surface runoff enters perennial or intermittent streams and rivers or within 200 feet around natural or impounded lakes and reservoirs. If atrazine is applied to highly erodible land, the 66-foot buffer or setback from runoff entry points must be planted to corn, seeded with grass, or another suitable crop.

Application rates – All soil applications prior to crop emergence –

***Highly Erodible Soils** (as defined by NRCS) – If conservation tillage is practiced (at least 30 percent of residue coverage at planting), apply a maximum of 2 lb a.i./acre. If residue coverage is less than 30 percent, apply a maximum of 1.6 lb a.i./acre.

***Soils Not Highly Erodible** – Apply a maximum of 2 lb a.i./acre.

Postemergence Applications – If no atrazine was applied prior to corn emergence, apply a maximum of 2 lb a.i./acre. If a postemergence treatment is required following an earlier herbicide application, the total atrazine applied may not exceed 2.5 lb a.i./acre/calendar year. Postemergence application to corn must be made before corn exceeds 12 inches in height.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FIELD CORN				
Removing Partial Corn Stands for Replant				
clethodim @ 0.045 lb/A	Corn, including Roundup Ready and LibertyLink.	**Select Max** 0.97 lb/gal, 6 oz/A.	Up to 12-inch corn. Add surfactant.	Do not plant corn for 7 days after application.
glufosinate @ 0.6 lb/A	Corn, including Roundup Ready but not LibertyLink.	**Glufosinate** (280 formulations) 32 oz/A.	Good coverage is essential. Adding AMS may enhance control.	Note that corn with the Herculex insecticide trait is tolerant to glufosinate and will not be controlled. Corn may be replanted immediately.
paraquat + metribuzin @ 0.625 + 0.14 lb/A	Corn, including Roundup Ready and LibertyLink.	**Paraquat** (3 lb/gal formulations) **+ metribuzin 75DF** 40 or 26 oz/A + 3 oz/A.	Good coverage is essential.	Corn may be replanted immediately.
paraquat + diuron @ 0.625 + 0.5 lb/A	Corn, including Roundup Ready and LibertyLink.	**Paraquat** (3 lb/gal formulations) **+ Direx 4L** 40 or 26 oz/A + 1 pt/A.	Good coverage is essential.	Corn may be replanted immediately.
paraquat + atrazine @ 0.625 + 0.5 lb/A	Corn, including Roundup Ready and LibertyLink.	**Paraquat** (3 lb/gal formulations) **+ Atrazine 4L** 40 or 26 oz/A + 1 pt/A.	Good coverage is essential.	Corn may be replanted immediately.
Preemergence				
Many herbicide "pre-mixes" exist for field corn – too many to list here. Check the active ingredients and rates for all pre-mixes. Most individual components of these mixes are listed below.				
S-metolachlor @ 0.75 to 1.3 lb/A	Annual grasses and pigweed.	**Dual II Magnum 7.64 EC** 0.8 to 1.67 pt/A.	Preplant to preemergence.	Activating rainfall needed within 7 days of application.
atrazine @ 2 lb/A	Most small-seeded annuals, annual morningglory, cocklebur, velvetleaf, smartweed and sicklepod.	**AAtrex, Atrazine** 2.5 lb/A 80W or 2 qt/A 4L or 2.2 lb/A Nine-0.	At planting. Check label for any application updates.	Do not plant fall cover crops. Do not plant crops other than corn or grain sorghum in treated fields during the same season. Do not apply more than 2.5 lb/A active atrazine per season.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FIELD CORN **Preemergence [cont.]**				
S-metolachlor + atrazine @ 0.75 to 1.3 lb/A + 1 to 1.6 lb/A	Annual grasses, pigweed, annual morningglory, common cocklebur, velvetleaf, smartweed and sicklepod.	**Cinch or Dual II Magnum 7.64 EC + AAtrex, Atrazine** See label for specific formulations in question. 0.8 to 1.4 pt/A + 1.25 lb/A 80W or 2 pt/A 4L to 2.0 lb 80W or 3.2 pt/A 4L. or **Bicep II Magnum 5.5 L or Cinch ATZ** 1.3 to 2 qt/A.	Preemergence or preplant.	Add additional atrazine for improved control of cocklebur and morningglory. Rainfall in 5 to 7 days is necessary for best results. With preplants, shallow incorporate 2 to 3 inches within 7 days of planting. If concerned about achieving a stand, leave atrazine out as pre and follow with atrazine early post.
dimethenamid + atrazine @ 0.56 to 0.75 lb/A + 0.75 to 2 lb/A	Annual grasses, pigweed, annual morningglory, common cocklebur, velvetleaf and smartweed.	**Outlook 6E + AAtrex, Atrazine** 12 to 16 + 0.75 to 2 qt/A 4L	From 45 days preplant to preemergence up to 8" tall corn.	Same as above. Rates depend on percent organic matter. See label.
dimethenamid + saflufenacil @ 0.31 to 0.62 + 0.044 to 0.088 lb/A	Annual grasses, pigweed, velvetleaf, morningglory and horseweed.	**Verdict** 10 to 12 oz/A.	Burndown up to preemergence. **Do not** apply Verdict over the top of emerged corn.	Rainfall or overhead irrigation is required for activation. Verdict can be used as a burndown that leaves behind residual control. For best burndown activity, tank mix with glyphosate and use MSO 1 pt/A + AMS. On medium to fine soils, the rotation interval to soybeans is 30 days if you were to lose the corn crop. See label for restrictions.
acetochlor @ 1.09 to 1.97 lb/A	Annual grasses and pigweed.	**Surpass NXT** 1.25 to 2.25 pt/A.	Preplant or preeemergence.	
acetochlor + atrazine @ 1.7 lb/A + 0.8 lb/A	Annual grasses, pigweed, morningglory, cocklebur, velvetleaf, smartweed and sicklepod.	**Degree 3.8 SL + Atrazine** 3.5 pt + 0.8 qt/A Atrazine 4L. or **Degree Xtra** 5 pt/A.	Preplant or preemergence.	Add additional atrazine for improved control of cocklebur and morningglory. Rainfall in 5 to 7 days is necessary for best results. With preplants, shallow incorporate 2 to 3 inches within 7 days of planting.
S-metolachlor + mesotrione + bicyclopyrone + atrazine @ 1.34 + 0.148 + 0.037 + 0.624 lb/A to 1.6 + 0.18 + 0.045 + 0.75 lb/A	Annual grasses, yellow nutsedge and broadleaf weeds.	**Acuron** 2.5-3 qt/A.	Preplant or preemergence.	May be applied up to 28 days before planting. Do not plant crops other than corn in treated area.
S-metolachlor + mesotrione +pyroxasulfone + bicyclopyrone @ 1.41 + 0.163 + 0.08 + 0.039 lb/A	Annual grasses, yellow nutsedge and broadleaf weeds.	**Storen** 2.1 qt/A	Preplant or preemergence.	May be applied up to 28 days before planting. Do not plant crops other than corn in treated area.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
acetochlor + atrazine @ 0.85 to 2 lb/A + 0.88 to 1.6 lb/A	Annual grasses, pigweed, morningglory, common cocklebur, velvetleaf, smartweed and sicklepod.	**Keystone NXT** 1.4 to 2.6 qt/A.	Preplant or preemergence.	Add additional atrazine for improved control of morningglory.
acetochlor + clopyralid + flumetsulam @ 0.7 to 1.4 + 0.07 to 0.14 + 0.023 to 0.045 lb/A	Annual grasses and broadleaves, thistles.	**Surestart II** 1.5 to 2.5 pt/A.	Preplant or preemergence.	Optimal weed control will be obtained when applications are as close as possible to planting but before weeds emerge. Applications may be made from 30 days prior to planting till 11 inch tall corn.
mesotrione @ 0.188 to 0.24 lb/A	Annual broadleaf weeds.	**Callisto 4L** 6 to 7.7 oz/A.	Preemergence.	**Do not plant crops other than corn in treated fields during the same season.**
S-metolachlor + mesotrione + atrazine @ 1.3 + 0.168 +1.3 lb/A	Annual grasses and broadleaf weeds.	**Lexar EZ 3.75 SE** 3 qt/A.	Preemergence.	**Do not plant crops other than corn in treated fields during the same season. Do not exceed 3.5 qt/A per year.**
Thiencarbazone + isoxaflutole + flufenacet @ 0.018 to .036 lb/A + 0.044 to 0.089 lb/A + 0.22 to 0.44 lb/A	Annual grasses and broadleaf weeds	**Trivolt** 10 to 20 oz/A	Preplant, Preemergence or Early Postemeregence from spiking to 2-leaf collars.	Adjust rate by soil type. See label for additional rate restrictions. **Add 1% COC or MSO if weeds are present**
saflufenacil + pyroxasulfone @ 0.045 to 0.083 lb/A + 0.07 to 0.13 lb/A	Annual grasses, pigweed, glyphosate-resistant ryegrass. pigweed, velvetleaf, morningglory and horseweed.	**Surtain** 9.2 to 17 oz/A.	Preplant, Preemergence or Early Postemergence from spiking to 3-leaf collars.	Add atrazine for improved control. Do not use MSO on POST applications. Rates vary based on soil type. Do not apply where an at-planting application of an organophosphate or carbamate insecticide is planned or has occurred.
pyroxasulfone @ 0.08 to 0.212 lb/A	Annual grasses, pigweed, glyphosate-resistant ryegrass.	**Zidua 4.17 SC** 2.5 to 6.5 oz/A**.**	Preemergence.	Add atrazine for improved control of cocklebur and morningglory. Rates vary based on soil type. Do not apply more than one application to corn in the spring.
pyroxasulfone + fluthiacet-methyl @ 0.11 to 0.16 lb/A + 0.003 to 0.005 lb/A	Annual grasses, pigweed, glyphosate-resistant ryegrass.	**Anthem Maxx** 2.5 to 5 oz/A**.**	Preemergence.	Add atrazine for improved control of cocklebur and morningglory. Rates vary based on soil type. Do not apply more than one application to corn in the spring.
pyroxasulfone + carfentrazone @ 0.086 to 0.211 + 0.006 to 0.0151 lb/A	Annual grasses, pigweed, glyphosate-resistant ryegrass.	**Anthem Flex** 2.75 to 7.28 oz/A**.**	Preemergence.	Add atrazine for improved control of cocklebur and morningglory. Rates vary based on soil type. Do not apply more than one application to corn in the spring.
acetochlor + mesotrione @ 1.5 to 2.6 + 0.14 to 0.24 lb/A	Annual grasses and broadleaf weeds.	**Harness MAX** 55 to 95 oz/A**.**	Preemergence.	**Do not plant crops other than corn in treated fields during the same season. Do not apply more than 95 oz/A per year.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FIELD CORN				
Postemergence				
atrazine @ 2 lb/A	Most small-seeded annuals. More effective on broadleaf weeds, weedy rice and sicklepod.	**AAtrex, Atrazine** 2.5 lb/A 80W or 2 qt/A of 4L or 2.2 lb/A Nine-0. Select rate according to soil texture. No surfactant recommended on label. Dual or Outlook may be added if no soil-applied grass herbicide was used. **AAtrex, Atrazine + oil** 2.5 lb/A 80W or 2 qt/A 4L or 2.2 lb/A Nine-0 + 1 qt/A oil concentrate.	After corn emergence, before grass weeds reach ½-inch or broadleaf 1½ inches.	Do not apply if corn is taller than 12 inches. Do not plant crops other than corn or grain sorghum in treated field until following season. After June 10, do not plant any crop other than corn or grain sorghum the following year. Do not apply more than 2.5 lb/A active atrazine per season.
S-metolachlor @ 0.95 to 1.9 lb/A	Annual grass and some small-seeded broadleaf weeds.	**Dual II Magnum 7.64 EC** 1 to 2 pt/A.	Apply before weeds emerge or tank mix with a postemergence herbicide like glyphosate or Liberty.	Do not apply more than 3.9 pints of Dual Magnum per acre per year.
acetochlor plus atrazine @ 1.13 lb/A plus 1.0 to 2.5 lb/A	Control of grass and broadleaf weeds.	**Warrant 3ME** 3 pt/A **+ Aatrex 4L** 1-2.5 qrt/A	After corn emergence, but prior to 12 in corn.	Do not plant crops other than corn or grain sorghum in treated field until following season.
2,4-D amine @ 0.5 lb/A	Morningglory, cocklebur and most other young broadleaf weeds.	**2,4-D amine** 1 pt/A of 4 lb/gal 2,4-D + 0.25% NIS.	Apply when weeds are small and corn is under 12 inches; however, effective results can be obtained with later application.	After corn is more than 12 inches, apply spray directly on weeds with a drop-type nozzle between the corn row and not on the terminal growth of corn. **AVOID DRIFT to cotton and soybeans. Follow all State Plant Board Regulations.**
dicamba @ 0.25 lb/A	Same as above.	**Dicamba** (various formulations) 0.5 pt/A + 0.25% NIS of 4 lb/gal. Rates vary.	From corn emergence up to 15 inches tall.	Ground application only. **Drift is extremely toxic to soybeans.** Do not apply after soybeans begin to emerge in general area. **Follow all State Plant Board regulations.**
dicamba + diflufenzopyr 0.125 to 0.25 lb/A + 0.05 to 0.1 lb/A	Pigweed, morningglory and most other annual broadleaf weeds.	**Status** 5 to 10 oz/A + 0.25% NIS.	Apply on 4-inch to 36-inch-tall corn.	Status requires an NIS at 0.25% v/v. Do not tank mix with 2,4-D or clopyralid-containing products. Ground application only. **Drift is extremely toxic to soybeans. Do not apply after soybeans begin to emerge in general area. Follow all State Plant Board regulations.**
dicamba @ 0.25 to 0.5 lb/A	horseweed, morningglory, pigweed and most other broadleaf weeds.	**Diflex** 8-16 oz/A	From spiking through V10 or 36-inch-tall corn.	Ground application only. **Drift is extremely toxic to soybeans. Do not apply after soybeans begin to emerge in general area. Follow all Arkansas State Plant Board regulations.**
bentazon @ 0.75 to 1 lb/A	Cocklebur, ragweed, jimsonweed, smartweed, prickly sida, velvetleaf and yellow nutsedge.	**Basagran** 0.75 to 1 qt/A. **Can be tank mixed with 0.5 to 0.75 lb/A active atrazine.**	Postemergence. See label for specific timing for weed desired. Corn tolerant at all stages.	May be tank mixed with atrazine. See label. Best treatment for smartweed.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
nicosulfuron @ 0.031 lb/A	Johnsongrass, broadleaf signalgrass, foxtail and shattercane.	**Accent Q 54.5 DF** Accent Q + nonionic surfactant (80%) or crop oil concentrate and 28% or 32% UAN liquid fertilizer (optional). 0.5 oz/A + 2 pt/100 gal or 1 gal/100 gal and 4 gal/100 gal. Tank mix with atrazine for broadleaf weeds.	Apply to 4- to 10-inch seedling and 8- to 12-inch rhizome johnsongrass. If regrowth occurs, apply a second application when johnsongrass is 8 to 10 inches tall. 1- to 2-leaf broadleaf signalgrass. May be applied to 2- to 6-leaf stage of corn.	Repeat application may be required to control regrowth. **See label for restrictions with other organo-phosphate insecticides and postemergence herbicides. Do not apply during cool, cloudy weather.**
halosulfuron @ 0.063 lb/A or halosulfuron + thifensulfuron @ 0.031 + 0.004	Nutsedge, cocklebur. See label for tank mixes to broaden weed spectrum.	**Halomax, Permit 75 WG, or Permit Plus** 1 to 1.33 oz/A for nutsedge. Add a nonionic surfactant or crop oil concentrate. May use two applications not to exceed 2.67 oz/A total rate. Use 0.75 oz Permit Plus.	Postemergence from corn spike through layby. 4- to 12-inch nutsedge 1- to 9-inch cocklebur	See label for mixtures and other precautions such as restrictions with organo-phosphate insecticides. Do not use Permit Plus after 5 collars or 6 leaf.
halosulfuron + prosulfuron @ 0.031 to 0.0625 + 0.018 to 0.036 lb/A	Sedges and most broadleaf weeds including triazine-resistant biotypes.	**Gambit 79 WDG** 1 to 2 oz/A. Add a surfactant.	Apply from 2- to 6-leaf stage.	Avoid drift to soybeans. See crop rotation section on label for precautions about rotational crops.
rimsulfuron + thifensulfuron @ 0.014 + 0.003 lb/A	Some grass and broadleaf weeds.	**Resolve Q 22.4 DG** 1.25 oz/A. Add a surfactant	Early postemergence to corn V6 stage of growth or earlier, or up to 20-inch corn, whichever is more restrictive.	**Some hybrids are sensitive to rimsulfuron. Consult with seed supplier for sensitivity prior to applying.** See label for restrictions with organo-phosphate insecticides.
nicosulfuron + rimsulfuron @ 0.023 + 0.012 lb/A	Annual grass and broadleaf weeds.	**Steadfast Q 37.7 DG** 1.5 oz/A. Add a crop oil concentrate.	Apply to small weeds. Early post to corn, V6 or up to 20-inch corn, whichever is more restrictive.	**Some hybrids are sensitive to rimsulfuron. Consult with seed supplier for sensitivity rating prior to applying.** Do not apply to corn treated with Counter or Counter 20 CR insecticides. See label for other precautions.
mesotrione @ 0.094 lb/A	Annual broadleaf weeds.	**Callisto 4L** 3 oz/A. Add surfactant.	May be applied up to 30 inches or 8-leaf stage of corn for extended morningglory control.	Do not apply to corn treated with Counter or Lorsban insecticides. See label.
thiencarbazone + tembotrione @ 0.013 + 0.068 lb/A	Johnsongrass, annual grasses and broadleaf weeds.	**Capreno 3.45L** 3 oz/A. Add surfactant.	Apply when corn has between 1 and 5 collars.	**Some hybrids are sensitive to ALS-inhibiting herbicides. Consult with seed supplier for sensitivity rating prior to use.** Do not apply to corn treated with Counter or Lorsban insecticides.
S-metolachlor + mesotrione + bicyclopyrone + atrazine @ 1.34 + 0.148 + 0.037 + 0.624 lb/A to 1.6 + 0.18 + 0.045 + 0.75 lb/A	Grasses and broadleaf weeds.	**Acuron** 2 to 3.0 qt/A. Add a surfactant.	From corn emergence up to 12 inches.	Do not apply to corn treated with Counter or Lorsban insecticides. See label.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FIELD CORN Postemergence [cont.]				
S-metolachlor +mesotrione + pyroxasulfone + bicyclopyrone @ 1.41 + 0.163 + 0.08 + 0.039 lb/A	Annual grasses, yellow nutsedge and broadleaf weeds.	**Storen** 2.1 qt/A.	Apply before 3in broadleaves and 2in grasses up to V8 corn.	Add atrazine for improved control of pigweed.
S-metolachlor + mesotrione + atrazine @ 1.3 + 0.168 + 1.3 lb/A	Annual grasses and broadleaf weeds.	**Lexar EZ 3.75 SE** 3 qt/A. Add a surfactant.	Early postemergence.	**Do not plant crops other than corn in treated fields during the same season. Do not exceed 3.5 qt/A per year.**
pyroxasulfone @ 0.08 to 0.21 lb/A	Annual grasses, pigweed, glyphosate-resistant ryegrass.	**Zidua 4.17 SC** 2.5 to 6.5 oz/A**.**	Apply before weeds emerge or tank mix with a postemergence herbicide like glyphosate or Liberty. Emergence to V4.	4.65 oz/A max use rate per application. 8.25 oz/A total allowed per season on medium to heavy soils.
pyroxasulfone + fluthiac-et-methyl @ 0.08 to 0.16 lb/A + 0.003 to 0.005 lb/A	Annual grasses, pigweed, glyphosate-resistant ryegrass.	**Anthem Maxx** 2.5 to 5 oz/A**.**	Apply before weeds emerge or tank mix with a postemergence herbicide like glyphosate or Liberty. Emergence to V4.	Do not exceed a maximum of 8.15 oz per season.
mesotrione + rimsulfuron @ 0.078 + 0.019 lb/A	Annual grass and broadleaf weeds.	**Realm Q 38.75 DG** 4 oz/A. Add surfactant.	Early postemergence to corn V6 stage of growth or up to 20 inches, whichever is more restrictive.	**Some hybrids are sensitive to rimsulfuron. Consult with seed supplier for sensitivity rating prior to applying.** Do not apply to corn treated with Counter or Counter 20 CR insecticides. See label for other precautions.
topramezone + atrazine @ 0.0164 lb/A + 1 lb/A	Pigweed, horseweed, velvetleaf, morningglory, barnyardgrass, fall panicum and broadleaf signalgrass.	**Armezon or Impact + Atrazine** 0.75 oz/A + 1 qt/A. COC or MSO at 1% v/v.	Postemergence up to 45 days from harvest.	Apply to corn when weeds are small and actively growing. Use an MSO at 1% v/v and tank mix with atrazine for larger weeds and best results. Can use up to 1 oz Armezon for larger weeds.
topramezone + dimethenamid @ 0.016 lb/A + 0.82 lb/A	Pigweed, horseweed, velvetleaf, morningglory, barnyardgrass, fall panicum and broadleaf signalgrass.	**Armezon PRO** 20 oz/A. Add a surfactant.	Emergence through V8 or 30-inch corn.	Apply to corn when weeds are small and actively growing. Use an MSO at 1% v/v and tank mix with atrazine for larger weeds and best results.
topramazon plus acetochlor @ 0.011-0.022 plus 1.11 to 2.21 lb/A	POST and residual control of most grasses and broadleaf weeds.	**Impact Core** 20-40 oz/A	From spiking to 11-inch corn.	Rate is dependant on soil type. Refer to label for specific rates.
acetochlor plus mesotrione @ 1.09 to 1.76 plus 0.10 to 0.16 lb/A	Control of grass and broadleaf weeds.	**Harness Max** 40-64 oz/A	Postemergence until corn reaches 11in tall.	Tankmix with atrazine 1.5- 2 qrt/A for improved weed control. Do not apply more than 95 fl oz/ year.
tolpyralate + acetochlor @ 0.022 lb/A to 0.035 lb/A + 1.5 lb/A to 2.4 lb/A	Same as above with better residual control of grass and pigweed	**Restraint 6.5 EC** 30–48oz/A Add a surfactant.	From emergence until 11-inch corn.	Tankmixing with atrazine will improve control.
tolpyralate @ 0.026 to 0.035 lb/A	Pigweed, horseweed, velvetleaf, morningglory, barnyardgrass, ragweed, crabgrass, foxtail and goosegrass.	**ShieldEx** 1 to 1.35 oz/A. Add a surfactant.	Small actively growing weeds from corn emergence up to 20 in corn or 6 collars.	Tankmixing with atrazine will improve control.
S-metolachlor + mesotrione @ 1.0 to 1.25 lb/A + 0.10 to 0.125 lb/A	Pigweed, smartweed, prickly sida, ragweed, annual grasses and weedy rice.	**Coyote** 1.2 to 1.5 qrt/A. Add a surfactant.	Emergence through V8 or 30-inch corn.	Tankmixing with atrazine will improve control. Do not apply to corn treated with Counter or Lorsban insecticide. See label.
acetochlor + mesotrione + clopyralid @ 0.875 + 0.09 to 0.059 lb/A	Annual grasses and broadleaf weeds.	**Resicore XL** 40 oz/A. Add a surfactant.	Emergence through 24-inch tall corn.	Tankmixing with atrazine will improve control. Do not apply to corn treated with Counter or Lorsban insecticide. See label.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FIELD CORN				
Postemergence - Herbicide-Tolerant – Check suitability of available hybrids with county agent.				
glyphosate @ 0.75 to 1 lb/A	Most annual grass and broadleaf weeds and Johnsongrass.	**Glyphosate** (4 lb/gal formulations) 2 pt/A.	May be applied up to 30 inches or 8-leaf stage of corn.	Apply only to Roundup Ready corn. Single in-crop applications not to exceed 1 lb/A and multiple in-crop applications not to exceed 2 lb/A total. See label for tank mixes.
glyphosate + atrazine @ 0.75 to 1 lb/A + 1 lb/A	Same as above plus residual control of broadleaf weeds. Improved morningglory control.	**Glyphosate** (4 lb/gal formulations) **+ AAtrex** 2 pt/A + 1 qt/A.	Prior to 12-inch corn.	Apply only to Roundup Ready corn. Single in-crop applications not to exceed 1 lb/A and multiple in-crop applications not to exceed 2 lb/A total. See label for tank mixes.
glyphosate + atrazine + thifensulfuron/rimsulfuron @ 0.75 to 1 lb/A + 1 lb/A + 0.014 lb/A	Most annual grass and broadleaf weeds. Improved residual control of annual grass.	**Glyphosate** (4 lb/gal formulations) **+ AAtrex + Resolve Q** 2 pt/A + 2 pt/A + 1.25 oz/A or **Realm Q** 2 pt/A + 2 pt/A + 4 oz/A.	Prior to 12-inch corn or 7 collar, whichever comes first.	Apply only to Roundup Ready corn. Single in-crop applications not to exceed 1 lb/A and multiple in-crop applications not to exceed 2 lb/A total. See label for tank mixes. **Some hybrids are sensitive to rimsulfuron. Consult with seed supplier for sensitivity rating prior to applying.**
glyphosate + mesotrione @ 0.75 to 1 lb/A + 0.094 lb/A	Annual grass and broadleaf weeds with residual activity.	**Glyphosate** (4 lb/gal formulations) **+ Callisto 4L** 2 pt/A + 3 oz/A.	May be applied up to 30-inch or 8-leaf stage of corn.	Apply only to Roundup Ready corn. Single in-crop applications not to exceed 1 lb/A and multiple in-crop applications not to exceed 2 lb/A total. See label for tank mixes. Do not apply to corn treated with Counter or Lorsban insecticides.
S-metolachlor plus glyphosate plus mesotrione plus bycyclopyrone @ 0.95 plus 0.94 plus 0.094 plus 0.0445 lb/A	POST and residual control of most grasses and broadleaf weeds.	**Acuron GT** 3.75 pt/A	From corn emergence to 8 leaf or 30-inch corn.	Tankmix with atrazine will improve residual control of morninglories and pigweed.
glyphosate + *S*-metolachlor + mesotrione @ 0.94 + 0.94 + 0.094 lb/A	Most annual grass and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ Dual Magnum II 7.64 EC or Cinch 7.64 EC + Callisto 4L** 30 oz + 16 oz + 3 oz/A. or **Halex GT** 3.6 to 4.0 pt/A.	From corn emergence to 30-inch or 8-leaf corn.	Tank mix with atrazine will improve residual morningglory control. Sequence at 2.5 to 3.5 pt/A contains glyphosate and metolachlor. The Halex GT rate is 3.6 to 4 pt/A.
glufosinate @ 0.4 lb/A	Most annual grass and broadleaf weeds.	**Glufosinate** (280 formulations) 22 oz/A.	May be applied to corn through the V7 growth stage. May be tank mixed with other corn herbicides for residual control.	**Apply only to LibertyLink corn hybrids or those containing Herculex or Smartstax traits.** Do not apply more than 44 ounces of glufosinate per season.
L-glufosinate @ 0.24 to 0.36 lb/A	Emerged annual grasses, seedling Johnsongrass, broadleaf weeds.	**Liberty Ultra** 19 to 29 oz/A Can add AMS, no additional surfactant needed.	Emergence through V6. Up to 2 in-crop applications 7 days apart.	**Apply only to LibertyLink corn hybrids or those containing Herculex or Smartstax traits.** 19oz rate is equivalent to 29oz rate of standard glufosinate. Maximum allowable rate per year is 58 oz/A. Read label for additional restrictions.
glufosinate plus topramazone @ 0.41-0.54 lb/A plus 0.016 to 0.022 lb/A	POST control of most broadleaf and grass weeds	**Sinate** 21-28 oz/A Add 1% v/v MSO + AMS 3 lb/A	From spiking to V7 or 24-inch corn.	Tankmix with atrazine will improve control of larger weeds and provide increased residual activity.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Field Corn Preharvest				
carfentrazone @ 0.0312 lb/A	Morningglory desiccation.	**Aim 2 EC** 2.0 oz/A. Add 1% crop oil concentrate.	3 days prior to harvest.	Good coverage is critical to Aim activity. 10 gpa is recommended. Add glyphosate or paraquat for best results.
sodium chlorate @ 4.5 to 6 lb/A	Desiccation of green vegetation.	**Sodium Chlorate** Several brands and trade names available. 2 gal of 3 lb/gal or 1 gal of 6 lb/gal.	7 to 10 days prior to harvest.	Use a labeled brand and follow label directions.
paraquat @ 0.3 to 0.5 lb/A	Same as above.	**Gramoxone SL 3.0** 0.8 to 1.33 pt/A. 0.25% NIS.	After black layer or 7 days prior to harvest.	Good coverage critical.
Post Harvest				
paraquat + flumioxazin @ 0.625 + 0.063 lb/A	Pigweed.	**Paraquat** (3 lb/gal formulations) **+ Valor 51 WDG** 40 or 27 oz/A + 2.0 oz/A. Add 1% COC.	Apply to small pigweed after harvest.	Apply 30 days prior to planting wheat.
paraquat + *S*-metolachlor @ 0.625 + 0.95 lb/A	Pigweed and annual grass.	**Paraquat** (3 lb/gal formulations) **+ Dual Magnum 7.62 EC** 32 oz/A + 1 pt/A. Add 1% COC.	Apply to small pigweed after harvest.	Apply to acres that **will not be** planted to small grains (wheat). Follow Dual label on total use rates.
paraquat + metribuzin @ 0.625 + 0.141 lb/A	Volunteer corn, pigweed and other weeds.	**Paraquat** (3 lb/gal formulations) **+ metribuzin 75 DF** 32 oz/A + 3 oz/A. Add 1% COC.	Apply to 6-inch volunteer corn.	If planting wheat, use a metribuzin-tolerant variety.
		Or Boundary 2 pt/A.	3- to 4-inch ryegrass. September through November.	Add Gramoxone 32 oz/A. Section 24(c).
2,4-D amine @ 0.75 lb/A	Pigweed and other broadleaf weeds.	**2,4-D amine** 1.5 pt/A of 4 lb/gal 2,4-D. Add a surfactant.	Apply to 4- to 6-inch pigweed.	Avoid drift to cotton and soybeans. Be aware of state regulations on 2,4-D. 7-day plant-back to wheat. Due to potential off-target movement to maturing soybeans, dicamba is not recommended for use post-harvest in corn.
saflufenacil @ 0.022 to 0.044 lb/A	Pigweed and other broadleaf weeds.	**Sharpen 2.85 SC** 1.0 oz/A + 1% v/v MSO.	Apply to 4- to 6-inch pigweed.	Avoid off-target drift to soybean.

WEED RESPONSE RATINGS FOR GRAIN SORGHUM HERBICIDES

(See Explanation of Rating Tables on Page 3.)

HERBICIDES	WSSA GROUP #	GRASSES												BROADLEAVES													SEDGES
		Barnyardgrass	Broadleaf Signalgrass	Crabgrass	Fall Panicum	Foxtail	Goosegrass	Weedy rice	Rhizome Johnsongrass	Ryegrass	Seedling Johnsongrass	Shattercane	Texas Panicum	Bigroot Morningglory	Cocklebur	Common Ragweed	Honeyvine Milkweed	Horsenettle	Lambsquarters	Morningglory	Pigweed sp.	Prickly Sida	Purslane	Sicklepod	Smartweed	Velvetleaf	Yellow Nutsedge
Preemergence																											
Atrazine	5	6	4	7	3	6	6	8	0	-	2	0	3	4	9	9	6	5	9	8	9	9	9	8	9	8	0
Atrazine + Degree	5, 15	9	7	9	9	9	9	8	0	8	6	7	3	4	8	9	6	3	9	8	9	9	9	8	4	7	7
Atrazine + Dual II Magnum	5, 15	9	8	9	9	9	9	9	0	9	4	7	3	4	8	9	6	3	9	8	9	9	9	8	4	7	7
Dual Magnum/Outlook	15	9	8	9	9	9	9	7	0	9	6	7	0	2	0	7	-	3	6	2	8	6	6	0	5	4	9
Halex GT	9, 15, 27	9	9	9	9	9	9	9	0	5	6	8	6	9	9	9	-	7	9	8	9	9	9	9	9	9	7
Lexar	5, 15, 27	9	9	9	8	8	7	8	0	9	3	5	-	4	9	9	7	3	9	9	10	9	9	9	9	10	7
Atrazine + Outlook	5, 15	9	8	9	9	9	9	8	0	8	6	7	3	4	8	9	6	3	9	8	9	9	9	8	6	6	7
Verdict	14, 15	8	7	8	7	8	8	7	0	-	-	-	0	5	-	-	-	-	7	8	9	7	-	5	-	-	-
Postemergence																											
2,4-D	4	0	0	0	0	0	0	0	0	0	0	0	0	3	9	9	9	4	8	9	8	8	9	8	5	8	0
Atrazine + oil	5	6	6	6	5	7	6	9	0	5	3	0	2	4	9	8	6	4	8	8	9	8	9	8	9	7	3
Basagran	6	0	0	0	0	0	0	0	0	0	0	0	0	3	9	8	5	0	5	4	0	7	7	0	9	8	7
Buctril	6	0	0	0	0	0	0	0	0	0	0	0	0	7	9	7	7	4	8	7	5	-	-	3	9	7	0
Dicamba	4	0	0	0	0	0	0	0	0	0	0	0	0	8	8	9	9	6	9	9	9	-	-	8	9	8	0
Facet L	4	8	9	7	6	7	6	0	0	-	0	0	2	4	-	6	-	-	6	8	4	-	-	-	0	6	0
Facet L+ Atrazine	4, 5	8	9	8	6	8	7	8	0	6	4	0	3	4	9	8	6	4	8	9	9	8	9	8	9	7	5
Gambit	2	0	0	0	0	0	0	0	0	0	0	0	0	-	4	9	-	-	7	5	0	8	8	8	8	9	9
Atrazine + Huskie	5, 27	6	6	6	5	7	6	8	0	0	0	0	2	7	9	8	7	5	9	9	9	9	-	8	9	8	5
Paraquat directed or Hood	22	9	9	9	8	8	9	9	0	7	8	0	6	-	4	8	-	7	9	4	9	3	8	9	5	7	3
Peak	2	0	0	0	0	0	0	0	0	0	0	0	0	-	3	8	-	-	8	8	4	8	-	8	8	8	0
Permit	2	0	3	3	3	0	3	0	3	-	3	0	0	-	-	5	-	-	5	5	0	7	7	4	6	6	9
Yukon	2, 4	0	3	3	3	0	3	0	3	0	3	0	0	8	8	9	9	6	9	9	9	8	8	8	9	8	9
FirstAct[1]	1	8	9	9	9	9	9	8**	9	0	9	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ImiFlex[2]	2	8	8	8	7	8	7	0	8	7	8	8	8	-	8	-	-	-	7	7	0	-	-	-	7	-	6
Zest[3]	2	8	8	7	7	8	7	-	8	6	9	9	8	7	5	6	2	2	3	6	0	-	-	7	7	6	3

*Rating will be 0 on ALS inhibitor-resistant weeds (Group 2).
**Repeat application may be needed to achieve these ratings.
Footnote #1: Use only on Double Team™ grain sorghum.
Footnote #2: Use only on Advanta growth™ grain sorghum.
Footnote #3: Use only on Inzen™ grain sorghum.

Rating scale – 0 = No Control 10 = 100% Control.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
GRAIN SORGHUM				
Preplant				
glyphosate @ 1 lb/A	Emerged weeds.	**Glyphosate** (4 lb/gal formulations) 32 oz/A.	Preplant for vegetation knockdown.	Apply in low volume – 5 to 10 gpa.
glyphosate + 2,4-D @ 1.0 + 0.50 lb/A	Annual grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) **+ 2,4-D** 32 oz/A + 1 pt/A of 4SL 2,4-D amine.	Same as above.	Improved control of horseweed, curly dock and primrose.
S-metolachlor @ 0.9 to 1.4 lb/A	Weedy rice, yellow nutsedge, annual grasses and pigweed.	**Dual Magnum 7.64 EC or Cinch 7.64 EC** 1 to 1.6 pt/A.	Incorporate thoroughly in top 2-inches within 14 days before planting.	**Use with Concep-treated sorghum seed only.** If broadleaf weeds emerge, use 2,4-D or atrazine postemergence.
dimethenamid @ 0.56 to 0.98 lb/A	Weedy rice, yellow nutsedge, annual grasses and pigweed.	**Outlook 6 E** 12 to 21 oz/A.	Apply up to 45 days preplant.	**Use with Concep-treated seed only.**
Preemergence				
S-metolachlor @ 0.95 to 1.9 lb/A	Annual grasses and pigweed. For weedy rice or yellow nutsedge use ppi treatment above.	**Dual Magnum 7.62 EC or Cinch 7.62 EC** 1 to 2 pt/A.	At planting.	**Use with Concep-treated sorghum seed only.** May be tank mixed with atrazine according to label directions or may be followed with atrazine or 2,4-D for broadleaf control as recommended below.
S-metolachlor + atrazine @ 1.25 + 1 lb/A	Annual grasses and broadleaf weeds. For weedy rice or yellow nutsedge, use Dual Magnum ppi above.	**Bicep II Magnum 5.5 L or Cinch ATZ 5.5 F** 1.3 qt/A.	At planting.	**Use with Concep-treated seed only.** Good treatments for average weed infestations. However, if weedy rice is a problem, use Dual ppi and atrazine early post if needed. If heavy cocklebur and morningglory pressure exists, use atrazine pre-emergence at preemergence rates below or use atrazine early post as listed below.
S-metolachlor + glyphosate + mesotrione @ 1.04 to 1.57 + 1.04 to 1.57 + 0.1 to 0.157 lb/A	Most annual grasses and broadleaf weeds.	**Halex GT** 4 to 6 pt/A.	Preplant/at planting, prior to grain sorghum emergence.	**Use with Concep-treated sorghum seed only.** May be tank mixed with atrazine according to label directions or may be followed with atrazine or 2,4-D for broadleaf control as recommended below.
atrazine @ 1 lb/A	Germinating annual grasses and most annual broadleaf weeds, including cocklebur, annual morningglory and sicklepod.	**Atrazine** 1 qt/A 4L or 1.1 lb/A Nine-0.	At planting.	Do not plant fall cover crops. Do not plant crops other than corn in treated fields during the same season. Thoroughly till soil before planting any spring crop other than corn or sorghum. Planting deeper than 1-inch will increase safety margin. Do not use on coarse-textured soils (sand, loamy sand, sandy loam) or on any soil with less than 1% o.m. For sandy soils, see AAtrex + oil below. All atrazine labels have been revised because of surface and groundwater concerns. Special precautions are required on new labels.
S-metolachlor + mesotrione @ 1.0 to 1.25 lb/A + 0.10 to 0.125 lb/A	Pigweed, smartweed, prickly sida, ragweed, annual grasses and weedy rice.	**Coyote** 2 qrt/A.	At planting.	**Use with Concep-treated sorghum seed only.** Do not apply to emerged grain sorghum as severe injury will occur.
S-metolachlor + mesotrione + atrazine @ 1.3 + 0.168 + 1.3 lb/A	Annual grasses and broadleaf weeds.	**Lexar 3.75 SE** 3 qrt/A.	At planting.	**Use with Concep-treated sorghum seed only.** Do not apply to emerged grain sorghum as severe injury will occur.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
saflufenacil @ 0.022 to 0.044 lb/A	Pigweed, velvetleaf, morning-glory and horseweed.	**Sharpen** 1 to 2 oz/A.	Burndown up to preemergence. **Do not** apply Sharpen over the top of emerged sorghum.	For best burndown results, tank mix with glyphosate or paraquat. An MSO and AMS must be used for burndown. See label for further recommendations and restrictions.
dimethenamid + saflufenacil @ 0.31 to 0.62 + 0.044 to 0.088 lb/A	Annual grasses, pigweed, velvetleaf, morningglory and horseweed.	**Verdict** 10 oz/A.	Burndown up to preemergence. **Do not** apply Verdict over the top of emerged grain sorghum.	Rainfall or overhead irrigation is required for activation. Verdict can be used as a burn-down that leaves behind residual control. For best burndown activity, tank mix with glypho-sate and use MSO 1 pt/A + AMS. On medium to fine soils, the rotation interval to soybeans is 30 days if you were to lose the grain sorghum crop. Use with Concep-treated seed. See label for restrictions.
dimethenamid 0.56 to 0.98 lb/A	For annual grasses and pig-weed. For weedy rice or yellow nutsedge, use ppi treatment.	**Outlook 6E** 12 to 21 oz/A.	At planting.	**Use with Concep-treated seed only. Rates depend on percent organic matter. See label.**
dimethenamid + atrazine package mix	Annual grasses and broadleaf weeds. For weedy rice or yellow nutsedge, use ppi treatment.	**Guardsman Max 5L** 2.5 pt/A.	At planting.	**Use with Concep-treated seed only.**
Postemergence				
2,4-D amine @ 0.5 lb/A	Most broadleaf weeds such as morningglory, cocklebur and sicklepod.	**2,4-D amine** 1 pt/A of 4 lb/gal 2,4-D amine. Do not use a surfactant or oil.	Apply when weeds are small and sorghum 6 to 12 inches.	May be applied broadcast overtop to sorghum not over 8 inches. Directed applications later with drop nozzles. Do not treat when sorghum is in bloom. AVOID DRIFT. Do not apply during very active growth, i.e., when combi-nation of good moisture, warm temperatures and high nitrogen exist, or excessive injury may result. **Follow all State Plant Board regulations.**
dicamba @ 0.25 lb/A	Most broadleaf weeds such as morningglory, cocklebur and sicklepod.	**Dicamba** (various formulations) 0.5 pt/A. Do not use a surfactant or oil.	From grain sorghum emergence up to 8 inches tall. Best results on weeds 3 inches or less.	Ground application only. Drift is extremely toxic to soybeans. Do not apply after soybeans begin to emerge in general area. **Follow all State Plant Board regulations.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
GRAIN SORGHUM				
Postemergence [cont.]				
atrazine @ 1 to 2 lb/A	Most small-seeded annuals. More effective on broadleaf weeds. Good control of pigweed, cocklebur, annual morningglory, velvetleaf, spurred anoda, prickly sida, smartweed, sicklepod and weedy rice.	**AAtrex, Atrazine** 1.25 to 2.5 lb/A 80W or 1 to 2 qt/A 4L or 1.1 to 2.2 lb/A Nine-0. Use low rate on silt loam soil and high rate on clay soil. No surfactant is recommended on label.	Apply from sorghum emergence up to "close in". Apply before weeds exceed 1½ inches in height. **Best grass control obtained before grass weeds exceed ½-inch.**	Do not apply if grain sorghum is taller than 12 inches. Do not graze treated areas or feed forage from treated land within 21 days of application. After June 10, do not plant crops other than corn or grain sorghum the following year. **Do not use on sands or sandy loam soils. For these soils, use atrazine and crop oil concentrate below.** Do not apply more than 2.5 lb/A active atrazine per season.
atrazine @ 1.2 lb/A + oil concentrate	Same as above.	**AAtrex, Atrazine + Crop Oil Concentrate** 1.5 lb/A 80W or 1.2 qt/A 4L or 1.33 lb/A Nine-0 + 1 qt/A oil concentrate.	Same as above.	Same as above but may be used on sandy loam soil. Less likely to cause injury to milo or carryover to sensitive follow crops.
S-metolachlor + atrazine @ 0.75 to 1.3 lb/A + 1 to 1.2 lb/A	Annual grasses, pigweed, annual morningglory, velvetleaf, smartweed and sicklepod.	**Dual Magnum + Aatrex** 0.8 to 1.4 pt/A + 1/2 qt/A **or Bicep II Magnum** 1.5 to 2.5 qt/A.	Before sorghum reaches 12 inches tall. Best grass control obtained before grass weeds exceed ½-inch.	Some injury may occur with higher rates on lighter soils.Select rates based on soil types.
halosulfuron @ 0.047 lb/A	Yellow nutsedge, flatsedge and hemp sesbania.	**Permit or Halomax 75 WG** 1 oz/A. Add a nonionic surfactant or crop oil concentrate.	Apply to emerged weeds. 2 leaf to layby.	Aerial or ground application. Avoid drift to soybeans.
halosulfuron + prosulfuron @ 0.031 to 0.048 + 0.018 to 0.027 lb/A	Sedges and most broadleaf weeds including triazine-resistant biotypes.	**Gambit 79 WDG** 1 to 1.5 oz/A.	Apply from 2 leaf through layby stage (before grain head emergence).	Avoid drift to soybeans. Will not control ALS-resistant weeds. See crop rotation section on label for precautions about rotational crops.
prosulfuron @ 0.018 to 0.036 lb/A	Most broadleaf weeds including triazine-resistant biotypes.	**Peak 57 WDG** 0.5 to 1.0 oz/A. Add 0.25% nonionic surfactant.	Apply to actively growing sorghum between 5 and 30 inches in height and before head emergence.	Will not control ALS-resistant weeds. See crop rotation section for precautions about rotational crops. Do not apply to sorghum under stress from moisture or cold weather. Do not apply to sorghum that has been treated with an organophosphate insecticide at planting or within 15 days of a postemergence organophosphate insecticide application.
bentazon @ 0.75 to 1 lb/A	Cocklebur, ragweed, jimsonweed, smartweed, prickly sida, velvetleaf and yellow nutsedge.	**Basagran** 0.75 to 1 qt/A.	Postemergence. See label for specific timing for weed desired.	May be tank mixed with atrazine. See label. Best treatment for smartweed.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
bentazon + atrazine @ 0.5 to 0.75 + 0.5 to 0.75 lb/A	Most broadleaf weeds.	**Basagran + Atrazine** 1 to 1.5 pt/A + 1 to 1.5 pt/A 4L or 0.6 to 0.9 lb/A 80W or 0.55 to 0.8 lb/A 90DF. Add crop oil concentrate.	Postemergence from emergence to 12 in grain sorghum.	Use low rate on small weeds and higher rate on larger weeds. All atrazine labels have been revised because of surface and groundwater concerns. Special precautions are required on new labels.
bromoxynil @ 0.25 to 0.375 lb/A	Cocklebur, smartweed, morningglories and pigweed.	**Buctril 2 E** 1 to 1½ pt/A. On larger weeds, tank mix with 0.5 lb/A active Atrazine.	Postemergence to weeds in seedling (2- to 4-leaf) stage.	Use high rate on morningglories and pigweed. **Weeds must be small.** Expect some temporary burn.
bromoxynil + pyrasulfotole @ 0.175 to 0.22 lb/A + 0.03 to 0.39 lb/A	Annual broadleaves including pigweed and morningglories.	**Huskie** 12.8 to 16 oz/A. Add 0.25% NIS.	Apply on or after 3-leaf stage until grain sorghum reaches 30 inches tall, or flag leaf emerges.	Use high rate on morningglories and pigweed. **Weeds must be small.** Expect some temporary injury if tank mixed with atrazine.
paraquat @ 0.5 lb/A	Annual grasses and broadleaf weeds.	**Paraquat** (3 lb/gal formulations) 21 oz/A. Add 0.25% nonionic surfactant.	After sorghum is 12 inches.	**Directed spray with hoods. Spray must not touch more than lower 3 inches of stalk. Some injury will occur.**
quinclorac @ 0.25 to 0.375 lb/A	Annual grasses and broadleaf weeds.	**Facet L** 22 to 32 oz/A.	Apply to weeds less than 2 inches tall.	Apply prior to 12-inch grain sorghum. Tank mix with 1 lb/A atrazine for improved control. Do not drift on cotton or tomatoes.
INZEN™ Grain Sorghum Only!				
nicosulfuron @ 0.031 to 0.062 lb/A	Barnyardgrass, broadleaf signalgrass, panicum and foxtail.	**Zest 75 WDG** 0.67 to 1.33 oz/A + 0.25% NIS.	Small actively growing weeds. Spray on 4- to 20-inch Inzen grain sorghum.	**FOR USE ONLY ON INZEN™ GRAIN SORGHUM.** – Several populations of ALS-resistant Johnsongrass exist in Arkansas; do not plant Inzen in fields with suspected ALS resistance. – Do not tank mix with Huskie. – Check label for other precautions.
DoubleTeam Grain Sorghum Only!				
quizalofop @ 0.032 to 0.078 lb/A	Most annual and some perennial grasses including Johnsongrass	**FirstAct** 5 to 12 oz/A + 1% COC Use highest rate for Johnsongrass	Apply to grain sorghum from 4 to 20 inches tall.	**Use ONLY on DoubleTeam Grain Sorghum.** Make 2 applications at least 7 days apart at 15GPA. Crop injury may occur in cool/wet/cloudy conditions.
igrowth Grain Sorghum Only!				
imazamox@ 0.047 lb/A	Suppression or control of most annual grasses including Johnsongrass	**ImiFlex** 6 oz/A + 1% COC or MSO.	Postemergence to 20in grain sorghum.	**Use ONLY on igrowth Grain Sorghum** – Some populations of ALS-resistant Johnsongrass exist in Arkansas; do not plant igrowth in fields with suspected resistance – Only one application allowed per year. – Some injury can occur, check label for other precautions.
Preharvest				
sodium chlorate @ 4.5 to 6 lb/A	Desiccation of green vegetation.	**Sodium Chlorate** Several brands and trade names available. 2 gal of 3 lb/gal or 1 gal of 6 lb/gal.	7 to 10 days prior to harvest.	Use a labeled brand and follow label directions.
carfentrazone @ 0.016 lb/A	Desiccation of morningglories.	**Aim 2 EC** 1 oz/A.	3 days prior to harvest.	Coverage is important. Use 10 gallons of spray solution per acre. Can be tank mixed with sodium chlorate.
glyphosate @ 1 to 1.3 lb/A	Desiccation of green vegetation.	**Glyphosate** (4 lb/gal formulations) 32 to 40 oz/A.	7 days prior to harvest.	Coverage is important. Use 10 gallons of spray solution per acre. Can be tank mixed with sodium chlorate.
glyphosate + carfentrazone @ 1 lb/A + 0.016 lb/A	Improved desiccation of vines/ morningglories.	**Glyphosate** (4 lb/gal formulations) **+ Aim 2 EC** 32 oz/A + 1 oz/A.	7 days prior to harvest.	Coverage is important. Use 10 gallons of spray solution per acre. Can be tank mixed with sodium chlorate.

WEED RESPONSE RATINGS FOR WHEAT HERBICIDES

(See Explanation of Ratings Tables on Page 3.)

HERBICIDES	WSSA GROUP #	WEEDS																	
		Annual Bluegrass	An. Mustard sp.	Buttercup	Carolina Foxtail	Cheat	Chickweed	Coreopsis	Curly Dock	Cutleaf Eveningprimrose	Henbit	Horseweed	Little Barley	Mayweed[1]	Ryegrass[1]	Shepherdspurse	Vetch	V. Pepperweed	Wild Garlic
Axial Bold	1	0	0	0	3	4	0	0	0	0	0	0	0	0	8	0	0	0	0
Beyond Xtra	2	7	5	0	5	8	5	-	2	0	7	3	8	6	8	8	0	-	0
Express	2	0	6	8	0	0	8	-	8	7	7	5	0	9	0	7	7	-	5
Finesse	2	6	8	8	8	6	8	8	8	8	8	7	5	9	7	8	7	8	7
Harmony Extra	2	0	9	9	0	0	8	6	8	6	7	8	0	9	0	9	6	8	8
Osprey	2	9	5	7	9	3	6	-	0	0	5	4	5	3	9	7	7	-	0
Peak	2	4	6	8	0	0	8	-	8	8	8	7	0	8	0	7	8	-	8
PowerFlex HL	2	5	9	8	8	8	9	8	7	0	9	3	5	9	9	8	8	8	0
Prowl H_2O	3	3	8	8	6	3	8	2	0	4	8	5	3	0	6	8	0	-	0
2,4-D	4	0	8	9	0	0	4	8	6	9	4	9	0	6	0	7	9	9	7
Quelex	2, 4	0	9	7	0	0	8	6	5	5	9	9	0	8	0	9	8	-	0
Metribuzin	5	9	7	8	6	7	9	6	0	0	7	8	7	5	3	4	0	9	0
Axiom	5, 14	9	9	8	0	5	8	-	2	2	8	9	2	-	6	8	5	-	0
Zidua/Anthem Flex	15	9	-	-	9	9	-	-	-	-	-	8	9	-	9	-	0	-	0

[1]Some ryegrass and mayweed populations in Arkansas have been found to be resistant to ALS herbicides (Finesse, Osprey, PowerFlex).

Forage, Feed and Grazing Restrictions for Wheat Herbicides

Herbicide	Restrictions
2,4-D	Do not permit dairy animals or meat animals being finished for slaughter to forage treated grain fields within 2 weeks after treatment. Do not feed treated straw to livestock if a preharvest or emergency treatment is used. See label.
Anthem Flex	Do not harvest or graze for 7 days.
Axial Bold	Do not graze treated fields for 50 days following application.
Axiom	Do not graze wheat within 14 days following application.
Banvel	Do not graze or harvest for livestock feed prior to crop maturity.
Beyond Xtra	Do not graze for 30 days following application.
Express	Do not graze for 7 days following application.
Finesse Cereal and Fallow	No grazing, forage or hay restrictions.
Harmony Extra	Do not graze for 7 days following application.
Metribuzin	Do not graze wheat within 14 days following application.
Osprey	Do not apply within 30 days of harvesting forage or 60 days for hay, grain or straw.
Paraquat	Do not graze or harvest for feed.
Peak	Do not graze within 30 days following application.
PowerFlex HL	Do not graze for 7 days; do not cut for hay for 28 days.
Prowl H_2O	Do not apply Prowl within 60 days of wheat harvest, 28 days for hay, and 11 days for wheat forage.
Zidua	Do not harvest or graze for 7 days.

Restrictions are listed as worded on the labels. Feeding and application restrictions for herbicides are generally based on residue tolerances allowed for animal feeding. The restrictions are generally not due to acute toxicity (poisoning) problems. Livestock that are accidentally fed treated crops earlier than allowed may not be harmed, but may have illegal pesticide residues in their meat or milk. If you have fed livestock treated crops within the restricted period, refer to the label, your dealer, or herbicide company representative for more information.

Wheat Herbicide Compatibility with Fertilizers as Application Carriers

Herbicide	Fertilizer	
	Fluid	Dry
2,4-D amine	N	N
2,4-D ester	Y	N
Anthem Flex	Y	Y
Axial Bold	N	N
Axiom	N	N
Banvel	Y	N
Beyond Xtra	N	N
Finesse	Y	N
Harmony Extra or Express	Y	N
Metribuzin	N	N
Osprey	N	N
PowerFlex	Y	N
Prowl H_2O	Y	Y
Zidua	Y	Y

Y = Yes, N = No

There are many specific fertilizer incompatibilities and restrictions with most herbicides. Be sure to read the herbicide label for specific mixing or impregnation instructions. Compatibility agents are required for many mixes. A typical compatibility test procedure for mixing herbicides in fluid fertilizers is given on page 4. NOTE: Compatibility with dry fertilizer is listed here from a labeling standpoint. The University of Arkansas only recommends herbicide application on dry fertilizer as a third alternative to spraying in water or in liquid fertilizer.

Crop Replant and Rotation Guide for Wheat Herbicides

Herbicide	Replant/Crop Rotation	Time Interval	Precautions
2,4-D	All	90 days	90 days or until dissipated.
Anthem Flex	C, CT, S, W P, SF R, SG All	I 4 months 10-11 months 18 months	
Axial Bold	W All others	I 4 months	
Axiom	S† AL, C, FG, W, B CT, R All (except root crops)†† Root crops	I 4 months 8 months 12 months 18 months	† Waiting period for replanting soybeans depends on the rate of metribuzin used. See specific label for more information. Add 2 months to time intervals if pH of soil is above 7.5. †† Cover crops may be planted anytime, but stand reductions may occur.
Beyond Xtra	S A, W C, GS, CT, SF All others	I 3 months 9 months 18 months	For CL wheat only.
Express	W, O CA All	I 60 days 45 days	
Finesse	Follow only with STS or BOLT soybeans the next year.		
Harmony Extra	W, O CA All	I 60 days 45 days	
Metribuzin	S† AL, C, FG, W, B CT, R All (except root crops)†† Root crops	I 4 months 8 months 12 months 18 months	† Waiting period for replanting soybeans depends on the rate of metribuzin used. See specific label for more information. Add 2 months to time intervals if pH of soil is above 7.5. †† Cover crops may be planted anytime, but stand reductions may occur.

Herbicide	Replant/Crop Rotation	Time Interval	Precautions
Osprey	W B, SF S, CT, R, P C All others	7 days 30 days 90 days 12 months 10 months	Under cold temperature or drought, degradation may be slower.
Peak	W C, GS R, S, CT All others	I 1 month 10 months 18 months	Apply to soils below pH 7.8 if rice, soybeans or cotton in rotation.
PowerFlex HL	S, CT W C, O, GS, CA, SF, P R	90 days 1 month 9 months 12 months	
Prowl H_2O	CT, S W, B All	I 4 months FY	Do not rework soil deeper than treated zone.
Quelex	W, B C, SG, CT, S, SF, R Peanut	I 3 months 9 months	
Zidua	C, S CT P, SF R W	I 2 months 4 months 12 months 30 days	

KEY

Crop

All = All crops not specified
B = Barley
C = Corn
CA = Canola
CT = Cotton
FG = Forage Grasses
GS = Grain Sorghum
O = Oat
P = Peanuts
R = Rice
S = Soybeans
SF = Sunflower
SG = Small Grains
W = Wheat

Timing

I = Immediately
FY = Following year (usually spring)

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
WHEAT				
chlorsulfuron + metsulfuron @ 0.020 + 0.004 lb/A	Mustards, henbit, chickweed, mayweed, buttercup, coreopsis, primrose, dock, and suppression of ryegrass, cheat and garlic.	**Finesse 75 DF** 0.5 oz/A.	Immediately after planting. Add glyphosate or paraquat if emerged vegetation present.	**Note: May only be followed with STS soybean in spring if pH is 7.5 or less. Carryover will injure non-STS soybean varieties.**
pyroxasulfone + carfentrazone @ 0.058 + 0.004 to 0.133 + 0.009 lb/A	Ryegrass, other grass weeds, and some small-seeded broadleaves.	**Anthem Flex 4 SE** 2 to 4.55 oz/A. Rate depends on soil type.	Apply from delayed PRE to early POST.	Do not apply delayed PRE until wheat has germinated.
pyroxasulfone @ 0.038 to 0.15 lb/A	Ryegrass, other grass weeds, and some small-seeded broadleaf weeds.	**Zidua 4.17 SC** 1.25 to 4 oz/A. Rate depends on soil type and timing.	Apply from delayed PRE to early POST.	Do not apply delayed PRE until wheat has germinated.
flufenacet + metribuzin @ 0.204 + 0.051 to 0.340 + 0.085 lb/A	Annual bluegrass and broadleaf weeds. Ryegrass suppression.	**Axiom 68 DF** 6 to 10 oz/A. See label for soil type restrictions.	Spike to 2-leaf wheat.	Apply early. Some varieties may be injured by metribuzin. Will suppress ryegrass, but must follow with POST application of Axial Bold, Osprey or PowerFlex (Osprey and PowerFlex will only work on ALS-susceptible ryegrass).
pinoxaden + fenoxaprop-pethyl @ 0.053 + 0.027 lb/A	Ryegrass, ALS-inhibitor-resistant ryegrass, other selected grass weeds.	**Axial Bold 0.69 EC** 15 oz/A.	Apply to 1-leaf to 2-tiller ryegrass. Apply from 2-leaf wheat to pre-boot. 70 day PHI.	Do not use on oats. Do not tank-mix with 2,4-D.
mesosulfuron-methyl @ 0.013 lb/A	Ryegrass (ALS-susceptible), wild oat, and annual bluegrass.	**Osprey 4.5 WDG** 4.75 oz/A. Follow label recommendation for adjuvant and fertilizer carrier.	Apply to winter wheat only from emergence up to joint stage. Do not apply more than 4.75 oz/A on one wheat crop.	Apply to small actively growing ryegrass in the 4-leaf to 2-tiller growth stage. Osprey will control larger ryegrass under good conditions as a salvage treatment, but significant yield loss from ryegrass competition will occur if it is not controlled early. Rainfast in 4 hours. Cold weather following an application may reduce effectiveness. For spring applications, avoid simultaneous activation of topdress nitrogen and Osprey. See label for nitrogen restrictions.

FOR SEVERE RYEGRASS INFESTATIONS/ALS/ACCase-RESISTANT RYEGRASS (WSSA Group 1 & 2)

Where ryegrass populations are most severe, especially resistant ryegrass, it may be necessary to take a program approach. This may include a full tillage program following the first "flush" of ryegrass followed by a post-applied herbicide prior to planting (glyphosate or paraquat) followed by a sequential program of Axiom (or Axiom plus Prowl or Zidua/Anthem Flex) in the fall (1- to 2-leaf wheat), followed by a spring application of Axial. In addition, one year of fallowing a field and not allowing ryegrass to go to seed will typically eliminate 95% of ryegrass seed in the soil seed bank.

Cereal Rye Control in Wheat

Cereal rye and wheat are very similar and therefore cereal rye is difficult to control in wheat. Zidua applied delayed PRE followed by an early-POST application of Axial Bold will provide suppression of Cereal rye.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
WHEAT [cont.]				
pendimethalin @ 1.0 lb/A	Residual only. Suppression of ryegrass. Good control of small-seeded winter annual weeds.	**Prowl H_2O 3.8 CS** 2.1 pt/A.	After wheat has 1 leaf, until 4 tillers. Prior to weed germination.	Emerged weeds will not be controlled. University testing has shown good crop safety both pre and delayed PRE (in cases of poor stand) as long as seed is covered by at least 0.5-inch of soil. Prowl H_20 can be tank mixed with Axial Bold, PowerFlex or Osprey to provide around 30 days of residual ryegrass control.
pyroxsulam @ 0.016 lb/A	Ryegrass (ALS-susceptible), henbit, vetch, chickweed, curly dock and others.	**PowerFlex HL 13 DG** 2 oz/A. Add 0.5% nonionic surfactant or 1 to 1.25% crop oil concentrate or 1% MSO.	Apply from 3-leaf to joint, after ryegrass has emerged.	Do not apply more than 2 oz/A per year. Do not use on oats. Do not harvest within 60 days. See label for nitrogen restrictions.
metribuzin @ 0.094 to 0.141 lb/A	Cheat, bluegrass and little barley.	**Metribuzin 75 DF** 2 to 3 oz/A.	After wheat plants have 2 leaves and 1-inch secondary roots.	**Do not use on oats.** Best cheat control with fall application. Avoid use on sandy soils. Some wheat varieties may be injured by metribuzin.
2,4-D amine or LV esters @ 0.5 to 0.75 lb/A	Mustard, thistles, buttercup, dock seedlings, horseweed seedlings, vetch and winter peas.	**2,4-D amine or LV esters** 1 to 1.5 pt/A of 4 lb/gal 2,4-D.	In spring after the wheat plants have tillered and are 4 to 8 inches tall to the time the joint begins to elongate. (Growth stages 3 to 5.)	Apply when temperature is above 60°F and when no rain is expected for 12 hrs. Do not graze lactating dairy animals until 7 days after application. AVOID DRIFT.
2,4-D LV esters @ 0.75 to 1 lb/A	Wild onion or garlic.	**2,4-D LV esters** 1½ to 2 pt/A of 4 lb/gal formulation. Add a surfactant. Use 2 pt rate only if severe infestations and if some injury can be tolerated. See right column for addition of **dicamba**.	In spring after the wheat plants have tillered and are 4 to 8 inches tall to the time the joint begins to elongate. (Growth stages 3 to 5.) The LV esters can be applied in liquid N **if** the optimum timing for the two applications coincide.	Prevents seed and aerial bulblets but will not completely control. Do not graze lactating dairy animals until 14 days after application. AVOID DRIFT. Dicamba can be added at the rate of 4 oz/A of 4 lb/gal or 8 oz/A of 2 lb/gal dicamba. This may increase garlic suppression. It is less selective and should not be used unless some injury can be tolerated. Do not add dicamba if any joint movement has occurred in wheat.
halauxifen-methyl + florasulam @ 0.075 + 0.075 lb/A	Henbit, mustards, horseweed, shepherdspurse.	**Quelex 20 DF** 0.75 oz/A.	Apply from 2 leaf to flag leaf emergence.	60-day PHI. Do not apply more than one application per year. Do not apply less than 21 days prior to cutting for hay, 7-day grazing restriction.
thifensulfuron + tribenuron @ 0.016 to 0.019 + 0.008 to 0.009 lb/A	Wild garlic, buttercup, mayweed, dock, chickweed, primrose, and suppression of vetch.	**Harmony Extra 50 SG** 0.75 to 0.9 oz/A. Surfactant required for both water and liquid N carriers.	In early to mid-March when wild garlic is 6" to 12" tall.	Apply to actively growing weeds. May be tank mixed with liquid N if slurried in water first. Thorough spray coverage is necessary; coarse spray is not recommended. May be used on oats after 3-leaf but prior to jointing.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
thifensulfuron + tribenuron + 2,4-D @ 0.016 + 0.008 + 0.75 lb/A	Horseweed.	**Harmony Extra 50 SG + 2,4-D LV ester** 0.75 oz/A + 1.5 pt/A of 4 lb/gal formulations. Add surfactant.	See 2,4-D above.	For severe horseweed infestations, add 4 oz of dicamba. Effective treatment when intentions are to plant soybeans after harvest.
thifensulfuron + tribenuron + halauxifen-methyl + florasulam @ 0.016 + 0.008 + 0.075 + 0.075 lb/A	Horseweed, wild garlic, and other broadleaves.	**Harmony Extra 50 SG + Quelex 20 DF** 0.75 oz/A + 0.75 oz/A.	Apply before flag leaf emergence.	Same as above.
tribenuron @ 0.008 to 0.016 lb/A	Buttercup, mayweed, chickweed. Suppression of vetch and curly dock.	**Express 50 SG** 0.25 to 0.50 oz/A. Surfactant required for both water and liquid N carriers.	Apply before flag leaf emergence.	Same as above.
prosulfuron @ 0.009 to 0.018 lb/A	Wild garlic, vetch, chickweed, henbit.	**Peak 57 WG** 0.25 to 0.5 oz/A. Add a surfactant.	After wheat plants have developed 3 leaves and before second node is detectable.	**Expect slow results. Use high rate for garlic. (10-month minimum plant back interval for soybeans, regardless if STS/BOLT or not.)**
Preharvest				
glyphosate @ 1 lb/A	Annual broadleaf and grass weeds and johnsongrass.	**Glyphosate** (4 lb/gal formulations) 2 pt/A.	Timing after hard dough stage (30% or less moisture) and at least 7 days prior to harvest.	Apply in spray volume of 3 to 10 GPA. Not recommended for use on wheat grown for seed because reduction in germination and vigor can occur.
carfentrazone @ 0.0312 lb/A	Morningglory desiccation.	**Aim 2 EC** 2.0 oz/A. Add 1% crop oil concentrate.	7 days prior to harvest.	Good coverage is critical to Aim activity. 10 GPA is recommended.

WEED RESPONSE RATINGS FOR RICE HERBICIDES

(See Explanation for Ratings Tables on Page 3.)

HERBICIDES	WSSA GROUP #	GRASSES							BROADLEAF WEEDS																SEDGES				
		Barnyardgrass[1]	Broadleaf Signalgrass	Crabgrass	Fall Panicum	Weedy rice	Rice Cutgrass	Sprangletop spp.	Ammania (red stem)	Dayflower	Ducksalad	Eclipta	Gooseweed	Groundcherry	Hemp Sesbania (coffeebean)	Indian Jointvetch	Northern Jointvetch (curly indigo)	Palmleaf Morningglory	Pigweed, Palmer[2]	Pitted Morningglory	Smartweed	Texasweed	Water Hyssop	Flatsedges[3]	White-margined flatsedge	Spikerush	Umbrella Sedge	Yellow Nutsedge
Preemergence																													
League	2	0	0	0	0	0	0	0	7	-	5	-	-	-	9	8	8	2	0	2	7	8	-	8	5	-	0	8
Prowl delayed PRE	3	8	6	8	7	0	0	6	0	0	4	0	0	-	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0
Facet	4	9	9	9	9	0	0	0	3	5	3	8	3	8	6	7	7	7	4	7	0	0	6	5	6	-	0	0
Facet + Prowl delayed PRE	4/29, 3	9	9	9	9	0	0	7	3	5	3	8	3	-	7	7	7	8	6	8	0	0	6	5	6	-	0	0
Facet + Bolero delayed PRE	4/29, 15	9	9	9	9	0	0	8	6	7	7	9	5	-	8	8	8	8	5	8	5	-	6	8	8	7	4	0
Quinclorac + clomazone	4/29, 13	10	10	10	10	0	0	9	3	6	3	8	4	8	7	8	8	8	4	8	6	0	6	5	6	7	-	0
Gambit	2	2	0	0	0	0	0	0	-	7	-	7	-	8	7	7	7	5	0	5	8	-	-	8	5	-	-	8
Clomazone	13	9	9	9	9	0	0	9	0	3	3	3	0	-	2	3	3	4	0	3	2	0	0	0	0	0	0	0
Sharpen	14	0	0	0	0	0	0	0	-	-	-	-	-	-	4	4	4	7	9	7	4	-	-	8	7	-	8	2
Bolero delayed PRE	15	7	5	7	7	0	0	7	7	8	7	8	6	-	5	5	5	5	-	5	5	-	7	7	8	7	4	4
Bolero – Water seeded	15	8	7	7	-	8*	0	8	3	6	6	-	6	-	-	-	-	-	-	-	-	-	5	7	8	5	3	3
Prowl + Bolero delayed PRE	3, 15	9	7	8	8	3	0	8	7	7	7	8	6	-	5	5	5	5	6	5	5	-	7	7	8	7	4	4
Early Postemergence																													
Clincher	1	8	9	5	9	0	2	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Provisia fb Provisia fb Provisia	1	10	10	10	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Highcard fb Highcard	1	9	9	10	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ricestar HT	1	9	9	8	7	0	2	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grasp	2	8	0	0	0	0	6	0	7	8	9	8	-	8	8	8	8	4	0	5	7	7	8	8	5	8	0	6
Newpath/Preface fb Newpath/Preface-Beyond Xtra/Postscript	2	9	9	9	9	9[4]	9	8	8	5	7	0	5	9	0	0	0	5	0	7	9	5	0	9	5	9	0	8
Permit	2	0	0	0	0	0	0	0	5	8	3	5	4	6	9	3	6	0	0	4	4	5	-	9	5	-	0	9
Permit Plus	2	0	0	0	0	0	0	0	8	9	7	7	4	8	9	5	7	3	0	5	7	5	-	9	5	-	0	9
Regiment	2	8	0	0	0	0	7	3	6	9	9	7	0	-	8	7	7	4	0	5	9	7	6	4	3	-	3	5
Facet	4	8	9	7	6	0	2	0	3	3	3	9	3	8	8	8	8	8	4	8	0	0	3	5	6	-	0	0
Grandstand + Permit	4, 2	0	0	0	0	0	0	0	8	8	4	5	-	4	8	9	9	9	4	9	7	9	-	9	5	-	3	9
Facet + propanil	4, 5	9	9	7	9	0	2	4	6	5	6	9	5	8	9	9	9	8	8	8	6	6	8	9	6	9	3	5
Grandstand + propanil	4, 5	9	9	7	9	0	0	4	9	5	8	9	8	4	9	9	9	9	9	9	7	8	8	9	5	9	3	5
Propanil (weeds less than 2")	5	9	9	7	9	0	1	4	6	5	7	8	5	-	9	9	9	4	8	4	6	6	8	9	5	9	5	4
Propanil fb propanil	5	9	9	7	9	0	2	8	6	6	7	9	5	-	9	9	9	5	10	5	8	6	8	10	7	9	6	6
Propanil + Permit	5, 2	9	9	7	9	0	1	4	6	9	7	8	5	6	10	9	9	4	7	4	6	5	8	9	5	9	3	9
Propanil + Prowl	5, 3	9	9	7	9	0	1	9	7	5	7	9	6	-	9**	9**	9**	5	8	5	6	4	7	9	5	7	3	5
Propanil + Bolero	5, 15	9	9	7	9	0	2	9	8	8	8	9	6	-	9**	9**	9**	5	8	5	6	4	9	9	5	9	8	5

[1]Some biotypes of barnyardgrass in Arkansas are resistant to Command, propanil, Facet or both (Facet + propanil), Newpath, Grasp, Regiment, Clincher, Ricestar, and Loyant. **Best barnyardgrass control is achieved through a program approach with overlapped residuals at the front of the season.**

[2]Data from Arkansas resistance screenings has identified WSSA Group 3 (pendimethalin) and Group 14 (saflufenacil) resistant pigweed. Expect reduced control from herbicides such as Prowl or Sharpen when used alone.

[3]Data from Arkansas resistance screenings indicates more than 50% of annual flatsedge populations test positive for ALS-inhibitor (Permit) resistance.

[4]Off-types and evolved herbicide resistance would reduce this rating significantly (near 0).

*Water seed pin-point flood culture.

**Postemergence control only.

Rating Scale – 0 = No Control 10 = 100% Control.

(Cont. on page 89)

WEED RESPONSE RATINGS FOR RICE HERBICIDES (cont.)

(See Explanation for Ratings Tables on Page 3.)

HERBICIDES	WSSA GROUP #	GRASSES							BROADLEAF WEEDS																SEDGES				
		Barnyardgrass[1]	Broadleaf Signalgrass	Crabgrass	Fall Panicum	Weedy rice	Rice Cutgrass	Sprangletop spp.	Ammania (red stem)	Dayflower	Ducksalad	Eclipta	Gooseweed	Groundcherry	Hemp Sesbania (coffeebean)	Indian Jointvetch	Northern Jointvetch (curly indigo)	Palmleaf Morningglory	Pigweed, Palmer[2]	Pitted Morningglory	Smartweed	Texasweed	Water Hyssop	Flatsedges[3]	White-margined flatsedge	Spikerush	Umbrella Sedge	Yellow Nutsedge
Early Postemergence [cont.]																													
Basagran	6	0	0	0	0	0	0	0	8	9	6	8	7	0	3	3	3	8	0	3	7	0	8	8	6	8	7	6
Basagran + propanil	6, 5	9	9	7	9	0	2	5	9	9	7	9	7	4	9	9	9	8	7	5	8	6	9	9	7	9	8	7
Aim	14	0	0	0	0	0	0	0	6	7	5	7	-	8	9	6	6	10	6	10	9	3	7	-	0	0	3	0
Sharpen	14	0	0	0	0	0	0	0	8	7	5	9	7	8	9	9	9	9	7	10	-	8	8	8	4	-	6	6
Ultra Blazer + propanil	14, 5	8	8	7	8	0	1	5	6	5	7	8	5	8	9	6	9	8	9	8	7	3	8	8	5	8	2	5
Early Postflood[5]																													
Ricestar + Regiment	1, 2	8	5	5	4	0	4	6	4	6	6	5	0	-	6	5	5	2	0	3	7	5	4	1	1	-	1	2
Ricestar + Beyond Xtra	1, 2	8	8	8	8	6[4]	6	8	6	2	4	0	3	6	0	0	0	2	0	4	6	4	0	6	3	6	0	5
Novixid[6]	2, 4	7	5	0	0	0	3	4	6	8	9	8	8	5	9	9	9	2	8	6	4	4	8	8	3	7	8	6
Rogue	27	5	3	-	-	8***	8	9	0	-	10	-	6	-	6	6	6	-	-	-	3	-	-	10	7	-	10	6
Midseason																													
2,4-D	4	0	0	0	0	0	0	0	9	9	9	9	6	5	9	5	5	9	8	9	6	0	9	8	7	8	3	5
Grandstand + propanil	4, 5	4	4	4	4	0	0	0	9	-	6	6	7	3	9	8	9	9	7	9	5	0	8	5	5	8	5	3
Propanil	5	4	4	4	4	0	0	0	4	0	3	4	0	4	8	5	5	3	6	0	3	0	8	5	5	7	5	3
Propanil + Ultra Blazer	5, 14	5	5	5	5	0	0	0	5	2	4	5	2	5	9	6	6	7	7	8	7	0	8	6	5	7	5	4
Ultra Blazer	14	0	0	0	0	0	0	0	0	0	0	0	0	3	9	0	0	3	6	3	6	0	0	0	0	0	0	0

*Water seed pin-point flood culture. **Postemergence control only. ***Only effective on sensitive populations.
There are known Rogue-resistant weedy rice populations within Arkansas. Rating Scale: 0 = No Control 10 = 100% Control.

[1]Some biotypes of barnyardgrass in Arkansas are resistant to Command, propanil, Facet or both (Facet + propanil), Newpath, Grasp, Regiment, Clincher, Ricestar, and Loyant. **Best barnyardgrass control is achieved through a program approach with overlapped residuals at the front of the season.**
[2]Data from Arkansas resistance screenings has identified WSSA Group 3 (pendimethalin) and Group 14 (saflufenacil) resistant pigweed. Expect reduced control from herbicides such as Prowl or Sharpen when used alone.
[3]Data from Arkansas resistance screenings indicates more than 50% of annual flatsedge populations test positive for ALS-inhibitor (Permit) resistance.
[4]Off-types and evolved herbicide resistance would reduce this rating significantly (near 0).
[5]Applying these herbicides individually, rather than in a mixture, would result in significantly reduced control at this timing.
[6]These ratings are based on spray applications. Reduced grass control would be observed if coated on fertilizer.

ROW RICE WEED RESPONSE RATINGS TABLE

HERBICIDES	Goosegrass	Large Crabgrass	Johnson-grass	Carpetweed	Entireleaf Morning-glory[2]	Prickly Sida[3]	Palmer Amaranth[4]	Sicklepod
Preemergence								
Prowl	C	C	C[1]	C	NR	C	C	NR
Bolero	C	S	-	-	-	-	-	-
Clomazone	S	C	S[1]	NR	NR	S	NR	NR
Sharpen	NR	NR	NR	C	C	C	C	NR
Early Postemergence								
Clincher	S	S	C	NR	NR	NR	NR	NR
Ricestar	S	C	C[1]	NR	NR	NR	NR	NR
Grasp	NR	NR	NR	NR	S	NR	NR	C
Newpath/Preface - Beyond Xtra/Postscript	S	S	C[1]	C	S	S	NR	NR
Gambit	NR	NR	NR	NR	S	C	NR	C
Regiment	NR	NR	C	NR	C	NR	NR	C
Loyant	NR	NR	NR	-	NR	NR	C	C
Facet	NR	C	NR	-	C	NR	NR	NR
Grandstand	NR	NR	NR	-	C	NR	NR	C
Propanil	C	C	S	C	C	S	S	S
Ultra Blazer	NR	NR	NR	C	C	NR	S	NR

C = Control S = Suppression NR = Not Recommended
[1]Johnsongrass seedling only, not rhizome.

RAINFALL-FREE PERIODS FOR POSTEMERGENCE RICE

Herbicide	Time Before Rainfall	Herbicide	Time Before Rainfall
2,4-D	6 hrs	Newpath/Preface	1 hr
Aim	1 hr	Permit/Permit Plus	4 hrs
Basagran	4 hrs	Propanil	6 hrs
Beyond Xtra/Postscript	1 hr	Provisia/Highcard	1 hr
Bolero	24 hrs	Regiment	8 hrs
Clincher	1 hr	Ricestar HT	1 hr
Facet	6 hrs	Sharpen	1 hr
Gambit	4 hrs	Storm	8 hrs
Grasp	1 hr	Strada	6 hrs
League	6 hrs	Ultra Blazer	4 hrs
Loyant	2 hrs		

Crop Replant and Rotation Guide for Rice Herbicides

Herbicide	Replant/Crop Rotation	Time Interval	Precautions
2,4-D	All	90 days	90 days or until sufficiently dissipated.
Aim	AL, CL All other	12 months I	
Basagran	All	I	
Beyond Xtra/ Postscript	S A B, CT, GS, O, SF, P, C, R CA	I 3 months 9 months 18 months	
Bolero	All*		* Do not plant subsequent crops in treated fields within 6 months of last application. Do not use in fields where fall farming of crayfish will be practiced. Do not apply to second stubble rice crop.
Clincher	All	3 months	No more than 25 oz per growing season. Keep away from peach trees.
Clomazone	S W	I 4 months	
Facet	GS, R, W All	I 10 months	Do not plant tomatoes or carrots within 2 years. Do not use in fields for fish farming or where fall farming of crayfish will be practiced.
Gambit	R C W, GS, SG CT, P, S	I 1 month 2 months 10 months	See label for other rotational crop restrictions.
Grandstand	R All	I 4 months	
Grasp	All	3 months	
League	R CT C, S, GS	I 8 months 12 months	* See label for vegetables and other crops.
Londax	All	120 days	
Loyant	All	3 months	
Newpath/ Preface	S, P, Clearfield Corn, Clearfield Rice W C CT, GS, Non-Clearfield Rice	I 4 months 8.5 months 18 months	Wheat rotation is longer if more than 8 oz/year is used.
Novixid	All	3 months	
Permit, Permit Plus or Halomax	R W, C, GS CT, P S SF	I 2 months 6 months 9 months 18 months	Preplant to rice up to pH 8.
Propanil	All	I	
Provisia	B, CA, CT, S, SF, W All	I 120 days	Provisia rice can be planted immediately. Do not plant Provisia rice in consecutive years.
Prowl	CT, S All B, W	I FY 120 days*	* 90 days after a post incorporated application in irrigated field corn or grain sorghum. Do not plant following irrigation if crop failure occurs. Do not plant following no-till practices. Do not plant following higher Prowl rates for rhizome johnsongrass or weedy rice.
Regiment	R All	I FY	
Ricestar HT	R, S All	I 9 months FY	
Rinde	GS, R, W All AL, CL	I 10 months 24 months	
Rogue	All	30 days	
Sharpen	C, R, GS, SG, S CT All	I 1.5 months 4 months	Sweet corn plant back is 0.5 months.
Storm	All	Fall	
Strada	R C, SG C, S All others	I 3 months 6 months 12 months	
Ultra Blazer	P, S All*	I FY	* Root crops (such as carrots, turnips, sweet potatoes, etc.) must not be planted in treated fields for a period of 18 months following treatment.

* This table applies to the major field and forage crops. Refer to the herbicide labels for the latest recrop and rotation information for horticultural crops. These are written as best we could interpret the labels. We regret any omissions or errors. Always refer to product labels before using a pesticide or replanting into treated fields.

KEY

Crop

All = All crops not specified
AL = Alfalfa
B = Barley
C = Corn
CA = Canola
CL = Clovers
CT = Cotton
GS= Grain Sorghum
O = Oat
P= Peanuts
R = Rice
S = Soybeans
SF = Sunflowers
SG = Small Grains
W = Wheat

Timing

I = Immediately
FY = Following year (usually spring)

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE **Preplant Non-incorporated [Water Seeded Rice Only]**				
thiobencarb @ 4 lb/A	Weedy rice.	**Bolero 8E** 4 pt/A.	After final seedbed preparation.	Flood within 2 to 3 but no sooner than 1 day after Bolero application. If pin-point flood management is used, reflood within 3 to 5 days to prevent loss of Bolero. **Use pregerminated seed. Severe injury has occurred in some cases with this recommendation. Contact company for full instructions before using.**
Preemergence [Dry Seeded Rice Only] **For information on burndown herbicides see p. 21 and p. 26, WEED RESPONSE RATINGS FOR BURNDOWN HERBICIDES.**				
quinclorac @ 0.25 to 0.5 lb/A	Barnyardgrass, broadleaf signalgrass, morningglory, hemp sesbania, northern jointvetch.	**Facet L or QuinStar 4L** 22 to 43 oz/A or 8 to 16 oz/A	Apply to smooth seedbed with rice seed covered by soil. Rice seed exposed to the spray may be severely injured. Use the lower rate on sandy soils; use the higher rate on clays.	**Tomatoes and cotton are extremely sensitive to Facet and QuinStar.** For more consistent results, follow the Delayed Preemergence instructions below. If weeds emerge after application, rainfall or flushing may be required for activation and reactivation. Fields treated with Facet or QuinStar should be scouted for smartweed, nutsedge and sprangletop and treated if necessary. Common purslane will not be controlled by Facet or QuinStar. However, it should be controlled by the flood.
clomazone @ 0.3 to 0.6 lb/A or glyphosate + clomazone @1 lb/A + 0.3 to 0.6 lb/A or paraquat + clomazone @ 0.625 + 0.3 to 0.6 lb/A or quinclorac + clomazone @ 0.25 to 0.5 + 0.3 to 0.6 lb/A	Barnyardgrass, broadleaf signalgrass, sprangletop and other annual grasses.	**Glyphosate** (4 lb/gal formulations) **+ Clomazone** (3 lb/gal formulations) or **Paraquat** (3 lb/gal formulations) **+ Clomazone** (3 lb/gal formulations) or **Clomazone** (3 lb/gal formulations) **+ Facet L or QuinStar 4L**	Apply from planting to rice emergence to smooth seedbed with rice seed covered by soil. **Injury may increase with lower seeding rates**. May be used in conventional, stale seedbed and no-till culture. If emerged vegetation is present, add glyphosate at 1 qt glyphosate or equivalent, or paraquat at 1.67 pt/A. **Using less glyphosate can result in failure due to tank mix antagonism.** *Add Permit or Permit Plus for emerged sedges.	If grasses emerge after application, rainfall or flushing may be needed for activation and reactivation. Grasses may emerge white, however usually die off after emergence. **Application on newly cut ground can result in severe injury and stand loss.** Rice in low areas of the field, or where water is prone to stand, may show more injury. Fields treated with clomazone should be scouted for nutsedge and flatsedge species and other broadleaf weeds and treated if necessary. Clomazone is not a stand-alone herbicide. It should be used in a herbicide program to control these species. Scout carefully for escaped grasses prior to flooding. Do not exceed 0.8 lb ai/A per year of clomazone. Clomazone plus glyphosate can be applied up to 14 days prior to planting. However, sequential post grass herbicides may be needed due to shorter residual.
clomazone @ 0.3 to 0.6 lb/A + imazosulfuron @ 0.304 lb/A	Grasses plus nutsedge and other broadleaves.	**Clomazone** (3 lb/gal formulations) **+ League 75 WG** 0.8 to 1.6 pt/A + 6.4 oz/A.	Apply from planting to rice emergence to smooth seedbed with rice seed covered by soil. May be used in conventional, stale seedbed and no-till culture. If emerged vegetation is present, add glyphosate at 1 qt glyphosate or equivalent, or paraquat at 1.67 pt/A. **Using less glyphosate can result in failure due to tank-mix antagonism.**	Keep away from soybeans and ground to be planted to soybean. Do not exceed 6.4 oz League per season. May carry over to soybean on very high pH soils.
clomazone @ 0.3 to 0.6 lb/A + saflufenacil @ 0.066 lb/A	Grasses plus annual flatsedges and other broadleaves.	**Clomazone** (3 lb/gal formulations) **+ Sharpen** 0.8 to 1.6 pt/A + 3 oz/A	Apply from planting to rice emergence to smooth seedbed with rice seed covered by soil. May be used in conventional, stale seedbed and no-till culture. If emerged vegetation is present, add glyphosate at 1 qt glyphosate or equivalent, or paraquat at 1.67 pt/A. **Using less glyphosate can result in failure due to tank-mix antagonism.**	See above precautions on rice injury potential. Do not exceed 6 oz/A Sharpen per season.
clomazone @ 0.3 to 0.6 lb/A + halosulfuron + prosulfuron @ 0.031 + 0.018 lb/A	Grasses plus yellow nutsedge and broadleaves.	**Clomazone** (3 lb/gal formulations) + **Gambit** 0.8 to 1.6 pt/A + 1 oz/A.	Apply from planting to rice emergence to smooth seedbed with rice seed covered by soil. If emerged vegetation is present, add glyphosate at 1 qt glyphosate or equivalent, or paraquat at 1.67 pt/A. **Using less glyphosate can result in failure due to tank-mix antagonism.**	See above precautions on rice injury potential. Do not exceed 2 oz/A Gambit per season or 0.063 lb/A of halosulfuron. Use on high pH soils may stunt or tyellow rice, temporarily.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE				
Delayed Preemergence [Dry Seeded Rice Only]				
thiobencarb @ 4 lb/A	Sprangletop, barnyardgrass and aquatic weeds.	**Bolero 8E** 4 pt/A.	Apply 1 to 5 days before rice emergence or about 5 to 9 days after planting. Rice seed must have imbibed its germination water prior to application.	Bolero delayed preemergence will usually require follow-up treatment for complete grass control prior to flooding. Apply to soil that has been sealed by rain or flush. Application to rice stressed by high salt and/or high pH soils may cause excessive rice injury. Drain surface water before application. Rainfall or flush required for activation if soil begins to crack or if grass begins to germinate. Does not control broadleaf signalgrass. If barnyardgrass or sprangletop has emerged, use tank mix with propanil.
quinclorac @ 0.25 to 0.5 lb/A	Barnyardgrass, broadleaf signalgrass, morningglory, hemp sesbania, northern jointvetch.	**Facet L or QuinStar 4L** 22 to 43 oz/A or 8 to 16 oz/A. Add 1 qt/A crop oil concentrate if weeds have emerged. Apply 1 to 5 days before rice emergence or about 5 to 9 days after planting.	Apply before or after rain or flushing. Rice seed that is exposed to the spray may be severely injured. Best weed control is obtained if soil surface is smooth and wet, especially on clays.	If weeds emerge after application, rainfall or flushing may be required for activation and reactivation. Fields treated with Facet should be watched for smartweed, nutsedge and sprangletop and treated if necessary. Common purslane will not be controlled by Facet. However, it should be controlled by the flood. **Tomatoes and cotton are extremely sensitive to Facet drift.**
pendimethalin + clomazone @ 0.71 + 0.30 to 1.02 + 0.42 lb/A	Barnyardgrass, fall panicum, sprangletop, broadleaf signalgrass, crabgrass, and small-seeded broadleaf weeds.	**RiceOne CS** 35 to 50 oz/A.	Delayed preemergence through 4-tiller rice.	Rice seed must have imbibed water. Apply after rain or flush to seal soil. If grass weeds have emerged, tank-mix with propanil or follow with propanil.
quinclorac + thiobencarb @ 0.25 to 0.5 + 3 to 4 lb/A	Barnyardgrass, broadleaf signalgrass, fall panicum, sprangletop, morningglory, hemp sesbania, northern jointvetch.	**Facet L or QuinStar 4L + Bolero 8E** 22 to 43 oz/A or 8 to 16 oz/A + 3 to 4 pt/A. Research has shown 2 pt/A Bolero effective if sprangletop is only target weed for the Bolero in this mixture, and sprangletop density is light.	Apply 1 to 5 days before rice emergence or about 5 to 9 days after planting. May be applied early postemergence later than Bolero applied alone. Rice seed exposed to the spray may be severely injured. Rice seed must have imbibed germination water prior to application.	Apply to soil that has been sealed by rain or flush. Application to rice stressed by high salt and/or high pH soils may cause excessive rice injury. Drain surface water before application. Rainfall or flush required for activation and reactivation if soil begins to crack or if grass begins to germinate. **Tomatoes and cotton are extremely sensitive to Facet drift.**
quinclorac + pendimethalin @ 0.25 to 0.5 + 1 lb/A	Barnyardgrass, broadleaf signalgrass, fall panicum, sprangletop, morningglory, hemp sesbania, northern jointvetch.	**Facet L or QuinStar 4L + Prowl H_2O 3.8 CS** 22 to 43 oz/A or 8 to 16 oz/A + 2.0 pt/A.	Apply 1 to 5 days before rice emergence or about 5 to 9 days after planting. May be applied early postemergence later than Bolero applied alone. Rice seed exposed to the spray may be severely injured. Rice seed must have imbibed germination water prior to application.	Apply to soil that has been sealed by rain or flush. Drain surface water before application. Rainfall or flush required for reactivation. This has been an excellent broad spectrum program in University trials. **Tomatoes and cotton are extremely sensitive to Facet drift.**
glyphosate + thiobencarb @ 1.0 + 4 lb/A	Emerged weeds, residual control of sprangletop, barnyardgrass, and aquatic weeds.	**Glyphosate** (4 lb/gal formulations) **+ Bolero** 2 pt/A + 4 pt/A.	Apply 1 to 5 days before rice emergence or about 5 to 9 days after planting. May be applied early postemergence later than Bolero applied alone. Rice seed exposed to the spray may be severely injured. Rice seed must have imbibed germination water prior to application.	EMERGED RICE WILL BE KILLED.
pendimethalin @ 0.75 to 1 lb/A	Barnyardgrass, fall panicum, sprangletop, broadleaf signalgrass, crabgrass.	**Prowl H_2O 3.8 CS** 1.5 to 2.0 pt/A. Use low rate for sandy loam soils and high rate for all others.	Apply 1 to 5 days before emergence or about 5 to 9 days after planting. **DO NOT** apply preplant incorporated or immediately after planting. Rice seed must have imbibed germination water prior to application.	Rice seed must have imbibed germination water. Apply after rain or flush to seal soil. If grass weeds have emerged, add propanil or follow with propanil.
pendimethalin + thiobencarb @ 1 + 3 lb/A	Barnyardgrass, fall panicum, sprangletop, broadleaf signalgrass, suppression of aquatics and weedy rice.	**Prowl H_2O 3.8 CS + Bolero 8 EC** 2.0 + 3 pt/A.	Apply 1 to 5 days before rice emergence, usually about 5 to 9 days after planting. Rice seed must have imbibed its germination water prior to application.	This treatment is an option to consider in areas where drift to sensitive plantings is a problem. Some injury to rice may occur under cool, wet conditions.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE **Clearfield Rice System**				
imazethapyr @ 0.063 to 0.095 lb/A followed by 0.063 to 0.095 lb/A	Weedy rice, barnyardgrass, broadleaf signalgrass, sprangletop, fall panicum, yellow nutsedge. Suppression of some aquatic broadleaf species.	**Newpath 2 AS** 4 to 6 oz/A ppi. Follow with 4 to 6 oz/A post-emergence. Add a nonionic surfactant to post-application. The 6-oz rate may provide longer residual from a single application. However, rates higher than 4 followed by 4 oz/A have not improved weed control when properly timed.	Preplant incorporated or preemergence followed by postemergence. Apply 4 oz/A preplant incorporated up to 7 days prior to planting or preemergence immediately following planting. Apply postemergence treatment when rice is in 3- to 5-leaf stage. Do not exceed 6 oz/A per application on conventional CL varieties and 4 oz/A per application on CL hybrids. Under cloudy, cool, wet conditions, Newpath may injure hybrid rice.	**Use on Clearfield rice varieties only**. Preferred method for soil application is preplant incorporated at the time of final seedbed preparation. Incorporate during final seedbed preparation pass. Flush for activation if rainfall does not occur within a few days of planting. Repeat flushing as needed to keep soil-applied treatment active. Tank mixing with propanil or other suitable products will be required for control of weeds such as hemp sesbania, northern jointvetch and eclipta. To prevent outcrossing between Clearfield rice and weedy rice, strive to achieve 100 percent weedy rice control, allowing no escapes. Avoid post applications to hybrids when cool temperatures persist. **The University of Arkansas recommends growing Clearfield rice in the same field only one year in a row. Conventional rice varieties cannot be planted the year following Clearfield rice due to carryover of the Newpath injuring the conventional rice.**
Sequential Post Program				
imazethapyr @ 0.063 to 0.095 lb/A followed by 0.063 to 0.095 lb/A	Same as above. Suppression of sprangletop. Improved control of barnyardgrass and weedy rice on heavy clays and reduced/no-till or chicken litter fields.	**Newpath 2 AS** 4 to 6 oz/A followed by 4 to 6 oz/A. Add nonionic surfactant at 0.25% v/v.	4 oz/A on 1-leaf to 2-leaf weedy rice followed by 4 oz/A approximately 14 days later.	Same as above. A soil-applied herbicide, such as clomazone, should be used for sprangletop control and to aid in the control of annual grass. Most aquatic suppression will be lost, so be prepared to make appropriate tank-mixtures.
imazethapyr + quinclorac @ 0.063 + 0.30 lb/A followed by imazethapyr @ 0.063 to 0.095 lb/A	Same as above with improved barnyardgrass, hemp sesbania and northern jointvetch control.	**Clearpath followed by Newpath** 0.5 lb/A followed by 4 to 6 oz/A. Add 1% v/v crop oil concentrate with Clearpath on enhanced tolerance varieties.	Preemergence followed by postemergence or same as above.	Same as above. See Facet Restrictions and Precautions.
imazamox @ 0.04 lb/A	Late-season suppression of weedy rice.	**Beyond Xtra 1 AS** 5 oz/A. Surfactant or crop oil concentrate required.	After Newpath or Clearpath has been applied. Apply to weedy rice prior to seedhead emergence. **Apply to conventional Clearfield rice no later than 14 days past panicle initiation. Apply to hybrid Clearfield rice no later than panicle initiation.**	Late application of Beyond Xtra may help prevent weedy rice outcrossing with Clearfield rice varieties. Do not apply more than 15 ounces per year.
Beyond Xtra-Only Program				
imazamox @ 0.04 lb/A	Grasses and some other broadleaf species.	**Beyond Xtra 1 AS** 5 oz/A. Surfactant or crop oil concentrate required.	Can be applied from 4-leaf rice to panicle initiation (green ring) plus 14 days for varieties.	Use on Clearfield rice varieties only. A Beyond Xtra- only program allows for Clearfield rice to be grown, and removes the rotation restriction of not allowing conventional or Provisia/Max-Ace rice to be planted the following year. Do not apply more than 15 oz/A per year. Do not make more than 3 applications per year. Wait at least 5 days between applications.

In order to prevent the development of ALS-resistant (WSSA Group 2) barnyardgrass, the University recommends using an additional barnyardgrass herbicide with a different WSSA Group # (see table on pages 90-91). **The University also recommends a standard residual program regardless of trait technology planted to maximize barnyardgrass and other weed control.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE				
FullPage Rice System				
(Preface and Postscript are not effective at controlling Newpath and Beyond Xtra-resistant weeds.)				
imazethapyr @ 0.063 to 0.095 lb/A followed by 0.063 to 0.095 lb/A	Weedy rice, barnyardgrass, broadleaf signalgrass, sprangletop, fall panicum, yellow nutsedge. Suppression of some aquatic broadleaf species.	**Preface** 4 to 6 oz/A ppi. Follow with 4 to 6 oz/A post-emergence. Add a nonionic surfactant to post-application. The 6-oz rate may provide longer residual from a single application. However, rates higher than 4 followed by 4 oz/A have not improved weed control when properly timed.	Preplant incorporated or preemergence followed by postemergence. Apply 4 oz/A preplant incorporated up to 7 days prior to planting or preemergence immediately following planting. Apply postemergence treatment when rice is in 3- to 5-leaf stage.	**Use on FullPage rice varieties only**. Preferred method for soil application is preplant incorporated at the time of final seedbed preparation. Incorporate during final seedbed preparation pass. Flush for activation if rainfall does not occur within a few days of planting. Repeat flushing as needed to keep soil-applied treatment active. Tank mixing with propanil or other suitable products will be required for control of weeds such as hemp sesbania, northern jointvetch and eclipta. To prevent outcrossing between Clearfield rice and weedy rice, strive to achieve 100 percent weedy rice control, allowing no escapes. Avoid post applications to hybrids when cool temperatures persist. **TheUniversity of Arkansas recommends growing Clearfield or FullPage rice in the same field only one year in a row. Conventional rice varieties cannot be planted the year following Clearfield or FullPage rice due to carryover of the imazethapyr injuring the conventional rice.**
Sequential Post Program				
imazethapyr @ 0.063 to 0.095 lb/A followed by 0.063 to 0.095 lb/A	Same as above. Suppression of sprangletop. Improved control of barnyardgrass and weedy rice on heavy clays and reduced/no-till or chicken litter fields.	**Preface** 4 to 6 oz/A followed by 4 to 6 oz/A. Add nonionic surfactant at 0.25% v/v.	4 oz/A on 1-leaf to 2-leaf weedy rice followed by 4 oz/A approximately 14 days later.	Same as above. A soil-applied herbicide, such as clomazone, should be used for sprangletop control and to aid in the control of annual grass. Most aquatic suppression will be lost, so be prepared to make appropriate tank-mixtures.
imazamox @ 0.04 lb/A	Late-season suppression of weedy rice.	**Postscript** 5 oz/A. Surfactant or crop oil concentrate required.	After Preface has been applied. Apply to weedy rice prior to seedhead emergence.	Late application of Postscript may help prevent weedy rice outcrossing with FullPage rice varieties. Do not apply more than 15 ounces per year.
imazamox + quinclorac @ 0.04 + 0.38 lb/A	Postemergence and residual control of grasses. Improved control of some broadleaf species, particularly hemp sesbania and northern jointvetch.	**FullScript 3.3 L** 16 oz/A. Surfactant or crop oil concentrate required.	Can be applied from 1-leaf rice to 7 days prior to panicle initiation (green ring).	**Use on FullPage rice cultivars only.** If Preface is not applied prior to FullScript, it allows for FullPage rice to be grown, and removes the rotation restriction of not allowing conventional or Provisia/MaxAce rice to be planted the following year. Do not apply more than 20 oz/A per year. Do not make more than 1 application per year. See Facet restrictions and precautions.
Postscript-Only Program				
imazamox @ 0.04 lb/A	Grasses and some other broadleaf species.	**Postscript** 5 oz/A. Surfactant or crop oil concentrate required.	Can be applied from 1-leaf rice to panicle initiation (green ring) plus 14 days.	**Use on FullPage rice varieties only**. A Postscript-only program allows for FullPage rice to be grown, and removes the rotation restriction of not allowing conventional or Provisia/MaxAce rice to be planted the following year. Do not apply more than 15 oz/A per year. Do not make more than 3 applications per year. Wait at least 5 days between applications.

In order to prevent the development of ALS-resistant (WSSA Group 2) barnyardgrass, the University recommends using an additional barnyardgrass herbicide with a different WSSA Group # (see table on pages 90-91). **The University also recommends a standard residual program regardless of trait technology planted to maximize barnyardgrass and other weed control.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Provisia Rice System				
quizalofop-P-ethyl @ 0.07 lb/A followed by 0.07 lb/A followed by 0.08 lb/A.	Annual grasses and weedy rice.	**Provisia 0.88 EC** 10 oz/A followed by 10 oz/A followed by 11 oz/A. Add 1 % v/v COC.	Sequential program 2-3 leaf followed by 4-5 leaf (preflood) followed by postflood. Apply first application to small grass.	**Use only on Provisia rice varieties**. Use a good residual broadleaf and grass program at planting. Use broadleaf and sedge tank mixes in the first and second applications. Avoid broadleaf and sedge tank mixtures in the third (final) application. Do not mix with propanil or Grandstand. Flood as soon as possible following the second application for best result. Do not exceed 31 oz/A per year. **Crop injury has occurred following sequential applications under certain environmental conditions.**
Quizalofop-P-ethyl @ 0.109 lb/A followed by 0.109 lb/A.	Annual grasses and weedy rice.	**Provisia 0.88 EC** 15.5 oz/A followed by 15.5 oz/A. Add 1% v/v COC.	Sequential program at higher rate preferred if grass larger than 3 lf at first application.	**See above.**
quizalofop-P-ethyl + florpyrauxifen-benzyl @ 0.07 + 0.013 lb/A.	Broad-spectrum weed control.	**Provisia 0.88 EC + Loyant 0.21 EC** 10 oz/A + 8 oz/A. Add 1% v/v COC.	Preflood. Second application in a sequential Provisia program.	See above comments.
Max-Ace Rice System				
quizalofop-P-ethyl @ 0.11 lb/A followed by 0.11 lb/A.	Annual grasses and weedy rice.	**Highcard 0.88 EC** 15.5 oz/A followed by 15.5 oz/A. Add 1% v/v COC.	Sequential program 2-3 leaf rice followed by 4-5 leaf (preflood). Applications should begin when barnyardgrass and other grass weeds areno larger than 3 leaf.	**Use only on Max-Ace rice varieties**. Use a good residual broadleaf and grass program at planting. Use broadleaf tank mixes in first application. Avoid broadleaf and sedge tank mixtures in second application. Do not mix with propanil or Grandstand. The addition of a residual grass herbicide such as Prowl, Facet L, or clomazone to applications of Highcard is highly encouraged. Preferred broadleaf and sedge tankmix partners are Permit, Permit Plus, Gambit, and Loyant. Flood as soon as possible following final application for best result. Do not exceed 31 oz/A per year. **Crop injury has occurred following sequential applications under certain environmental conditions.** Highcard herbicide performance is slower than Provisia herbicide. Remember, due to the safener in Highcard, sequential applications are required for successful control.

*Avoid growing Provisia/Max-ace rice in consecutive years.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE				
Overlapping Grass Residual + Early Postemergence				
clomazone @ 0.3 to 0.6 lb/A or pendimethalin + thioben-carb @ 1 + 3 lb/A +	Barnyardgrass and other annual grasses. Certain broadleaf weeds.	**Clomazone 3 ME** 0.8 to 1.6 pt/A. or **Prowl H_2O 3.8 CS + Bolero 8 EC** 2.1 + 3 pt/A. +	Prior to 5-leaf rice.	Apply to small, actively growing weeds. If soil moisture is low and the field is hard to flush, Facet is recommended as tank-mix partner with clomazone 3 ME.
cyhalofop @ 0.28 lb/A or fenoxaprop @ 0.11 lb/A or propanil @ 3 to 4 lb/A or	Sequential applications of Clincher are recommended for suppression of Brooks paspalum, knotgrass and Nealley's sprangletop.	**Clincher 2.38 EC** 15 oz/A. Add 1 qt/A of COC. or **Ricestar HT 0.58 EC** 24 oz/A. or **4 lb propanil formulations** 3 to 4 qt/A.		Expect reduced control with Clincher and Ricestar HT when temperatures increase above 90°F.
quinclorac @ 0.25 to 0.5 lb/A or	Adds residual jointvetch and hemp sesbania control.	or **Facet L or QuinStar 4L** 22 to 43 oz/A or 8 to 16 oz/A. Add 1% v/v COC.		
penoxsulam @ 0.031 lb/A	Adds postemergence and 2 weeks residual control of hemp sesbania and rice flatsedge.	or **Grasp 2 SC** 2 oz/A. Add 1 qt/A crop oil concentrate or MSO.	Early postemergence.	In water-seeded rice, rice roots should be well established prior to application.
Postemergence				
propanil @ 3 to 4 lb/A	Barnyardgrass (millet, blue-stem, watergrass), fall panicum, broad-leaf signalgrass, hemp sesbania (coffeebean), northern jointvetch (curly indigo), spike rushes, flat-sedges, giant foxtail, eclipta, false pimpernel, morningglory, volunteer milo, aquatics. (Refer to rating table for more detail.)	**4 lb Propanil Formulations** 3 to 4 qt/A. (EC formulations have been shown to be most effective.)	Weed — Inches — No. Leaves Barnyardgrass 1-4 1-4 Fall panicum 1-4 1-4 Broadleaf signalgrass 1-4 1-4 Sprangletop 1/2 1-2 Morningglory 3 2-3 Ducksalad 1 2 Redstem 1 2-4 Smartweed 2 2-4 Volunteer milo 5 4-6 Palmer amaranth 1-2 2-4 Northern jointvetch 6 -- Hemp sesbania 12 -- Use 4 lb rate if 4-leaf barnyardgrass is present or on larger stages of weeds listed above.	Dry- or water-seeded rice. Weed foliage must not be covered with water at time of application. Repeat treatment if necessary. Two applications 5 to 7 days apart will be necessary for hard-to-kill weeds such as smartweed, volunteer milo or sprangletop.

Some biotypes of barnyardgrass in Arkansas are resistant to Command, propanil, Facet or both (Facet + propanil), Newpath, Grasp, Regiment, Clincher, Ricestar, and Loyant. Best barnyardgrass control is achieved through a program approach with overlapped residuals at the front of the season. (See Weed Resistance to Herbicide, pages 18 - 20.)

GENERAL INFORMATION FOR PROPANIL: Avoid drift to susceptible crops. NOTE: Under certain conditions propanil drift to cotton fields before crop emergence can cause injury after emergence. Soybeans are very sensitive to propanil drift. Apply 10 gallons spray mixture for aerial spraying or 15 to 20 gallons for ground spraying. Flush and drain the fields 2 to 3 days before applying propanil to improve weed control if the field is dry and grass is growing slowly. Shallow flood field starting 24 hours after treatment and complete within 4 days after treatment to prevent grass reinfestation. Rice may turn yellow but recovers quickly. When applied during prolonged periods of high temperatures (100°F or above), seedling rice may be severely injured or killed.

Cutoff date is ½-inch internode elongation. Cannot be applied within 60 days prior to harvest. The actual dates are provided in the DD50 program. NOTE: Adding surfactants, petroleum oils, vegetable oils or other additives does not increase efficacy of EC propanil formulations.

DO NOT (a) mix with insecticides, (b) apply within 14 days before or after applying ethyl parathion or carbaryl (Sevin) or anytime after applying carbofuran (Furadan), (c) apply within 7 days before or after methyl parathion, EC or encapsulated formulations, (d) exceed 6 lb/A per application or 8 lb/A per season, (e) apply when rain is expected within a 12-hour period, (f) apply during cool weather (low night temperatures below 50°F and high daytime temperatures below 70°F).

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
fenoxaprop @ 0.078 to lb/A	Barnyardgrass, broadleaf signalgrass, fall panicum, loosehead sprangletop, seedling johnsongrass. Suppression of rhizome johnsongrass.	**Ricestar HT 0.58 EC** 24 oz/A.	Small, actively growing grasses. Barnyardgrass must be less than or equal to 4-leaf. Best results are obtained when applied early POST as a part of a planned program. Apply to 3lf rice.	Excellent soil moisture is critical for good activity. Tank mixing with broadleaf and sedge herbicides can result in loss of grass activity. The greatest antagonism has been observed with Aim, Permit, Permit Plus and Gambit. This treatment is most effective on small, actively growing grasses. It is not an effective salvage herbicide. Expect reduced control when temperatures increase above 90°F.
quinclorac + cyhalofop @ 0.25 to 0.50 lb/A + 0.28 lb/A	Barnyardgrass, sesbania, eclipta and johnsongrass.	**Facet L or QuinStar 4L + Clincher 2.38 EC** 22 to 43 oz/A or 8 to 16 oz/A + 15 oz/A. Add 1 qt/A of COC.	Small, actively growing weeds. **Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	Do not drift on cotton or tomatoes. Follow State Plant Board recommendations. Excellent soil moisture is needed for good activity. Do not add Facet if sprangletop is present. Expect reduced control when temperatures increase above 90°F.
quinclorac + fenoxaprop @ 0.25 to 0.50 lb/A + 0.11 lb/A	Annual grasses, sesbania, eclipta, and johnsongrass.	**Facet L or QuinStar 4L + Ricestar HT 0.58 EC** 22 to 43 oz/A or 8 to 16 oz/A + 24 oz/A.	Small, actively growing weeds. **Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	Do not drift on cotton or tomatoes. Follow State Plant Board recommendations. Expect reduced control when temperatures increase above 90°F.
bispyribac + quinclorac @ 0.021 to 0.034 + 0.258 to 0.422 lb/A	Barnyardgrass, broadleaf signalgrass, smartweed, several other broadleaves.	**Rinde** 22 to 36 oz/A. Must use proper adjuvants. See label for recommendations.	Early postemergence, 3-lf rice to preflood**. Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	Do not exceed 36 oz/A per year. Do not drift onto susceptible crops; follow Arkansas State Plant Board recommendations.
propanil + bensulfuron methyl @ 3 to 4 lb/A + 0.028 to 0.038 lb/A	Yellow nutsedge, rice flatsedge, morninglories, hemp sesbania, northern jointvetch, redstem eclipta.	**Propanil (4 lb/gal) + Londax 60DF** 3 to 4 qt/A + 0.75 to 1 oz/A. Use 0.5 oz/A if applying sequentially with propanil. or **Duet 4.03 EC** 3 to 4 qt/A. **For increased control of nut-sedge, add 0.25 oz/A of Permit.**	Apply 1 to 7 days prior to establishment of permanent flood.	For best results, maintain permanent flood and keep water as static as possible.
halosulfuron @ 0.047 lb/A	Yellow nutsedge, flatsedge and hemp sesbania. May be used for late-season seedhead suppression of northern jointvetch and hemp sesbania.	**Permit or Halomax 75 WG** 1 oz/A. Add a nonionic surfactant or crop oil concentrate.	Apply to emerged weeds prior to rice emergence until 48 days prior to harvest.	Aerial or ground application. Avoid drift to non STS/BOLT soybeans. Do not apply within 48 days of harvest.
halosulfuron + thifensulfuron @ 0.031 + 0.004 lb/A to 0.062 + 0.008 lb/A.	Same as Permit with better control of smartweed and other broadleaf weeds.	**Permit Plus 75 WG** 0.75 to 1.5 oz/A. Add 1% crop oil concentrate or MSO.	Apply to emerged weeds prior to rice emergence until 48 days prior to harvest.	Aerial or ground application. Avoid drift to non STS/BOLT soybeans. Do not apply within 48 days of harvest. Do not exceed 1.5 oz/A/Year.
fluoridone @ 0.11 to 0.15 lb/A	Pigweed control. Suppression of barnyardgrass, morningglory spp., and hemp sesbania. Tank-mix with Loyant (8oz/A) for pigweed control.	**Brake** 12 to 16 oz/A.	Apply from 3-leaf rice to postflood. 30 day PHI. **Do not apply PRE or DPRE as severe injury can occur.**	Ground applications only. Brake only has residual activity for weed control, there is no POST activity. The best fit for Brake is in a row rice system in areas where no flood occurs. **Severe injury may occur if applied PRE or DPRE and in areas of field that become flooded. Differences in cultivar tolerance have also been observed**. Discuss cultivar selection with your SePRO representative prior to an application. **Do not apply to cut ground as severe injury is likely.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE **Postemergence [cont.]**				
halosulfuron + prosulfuron @ 0.031 to 0.063 + 0.018 to 0.036 lb/A	Similar to Permit Plus, broader spectrum and short residual in broadleaf weeds.	**Gambit 79 WDG** 1 to 2 oz/A. Add 1% v/v crop oil concentrate or MSO.	Apply to emerged weeds from prior to rice emergence until 48 days prior to harvest. Use lower rate prior to rice emergence.	Aerial or ground application. Avoid drift to non-STS, STS, and BOLT soybeans as severe crop injury will result. Do not apply within 48 days of harvest. 10-month rotational restriction to soybean. Do not apply 10 days before or 7 days after organophosphate application. Use on high pH soils may stunt or yellow rice temporarily.
propanil + halosulfuron @ 3 to 4 lb/A + 0.031 to 0.063 lb/A	Yellow nutsedge, flatsedges, morningglories, eclipta, hemp sesbania and northern jointvetch.	**Propanil + Permit** 3 to 4 qt/A or equivalent + 0.67 to 1 oz/A Permit.	Apply to emerged weeds. Follow any Permit and propanil restrictions.	See propanil or Permit above.
propanil + thiobencarb @ 3 + 3 lb/A	Barnyardgrass, sprangletop, broadleaf signalgrass, flatsedge and aquatic weeds. (Refer to rating table for more detail.)	**Propanil + Bolero 8E** 3 qt/A + 3 pt/A. or **RiceBeaux 6 SC** 4 qt/A.	Refer to table on propanil for optimum timing according to weed size. **If rice is water seeded, apply only after rice is well rooted and usually in the 2-leaf stage. Best results if applied prior to 3-leaf rice.**	Apply to soil that has been sealed by rain or flush. Application to rice stressed by high salt and/or high pH soils may cause excessive rice injury. Drain any flood or surface water from field. Rainfall or flush will be needed for activation if soil begins to crack or weeds begin to germinate. Provides up to 3 weeks residual.
propanil + thiobencarb @ 3 + 3 lb/A fb propanil + bentazon @ 1 + 0.75 lb/A	ALS-resistant sedges.	**RiceBeaux fb propanil + Basagran** 4 qt fb 1 qt + 1.5 pt/A.	Apply RiceBeaux at 1- to 2-leaf rice fb propanil + Basagran on 4-inch sedges.	Option for ALS-resistant sedges.
propanil + thiobencarb fb propanil + thiobencarb @ 2 to 3 + 2 fb 2 to 3 + 2 lb/A	Same as above.	**Propanil + Bolero** 2 to 3 qt/A + 2 pt/A followed by 2 to 3 qt/A + 2 pt/A.	Time first application according to early propanil timing above. Repeat the application immediately prior to flooding.	See above comments. In addition, this treatment will provide an extended period of residual control often needed with semi-dwarf rice varieties.
propanil + pendimethalin @ 3 to 4 lb/A + 0.75 to 1 lb/A	Same as above.	**Propanil + Prowl EC** 3 to 4 qt/A + 1.8 to 2.4 pt/A.	Apply to rice in spiking to 3-leaf stage. Refer to table (p. 100) for propanil for optimum timing according to weed size.	Dry-seeded rice only. Soil should be sealed by rain or flush. Drain any surface water. Rainfall will be needed for activation. Gives residual control up to 2 weeks. Residual control from Prowl reduced after flooding, flushing or several days of heavy rainfall.
quinclorac + propanil @ 0.25 to 0.5 + 3 to 4	Barnyardgrass, broadleaf signal-grass, morningglory, hemp sesbania, northern jointvetch.	**Facet L or QuinStar 4L + Propanil** 22 to 43 oz/A or 8 to 16 oz/A + 3 to 4 qt/A + 1% v/v COC.	Apply to small, actively growing weeds. Follow adjuvant recommendation on label for propanil formulation used. **Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	Rainfall or flushing may be required for activation or reactivation. Fields treated with Facet should be scouted for smartweed, nutsedge and sprangletop and treated if necessary. **Tomatoes and cotton are extremely sensitive to Facet drift.**
bispyribac @ 0.02 to 0.034 lb/A	Barnyardgrass, smartweed, ducksalad and johnsongrass.	**Regiment 80 WP** 0.4 to 0.67 oz/A. See label for approved surfactants. Must use proper adjuvants.	From 4-leaf rice to joint movement. **Do not apply past joint movement.**	May cause root pruning and stunting, especially if higher than labeled rates are applied. Studies have shown that the addition of UAN liquid fertilizer can improve weed control. Expect reduced control when temperatures increase above 90°F.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
penoxsulam @ 0.031 to 0.036 lb/A	Ducksalad, rice flatsedge, barnyard--grass, jointvetch and hemp sesbania. May be used for late-season seedhead suppression of northern jointvetch and hemp sesbania.	**Grasp 2 SC** 2 to 2.3 oz/A. Add 1 qt/A crop oil concentrate or methylated seed oil.	Apply early postemergence. Make only 1 application per year. *Water-seeded rice should be well-rooted prior to application. Do not apply within 60 days of harvest.	May cause root pruning and stunting, especially if higher than labeled rates are applied. Avoid high pH soils (>7.8) and soils with salt-related problems. Delay flooding for 3 days after application.
penoxsulam + triclopyr @ 0.03 to 0.035 lb/A + 0.26 to 0.29 lb/A	Barnyardgrass, rice flatsedge, morningglories, pigweed, ducksalad, dayflower, hemp sesbania, jointvetch, eclipta, smartweed and other broadleaf weeds.	**Grasp Xtra** 16 to 18 fl oz/A. Use of COC or MSO at 1 qt/A recommended.	From 2- to 3-leaf rice to ½-inch internode.	Avoid high pH soils (>7.8) and soil with salt-related problems. Clearfield varieties/hybrids have slightly higher tolerance compared to non-Clearfield varieties/hybrids. Delay flooding for 3 days after application to dry soil.
penoxsulam + florpyrauxifen-benzyl @ 0.036 + 0.021 lb/A	Barnyardgrass, broadleaf signalgrass, ALS-susceptible annual flatsedges, and other broadleaf weeds.	**Novixid** 27.4 oz/A	2-leaf rice up to 60 days preharvest. **Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	Do not make more than 1 application at 27.4 oz/A per year. Do not mix with propanil. Visit www.NovixidTankMix.com for approved tank-mixtures. Rice injury may occur, see comments and precautions on Loyant.
saflufenacil @ 0.022 lb/A	Non-PPO-resistant pigweed and other broadleaf weeds.	**Sharpen** 1 oz/A +1% v/v COC.	2- to 3-leaf rice. Up to PI. Do not apply earlier than fully emerged second leaf.	Increased crop injury will occur under high soil moisture conditions and when applications are made prior to dew drying. Do not use MSO in crop. Avoid excessive tank mixes.
penoxsulam + cyhalofop @ 0.031 to 0.039 lb/A + 0.22 to 0.28 lb/A	Barnyardgrass, fall panicum, ducksalad, rice flatsedge, dayflower, eclipta and suppression of other broadleaf weeds.	**Rebel EX** 16 to 20 fl oz/A. Use of COC or MSO at 1 qt/A recommended.	Emergence to 60 days preharvest.	Delay flooding for 3 days if applied to dry soil.
florpyrauxifen-benzyl @ 0.026 lb/A	Broadleaves, aquatics, annual sedges, including ALS-resistant populations. Variable control of barnyardgrass. Suppression of Cat-tail.	**Loyant 0.21 EC** 1 pt/A. Add 0.5 pt/A MSO.	Preflood. Works best when used in a program following multiple residual herbicides. **Check LoyantTankmix.com for approved tank mixtures. Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	**Do not get on soybean.** Apply no more than 7 days prior to flooding. No more than two applications per year, no more than 16 oz per application. **High levels of injury have been observed on hybrid and medium grain cultivars as well as Diamond. Tank mixtures with Preface on Fullpage hybrid are not recommended due to potential for increased injury. Sequential applications are not recommended on hybrid due to potential for reduced grain yield. The addition of quinclorac (Facet) PRE or POST prior to an application of Loyant has increased observed injury. Temperatures above 90 F and excessive moisture or dry conditions at or near application will increase the risk for rice injury.**
florpyrauxifen-benzyl @ 0.013 to 0.0195 lb/A	Less than 6-inch Palmer amaranth and rice flatsedge, including ALS-resistant populations. Suppression of Cat-tail.	**Loyant 0.21 EC** 8 to 12 oz/A. Add 0.5 pt/A MSO.	Preflood. Check LoyantTankmix.com for approved tank mixtures. **Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	See comments above. Less injurious than the full rate (1 pt/A) to susceptible varieties.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE				
Postemergence [cont.]				
propanil + bentazon @ 3 to 5 lb/A + 3/4 lb/A	Barnyardgrass, smartweed, cocklebur, redstem, yellow nutsedge, flatsedge, dayflower and spikerush.	**Propanil + Basagran** 3 to 5 qt/A + 1½ pt/A. If grass weeds are not present, **Basagran alone** at 1½ to 2 pt/A will control broadleaf weeds such as cocklebur or smartweed. Refer to rating table for comparison.	Apply up to 6-inch broadleaf weeds on all except cocklebur (10 inches), redstem (4 inches), and nutsedge (4 to 6 inches). Propanil timing for grasses should be applied as for propanil alone.	Dry- or water-seeded rice. See general propanil and follow information on state label. No residual control. Control of yellow nutsedge erratic if larger than 6 inches.
propanil + acifluorfen @ 3 lb/A + 0.2 lb/A	Morningglory, pigweed and hemp sesbania.	**Propanil + Ultra Blazer** 3 qt/A + 0.8 pt/A Ultra Blazer	When hemp sesbania is 1 to 5 feet and morningglory runners are less than 1 foot.	May cause tip burn on rice, but symptoms will be quickly outgrown. Do not apply more than 1 pt/A per season. The addition of Ultra Blazer reduces propanil activity on grasses. Do not apply past boot stage.
propanil + bentazon/acifluorfen @ 3 to 5 lb/A + 0.5 + 0.25 lb/A	Barnyardgrass, cocklebur, hemp sesbania, morningglory, redstem, smartweed and eclipta.	**Propanil + Storm** 3 to 5 qt/A + 1½ pt/A. (If grass weeds are not present, Storm alone will control broadleaf weeds such as cocklebur, morningglory and hemp sesbania.)	Apply to small, actively growing weeds, except cocklebur (10 inches), hemp sesbania (1 to 4 feet), and redstem (4 inches).	Dry- or water-seeded rice. No residual control. Stormcontains the same active ingredient as in Ultra Blazer; therefore, reduced propanil activity on grasses may occur.
propanil + triclopyr @ 3 to 4 + 0.125 to 0.25 lb/A	Barnyardgrass, morningglories, hemp sesbania, northern jointvetch, eclipta, pigweed, redstem and cocklebur.	**Propanil + Grandstand 3 SL** 3 to 4 qt/A + ½ to ⅔ pt/A. Surfactant not required when tank-mixing Grandstand and propanil. **If no grasses are present, the rate of propanil may be reduced to 1 to 2 qt/A.**	Apply after rice reaches 2- to 3-leaf stage, and before weeds exceed 6 inches in height. Use no more than ½ pt/A if applying to 2- to 3-leaf rice and up to ⅔ pt/A if after 4-leaf stage.	Research has shown that injury can be caused by fertilizing and flooding soon after application. Flood should be delayed 3 days after application.
carfentrazone @ 0.02 lb/A	Morningglories, hemp sesbania, groundcherry and smartweed.	**Aim 2 EC** 1.25 oz/A. Add a nonionic surfactant.	Apply after rice reaches 2-leaf stage to small, actively growing weeds. Avoid applications from flag leaf emergence through harvest aid applications.	Thorough mixing and excellent sprayer agitation required. Avoid drift to cotton. Can burn or speckle rice, especially if foliage is wet. Symptoms are cosmetic and quickly outgrown.
carfentrazone + quinclorac @ 0.02 + 0.19 to 0.25 lb/A	Barnyardgrass, morningglories, hemp sesbania, groundcherry and other grass and broadleaf weeds.	**Aim 2 EC + Facet L or QuinStar 4L** 1.25 oz/A + 22 to 43 oz/A or 8 to 16 oz/A. Add crop oil concentrate at 1% v/v.	Apply after rice reaches 2-leaf stage. **Prior to 7 days before panicle initiation (PI) or yield loss may occur.**	See Aim and Facet precautions.
carfentrazone + halosulfuron @ 0.02 + 0.047 lb/A	Smartweed early, morningglories, sedges and other broadleaves.	**Aim 2 EC + Permit 75 WG** 1.25 oz/A + 1 oz/A. Add surfactant.	Apply after rice reaches 2-leaf stage.	Possible antagonism on hemp sesbania.
triclopyr + propanil @ 0.25 to 0.375 lb ai/A + 1 lb/A	Morningglories, jointvetch, cocklebur, alligatorweed, eclipta, redstem and sicklepod.	**Grandstand 3 SL + Propanil** 2/3 to 1 pt/A + 1 qt/A.	After rice reaches 3- to 4-leaf stage.	Research has shown that injury can be caused by fertilizing and flooding soon after application. Flood should be delayed 3 days after application.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
triclopyr + acifluorfen @ 0.19 to 0.25 + 0.2 lb/A	Morninglories, jointvetch, hemp sesbania and cocklebur.	**Grandstand 3 SL + Ultra Blazer 2L** ½ to ⅔ pt/A + 0.8 pt/A. NIS required with tank mix.	Apply after rice reaches 2- to 3-leaf stage.	Research has shown that injury can be caused by fertilizing and flooding soon after application. Flood should be delayed 3 days after application. **Do not apply past ½-inch internode.**
triclopyr + halosulfuron @ 0.25 lb ai/A + 0.031 to 0.063 lb/A	Morninglories, jointvetch, hemp sesbania, cocklebur and nutsedge.	**Grandstand 3 SL + Permit 75 WG** 0.67 pt/A + 0.67 to 1 oz Permit. Add 1% v/v COC or MSO.	From 2-leaf stage until after field is flooded.	Same as above. Do not apply within 48 days of harvest.
RICE				
Postemergence [After Flooding]				
cyhalofop @ 0.28 lb/A	Barnyardgrass, fall panicum and other annual grasses. Sequential applications of Clincher are recommended for suppression of Brooks paspalum, knotgrass and Nealley's sprangletop.	**Clincher 2.38 EC** 15 oz/A + 1 qt/A of COC or MSO.	Do not apply within 60 days of harvest. Apply to grasses in shallow flood. Best results have been achieved when applications are made no later than 7 days after flooding with 70% of the foliage exposed.	**Do not apply within 60 days of harvest.** Maintain flood after application. Do not tank-mix with broadleaf herbicides. (Later than 7 days after flood, **adding 0.25 to 0.50 lb/A of Facet will improve control and consistency.**) In salvage situations, 15 oz/A of Clincher can be followed by 10 oz/A of additional product. Apply approximately 10 days apart, preferably in an alternative spray pattern. Do not use more than 25 oz per year. Do not add Facet if sprangletop is present. Expect reduced control when temperatures increase above 90°F.
penoxsulam @ 0.044 lb/A	Suppression of barnyardgrass, jointvetch, hemp sesbania, eclipta and rice flatsedge.	**Grasp 2 SC** 2.8 oz/A + 1 qt/A COC or MSO.	Apply 7 to 10 days after flood. Not a salvage treatment.	At least 70% of target weed should be exposed (above flood). Good coverage is essential. Do not apply within 60 days of harvest.
benzobicyclon @ 0.33 lb/A	Sprangletop, annual flatsedges, aquatics. Possible weedy rice suppression.Suppression of Rice Cutgrass.	**Rogue** 12.6 oz/A. Add 1% v/v MSO.	Once permanent flood is established, apply within 7 days.	For Rogue to be effective, **it must make contact with water** and the flood must be held constant and deep (greater than or equal to 3 inches). Low spray volumes and small droplet sizes will reduce efficacy. Recommended only on zero-grade and straight levee fields. Use only highest rate for weedy rice suppression. Best control is achieved when weeds are at least 70% submerged. Rogue should not be applied to RiceTec medium grain hybrid RT3202 as severe injury will result.
2,4-D amine @ 0.48 to 1.43 lb/A	Broadleaf and aquatic weed control. Refer to rating table.	**2,4-D amine** 1 to 3 pt/A of 3.8 lb/gal.	Apply at correct DD50 threshold or when the first elongating internode begins movement to ½-inch long. Do not apply when internode exceeds ½-inch.	If rice injury occurs, apply 20 to 30 pounds of nitrogen within 5 days after phenoxy herbicide treatment. Apply additional nitrogen 10 to 14 days after the recommended mid-season stage for the variety. For specific nitrogen rates and timing, consult your county Extension agent. If for some reason nitrogen is applied first, a phenoxy herbicide can be safely applied 5 days after the nitrogen application, providing the first elongating internode is not longer than ½-inch. **Application of 2,4-D is restricted in some counties. Do NOT mix with ACCase-inhibiting herbicides (Clincher and Ricestar) as grass control will be reduced.**

GENERAL INFORMATION ON PHENOXY HERBICIDE. **Follow State Plant Board Regulations.** Drain field or lower flood sufficiently to expose weeds to herbicides before treatment. Phenoxy herbicides are hazardous to cotton and soybeans. AVOID DRIFT. Cotton is extremely sensitive to 2,4-D. Rain 1 to 6 hours after treatment may reduce effectiveness. Do not apply nitrogen during the 7 to 21 days before phenoxy herbicide application, since the nitrogen stimulates the rice plant growth, making it more susceptible to phenoxy treatment injury. **Note: Not all brands of 2,4-D are labeled for use on rice. Choose a brand labeled for the intended use.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
RICE **Postemergence [After Flooding] [cont.]**				
bensulfuron methyl @ 0.0375 to 0.063 lb/A	Ducksalad, redstem, eclipta, false pimpernel, gooseweed, day-flower, flatsedge, water hyssop, arrowhead and emerged yellow nutsedge.	**Londax 60 DF** 1 to 1.67 oz/A. Add 1% crop oil concentrate for emerged weeds.	For aquatics, apply within 5 days after flooding when target weeds are small and maintain flood at least 7 days. For water-seeded rice, apply as soon as possible after rice has pegged and flood stabilized. For emerged yellow nutsedge, when leaves are 3 to 4 inches above water surface.	Londax is highly water soluble, which requires non-moving water. Avoid pumping for 7 days after treatment, if possible. Activity is slow. Most consistent results are obtained on aquatics before or just at emergence.
acifluorfen @ 0.125 to 0.25 lb/A	Hemp sesbania (coffeebean).	**Ultra Blazer 2L** ½ to 1 pt/A. Add a surfactant.	When hemp sesbania is 1 to 5 feet tall. See DD50 program for specific begin and end dates.	**Do not apply past the boot stage of rice.** May cause tip burn on rice, but symptoms will be quickly outgrown. Do not apply more than 1 pt/A per season.
triclopyr + propanil @ 0.25 + 1 lb/A	Morningglories, hemp sesbania and northern jointvetch.	**Grandstand 3 SL + Propanil** ⅔ pt/A + 1 qt/A. Surfactant not required when tank-mixing with propanil.	Apply prior to ½-inch internode elongation. See DD50 program for details.	For the midseason applications, research has shown significant yield reductions when applied soon after ½-inch internode elongation. Also, make sure flood water covers soil surface and root area of plants. Note: This is in contrast to the recommendation for the early season application.
Colletotrichum gloeosporioides f sp. aeschynomene	Northern jointvetch (curly indigo).	**LockDown** 75 billion spores/A. See label for specific instructions.	Apply when northern jointvetch averages 8 to 24 inches tall and when plants have emerged through rice canopy. See DD50 printout for specific beginning and ending dates.	Expect slow results. Special sprayer cleanup and mixing instructions must be used. Refer to LockDown label for details. Late application near blooming stage of northern jointvetch may not allow enough time to prevent seed production or kill weeds before harvest. Does not control Indian jointvetch. Do not apply Benlate within 14 days before or after a LockDown application. If possible, do not apply Quadris, Tilt or Moncut within 14 days of LockDown, but applications down to 7 days before or after Lockdown likely will not reduce overall effectiveness. Very late afternoon to early evening or just prior to rainfall are optimal for application.
propanil + 2,4-D @ 3 to 4 lb/A + 0.75 to 1.25 lb/A	Barnyardgrass, broadleaf and aquatic weeds on levees.	**Propanil + 2,4-D** 3 to 4 qt/A + 1.5 to 2.5 pt/A.	Apply at correct DD50 date or when the first elongating internode begins movement to ½-inch long. Do not apply when internode exceeds ½-inch.	Use 5 gpa by air and 10 to 20 gpa by ground. **Grower's risk treatment (see inside cover for explanation). Application of 2,4-D is restricted in some counties.** Follow all phenoxy regulations.
propanil + acifluorfen @ 3 to 4 lb/A + 0.25 lb/A	Barnyardgrass, broadleaf and aquatic weeds on levees.	**Propanil + Ultra Blazer 2L** 3 to 4 qt/A + 1 pt/A.	See DD50 printout for specific beginning and ending dates.	Less effective than propanil + 2,4-D but is safer to use when cotton is grown nearby. Reduced activity on morningglories with runners greater than 1 foot.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
propanil + bentazon/aci-fluorfen @ 3 to 4 lb/A + 0.5 + 0.25 lb/A	Barnyardgrass, cocklebur, hemp sesbania, morningglory, red-stem, smartweed, dayflower and eclipta.	**Propanil + Storm** 3 to 5 qt/A + 1½ pt/A. [If grass weeds are not present, Storm alone will control broadleaf weeds such as cocklebur, morning-glory and hemp sesbania.]	See DD50 printout for specific beginning and ending dates.	Less effective than propanil + 2,4-D but is safer to use when cotton is grown nearby. Reduced activity on morningglories with runners greater than 1 foot.
triclopyr + propanil @ 0.25 + 4 lb/A	Jointvetch, barnyardgrass and other broadleaves.	**Grandstand + Propanil** ⅔ pt + 4 qt/A.	See Grandstand.	See Grandstand restrictions.
carfentrazone + propanil @ 0.02 + 4 lb/A	Pigweeds, morninglories and other broadleaves.	**Aim 2 EC + Propanil** 1.25 oz + 4 qt/A.	When pigweeds are 2 inches tall.	See Aim and propanil restrictions.
carfentrazone + quinclorac @ 0.02 + 0.375 lb/A	Groundcherry, morningglory and other broadleaf weeds.	**Aim 2 EC + Facet 75 DF** 1.25 oz + 0.5 lb/A.	Less than 6-inch weeds on levees. Prior to panicle initiation (PI).	See Aim and Facet restrictions.
halosulfuron @ 0.63 or halo-sulfuron + thifensulfuron @ 0.031 + 0.004 lb/A	Hemp sesbania and jointvetch (Suppression only).	**Halomax/Permit or Permit Plus 75 WG** 1.33 or 1 oz/A. Add 1% v/v COC or MSO.	48 day PHI.	
halosulfuron + prosulfuron @ 0.049 to 0.099 lb/A	Hemp sesbania and jointvetch (Control.)	**Gambit 79 WDG** 1 to 2 oz/A. Add 1% v/v COC or MSO.	48 day PHI.	
RICE **Postemergence [After Flooding] - Herbicide Coated on Fertilizer**				
florpyrauxifen-benzyl @ 0.026 lb/A	Hemp sesbania, jointvetch, goose-weed, aquatics, and annual flatsedges, including ALS-resistant populations. Will NOT control grasses. Suppression of Cat-tail.	**Loyant 0.21 EC** 16 fl oz/A coated on at least 150 lb/A fertilizer.	Postflood, 60 day PHI. **Prior to 7 days before panicle initiation (PI) or yield loss may occur**.	Do not apply Loyant to fertilizers that generate dust. There is less risk for injury to rice and to adjacent soybean than with a foliar spray. A flood must be maintained for effective control. Weeds must be at least 70% submerged.
florpyrauxifen-benzyl + penoxsulam @ 0.021 + 0.036 lb/A	Hemp sesbania, jointvetch, goose-weed, and aquatics. Does have some activity on grasses and annual flatsedges, including ALS-resistant populations.	**Novixid** 27.4 oz/A coated on at least 200 lb/A fertilizer.	Postflood, as soon as possible after permanent flood establishment. 60 day PHI. **Prior to 7 days before panicle initiation (PI) or yield loss may occur**.	Refer to Loyant notes. Weeds must be at least 70% submerged.
benzobicyclon @ 0.33 lb/A	Sprangletop, flatsedges, and aquatics.	**Rogue** 12.6 oz/A coated on at least 150 lb/A fertilizer.	Postflood, apply within 7 days of permanent flood establishment. 60 day PHI.	Flood must be maintained relatively constant. Refer to previous Rogue notes. Weeds must be at least 70% submerged.
RICE **Postemergence [After Flooding] - Barnyardgrass and Sprangletop Salvage**				
fenoxaprop + bispyribac-sodium @ 0.11 + 0.034 lb/A	Salvage barnyardgrass and sprangletop.	**Ricestar HT + Regiment** 24 + 0.67 oz/A. Use recommended adjuvants according to Regiment label.	Do not apply past panicle initiation (PI).	Ensure proper coverage occurs. Do not exceed 1.06 oz/A per year of Regiment or 30 oz/A per year of Ricestar HT.
fenoxaprop + imazamox @ 0.11 + 0.04 lb/A	Salvage barnyardgrass and sprangletop.	**Ricestar HT + Beyond Xtra/ Postscript** 24 + 5 oz/A.	Only apply to Clearfield (Beyond Xtra) or FullPage (Postscript) rice varieties.	Do not apply past panicle initiation (PI). Do not exceed 30 oz/A per year of Ricestar HT, 10 oz/A per year of Beyond Xtra, or 15 oz/A per year of Postscript.

GENERAL INFORMATION ON SALVAGE TREATMENTS. Avoid using quinclorac (Facet L, QuinStar 4L, etc.) and/or florpyrauxifen-benzyl (Loyant) as a salvage option. Reduced efficacy and rice injury has been observed. Antagonism on sprangletop species from quinclorac mixed with Clincher or Ricestar HT has also been observed.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions

RICE

Levee Application

LEVEE WEED CONTROL (LARGER WEEDS)[1, 2]

HERBICIDES	WSSA Group #	Grasses					Broadleaf Weeds								
		Barnyardgrass	Bermudagrass	Broadleaf Signalgrass	Crabgrass	Foxtail sp.	Entire/Ivyleaf Morningglory	Groundcherry	Hemp Sesbania (coffeebean)	Northern Jointvetch	Palmer Amaranth	Palmleaf Morningglory	Prickly Sida (Teaweed)	Sicklepod	Smartweed
Clincher	1	7	3	6	0	6	0	0	0	0	0	0	0	0	0
Ricestar	1	6	2	4	3	8	0	0	0	0	0	0	0	0	0
Beyond Xtra	2	7	0	7	4	4	4	3	0	0	0	4	4	0	6
Grasp	2	7	2	0	0	3	6	3	5	7	0	4	0	5	5
Permit	2	0	0	0	0	0	5	0	8	6	0	3	2	5	6
Permit Plus	2	0	0	0	0	0	6	0	8	7	0	4	3	5	8
Regiment	2	8	0	0	0	4	4	4	7	7	0	0	2	6	9
2,4-D	4	0	0	0	0	0	8	6	9	5	8	9	9	9	9
2,4-D + propanil	4 + 5	6	4	6	2	0	8	5	9	8	9	8	8	8	7
Facet	4	6	0	5	3	4	6	6	7	5	0	5	4	3	7
Grandstand	4	0	0	0	0	0	9	5	7	7	4	9	3	6	7
Loyant	4	4	0	-	0	-	0	0	10	9	9	5	-	9	0
Propanil	5	6	4	6	3	0	4	3	9	8	6	3	2	4	7
Basagran	6	0	0	0	0	0	4	2	2	0	0	4	4	0	5
Aim	14	0	0	0	0	0	8	3	6	3	3	8	2	3	7
Sharpen	14	0	0	0	0	0	9	7	8	8	8	8	6	6	4
Ultra Blazer	14	0	0	0	0	0	7	3	9	0	4	6	2	0	6

[1]For good levee broadleaf weed control, a combination of products is needed, especially where 2,4-D cannot be used. Applying Facet or other residuals prior to weed emergence is recommended in 2,4-D-restricted areas. **Ratings based on maximum use rates.**

[2]Make sure to follow all appropriate herbicide cutoff timings as indicated on the label or rice injury and yield loss is likely to occur.

For more information on rice cultivar characteristics and other rice production recommendations, please scan the QR code to download the latest Division of Agriculture Rice Management Guide.

RICE

Preharvest

sodium chlorate @ 3 to 6 lb/A	Desiccating green weed foliage.	**Sodium Chlorate** Several brands and trade names are available. 0.5 to 1 gal/A of 6 lb/gal formulations.	When average moisture is 25% or below for varieties; or when moisture is 23% or below for hybrids.	See label for details. **Harvest within 5 days after application to prevent overdrying, and potential milling quality reduction.** See Rice Production Handbook for more details.
carfentrazone @ 0.023 lb/A	Morningglories.	**Aim 2 EC** 1.47 oz/A. Add 1% COC.	When average moisture is 25% or below for varieties; or when moisture is 23% or below for hybrids.	Aim has a 3-day PHI. Can be tank-mixed with sodium chlorate.

Control of Common Weeds in Pastures

Read This First

These recommendations are based on results obtained in Arkansas field trials. In our research plots, broadcast applications are applied at 15 gal/A using a boom sprayer equipped with Spraying Systems 8002 flat fan nozzles on 20-inch spacing. We add 0.25% nonionic surfactant to the spray mix. **Use a boom sprayer when precise application is critical.** Boomless nozzles (Boom Buster, Boominator, Boomjet, etc.) are not as accurate as a boom sprayer. When making broadcast herbicide applications, use a water volume between 10 and 40 gal/A. In our individual plant treatment brush trials, soil spot treatments are applied with a Spraying Systems Meterjet applicator. Leaf spraying is done with a Conejet 5500 X-6 or X-8 nozzle. Basal bark and stump applications are done with a Conejet 5500 X-2 nozzle using commercial basal oil.

Banvel, Clarity, Grazon P+D, GrazonNext HL, metsulfuron 60 DF, PastureGard HL, Remedy Ultra, Surmount, Tordon 22K and Weedmaster will kill all clover. White clover has some tolerance for 2,4-D amine at rates up to 1 lb ai/A. Other clovers (red, crimson, arrowleaf, etc.) do not.

Metsulfuron 60 DF, Pastora and Chaparral are intended for use in bermudagrass. They will damage tall fescue, ryegrass and bahiagrass.

Bahiagrass (*Paspalum notatum*)

This recommendation is for use in established bermudagrass to control 'Pensacola' bahiagrass. In late May, apply 60 DF metsulfuron at 0.5 to 1 oz/A plus 0.25% surfactant. Make a second application three to four weeks later. It is important to follow up the herbicide application with a fertility program to encourage the bermudagrass growth. Metsulfuron is safe on bermudagrass and has no grazing or haying restrictions. Metsulfuron also controls many broadleaf weeds and some brush species. Chaparral and Pastora contain metsulfuron and will control bahiagrass.

Bitterweed (*Helenium autumnale*)

Spray bitterweed before it flowers. Bitterweed is readily controlled with 2,4-D amine at 1 to 2 pt/A applied in May or early June. Metsulfuron 60 DF, Grazon P+D, GrazonNext HL and Dicamba + 2,4-D also control bitterweed.

Blackberry and Dewberry (*Rubus* spp**)**

Use metsulfuron 60 DF at 1 oz/A plus 0.25% nonionic surfactant. Apply in May or June while blackberry and dewberry are actively growing. Remedy Ultra at 3 pt/A applied during or after bloom has been effective for blackberry and dewberry. Chaparral at 3.3 oz/A or Surmount at 2 qt/A are other options. Apply after fruit drop. Do not mow during the year of application. Regardless of treatment choice, plan on making a follow-up treatment the next year to control escapes.

Brush, Mixed

Apply a mixture of 0.25% Remedy Ultra plus 1% Grazon P+D as a leaf spray to individual plants. Add 0.25% v/v nonionic surfactant. Spray between May and October while brush is actively growing. Picloram-free combinations include GrazonNext HL + Remedy Ultra or Chaparral + PastureGard HL.

Buttercup (*Ranunculus* spp)

Spray buttercup in late February or early March before it flowers. This weed is easily controlled with 2,4-D amine at 1 to 2 pt/A. Metsulfuron 60 DF, Grazon P+D, GrazonNext HL and dicamba + 2,4-D also control buttercup. In dormant bermudagrass, either glyphosate or paraquat will control buttercup at normal use rates.

Cedar, Eastern Red (*Juniperus virginiana*)

Apply undiluted Tordon 22K to the soil prior to periods of expected rainfall. Apply directly to the soil within the drip line and on the upslope side of the tree. Application to trees taller than 12 feet is not recommended. Apply 3 to 4 mls (ccs) per 3 feet of plant height in either spring (April-May) or fall (September-October). Soil spot treatments with Velpar are also effective on cedar less than 6 feet tall. Use a Spraying Systems Meterjet applicator or a livestock worming gun to apply a precise amount of the herbicide. DuPont offers a spot gun that will attach directly to the Velpar jug. Leaf sprays of Surmount or Tordon 22K will control cedar.

Crabgrass (*Digitaria sanguinalis*)

Glyphosate may be applied between cuttings to control crabgrass in established bermudagrass hayfields. Apply 4 to 8 fl oz/A of 3 lb/ae/gal glyphosate as soon as the hay is removed after cutting. Be warned that glyphosate should not be used in this manner unless bermudagrass stunting, yield reduction and possible stand reduction can be tolerated. Applications made after regrowth is well under way will result in increased damage to the bermudagrass. We have tested this practice many times, and the amount of bermudagrass injury is unpredictable. Injury ranged from almost none up to 50% stunting. 'Tifton 44' bermudagrass seems to be more susceptible to glyphosate damage. These rates are not effective on big sandbur and foxtail. Broadleaf signalgrass and barnyardgrass will be partially controlled. No waiting period is required between application and grazing or harvesting for feed.

Dallisgrass (*Paspalum dilatatum*)

There is a period in late fall to early winter when bermudagrass is dormant and dallisgrass remains green. During this time, 16 fl oz/A of 4 lb/gal glyphosate provides fair to good dallisgrass control. Bermudagrass injury varies. Timing and calibration are important. Once frost occurs, the bermudagrass should be checked frequently so that the application can be made as soon as it is completely dormant. If glyphosate products with higher concentrations are used, the rate should be adjusted.

Dogfennel (*Eupatorium capillifolium*)

Spray dogfennel when it is 6 to 12 inches tall. At this height, Grazon P+D or Weedmaster at 1 qt/A will give 90 to 100% control. Research has shown that Remedy Ultra (triclopyr) and PastureGard HL (triclopyr + fluroxypyr) are also highly effective for controlling dogfennel. PastureGard HL at 3 pt/A is the preferred treatment for dogfennel that is more than 3 feet tall.

Hemp Dogbane (*Apocynum cannabium*)

Surmount at 3 to 6 pt/A is the best treatment we have found for hemp dogbane. Apply when the weeds are 18 to 24 inches tall. Add 0.25% nonionic surfactant. In areas where picloram cannot be used, apply 2 qt/A Weedmaster + 1 oz/A metsulfuron 60 DF plus 0.25% nonionic surfactant. Another cheaper option is metsulfuron 60 DF at 1 ounce of product per acre plus 0.25% nonionic surfactant. Follow up next spring to control escapes.

Honeylocust (*Gleditisia triancanthos*)

Spray the leaves with a 1% solution of Remedy Ultra. Add 0.25% nonionic surfactant. Apply after full leaf-out when conditions are favorable for plant growth. Make a follow-up application the next spring.

Honeysuckle (*Lonicera* spp)

Metsulfuron 60 DF at 1 oz/A provides excellent honeysuckle control. For individual plant treatment, add 1 ounce of product per 100 gallons of water and spray to wet. A 2% solution of 3 lb/ae/gal glyphosate or 4 lb/gal triclopyr, applied in the fall, also controls honeysuckle. Follow-up treatments will be needed.

Horsenettle (*Solanum carolinense*)

Grazon P+D (3 to 4 pt/A) or GrazonNext HL (2 pt/A) are good choices for horsenettle control. Time herbicide applications to occur between bloom and fruit set. Complete horsenettle control will not be achieved with a single herbicide application. Spray for three consecutive years to reach the 90 to 100% control range.

Horseweed (*Conyza canadensis*)

Spray horseweed when it is less than 12 inches tall. A properly timed application of Grazon P+D or Weedmaster at 1 qt/A will give 90 to 100% control. Metsulfuron 60 DF at 0.5 oz/A will also provide 90 to 100% control.

Foxtail, Knotroot (*Setaria geniculata)*

Foxtail is a late-germinating summer grass that becomes obvious in July. One option is to apply 8 to 10 fl oz per acre of 4 lb/gal glyphosate as soon as the hay is off the field. Panoramic at 4 to 6 fl oz/A does a fair job of foxtail control if it is in the seedling stage. Add 0.25% nonionic surfactant. Control of large plants will be poor. Application timing will typically be from late May to early June. Panoramic (imazapic) will stunt bermudagrass. Damage varies, but the loss of one hay cutting is typical. Expect 30 to 45 days of bermudagrass suppression after application. Do not apply to drought-stressed bermudagrass. Do not apply during spring transition. Do not apply to newly sprigged or seeded bermudagrass or to Jiggs or World Feeder varieties.

Groundsel (*Senecio* spp)

Metsulfuron 60 DF at 0.5 to 1 oz/A has proven to be the most effective herbicide for groundsel control. Apply in May. Add 0.25% nonionic surfactant. Grazon P+D at 2 to 3 qt/A provides partial control.

Johnsongrass (*Sorghum halepense*)

Use 1.33 oz/A of Outrider with 0.25% nonionic surfactant in 10 to 40 gallons of water per acre as a broadcast application. Apply to actively growing johnsongrass that is at least 18 to 24 inches tall and up to the heading stage. Weeds to be treated should not be mowed or grazed for two weeks before or after application. Bermudagrass may be harvested after the two-week period without any effect on Outrider performance. Weed response to Outrider is very slow. It may require up to one month for weeds to become brown. Tank mixing Outrider with herbicides formulated as amines (including 2,4-D) may decrease the effectiveness of Outrider on johnsongrass. For spot treatment, mix 1.33 oz/A of Outrider in 100 gallons of water with 0.25% nonionic surfactant. Apply this as a spray to wet application. Panoramic at 4 fl oz/A plus 0.25% nonionic surfactant will provide about 80% johnsongrass control. Panoramic will stunt bermudagrass. Damage varies, but the loss of one hay cutting is typical. Pastora is effective for johnsongrass control. See the label for instructions.

Maypop, Passion Flower (*Passiflora incarnata*)

Control data is scarce for maypop. One greenhouse study indicates that Remedy Ultra or 2,4-D amine at 2 qt/A will provide good initial control. Clarity at 1 pt/A also performed well in this trial. Expect regrowth the next year.

Oaks (*Quercus* spp)

It is possible to achieve partial control of some oak species using 2,4-D alone at 2 qt/A. Improved control can be achieved by using a mixture of 1% Grazon P+D plus 0.25% Remedy Ultra as an individual plant leaf spray. Add 0.25% nonionic surfactant. Basal bark treatments are very effective on oaks with stem diameters of 4 inches or less. Mix 1 quart Remedy Ultra with 3 quarts commercial basal oil and apply to the lower 18 inches of the stems with a Conejet 5500 X-2 nozzle.

Osage Orange (*Maclura pomifera*)

Apply 1% Remedy Ultra plus 0.25% surfactant as a leaf spray to individual plants. For Osage Orange with stems less than 4 inches in diameter, mix 1 quart Remedy Ultra with 3 quarts commercial basal oil and apply to the lower 18 inches of the stems with a Conejet 5500 X-2 nozzle. Agitate the mixture before spraying.

Palmetto, Dwarf (*Sabal minor*)

Apply a 4% solution of Remedy Ultra as an individual plant treatment. Add 0.25% v/v nonionic surfactant. Be patient.

Perilla mint (*Perilla frutescens*)

Grazon P+D at 1 qt/A or Weedmaster at 1 qt/A will control perilla mint. Apply in late May or early June when weeds are actively growing. Spray before the weeds are 12 inches tall. Add 0.25% nonionic surfactant to the spray mix. Bush hog large plants that have already formed flowers.

Persimmon (*Diospyros virginiana*)

Persimmon is one of the more difficult brush species to control. The most effective treatment is undiluted Tordon 22K applied to the soil as a spot concentrate prior to periods of expected rainfall. Apply directly to the soil within the drip line and on the upslope side of the tree. Application to trees taller than 12 feet is not recommended. Apply 2 to 4 mls (ccs) per inch of stem diameter in spring (April-May). Use a Spraying Systems Meterjet applicator or a livestock worming gun to apply a precise amount of the herbicide. A leaf spray using a 1% Surmount solution is less effective.

Pigweed (*Amaranthus* spp)

Pigweeds are prolific seed producers. Single plants are capable of producing thousands of seeds. Given adequate rainfall, pigweed seeds germinate throughout the summer. All emerged pigweed may be killed by a herbicide treatment only to be replaced by another flush of seedlings. Repeat applications will be needed for full-season control. Spray when the pigweeds are less than 12 inches tall. Metsulfuron 60 DF, Grazon P+D, GrazonNext HL and dicamba + 2,4-D, and 2,4-D amine all provide good control of seedling pigweed.

Plantain, Buckhorn (*Plantago lanceolata*)

A proven treatment for buckhorn plantain is Grazon P+D at 1.5 qt/A. This product provided 90 to 100% control of buckhorn plantain. Add 0.25% nonionic surfactant to the spray mix. Apply in late May or early June when weeds are actively growing. Metsulfuron 60 DF at 0.5 oz/A is also an effective herbicide for this weed.

Poison Hemlock (*Conium maculatum*)

Spray poison hemlock when it is less than 18 inches tall and before it flowers. Grazon P+D and GrazonNext HL at 1 qt/A are very effective for poison hemlock control when applied in May or early June.

Pricklypear (*Opuntia* spp)

Employing individual plant treatment, spray pricklypear with a 1% Surmount solution plus 0.5% nonionic surfactant. Use of Hi-Lite Blue Dye will help avoid spraying the same plant twice and show the extent of the coverage on treated plants. Apply during active growth. Do not spray under desirable trees. Do not spray wet pads. Be patient, Surmount works very slowly. It may take one to three years for complete control.

Ragweed, Common and Lanceleaf (*Ambrosia* spp)

The key to effective ragweed control is spraying when the weeds are small (2 to 4 inches tall). Small ragweeds are readily controlled with 2,4-D amine at 1 qt/A. Grazon P+D, GrazonNext HL and Dicamba + 2,4-D also control ragweeds at 1 qt/A. Metsulfuron is not effective on ragweed.

Red Sorrel (*Rumex acetosella*)

Grazon P+D at 1 qt/A provides excellent control of red sorrel. Metsulfuron at 0.5 oz/A is also very good. Treat anytime the red sorrel is actively growing. Remedy Ultra is not effective on red sorrel.

Rose, Wild (*Rosa* spp)

Spray the leaves with a 1% solution of Grazon P+D. Add 0.25% nonionic surfactant. Apply after full leaf-out when conditions are favorable for plant growth.

Ryegrass (*Lolium* spp)

Glyphosate must be applied in January or February while the ryegrass is small to achieve effective control in dormant bermudagrass. A good rule of thumb is waiting for the high to reach 50 degrees three days in a row. Glyphosate works very slowly in cold weather. Delaying application into March and April results in big ryegrass that is very difficult to control regardless of the rate applied. In two years of testing at six locations, we have gotten excellent ryegrass control with glyphosate at 1.0 lb/ai/A applied in January or February. Another important factor in ryegrass control is adequate spray coverage. Our research herbicides are applied with a boom sprayer at 15 gal/A using 8002 flat fan nozzles on 20-inch spacing.

Sandbur (*Cenchrus longispinus*)

Three options for early postemergence sandbur control include Pastora at 1.5 oz/A, Roundup Weathermax at 11 fl oz/A or Panoramic (imazapic) at 6 fl oz/A. Apply after the first hay cutting as soon as the hay is removed from the field. Add 0.25% nonionic surfactant. Panoramic will stunt bermudagrass. Damage varies, but the loss of one hay cutting is typical. Expect 30 to 45 days of bermudagrass suppression after application. Do not apply to drought-stressed bermudagrass. Do not apply during spring transition. Do not apply to newly sprigged or seeded bermudagrass. Fertilization of bermudagrass is a key part of sandbur control.

Sawbrier or Greenbrier (*Smilax* spp)

Greenbrier control is difficult regardless of the methods or herbicides used. The waxy leaves are a barrier to herbicide uptake. Ester formulations of herbicides are more likely to penetrate the leaves. Apply a 4 lb/gallon triclopyr ester (Remedy Ultra, etc.) at 1.5 quarts per acre. Add 0.5% surfactant. Broadcast in at least 15 gallons of spray mix per acre. Apply in late April or early May before the leaves mature and the wax thickens. Expect 70 to 80% control from one application. Make follow up applications when regrowth appears.

Sedges (*Cyperus* spp)

Use 1.33 oz/A of Outrider or Permit with 0.25% nonionic surfactant in 10 to 40 gallons of water per acre as a broadcast application. Permit may be used on all grasses. Use Outrider on bermudagrass only. Apply to actively growing sedges with enough leaf area to intercept the spray. Weeds to be treated should not be mowed or grazed for two weeks before or after application. Hay may be harvested after the two-week period without any effect on efficacy. Weed response to Outrider and Permit is slow. Tank mixing Outrider with herbicides formulated as amines (including 2,4-D) may decrease the effectiveness of Outrider on sedges. Permit may be tank mixed with Grazon P+D or Weedmaster.

Sericea lespedeza (*Lespedeza cuneata*)

Apply 1.5 pt/A PastureGard HL in the late spring to early summer before bloom. The plants should be 12 to 15 inches tall with fully developed leaves. Increase the rate to 2 pints per acre for dense stands or later stages of growth. Use a minimum spray volume of 10 gallons per acre. Higher application volumes are preferred. For spot application, mix 6 pints PastureGard HL per 100 gallons of water or 1 fluid ounce PastureGard HL per gallon of water. Apply the spray uniformly and thoroughly wet the Sericea lespedeza foliage. Metsulfuron 60 DF at 1.0 oz/A plus 0.25% nonionic surfactant is an excellent treatment for sericea control.

Sumac (*Rhus* spp)

Sumac is one of the few brush species that is readily controlled with 2,4-D amine. Apply at the rate of 1.5 to 2 qt/A. Other herbicides effective for sumac include Chaparral, Grazon P+D, Remedy Ultra, PastureGard HL and Surmount.

Thistles (*Carduus*, *Cirsium* spp)

The key to effective thistle control is spraying while the thistles are in the rosette stage of growth (before the flower stalk appears). Biennial thistles in Arkansas are readily controlled with a properly timed application of 2,4-D amine at 1.5 qt/A. Spring applications should be made from late February to early March. Fall applications from late October through November will enhance a thistle control program. Grazon P+D, GrazonNext HL and dicamba + 2,4-D also provide excellent control of thistles at 1 qt/A.

Trumpetcreeper (*Campsis radicans*)

As with many perennial vines, it is virtually impossible to control trumpetcreeper with a single herbicide application. Banvel or Clarity at 2 qt/A, or the combination of 2,4-D with a lower rate of Banvel or Clarity, will provide from 60 to 100% control of this weed. Spot treatments of a 2% glyphosate solution are also an effective means of controlling small infestations of trumpetcreeper.

Wild Garlic (*Allium vineale*)

In tall fescue, 2, 4-D ester at 2 qt/A will provide fair wild garlic control. Apply from December to March. Repeat the application the following year. In bermudagrass, metsulfuron 60 DF at 0.5 oz/A is the preferred treatment. Add 0.25% nonionic surfactant to the spray mix.

Woolly Croton (*Croton capitatus*)

Along with bitterweed and buttercup, woolly croton is one of the easiest pasture weeds to control with herbicides. Apply 2,4-D amine at 1 to 2 pt/A in May or early June when woolly croton is less than 12 inches tall. Metsulfuron 60DF, Grazon P+D, GrazonNext HL and dicamba + 2,4-D also control woolly croton.

WEED RESPONSE RATINGS FOR FORAGE HERBICIDES

HERBICIDES \ WEEDS	Cancerweed	Crabgrass	Foxtail	Cheat	Little Barley	Horseweed	Smooth Pigweed	Smartweed	Bullthistle	Curly Dock	Buttercup	Goldenrod	Horsenettle	Wild Garlic	Dogfennel	Bitterweed	Red Sorrel	Common Ragweed	Lanceleaf Ragweed	Chickweed	Henbit	Tall Fescue	Bahiagrass	Mullein	Groundsel	Crotons	Coreopsis	Prickly Pear Cactus	Johnsongrass	Nutsedge	Sandbur	Virginia Buttonweed
Preemergence																																
Kerb	N	R	R	R	R	N	N	N	N	N	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Prowl H_2O	N	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N
Rezilon		R			R	R	H	R								R										R			N			
Sinbar	N	H	H	H	H	N	N	N	N	N	N	N	N	N	N	N	N	N	N	H	H	N	N	N	N	N	N	N	N	N	N	N
Postemergence																																
2,4-D	N	N	N	N	N	R	R	R	H	R	H	R	R	R	R	H	N	H	R	R	N	N	N	N	N	H	R	N	N	N	N	R
2,4-DB	N	N	N	N	N	N	R	N	R	R	R	N	N	N	N	R	N	R	N	H	N	N	N	N	N	R	N	N	N	N	N	N
Banvel	N	N	N	N	N	H	H	H	H	H	H	H	R	R	H	H	H	H	R	H	H	N	N	N	N	H	R	N	N	N	N	N
Beyond Xtra	N	R	R	R	N	N	R	N	N	R	N	N	N	N	N	N	N	N	R	R	N	N	N	N	N	N	N	N	N	N	N	N
Chaparral	R	N	N	N	N	R	R	R	R	R	R	N	R	N	R	R	R	R	R	R	R	N	R	R	R	R	R	N	N	N	N	R
Crossbow	N	N	N	N	N	H	H	H	H	H	H	H	R	R	R	H	R	H	R	R	R	N	N	N	N	H	R	N	N	N	N	N
Duracor		N	N	N	N		R	R					R		R											R						R
Glyphosate	R	R	R	R	R	R	R	R	N	R	R	N	N	H	R	R	R	R	N	R	N	H	H	N	N	H	R	N	R	R	R	N
GrazonNext HL		N	N	N	N	R	R	H	R	R	H	H	H			H		H	H	R	R	N	N			H		N	N	N	N	R
Grazon P + D/PD3	R	N	N	N	N	H	H	H	H	H	H	H	H	R	H	H	H	R	R	R	R	N	N	R	R	H	R	H	N	N	N	R
Karmex	N	R	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N	R	N	N	N	N	R	N
Metribuzin	N	N	N	R	R	R	R	N	N	N	R	N	N	N	N	N	N	N	N	R	R	N	N	N	N	N	N	N	N	N	N	N
Metsulfuron	H	N	N	N	N	H	H	H	N	R	H	N	N	H	N	H	H	N	N	H	H	N	H	R	H	R	R	N	N	N	N	R
Milestone		N	N	N	N	R	R	H	R	R	R		H			H				R	R	N	N					N	N	N	N	R
Outrider	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	H	H	N	N
Panoramic	N	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N	R	R	R	N
Paraquat	N	N	H	H	H	N	N	N	N	N	H	N	N	H	N	N	N	R	N	H	H	H	N	N	N	R	N	N	N	N	N	N
Pastora	N	R	R	R	R	R	R	R	N	R	R	N	N	R	N	R	R	N	N	R	R	N	R	R	N	R	N	N	R	N	R	N
Permit	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	H	N	N
Poast/Poast Plus	N	R	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N	N	N	R	N	N	N	N	N
Pursuit	N	R	H	R	N	N	R	N	N	R	N	N	N	N	N	N	N	R	N	R	R	R	N	N	N	N	N	N	N	N	N	N
Select	N	H	H	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N	N	N	N	N
Tordon 22K	R	N	N	N	N	R	R	R	H	R	N	R	H	N	R	N	R	R	R	N	N	N	N	N	R	N	N	H	N	N	N	R
Velpar	N	N	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N	N	N	R	R	N	N	N	N	N	N	N	N	N	N	N
Weedmaster	N	N	N	N	N	H	H	H	H	H	H	H	R	R	H	H	R	H	H	H	H	N	N	R	N	H	R	N	N	N	N	R

H = Highly recommended
R = Recommended
N = Not recommended
Blank = No data

RESTRICTIONS FOR FORAGE HERBICIDES

Herbicide	Crops	Waiting Interval in Days After Treatment Before:				
		Grazing Beef or Dry Dairy Cattle	Grazing Lactating Dairy Cattle	Hay for Lactating Dairy Cattle	Hay for Beef or Dry Dairy Cattle	Slaughter
2,4-D (Weedar 64-A)	grass pastures	0	14	30	30	7
Arsenal	pastures	0	0	0	0	0
Atrazine	forage sorghum	21	21	21	21	no information
Beyond Xtra	alfalfa	20	20	20	20	20
Bicep	forage sorghum					
Butyrac 200 (2,4-DB)	seedling alfalfa, clovers					60
Butyrac 200 (2,4-DB)	established alfalfa, clovers	30	30	30	30	30
Chaparral	grass pasture	0	0	0	0	0
Clarity, Banvel	grass pastures	0	7 to 40, interval depends on rate	37 to 70	37 to 70	30
DuraCor	grass pasture	0	0	0	0	0
Glyphosate, 2 qt/A or less	broadcast	0	0	0	0	no information
Grazon P+D/PD3	grass pastures	0	7	30	30	3
GrazonNext HL	grass pastures	0	0	7	7	no information
Facet L	grass pastures, bermudagrass	0	0	7	7	no information
Kerb	alfalfa, clovers[1]	3 lb/A or less 25 days	3 lb/A or less 25 days	3 lb/A or less 25 days	3 lb/A or less 25 days	no information
Milestone	grass pastures	0	0	0	0	0
Outrider	bermudagrass	0	0	14	14	no information
Paraquat	dormant bermuda	no information	no information	40	40	no information
Pastora	bermudagrass	0	0	0	0	0
PastureGard HL	grass pastures	0	365	14	14	3
Permit	grass pastures	0	0	37	37	0
Poast, Poast Plus	alfalfa, clover	7	7	7	7	20
Pursuit	alfalfa	30	30	30	30	no information
Remedy Ultra	grass pastures	0	14	365	7	3
Rezilon	bermudagrass	0	0	0	0	0
Select	alfalfa	15	15	15	15	15
Metribuzin/Lexone	alfalfa	28	28	28	28	28
Sinbar	alfalfa	70	no information	no information	70	no information
Spike 20P	grass pastures	0	0	365	365	no information
Surmount	grass pastures	0	14	7	7	3
Tordon 22K	grass pastures	0	14	14	14	3
Velpar, do not exceed 1/3 gal/A	grass pastures	30	30	30	30	30
Velpar	alfalfa	30	30	30	30	30
Weedmaster	grass pastures	0	7	37	37	30

[1]All crops except alfalfa, 125 days.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FORAGE **Established Grass Pasture and Hay Crops**				
2,4-D amine @ 0.5 to 2 lb/A	Bitter sneezeweed, buttercup, common ragweed, cocklebur, curly dock, goatweed, lanceleaf ragweed, pigweed, thistles.	**2,4-D amine** 1 to 4 pt/A of 4 lb/gal 2,4-D. Use the higher rate for late applications and on the more resistant weeds.	**Early Treatment** South of I-40: January 15 to February 15 North of I-40: February 1 to March 1	Delayed treatment is more effective on late spring weeds. All legume species except established white clover and lespedeza (more than 2") are severely injured or killed. See animal restrictions. Check state 2,4-D restrictions.
2,4-D LV esters @ 0.5 to 2 lb/A	Bitter sneezeweed, buttercup, common ragweed, cocklebur, curly dock, goatweed, lanceleaf ragweed, pigweed, thistles, wild garlic.	**2,4-D ester** 1 to 4 pt/A of 4 lb/gal 2,4-D.	Same as above except garlic which should be treated in November or December and repeat in early to mid-February.	Tends to be 10 to 20% more active than amine formulation due to greater leaf penetration. More effective on larger weeds and most perennials. Add a surfactant for garlic. Check state 2,4-D restrictions.
dicamba @ 0.5 to 8 lb/A	Most 2,4-D weeds and dogfennel, red sorrel and smartweed.	**Banvel, Clarity** 1 pt to 2 gal/A of 4 lb/gal.	For annuals, apply when weeds are 2 to 4 inches tall and actively growing. Thistles: rosette stage. Dogfennel: 12 to 18 inches.	May be tank mixed with 2,4-D to improve control of thistles, red sorrel and smartweed. Do not apply to legumes.
2,4-D + picloram @ 0.5 + 0.135 to 1 + 0.27 lb/A or 0.5 + 0.127 to 1 to 0.27 lb/A	Bitterweed, buttercup, cocklebur, docks, dogfennel, thistles, horse-nettle, horseweed, prickly lettuce, prickly pear, ragweed, woolly croton, red sorrel and smartweed.	**Grazon P + D** 2 to 4 pt/A. **Grazon PD3** 1 ¼ pt to 2 2/3 pt/A.	Apply when broadleaf annual weeds are small and actively growing. Spray horsenettle at bloom stage. Treat prickly pear in early May.	**Check label for groundwater advisory.** The county Extension office has information on the leachability of the soil types on your land. Use higher rates for perennials. Do not use on or near land to be planted in legumes. Check state 2,4-D restrictions.
2,4-D + dicamba @ 0.375 + 0.125 lb to 0.75 + 0.25 lb/A	Dogfennel (cypressweed), smartweed, horsenettle, thistles, dock and all weeds listed for 2,4-D alone.	**Weedmaster** 1 to 4 pt/A. High rate for horsenettle and thistles.	See instructions for Banvel.	1 lb of Banvel and 2.87 lb of 2,4-D amine per gallon. Controls a broader spectrum of weeds than 2,4-D. May severely injure or kill legumes. Check state 2,4-D restrictions.
aminopyralid @ 0.046 to 0.1 lb/A	Cocklebur, thistle, horsenettle, buttercup, bitterweed, horseweed, smartweed and others.	**Milestone 2L** 3 to 7 fl oz/A.	Postemergence to actively growing weeds. See label for specifics.	No grazing or haying restrictions. Will kill legumes. Do not exceed 7 ounces per acre per year. See label for crop rotation restrictions. Urine and manure of animals grazing treated pastures may contain enough aminopyralid to damage sensitive crops. See label for details.
aminopyralid + 2,4-D @ 0.55 to 0.99 lb/A	Many broadleaf herbaceous and woody plants.	**GrazonNext HL** 19 to 34 fl oz/A.	Postemergence.	A more concentrated version of GrazonNext. Do not use more than 2.1 pt/A in a single growing season. See label restrictions on movement of treated hay off farm and manure use. Do not harvest hay for 7 days after application. . Check state 2,4-D restrictions.
aminopyralid + florpyrauxifen-benzyl @ 0.063 to 0.104 + 0.006 to 0.014 lb/A	Most broadleaf pasture weeds.	**DuraCor** 12 to 20 fl oz/A.	Postemergence.	Manure from animals eating Duracor treated forage or mulching with treated hay will damage sensitive broadleaf crops. Do not make more than two applications per year. Wait 30 days between applications. Extremely small amounts of this herbicide may damage sensitive plants. Read the label carefully. Tree damage through root uptake is possible.
aminopyralid + metsulfuron methyl @ 0.039 + 0.006 to 0.013 + 0.019 lb/A	Many broadleaf weeds including blackberry, sumac, buckbrush. Suppresses Virginia buttonweed.	**Chaparral 72 DF** 1.0 to 3.3 oz/A.	Postemergence to actively growing weeds.	Chaparral will kill or injure bahiagrass and ryegrass. Manure or urine from animals eating Chaparral-treated forage may damage sensitive plants. Do not mulch plants with Chaparral-treated forage.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
imazapic @ 0.063 to 0.19 lb/A	Johnsongrass, crabgrass, sandbur, sedges, barnyardgrass, broadleaf signalgrass, foxtail.	**Panoramic 2 SL** 4 to 12 fl oz/A.	When bermudagrass is fully green and actively growing. Do not apply during transition. Do not apply to drought-stressed bermudagrass, newly aerated fields for 30 days, or to newly sprigged or seeded bermudagrass.	**Do not use this product unless you can tolerate 30 to 45 days of bermudagrass suppression after application. Start with the 4 oz rate.** Panoramic 2 SL may be applied to common and coastal bermudagrass varieties. Jiggs bermudagrass is more sensitive than other types. Do not apply to World Feeder bermudagrass varieties. Use the 6 oz rate for sandbur.
quinclorac @ 0.258 to 0.375 lb/A	Grasses and broadleaves. Good option for barnyardgrass, crabgrass, and field bindweed control.	**Facet L** 22 to 32 fl oz/A.	Postemergence.	Safe on fescue, ryegrass, and bermudagrass. Application to bermudagrass may result in temporary yellowing under certain conditions. Do not cut treated hay within 7 days after application, but may be grazed immediately. Can use up to 64 fl oz/A for control of leafy spurge.
sulfosulfuron @ 0.062 lb/A	Johnsongrass, sedges.	**Outrider 75DF** 1.33 oz/A.	Postemergence.	For use in bermudagrass. Add 0.25% v/v of a nonionic surfactant in 10 to 40 gallons per acre as a broadcast application. Apply to actively growing johnsongrass that is at least 18-24 inches tall and up to the heading stage. Sedges should be actively growing with sufficient leaf area developed to intercept the herbicide. Weeds to be treated should not be mowed or grazed for two weeks before or after application.
halosulfuron @ 0.062 lb/A	Nutsedge and some broadleaf weeds.	**Permit 75DF** 1.33 oz/A.	Treat actively growing nutsedge at the 3- to 5-leaf stage.	Safe on all grasses. Add nonionic surfactant one to two quarts per 100 gallons. May be tank mixed with 2,4-D, Weedmaster or Grazon P+D. A second application may be necessary for full-season nutsedge control.
metsulfuron + nicosulfuron @ 0.014 to 0.028 + 0.035 to 0.05 lb/A	Many broadleaf weeds and grasses including johnsongrass.	**Pastora 75DF** 1.0 to 1.5 oz/A.	Postemergence to small weeds.	Will stunt bermudagrass temporarily. There are no grazing or haying restrictions. May be tank mixed with 6 fl oz of 4 lb/gal glyphosate per acre for improved grass control. Use on established bermudagrass only. Add 0.25% surfactant. Tank mix with 1 qt/A 2,4-D to improve control of thistle, ragweed and plantain.
metsulfuron @ 0.0038 to 0.038 lb/A	Broadleaf weeds, wild garlic and bahiagrass, weak on ragweed and thistle.	**Metsulfuron 60DF** 0.1 to 1.0 oz/A.	Postemergence.	Add 0.25% nonionic surfactant. Will stunt fescue. Do not spray ryegrass or legume pastures.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Dormant Bermudagrass Pastures				
paraquat @ 0.25 to 0.5 lb/A	Tall fescue, annual grassy weeds such as little barley and broadleaf weeds such as buttercup.	**Paraquat** (3 lb/gal formulations) 0.7 to 1.3 pt/A.	During active weed growth when there is good soil moisture. Tall fescue: fall, fescue 4 inches tall. Dormant bermuda: February-March before mid-boot stage of little barley.	Two to three applications may be needed for fescue control. When converting to non-endophyte fescue, an intervening crop should be planted before planting the endophyte-free fescue. Do not graze or cut for hay for 40 days after treatment.
glyphosate @ 0.25 lb/A	Annual grasses such as crabgrass, foxtail and sandbur and small broadleaf weeds. Seedling weeds are easier to control.	**Glyphosate** (4 lb/gal formulations) 16 oz/A.	Late winter or early spring to dormant bermudagrass or immediately after first cutting.	May be applied to **dormant** bermudagrass or **immediately** after the first cutting. **Applying Roundup to partially green bermudagrass in the spring or regrown bermudagrass after the first cutting will result in crop injury.** Do not graze or cut for hay for 60 days following a dormant application. When applying after first cutting, wait 28 days before grazing or harvesting. Roundup cannot be applied to dormant bermudagrass and after the first cutting in the same year. Remove livestock before applying.
Preemergence Grass Control				
indaziflam @ 0.04 to 0.065 lb/A	Annual grass and broadleaf weeds.	**Rezilon 1.67 SC** 3 to 5 fl oz/A.	September to February 15 for preemergence control of summer annual weeds.	For use in established bermudagrass, bahiagrass, and other warm-season grass pastures and hayfields. Split applications of 3 fl oz/A can extend residual control of annual weeds. Early fall applications can prevent winter annuals and offer early-season weed control in subsequent spring. Do not exceed 6 fl oz/A per 12 month period. No grazing restrictions. Rezilon can prevent stolons from rooting, use caution when applying after February 15.
pendimethalin @ 1.0 to 4.0 lb/A	Crabgrass and other annual grasses.	**Prowl H_2O** 1.1 to 4.2 qt/A.	Preemergence.	For use on bermudagrass and other established, perennial warm season grasses. Do not apply more than 4.2 quarts per year. Prowl may be applied as a split application. For example, make the first application in March followed by an application after the first cutting. 0.25 to 0.5 inches of rainfall is needed to move Prowl into the soil.
Newly Sprigged Bermudagrass				
2,4-D + dicamba @ 0.7 to 1.4 + 0.25 to 0.5 lb/A	Annual grasses and annual broadleaf weeds.	**Weedmaster** 1 to 2 qt/A, or 1 to 2 pints.	As weeds begin to emerge, typically 7 to 10 days after planting, but the timing may vary with environmental conditions.	For use after sprigging bermudagrass. Control will be reduced if the weeds are allowed to reach 1–inch height or emergence occurs 10 days after application.
diuron @ 1.0 to 1.5 lb/A	Many grass and broadleaf weeds.	**Diuron 4L** 1.0 to 1.5 qt/A.	Preemergence or early postemergence.	Apply after planting and before emergence of bermudagrass or weeds. Alternatively, for control of emerged annual weeds up to 4 inches in height, apply 0.4 to 0.8 quart per acre, add 0.25% nonionic surfactant. If bermudagrass has emerged at time of treatment, temporary burn of exposed plant parts may occur. Plant sprigs 2 inches deep in a well-prepared seedbed; do not treat areas where sprigs are planted less than 2 inches deep as crop injury may result. Do not graze or feed foliage from treated areas to livestock within 70 days after application. Never use diuron on “Tifway” or “419” turf-type hybrid bermudagrass.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Native Warm Season Grass				
acetochlor @ 1.5 lb/A	Small-seeded grass and broad- leaf weeds.	**Degree 3.8 EC** 3.2 pt/A.	Apply at planting up to early post. Residual control only.	Do not exceed 6.4 pints per year. Do not graze treated forage or use for hay.
acetochlor + atrazine @ 1.11 to 1.5 + 0.55 to 0.74 lb/A	Same as above plus post broad-leaf activity and better residual control.	**Degree Xtra 4L** 3.3-4.4 pt/A.	Apply at planting or when miscanthus is 2 to 3 inches tall.	Do not exceed 8.8 pt/A per year. Do not graze or feed.
ALFALFA				
Preemergence and Postemergence				
terbacil @ 0.5 lb/A	Postemergence control of winter weeds, also preemergence control of summer annual grass and broadleaf weeds.	**Sinbar 80W** 0.6 lb/A.	In late winter or early spring **before** alfalfa breaks dormancy.	Treat only stands established for one year or more. Do not use on alfalfa-grass mixture.
diuron @ 1.2 to 2.4 lb/A	Winter annuals.	**Karmex 80 DF** 1.5 to 3.0 lb/A.	While alfalfa is dormant.	Treat only stands established for one year or more. Do not treat alfalfa under stress.
metribuzin @ 0.38 to 0.75 lb/A	Winter annuals.	**Sencor 75 DF** 0.5 to 1.0 lb/A.	While alfalfa is dormant.	Treat only stands established for one year or more. Do not treat alfalfa under stress.
pronamide @ 0.5 to 0.75 lb/A	Winter grasses and some winter broadleaves.	**Kerb 50W** 1 to 1.5 lb/A.	Apply during the fall or winter months. Has preemergence and post-emergence activity.	Do not use on legumes before the first trifoliate stage. See label for particulars.
hexazinone @ 0.5 to 1.5 lb/A	Most winter broadleaves and some winter grasses.	**Velpar L** 1 to 3 qt/A.	Treat while crop is dormant.	Treat only healthy stands established one year or more. Do not use on sandy loams or loamy sands with less than 1% organic matter. Do not exceed 1 qt/A on sandy loams or loamy sands with 1 to 2% organic matter.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
ALFALFA				
Postemergence				
2,4-DB amine @ 1 lb/A	Broadleaf weeds.	**Butyrac 200/Butoxone** 2.3 qt of 1.75 lb/gal 2,4-DB or 2 qt of 2 lb/gal.	When alfalfa seedlings are 3 inches or following hay harvest before new growth starts.	AVOID DRIFT. Best applied to very small weeds, 2 to 6 leaves.
imazethapyr 0.047 to 0.094 lb/A	Foxtails, chickweed, cocklebur, mustards, shepherdspurse.	**Pursuit 70 DG** 1.08 to 2.16 oz/A.	Postemergence to seedling alfalfa when the weeds are in the 1- to 3-inch size range.	Apply to alfalfa that has reached the second trifoliate or later. Pursuit may be tank mixed with other herbicides. Add crop oil concentrate and UAN at 1 qt/A.
imazamox @ 0.03 to 0.04 lb/A	Annual grasses and some broadleaf weeds.	**Beyond Xtra 1L** 4 to 6 oz/A.	Early postemergence while the weeds are actively growing and before they exceed 3 inches.	Alfalfa should have at least two trifoliates before applying Beyond Xtra. For weeds such as mustards with a prostrate growth habit, apply before the rosette exceeds 3 inches. Beyond Xtra may cause temporary stunting.
clethodim @ 0.094 to 0.125 lb/A	Crabgrass, fall panicum, foxtails, johnsongrass.	**Select 2E** 6 to 8 oz/A.	Postemergence.	See label for weed sizes and rates. Allow time for regrowth if applying after harvest. Add crop oil concentrate at 1 qt/A.
sethoxydim @ 0.2 to 0.3 lb/A	Annual grasses and johnsongrass.	**Poast 1.5 EC** 1 to 2.5 pt/A. Use low rate for small annual grasses, high rate for johnsongrass.	Small annual grasses. Johnsongrass 15" to 20". Do not apply to grass under stress.	See comments for Poast in soybean section. Do not apply more than 5 pt/A per year. Split application most effective for johnsongrass. 1.5 pt/A followed by 1 pt/A.
glyphosate @ 0.7 to 1.4 lb/A	Many broadleaf and grass weeds.	**Glyphosate 4 lb/gal** 22 to 44 oz/A.	Postemergence.	For use with Roundup Ready Alfalfa. Do not exceed 44 fl oz/A in a single application. May be used from emergence to 5 days before cutting. Wait at least 7 days between applications. Do exceed 132 oz/A per growing season. Remove livestock before application and do not graze for 5 days. Make a 22 oz/A application during establishment before the 3 to 4 trifoliate stage to eliminate non Roundup Ready seedlings. In established stands, make weed control applications while the weeds are exposed and not hidden by alfalfa regrowth.
CLOVER: RED, ALSIKE, LADINO				
Postemergence				
sethoxydim @ 0.31 lb/A	Most grasses.	**Poast 1.5 EC** 2.5 pt/A.	Postemergence.	For use on established stands of clover. See label for specific grass weed information. Do not spray drought-stressed weeds. Add surfactant or crop oil concentrate.

WEED RESPONSE RATINGS FOR PASTURE BRUSH CONTROL HERBICIDES

HERBICIDES / WEEDS	Blackberry	Black Locust	Buckbrush	Cedar	Cherry	Elm	Greenbrier	Hawthorn	Honey-locust	Honeysuckle	Kudzu	Oaks	Osage Orange	Persimmon	Pine	Poison Ivy	Prickypear Cactus	Rose, Wild	Sassafras	Sericea Lespedeza	Sumac	Sweetgum	Willow
2,4-D	N	H	H	N	N	N	N	H	N	N	N	R	N	N	N	N	N	N	N	N	H	N	H
Arsenal	N	R	R	N	R	R	R	R	R	R	N	H	H	H	N	H	N	R	H	N	R	H	H
Banvel	R	N	N	N	N	N	N	N	N	N	H	N	N	R[4]	N	N	N	R	N	R	N	N	N
Chaparral	H	H	H	N	N	N	N	N	H	H	H	R	N	N	N	N	N	H	N	H	H	N	H
Chaparral + PastureGard HL	H	H	H	N	R	R	R	R	H	H	R	H	R	R	R	H	N	H	R	H	H	R	H
Crossbow	R	R	R	N	R	R	N	R	R	R	R	R	N	N	N	R	N	N	N	R	R	R	R
Glyphosate	H[2]	R	N	N	R	R	N	R	R	H[2]	R	R	N	N	N	H[2]	N	H	N	N	N	R	H
Grazon P+D	R	R	R	N	R	R	R[3]	R	H	R	R	R	N	R	N	N	H	R	N	R	R	R	R
GrazonNext HL + Remedy Ultra	H	H	H	N	R	R	R	R	H	H	R	H	H	R	R	H	N	H	R	H	H	R	H
Metsulfuron	H	H	R	N	R	R	N	R	H	R	H	N	R	N	N	N	N	R	N	H	N	N	R
PastureGard HL	H	R	R	N	R	R	R	R	R	N	R	R	H	N	N	R	N	R	N	H	R	H	R
Remedy Ultra	H	R	R	N	R	R	R[3]	R	H	N	R	R	H	N	R	R	N	N	N	H	R	H	R
Spike	R	R	R	R[1]	R	H	N	R	R	H	R	R	N	N	H	R	N	H	N	N	N	R	R
Surmount	R	N	N	R	N	N	N	N	H	N	H	N	N	R	N	R	H	R	R	R	R	N	N
Tordon 22K	R	N	N	R[4]	N	N	N	N	H	N	H	N	N	R[4]	R	N	H	R	R	R	N	N	N
Velpar	R	R	R	R[1]	R	R	N	R	H	H	R	R	N	N	N	R	N	H	N	N	N	R	R
Weedmaster	R	N	R	N	N	R	N	R	R	R	R	R	N	N	N	R	N	N	N	R	R	N	R

Small red cedar[1] September application[2] Suppression only[3] Soil application[4]

H = Highly recommended, has been shown to be effective if used properly.

R = Recommended, intermediately susceptible or listed by the manufacturer on the label.

N = Not recommended, has not performed in research or is not listed on the label.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BRUSH CONTROL				
Imazapyr @ 0.25 to 0.75 lb/A	Persimmon, sassafras, oak, hickory, sweetgum.	**Arsenal** 1% solution.	May to September.	Add 0.5% surfactant. No grazing restrictions. Will kill grass. Do not exceed 48 oz per acre.
2,4-D + picloram @ 2 + 0.54 lb/A	Buckbrush, honeylocust, multiflora rose, some oaks, persimmon, prickly pear cactus.	**Grazon P+D** 4 qt/A. **Grazon PD3** 2 2/3 pt/A	At full leaf-out in May or June.	Use high rate for prickly pear control. Results are very slow. Evaluate one year after application. Add 0.5% nonionic surfactant. Tank mix Grazon P+D with 1 qt/A or 0.5% Remedy or for broad spectrum mixed brush control. Adding Remedy may improve honeylocust control. Use 1 to 2% solutions for hand-held equipment.
picloram @ 0.25 to 0.5 lb/A	Prickly pear cactus, persimmon, honeylocust.	**Tordon 22K** 1 to 2 pt/A.	Treat prickly pear in early May. Treat persimmon or honeylocust in May or June.	Read the entire label carefully before using picloram. We recommend that it be used as a spot treatment (see label) rather than broadcast application. Do not exceed 1 quart of Tordon 22K per acre per season. Picloram is a chemical which can travel (seep or leach) through soil and under certain conditions has the potential to contaminate groundwater which may be used for irrigation and drinking purposes. Users are advised not to apply picloram where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow or to soils containing sinkholes over limestone bedrock, severely fractured surfaces and substrates which would allow direct introduction into an aquifer. Your local county Extension office can provide further information on the type of soil in your area and the location of groundwater.
picloram + fluroxypyr @ 0.22 + 0.18 to 0.9 to 0.72 lb/A	Horsenettle, hemp dogbane, ragweed, thistles, etc., and also for many brush species, including blackberry and multiflora rose. Will not control any grass weeds or sedges.	**Surmount** 1.5 to 2 pt/A for general broadleaf control. 3 to 6 pt/A for brush control.	During active weed growth. Blackberry and multiflora rose are best controlled when they have not been mowed for at least one year.	New legume seedlings may not be successful if planted within 1 year after applying herbicide. Consult label for specific recommendations. Using a surfactant will improve the performance of this herbicide.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
triclopyr @ 0.75 to 1.5 lb/A	Blackberries, buckeye, oaks, willow, pine, sumac, osage orange, sweetgum, mixed brush.	**Remedy Ultra** 1.5 to 3 pt/A.	Apply during good growing conditions. Blackberries: flowering through mid-July, leaves must be fully developed on fruiting canes. May through June for general foliar use. Treat cut stumps when fresh, make basal bark applications during dormant season.	Use a 0.5 to 1% solution for hand equipment applications. Add 0.5% nonionic surfactant. Follow-up applications will be needed for control of most species. Tank mix with 1 gallon per acre or 2% Grazon P+D for broader spectrum brush control.
metsulfuron @ 0.038 lb/A	Blackberry, dewberry, *Sericea lespedeza*, honeysuckle.	**Metsulfuron 60DF** 1.0 oz/A.	Postemergence.	Add 0.25% nonionic surfactant. Will stunt fescue. Do not spray ryegrass or legume pastures.
fluroxypyr + triclopyr @ 0.5 to 2.0 lb/A	Many broadleaf herbaceous and woody plants.	**PastureGard HL** 1 to 4 pt/A.	Postemergence.	A more concentrated version of PastureGard. Do not use more than 2 qt/A in a single growing season. Do not harvest hay for 14 days after application. Do not graze lactating dairy cows during the growing season of application. Withdraw animals from treated pasture 3 days before slaughter.
metsulfuron + aminopyralid + triclopyr + fluroxypyr @ 0.019 + 0.1 + 0.38 + 0.125 lb/A	Many brush species and broadleaf weeds.	**Chaparral + PastureGard HL** 3.3 oz + 1 pt/A	May to September.	Will kill bahiagrass. Does not contain picloram. Add 0.5% nonionic surfactant.
aminopyralid + 2,4-D + triclopyr ester @ 0.1 + 0.8 + 1.0 lb/A	Many brush species and broadleaf weeds.	**GrazonNext HL + Remedy Ultra** 2.0 + 2.0 pt/A	May to September.	Provides brush control without the use of picloram. Add 0.5% nonionic surfactant.
glyphosate @ 2 to 5 lb/A	Blackberry, honeysuckle, kudzu, multiflora rose, poison ivy, trumpetcreeper.	**Glyphosate** (4 lb/gal formulations) 2 to 5 qt/A.	Late fall to early summer before leaf color changes. Do not apply to drought-stressed or dusty brush.	Use a 2% solution for spot treatment. Add 0.5% nonionic surfactant. Follow-up treatment will be needed. Will kill grass.
tebuthiuron @ 2 to 4 lb/A	Buckbrush, red cedar, elms, hickory, honeylocust, honeysuckle, oaks, pines, sweetgum.	**Spike 20P** 10 to 20 lb/A.	Can be applied any time. Late winter and early spring applications perform the best. Needs rainfall for activation.	Soil-applied only. May take up to 3 years for complete kill. Do not use on soils with a high clay content. Persimmon and sassafras are not controlled. Do not apply where the roots of desirable vegetation extend. Root spread of trees may be triple the crown width. Will injure grass. Apply during the dormant season. Do not apply when the soil is frozen or snow-covered. Do not apply to red cedar over 6 feet tall.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BRUSH CONTROL [cont.]				
hexazinone @ 0.66 lb/A	Red cedar, elms, honeysuckle, hickory, oaks.	**Velpar L** 2 to 4 milliliters per stem up to ⅓ gal/A.	Can be applied any time. Late winter and early spring applications perform the best. Needs rainfall for activation.	Soil-applied only. Do not use on soils with a high clay content. Persimmon and sassafras are not controlled. Do not apply where the roots of desirable vegetation extend. Will injure grass. Apply during the dormant season. Do not apply when the soil is frozen or snow-covered. Do not apply to red cedar over 6 feet tall. Apply to soil at base of stem with a spotgun. Do not exceed ⅓ gal per acre per season or treat more than 709 brush plants per acre per season.
2,4-D + dicamba @ 1.4 + 0.5 lb/A	Buckbrush, hawthorn, black locust, sumac, willows.	**Weedmaster** 2 qt/A, or 32-48 oz.	At full leaf-out in spring.	Effective on a limited number of brush species. Contains amine 2,4-D. Follow-up treatments are usually needed. Use 2% solution for hand equipment applications. Add 0.5% nonionic surfactant.
2,4-D ester @ 2 to 4 lb/A	Buckbrush, black locust, hawthorn, sumac, willows.	**2,4-D** 2 to 4 qt/A or 32 to 48 oz/A.	At full leaf-out in spring.	Ester formulations more readily penetrate the leaves of brush species. Effective on a limited number of brush species. Follow-up treatments are usually needed. Use 2% solution for hand equipment applications. Add 0.5% nonionic surfactant. Some studies have shown the amine formulation to be more effective on buckbrush.

WEED RESPONSE RATINGS FOR VEGETABLE, SMALL FRUIT AND NUT CROP HERBICIDES

(See Explanation of Ratings Tables on Page 3.)

	Barnyardgrass	Bermudagrass	Crabgrass	Fall panicum	Foxtail	Goosegrass	Johnsongrass (S)	Johnsongrass (R)	Signalgrass	Texas panicum	Carpetweed	Chickweed	Cocklebur	Evening primrose	Jimsonweed	Lambsquarters	Morningglory	Nightshade	Pigweed	Prickly sida	Purslane	Ragweed	Sicklepod	Smartweed	Velvetleaf	Nutsedge, yellow	Nutsedge, purple
2,4-D	N	N	N	N	N	N	N	N	N	N	G	G	G	G	E	E	E	E	E	E	G	E	F	F	G	F	G
Atrazine	G	P	G	P	G	G	P	P	P	P	E	E	G	E	G	E	G	G	E	G	E	E	F	E	E	P	P
Basagran	P	P	P	P	P	P	P	P	P	P	G	G	E	G	G	G	G	G	P	F	G	G	F	G	E	P	P
Beyond Xtra	G		G	G	G	P	G	G																		P	
Chateau	F	F	F	F	F	F	F	P	F	F	E	E	P	E	G	E	G	E	E	E	E	G	P	G	G	P	P
Command	E	N	E	E	E	E	E	N	E	E	N		P		F	G	P		F	E	G		F	F	E	N	N
Curbit	G	N	E	G	G	G	G	N	G	G	G		N		N		N		G		G		N	N	N	N	N
Dual	G	P	E	E	E	E	F	N	G	F	G	G	P	G	P	F	P	G	G	P	E	F	P	F	P	G	P
Eptam	G	P	E	G	E	G	G	P	F	G	G	F	P	F	P	G	P	P	G	P	G	P	P	P	E	G	G
Fusilade DX	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Glyphosate	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	E
Goal	E	P	E	F	F	E	F	P	F	F	E	E		G		E	P	E	E	E	E	E	E	E		P	P
Karmex	G	P	G	F	G	G	P	P	P	F		G	F	G	G	E	F	G	E	F	E	G	P	F	F	P	P
Metribuzin Pre	G	P	G	E	E	E	F	P	P	F	E	G	F	G	E	E	F	P	E	G	E	G	F	G	G	P	P
Metribuzin Post	G	P	G	E	E	E	F	P	P	F	E	G	E	G	E	E	E	P	E	G	E	G	E	G	G	P	P
Paraquat	E	P	E	E	E	E	E	P	E	E	E	G	G	G	G	E	G	G	E	G	G	E	G	G	G	P	P
Poast	E	E	E	E	E	E	E	E	E	E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Princep	E	P	G	G	G	G	P	P	P	P	E	E	G	E	E	E	G	G	E	G	E	E	F	E		P	P
Pursuit	F	F	F			P	G	G	F				E				G	P	E	F		G	P	F		F	
Pyramin	N	N	N	N	N	N	N	N	N	N						E		P	E	G	E	E		E		P	P
Select	E	E	E	G	G	G	E	E	E	G																	
Sandea													G						G			G		G	G	E	E
Sinbar	G	F	G	E	G	G	G	P	G	G	E	E				E	E	G	G	G	G	G		G		F	P
Spin-aid	N	N	N	N	N	N	N	N	N	N						E		G			G					P	P
Stinger	N	N	N	N	N	N	N	N	N	N	N	N	E		G				G			G	E			N	N
Treflan	G	N	E	G	E	E	G	F	G	G	G	E	P	P	P	G	P	P	G	P	G	F	P	P	E	P	P

At recommended rates for your soil type or weed species:
E = 90% control or better
G = 75-90% control
F = 50-75% control
P = 5-50% control
N = less than 5% control

NOTE: Always check current recommendations to be sure the herbicide is registered for the crop in question.

VEGETABLE HERBICIDE REGISTRATION CHART FOR HOME GARDENS

	Asparagus	Beans, Pole & Snap	Beans, Lima	Brussel Sprouts	Broccoli	Cabbage	Carrots	Cantaloupes	Cauliflower	Collard Greens	Cucumbers	Eggplant	Garlic	Lettuce	Honeydew	Horseradish	Kale	Mustard Greens	Okra	Onions	Peas, English	Peas, Southern	Peppers	Potatoes	Pumpkins	Radishes	Sweet Potatoes	Squash	Tomatoes	Turnip Greens	Watermelon
Poast (L)**	R	R	R	R	R	R		R	R	R	R	R	R	R			R	R		R	R	R	R	R	R		R	RP	R		R
Preen (trifluralin)	R	R	R	R	R	R	R	R	R	R	R	R					R	R	R	R	R	R	RT	R		R			R	R	R

R = The herbicide is registered on this crop.
RP = Apply this herbicide only after the plants have 4 to 6 true leaves and are not under stress.
RT = Do not use this chemical on newly seeded crops or small seedlings.
* = This chemical must be incorporated into the top 2 to 3 inches of soil before seeding or transplanting.
** = Apply to annual grasses when they are less than 4 inches tall.
L = Liquid
WP = Wettable Powder
GR = Granular

Weed control in home vegetable gardens requires a coordinated effort using a combination of methods. These include cultural, mechanical and chemical techniques.

Aggressive, fast-growing crops make weed control easier because they are better able to compete with weeds. Squash, beans, southern peas, pumpkins, cucumbers, sweet corn, Irish potatoes and sweet potatoes emerge quickly and have the potential to suppress weeds. Small-seeded and slow- growing crops such as lettuce, carrots, peppers, greens, onions, English peas, tomatoes, broccoli, cabbage and radishes do a rather poor job of competing with weeds.

Cover or smother crops can be used to reduce weed seed germination in succeeding crops. Cover crops are usually planted in the fall and killed by tillage or chemicals the following spring before planting vegetables. The residue from cover crops (rye, ryegrass, etc.) can inhibit early season germination of weeds such as lambsquarters, purslane and pigweed. Avoid planting cover crops where small-seeded crops such as lettuce will be planted the following year or germination will be reduced. To prevent increases in weeds, rotate crops to different areas of the garden so that the same crop is never planted in the same area two years in a row.

Organic mulches include straw, grass clippings, leaves, newspapers, manures, bark chips and other products derived from plant materials. Do not mulch with straw containing weed seeds. Weedy straw may be cleaned by wetting to encourage weed seed germination and then air dried several times to kill seedlings. Organic mulches allow some flexibility in fertilizing and watering since they can be raked back from the plant. Use organic mulches after the soil has warmed in the spring. If applied to cold soils, the rate of soil warming will be slowed.

Black plastic is one of the most commonly used inorganic mulches. Clear plastic is not recommended. Before applying plastic films, make sure the soil is moist and most of the fertilizer has been applied. A more durable option is the use of woven landscape fabric for garden weed control. They may last for up to 20 years if kept covered with soil. Inorganic mulches will increase soil temperature by 6 to 8°F.

When using mechanical means of weed control such as pulling, hoeing or tillage, it is important to remove weeds before they are more than 3 inches tall. There are a variety of hoes available for removing weeds including the scuffle hoe (an open stirrup with a blade), Warren hoe (arrowhead shaped), and the onion hoe (narrow blade). The scuffle hoe is a push-pull weeder that requires no lifting. The garden Weasel has three sets of wheels with spikes that are push-pulled to cultivate weeds. It is recommended where numerous small weeds are present.

Adjust tillers or cultivators to cultivate no deeper than 2 inches and to throw dirt into the row to cover emerged weeds.

When considering the use of herbicides in the home garden, it is important to know that **no single herbicide will do the entire job** of controlling weeds in all vegetable crops. Another problem is accurately and uniformly applying relatively small amounts of herbicide to the garden surface. Under application will result in poor weed control, while over application will result in crop damage.

For all-purpose weed control or to prepare a future garden site, Roundup or Ortho Kleenup (glyphosate) may be used for nonselective weed control. This is typically done in fall, late winter or early spring. **Do not use this material when crops are present or serious damage will occur.**

The major chemical available to control germinating seedlings before the crop emerges is Treflan (trifluralin). Treflan is a trade name, and the common name is listed in parenthesis. This herbicide is marketed under several trade names, so check the common name on the label before buying. Check the herbicide registration chart for home vegetable gardens for specifics on the use of these products.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
VEGETABLES **Cole Crops - Broccoli and Cabbage**	Go this website for more information on weed control in vegetables: www.vegcrophandbook.com			
S-metolachlor @ 0.47 to 1.2 lb/A	Annual grasses and small-seeded broadleaf weeds.	***Dual Magnum 7.62 EC** 0.5 to 1.3 pt/A.	Post-transplant.	***Section 24(c), indemnified label.** Do not exceed 1.3 pt/A. Make only one application per year. Do not harvest within 60 days of application. Do not mechanically incorporate Dual Magnum before transplanting. The risk of crop injury is less with post-transplant applications than from pre-transplant applications, and the risk of crop injury is less with post- directed than from post over-the-top applications. Application before bed formation may result in crop injury. The addition of another registered herbicide, especially Goal, will increase the risk of crop injury from postemergence applications.
oxyfluorfen @ 0.25 to 0.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Goal 2XL** 1 to 2 pt/A.	Pre-transplant.	Do not apply if Dual Magnum herbicide has been applied to the field during the current growing season. Do not apply as a preemergence treatment to direct-seeded broccoli. Do not apply post-transplant or over-the-top of broccoli. Sprinkler irrigation is recommended during early establishment of transplants. Do not apply more than 2 pt/A per season.
bensulide @ 4 to 6 lb ai/A	Annual grasses and broadleaf weeds. Less effective on pigweeds and morningglories. Will not control emerged weeds.	**Prefar 4E** 4 to 6 qt/A.	Preplant or preemergence.	For preplant application, incorporate 1-2 inches deep. For preemergence application, incorporate by irrigation 1 to 2 inches. Apply in at least 10 GPA carrier volume. Do not apply more than 6 lb ai/A. Use low rate on light soil. Cool, wet conditions may cause crop injury.

*Use of the Dual Magnum 24(c) labels for spinach, collards, kale, mustard greens, turnip greens, cantaloupe, cucumber, summer squash, watermelon, transplanted broccoli, cabbage and Chinese cabbage requires agreeing to **Syngenta's waiver of liability and indemnification agreement**. To accept, go to the website, **www.syngenta-us.com/labels/indemnified-label-login**, and register to set up an account. After registering go to the top left of the home page, click on **Products** and then **Indemnified Labels**. You will then be prompted to select the state, Arkansas, the product, Dual Magnum and the crop. Read the **waiver of liability and indemnification agreement** and either accept or decline. If the conditions are unacceptable, return the Dual Magnum herbicide at once unopened or use the Dual Magnum herbicide for a different approved use in accordance with the label on the product container.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Cucurbits - Cantaloupe, Cucumber, Summer Squash, Watermelon **Preplant - Burndown**				
carfentrazone @ 0.03 lb/A	Annual broadleaves, excellent control of morningglories.	**Aim 2EC** 2 fl oz/A.	Apply to actively growing weeds less than 4 inches tall.	**Crops: All cucurbits** Apply to preformed beds. Transplants: Apply no later than one day before transplanting. Seeded: Apply no later than 7 days after seeding.
glyphosate @ 1 to 2 lb/A	Annual grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) 2 to 4 pt/A.	Prior to planting for planting into a weed-free bed.	**Crops: All cucurbits** Apply directly to emerged weeds. Provides only postemergence control.
paraquat @ 0.5 to 1 lb/A	Annual weeds and foliage of perennials.	**Gramoxone SL** 2 to 4 pt/A.	Apply to emerged and actively growing weeds.	**Crops: All cucurbits** Apply to emerged weeds prior to planting. Herbicide has no residual activity.
Cucurbits **Preplant**				
ethalfluralin + clomazone @ 0.52 lb total ai	Small-seeded broadleaves and annual grasses.	**Strategy 2.1L** 1 qt/A.	Broadcast after seeding but prior to emergence or banded after crop emergence or transplanting.	**Crops: All cucurbits** Activate with at least ½-inch of irrigation or rainfall within 2 days of application. If rainfall does not occur within 5 days, incorporate with shallow cultivation or reduced weed control will occur. DO NOT soil incorporate prior to crop emergence.
halosulfuron @ 0.024 to 0.048 lb ai/A	Sedges, ragweed, pigweed, smartweed, morningglory.	**Sandea 75 DG** 0.5 to 0.75 oz.	Apply to soil surface 7 days pre-transplant or 7 days before seeding, before plastic installation.	**Do not use in summer squash. Not recommended on pumpkin.** **Plastic mulch:** Apply to preformed beds and prior to laying mulch. Wait 7 days before transplanting or seeding. DO NOT apply overtop of mulch. **Bareground:** If seeding, apply after seeding but before cracking. If transplanting, apply to preformed beds, lightly irrigate, and wait 7 days to transplant.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
CUCURBITS PREPLANT [cont.]				
bensulide @ 5 to 6 lb/A	Annual grasses and broadleaf weeds, not very effective on pigweeds and morningglories.	**Prefar 4E** 5 to 6 qt/A.	Apply preplant and incorporate.	**Crops: All cucurbits.** Incorporate 1" deep with light cultivation. Do not incorporate deeper than 2".
Cucurbits Preemergence				
bensulide @ 5 to 6 lb/A	Annual grasses and broadleaf weeds, not very effective on pigweeds and morningglories.	**Prefar 4EC** 5 to 6 qt/A.	Apply to soil surface of preformed beds.	**Crops: All cucurbits.** Must be activated within 24 hours of application or reduced weed control can occur. Wet soil at least 2-4" inches deep for best results.
bicyclopyrone @ 0.046 lb/A	Annual grass and broadleaf weeds	**Optogen** 3.5 fl oz	Apply before transplanting.	**Crops: Watermelon.** Do not disturb soil following application. Do not make more than 1 application per crop per year.
clomazone @ 0.15 to 0.25 lb/A	Small-seeded broadleaves and annual grasses.	**Command 3ME** 6.4 to 16 fl oz/A.	Cantaloupe, cucumber, and watermelon: apply immediately after seeding or prior to transplanting Summer squash: apply prior to seeding or transplanting.	Rate is crop dependent. Activate with at least ½-inch of irrigation. DO NOT APPLY UNDER PLASTIC. Research from other states suggests irrigation after application but prior to preparing plant holes or planting.
ethalfluralin + clomazone @ 0.4 to 1.2 lb/A + 0.125 to 0.375 lb/A	Small-seeded broadleaves and annual grasses.	**Strategy 2.1L** 2 to 6 pt/A.	Apply to soil surface of preformed beds.	**Crops: All cucurbits.** Apply immediately after planting. Activate with at least ½-inch of irrigation. DO NOT APPLY UNDER PLASTIC. See label for rotation restrictions.
ethalfluralin @1.1 to 1.7 lb/A	Small-seeded broadleaves and annual grasses.	**Curbit 3 EC** 3 to 4.5 pt/A.	Apply to the soil surface of preformed beds immediately after seeding.	**Crops: All cucurbits.** Activate with at least ½-inch of irrigation. DO NOT SOIL-INCORPORATE. DO NOT APPLY UNDER PLASTIC. Do not use under row covers or hot caps. May be used as banded spray between beds. Irrigate within 5 days for activation. Injury may occur under extreme cold or high moisture conditions.
S-metolachlor @ 0.64 to 1.21 lb/A	Annual grasses, yellow nutsedge and small-seeded broadleaves. Will not control emerged weeds.	***Dual Magnum 7.62 EC** 0.67 to 1.27 pt/A	Apply to the crop at 1-2 leaf stage. Apply to row middles in mulched crops.	***Section 24(c), Indemnified label.** **Pumpkin and summer squash.** Not recommended for cucumber, cantaloupe, or watermelon as significant injury can occur. **Bareground:** Seeded- apply directed once plants reach 4" in height. Transplant- irrigate to seal soil around the root ball then apply 10-14 days after transplanting. **Plastic mulch:** Seeded- apply once plants reach 3" in height. Transplant- apply 7-10 days after planting. **Row middles:** Rate can be increased to 1.33 pt/A

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Cucurbits Postemergence				
bicyclopyrone @ 0.034 to 0.046 lb/A	Annual grass and broadleaf weeds	**Optogen** 2.6 to 2.5 fl oz	Apply to row middles any time after transplanting.	**Crops: Watermelon** Using a hooded sprayer will minimize crop injury during application to middles. Add NIS (0.25% v/v) or COC (1% v/v). Do not make more than 1 application per crop per year.
clethodim @ 0.09 to 0.125 lb/A	Annual and perennial grasses ONLY. Very effective on annual bluegrass.	**Select 2 EC** 8 fl oz/A **Select Max** 16 fl oz/A.	Apply to emerged and actively growing weeds.	**Crops: All cucurbits** Add 1 gal crop oil concentrate per 100 gal spray mix. Do not apply within 14 days of harvest. Multiple applications will be needed for perennial grass control. Repeat application after 14 to 21 days.
halosulfuron @ 0.024 to 0.044 lb/A	Sedge and broadleaf control; should be mixed with other herbicides to enhance grass activity.	**Sandea 75 DG** 0.5 to 0.75 oz.	Apply to emerged and actively growing weeds when crop is at 3 to 5 leaves. Split application (PRE fb POST) for better sedge control.	**Crops: Cantaloupe. cucumber, pumpkin.** Do not use on summer squash or watermelon. Do not apply sooner than 14 days after transplanting. Can be applied over the top, if bareground, but reduce late-season applications when the temperature and humidity are high. If on plastic, apply in row middles**; keep off the plastic.** Research from other universities indicates significant injury and delayed maturity possible with application to pumpkin. A directed application is recommended for pumpkin. Do not apply more than 2 oz/A per year. Do not apply to crops treated with organophosphate insecticides. Add NIS at 0.25% v/v.
sethoxydim @ 0.2 to 0.5 lb/A	Annual and perennial grasses ONLY.	**Poast 1.5 EC** 1 to 2.5 pt/A.	Apply to emerged and actively growing weeds,	**Crops: All cucurbits** Add 1 gal crop oil concentrate per 100 gal of spray mix. Total herbicide cannot exceed 3 pt/A/year. Do not apply on unusually hot and humid days. Do not apply within 14 days of harvest.

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Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Greens [Collards, Kale, Mustard, Turnips]				
trifluralin @ 0.3 to 0.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Treflan 4 EC** 12 to 16 fl oz/A.	Preplant incorporated	Trifluralin requires thorough incorporation into soil to a depth of 2-3" deep before planting. Must be incorporated within 24 hours of application, though within 8 hours is preferable.
sethoxydim @ 0.2 to 0.3 lb/A	Annual and perennial grasses.	**Poast 1.5 EC** 1 to 1.5 pt/A.	Postemergence. Consult label for the correct timing for the target weed(s).	Do not apply within 30 days of harvest.Do not apply more than 1.5 pt/A per treatment and do not exceed 3 pt/A per growing season. Add COC at 1 qt/A. Some necrotic speckling may occur, with use of an adjuvant in high temperatures.
clethodim @ 0.07 to 0.12 lb/A	Annual and perennial grasses.	**Select 2 EC** 6 to 8 oz/A or **Select Max** 9 or 16 oz/A..	Postemergence.	Select Max: add NIS at 0.25% v/v. Select: Add COC at 1% v/v. Adding adjuvant increases the likelihood of crop injury at high air temperatures. Very effective in controlling annual blue- grass. Apply to actively growing grasses not under drought stress. More effective than Poast for perennial grasses; use higher rate for perennial grasses. Do not apply within 14 days of harvest of green crops. Do not apply within 30 days of harvest of turnips grown for roots.
S-metolachlor @ 0.64 to 0.95 lb/A	Annual grasses and small-seeded broadleaf weeds.	***Dual Magnum 7.62 EC** 0.67 to 1 pt/A.	Preemergence or postemergence.	***Section 24(c), indemnified label.** Do not exceed 1 pt/A. Make only one application per year. Do not harvest within 30 days of application. Will not control emerged weeds. May be post-applied when the crop has 1 to 2 true leaves.
bensulide @ 4 to 6 lb/A	Annual grasses and broadleaf weeds. Less effective on pigweeds and morningglories. Will not control emerged weeds.	**Prefar 4E** 4 to 6 qt/A.	Preplant or preemergence.	**Do not use on turnips.** For preplant application, incorporate 1-2 inches deep. For preemergence application, incorporate by irrigation at least 2 inches. Apply in at least 10 GPA carrier volume. Do not apply more than 6 lb ai/A. Use low rate on light soil. Cool, wet conditions may cause crop injury.
Okra				
trifluralin @ 0.5 to 0.75 lb/A	Grasses, pigweed, purslane.	**Treflan 4 EC** 1 to 1.5 pt/A.	Preplant incorporated.	Apply and incorporate before planting. Research from other universities suggest waiting 3 days and irrigation between application and planting.
sethoxydim @ 0.3 lb/A	Grasses only.	**Poast 1.5 EC** 1 to 1.5 pt/A.	Postemergence.	Apply to grasses that are actively growing and not under stress. Do not apply within 14 days of harvest. Add COC at 1qt/A; the addition of COC may increase risk of injury.
glyphosate (see labels)	Annual and perennial grass and broadleaf weeds.	**Many trade names** Check labels	Postemergence application to row-middles	Row middles only. Apply as a hooded spray in row middles, as shielded spray in row middles, as wiper applications in row middles, or postharvest. To avoid severe injury to crop, do not allow herbicide to contact foliage, green shoots or stems, exposed roots, or fruit of crop. PHI = 14 days.

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Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
VEGETABLES **Okra [cont.]**				
Halosulfuron-methyl @ 0.024 to 0.048 lb/A	Yellow and purple nutsedge and broadleaf weeds.	**Sandea 75 DG** 0.5 to 1 oz/A	Postemergence application to row-middles	Apply to row middles as a postemergence shielded or hooded spray to avoid contact of herbicide with planted crop. In plasticulture, do not allow spray to contact plastic. Do not apply more than 2 oz/A per 12-month period. PHI = 30 days.
Peppers				
trifluralin @ 0.5	Small-seeded annual grass and broadleaf weeds.	**Treflan 4 EC** 1 pt/A.	Any time from 6 weeks before planting up to planting. After bedding if beds are used.	Transplants only. Requires thorough incorporation to a depth of 2-3" within 24 hours, 8 hours preferred. Tillage that concentrates trifluralin in the root zone will cause injury. Not suggested for use in plastic mulch systems.
sethoxydim @ 0.19 to 0.38 lb/A	Grasses.	**Poast 1.5 EC** 1 to 1.5 pt/A.	Postemergence.	Add 1 qt COC/A- adding crop oil may increase crop injury in high temperatures. Apply only under conditions of active growth. Thorough coverage required. Do not tank mix with other pesticides. Do not cultivate 7 days before or after treatment. Cultivation soon after 7 days will be helpful. Do not apply within 20 days of harvest. Do not apply more than 4.5 pt/A per year.
clethodim @ 0.07 to 0.12 lb/A	Annual and perennial grasses.	**Select 2 EC** 6 to 8 oz/A **or Select Max** 9 or 16 oz/A.	Postemergence.	Select Max: add NIS at 0.25% v/v. Select: Add COC at 1% v/v. Adding adjuvant increases the likelihood of crop injury at high air temperatures. Very effective in controlling annual bluegrass. Apply to actively growing grasses not under drought stress. More effective than Poast for perennial grasses; use higher rate for perennial grasses. Do not apply within 20 days of harvest.
glyphosate @ 0.75 to 2.25 lb/A	Most emerged weeds except resistant weeds (some pigweeds, ryegrass, and horseweed)	**Roundup WeatherMax 5.5L** 22 to 64 fl oz/A.	Preplant burndown.	**Bareground transplants:** Apply no more than 1.13 lb ae/A in a single application. Must till or irrigate 0.5" and wait at least 7 days before planting to reduce risk of injury. **Bareground seeding:** Apply at least 3 days and irrigate before planting. **Plasticulture:** Up to 1.13 lb ae/A- wait 3 days before planting, up to 2.25 lb ae/A- wait at least 10 days before transplanting. **AT LEAST 0.5" IRRIGATION OR RAINFALL MUST OCCUR BETWEEN APPLICATION AND PLANTING.** Do not punch new holes until after washing. Transplants in old holes may be injured. For nutsedge, apply glyphosate followed by paraquat 5-7 days later.
paraquat @ 0.5 to 1.0 lb/A	Nonselective.	**Gramoxone 2.0 SL** 2 to 4 pt/A.	Preplant burndown, or pretransplant.	Add nonionic surfactant, 0.25% v/v.
bensulide @ 4 to 6 lb lb/A	Annual grasses and broadleaf weeds. Less effective on pigweeds and morningglories. Will not control emerged weeds.	**Prefar 4E** 4 to 6 qt/A.	Preplant, or preemergence.	For preplant application, incorporate 1-2 inches deep. For preemergence application, incorporate by irrigation at least 2 inches. Apply in at least 10 GPA carrier volume. Do not apply more than 6 lb ai/A. Use low rate on light soil. Cool, wet conditions may cause crop injury.
carfentrazone @ 0.007 to 0.022 lb ai/A	Broadleaf weeds.	**Aim 1.9EW** 0.5 to 1.5 fl oz/A.	Preplant, pretransplant burndown, before crop emergence or postdirected in row middles.	Apply in the row middles using hooded sprayer. Apply with NIS or crop oil at recommended rates. Does not have residual activity. Drift will burn the crop leaves.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
PEPPERS [cont.]				
clomazone @ 0.25 to 0.50 lb ai/A	Annual grasses, common lambs-quarters, spurred anoda, velvet-leaf, prickly sida.	**Command 3ME** 0.67 to 1.34 pt/A.	Preplant, pretransplant, or pre-emergence.	**Do not use on banana peppers.** Place seed or root of transplants below the herbicide layer. Do not make more than one application. Use lower rate on light-textured soils.
halosulfuron @ 0.023 to 0.047 lb ai/A	Broadleaf weeds and nutsedge.	**Sandea 75DF** 0.5 to 1 oz/A.	Preemergence, or in row middles of direct-seeded or transplanted pepper.	Avoid contact with the crop, or with plastic. Do not make more than two applications per crop. Do not exceed 2 oz product/season.
pendimethalin @ 0.95 to 1.42 lb/A	Annual grasses and small-seeded broadleaf weeds. Will not control emerged weeds.	**Prowl H2O (3.8 EC)** 2 to 3 pt/A.	Preplant or postdirected to transplants.	**Bell and nonbell. F**or non-mulched crop, apply preplant-incorporated, before transplanting. **Bell and nonbell.** For mulched crop only- pre-plant, NOT incorporated, on top of firmed bed, before laying plastic. Can also be applied in the row middles, tank-mixed with a labeled POST-herbicide. Needs irrigation or shallow incorporation for activation. **Bell and nonbell.** For non-mulched crop only- apply post-directed to transplants, or to established direct-seeded crop. Can also be applied in the row middles, tank-mixed with a labeled POST-herbicide. Needs irrigation or shallow incorporation for activation.
Snapbeans, Lima Beans				
halosulfuron @ 0.02 to 0.04 lb/A	Yellow and purple nutsedge, ragweed, pigweed, smartweed, cocklebur and morningglory.	**Sandea 75 DF** 0.5 to 1 oz/A.	Preemergence.	Apply after planting but before cracking.
S-metolachlor @ 0.6 to 1.01 lb/A	Annual weeds.	**Dual Magnum 7.62 EC** 10 oz to 16 oz/A.	Preemergence.	Apply during or after planting but before weeds emerge.
EPTC + trifluralin @ 3.5 + 0.5 lb/A	Annual weeds.	**Eptam + Treflan 4 EC** 3.5 pt/A + 1 pt/A.	Just prior to planting.	Requires thorough incorporation to a depth of 3 inches.
trifluralin @ 0.5 lb/A	Small-seeded broadleaf weeds and annual grasses.	**Treflan 4 EC** 1 pt/A.	Any time from 6 weeks before planting up to planting. After bedding if beds are used.	Requires thorough incorporation to a depth of 1 to 1½ inches.
bentazon @ 0.25 to 0.5 lb/A	Purslane, velvetleaf, ragweed, smartweed, cocklebur, jimsonweed.	**Basagran** 0.5 to 1 pt/A.	Postemergence to small weeds.	See label for details and weed sizes.
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses.	**Poast 1.5 EC** 1.5 to 2.5 pt/A.	Postemergence.	Do not apply within 15 days of harvest. Do not exceed 4 pt/A per season. Add 1% crop oil concentrate.
fomesafen @ 0.1875 to 0.375 lb lb/A	Many broadleaf weeds.	**Reflex 2L** 0.75 to 1 pt/A.	Apply postemergence to dry beans having at least 4 expanded trifoliate leaves or snap beans having at least 1 expanded trifoliate leaf. Include a nonionic surfactant at 1 quart per 100 gallons spray mixture.	Dry or snap beans only. Total use per year cannot exceed 1.5 pt/A. Do not apply within 45 days of dry bean harvest or 30 days of snapbean harvest. See label for further information.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
VEGETABLES				
Snapbeans, Lima Beans [cont.]				
sulfentrazone + carfentrazone @ 0.1 to 0.2 lb/A + 0.01 to 0.02 lb/A	Annual grasses and small-seeded broadleaves, good activity on pigweeds.	**Spartan Charge** 3.8 to 7.6 fl oz/A.	Apply to the soil surface 14 to 7 days prior to planting. Will control small seedlings at the time of application. **Can also be applied preemergence.**	Tank mixing with Dual Magnum preemergence may cause stunting, but will increase weed control spectrum. Apply to the soil surface immediately after planting. Do not apply to sandy soil with <1% organic matter, or soils above Ph7.
sulfentrazone + *S*-metolachlor @ 0.1 lb/A to 0.14 + 0.95 to 1.27 lb/A	Annual grasses and small-seeded broadleaves, excellent on pigweeds and morninglories; good control of yellow nutsedge.	**Authority Elite** 19 to 26 fl oz/A.	Apply to a weed-free bareground soil. **Can also be applied pre-emergence.**	Preplant application is safer than preemergence application.
Southernpea - Preemergence				
imazethapyr @ 0.063 lb/A	Small-seeded broadleaves and annual grasses.	**Pursuit 2 AS** 4 fl oz/A.	Preplant soil-incorporated, preemergence, or early postemergence.	Has activity on pigweeds, but will not control ALS-resistant pigweed.
S-metolachlor @ 0.64 to 0.95 lb/A	Small-seeded broadleaves and annual grasses.	**Dual Magnum 7.62 EC** 0.67 to 1 pt/A.	Preplant soil-incorporated or preemergence. Apply to a weed-free bareground soil.	Excellent control of pigweeds, other small-seeded broadleaves and annual grasses. Needs 1-inch of rainfall for activation. Rainfall exceeding 2 inches will reduce residual activity.
halosulfuron @ 0.02 to 0.04 lb/A	Yellow and purple nutsedge, some broadleaves.	**Sandea 75 DF** 0.5 to 0.75 oz/A.	Preemergence.	Apply after planting but before cracking.
trifluralin @ 0.5 to 0.75 lb/A	Annual grasses and small-seeded broadleaves.	**Treflan 4 L** 1 to 1.5 pt/A.	Apply to a weed-free bareground soil.	Requires thorough incorporation to a depth of 1 to 1.5 inches. Tankmix with another herbicide to improve spectrum.
Southernpea - Postemergence				
bentazon @ 0.5 lb/A	Prickly sida, smartweeds, and common cocklebur.	**Basagran** 1 pt.	Apply over the top of the crop and weed; good coverage required.	Apply over the top. Weak on pigweeds. Excellent activity on prickly sida, smartweeds and common cocklebur.
clethodim @ 0.094 to 0.125 lb/A	Grasses.	**Select 2 EC** 6 to 8 fl oz/A.	Apply to actively growing grass seedlings.	Add 1 gallon of crop oil concentrate per 100 gallons of spray mixture. Adding crop oil may cause crop injury at high temperature conditions. Do not apply on days that are unusually hot or humid. Do not apply within 14 days of harvest.
fomesafen @ 0.2 lb/A	Small annual grasses and small-seeded broadleaves, good activity on pigweeds 2 inches tall.	**Reflex 2 SL** 13 oz/A.	2- to 4-trifoliate crop.	**For dry beans only.** Will burn crop leaves; crop injury will be severe if applied on a very hot, sunny, humid day, but the crop will recover. Some varieties will be injured more than others. Total use per year cannot exceed 1.5 pt/A. Do not apply within 45 days of dry bean harvest.
halosulfuron @ 0.02 to 0.04 lb/A	Yellow and purple nutsedge, some broadleaves.	**Sandea 75 DF** 0.5 to 0.75 oz/A.	Apply after 2nd trifoliate but before flowering.	Directed sprays are recommended to reduce injury. Temporary stunting and chlorosis is expected with broadcast applications. Some varieties are more susceptible to injury than others.

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imazamox @0.03 lb/A	Small-seeded broadleaves, annual grasses, and sedges.	**Raptor** 4 fl oz/A.	Apply over the top of the crop and weed; good coverage required.	Similar to Pursuit, but has shorter residual activity. Will not control ALS-resistant pigweeds. Some varieties may be stunted by Raptor.
imazethapyr @ 0.063 lb/A	Small-seeded broadleaves, annual grasses and sedges.	**Pursuit 2 AS** 4 fl oz/A.	Apply over the top of the crop and weed; good coverage required.	Annual grasses and broadleaves. Will not control ALS-resistant pigweeds. Good on sedges.
sethoxydim @ 0.2 to 0.5 lb/A	Annual and perennial grasses ONLY.	**Poast 1.5 EC** 1 to 2.5 pt/A.	Apply to emerged and actively growing weeds.	Thorough coverage required. Do not tank mix with other pesticides. Do not cultivate 7 days before or after treatment. Cultivation after 7 days is helpful. Add 1 quart of crop oil concentrate per acre. This may cause injury on a hot, sunny day. Total cannot exceed 2.5 pt/A/year. Do not apply within 15 days of harvest.
Spinach				
sethoxydim @ 0.19 to 0.38 lb/A	Grasses.	**Poast 1.5 EC** 1 to 1.5 pt/A.	Before annual grasses exceed 14 days after emergence. Timing is very important. Johnsongrass: 15 to 20 inches Bermudagrass: 1-inch height or 6-inch maximum runner length	Apply only under conditions of active growth. Thorough coverage required. Do not tank mix with other pesticides. Do not cultivate 7 days before or after treatment. Cultivation soon after 7 days will be helpful. Do not apply within 15 days of harvest.
clethodim @ 0.094 to 0.125 lb/A	Grasses.	**Select 2 EC** 6 to 8 oz/A.	Postemergence.	Apply to emerged grasses. Consult manufacturer's label for specific rates and best times to treat. For sethoxydim, add 1 quart of crop oil concentrate per acre. For clethodim, add 1 gallon of crop oil concentrate per 100 gallons of spray solution. Adding crop oil to Poast or Select may increase the likelihood of crop injury at high air temperatures. Do not apply Poast or Select on days that are unusually hot and humid. Do not apply sethoxydim within 15 days of harvest or clethodim within 14 days of harvest.
S-metolachlor @ 0.32 to 0.64 lb/A	Annual grasses and small-seeded broadleaf weeds.	***Dual Magnum 7.62 EC** 0.33 to 0.67 pt/A.	Preemergence.	***Section 24(c), indemnified label.** Do not incorporate. Make only one application per year. Do not exceed 0.67 pt/A. Use low rate on coarse soil. Do not harvest within 50 days of application. Do not apply through an irrigation system. Irrigate within 2 days of application.

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Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
VEGETABLES **Spinach [cont.]**				
phenmedipham @ 0.5 to 1 lb/A	Annual broadleaf.	**Spin-Aid 1.3 EC** 3 to 6 pt/A.	Postemergence.	Do not use when expected high temperatures will be above 75°F. For best results, spray when weeds are in the 2-leaf stage. Use the 6 pint rate only on well-established crops which are not under stress. Do not apply within 40 days of harvest. Spinach plants must have 6 true leaves or more. For processing spinach only. Do not exceed 22 gallons per acre water. Avoid drift.
Sweet Corn				
S-metolachlor + atrazine 1.25 to 1.5 lb + 1 to 1.6 lb/A	Annual weeds.	**Dual Magnum 7.62 EC + AAtrex, atrazine** See label for specific formulations.	Preplant incorporated, preemergence or early postemergence.	Use high atrazine rate where cocklebur and morningglory are severe. Rainfall in 5-7 days is necessary for best results. With preplant, shallow incorporate 2-3 inches within 7 days of planting.
bentazon @ 0.75 to 1 lb/A	Cocklebur, common ragweed, jimsonweed, Pennsylvania smartweed, velvetleaf, yellow nutsedge, and morningglory.	**Basagran** 0.75 to 1 qt/A.	Apply early postemergence over top when weeds are small and corn has 1 to 5 leaves.	See label for rates according to weed size and special directions for annual morningglory and yellow nutsedge control. Use a crop oil at a rate of 1 qt/A.
halosulfuron @ 0.032 lb/A	Cocklebur, passionflower, pigweed, pokeweed, ragweed, smartweed, velvetleaf.	**Permit 75 DF** 0.67 oz/A.	Postemergence.	Apply over the top with drop nozzles to sweet corn from spike to lay-by for control of emerged weeds. Add nonionic surfactant at 0.5 oz per gallon of spray solution or 1 quart per 100 gallons of spray solution. See label for all instructions and restrictions.
S-metolachlor + atrazine @ 1 to 2 + 0.78 to 1.56	Most annual grass and broadleaf weeds.	**Bicep II Magnum** 1.3 to 2.6 qt/A.	Preemergence.	Apply to soil surface immediately after planting. See label for further instructions.
atrazine @ 1 to 2 lb/A	Most annual broadleaf and grass weeds.	**Aatrex 4L** 1 to 2 qt/A.	Preemergence or postemergence.	Apply to soil surface immediately after planting. Shallow cultivation of preemergence applications improves control. Postemergence: Use the 2 quart rate and apply before weeds reach 1.5 inches. See label for amount of crop oil to add. For best results, tank mix with a grass herbicide such as Dual.
Sweet Potatoes				
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses.	**Poast 1.5 EC** 1.5 to 2.5 pt/A.	Apply to small annual grasses, preferably within 14 days after emergence. See label for timing perennial grasses.	Do not apply within 30 days of harvest. Do not apply more than 5 pt/A in one season. Add 1% crop oil concentrate.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
clethodim @ 0.09 to 0.25 lb/A	Grasses.	**Select 2 EC** or **Select Max** 8 to 16 oz/A. Add crop oil concentrate + AMS.	Postemergence.	Apply postemergence for annual grasses at 6 to 8 oz/A or bermudagrass and johnsongrass at 8 oz/A. Add 1 gallon crop oil concentrate per 100 gallons of spray mix. Adding crop oil may increase the likelihood of crop injury at high air temperatures. Very effective in controlling annual bluegrass. Apply to actively growing grasses not under drought stress. Do not apply within 30 days of harvest.
clomazone @ 0.48 to 1.5 lb/A	Annual grasses.	**Command 3 ME** 1.3 to 4 pt/A.	Pre-transplant.	Use the low rate on coarse soils and the high rate on fine soils. May also be applied as a single, post-transplant application to the crop before weeds emerge at a maximum of 1.5 pt/A.
fluazifop-P @ 0.19 lb/A	Grasses.	**Fusilade DX 2 EC** 6 to 18 oz/A.	Before annual grasses exceed 14 days after emergence. Timing is very important. Johnsongrass: 12 to 18 inches. Bermudagrass: 3-inch height or 6- to 12-inch maximum runner length.	Less effective than Poast on annual grasses. More effective on bermudagrass and johnsongrass. Thorough coverage required. Do not tank mix. Do not cultivate 7 days before or after application. Do not apply within 14 days of harvest.
flumioxazin @ 0.094 lb/A	Annual broadleaf weeds including pigweed.	**Valor 51 WDG** 3 oz/A.	Apply 2 to 5 days prior to transplanting crop.	Movement of soil during transplanting should not occur or reduced weed control may result. Do not use on greenhouse-grown transplants. Do not apply postemergence or serious crop injury will occur. Do not use on transplants harvested more than 2 days prior to transplanting. Do not use on transplant propagation beds. See label for instructions on use. Use only on the 'Beauregard' variety.
S-metolachlor @ 0.95 to 1.26 lb/A	Annual sedge and yellow nutsedge.	**Dual Magnum 7.62 EC** 1 to 1.33 pt/A.	After the sweet potatoes have been transplanted but before weeds emerge.	Do not incorporate following application. Use the lower rate on coarse-textured soils. The transplanter trench must be closed before applying. Do not apply more than 0.5 inches of irrigation for the first irrigation following application. Make only one application per season.
Tomatoes				
S-metolachlor @ 0.95 to 1.5 lb/A	Yellow nutsedge, annual grasses, broadleaf weeds.	**Dual Magnum 7.62 EC** 1 to 2 pt/A.	Preplant or postdirected to transplants.	Apply preplant or postdirected to transplants after the first settling rain or irrigation. In plasticulture, apply to preformed beds just prior to applying plastic mulch. Minimize contact with crop. Do not apply within 90 days of harvest. Also registered for use in row middles, and in seeded crop. See label for further instructions.
trifluralin @ 0.5 to 0.75 lb/A	Annual weeds.	**Treflan 4 EC** 1 to 1.5 pt/A.	Preplant any time from 6 weeks before transplanting up to transplanting. After bedding if beds are used.	Requires thorough incorporation to a depth of 1 to 1½ inches. Do not use on direct-seeded tomatoes.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
VEGETABLES **Tomatoes [cont.]**				
metribuzin @ 0.25 to 0.5 lb/A	Annual broadleaf and grass weeds.	**Metribuzin 75 DF** 0.33 to 0.67 lb/A.	Preplant or postplant	**Preplant:** Prior to direct seeding or transplanting. If using plastic, apply after bed formation and just prior to laying plastic. Place transplant roots below herbicide layer to avoid injury. **POST:** Apply overtop after transplants have 5-6 leaves or have fully recovered from shock of transplanting and weeds are small. Do not apply within 3 days after period of cool, wet or cloudy weather or injury will occur. Can also be applied as directed spray. Can use 0.67 to 1.33 lb/A if applying as a directed spray. Do not apply within 24 hours of other pesticide applications and do not tank-mix with other pesticides. See label for other precautions and rotational restrictions.
halosulfuron @ 0.02 to 0.04 lb/A	Yellow and purple nutsedge, ragweed, pigweed, smartweed, cocklebur and morningglory.	**Sandea 75 DF** 0.5 to 1.0 oz/A.	Preemergence and postemergence.	Direct-seeded, postemergence: Sandea may be applied over the top from the 4-leaf stage to first bloom. After bloom, use shields or directed spray to avoid contact with the plant. Transplants: May be applied from 14 days after transplanting to first bloom. After first bloom, apply as a directed spray.
sethoxydim @ 0.19 to 0.38 lb/A	Grasses.	**Poast 1.5 EC** 1 pt/A.	Before annual grasses exceed 14 days after emergence. Timing is very important. Johnsongrass: 15 to 20 inches. Bermudagrass: 1-inch height or 6-inch maximum runner length.	Apply only under conditions of active growth. Thorough coverage required. Do not tank mix with other pesticides. Do not cultivate 7 days before or after treatment. Cultivation soon after 7 days will be helpful. Do not apply within 20 days of harvest. Do not apply more than 4.5 pt/A per season.
clethodim @ 0.09 to 0.25 lb/A	Annual and perennial grasses.	**Select 2E** 6 to 16 oz/A.	Postemergence.	Add 1.0% crop oil concentrate. Apply to actively growing grasses. Repeat applications may be needed for perennial grass control. Good on annual bluegrass and broadleaf signalgrass.
trifloxysulfuron-sodium @ 0.0047 to 0.0094 lb/A	Yellow nutsedge, morningglory, common cocklebur, common lambsquarters and other broadleaf weeds.	**Envoke 75 DG** 0.1 to 0.2 oz/A.	Post-directed.	**In row.** Apply post-directed to tomato grown on plastic for control of nutsedge and certain broadleaf weeds. Crop should be transplanted at least 14 days prior to application. The application should be made prior to fruit set and at least 45 days prior to harvest. Use nonionic surfactant at 1 quart per 100 gallons spray solution with all applications. **Row middles.** Apply for control of nutsedge and certain broadleaf weeds. Crop should be transplanted at least 14 days prior to application. Use nonionic surfactant at 1 quart per 100 gallons spray solution with all applications. See label for information on registered tank mixes. Tank mixtures with Select or Poast may reduce grass control. See label for more information.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Carfentrazone @ up to 0.031 lb/A	Most broadleaf weeds less than 4 inches tall or rosettes less than 3 inches in diameter; does not control grasses	**Aim 1.9 EW or Aim 2 EC** Up to 2 oz/A. Add nonionic surfactant	Apply as a preplant burndown treatment.	See label for rates. May be tank-mixed with other registered burndown herbicides. Efficacy requires good coverage and the use of a non-ionic surfaction. **Transplanted crop**. Apply no later than 1 day before transplatning. **Seeded crop** (Aim 2 EC only). Apply no later than 7 days before planting seeded crop.
Paraquat @ 0.5 to 1 lb/A	Contact kill of all green foliage, stale bed application	**Firestorm 3 SL** 1.3 to 2.7 pt/A **Gramoxone 2 SL** 2 to 4 pt/A	Preplant burndown application.	Apply to emerged weeds in a minimum of 20 gal spray mix per acre before crop emergence as a broadcast of band treatment over a pre-formed row. Row should be formed seceral days ahead of planting and treating to allow maximum weed emergence. Use a nonionic surfactance at a rate of 16 to 32 oz per 100 gal spray mix or 1 gal approved crop oil concentrate per 100 gal spray mix.
Oxyfluorfen @ 0.5 lb/A	Broadleaf weeds including Carolina geranium and cutleaf eveningprimrose and a few annual grasses	**Goal 2 XL** Up to 2 pt/A	Preplant burndown/preemergence application.	Plasticulture only. Apply to soil surface of pre-formed beds at least 30 days prior to transplanting crop. While incorporation is not necessary.
Napropamide @ 1 to 2 lb/A	Annual grasses and small-seeded broadleaf weeds including lambsquarters, pigweed, carpetweed, and common purslane	**Devrinol 50 DF or Devrinol 2 EC** 2 to 4 lb/A 2 to 4 qt/A	Preemergence.	**Bareground:** Apply preplant and incorporate into the soil 1 to 2 inches as soon as possible with a rototiller or tandem disk. Can be used on direct-seeded or transplanted tomatoes. See label for instructions on use. **Plasticulture:** Apply to a weed-free soil before laying plastic mulch. Soil should be well worked yet moist enough to permit a thorough incorporation to a depth of 2 inches. Mechanically incorporate or irrigate within 24 hours after application. If weed pressure is from small seeded annuals, apply to the surface of the bed immediately in front of the laying of plastic mulch. If soil is dry, water or sprinkle irrigate with sufficient water to wet to a depth of 2 to 4 inches before covering with plastic mulch. Between rows: Apply to a weed free soil surface between the rows (bareground or plastic mulch). Mechanically incorporate or irrigate Devrinol into the soil to a depth of 1 to 2 inches within 24 hours of application. See XT labels for information regarding delay in irrigation event.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
VEGETABLES **Tomatoes [cont.]**				
Pendimethalin @ 0.5 to 1.5 lb/A	Annual grasses and small-seeded broadleaf weeds including lambsquarters, pigweed, carpetweed, and common purslane	**Prowl H20 AS** 1 to 3 pt/A	Preemergence.	**Plasticulture In-row**. May be applied as a preplant surface application or a preplant incorporated application prior to transplanting tomato. **Bareground In-row**. May be applied as a broadcast preplant surface application or preplant incorporated application prior to transplanting tomato. **Post-directed spray**. May be applied as a post-directed spray on the soil at the base of the plant, beneath plants, and between rows. Avoid direct contact with tomato foliage or stems. Do not apply over the top of tomato. PHI=21 days. Do not apply more than 3 pt per acre per season. See label for specific use rate for your soil type.Emerged weeds will not be controlled. See label for further instructions and precautions.
Rimsulfuron @ 0.25 to 0.5 lb/A	Most broadleaf weeds including wild radish, common purslane, redroot and smooth pigweed	**Matrix 25 WDG, Pruvin 25 WDG** 1 to 2 oz/A	Postemergence.	Apply in tomatoes after the crop has at least two true leaves and weeds are small (1-inch or less) and actively growing. Add nonionic surfactant at 1 qt per 100 gal of spray solution. Do not apply within 45 days of tomato harvest. See label for further instruction.

WEED CONTROL IN HOME FRUIT PLANTINGS

Many home gardeners have fruit plantings that are too large to hand weed and too small to use heavy equipment in. Hand pulling and mulching can be used to control weeds in many cases. In addition, herbicides can be used to supplement the above cultural practices to make controlling weeds easier and faster. For small areas, several chemical manufacturers (e.g., Ortho, Scott, Southern States, Security and others) sell a variety of herbicides in small quantities which are ideal for this job. These chemicals are formulated to make them more convenient and easier for the homeowner to use. For larger areas, several products can be purchased over the counter at farm chemical retail stores. For all-purpose weed knockdown, use glyphosate. These knockdown materials (postemergence) will kill many emerged weeds already growing. Remember to keep these materials off the crop plants to avoid damage.

To control germinating seedlings, several preemergence herbicides are available. General use recommendations are given below, but consult the label on each product for specific directions before application.

Strawberries

Weed control is difficult since newly set strawberries are sensitive to many of the herbicides. Devrinol can also be used on established plants. See the label for directions. Apply one-half inch of irrigation immediately after application of Devrinol for best results. Poast can be used for control of emerged annual and perennial grasses at any time except during harvest and during the period up to 30 days before harvest begins.

Small Fruits

(raspberries, blackberries, blueberries, grapes) and Orchard Fruit (apples, pears, peaches, plums, nuts)

A weed-free strip around the base of each plant is desirable. Mowing a grass or natural weed strip between crop plants and applying a preemergence herbicide and/or a 3-inch mulch under the crop plants is the ideal method of managing weeds in your home fruit planting. Following are general suggestions for using weed control chemicals in fruit plantings. Read the information on the container for more detailed directions.

Preemergence Herbicides

These materials are used to prevent weed germination. They must be applied as a directed spray to the base of the crop plant. Contact of the spray with the lower stems or leaves of these plants, however, will not damage them. Mixing these herbicides into the soil surface is often suggested to increase effectiveness. Watering with an inch or more of water can often be used as a substitute for incorporation around established plants.

- Casoron (dichlobenil) is available as a 2 or 4% granule. It can be used on most woody plants 30 days after transplanting. This material is excellent for control of cool-season grasses and weeds. It is best applied during the winter months.
- Devrinol 50% dry flowable granules can be used on many newly planted and established fruit crops. Put 1 ounce by weight in one gallon of water (or more) and spray uniformly over 1,000 square feet. It is best applied either in early spring or after harvest to weed-free soil.
- Princep (simazine) is available as a wettable (90 WP) powder and a liquid (4L) and can be used on many established woody plants. Do not apply to plants less than 3 years old. It is best applied either in early spring or after harvest to weed-free soil.
- Surflan is available as a liquid (4AS). Apply 2 to 4 quarts of the 4AS evenly over one acre in at least 20 gallons water or put 1½ to 3 tablespoons of 4AS in one gallon water and spray evenly over 1,000 square feet. Surflan can be applied safely after transplanting on many woody stemmed crops. It is best applied either in early spring or after harvest to weed-free soil.

Postemergence Herbicides

These materials are used to eliminate existing weeds. Remember to keep these materials off crop plants or damage will result.

- Roundup or Ortho Kleenup – This material is most effective on small annuals and perennials in the middle of the summer. Roundup is a slow-acting material which will completely kill the plants, including the roots of perennials. It will take 10 to 14 days for the plants to die. Since the concentration of active ingredient in these products varies, follow the mixing directions on the container. Do not use these materials during bloom or harvest periods.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FRUIT AND NUT CROPS				
Tree Fruits				
Preemergence				
flumioxazin @ 0.19 to 0.38 lb/A	Annual broadleaf and grass weeds.	**Chateau EZ** 6 to 12 oz/A.	Preemergence, dormant applications preferred or use shielded sprayer.	For trees established less than three years growing in soil with a sand plus gravel content of over 80 percent, use a maximum rate of 6 ounces per acre. Do not harvest fruit from treated trees within one year of application.
indaziflam @ 0.065 to 0.085 lb/A	Annual broadleaf and grass weeds.	**Alion 1.67 SC** 5 to 6.5 fl oz/A.	Apply in the fall and again in late spring	Use in orchards established three years or more. See label for details pertaining to replants in established orchards. Allow at least 90 days between applications. Use 5 fl oz/A on medium- and coarse-textured soils. Do not use on soils that have a 20% or greater gravel content. Do not use in orchards with open channels or cracks in soil. Do not apply more than 10.3 oz/A per year. Alion has a 14-day PHI. Tank mix glyphosate, glufosinate, or paraquat for non- selective POST weed control.
norflurazon @ 2 to 4 lb/A	Annual weeds and some perennials.	**Solicam 80 DF** 2.5 to 5 lb/A.	From fall to early spring before weeds emerge.	Orchard floor should be free of weeds. Use only on trees 18 months or older. May be applied to applies, cherries, pears, nectarines, peaches and plums.
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Surflan 4 AS** 2 to 4 qt/A.	Apply to weed-free soil. Mix any weed residue or trash thoroughly into soil before application.	Sprayer must have thorough agitation and avoid spray drift to foliage. For broader spectrum of control, Surflan may be tank mixed with simazine. See label for details. May be used on apples, peaches, pears and most other tree fruits. Use low rate for short-term (4 months) weed control and high rate for 6- to 8-month weed control.
pendimethalin @ 1.9 to 3.8 lb/A	Annual grasses and some broadleaf weeds.	**Prowl H2O 3.8 AS** 2 to 4 qt/A.	Preemergence.	Most effective when adequate rainfall or irrigation is received within 7 days of application. Do not apply to newly transplanted trees until ground has settled around roots. Apply with paraquat to control emerged weeds. Prowl has a 60-day preharvest interval (PHI). May be applied as sequential applications so long as total amount used does not exceed 4.2 qt/A. Allow at least 30 days between applications.
simazine @ 2 to 4 lb/A	Annual weeds, primarily broadleaves.	**Princep** 2 to 4 qt/A of 4L.	From fall to early spring before weeds emerge.	Apples, peaches, plums, nectarines, cherries, pears should be established 1 year before using Princep. Do not apply more than 4 qt/A (4 lb ai/A) per year. PHI for apples is 150 days.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FRUIT AND NUT CROPS **Tree Fruits** **Preemergence [cont.]**				
terbacil @ 0.4 to 3.6 lb/A	Annual weeds and some perennials.	**Sinbar 80W** 0.5 to 4 lb/A.	From fall to early spring before weeds emerge.	**NEWLY PLANTED OR NON-BEARING ORCHARDS:** Apply once soil has settled after transplanting. Apply no more than 1 lb per acre per year. For best results apply 0.5 lb in late winter or early spring followed by another 0.5 lb when control from the initial application fails. Do not apply to soils coarser than sandy loam having < 2% organic matter. Tank mix with paraquat for non-selective POST weed control. **ESTABLISHED, BEARING ORCHARDS (>3 YEARS):** Apply in the spring or after harvest in the fall before weeds emerge or before weeds exceed 2" tall. Some chlorosis of weakened trees may occur. DO NOT use Sinbar on sand, loamy sand, or gravelly soils or on eroded areas where tree roots are exposed. Rate is soil texture dependent. See label for details. DO NOT use on any soil with less than 1% organic matter. Use rate cannot exceed 3 lb/A unless soil organic matter is >2%.
Tree Fruits **Postemergence**				
fluazifop-P @ 0.13 to 0.38 lb/A	Annual and perennial grasses, including johnsongrass and bermudagrass.	**Fusilade DX 2 EC** 8 to 24 fl oz/A.	When grasses are actively growing. See label for growth stages. Repeat applications needed for bermudagrass and johnsongrass.	Do not use on bearing apples or pears. Do not harvest apricots, cherries, nectarines, peaches, plums or prunes within 14 days of application.
glyphosate @ 0.75 to 3.75 lb/A	Annual weeds, johnsongrass and bermudagrass.	**Glyphosate** (4 lb/gal formulations) 1 to 5 qt/A in 10 to 20 gal water.	To actively growing vegetation.	Apply to peach orchards that have been planted for 2 years or more. Application **must** be made with a shielded boom sprayer or wiper applicator which prevents any contact of glyphosate with the peach foliage or bark. Remove suckers and hangers at least 10 days before application. Misapplication of Roundup around peach trees can result in severe tree injury or death. Use 20 gpa or less of clean water.
paraquat @ 0.6 to 0.9 lb/A	Annual weeds and foliage of perennials.	**Gramoxone 3SL** 1.7 to 2.7 pt/A.	Apply in spring with preemergence herbicide. If needed, repeat alone throughout the season as required to contain weeds.	Apply directly to weed foliage. May be used with preemergence material to eliminate existing weeds or 6 to 8 weeks later to eliminate escape weed plants. May be used in apples, cherries, peaches, nectarines, pears, plums, prunes and apricots. PHI in peaches is 14 days.
sethoxydim @ 0.19 to 0.5 lb/A	Annual and perennial grasses.	**Poast 1.5 EC** 1 to 2.5 pt/A.	Apply to small annual grasses preferably within 14 days after emergence. See label for timing for perennial grasses.	Low spray volumes (10 GPA) generally improve control. Add 1% v/v crop oil concentrate. PHI for apple is 14 days, PHI for peach is 25 days.
Blackberry, Raspberry, Blueberry **Preplant**				
glyphosate @ 1 to 4 lb/A	Annual grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) 1 to 4 qt/A	Prior to planting for planting into a weed free bed.	Apply directly to emerged weeds. Provides only postemergence control. Wait at least 3 days between application and planting.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Blackberry, Raspberry, Blueberry Preemergence				
dichlobenil @ 4 lb/A	Annual broadleaf and grass weeds.	**Casoron 4G** 100 lb/A	Early winter and not later than mid-February.	Shallow incorporation or irrigation of ½ to 1-inch recommended. Apply to bearing and nonbearing plants. Do not apply when shoot emergence is occurring. **Established plants (>1 year).**
indaziflam @ 0.045 to 0.065 lb ai/A	Annual grasses and broadleaf weeds. Also controls bermudagrass.	**Alion 1.67E** 3.5 to 5 fluid oz/A.	Dormant application between late fall and early spring before budbreak.	Use only in plantings at least 3 years old. May tank mix with other preemergence herbicides to broaden spectrum of control and also with nonselective herbicides for burndown of emerged weeds. Apply as a directed spray. Sequential applications may be made with at least 90 days between applications. Do not apply more than a total of 7.0 fl oz/A per year on soils containing <1% OM, or 10.0 fl oz/A per year on soils containing ≥1% OM.
isoxaben @ 0.5 to 1 lb/A	Annual broadleaf weeds.	**Trellis SC** 16 to 31 fl oz/A	Sequential applications throughout the year.	Can be applied to new plantings after soil has settled and to established plants. Do not apply more than twice per crop year, total amount applied cannot exceed 1 lb ai/A (31 fl oz) per year.
mesotrione @ 0.1 to 0.2 lb/A	Broadleaves weeds.	**Callisto** 3 to 6 fl oz/A.	Pre-bloom.	Apply as a directed spray. Callisto has some POST activity, add 1% v/v crop oil concentrate. Sequential applications of 3 fl oz/A can be made as long as they are at least 14 days apart. No more than 6 fl oz/A per season. May cause bleaching. Take care to ensure the adjuvant is not one known to injure caneberry leaves. **Established plants (>1 year).**
napropamide @ 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Devrinol DF-XT or 2-XT** 8 lb/A or 2 gal/A	Early spring or after harvest.	Apply to a weed-free surface or tank mix with a POST herbicide. Must be incorporated with irrigation or rainfall within 24 hours. Can be applied to new plantings as long as soil has settled and to established plants. Do not exceed 8 lb/A or 2 gal/A per crop cycle.
norflurazon @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaves and some seedling perennials.	**Solicam DF** 2.5 to 5 lb/A.	Apply from fall to early spring while plants are dormant.	Apply while plants are dormant. Limit to one application per year. Do not apply within 60 days of harvest. Use higher rates on higher clay soil. May cause some bleaching or yellowing. Residual control is expanded when mixed with simazine. Tank mix with paraquat to control emerged weeds. **Established plants (>18 months).**
oryzalin @ 2 to 6 lb/A	Annual grasses and small-seeded broadleaf weeds	**Surflan 4AS** 2 to 6 qt/A.	Sequential applications throughout the year	Irrigation or rainfall of ½ to 1-inch needed for proper activation.Can be applied to new plantings as long as soil has settled and to established plants. Sequential applications can be made at least 2.5 months apart. Do not exceed 12 qt/A per year.
pendimethalin @ 1.9 to 11.9 lb/A	Annual grasses and small-seeded broadleaf weeds	**Satellite HydroCap** 2 to 6.3 qt/A.	Sequential applications throughout the year	Apply as a directed application. Do not apply over the top of canes, or primocanes withleaves, buds, or fruit. Sequential applications can be made with at least 30 days between applications. Do not exceed 6.3 qt/A per year.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
BLACKBERRY, RASBERRY, BLUEBERRY Preemergence [cont.]				
simazine @2 to 4 lb/A	Annual broadleaf and grass weeds.	**Princep 4L** 2 to 4 qt/A.	Before bud break and again after harvest.	Apply 2 qt/A in the spring followed by 2 qt/A in the fall. Apply before weeds emerge in the spring and before bud break. On plantings <6 months, use 1 qt/A. The addition of oryzalin, norflurazon, or pendimethalin will extend residual grass control. Do not apply when fruit is present or illegal residues may result.
terbacil @ 0.4 to 1.6 lb/A	Annuals and some perennials.	**Sinbar 80W** 1 to 2 lb/A.	In spring before fruit set or after harvest in the fall.	Apply in early fall or spring, prior to fruit set. Do not contact foliage. Do not apply within 70 days of harvest. Apply with a minimum of 20 GPA. Do not use on sand or loamy sand soils. Do not use on soils with <1% OM. **Established plants (>1 year**).
Blackberry, Raspberry, Blueberry Pre or Postemergence				
flumioxazin @ 0.19 lb/A	Annual grasses and broadleaves.	**Chateau EZ** 6 fl oz/A	May be applied as a PRE or POST. PHI is 7 days.	Apply as a directed spray to plantings established 1 year or longer. Use ONLY 1 application per year. Mix with paraquat for non-selective POST control. DO NOT tank mix with Zeus Prime.
sulfentrazone + carfentrazone @ 0.19 to 0.37 lb/A + 0.02 to 0.04 lb/A	Annual grasses and broadleaves. Yellow nutsedge	**Zeus Prime XC** 7.7 to 15.2 fl oz/A	May be applied as a PRE or POST. PHI is 3 days.	Apply as directed spray to caneberries that have been established 2 years or longer. If applying in a band and 50% or less of the area is treated Zeus may be applied twice with in a 12 month period. Allow at least 60 days between applications. Zeus has a 3 day PHI. Spray water must have a pH from 5.0 to 9.0 for optimum herbicide performance. Tank mix with paraquat for non-selective POST weed control. Sequential applications of Zeus are the most effective on yellow nutsedge. See label for details. For broad spectrum residual control of annual grasses tank mix with oryzalin or pendimethalin. Zeus has no postemergence activity on grass weeds.
rimsulfuron @ 0.063 lb/A	Annual grasses and broadleaves.	**Solida 25 WDG, Matrix 25 WDG** 4 oz/A	May be applied as a PRE or POST. PHI is 14 days.	For broad spectrum residual control, tank mix rimsulfuron with oryzalin or pendimethalin. For nonselective POST weed control, tank mix rimsulfuron with paraquat. Rainfall for herbicide activation is necessary within 2 to 3 weeks of application. Do not apply within 14 days of harvest. The pH of spray solution should be in the range of 4 to 8. Rimsulfuron may be applied as a sequential application so long as total use rate does not exceed 4 oz/A per year and application is made in band to less than 50% of the row spacing. Apply prior to primocane emergence or after primocanes are 3 ft. tall to minimize primocane injury. If primocanes are emerged at time of application chlorosis and stunting will occur but they will recover after several weeks. **Established plants (>1 year).**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Blackberry, Raspberry, Blueberry				
Postemergence				
carfentrazone @ 0.016 to 0.031 lb/A for weed control @0.1 lb/A for primocane control	Annual broadleaves.	**Aim 2EC** **1** to 2 fl oz/A for weed control. 6.4 fl oz/A for primocane supression.	Apply to emerged and actively growing weeds.	Apply to primocanes as post-directed spray when they are approximately 6 inches tall. Use a crop oil concentrate at 1% v/v or non- ionic surfactant at 0.25%. Avoid contact with vegetation, flowers and fruit or injury will occur. Sequential applications can be made with at least 14 days between applications. Do not exceed 25 oz/A per year. Do not apply within 15 days of harvest. A shielded or hooded sprayer must be used to apply to newly established plantings.
clethodim @ 0.09 to 0.12 lb/A	Annual and perennial grasses ONLY.	**Select 2EC or Select Max** 6 to 8 or 12 to 16 fl oz/A	Apply to emerged and actively growing weeds.	The **Select Max** formulation is labeled for **bearing** caneberries and can be applied up to within 7 days of harvest. **All other clethodim formulations can only be used on nonbearing caneberries.** Low rates are for annual grass weeds. High rates and sequential applications are for perennial grasses (bermudagrass or johnsongrass). The addition of a non-ionic surfactant at 0.25 % v/v is required.
fluazifop @ 0.19 to 0.38 lb/A	Annual and perennial grasses ONLY.	**Fusilade DX** 12 to 24 fl oz/A.	Apply to emerged and actively growing weeds.	Sequential applications will be necessary for perennial grass control. Add a non-ionic surfactant (1 quart/100 gallons of water) or crop oil concentrate (1 gallon/100 gallons of water). Fusilade has a 1 day PHI. Total use cannot exceed 48 fl oz per acre per year. DO NOT apply more than 24 fl oz in a single application. Wait at least 14 days to make sequential application.
sethoxydim @ 0.2 to 0.5 lb/A	Annual and perennial grasses ONLY.	**Poast 1.5EC** 1 to 2.5 pt/A.	Apply to emerged and actively growing weeds.	Sequential applications will be necessary for control of perennial grasses. Do not apply within 45 days of harvest. Use a crop oil concentrate at 1% v/v. Do not exceed 5 pt/A per year.
glyphosate @ 1 to 2 lb/A	Annual and perennial weed control.	**Glyphosate** (4 lb/gal formulations) 2 to 4 pt/A.	Apply from late fall to early spring.	EXTREME care must be taken to PREVENT glyphosate contact with the crop. Glyphosate will cause severe crop injury or death if it contacts caneberry plants. Caneberries are least susceptible to injury when dormant or in early spring. Susceptibility increases from bloom until caneberries are completely dormant. Wiper applicators may be used for glyphosate application to weeds. Do not apply within 14 days of harvest. Some generic formulations require additional surfactant. Roundup WeatherMax is not registered on raspberries.
paraquat @ 0.5 to 1 lb/A	Annual weeds and foliage of perennials.	**Gramoxone 3SL** 1.3-2.7 pt/A.	Apply to emerged and actively growing weeds.	Direct spray to weed foliage and avoid any green or exposed tissues on the blackberry. Make no more than five applications per year. Use a crop oil concentrate at 1% v/v or non- ionic surfactant at 0.25%. Can be tank mixed with PRE herbicides for residual activity. Contact with new growth will cause injury, in most cases injury is transient.
pelargonic acid	Annual weeds and foliage of perennials.	**Scythe** 3% -10% v/v.	Apply to emerged and actively growing weeds.	The only herbicide recommended for weed control in organic production systems. Herbicide must have direct contact and adequate coverage with the foliage of young weeds for activity.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Blueberry ONLY **Postemergence**				
glufosinate @ 0.75 to 1.25 lb/A	Annual and perennial weeds.	**Rely 280** 48 to 82 fl oz/A.	Postemergence as required to contain weeds. Use in the spring and fall as a burndown when applying preemergence herbicides.	Avoid contact or drift onto green tissue. Shielded applications are recommended. Repeat application is needed to control regrowth. Do not exceed 246 fl oz/A of Rely 280 per year, or no more than three applications of 82 fl oz/A. Do not apply within 14 days of harvest. Should be tank mixed with a preemergence herbicide for residual control.
Grape **Preemergence**				
dichlobenil @ 4 to 6 lb/A	Annuals and many perennials.	**Casoron 4G** 100 to 150 lb/A.	In early winter and not later than mid-February.	Granular form preferred. Apply in early spring. Incorporate lightly for best results. May be used in vineyards in first year after transplanting after vines are established. Do not apply immediately after transplanting.
flumioxazin @ 0.19 to 0.375 lb/A	Annual grasses and small broadleaf weeds.	**Chateau 51 WDG** 6 to 12 oz/A.	Preemergence, dormant applications preferred or use shielded sprayer.	Apply with hooded or shielded application equipment. Grapes established less than 2 years must be shielded with grow tubes. Flumioxazin may only be used in table grapes after completing harvest and before bud break. Flumioxazin may be applied in vineyards producing grapes used for wine or juice after bud break so long as hooded application equipment is used. DO NOT tank mix with glyphosate after bud break. DO NOT apply more than 6 oz per acre to vines established less than 3 years planted on soils having a sand plus gravel content that exceeds 80%. Flumioxazin formulations have a 60-day PHI.
isoxaben @ 0.5 to 1.0 lb/A	Annual broadleaf weeds.	**TrellisSC** 16 to 31 fl oz/A.	Preemergence.	In newly planted vineyards apply once soil has settled after transplanting. Total use rate per year (from harvest to harvest) cannot exceed 31 fl. oz/A. Trellis SC has a 60 day PHI. For residual control of annual grasses, tank mix with oryzalin or pendimethalin. Tank mix with glyphosate, paraquat, or glufosinate for non-selective POST weed control. PHI is 60 days.
norflurazon @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Solicam 80 DF** 2.5 to 5 lb/A.	Fall to early spring. Do not apply to sandy loam soils after bud break.	Do not use on sandy or gravelly soils, use low rate on light soils. Vines must be established for 2 years. Do not use on nursery stock. PHI is 60 days.
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Surflan 4 AS** 2 to 4 qt/A.	Apply to weed-free soil. Mix any weed residues or trash thoroughly into soil before application.	Sprayer must have thorough agitation and avoid spray drift to foliage. Use low rate for short- term (4 months) weed control and high rate for 6- to 8-month weed control. See label for further details. Surflan may be tank mixed with simazine in established vineyards to broaden spectrum of control. May be tank mixed with glyphosate, paraquat, or glufosinate for postemergence control.
oxyfluorfen @ 1.25 to 2.0 lb/A	Annual broadleaf weeds.	**Goal 2 XL** 5 to 8 pt/A.	Use only on dormant grapes for preemergence or postemergence control of weeds.	Direct spray to base of plant. Do not apply after buds begin to swell or when foliage or fruit is present. Do not apply to grapes established less than 3 years unless vines are on a trellis wire at least 3 feet above the ground.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
FRUIT AND NUT CROPS **GRAPES** **Postemergence [cont.]**				
pendimethalin @ 2.0 to 4.0 lb/A	Annual broadleaf and grass weeds.	**Prowl H2O, Sateillite HydroCap** 2.0 to 4.0 qt/A.	Preemergence. Apply only to dormant plants. Do not apply after bud swell.	In newly planted grapes allow soil to settle after transplanting before applying Prowl. Use only during dormancy (prior to bud swell) when applying around newly planted and 1-year-old vines. In bearing vineyards apply any time after harvest, during winter dormancy in spring, and in season before harvest. Use rate cannot exceed 6.3 quarts/acre per year. Prowl H2O has a 21-day PHI. Tank mix with Zeus Prime, simazine or rimsulfuron for expanded residual control of broadleaf weeds. Apply in combination with paraquat, glyphosate, or glufosinate for non-selective POST weed control.
simazine @ 2 to 4 lb/A	Annual grasses and broadleaf weeds.	**Princep 4L or 90WDG** 2 to 4 qt/A or 2.2 to 4.4 lb/A	Early spring before weeds emerge.	Vineyard must be at least 3 years old. May be tank mixed with Surflan, paraquat or Roundup. Tank mix with glyphosate, paraquat, or glufosinate for postemergence weed control. The addition of oryzalin, norflurazon, or pendimethalin will extend residual grass control several weeks.
Grape **Postemergence**				
clethodim @ 0.09 to 0.25 lb/A	Annual and perennial grasses.	**Select 2EC or Select Max** 6 to 8 or 12 to16 fl oz/A.	Postemergence to grasses.	Use on nonbearing crop only. Do not apply within one year of harvest. Effective for annual bluegrass control.
fluazifop-P @ 0.19 lb/A	Annual and perennial grasses including johnsongrass and bermudagrass.	**Fusilade DX 2EC** 1.5 pt/A.	Postemergence to grasses.	Apply to NONBEARING vines that will not be harvested within 1 year of application. Apply as a directed spray using 25 gal water/acre and 30 to 60 psi pressure. Use flat fan nozzle tips and DO NOT contact foliage. Always use a crop oil concentrate at 1% v/v or a nonionic surfactant at 0.25% v/v for best results. Make application to johnsongrass – 12 to 18 inches tall; bermudagrass – 3 inches tall or with 4- to 6-inch runners; annual grasses – 2 to 8 inches tall.
glyphosate @ 0.75 to 1.5 lb/A	Annual weeds, bermudagrass and johnsongrass.	**Glyphosate (4 lb/gal formulations)** 1 to 2 qt/A.	Apply to actively growing weeds.	Direct to base and avoid contact with green bark, foliage or suckers. Do not apply to vines less than 3 years old or within 14 days of harvest. See label.
paraquat @ 0.6 to 0.9 lb/A	Annual weeds and foliage of perennials.	**Gramoxone 3SL** 1.3 to 2.7 pt/A.	Apply in spring with preemergence herbicide. If needed, repeat alone throughout the growing season as required to contain weeds.	Do not allow herbicide to contact desirable foliage or immature, uncallused bark. Young vines must be shielded. Apply in a minimum spray volume of 20 gal./A with nonionic surfactant at 0.25 % v/v. Please note additional training requirements for applicators.
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses including johnsongrass and bermudagrass.	**Poast 1.5 EC** 1.5 to 2.5 pt/A.	Postemergence to grasses.	Do not apply within 50 days of harvest. Apply as a directed spray using 5 to 20 gal water/acre and 40 to 60 psi pressure. Use flat fan nozzle tips. Add crop oil concentrat at 1% v/v or nonionic surfactant at 01.25% v/v for optimal control. Use low rate on annual grasses up to 6 inches tall; high rate on annual grasses up to 12 inches tall and perennial grasses.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Strawberry Preplant				
acifluorfen @ 0.125 to 0.375 lb/A	Annual broadleaf weeds.	**Ultra Blazer 2L** 0.5 to 1.5 pt/A.	Apply banded application to crop row after final land preparation, prior to laying plastic and transplanting	Crop row: Make one banded application after final land preparation and before laying plastic mulch and transplanting. For best results, avoid soil disturbance during laying of plastic and planting of crop. Do not apply more than 3 pt/A per season.
EPTC @ 3 to 6 lb/A	Annual broadleaf and grass weeds. Yellow and purple nutsedge.	**Eptam 7E** 3 oz/A.	Apply after bed formation and prior to plastic laying and transplanting. Wait at least 45 days after application to transplant.	For best control of nutsedge, soil must have enough moisture for tuber sprouting. Allow 10 to 14 days for nutsedge tuber sprouting to occur, then lightly till to destroy shoots and dry the soil surface. Apply and incorporate Eptam 7E to prevent volatilization; immediately incorporate into soil to a depth of approximately 2 to 4 in. If possible, use a leveling device behind the incorporating equipment to leave soil surface as smooth as possible. Field traffic, excessive rainfall or irrigation, and other soil disturbances will reduce the level of nutsedge suppression. To avoid injury to following crops, irrigating at least 30 days prior to planting is recommended.
flumioxazin @ 0.1 lb/A	Annual broadleaf and grass weeds.	**Chateau SW** 3 oz/A	Apply after bed formation and prior to plastic laying and transplanting. Wait at least 30 days after application to transplant.	Crop row: Make one banded application after final land preparation and before laying plastic mulch. Wait at least 30 days after application to transplant. For best results, avoid soil disturbance during laying of plastic and planting of crop.
glyphosate @ 0.1 lb/A	Annual broadleaf and grass weeds.	**Roundup Powermax 3, others** 20 to 40 oz/A	Apply to emerged weeds. Wait at least 3 days after application to transplant.	May be used as a burndown prior to bed formation of after forming beds and before laying plastic. Wait at least 3 days to transplant.
napropamide @ 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Devrinol 50 DF** 8 lb/A.	Apply after bed formation and prior to plastic laying and transplanting. Wait at least 3 days after application to transplant.	Devrinol applied to the bed before laying the plastic has potential to injure strawberry plants. For plant bed treatment preplant incorporate to weed-free soil before laying plastic mulch. Soil should be well worked yet moist enough to permit a thorough incorporation to a depth of 2 in. Incorporate within 24 to 72 hr (depending on formulation) of application before laying plastic mulch. If weed pressure is from small-seeded annuals, apply Devrinol to the surface of the bed immediately before laying the plastic mulch. If soil is dry, water or sprinkler irrigate with sufficient water to wet to a depth of 2 to 4 in. before laying the plastic mulch. Apply the plastic mulch over the treated soil within 24 to 72 hr.
oxyfluorfen @ 0.125 to 0.375 lb/A	Annual broadleaf weeds.	**Goal 2XL** 2 pt/A.	Apply after bed formation and prior to plastic laying and transplanting. Wait at least 30 days after application to transplant.	Plastic mulch should be applied soon after Goal application. Best results occur when plastic is applied immediately after herbicide application. Incorporation is not necessary, but it may result in less crop injury. Soil disturbance after application will reduce weed control.
pendimethalin @ 0.7 to 1.4 lb/A	Annual broadleaf and grass weeds.	**Prowl H2O, Satellite HydroCap** 1.5 to 3 pt/A	Apply after bed formation and prior to plastic laying and transplanting.	Apply to formed bed before laying plastic. Frequent irrigation may reduce efficacy.
sulfentrazone @ 0.125 to 0.25	Annual grasses and small-seeded broadleaf weeds.	**Spartan 4F** 4 to 8 oz/A.	Apply to soil surface of pre-formed beds.	Rate is soil-type dependent. Use lower rate for coarse soils. Apply prior to planting and before weeds have emerged. Please refer to label for soil type restrictions.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Strawberry - Postemergence				
clethodim @ 0.09 to 0.125 lb/A	Annual and perennial grasses ONLY.	**Select 2EC or Select Max** 6 to 8 or 9 to 16 fl oz/A.	Apply to emerged and actively growing weeds.	Multiple applications are required for perennial grass control. Repeat application on 14- to 21-day intervals. Add a crop oil concentrate at 1% v/v to increase efficacy. Use 0.25% v/v non-ionic surfactant with Select Max. Do not apply within 4 days of harvest.
clopyralid @ 0.125 lb/A	Broadleaf weeds, especially clovers, vetch, curly dock, horsenettle.	**Stinger 3 SL** 1/3 pt/A.	Apply in the spring up to 30 days before harvest.	**Section 24(c) label**. Make only 1 application in the spring. Do not use any surfactant or tank mix with other pesticides. May cause some injury in certain conditions. Do not compost treated vegetation.
sethoxydim @ 0.2 to 0.3 lb/A	Annual and perennial grasses ONLY.	**Poast 1.5EC** 1 to 1.5 pt/A.	Apply to emerged and actively growing weeds.	Multiple applications are required for perennial grass control. Repeat application on 14- to 21-day intervals. Do not apply within 7 days of harvest. Use a crop oil concentrate at 1% v/v. Do not exceed 2.5 pt/A per year.
Strawberry - Row Middles Only				
acifluorfen @ 0.125 to 0.375 lb/A	Annual broadleaf weeds.	**Ultra Blazer 2L** 0.5 to 1.5 pt/A.	Apply to row middles prior to weed emergence.	Do not allow spray to contact strawberry plants. May be used for sequential applications with at least 15 days between applications. Do not apply more than 3 pt/A per season.
carfentrazone @ 0.03 lb/A	Annual broadleaves, excellent control of morningglories.	**Aim 2EC** 2 fl oz/A	Apply to actively growing weeds less than 4 inches tall.	Apply post-directed/ shielded to the row middles. If contact with foliage occurs some burning will occur. Does not have activity on grasses. Use crop oil at 1% v/v or non-ionic surfactant at 0.25% v/v. Coverage is critical for good control. 0 day PHI
flumioxazin @ 0.1 lb/A	Annual broadleaf and grass weeds.	**Chateau SW or EZ** 3 oz/A or 3 fl oz/A	Apply to row middles prior to weed emergence. Do not apply after fruit set.	Do not allow spray to contact fruit or foliage. Necrotic speckling may occur. May injure or kill ryegrass in row middles. **Do not apply after fruit set**.
glyphosate @ 0.1 lb/A	Annual broadleaf and grass weeds.	**Roundup Powermax 3, others** 20 to 40 oz/A	Apply to actively growing weeds.	Avoid contact with foliage, fruit, and **plastic mulch** to avoid severe crop injury. PHI is 14 days.
napropamide @ 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Devrinol 50 DF** 8 lb/A.	Apply to row middles prior to weed emergence. Do not apply after bloom.	Do not apply if new foliage is expose to spray. May be tank mixed with paraquat to control emerged weeds. Rainfall or irrigation within 24 hours of application is needed for optimal activation. **Do not apply after bloom**.
paraquat @ 0.5 lb/A	Contact kill of all green foliage	**Gramoxone 3SL or 2SL** 1.3 to 2 pt/A	Apply to actively growing weeds less than 6 inches tall.	Apply post-directed/shielded to the row middles. If contact with foliage occurs some burning will occur. Make no more than 3 applications per season. PHI is 21 days.
pendimethalin @ 0.9 lb/A	Annual grasses and small-seeded broadleaves.	**Prowl H2O** 1.5 pt/A	Apply to row middles prior to weed emergence	Apply to row middles only. Must be activated with at leat ½-inch of rainfall. Do not apply if new foliage is exposed to spray. PHI is 35 days.
Pecans Preemergence				
norflurazon @ 2 to 4 lb/A	Annual grasses and some broadleaf annual weeds.	**Solicam 80 DF** 2.5 to 5 lb/A.	Apply in early spring or after harvest in the fall.	Do not apply until transplanted trees have completed their first growing season (fall application). Make only one application per year. Do not graze treated areas. May be tank mixed with paraquat. Do not apply when nuts are on the ground.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
PECANS Preemergence [cont.]				
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Surflan 4AS** 2 to 6 qt/A.	Apply to weed-free soil. Mix any weed residues or trash thoroughly into soil before application.	Sprayer must have thorough agitation and avoid spray drift to foliage. May be tank mixed with glyphosate, paraquat or simazine. Use low rate for short-term control (2-4 months); high rate for long-term control (8-12 months). Sequential applications may be used so long as total use rate does not exceed 12 qt/A/year and there are 2.5 months between applications.
simazine @ 1 to 2 lb/A	Most annual broadleaf weeds and grasses.	**Princep 4L or 90WDG** 2 to 4 qt/A or 2.2 to 4.4 lb/A.	Apply in spring or early summer.	Direct to floor of orchard and avoid contact with foliage. Only use under trees established for at least 2 years. Do not use on sand or loamy sand soils. May be tank mixed with glyphosate, paraquat,or oryzalin. PHI is 21 days.
Pecans Postemergence				
fluazifop @ 0.13 to 0.38 lb/A	Annual and perennial grasses including johnsongrass and bermudagrass.	**Fusilade DX 2 EC** 8 to 24 fl oz/A.	Postemergence to grasses.	Do not apply to pecans within 30 days of harvest. Apply as a directed spray using 25 gal water/acre and 30 to 60 psi pressure. Use flat fan nozzle tips and DO NOT contact pecan tree foliage. Always use a crop oil concentrate at 1% v/v or a nonionic surfactant 0.25% v/v. Make application to johnsongrass – 12 to 18 inches tall; bermudagrass – 3 inches tall or with 4- to 8-inch runners; annual grasses – 2 to 8 inches tall.
glyphosate @ 0.75 to 1.5 lb/A	Annual weeds, johnsongrass and bermudagrass.	**Glyphosate (4 lb/gal formulations)** 1 to 2 qt/A.	To actively growing vegetation.	Direct to base of tree and do not allow drift to contact foliage or green bark. See label for details. Injury may occur due to systemic activity of glyphosate. May be tank mixed with oryzalin or simizine.
paraquat @ 0.65 to 1 lb/A	Annual weeds and foliage of perennials.	**Gramoxone 3SL** 1.3 to 2.7 pt/A.	Apply in spring and repeat as needed.	Directed spray. Do not allow spray to contact green stems, fruit or foliage of pecan tree. Do not apply when nuts to be harvested are on ground. May be tank mixed with simazine or oryzalin.
sethoxydim @ 0.3 to 0.5 lb/A	Annual and perennial grasses including johnsongrass and bermudagrass.	**Poast 1.5 EC** 1 to 2.5 pt/A.	Postemergence to grasses.	Do not apply within 15 day of harvest. Apply as a directed spray using 5 to 20 gal water/acre and 40 to 60 psi pressure. Use flat fan nozzle tips. Always use crop oil concentrate at 1% v/v. Use low rate on annual grasses up to 6 inches tall; high rate on annual grasses up to 12 inches tall and perennial grasses.

Using registered herbicides for aquatic plant control is a widely employed technique for both private and public waters. Treatments can be applied with a 1-gallon pump sprayer for a spot treatment, a helicopter or airboat for a whole lake treatment, or anything in-between. Treatment objectives could be the control of a single invasive plant species or a broad spectrum control of numerous species.

All herbicides listed have undergone EPA review and are approved for aquatic use in Arkansas, when used in accordance to the instructions included on the label. There are approximately 300 herbicides registered in the U.S., but only 16 of these are labeled for aquatic use.

Like all pesticides, herbicides have three names: a trade name, a common name and a chemical name. An example of this is the common herbicide Rodeo. Rodeo is the trade name, the common name is glyphosate and the chemical name is N-(phosphono-methyl) glycine, isopropylamine salt. In this publication, the common name will be used the majority of time.

All herbicides come with a label. Included on the label is the product form and instructions for safe handling and effective use. It cannot be stressed too strongly that the label is the law, and not using herbicides according to the labeled directions can have legal ramifications for the applicator.

Often included is a listing of species that are controlled by the chemical and sometimes the extent of the control. If the target species is not included on a particular label, the herbicide may still be used as long as the herbicide is labeled for use at the desired site of application, though effectiveness may be unknown.

Herbicide Types

Herbicides can be classified in several ways. One way is by their activity in the plant: systemic or contact. This classification refers to whether or not the herbicide is translocated, or moves within the plant. Whether the herbicide moves within a plant or not has implications on its effectiveness, application and how quickly it acts upon the plant.

Contact herbicides do not move and will cause death to only those parts of the plant they contact. Contact herbicides also tend to cause more rapid injury to treated plants, but require more complete spray coverage of all plant tissue during application. If a contact herbicide is used on submersed plants, the chemical must remain in the treatment area long enough for the entire plant to be exposed to a lethal concentration. Since contact herbicides tend to cause rapid plant death, in areas with dense plant populations and warm water, the decomposing plant tissue can lead to a low dissolved oxygen fish kill. Care must be taken to treat only 33-50% of a pond or have supplemental aeration available.

Systemic herbicides are mobile in plant tissue and move through the plant's vascular tissue to their action site. This gives them the ability to affect all parts of the plant, not just those parts they contact. One implication is effects on the plant take longer to become apparent. Additionally, complete plant coverage may not be necessary to attain control. Finally, with correct timing, some herbicides will be stored within the plant's root tissues. The following season, as sugars move upward in the plant, the herbicide moves with it, leading to a second season of activity.

Adjuvants

Herbicides that are applied as a foliar treatment will include a recommendation to include an adjuvant. The two most common are a crop oil or a nonionic surfactant. While different in chemistry, they serve the same function. Both of these reduce the surface tension of the herbicide solution and increase the herbicide coverage and penetration into plant stems and leaves. A third type of adjuvant often used in aquatic plant control acts as a "sinker" when added to a spray solution. When the solution is sprayed onto the water surface, the "sinker" will help carry the herbicide down through the water column, into the weeds growing on the pond bottom.

Contact Herbicides	Systemic Herbicides
Copper and Copper products	2,4-D
Diquat*	Glyphosate
Endothall*	Fluridone
Carfentrazone	Triclopyr
Sodium Carbonate Peroxyhydrate	Imazapyr
Flumioxazin	Imazamox
	Penoxsulam
	Bispyribac Sodium
	Topramezone
	Florpyrauxifen

*Systemic herbicide that acts like a contact herbicide.

Why Treatments Fail

Oftentimes a herbicide treatment for a submersed plant will not have the desired results. Sometimes this results from inaccurate plant identification, leading to incorrect herbicide selection. Another cause is using the herbicide under suboptimal conditions. For example, selecting diquat for a submersed plant in a muddy pond. Diquat binds with suspended particles, rendering it inactive. Water temperature can also affect effectiveness. As a general rule, most herbicides shouldn't be used when the water temperature is below 50-60°F. While still growing, reduced plant metabolism may prevent sufficient herbicide uptake.

However, the most common reason is some form of dilution. Every plant and herbicide has a unique concentration and exposure time relationship. If the exposure time is reduced or the concentration is lower than required, the treatment results will be suboptimal. Exposure time can be shortened by increased degradation due to bacteria, sunlight, high pH or a water current carrying the herbicide away, to list some examples. Inaccurately estimating a pond's volume can also reduce the herbicides' target concentration. The end result of these things is that plants are not exposed to a concentration of herbicide sufficient to lead to plant control. Please take the time to carefully read the label and correctly estimate the water body's size and conditions prior to an herbicide application.

Further Information

Like most weed control, the sooner the nuisance plants are treated, the better the results. With few exceptions, most aquatic plants start actively growing when water temperatures reach 50-60 F, and their growth increases with increasing temperatures until they begin die back or senesce in the fall. Also take into account the time a selected herbicide takes to reach maximum effectiveness. Consult the label for further information. Another source of relevant information is extension publications MP556 Aquatic Vegetation Control in Arkansas which can be found at https://www.uaex.uada.edu/publications/pdf/MP556.pdf.

WEED RESPONSE RATINGS FOR AQUATIC HERBICIDES[1]

Aquatic Weed Group	Copper Sulfate and Copper Complexes	2,4-D	Diquat	Endothall	Fluridone	Glyphosate	Triclopyr	Imazapyr	Imazamox	Carfentrazone	Penoxsulam	Sodium Carbonate Peroxyhydrate	Flumioxazin	Bispyribac Sodium	Topramezone	Florpyrauxifen	Grass Carp
Algae																	
Planktonic	E	P	P	G	P	P	P	P				G-E					
Filamentous	E[2]	P	G	P-G[3]	P	P	P	P				G-E	G-E				F-P
Chara	E	P	P-G	P-G[3]	P	P	P	P									E
Nitella	E	P	P-G	P-G[3]	P	P	P	P									G
Free Floating Weeds																	
Bladderwort	P	P-G[4]	E	F	G			G-E			G		G		G		E-G
Duckweed	P	F	G	P	E			G		G-E	E		E	E			P-F
Watermeal	P	P	F		G	P	P	P		G	G		E	E			
Azolla	P	F	G		G-E	F				E	E		E	E		G-E	P-F
Water hyacinth	P	E	E		P	F	E	E	E	G-E	E			E	E	G-E	P
Rooted Floating Weeds																	
American lotus	P	E	P	P	F	G	E	G	G						G	G-E	P
Water lily (fragrant and white)	P	E	P	P	E	E	E	E	G								P
Spatterdock	P	E	P	P	E	G		G									P
Watershield	P	E	P		G	G		E	G	G						G-E	F-P
Emersed Weeds																	
Alligator weed	P	F	P	P	G	E	E	E	G	G	G		E	E		G-E	P
Arrowhead	P	E	G	G		P		E	E		G				E		F-P
Buttonbush	P	E	F	P	P	G	G	G									
Cattails	P	G	G	P	F	E	P	E	E								
Common reed	P	F	F	P	F	E	G	E									
Ducksalad	P	E	G	P		E		E	G-E								P
Frogbit	P	E	E					E	E	G	E		E				P
Maidencane	P	P	F		F	E	P	E									F-P
Pickerelweed	P	G	G			P	E	E	E		G						P
Pond edge annuals	P		G		E	E		E									
Sedges and rushes	P	F	F	P		G	P	E	G								P
Slender spikerush	P		G		G	P	P	E			G					G-E	
Smartweed	P	G	F		F	E	E	E	E		G						P
Water pennywort	P	G	G	P	P	G	E	E			E		E	E		G-E	F-P
Water primrose	P	E	F-G		F	E	E	E	E	G			G-E			G-E	P
Willows	P	E	F	P	P	E	E	E									

[1] E = excellent control, G = good control, F = fair control, P = poor control.
[2] For Pithophora, only F-G control.
[3] Hydrothol formulation only.
[4] Granular 2,4-D formulation.
[5] Copper complexes only (ex. Komeen, Captain, K-Tea).

(Continued on page 148)

WEED RESPONSE RATINGS FOR AQUATIC HERBICIDES[1] [cont.]

Aquatic Weed Group	Copper Sulfate and Copper Complexes	2,4-D	Diquat	Endothall	Fluridone	Glyphosate	Triclopyr	Imazapyr	Imazamox	Carfentrazone	Penoxsulam	Sodium Carbonate Peroxyhydrate	Flumioxazin	Bispyribac Sodium	Topramezone	Florpyrauxifen	Grass Carp
Submersed Weeds																	
Coontail	P	G	E	E	E	P							E			G-E	G-F
Egeria	P-G[5]	P	G	G	E	P		P			E						E
Elodea	P-G[5]	G	E	F	E	P		P			E		E				E
Fanwort	P	F	G	E	E	P		P					E				E
Hydrilla	P-E[5]	P	G	G	E	P		P	G		E		E	E	E	E	E
Naiads	P	F	E	E	E	P		P			G		E		G		E
Parrotfeather	P	E	E	E	E	F	F	G (when emerged)	G	E	G		E	E		G-E	F-P
Pondweeds	P-G[5]	P	G	E	E	P		F	E		E		E	E	E		G-P
Water milfoil (broadleaf)	P		E	E	E	P	G	P	G	G	E						P
Water milfoil (Eurasian)	P	E	E	E	E	P	G	P	G	G-E	E		E	E	G		F-P

[1] E = excellent control, G = good control, F = fair control, P = poor control.
[2] For Pithophora, only F-G control.
[3] Hydrothol formulation only.
[4] Granular 2,4-D formulation.
[5] Copper complexes only (ex. Komeen, Captain, K-Tea).

GRASS CARP FOR AQUATIC WEED CONTROL

Grass carp (*Ctenopharyngodon idella*), or white amur, is a member of the minnow family native to Asia. They feed almost exclusively on aquatic plants. Their short digestive tract requires grass carp to feed almost continuously when water temperatures are above 68ºF, which means they can eat two to three times their body weight each day. This makes them an excellent biological control of certain nuisance aquatic plants.

Grass carp are capable of fast growth and may gain 5 to 10 pounds per year, reaching their final size of 20 to 30 pounds within a few years, and can live for 10 to 15 years. Unfortunately, when they reach maturity, their rate of weed consumption declines, and restocking of additional fish is required every 3 to 5 years.

Grass carp have definite preferences of the type of vegetation they consume. They prefer tender, succulent vegetation that is under water. This makes them best suited for submerged vegetation, and they will not generally control tough, fibrous plants that grow up out of the water. The extent to which they are able to control a particular weed depends upon many factors, including their feeding preferences, the aquatic plant density, water temperature and the number and size of grass carp stocked. As more preferred vegetation becomes scarce, grass carp will eat less preferred types of vegetation. Water chemistry can affect weed palatability. Grass carp will consume floating fish food as well as aquatic plants.

Grass carp are readily available in Arkansas, and the *Sport Fish Supplier List* provides a listing of the fish farms that sell grass carp. This publication is available at the county office or online at https://uapb.edu/academics/safhs/department-of-aquaculture-fisheries/pond-management/fish-stocking-and-management/. Unlike many states, Arkansas permits the stocking of either diploid (normal) or triploid (sterile) grass carp in ponds and lakes. Because grass carp require flowing water to reproduce, stocking fertile grass carp in your pond will not result in more grass carp. New ponds can be stocked with 2- to 6-inch grass carp, but if largemouth bass are present, the grass carp stocked should be 8 to 10 inches in length. The stocking rates can vary depending on the amount of weeds. A standard recommendation is 5 to 10 per acre, but if the pond has plant coverage of greater than 50 percent, a stocking rate of 20 or more per acre may be required.

As a biological control agent, they will not provide immediate results. Assuming the target plant is readily consumed by grass carp, 1 to 2 years are required for control. If the pond/lake owner wants quicker results, applying an aquatic herbicide followed by stocking grass carp 2 to 3 weeks later may be the best solution. Stocking should take place after much of the dead plant material has had a chance to decompose.

Grass carp are natural inhabitants of rivers and readily escape ponds that overflow. Barriers on spillways are a good idea to prevent fish losses. Ponds with grass carp often develop a green or yellow color as grass carp promote greater phytoplankton growth in the water by the release of nutrients from the plants they eat.

After the grass carp reach maturity, the pond/lake owner may want to remove them. These large fish can be removed by snagging, bow fishing, spearing or angling. Their habit of hanging near the surface can make bow fishing especially simple. Because of their jumping ability, seining is often not effective. Their flesh is white, firm and not oily, but the muscle mass contains “Y” bones that can make cleaning more difficult. Their flesh is considered a delicacy by many seafood enthusiasts.

For more information, ask your county extension agent for Southern Regional Aquaculture Center (SRAC) Fact Sheet #3600, *Using Grass Carp in Aquaculture and Private Impoundments*, or it can be downloaded from https://srac.tamu.edu/.

GOLDFISH (*CARASSIUS AURATUS*) FOR WATERMEAL AND DUCKWEED

Duckweed (*Lemna* spp.) and Watermeal (*Wolffia* spp.) are free-floating aquatic plants commonly found together. Watermeal is the smallest and simplest of flowering plants. It is rootless and tiny, usually less that 1 mm, and appears as little green pinheads floating on the surface. To the touch, it feels somewhat like dry grits. Duckweed is a little bigger but still very small, usually ⅛ to ¼ of an inch across. The fronds tend to be elliptical, and a small root is present on the lower surface of each frond.

The growth of these plants is linked to high nutrient levels, which is why they are common in cattle ponds. Both of these plants tend to grow in dense colonies in quiet waters. Individual plants stick readily to birds, animals and equipment that may be in ponds that have these plants. As a result, they spread easily from one pond to another. Once in a new pond, their growth can be quite explosive if the conditions are right. Both species can reproduce by budding and, in some cases, double their population every 24 hours.

Both watermeal and duckweed tend to disappear from the pond surface in the late fall. During the summer, the plants have buoyancy due to trapped oxygen from photosynthesis. In the fall, photosynthesis slows down, leading to less oxygen in the plant, and the accumulated starch from a season of growth makes the plant heavier, so it sinks to the sediments. In the spring, the plants start photosynthesizing, accumulate oxygen and float to the surface again.

Under certain conditions, goldfish can provide a biological control option for watermeal. It is recommended that they be stocked into small ponds at a rate of 35 to 65 pounds per acre. Like any biological control, results take time and are not universal. In ponds where goldfish failed to control watermeal, it may have been due to predation from largemouth bass or some other factor. Stocking them is fairly inexpensive and will cause no harm, but success is not guaranteed.

AQUATIC DYES

Aquatic dyes are made from EPA registered non-toxic dyes (typically blue), that might control unwanted filamentous algae and submersed plants in natural and man-made lakes and ponds. They do not kill plants; they prevent growth by blocking light penetration, which reduces photosynthesis. They are less effective when plant growth is near the surface (2 ft or less). Aquatic dyes should only be applied to water bodies entirely within the control of the applicator, and only those with little or no outflow. If water is continuously released from the pond/lake, product is wasted and their effectiveness reduced. The effects on an aquatic dye typically last for up to 6 weeks.

Dye should be applied in the early spring before weed growth begins, or applied when weeds may be seen on the bottom of the pond. When applied to ice, it will melt a hole and disperse underneath. Additional applications will be necessary throughout the year to maintain an acceptable level of dye in the water. These dyes may be used at any time of the year.

Do not apply to water that will be used for human consumption. Water may be used for swimming after complete dispersal of the dye in water. Dyes are non-toxic to livestock.

At present, while there are many aquatic dye formulations available for purchase, only two dyes, Aquashade and Admiral, are registered with the EPA for aquatic plant control. As such, they are the only two that can make control claims. For the liquid formulations, the rate is typically 1 ppm, or one gallon/acre*ft. To restrict hydrilla growth, the rate should be doubled, due to its ability to grow at very low light levels. See label for rates.

USE RESTRICTIONS FOR AQUATIC HERBICIDES
(Number of Days After Treatment and Before Use)

Chemical	Active Ingredient Formulation	Withdrawal PPM	Drinking	Swimming	Eating Fish	Dairy	Other Stock	Withdrawal Crop Irrigation
Copper	Copper Sulfate Crystals, Copper Sulfate Solution, Copper Complexes		0	0	0	0	0	0
2,4-D	Amine, Ester, Acid formulation		(*a)	0	0	0	0	(*b)
Diquat			1-5 (*c)	0	0	1	1	5
Endothall	Dipotassium Salt		(*d)	0	0	7-25 (*e)	7-25 (*e)	0
Endothall	Mono (N,N-dimethylalkylamine) Salt		(*d)	0	0	7-25 (*e)	7-25 (*e)	0
Fluridone		0.15	0 (*f)	0	0	0	0	7-30 (*g)
Glyphosate		0.7	2 (*h)	0	0	0	0	0
Imazapyr			(*i)	0	0	0	0	120 or (*j)
Triclopyr			(*k)	0	0	0	0	120 or (*l)
Imazamox			(*m)	0	0	0	0	(*n)
Carfentrazone			0-1 (*o) (*m)	0	0	0-1 (*o)	0-1 (*o)	0-14 (*o)
Penoxsulam			0	0	0	0	0	(*p)
Sodium Carbonate Peroxyhydrate			0	0	0	0	0	0
Flumioxazin			0	0	0 (*q)	0	0	5 (*r)
Bispyribac-sodium			0	0	0 (*q)	(*s)	(*s)	(*s)
Topramezone			(*t)	0	0	0	0	(*u)
Florpyrauxifen			0	0	0	(*v)	(*v)	(*w)

(*a) Read the label. Restrictions will vary based upon formulation.

(*b) Read the label. Restrictions will determined by rate, crop to be irrigated, intake setbacks, and may require an Assay.

(*c) Withdrawal period will be determined by rate and formulation. An Assay may be required.

(*d) Restrictions are to ensure treated water exceeding Maximum Concentration Level (MCL) of less than 0.1 ppm. 600 foot setback from potable water intake in Lakes, Ponds and Quiescent Water bodies. For flowing water bodies, if intakes can be closed, they must remain closed until tested levels are below 0.1 ppm. If intakes can't be closed, the application must be below intake.

(*e) Withdrawal period is based upon application rate. If water is flowing, the water can be used immediately.

(*f) Do not apply within ¼ mile of water intake at rates above 20 ppb.

(*g Withdrawal period may depend upon crop to be irrigated and soil type. FasTEST assay may be required prior to use as irrigation.

(*h) Can't be applied within ½ mile upstream of active potable water intake. Water intakes must remain off for 48 hours if application made within ½ mile of intake, unless assay determines glyphosate level below 0.7 ppm.

(*i) not apply within ½ mile of active potable water intake.

(*j) Application to water used for irrigation that results in residues > 1.0 ppb must not be used for 120 days or until residue level is 1.0 ppb or less.

(*k) Potable water intakes must be turned off till triclopyr levels are determined to be 0.4 ppm or less.

(*l) Until residue is 1.0 ppb or less by assay.

(*m) May be applied to potable water at concentrations up to 500 ppb to within ¼ mile of active intake. Within ¼ mile, water concentrations can't exceed 50 ppb.

(*n) Restrictions based upon crop or location to be irrigated and rate used.

(*o) Read label. Restrictions based upon surface area treated. Do not apply within ¼ mile of potable water intake. Water intake may be turned back on less than 24 hours if assay shows carfentrazone-ethyl and degradate levels are below 0.2 ppm.

(*p) Treated water cannot be used for crop irrigation until below assay shows levels below 1 ppb, or 30 ppb if used to irrigate rice.

(*q) Do not use for water applied to crayfish ponds

(*r) 5 days for food crops. Turf and Landscape ornamental restriction determined by rate, water depth, and what is to be irrigated. Consult label.

(*s) Assay indicating concentration of less than or equal to 1ppb.

(*t) Application concentrations must be below 45 ppb.

(*u) Residue concentration assay must be below 1 ppb.

(*v) Do not allow livestock to drink treated water due to potential exposure of crops through compost.

(*w) Read label. Do not use for irrigation. For non-agricultural irrigation, waiting period depends upon treated water body area and rate.

USE OF COPPER SULFATE IN PONDS WITH FISH

Copper sulfate is a contact herbicide recommended for algae control. If improperly used, copper can be toxic to fish by interfering with gill function. Trout and koi are particularly sensitive to copper. However, most fish kills associated with copper sulfate treatments are related to oxygen depletions due to the decomposition of dead plant material or a massive phytoplankton kill.

The effectiveness and safety of copper sulfate treatments are mostly determined by water alkalinity. In water with an alkalinity below 40 ppm (mg/l), the amount of copper sulfate needed to control algae can be toxic to fish. Copper sulfate treatments at water alkalinities below 20 ppm are extremely risky and should be avoided. Low alkalinity water is considered "soft" water and can be very common in Arkansas fish ponds, especially watershed ponds. In high alkalinity water (>250-300 ppm), copper sulfate quickly binds with carbonate and forms a precipitate that is not effective for algae control.

The toxicity of copper sulfate to fish also increases as water temperatures increase. It is best to try and avoid copper sulfate treatments during the summer months. In most cases, treat only one-third to one-half of the pond at a time.

To calculate a copper sulfate treatment, you will need to know your pond's alkalinity, surface area and depth. A good starting "Recommended Dose Rate" for copper sulfate is typically 0.5 to 1.0 ppm. To calculate a pond's volume, multiply the acreage by the average depth.

In suitable water, the effective copper sulfate dosage can be calculated using the following formula:

Maximum Safe Dose in ppm = Total Alkalinity (ppm)/100

Amount copper sulfate needed (lb) =
Max Safe Dose x Recommended Dose Rate (ppm)
x Volume (in acre*ft) x 2.72

To make a copper sulfate solution, mix 1½ lb of copper sulfate crystals with 1 gal of water.

For water testing and further recommendations, contact your county extension office or one of the UAPB Aquaculture/Fisheries extension specialists. The algaecides listed in the copper complexes section are formulated for safe use in ponds with soft water.

HERBICIDES APPROVED FOR AQUATIC USE

Below is a listing of herbicides currently approved for aquatic use by the Arkansas State Plant Board. This list may not be complete. Copies of all current labels can be downloaded from the Arkansas State Plant Board website at https://aad-web-ser.agri.arkansas.gov/.

Chemical	Active Ingredient Formulation	Trade Name(s) (list may be incomplete)
Copper	Copper Sulfate Crystals & Granuales	Old Bridge Copper Sulfate Fine, AquaVet Copper Sulfate Algae Control, SePRO Total Pond- Clear G, Gordon's Pondmaster Copper Sulfate Crystals, Copper Sulfate Crystals-Chem One, AB Brand Copper Sulfate Crystals, AquaVet Algae Control, Lake Guard Blue, SeClear G, Quimag Quimicos Aguila Copper Sulfate Crystal, Aqua Hawk Cu, Blue-Stone Crystals, Crystal Blue Copper Sulfate Smart Crystals
Copper	Copper Sulfate Solution	Gordon's PondMaster SeClear Algaecide & Water Quality Enhancer Ready-To-Use, SeClear Algaecide- SePro, Liquid Copper Sulfate, AgriTec, Earthtec, Stock Plex Stock Tank Algae Control, Main Stream 635 Algaecide/Bactericide, SeClear Algaecide & Water Quality Enhancer Ready-to-Use, TMB-471C, EarthTec QZ, Pond Boss Pro, Crystal Plex Algae Control, SCI-62 Algicide/Bactericide, Current, Pond Champs Algae X Algaecide/Herbicide, Formula F-30 Algae Control, SePRO Total Pond-Clear
Copper	Copper Complexes (Copper Ethanolamin, Copper Carbonate, etc.)	Algimycin-PWF Algaecide/Cyanobacteriocide- Applied Biochemist, Cutrine Ultra- Applied Biochemist, Cutrine Plus Algaecide/Herbicide- Applied Biochemist, CutrinePlus Granular Algaecide- Applied Biochemist, Stocktrine II Algaecide, Algi-Cure Algaecide- Applied Biochemist, Harpoon Aquatic Herbicide, Clearigate- Applied Biochemist, Gordon's Pondmaster Aquatic Herbicide, Captain Liquid Copper Algaecide, K-Tea Aquatic Herbicide, Komeen, Nautique Aquatic Herbicide, Algae Defense, Captain XTR, Harpoon Granular Aquatic Herbicide, Symmetry NXG, Mizzen Algaecide, Komeen Crystal, Argos, Pond Oasis Algaecide, Cutrine Plus Algaecide- Applied Biochemist, Nalco 2877, Clearigate EC9- Applied Biochemist, Cutrine Plus- SePro, Cutrine Plus Granular- SePro, Algi-Cure- SePro, Cutrine Ultra- SePro, Clearigate- SePro, Harpoon Aquatic Herbicide- SePro, Harpoon Granular Aquatic Herbicide- SePro, Algimycin PWF- SePro
2,4-D		Agri Star 2,4-D Amine 4 Herbicide, Alligare 2,4-D Amine, Navigate- Applied Biochemist, DMA 4 IVM, 2,4-D Amine 4 Herbicide- Helena, Opti-Amine, Unison, Weed Rhap A-4D, Hardball, Amine 4 2,4-D Weed Killer- Loveland, Savage. Clean Amine, Riverdale WEEDestroy AM-40 Amine Salt, UAP Timberland Platoon, NuFarm Weedar 64, Sculpin, Amine 4 2,4-D Herbicide- Tenkonz, Hi-Yield 2,4-D Weed Killer, Aquasweep, Compare-N-Save 2,4-D Amine Salt Broadleaf Control, Defy Amione 4, Rugged Herbicide, Shredder Amine 4, GF-2654 Herbicide, Drexel De-Amine 4, Havoc Amine, Hardball Elite, Martin's 2,4-D Amine, Amine 400 Weed Killer, Usha 6, Navigate- SePro, Renovate MAX G Aquatic Herbicide (w/triclopyr), Depth Charge (w/flumioxazin), Chinook (w/endothall)
Diquat dibromide		Aceto Diquat 2L Landscape & Aquatic Herbicide, Alligare Diquat Herbicide, Weedtrine-D Diquat Herbicide- Applied Biochemist, Harvester Landscape & Aquatic Herbicide, NuFarm Diquat 2L Herbicide, NuFarm Diquat SPC 2L, Quick Kill, Solera Diquat Landscape & Aquatic Herbicide, Reward Landscape & Aquatic Herbicide, Elimination, Tsunami DQ, Littora, Tribune Herbicide, RowRunner ATO, Liberator 711, AquaVet Landscape & Aquatic Herbicide, Ultra PondWeed Defense, Pond Oasis Aquatic Plant Control, Verdure-X-Herbicide, SePro Total Pond- React, Dibrox Herbicide, Dessicash L&A Landscape & Aquatic Herbicide, Diquat Water Weed and Landscape Herbicide, Edge, Edger, Capone Desiccant, Harvester, Weedtrine-D- SePro, AquaStrike (w/endothall)
Endothall	Dipotassium Salt of Endothall	Aquathol K, Aquathol Super K, Cascade Aquatic Herbicide, Aquastrike (w/diquat), Chinook (w/2,4-D)
Endothall	Mono(N,N-dimethylalkylamine) salt of endothall	Hydrothol 191 Aquatic, Hydrothol 191 Granular, Teton Aquatic Herbicide, EasyKlear Defense 2 in 1 Granular Algae and Aquatic Weed Control
Fluridone		Avast! SC, Sonar A.S., Sonar PR Precision Release, Sonar Q (ABN), Sonar SRP, SonarOne, Sonar RTU, Alligare Fluridone, Sonar Genesis, Alligare Fluridone, Sonar H4C Aquatic Herbicide, SePro Total Pond-Prevent, Spritflo Herbicide, Pond Logic Wipeout Pondweed Defense Aquatic Herbicide, Airmax Wipeout Pondweed Defense Aquatic Herbicide, Sonar Infinity
Glyphosate		Aqua Star, Alligare Glyphosate 5.4, Shore-Klear Aquatic Herbicide, Rodeo, Cinco, AquaNeat Aquatic Herbicide, Gordon's Pro T&O Products GlyphoMate 41 Weed &* Grass Killer plus Aquatic Herbicide, Gordon's Pondmaster Surf & Shoreline Herbicide, CattPlex Cattail Control, AquaPro, Hi-Yield Killzall Aquatic Herbicide, IP410FC Herbicide- Monsanto, IP410 Herbicide- Monsanto, IP410-A Herbicide- Monsanto, Mon 8750 Herbicide- Monsanto, Roundup Custom for Aquatic & Terrestrial Use- Monsanto, Drexel Imitator Aquatic Herbicide, Enforcer Weed Defeat Concentrate, AquaVet Shoreline Weeds, Shoreline Defense, Buccaneer5 Extra Herbicide, Pond Oasis Shoreline Plant Control, SePro Total Pond- Emerge, Farmworks Aquatic Herbicide, Farm General Aquatic Herbicide, Tomahawk 5, Forester's Non-Selective Herbicide, Vanish Max 5.4 Glyphosate, Roundup Custom for Aquatic & Terrestrial Use- Bayer, K487 Herbicided, IP410-A Herbicide- Bayer, IP410FC Herbicide- Bayer, Mon 8750 Herbicide- Bayer, Aquamaster
Triclopyr		Alligare Triclopyr 3, Element 3A, Garlon 3A, Trycera, Tahoe 3A, Renovate 3, Renovate OTF, Navitrol Landscape and Aquatic Herbicide, AgriStar Triclopyr 3A, Navitrol DPF, Renovate MAX G Aquatic Herbicide (w/2,4-D), Aquasweep (w/2,4-D)
Imazapyr		Alligare Ecomazapyr 2 SL, Arsenal Applicators Concentrate, Arsenal Herbicide, Habitat- BASF, NuFarm Polaris Herbicide, NuFarm Polaris AC Complete Herbicide, Habitat- SePro, Weapon

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HERBICIDES APPROVED FOR AQUATIC USE [cont.]

Chemical	Active Ingredient Formulation	Trade Name(s) (list may be incomplete)
Imazamox		Clearcast- BASF, Clearcast- SePro, ImazaCast, Alligare Imox Herbicide, Top Deck Aquatic Herbicide, Castaway
Carfentrazone		Stingray, Altify H2O
Penoxsulam		Galleon SC
Sodium Carbonate Peroxyhydrate		EcoBlast Contact Granular Algaecide, Cape Furl, Pak 27 Algaecide- Solvay, Phycomycin SCP- SePro, Algae-Off Granular, Applied Biochemist Phycomycin SCP Algaecide/Cyanobacteriocide, Green X Concentrated Granular Algaecide, GreenClean Granular Algaecide, Phycomycin-SCP Algaecide & Oxidizer, PAK 27- SePro, GreenClean Pro
Flumioxazin		Clipper- Valent, Flumioxazin 51% WDG-NonCrop, Clipper SC Aquatic Herbicide- NuFarm, Pond-Klear Aquatic Herbicide, Semera 51% WDG, Flumioxazin 51WDG Select, Semera SC, Joya Non-Crop Herbicide, KnockDown Defense Algae & Aquatic Weed Control, Schooner 51.0% WDG, Schooner SC, Depth Charge (w/2,4-D)
Bispyribac Sodium		Tradewind
Topramezone		Oasis Aquatic Herbicide
Florpyrauxifen		ProcellaCor SC
Aquatic Dyes		Admiral Liquid, Admiral WSP, Aquashade, Aquashade Plus, others

APPLICATION NOTES

Active Ingredient	Rate	Application and Notes
Copper Sulfate Crystals	<u>Algae</u> Blue-Green, Filamentous and Planktonic 0.25-2.0ppm Chara, Nitella 1.5-2.0ppm <u>Submersed Weeds</u> 0.25-0.5ppm	• Copper is toxic to fish. Please refer to “Use of Copper Sulfate in Ponds with Fish” in this section for more details and correct dose calculation. • If water alkalinity is above 250 ppm, use results will be unsatisfactory. The free copper ions precipitate before they can be effective. • Use can lead to dissolved oxygen problems when applied to ponds with water temperatures above 85ºF. • To make a copper sulfate solution, mix 1½ lb of copper sulfate crystals with 1 gal of water. • For filamentous algae, copper can be tank mixed with diquat. • For submersed weeds, it can be tank mixed with endothall, diquat or fluridone.
Copper Sulfate Solution	See label.	• Copper solutions can be tank mixed with diquat, endothall and copper complexes. • See previous warning about copper toxicity to fish.
Copper Complexes	See label.	• Generally safe for use in soft water ponds. • If treated water is potable, rate cannot exceed 1 ppm. • Can be tank mixed with diquat and endothall. • Some formulations are labeled for hydrilla.
2,4-D	Various and numerous. Formulations can be liquid or granular; ester, amine or acid. This impacts the amount of active ingredient that is applied and application method used.	• Growth essential for uptake. • Please consult label thoroughly due to numerous formulations. • Due to local restrictions, use of 2,4-D may be prohibited at certain times of the year. • Plant roots absorb salt forms more readily than esters. • Esters more readily penetrate foliage. <u>Foliar</u> • Rate depends on species and water depth of emergent plant. • Apply early in season when weeds are small and growing actively before the bud stage. • Apply when biennial and perennial species are in the seedling stage and before flower stalks appear. • For liquid formulations, thorough wetting of foliage is essential for maximum control. • A pH above 8 reduces effectiveness. • Do not treat more than one-half pond at a time. • Do not apply within 600 to 2,400 feet of a potable water intake, depending on treatment rate. • 2,4-D may be more effective if applied after dark. <u>Submersed</u> • pH higher than 8 reduces effectiveness. • Do not treat more than one-half pond at a time. • Do not apply within 600 to 2,400 feet of a potable water intake, depending on treatment rate. • 4-hour contact time. • Low light intensity reduces ability of submersed plants to recover. • Can apply when water temperature is above 50°F if target plants are actively growing.

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APPLICATION NOTES [cont.]

Active Ingredient	Rate	Application and Notes
Diquat dibromide	2-4 lb ai/acre (foliar) (ai = active ingredient) 0.09-0.37 ppm 0.25-1 lb ai/acre*ft (submersed)	• Rapid wilting, often within several hours. • Plant must be actively growing for uptake. – Use whenever plant is growing, even in winter. **Foliar** • For spot treatment, apply a 0.5% solution with approved adjuvant at 0.25-1%. • For broadcast treatment, apply at labeled rate with sufficient carrier (water), and approved adjuvant, to ensure sufficient plant coverage. • For best results, apply before flowering (cattail). • Repeat treatments may be necessary. • Diquat becomes rainfast (won't wash off) in 1 to 2 hours. • For floating and emergent plants, diquat requires a 30-minute contact time with foliage to be effective. • Do not tank mix with penoxsulam. **Submersed** • Treat only one-third to one-half of pond at one time to avoid oxygen depletion due to decomposing vegetation. • Wait 14 days between treatments. • Application to muddy/turbid water may reduce effectiveness. • For submersed plants, faster acting when combined with copper or endothall. • Water half-life < 48 hours. • Diquat is rapidly absorbed by submersed leaves but still requires a 24-hour contact time to be effective. Do not apply to flowing water. • Low light intensity reduces ability of submersed plants to recover. • Labels have rates as gallons per surface acre, assuming a 4-foot average pond depth.
Endothall (Dipotassium Salt)	0.5-5 ppm (concentration) 1.3-13.5 lb ai/acre*ft	• If plant infestation is heavy, treat sections 5 to 7 days apart. • Not for use in brackish or salt water. • Up to 24-hour exposure needed. • Active growth needed for plant uptake. – Late winter/early spring. • Rapid breakdown of product occurs at temperatures > 80°F, reducing effectiveness.
Endothall (Mono(N, N-dimethylalkylamine) Salt)	0.05-1.5 ppm (algae) 0.5-3 ppm 1.4-8 lb ai/acre*ft (submersed)	• May be mixed with copper sulfate, 1 gallon plus 5 pounds per surface acre. • Toxic to fish at rates higher than 0.3 ppm. Generally rates of 0.05-0.3 ppm are effective. • If rates higher than 0.3 ppm, should be applied by commercial applicator only. • Do not treat more than one-tenth of pond or lake with doses in excess of 1 ppm. • Up to 24-hour exposure needed. • Active growth needed for plant uptake. – Late winter/early spring. • Rapid breakdown of product occurs at temperatures > 80F.
Fluridone	10-90 ppb (see label)	• Good to excellent control of duckweed, salvinia and bladderwort. • Poor control of water hyacinth and water lettuce. • Use "Lake" rate for water bodies over 5 surface acres. • Do not apply as a spot treatment. • Needs minimum of 45 days of contact. • May require 30 to 90 days to achieve weed control. • May be mixed with other herbicides and algaecides. • Greater potential for crop injury if treated water is applied to crops grown on low organic and sandy soil. • Thirty days may be insufficient restriction if pond water will be used to irrigate sensitive crops, such as tomatoes or peppers. • Absorbed from water by shoots and from hydrosoil by roots. • Can be applied to water surface or subsurface. • Broken down by sunlight. • No issues related to pH, alkalinity.

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APPLICATION NOTES [cont.]

Active Ingredient	Rate	Application and Notes
Glyphosate	Up to 3 lb ai/acre	• Nonselective. • For foliar application only. • Use of nonionic surfactant is recommended or required, depending on formulation, read label (2 or more quarts/100 gallons water). • If applying by boat, take care to not create waves that may wash the herbicide off floating leaves. • Rainfall within 6 hours may reduce effectiveness. • Will not work in water. • No root absorption. • Vegetation must be on or above the surface for treatment to be effective.
Imazapyr	0.25-0.75 lb ai/acre (foliar)	• Mix with 100 gallons water to insure complete coverage. • Will not control plants completely or mostly submerged. • Treat one-half of pond surface area or less in a single operation. Do not exceed 6 pints/acre (1.5 ppb ai/acre). • Do not use on food crops. • Do not apply within one-half mile upstream of active potable water intake. • Rapid foliage absorption (< 24 hours), root absorption too. • Adjuvant can be nonionic surfactant, methylated seed oil or silicone based surfactant based on weed to be controlled. • Plant needs to be actively growing. • Will not work on submersed vegetation. • Can be mixed with glyphosate. • Do not mix with diquat or 2,4-D. • Not temperature or light sensitive. • Can be selectively used when nontarget plants are dormant.
Triclopyr	1.5-6 lb ai/acre (foliar) 2-6.8 lb ai/acre*ft (submersed)	• Can be tank mixed with 2,4-D amine. • Readily absorbed by roots. • No pH, alkalinity, temperature issues. <u>Foliar</u> • Apply when plants are actively growing. • Use higher rate when the weed mass is dense. • Thoroughly wet all foliage. • Use of nonionic surfactant is recommended. • Do not exceed 2.5 ppm ai triclopyr/year. Can repeat treatments as long as 2.5 ppm annual limit not exceeded. • Readily penetrates foliage (< 4 to 12 hours). – Rainfast in 2 hours <u>Submersed</u> • Setbacks from potable water intake based on amount of area treated and rate used. • Do not exceed 2.5 ppm ai triclopyr/year. Can repeat treatments as long as 2.5 ppm annual limit not exceeded. • Results can be unsatisfactory if pond has high water exchange.
Imazamox	0.125-0.5 lb ai/acre (foliar) 50-500 ppb (submersed)	• An approved adjuvant should be used for foliar applications. Consult label for appropriate type and rate. • A glyphosate herbicide can be added for quicker brownout. • Imazamox can be applied to the water targeting emergent vegetation. Rate is 17-173 ounces product/acre*ft. (50-500 ppb). • Do not exceed 500 ppb (173 oz/acre*ft) for water application or 2 quarts/acre for foliar application. • Spot application can use 5% rate. • Absorbed mostly by foliage. • Root absorption is slower. • Broken down by photolysis (14-day half life in water). • Low light intensity may reduce ability of submersed plants to recover.

(Continued on page 155)

APPLICATION NOTES [cont.]

Active Ingredient	Rate	Application and Notes
Carfentrazone	0.05-0.2 lb ai/acre (foliar) 200 ppb (concentration) 0.5434 lb ai/acre*ft (submersed)	• Light dependent. • Best if applied to young actively growing plants. • Mixing with systemic herbicides can enhance effectiveness. • May be tank mixed with other herbicides (2,4-D, diquat, glyphosate, triclopyr, or imazapyr). • Single application will not control plants with high biomass. <u>Foliar</u> • For best results, use a methylated seed oil or non-ionic surfactant. • Dirty or muddy water for spray mixtures will reduce effectiveness. • Thorough wetting of foliage essential for maximum effectiveness. • Rapidly absorbed by foliage, rainfast in 15 minutes. – 1-2 hrs of contact for good activity. <u>Submersed</u> • Inject below the surface or use suitable polymer to rapidly sink spray mixture. • Do not apply within ¼ mile of potable water intake. • Treatment of dense weed mats may result in oxygen loss from dead weed decomposition. • Highly effective on broadleaved weeds. • Visible results in 24 to 48 hours. • pH 7 – half life 8.6 days, pH 9 – half life 3.6 hours.
Penoxsulam	0.03125-0.0875 lb ai/acre (foliar) 5-150 ppb (submersed)	• Absorbed by roots and foliage. <u>Foliar</u> • Use of surfactant required for best results. Surfactant should not be organosilicone surfactant. • Apply only to actively growing weeds (temperature > 50°F). .• Can be applied as a pre-emergent at rates of 5.6-11.2 oz/acre. • Do not tank mix with Diquat. • Works faster for submersed weeds when mixed with endothall. <u>Submersed</u> • Single application rate 25-75 ppb. Sum of all applications must not exceed 150 ppb/year.
Sodium Carbonate Peroxyhydrate	0.3-10.2 ppm hydrogen peroxide	• SCP converts to hydrogen peroxide when applied to water which is the compound that causes plant death. • Active ingredient concentration based on hydrogen peroxide concentration that evolves from product application.
Flumioxazin	3.06-6.12 oz ai/surface acre (foliar)	• Target plant will determine whether to make a surface or subsurface application (check label). • Taken up by roots and foliage. • Need actively growing plants for uptake. • Mature plants might have carbohydrate reserves to recover. • Very sensitive to pH (pH 9 – half-life is minutes). <u>Foliar</u> • Tank mix with water having a pH of 5-7. Buffer spray solution to pH less than 7. Use nonionic surfactant with at least an 80% ai (perform jar test to determine compatibility). Apply in 5-10 gallons of water per acre to ensure coverage. Treat less than one-half of the pond at a time and wait 10 to 14 days before treating remaining area. Do not retreat same section within 28 days. • May be tank mixed with 2,4-D, diquat or other approved aquatic herbicide. • Evidence that duckweed and watermeal are susceptible regardless of pH. • Foliar contact causes rapid desiccation and necrosis of exposed plant tissue. • 1 to 2 hours contact time needed. • Floating plants – Better efficacy during cooler weather (late September/October and March/April). <u>Submersed</u> • Application in early morning might enhance effectiveness, due to rapid break down of product in water with pH 8.5 or greater. Pond pH tends to be lower in the morning but should be tested prior to application. • Tank mix with water having a pH of 5-7. • May be tank mixed with other approved herbicides. • 4-6 hour contact time needed.

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APPLICATION NOTES [cont.]

Active Ingredient	Rate	Application and Notes
Bispyribac-sodium	0.8-1.6 oz ai/acre (foliar) 20 to 45 ppb initial concentration (submersed)	• Absorbed by roots and foliage. • No pH or temperature issues. • Need active growth. • Late winter/early spring application best. <u>Foliar</u> • Higher rate for more mature/denser vegetation. • Min of 30 gallons water per acre to ensure coverage. No more than 8 oz per year. • May be tank mixed with 2,4-D, diquat or other approved herbicide. • Tank mix with a nonionic surfactant at the labeled rate. <u>Submersed</u> • For optimum control, repeat applications 60 to 90 days to maintain desired concentration (not to exceed 45 ppb). • Do not reapply within 14 days. No more than 4 applications per year. • Tradewind can be tank mixed with other approved herbicides for enhanced Hydrilla control. • Clear water and higher light intensity may increase control.
Topramezone	0.03125-0.0875 lb ai/acre (foliar) 5-150 ppb (submersed)	• Can be applied directly to water or sprayed onto foliage of plants or exposed sediment after drawdown. • Symptoms appear 7 to 10 days after treatment. • Plant death occurs over 60 to 120 days period. • Maximum initial application can't exceed 50 ppb. • Do not exceed 150 ppb cumulative total. • Do not irrigate crops if concentrations above 1 ppb. • Use surfactant for foliar applications.
Florpyrauxifen	Foliar – Rate is 1 to 2 PDU (Prescription Dose Units) per acre Submersed – Rate is 1 to 5 PDU per acre*ft 1 PDU = 1.35 oz of product	Read label.

Useful Tank Mixes
- Imazapyr – glyphosate, triclopyr, carfentrazone
- Imazamox – penoxsulam, carfentrazone, endothall, fluridone
- Penoxsulam – imazamox, endothall (possible synergy), fluridone, flumioxazin, carfentrazone
- Bispyribac-sodium – endothall, flumioxazin
- Diquat – 2,4-D (emersed), endothall (submersed), copper (submersed),
- Carfentrazone – penoxsulam, glyphosate, 2,4-D, triclopyr, imazapyr, imazamox
- Flumioxazin – diquat, glyphosate, endothall, imazamox, copper, bispyribac-sodium (can use lower rates), penoxsulam
- Glyphosate – imazapyr, triclopyr, carfentrazone
- 2,4-D – diquat, triclopyr, carfentrazone
- Triclopyr – 2,4-D, glyphosate, imazapyr, carfentrazone
- Copper sulfate – diquat, endothall, flumioxazin (for algae),
- Endothall – penoxsulam, imazamox, bispyribac–sodium
- Fluridone – penoxsulam, imazamox

Aquatic Herbicide Toxicity to Some Fish

The 96-hour LC_{50} is given in ppm columns. The lb column gives the pounds of active ingredient needed per acre*ft to reach the 96-hour LC_{50}

Herbicide	Bluegill		Channel Catfish		Rainbow Trout	
	ppm	lb	ppm	lb	ppm	lb
Endothall (Aquathol)	343	933	150	408	230	625.6
Endothall (Hydrothol)	1.0	2.72	0.5	1.4	1.7	4.6
Copper	Toxicity dependent upon alkalinity of water. The lower the alkalinity, the greater the toxicity.					
Diquat	14	38			15	41
Rotenone (a fish toxicant)	0.02	0.05	0.002	0.005	0.03	0.08
Glyphosate	25	68	13	35	28	76
2,4-D (Amine) Weedar 64, Weed Rhap A-4D, DMA 4 IVM	263	715	166	452	222	604
2,4-D (Ester) Navigate, Aqua-Kleen	2	5.4	1	2.7	1	2.7
Imazapyr	336	914	>100	>272	>100	>272
Triclopyr	681	1,852	446	1,213	400	1,088
Imazamox	119	324			122	332
Carfentrazone	2.0	5.4			16	44
Penoxsulam	103	280			102	277
Sodium Carbonate Peroxyhydrate	26(*a)	71(*b)	24(*a)	65(*b)	22(*a)	60(*b)
Flumioxazin	21	111.3			2.3	12.2
Florpyrauxifen	Practically non-toxic to fish at normal use rates.(LC50 > 100ppm)					
Bispyribac-sodium	>100	272			>100	>272
Topramezone					>100	>272

-The 96-hour LC_{50} is the amount of material needed to kill 50% of a population within 96 hours.
-ppm values are for the amount of active ingredient.
(*a) - Toxicity as ppm Hydrogen Peroxide.
(*b) - Expressed as pounds Hydrogen Peroxide. User will need to calculate the amount of product this equals from label information.

Control of Common Lawn Weeds

American Burnweed (*Erechtites hieraciifolius*)

Simazine, Specticle and FreeHand provide preemergence control of burnweed. Celsius, Confront, Tribute Total and Blindside (metsulfuron + sulfentrazone) provide excellent postemergence control.

Annual Bluegrass (*Poa annua*)

It is difficult to achieve complete control of annual bluegrass with a single pre or post herbicide application. Preemergence and postemergence treatment may be needed. To achieve preemergence control with herbicides such as indaziflam (Specticle), prodiamine (Barricade), pendimethalin (Pendulum) and dithiopyr (Dimension), apply on August 15 and water in immediately. Specticle can be applied later because it has postemergence activity on small annual bluegrass. In bermudagrass, one of the cheapest and easiest ways to control *Poa annua* is to use glyphosate while bermudagrass is completely dormant. Revolver (foramsulfuron), TranXit (rimsulfuron) and Monument (trifloxysulfuron) will provide postemergence *Poa annua* control without damaging partially green bermudagrass or zoysiagrass. Simazine and atrazine are effective preemergence and postemergence on annual bluegrass that has not tillered.

Annual Sedge (*Cyperus compressus*)

Monument (trifloxysulfuron), Certainty (sulfosulfuron) and Dismiss South (sulfentrazone + imazethapyr) provide excellent annual sedge control. **See Sedge Control for Homeowners in this section.**

Bahiagrass (*Paspalum notatum*)

Metsulfuron (Manor, Blade, Mansion) is a good choice for bahiagrass control in bermudagrass. Make two applications of metsulfuron 60 DF at one ounce of product per acre three to four weeks apart. Do not use over the root zone of desirable trees and ornamentals. Add 0.25% nonionic surfactant. In centipedegrass, sethoxydim (Segment) may be used to control bahiagrass.

Bermudagrass (*Cynodon dactylon*) **–**
Selective Suppression

In zoysiagrass or tall fescue, use Fusilade II (fluazifop) at 6 fluid ounces per acre plus Turflon Ester at 32 fluid ounces per acre to suppress bermudagrass. Begin around June 1 and repeat every four weeks unless the zoysiagrass has not recovered from the first application. **In centipedegrass**, Segment (sethoxydim) may be used at 24 fluid ounces per acre to suppress bermudagrass, bahiagrass and other weedy grasses. Do not apply Segment sooner than three weeks after green-up and more than twice per season. Do not tank mix sethoxydim with other pesticides or fertilizers.

Bermudagrass – Preplant Control. Make three or four applications of 41% ai glyphosate or higher at 2 to 3 quarts per acre over the growing season (May, July and September). Wait for regrowth before making the next application. Using this method does not guarantee complete control. Tank mixing with 24 fluid ounces per acre of Fusilade II may improve control. Do not seed for 30 days after applying Fusilade II.

Carolina Geranium (*Geranium carolinianum*)

Effective control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Catsear, Common (*Hypochaeris radicata*)

Cat's ear dandelion may be effectively controlled in the fall or spring with two-, three- and four-way broadleaf herbicides, as well as with metsulfuron.

Chickweed, Common (*Stellaria media*)

Effective chickweed control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Chickweed, Sticky (*Cerastium glomeratum*)

Effective chickweed control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor, Mansion or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Corn Speedwell (*Veronica arvensis*)

Three-ways alone do not control corn speedwell. Effective control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor, Mansion or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Crabgrass (*Digitaria* spp)

For preemergence control, apply indaziflam (Specticle), prodiamine (Barricade) pendimethalin (Pendulum) and dithiopyr (Dimension) around March 1 or before crabgrass begins to germinate. **Scotts Halts (pendimethalin) is a good preemergence choice for homeowners.** For postemergence control, apply quinclorac (Quinclorac 75 DF, Drive, Drive XLR8) to tolerant turfgrasses when crabgrass is less than 2-tillers or mature. Repeat application in 7 days. Use methylated seed oil for a surfactant. Other postemergence possibilities include mesotrione (Tenacity) or sethoxydim (Segment) in centipedegrass. MSMA can be used for crabgrass control but is not labeled for use on residential turf. **Postemergence homeowner products that contain quinclorac include Ortho® Weed-B-Gon Weed Killer for Lawns Plus Crabgrass Control Concentrate, Bayer Advanced All-In-One Lawn Weed & Crabgrass Killer and Fertilome Weed Out with Q.**

Cudweed (*Gnaphalium* spp)

Cudweed species are biennial plants but are relatively easy to control. Two-, three- and four-way broadleaf herbicides control postemergence as do repeat applications of metsulfuron (Manor, Mansion, Blade, etc.). Apply in the spring while in rosette stage and before seed stalk formation.

Dallisgrass (*Paspalum dilatatum*)

One option is to dig out the clumps with a shovel. Repeat applications of Tribute Total (foramsulfuron + halosulfuron + thiencarbazone) in late summer and early fall will suppress dallisgrass in residential lawns. **Use Tribute Total only in bermudagrass.** Manuscript (pinoxaden) has postemergence activity on dallisgrass. Manuscript is most effective at the higher, spot spray rates. Another approach is spot treatment with glyphosate. Obviously, this is going to kill some of the desirable grass and leave brown spots in the turf. Two applications of glyphosate are needed. Apply the first after active growth begins in May, and spray again when regrowth appears. This will take most of the summer. Keep the glyphosate spray off nontarget plants. Spot treatment with MSMA is legal on sod farms and golf courses.

Dandelion (*Taraxacum officinale)*

The common three-way herbicides (2,4-D + dicamba + MCPP) control dandelion. Metsulfuron and quinclorac also control dandelion.

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Control of Common Lawn Weeds [cont.]

Dichondra (*Dichondra* spp.)

The common three-way herbicides (2,4-D + dicamba + MCPP) control dichondra. Two applications about 30 days apart will be needed. Tank mixing metsulfuron with a three-way herbicide often improves control.

Doveweed (*Murdannia nudiflora*)

Products containing atrazine or simazine, Revolver or metsulfuron applied twice 30 days apart provide partial control. Tank mixes of MSMA with metribuzin or multiple applications of two- or three-way broadleaf herbicide mixtures also provide good control but also can cause injury to some turfgrass species. Tank mixing Quicksilver or Dismiss with these products increases and hastens their activity. Repeat applications of all herbicides or combinations will be needed for complete control.

Facelis (*Facelis retusa*)

Effective control requires a tank mix of a postemergence broadleaf herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor, Mansion or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Field Madder (*Sherardia arvensis*)

Glyphosate alone does not control field madder. Effective field madder control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Goosegrass (*Eleusine indica*)

Use either Specticle or Ronstar for preemergence control of goosegrass. Barricade and Pendulum will provide slightly less effective preemergence control. Postemergence herbicides for goosegrass include Revolver, Illoxan, Dismiss and metribuzin. Repeat applications are needed when controlling goosegrass postemergence. Pylex (topramezone) is effective on goosegrass in centipedegrass and certain cool-season grasses. Reduced rates of Pylex can be used in bermudagrass for control of goosegrass.

Ground Ivy (*Glechoma hederacea*)

In cool-season grasses, use a product containing triclopyr or fluroxypyr. Momentum FX2 (2,4-D + triclopyr + fluroxypyr) or T-Zone (triclopyr + 2,4-D + dicamba + sulfentrazone) are good options for ground ivy. In warm season grasses, metsulfuron (Mansion, Manor, Blade) or Celsius WG are good choices. **Ortho Chickweed and Oxalis Killer (8% triclopyr) is a good choice for homeowners. Do not use on centipedegrass, St. Augustinegrass or bermudagrass.**

Hairy Bittercress *(Cardamine hirsuta*)

The dinitroaniline (prodiamine, pendimethalin, others) herbicides do not provide effective preemergence control of hairy bittercress. Effective hairy bittercress control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Henbit (*Lamium amplexicaule*)

Three-ways (2,4-D + MCPP + dicamba) alone do not control henbit. Effective control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or metsulfuron plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Kyllinga (*Kyllinga* spp.)

Monument (trifloxysulfuron), Certainty (sulfosulfuron) and Dismiss South (sulfentrazone + imazethapyr) provide excellent kyllinga control. SedgeHammer+ (halosulfuron), while slightly less effective on kyllinga, is safe to use on all turfgrasses. **See Sedge Control for Homeowners in this section.**

Large Hop Clover (*Trifolium campestre*)

Effective large hop clover control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or metsulfuron plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Lawn Burweed or Spurweed (*Soliva sessilis*)

Simazine or atrazine will provide pre and postemergence control of spurweed if applied early. For best results apply between Thanksgiving and Christmas. If that timing is missed, make the application before March 1. Metsulfuron (Manor, Mansion or Blade) or three-ways (MCPP + dicamba + 2,4-D) provide postemergence control of spurweed. Metsulfuron or a three-way may be tank mixed with either simazine or atrazine.

Lespedeza, Common (*Lespedeza striata* or *Kummerowia striata*)

Lespedeza is often an indicator of insufficient nitrogen fertilization. 2,4-D alone will not control lespedeza or white clover. Products containing metsulfuron, fluroxypyr or triclopyr are very effective on most legumes. Escalade II, Confront and metsulfuron (Manor, Mansion or Blade) are good lespedeza control products. When using three-ways (2,4-D + MCPP + dicamba), repeat applications are usually needed. Celsius (thiencarbazone + iodosulfuron + dicamba) should be effective on lespedeza. **Ortho Chickweed and Oxalis Killer (8% triclopyr) is a good choice for homeowners. Do not use this product on centipedegrass, St. Augustinegrass or bermudagrass.**

Moss (*Bryum argentum*)

Quicksilver T&O (carfentrazone) at 6.7 ounces per acre in 100 GPA when temperatures are less than 85°F provides excellent moss control. Bentgrass has excellent tolerance for Quicksilver. Do not apply to desirable hybrid bermudagrass. Quicksilver does not control algae.

Nutsedge, Purple (*Cyperus rotundus*)

This is the most difficult sedge to control. Repeat applications will be needed. Monument (trifloxysulfuron), Certainty (sulfosulfuron) and Dismiss South (sulfentrazone + imazethapyr) provide temporary suppression of purple nutsedge. SedgeHammer+ (halosulfuron), while slightly less effective, is safe to use on all turfgrasses. Image 70 DG (imazaquin) is an effective herbicide for suppressing sedges in warm-season turfgrasses. Image may cause stunting of turfgrasses. **See Sedge Control for Homeowners in this section.**

Nutsedge, Yellow (*Cyperus esculentus*)

Not usually a problem in lawns. It is more common in ornamental beds and vegetable gardens. SedgeHammer+, Image, Certainty, Monument, Dismiss and Dismiss South are all effective for yellow nutsedge. **See Sedge Control for Homeowners in this section.**

Plantain, Broadleaf (*Plantago major*)

The common three-way herbicides (2,4-D + dicamba + MCPP) control buckhorn plantain. Tank mixing metsulfuron with a three-way herbicide often improves control.

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Control of Common Lawn Weeds [cont.]

Plantain, Buckhorn (*Plantago lancelota*)

The common three-way herbicides (2,4-D + dicamba + MCPP) control buckhorn plantain. Tank mixing metsulfuron with a three-way herbicide often improves control.

Prostrate Knotweed (*Polygonum aviculare*)

Metsulfuron at 0.5 ounce per acre or dicamba (Banvel, Vanquish) at 0.5 pound per acre will control prostrate knotweed. Celsius WG (thiencarbazone + iodosulfuron + dicamba) should be effective on lespedeza. There are many combination products that contain 2,4-D and dicamba including Trimec 992 and Speedzone.

Purple Deadnettle (*Lamium purpureum*)

Three-ways (2,4-D + MCPP + dicamba) alone will not control purple deadnettle.

Effective deadnettle control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or metsulfuron plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Sedge Control for Homeowners

SedgeHammer+ (halosulfuron + surfactant) is a good sedge control choice for homeowners because it is effective on the common sedges, comes in a small package with surfactant added and is safe on all turfgrasses. Hi-Yield Nutsedge Control also contains halosulfuron. Ortho Nutsedge Killer for Lawns (0.05% sulfentrazone) is a quick-acting herbicide that is fairly effective on most sedges and safe on most lawn grasses. Sulfentrazone is fast-acting and will cause leaf burn on sedges within two to three days. It is weaker on purple nutsedge compared to halosulfuron.

Shepherd's Purse (*Capsella bursa-pastoris*)

Effective control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor, Mansion or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Spotted Burclover (*Medicago arabica*)

Effective control requires a tank mix of a postemergence herbicide with simazine or atrazine. Typical mixes are a three-way plus simazine or atrazine or Manor, Mansion or Blade plus simazine or atrazine. Apply early (between December and March 1) before the weeds get big.

Spring Beauty (*Claytonia virginica*)

Mano, Mansion or Blade (metsulfuron) will provide acceptable control of spring beauty. Apply in February or March. Add 0.5% nonionic surfactant.

Spurges (*Chamaescye* spp.)

Manor, Mansion or Blade (metsulfuron) is the best spurge control treatment. Use only in bermudagrass, centipedegrass, St. Augustinegrass and zoysiagrass.

Violets (*Viola* spp.)

Manor, Mansion or Blade (metsulfuron) is an effective violet control herbicide in bermudagrass, centipedegrass, St. Augustinegrass and zoysiagrass. Products containing triclopyr and clopyralid (Confront, Turflon), 2,4-D + fluroxypyr + dicamba (Escalade 2) or triclopyr + phenoxy herbicides (Cool Power, HorsePower or Chaser) are fairly effective for violet control, and these products can be used on cool-season grasses such as tall fescue. Repeat applications are usually required. Mid to late fall applications are best followed by mid-spring to early summer applications. **Ortho Chickweed and Oxalis Killer (8% triclopyr) is a good choice for homeowners. Do not use this product on centipedegrass, St. Augustinegrass or bermudagrass.**

Virginia Buttonweed (*Diodia virginiana*)

Herbicides provide only temporary suppression of Virginia buttonweed. Products containing fluroxypyr or triclopyr such as Escalade II or Momentum FX2 seem to be more consistent than the standard three-ways. However, multiple applications of three-way (2, 4-D + MCPP + dicamba) herbicides at intervals of three to six weeks do a fair job of suppressing Virginia buttonweed. **Consult label to determine the maximum number of applications allowed per year.**

White Clover (*Trifolium repens*)

Three-way growth regulator herbicides, quinclorac and metsulfuron will provide postemergence control of white clover.

Wild Garlic, Wild Onion (*Allium vineale*)

Metsulfuron (Manor, Mansion or Blade) is very effective for wild garlic control and many other winter broadleaf weeds. Apply in late February or early March on a warm (at least 50°F), sunny day when there is good soil moisture. Add 0.25% non-ionic surfactant. Another option is the use of either 2,4-D LV ester or one of the three-ways (Trimec, Triplet). These products are the least effective and require three applications to eliminate garlic. Make the first treatment in November, repeat in March and then again the following November. Do not treat 2,4-D-sensitive grasses such as centipedegrass and St. Augustinegrass unless they are dormant. The ester formulations of 2,4-D are more effective against garlic.

TURFGRASS WEED RESPONSE TO PREEMERGENCE HERBICIDES

HERBICIDES	ANNUAL GRASSES	Annual bluegrass	Crabgrass	Goosegrass	Sandbur	ANNUAL BROADLEAVES	Bittercress	Common Chickweed	Corn Speedwell	Henbit	Hop Clover'	Knotweed	Lespedeza	Parsley Piert	Spurges	Spurweed	PERENNIAL GRASSES	Bahiagrass	Bermudagrass	Dallisgrass	Tall Fescue	PERENNIAL BROADLEAVES	Clovers	Dandelion	Dichondra	Docks	Ground Ivy	Mallow	Mock Strawberry	Mousear Chickweed	Pennywort	Plantains	Woodsorrel	Violets	Virginia Buttonweed	OTHER WEEDS	Nutsedge, Yellow	Wild Garlic/onion
atrazine (AAtrex)		E	F				E	E	E	E	E	E	E	E	E	E		F			F		E	F	G	G					E	G	E		F			
benefin (Balan)		E	E	F	F			G	E	G				E																E								
benefin + oryzalin (Surflan XL)		E	E	F	G			G		G				E	G																							
benefin + trifluralin (Team Pro)		E	E	F	F									E																								
bensulide (Bensumec, PreSan)		F	E	F	G							G	G	E																								
bensulide + oxadiazon (Goose/Crab)		F	E	E	G																																	
dithiopyr (Dimension)		E	E	G			E	E	G	E				E	G																							
ethofumesate (Prograss)		G																	F																			
indaziflam (Specticle)		E	E	E						E																												
isoxaben (Gallery)		P	P	P	P		E	E	E	E	E			E	E	E																						
metolachlor (Pennant)		F	F	F	F																																F	
oryzalin (Surflan)		G	E	G	G			G		G				G	E																							
oxadiazon (Ronstar)		G	E	E	F			P	G	P	G	G	G	E	F	P																						
pendimethalin (Pendulum Aquacap)		G	E	G	G										G																							
prodiamine (Barricade)		E	E	G				G		G		G			G																							
siduron (Tupersan)			G	P								P			P				F																			
simazine (Princep)		E	F				E	E	G	E	E	G	E	G	G	E					F		G							E								

E = Excellent, ≥ 90% control. Good = 80% to 89% control. F = Fair, 70% to 79% control. P = Poor, <70% control. Blank = no data.

TURFGRASS WEED RESPONSE TO POSTEMERGENCE HERBICIDES

HERBICIDES	ANNUAL GRASSES	Annual bluegrass	Crabgrass	Goosegrass	Sandbur	ANNUAL BROADLEAVES	Bittercress	Common Chickweed	Corn Speedwell	Henbit	Hop Clover	Knotweed	Lespedeza	Parsley Piert	Spurges	Spurweed	PERENNIAL GRASSES	Bahiagrass	Bermudagrass	Dallisgrass	Tall Fescue	PERENNIAL BROADLEAVES	Clovers	Dandelion	Dichondra	Docks	Ground Ivy	Mock Strawberry	Mousear Chickweed	Pennywort	Plantains	Woodsorrel	Violets	Virginia Buttonweed	OTHER WEEDS	Nutsedge, purple	Nutsedge, yellow	Wild Garlic/onion	Green Kyllinga
2,4-D (many)							G	F	F	F	F		F	F	F	F							F	E		G	F	F	F	F	P	P	F	P				G	
2,4-D + dichlorprop (DPC)							E	E	E	E	E	G	E	E	G	G							E	E		E	G	G	E	E	F	F	G	G				G	
2,4-D + dichlorprop + dicamba							E	E	E	E	E	G	E	E	G	G							E	E		E	G	G	E	E	F	F	G	G				G	
carfentrazone (Quicksilver)															G	G																							
chlorsulfuron (Corsair)								G		G					G	G																							
clopyralid (Lontrel)											E		P										E																
dicamba (Banvel)							E	E	E	E	E	E	G	E	G	G							E	E	G	E	G	G	E	E	F	F	G	F					
dicamba + iodosulfuron + thiencarbazone (Celsius)								G	G	G			G		G	G							G	G	G		G		G		G	G							
diclofop (Illoxan)				E																																			
diquat (Reward)		E	E	E	E			E	E	G	E		G	E	E	E					G																		
ethofumesate (Prograss)		E																																					
fenoxaprop (Acclaim)			G																F																				
foramsulfuron (Revolver)		E	P	E																	G																		
glyphosate		E	E	E	E		E	E	E	E	E	E	E	E	E	E		G	E	E	E		F	E	E	E	G	G	E	E	E	E		F		G		E	
halosulfuron (Sedgehammer)																																				E	G		F
imazaquin (Image)																																				G	F	E	E
mecoprop (Mecomec)																																							
metribuzin		E	G	E	G		G	G	E	G	G	G	E	E	E	E					G		G						E										
metsulfuron (Manor)										E	E	G	E		E	E		E					E	E	G	E	G		E	G	E	E	E	G				E	
pronamide (Kerb)		E						E	E	P				P																									
pyrimisulfan																																				E	E		E
sethoxydim (Segment)			E	G																																			
simazine (Princep)							E	E	E	E	G			E															E										
triclopyr + clopyralid (Confront)							E	E	E	E	E	G	E	E	G	G							E	E		E	G	G	E	E	F	F	G	G				G	
trifloxysulfuron (Monument)		E	P	P							G							F			G		G		G						P	P			G	E	E		E
sulfentrazone (Dismiss)																																				F	G		G
sulfosulfuron (Certainty)		G																																		E	E		E

E = Excellent, ≥90% control. Good = 80% to 89% control. F = Fair, 70% to 79% control. P = Poor, <70% control. Blank = no data.

Turfgrass Tolerance of Postemergence Herbicides

Herbicide	Bermudagrass	Centipedegrass	St. Augustinegrass	Tall Fescue	Zoysiagrass
2,4-D	S	I	I	I	S
2,4-D + dicamba	S	I	I	S	S
2,4-D + dichlorprop (2,4-DP)	S	I	I	S	S
2,4-D + mecoprop	S	I	I	S	S
2,4-D + mecoprop + dicamba	S	I	I	S	S
2,4-D + mecoprop + dichlorprop	S	I	I	S	S
atrazine (AAtrex)	S-I	S-I	S-I	NR	S-I
bentazon (Basagran)	S	S	S	S	S
bromoxynil (Buctril)	S	S	S	S	S
carfentrazone (Quicksilver)	S	S	S	S	S
chlorsulfuron (Corsair)	S	NR	NR	NR	NR
clopyralid (Lontrel)	S	S	S	S	S
dicamba (Banvel)	S	I	I	S	S
dicamba + iodosulfuron + thiencarbazone (Celsius)	S	S	S	NR	S
diclofop (Illoxan)	S	NR	NR	NR	NR
fenoxaprop (Acclaim)	NR	NR	NR	S	S
fluazifop-p (Fusilade II)	NR	NR	NR	S-I	S-I
foramsulfuron (Revolver)	S	NR	NR	NR	S
halosulfuron (Sedge Hammer)	S	S	S	S	S
imazaquin (Image)	I	NR	S	NR	S
MCPA + MCPP + dichlorprop	S	I	I	S	S
mecoprop (MCPP)	S	I	I	S	S
mesotrione (Tenacity)	NR	R	I	R	NR
metribuzin	S-I	NR	NR	NR	NR
metsulfuron (Manor)	S	S	S	NR	S
MSMA, DSMA	S	NR	NR	I	I
pronamide (Kerb)	S	NR	NR	NR	NR
pyrimisulfan	S	S	S	S	S
sethoxydim (Segment)	NR	S	NR	NR	NR
sulfentrazone (Dismiss)	S	S	NR	S	S
sulfosulfuron (Certainty)	S	S	S	NR	S
topramezone (Pylex)	I	NR	NR	S	S
triclopyr (Turflon)	N	S	NR	S	NR
triclopyr + clopyralid (Confront)	I	NR	NR	S	I
trifloxysulfuron (Monument)	S	NR	NR	NR	S

S = safe at labeled rates, I = Intermediate safety, use at reduced rates, NR = Not registered for use on this turfgrass, do not use.

Turfgrass Tolerance of Preemergence Herbicides

Herbicide	Bermudagrass	Centipedegrass	St. Augustinegrass	Tall Fescue	Zoysiagrass
atrazine (AAtrex)	I	S	S	NR	I-S
benefin (Balan)	S	S	S	S	S
benefin + oryzalin (XL)	S	S	S	S	S
benefin + trifluralin (Team)	S	S	S	S	S
bensulide (PreSan)	S	S	S	S	S
bensulide + oxadiazon (Goosegrass/Crabgrass)	S	NR	NR	NR	S
dithiopyr (Dimension)	S	S	S	S	S
fenarimol (Rubigan)	S	NR	NR	NR	NR
indaziflam (Specticle)	S	S	S	NR	S
isoxaben (Gallery)	S	S	S	S	S
metolachlor (Pennant)	S	S	S	S	S
napropamide (Devrinol)	S	S	S	S	NR
oryzalin (Surflan)	S	S	S	S	S
oxadiazon (Ronstar)	S	NR	S	S	S
pendimethalin (Pre-M)	S	S	S	S	S
prodiamine (Barricade)	S	S	S	S	S
pronamide (Kerb)	S	R	R	NR	R
simazine (Princep)	I	S	S	NR	S

S = safe at labeled rates on healthy mature turf. I = Intermediate safety, may cause minor damage to mature, healthy turf. Consider using the lower end of the rate range. Do not apply to turf under stress. NR = Not registered for use on this species.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
TURFGRASSES	.			
Preemergence - Established Grasses				
atrazine @ 1 to 2 lb/A	Annual bluegrass, spurweed, chickweed and many other weeds.	**AAtrex 4 L** 1 to 2 qt/A.	Mid-October to November; after turf goes dormant.	**Restricted use herbicide. Do not apply to cool season grasses.** Atrazine provides both preemergence and post emergence control of annual broadleaf weeds. See label for special instructions. Do not apply to fairways or other areas that drain onto golf greens. Avoid applications during greenup. Should only be applied to dormant bermudagrass or zoysiagrass. DO NOT overseed 4 months before or 6 months after treatment. DO NOT apply within the active root zone of ornamental shrubs.
benefin @ 1.5 to 3.0 lb/A	Summer annual grasses, annual bluegrass, some small-seeded broadleaves.	**Balan 2.5 G** Up to 120 lb/A.	Apply February 15 to March 1 for control of crabgrass or goosegrass. Apply in September – Mid-October for annual bluegrass control.	Do not use on golf course putting greens. Will temporarily thin turf in sites heavily infested with annual bluegrass.
bensulide @ 7.5 to 12.5 lb/A	Summer annual grasses, annual bluegrass, and selected broadleaf weeds.	**Bensumec 4 LF** 1.88 to 3.13 gal/A or **Pre-san 12.5 G** 80 to 100 lb/A.	Apply February 15 to March 1 for control of crabgrass or goosegrass. Apply in September – Mid-October for annual bluegrass control.	Liquid formulation is labeled for use in home lawns and golf courses, granular formulation for golf courses only. Apply a light irrigation immediately after treatment. DO NOT apply to newly sprigged grasses. Delay reseeding for 4 months after treatment. May be used on bermudagrass and bentgrass greens.
dimethenamid-P @ 1.0 to 1.5 lb/A	Small-seeded broadleaf weeds, doveweed, purslane, spurge, yellow nutsedge and some annual grasses.	**Tower 6 L** 21 to 32 oz/A.	Apply February 15 to March 1 for control of summer annuals. Apply in September – Mid-October for winter annuals.	Golf courses: cool- and warm-season grasses. All other turf areas: warm-season grasses ONLY. Do not apply more frequently than 35 days, do not use more than 64 fl oz (3 lb ai) per year.
dithiopyr @ 0.25 to 0.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Dimension Ultra 40 WP** 0.625 to 1.25 lb/A. or **Dimension 1 EC or 1 EW** 1 to 2 pt/A.	Apply February 15 to March 15.	May be used on most species of turfgrass. Has postemergence activity on very small crabgrass. Do not reseed, overseed, or sprig within 8 weeks of application.
ethofumesate @ 0.75 to 2 lb/A	annual bluegrass, annual grasses and some annual broadleaves. Supression of bermudagrass in St. Augustine- grass.	**Prograss 1.5 L** 1 to 2 qt/A. or **PoaConstrictor or Prograss 4 SC** 0.75 to 2 qt/A.	Preemergence for weeds. Postemergence for suppression of bermudagrass in St. Augustinegrass.	Labeled for use in creeping bentgrass, perennial ryegrass, Kentucky bluegrass, tall fescue, and St. Augustinegrass. May also be applied to dormant bermudagrass. Do not apply more than 0.75 lb ai/A on Kentucky bluegrass and creeping bentgrass. **Check label for specific rates for each turf type.**
flumioxazin @ 0.25 to 0.38 lb/A	Annual bluegrass, winter annual broadleaf weeds, and summer annual grasses.	**SureGuard 51 WDG** 8 to 12 oz/A. or **SureGuard 4 SC** 8 to 12 fl oz/A.	Apply February 15 to March 1 for control of crabgrass or goosegrass. Apply late in the fall, after desirable turf is dormant.	**Do not use on cool-season turf**. Apply only to dormant bermudagrass. Leave at least 15 feet when applying upslope of creeping bentgrass putting greens.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
indaziflam @ 0.03 to 0.04 lb/A	Annual grasses including crabgrass and goosegrass and some broadleaf weeds.	**Specticle Flo** 6 to 9 fl oz/A or **Specticle G** 125 to 200 lb/A	Preemergence.	**Do not use on cool-season grasses.** Use only on well-established grasses. Leave a 15-foot buffer between treated areas and cool-season grasses. Do not apply more than 6 fl oz/A on centipedegrass or St. Augustinegrass. Do not apply to golf course putting greens, tees, or collars. Irrigate immediately after application. Sequential application recommended after 45-90 days.
isoxaben @ 0.5 to 1 lb/A	Broadleaf weeds including spurge.	**Gallery 75 DF** 0.66 to 1.33 lb/A. or **Gallery 4.16 SC** 16 to 31 fl oz/A.	MId-March to early April for summer weeds, October for winter annuals.	Tank mix with a grass herbicide such as Surflan, etc., if using for fall preemergence treatment to improve annual bluegrass control. May be used on most common turfgrasses. Do not use on putting greens.
oxadiazon @ 2 to 4 lb/A	Summer annual grasses including goosegrass, annual bluegrass, and some small-seeded broadleaves.	**Ronstar 50 WP** 4 to 8 lb/A. or **Ronstar Flo 3.17 L** 2.5 to 3.8 qt/A.	MId-March to early April for summer weeds, October for winter annuals.	Ronstar products are only available for professional applicators. Apply to dormant bermudagrass or zoysiagrass at least 2-3-weeks before greenup. DO NOT apply more than 3 lb ai/acre on St. Augustine. May cause temporary discoloration of bermudagrass and St. Augustine which is normally outgrown in 2 to 3 weeks. DO NOT apply to wet turf. Delay reseeding for 4 months after treatment. DO NOT apply to red fescue, centipede or golf course greens or tees.
oxadiazon + bensulide @ 1.5 + 6 lb/A	Annual grasses including crabgrass and goosegrass and some broadleaf weeds.	**Goosegrass/Crabgrass Control** 114 lb/A.	Preemergence.	**For golf course use only**. Apply a light irrigation after treatment. DO NOT use on newly sprigged grasses until well established. Delay reseeding for 5 months after treatment. May be used on bermudagrass and bentgrass greens under conditions of heavy goosegrass infestations. See label for precautions concerning use on putting greens.
oryzalin @ 1.5 to 3 lb/A	Annual grasses and certain broadleaf weeds.	**Surflan 4 AS** 1.5 to 2.0 qt/A or **Surflan XL 2 G** 100 to 150 lb/A.	Apply in late fall or early spring prior to the onset of conditions favorable for annual weed germination.	Do not use on cool-season grasses, except tall fescue. Do not apply to newly sprigged grasses until well-established. Delay reseed- ing 90 to 120 days after application. A second application of Surflan can be applied 8 to 10 weeks after initial application for extended control.
pendimethalin @ 1.5 to 3 lb/A	Summer annual grasses, annual bluegrass, and small-seeded broadleaves.	**Pendulum AquaCap 3.8 AS** 3.15 to 6.31 pt/A.	Spring. Preemergence to target weeds.	DO NOT use on newly sprigged turfgrasses; NOT recommended for turfgrass that has been severely thinned due to winter stress. DO NOT reseed within 4 months of application. Use the low rate for tall fescue and Kentucky bluegrass. The high rate may be used on warm-season grasses.
prodiamine @ 0.325 to 1.5 lb/A	Annual grasses and some broadleaf weeds.	**Barricade 65 WDG** 0.5 to 2.3 lb/A. or **Barricade 4 L** 0.625 to 3 pt/A.	Before crabgrass germinates. Applying around March 15 is usually effective.	Apply only to well established turf. See label for limitations. Do not apply to tees or greens. Do not exceed 0.65 lb of active ingredient per year for centipedegrass and St. Augustinegrass. Do not make more than two applications per calendar year, and allow at least 60 days between treatments. Use a split application for goosegrass control. Wait 4 to 6 months per 0.75 lb of Barricade applied before reseeding.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
TURFGRASSES Preemergence - Established Grasses [cont.]				
simazine @ 1 to 2 lb/A	Annual bluegrass, spurweed and many other winter annual weeds.	**Princep Liquid 4 L** 1 to 2 qt/A. or **Simazine 90 DF** 1.1 to 2.2 lb/A.	Apply simazine in October or November for preemergence control of winter annual weeds. Apply December through February for late post emergence control of winter annual weeds.	**Do not use on cool season turf. Apply only to dormant turf.** Apply low rate for annual blue- grass control or high rate for winter annual broadleaf control. DO NOT overseed with desirable turfgrass within 4 months before or 6 months after treatment. DO NOT apply more than 1 lb ai/acre on newly sprigged turfgrasses or on hybrid bermudagrass.
S-metolachlor @ 1.8 to 3.9 lb/A	Annual grasses and some small-seeded broadleaf weeds, yellow nutsedge suppression.	**Pennant Magnum 7.62 EC** 1.3 to 2.6 pt/A.	Mid-March to early April.	May be used on bermuda, zoysia, St. Augustine or centipede. **DO NOT use on cool-season turf**. See label for overseeding restrictions. May cause delayed greenup when applied to dormant bermudagrass. Needs 0.5-inch rainfall or irrigation within 5 days of application.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
TURFGRASSES [cont.]				
TURFGRASSES Postemergence - Established Grasses				
2,4-D amine @ 1 to 1.5 lb/A	Annual and perennial broadleaf weeds.	**Weedar 64, others** 2 to 3 pt/A.	Apply in spring or fall when weeds are actively growing.	Apply to small and actively growing broadleaf weeds as a summer or winter treatment. To control wild garlic/onion, use 3 pt/ acre plus a commercial surfactant. Make first application in late November or early December and follow with a second application in February or March. Repeat this schedule for three consecutive years to control this weed. **DO NOT apply 2,4-D to St. Augustinegrass or centipede**. DO NOT allow spray to drift to contact the foliage of ornamentals.
2,4-D choline @ 0.24 to 1.9 lb/A	Annual and perennial broadleaf weeds.	**Embed Extra** 2 to 3 pt/A.	Apply in spring or fall when weeds are actively growing.	**For use on sod farms only**. Do not use on newly seeded grasses until grass has at least 5-leaves. Maximum of 4 pt/A per application; season maximum is 8 pt/A. **DO NOT use on St. Augustinegrass**.
2,4-D + mecoprop + dicamba	Annual and perennial broadleaf weeds. Controls a broader spectrum of weeds than 2,4-D alone.	**Trimec Classic, Super Trimec, Trimec Southern, Others** (See label for rates.)	Apply in spring or fall when weeds are actively growing.	Several commercial formulations are available. See label for the recommended amount of the for- mulated product. Do not spray when the turfgrass is emerging from winter dormancy. **Do not spray St. Augustine or centipede**. Delay reseeding for 4 weeks after application.
2,4-D + triclopyr @ 0.5 to 1 + 0.25 to 0.5 lb/A	White clover, dandelion, henbit, chickweed, lespedeza, buck- horn plantain, ground ivy, wild violet, prostrate spurge.	**Chaser** 2 to 4 pt/A.	Postemergence to actively growing weeds.	For use on tall fescue, perennial ryegrass and perennial bluegrass. Do not use on other turf species unless injury can be tolerated. Wild violet and prostrate spurge control requires repeat applications.
amicarbazone @ 0.04 to 0.09 lb/A	Annual bluegrass, some broad- leaf weeds (see label).	**Xonerate 2 SC** 3 to 6 fl oz/A.	Postemergence. If necessary, repeat applications should be made at 14 to 21 day intervals.	DO NOT use on golf course putting greens. Apply in spring for annual bluegrass control. Do not apply in summer or fall. Apply when daily high temperatures are 55-80ºF. Irrigate soon after application with 0.1-0.2 inches of water. Do not apply to areas where mefluidide has been applied in the previous 3 months.
asulam @ 2 lb/A	Crabgrass, goosegrass, sandbur.	**Asulox 3.34 L** 5 pt/A.	Postemergence to actively growing weeds.	**For use in St. Augustinegrass sod production and Tifway 419 bermudagrass sod production only**. Do not apply to freshly mowed turf or turf under stress. Do not use a surfactant.
bentazon @ 0.75 to 1 lb/A	Yellow nutsedge, purple nut- sedge, annual sedges, and many broadleaf weeds.	**Basagran T&O, Broadloom** 1.5 to 2 pt/A.	Postemergence. Allow nutsedge to develop as much leaf area as possible.	Apply bentazon to emerged yellow nutsedge that is actively growing and under good soil moisture conditions. Apply 1.5 to 2 pt/A and follow 21 days later with an additional appli- cation if necessary. Do not exceed 4 pt/A (2 lb ai/A) per year. Thorough spray coverage is essential for acceptable control. Spot spraying may result in possible turf injury. DO NOT mow 3 to 5 days prior to or after application. DO NOT apply to golf course greens or collars.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
TURFGRASSES Postemergence - Established Grasses [cont.]				
bromoxynil @ 0.25 to 0.5 lb/A	Seedling broadleaf weeds with 4 true leaves or more.	**Maestro 2EC or 4EC** 1 to 2 or 0.5 to 1 pt/A.	When weeds are in the 2- to 4-leaf stage. Will not control larger weeds. Apply as summer or winter treatment to control seedling annual broadleaf weeds.	**For use on sod farms ONLY.** On newly sprigged or seeded grasses, DO NOT exceed 0.5 lb ai/acre of bromoxynil. Repeated applications spaced 2 weeks apart may be necessary for acceptable control of prostrate spurge. Bromoxynil is a contact herbicide and uniform spray coverage is essential. Do not use on centipedegrass.
carfentrazone @ 0.015 to 0.1 lb/A	Some broadleaf weeds (1.0 to 2.1 fl oz/A) and silvery thread moss (2.0 to 6.7 fl oz/A).	**Quicksilver T&O 1.9 F** 1.0 to 6.7 fl oz/A.	Postemergence. Repeat applications at 2 week intervals will extend duration of weed control.	Tall fescue may exhibit yellowing after application. Use a NIS at 0.25% (v/v).
carfentrazone + MCPP + 2,4-D + dicamba	Most broadleaf weeds.	**SpeedZone** 2 to 5 pt/A. **SpeedZone Southern** 1 to 6 pt/A	Postemergence to actively growing weeds.	Carfentrazone is a contact herbicide, which will cause rapid appearance of symptoms on target species. On warm season grasses, use 2-4 pt/A. See label for details. . Do not apply to St. Augustinegrass.
carfentrazone + MCPA + MCPP + dicamba	Most broadleaf weeds.	**PowerZone** 2 to 6 pt/A.	Postemergence to actively growing weeds.	Carfentrazone is a contact herbicide, which will cause rapid appearance of symptoms on target species. Power Zone does not contain 2,4-D. On warm season grasses, use 2-4 pt/A. See label for details.
carfentrazone + quinclorac @ 0.5 to 0.8 lb/A	Numerous broadleaf weeds, yellow nutsedge, crabgrass and foxtail. Refer to label for complete listing.	**Square One 70 WG** 12 to 18 oz/A.	Postemergence to actively growing weeds.	Refer to comments for carfentrazone and quinclorac. Do not use on golf greens. Can be used 1 day before seeding or 7 days after seeding. May be safely applied to dormant warm season grasses. Actively growing warm and cool season grasses may show injury symptoms for 3 to 7 days after application.
clopyralid @ 0.09 to 0.5 lb/A	Legume species including kudzu, white clover, hop clover, bur clover, black medic. Also controls some composites.	**Lontrel Turf and Ornamental** 0.25 to 1.33 pt/A.	Postemergence during periods of active growth.	Avoid contact with any leguminous andscape plants such as mimosa, honey locust, redbud or littleleaf linden (Tilia cordata). St. Augustinegrass and centipedegrass have good tolerance for Lontrel. Do not use on home lawns. Do not collect grass clippings for mulch or compost.
dicamba @ 0.25 to 0.5 lb/A	Annual and perennial broadleaf weeds. Provides better control of henbit, knotweed, clovers, docks, woodsorrel, spurge and lespedeza than 2,4-D alone.	**Banvel 4 L, Diablo 4L, Vanquish 4 L** 0.5 to 2 pt/A. **Clarity 4 L (sod farms only)** 0.2 to 2 pt/A.	Apply in spring or fall when weeds are actively growing.	Do not apply over the root zone of ornamental trees and shrubs. Repeat applications may be needed. Do not exceed 1 lb/acre during the growing season. **Do not apply to St. Augustinegrass**.
dicamba + iodosulfuron + thiencarbazone @ 0.11 to 0.21 lb/A	Broadleaf weeds including medic, clover, geranium, speedwell, dandelion, dollarweed, doveweed, burweed, spurge and others and carpetgrass.	**Celsius 68 WG** 2.5 to 4.9 oz/A.	Postemergence to actively growing weeds.	Do not exceed 7.4 oz/A per year. Not for greens, collars or turf that is not established. Do not use on bahiagrass or cool-season grasses. Do not use within 14 days of seeding ryegrass or sprigging bermudagrass, or 30 days before seeding bermu- dagrass or zoysiagrass. Do not use on cool-season turf.
fenoxaprop @ 0.02 to 0.17 lb/A	Control of annual grassy weeds. Offers bermudagrass suppres- sion.	**Acclaim Extra 0.57 EC** 3.5 to 39 fl oz/A.	Postemergence. Apply to actively growing weeds. Follow-up applications may be applied 2 weeks after the initial application.	Rate depends on growth stage of weeds. Use only on established Kentucky bluegrass, tall fescue, perennial ryegrass, red fescue and zoysiagrass.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
flazasulfuron @ 0.008 to 0.047 lb/A	Cool season grasses, fescue, annual bluegrass, ryegrass.	**Katana 25 DF** 0.5 to 3.0 fl oz/A.	Applications in late fall are optimal for treating smaller, less mature annual winter weeds.	Use only on bermudagrass, zoysiagrass, or centipedgrass. Do not apply on or upslope to desirable bentgrass or overseeded turf. Movement is encouraged when saturated soils are treated and/or heavy (>0.25-inch) rainfall occurs within 48 hours of application. Treated plants do not show herbicide symptoms until air temperatures are consistently above 60ºF.
florasulam @ 0.013 lb/A	Control of many broadleaf weeds, including chickweed, prickly lettuce, clover, and others. Offers suppression of purple and yellow nutsedge.	**Defendor 0.42 SC** 4 fl oz/A.	Postemergence. If necessary, a second application should be made 4 weeks after the first.	Defendor has soil and foliar activity at cool temperatures and provides fall and early spring postemergence weed control. Add NIS at 0.25%(v/v) when applied alone.
fluazifop @ 0.05 to 0.25 lb/A	Bermudagrass suppression, crabgrass, goosegrass, dallisgrass.	**Fusilade II EC** 3 to 16 fl oz/A.	Postemergence. Best results in spring or Fall. Avoid applications in July and August.	Application to stressed turf or use of high rates may cause discoloration of turf. Follow-up applications should be made every 30 days, unless turf has not recovered. Use a NIS at 0.25% (v/v).
flumioxazin @ 0.375 lb/A	Winter annual broadleaf weeds, crabgrass preemergence.	**SureGuard 51 WDG** 12 oz/A. or **SureGuard 4 SC** 12 fl oz/A.	Dormant bermudagrass.	A contact product for **dormant** bermudagrass for rapid nonselective winter annual broadleaf control with subsequent preemergence crabgrass control. Best winter annual broadleaf control is with late fall (November and December) applications. Best preemergence crabgrass control is with February applications. Allow 8 weeks after application before seeding or sodding.
fluroxypyr @ 0.13 to 0.5 lb/A	Broadleaf weeds.	**Vista XRT** 6 to 23 fl oz/A.	Postemergence. Repeat applications should be timed at 4 week intervals to minimize injury to turf.	Avoid applications to warm season grasses as they are transitioning from winter dormancy. Lower rates should be used on creeping bentgrass, bermudagrass, and St. Augustinegrass. Do not use on golf course putting greens or tees. Check label for specific rate recommendations.
foramsulfuron @ 0.006 to 0.052 lb/A	Cool season grasses, goosegrass, centipedegrass.	**Revolver** 4.4 to 35.2 fl oz/A.	Postemergence to actively growing weeds.	For use on bermudagrass and zoysiagrass. Do not apply to areas where runoff water may come into contact with cool-season grasses. Add NIS at 0.25% v/v.
glufosinate @ 0.75 to 1.5 lb/A	Existing vegetation.	**Finale XL T&O** 3 to 6 qt/A.	Postemergence. Apply to fully dormant turf or severe injury or delay in green-up will occur.	**Do not use on cool-season turf.** Can be used to edge or trim around tress, landscape beds, walkways, etc on golf courses and residential or commercial turf areas. May be broadcast or spot-sprayed. Product has limited translocation. Can also be used in dormant bermudagrass to control winter weeds. Addition of 8.5 to 17 lbs. of ammonium sulfate per 100 gal of water may improve control.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
TURFGRASSES Postemergence - Established Grasses [cont.]				
glyphosate @ 0.28 lb/A	Annual bluegrass.	**Glyphosate** (4 lb/gal formulations) 1 pt/A.	APPLY ONLY TO DORMANT BERMUDAGRASS OR BAHIAGRASS.	Add surfactant according to label directions. DO NOT apply during greenup or to actively growing bermudagrass. Do not apply to zoysiagrass at any time. Do not use on cool-season grasses.
halosulfuron @ 0.031 to 0.062 lb/A	Yellow and purple nutsedge green kyllinga (suppression).	**Prosedge, SedgeHammer** 0.66 to 1.33 oz/A.	Postemergence to actively growing nutsedge, early to mid-June.	Apply to 3- to 8-leaf nutsedge. Use 0.25 to 0.5% v/v nonionic surfactant. Two applications may be made. Do not exceed 0.125 lb/ai per acre in a single season. Do not apply to putting greens. For spot treatment, mix 0.9 grams of 75DF formulation in one gal- lon of water with ⅓ ounce surfactant. Do not mow for 2 days before and 2 days after application.
Imazosulfuron @ 0.38 to 0.66 lb/A	Supression and control of kyllinga, purple nutsedge, yellow nutsedge, and various broadleaf weeds.	**Celero 75 WDG** 8 to 14 oz/A.	Postemergence. If necessary, a second application should be made 21 days after the first.	Do not apply to golf course putting greens. Add NIS at 25% (v/v). Do not appy to wet turf.
MCPA + mecoprop + dicamba	Annual and perennial broadleaf weeds. Controls a broader spectrum of weeds than 2,4-D alone.	**Tri-Power, Trimec Encore, Triamine, others** (See label for rates.)	Apply in spring or fall when weeds are actively growing.	Delay applications to newly seeded grasses until after 3-4 mowings.Delay reseeding for 4 weeks after treatment. Do not spray when turfgrass is emerging from winter dormancy. **Do not spray on St. Augustine or centipede.**
mesotrione @ 0.125 to 0.25 lb/A	Tufted lovegrass, preplant crabgrass, chickweed, speedwells and others.	**Tenacity 4 L** 4 to 8 fl oz/A.	Pre and postemergence.	Use on tall fescue and centipedegrass. May also be used on St. Augustinegrass grown for sod only. Only apply to bermudagrass grown for sod if injury can be tolerated. A postemergence (primary) herbicide with some preemergence activity. Apply at grass seeding in at least 30 GPA. Activate with 0.15-inch irrigation.
metribuzin @ 0.25 to 0.5 lb	Goosegrass, chickweed, henbit, parsley-piert, spurweed.	**Sencor 75%** 0.33 to 0.66 lb/A.	Apply to dormant turf for control of the winter annual complex. Apply to actively growing turf for control of goosegrass.	Use low rate on actively growing bermudagrass Use high rate on dormant bermudagrass to control winter annual weeds. Do not apply in the root zone of shallow-rooted ornamentals. Do not apply to golf course tees, putting greens, or other turf mowed less than ½ inch. Do not use on cool-season grasses.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
metsulfuron @ 0.009 to 0.038 lb/A	Many broadleaf weeds and bahiagrass.	**Manor, Blade, MSM Turf, Mansion and others** 0.25 to 1 oz/A.	Postemergence to actively growing weeds.	Safe for use on bermudagrass, St. Augustinegrass and zoysiagrass. Will likely cause some temporary chlorosis. Add 0.25% nonionic surfactant. **Do not exceed the 0.25 ounce rate on centipedegrass**. To avoid damage to woody ornamentals through root uptake, do not apply more than 0.5 ounce per acre per treatment and do not make more than two applications per year. Treating zoysiagrass during transition may result in injury.
metsulfuron + rimsulfuron @ 0.015 + 0.018 lb/A	Most winter turfgrass weeds including broadleaf weeds and grasses.	**Negate 37 WG** 1.5 oz/A.	December-March.	For use on bermudagrass and zoysiagrass only. Do not use beneath desirable trees or ornamentals or on desirable bahiagrass. May injure zoysiagrass during transition. Do not use on residential turf. Leave a buffer around cool-season grasses. Add 0.5% nonionic surfactant.
MSMA @ 2 to 3 lb/A	Crabgrass and dallisgrass, sandbur and nutsedge suppression.	**MSMA** See label.	Two applications spaced 7 to 10 days apart are needed for acceptable control.	**MSMA is labeled for use in sod farms and golf courses only**. Not labeled for residential use, parks or other turf sites. Temporary discoloration of turf will occur. May be applied to newly sprigged bermudagrass at the above rates. On new stands of fescue, apply one-half rate after three mowings. Add a surfactant according to label directions. Zoysiagrass cultivars vary in tolerance to MSMA. 'Meyer' is more tolerant to MSMA than 'Emerald' or 'Matrella'. DO NOT apply to centipede or St. Augustinegrass.
MSMA + metribuzin @ 2 + 0.25 to 0.33 lb/A	Goosegrass.	**MSMA + Sencor 75%** See label.	Postemergence salvage application, usually done in July or August.	**MSMA is labeled for use in sod farms and golf courses only**. Not labeled for residential use, parks or other turf sites. This tank mix provides better control of goosegrass than the use of MSMA alone. Apply ONLY to established bermudagrass that is actively growing and not under stressed conditions. Two applications, spaced 7 to 10 days apart, may be necessary for acceptable control.
pinoxaden @ up to 0.063 lb/A	Control of crabgrass and other grass weeds. Some suppession of dallisgrass at spot spray rate.	**Manuscript** Up to 19.2 fl oz/A. Add methlyated seed oil surfactant (0.5 to 1% v/v).	Postemergence to actively growing weeds.	Labeled for bermudagrass and zoysiagrass. May also be use in St. Augustinegrass grown for sod only. Split applications of 9.6 fl oz/A at a 2-week interval are permitted. Instructions for spot spraying can be found on the label. Do not spot spray more than 10,000 sq ft per acre.
pyrimisulfan @ 0.044 to 0.061 lb/A	Nutsedge and kyllinga species	**Arkon** 3.4 to 4.7 pt/A	Postemergence control of sedges.	Best when 3.5 pt/A is followed by 3.5 pt/A with 30 days between applications. Do not exceed 7 pt/A per year. To minimize risk of injury on St. Augustinegrass and centipedegrass make applications when nighttime temperatures are over 50ºF for 7 consecutive nights. Can be used on creeping bentgrass greens.
quinclorac @ up to 1.5 lb/A	Selective control of crabgrass, foxtails, and broadleaf weeds in many common turfgrasses.	**Drive XLR 8** Up to 128 fl oz/A.	Postemergence to actively growing weeds.	Not labeled for golf course putting greens or collars. Add COC (2 pt/A) or MSO (1.5 pt/A) to increase performance. Generally safe to use on newly seeded turf, although adding a surfactant is not recommended on new seedlings. See label for details.
rimsulfuron @ 0.008 to 0.03 lb/A	Annual bluegrass, henbit, deadnettle, woodsorrel, and cool-season grasses.	**TranXit 25 DF** 0.5 to 2.0 oz/A.	See label for details.	**Not labeled for residential lawns.** Labeled for cool season grass control in non-overseeded bermudagrass, for transition of perennial ryegrass and annual bluegrass control before overseeding.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
TURFGRASSES Postemergence - Established Grasses [cont.]				
sethoxydim @ 0.19 to 0.28 lb/A	Large crabgrass, goosegrass.	**Segment 1 EC** 1.5 to 2.25 pt/A. **Segment II 1.5 EC** 1 to 1.5 pt/A.	Apply to actively growing large crabgrass before it is well tillered.	Postponing mowing for 7 to 14 days after appli- cation may improve weed control. Add 2 pt oil concentrate per acre or ¾ fl oz/1,000 sq ft when using Segment II. **Centipedegrass and fine fescue only.**
sulfentrazone @ 0.125 to 0.375 lb/A	Kyllinga, yellow nutsedge and many broadleaf weeds.	**Dismiss 4 F** 4 to 12 fl oz/A.	Postemergence to actively growing weeds.	Safe on most warm- and cool-season turfgrasses. Maximum use rate on creeping bentgrass is 4 fl oz/ acre. Weed control spectrum increases when tank-mixed with 2,4-D and dicamba. Do not apply to golf course tees or greens. Do not apply directly to land-scape ornamentals or ornamental beds.
sulfentrazone + imazethapyr @ 0.29 to 0.45 lb/A	Annual sedge, kyllinga, yellow and purple nutsedge.	**Dismiss South 4 L** 9.5 to 14.4 oz/A.	Postemergence to actively growing weeds.	Use only on well-established labeled turfgrass spe-cies. Do not use within 4 weeks of reseeding, over-seeding or sprigging. Do not use on golf course greens or tees or directly to landscape ornamentals or ornamental beds. Suggested split application rate options are 9.5 oz followed by 4.9 oz/acre or 7.2 oz followed by 7.2 oz/acre with 35 days between applications.
sulfentrazone + metsulfuron @0.26 to 0.41 lb/A	Numerous broadleaf weeds, especially dollarweed, ground ivy, doveweed, wilt violet and some sedges (not purple). Refer to label for complete listing.	**Blindside 66 WG** 6.5 to 10 oz/A.	Postemergence to actively growing weeds.	Refer to comments for sulfentrazone and metsulfuron. Not for use on golf greens, collars or tees. A one-month seeding restriction followsuse. Labeled for use in Bermuda, centi-pedegrass, Kentucky bluegrass, St. Augustine-grass, tall fescue, zoysiagrass. **Use caution when applying this product on cool-season grasses**, especially tall fescue.
sulfentrazone + quinclorac @ 0.75 to 1 lb/A	Numerous broadleaf weeds, yellow nutsedge, crabgrass, and foxtail. Refer to label for complete listing.	**Solitare 75 WG** 1 to 2 lb/A.	Postemergence to actively growing weeds.	Refer to comments for sulfentrazone and quinclorac. Not for use on golf greens, collars or tees. A one-month seeding restriction follows use. Bermudagrass, bluegrass, buffalograss, centipedegrass, perennial ryegrass, seashore paspalum, tall fescue, zoysiagrass.
sulfosulfuron @ 0.035 to 0.094 lb/A	Johnsongrass, sedges including yellow, purple and kyllinga.	**Certainty 75 DF** 0.75 to 2 oz/A.	Postemergence to actively growing weeds.	Do not use on cool-season turf. Add 0.25% non-ionic surfactant. May be used on commercial or residential turf. Make a second application after 30 days if needed. Do not apply within 4 feet of golf course putting greens.
thiencarbazone + foram-sulfuron + halosulfuron 0.038 to 0.12 lb/A	Nutsedge, goosegrass, see label for other weeds.	**Tribute Total** 1.0 to 3.2 oz/A.	Postemergence to actively growing weeds.	For use in bermudagrass and zoysiagrass only. Do not exceed 6.4 oz per year. Do not apply where run-off onto cool-season turf can occur. Add NIS at 0.25% v/v. See label for instructions on using next to sensitive areas such as olf course putting greens.
triclopyr @ 0.5 to 1.0 lb/A	Broadleaf weeds and bermudagrass supression.	**Turflon Ester 4 EC** 1 to 2 pt/A.	Postemergence to actively growing weeds.	For use on tall fescue, perennial ryegrass and perennial bluegrass. Do not use on other turf species unless injury can be tolerated. Bermu-dagrass, wild violet, and spurge control require repeat applications.
triclopyr + clopyralid @ 0.56 to 1.88 + 0.094 to 0.188 lb/A.	White clover, dandelion, henbit, chickweed, lespedeza, buck-horn plantain, ground ivy, wild violet, prostrate spurge.	**Confront** 1 to 2 pt/A.	Postemergence to actively growing weeds.	For use on tall fescue, perennial ryegrass and peren-nial bluegrass. Do not use on other turf species unless injury can be tolerated. Do not treat warm-season grasses being mowed at less than 0.5-inch. Wild violet and prostrate spurge control requires repeat applications. Do not use on residential turf.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
trifloxysulfuron @ 0.015 to 0.026 lb/A	Cool-season grasses, Virginia buttonweed, sedges, white clover, dichondra, carpetweed.	**Monument 75WG** 0.33 to 0.56 oz/A. **Recognition** 1.29 to 1.95 oz/A	Postemergence to actively growing weeds.	For use on bermudagrass and zoysiagrass. For spot treatment, add 0.0176 ounce per gallon plus two teaspoons of surfactant. Use repeat appli- cations for sedges. Do not apply to areas where runoff water may come into contact with cool-sea- son grasses. Add 0.25% nonionic surfactant.
trifloxysulfuron @ 0.016 to 0.025 lb/A *PLUS* fluazifop @ 0.27 to 0.53 lb/A	Bermudagrass plus those listed for trifloxysulfuron and fluazifop.	**Recognition** 1.29 to 1.95 oz/A *PLUS* **Fusilade II Turf and Ornamental** 12 to 24 fl oz.A	Postemergence to actively growing weeds.	Recognition contains a safener that allows Fusilade to be applied safely in zoysiagrass and St. Augustinegrass. To control bermudagrass, repeat applications made 4 to 6 weeks apart will be necessary. Wait at least 4 weeks after sprigging, sodding, or seed emergence. Can be used on sod farms, golf courses, and residential and commercial turfgrass areas.
topramezone @ 0.021 to 0.031 lb/A	Crabgrass, goosegrass and other annual grasses.	**Pylex 2.8 L** 1.0 to 1.5 fl oz/A.	Postemergence to actively growing weeds.	May be used on centipedegrass, Kentucky bluegrass and tall fescue. Do not apply to St. Augustinegrass or zoysiagrass. A reduced rate may be used for selective control of goosegrass in bermudagrass. See label for detailed instructions.

Quick Reference for Common Ornamental Weed Control Options

Weed	Herbaceous Ornamentals		Woody Ornamentals	
	Selective Preemergence Control	**Selective Postemergence Control**	**Selective Preemergence Control**	**Selective Postemergence Control**
Annual bluegrass	Pendulum, Surflan, Barricade, Treflan, Preen, Devrinol, Dimension (apply in August).	Envoy	Pendulum, Surflan, Barricade, Treflan, Preen, Devrinol, Dimension (apply in August).	Envoy
Bermudagrass	No	Fusilade/Ornamec, Segment, Envoy (repeat applications needed). In our trials, Fusilade has been the most effective for bermudagrass.	No	Fusilade/Ornamec, Segment, Envoy (repeat applications needed). In our trials, Fusilade has been the most effective for bermudagrass.
Common chickweed	Pendulum, Surflan, Barricade, Treflan, Preen, Devrinol, Dimension (apply in September). Ronstar does not control this weed.	No	Pendulum, Surflan, Barricade, Treflan, Preen, Devrinol, Dimension, Gallery (apply in September). Ronstar does not control this weed.	Limited Options (carefully directed applications of Roundup or Finale).
Creeping woodsorrel	Yes (from seed) Factor, RegalKade G, Pendulum 2G.	No	Yes (from seed) Gallery, Snapshot, Ronstar, Rout, OH2, Surflan.	No (carefully directed applications of Roundup or Finale).
Large crabgrass	Pendulum, Surflan, Barricade, Treflan, Preen, Devrinol, Dimension. Apply split applications for full-season control.	Envoy, Fusilade, Ornamec or Segment. Treat before crabgrass tillers. In our trials, Segment has been more effective on large crabgrass.	Pendulum, Surflan, Barricade, Treflan, Preen, Devrinol, Dimension Apply split applications for full-season control.	Envoy, Fusilade, Ornamec, or Segment. Treat before crabgrass tillers. In our trials, Segment has been more effective on large crabgrass.
Prostrate spurge	Pendulum and Surflan (fair control). Apply split applications for full-season control.	No	Rout, OH2, Snapshot. Apply split applications for full-season control.	No (carefully directed applications of Roundup or Finale).
Wild garlic	No	No	No	No (carefully directed applications of Roundup or Finale).
Yellow nutsedge	Pennant. Not effective on purple nutsedge.	No	Pennant. Not effective on purple nutsedge.	Directed applications of Basagran or Manage. Basagran is not effective on purple nutsedge.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
ORNAMENTALS				
Postplant but Preemergence to Weeds				
prodiamine @ 0.75 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Barricade WDG** 1.15 lb/A.	Postplant but preemergence to weeds.	Apply to established trees, shrubs and flowers listed on the label. Allow the soil to settle around the roots before application. Do not apply more than 1.15 lb in any 60-day period and do not exceed 2.3 lb per year.
dithiopyr @ 0.5 lb/A	Annual grasses and some broadleaf weeds.	**Dimension Ultra 40 WP** 1.2 lb/A.	Preemergence to weed-free soil.	Apply to established ornamentals. Do not incorporate. Activate by applying 0.5-inch of sprinkler irrigation. Check label for tolerant species.
isoxaben @ 0.5 to 1 lb/A	Many annual broadleaf weeds.	**Gallery 75 DF** 0.66 to 1.33 lb/A.	Postplant but preemergence to weeds.	Do not apply until the soil has settled around the roots and no cracks are present. Will not control emerged weeds. Combine with Surflan for improved annual grass control. **See label for plant back restrictions.** Do not treat seed, liner or cutting beds. Do not treat ground covers until they are established and well-rooted.
pendimethalin @ 2 to 3 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Pendulum 2G** 100 to 150 lb/A.	Postplant but preemergence to weeds.	May be applied to container- and field-grown ornamentals. Do not apply to moist foliage. Apply only to established plants. Do not apply to soil with cracks that would allow direct contact of Pendulum with roots. Do not apply to seedbeds, liner or transplant beds. Weed control spectrum similar to Treflan (trifluralin).
metolachlor @ 1.2 to 2.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Pennant Magnum 7.62** 1.3 to 2.6 pt/A.	Postplant but preemergence to weeds.	Apply to weed-free soil. Direct toward the base of ornamentals established at least 2 weeks. For additional broadleaf control, tank mix with Princep. Derby is a premix which contains Princep and Pennant.
simazine @ 1 to 2 lb/A	Annual grasses and broadleaf weeds.	**Princep 4L** 1 to 2 qt/A.	Postplant but preemergence to weeds.	Apply in fall or spring before new weed growth appears. Do not apply on Japanese holly, azaleas or rhododendrons. Apply only once per year. Apply at least one year after transplanting.
oxadiazon @ 2 to 4 lb/A	Annual grasses and some broadleaf weeds. **Does not control chickweed.**	**Ronstar 2G** 100 to 200 lb/A.	Postplant but preemergence to weeds.	Apply to weed-free soil. Safe on a wide variety of plant material. Disturbing soil after application may result in reduced weed control. Use on container- and field-grown nursery stock. Do not apply when the foliage is wet. Higher rates may be needed on bark/peat media. For continued weed control, a second application may be made 60 to 120 days later on some species. Ronstar 50WP may cause foliar injury to species that are not affected by Ronstar G. Consult WP label. Toxic to fish. Do not contaminate water.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
ORNAMENTALS				
Postplant but Preemergence to Weeds [cont.]				
oxyfluorfen + oryzalin @ 2 + 1 lb/A	Annual grasses and some broadleaf weeds.	**Rout** 100 lb/A.	Postplant but preemergence to weeds.	Use on container- and field-grown nursery stock. Apply to weed-free soil when plant foliage is dry and plants are not in a growth flush. Apply overhead irrigation to wash granules off foliage. Do not apply when foliage is wet.
isoxaben + trifluralin @ 0.5 to 1.0 + 2.0 to 4.0 lb/A	Annual grasses and broadleaf weeds.	**Snapshot 2.5 TG** 100 to 200 lb/A.	Postplant but preemergence to weeds.	Prepackaged mix of Gallery and Treflan. Apply before weed germination.
trifluralin + isoxaben + oxyfluorfen @ 2 + 0.25 + 0.25 to 4.0 + 0.5 + 0.5 lb/A	Wide range of grass and broadleaf weeds.	**Showcase 2.5 G** 100 to 200 lb/A.	Preemergence.	Useful on a wide range of container- and field-grown ornamentals. See label for sensitive species.
flumioxazin @ 0.25 to 0.38 lb/A	Many annual grasses and broadleaf weeds.	**SureGuard** 8 to 12 oz/A.	Preemergence to weeds.	This is a new product. It is a very active herbicide. Read the label carefully before using. Do not apply to wet foliage. Do not apply in an enclosed structure. Before moving plants into an enclosed structure, apply 1-inch of irrigation water and wait 14 days. Can severely injure bedding plants and herbaceous perennials, and immature foliage on woody plants.
flumioxazin @ 0.38 lb/A	Many annual grasses and broadleaf weeds.	**BroadStar** 150 lb/A.	Preemergence to weeds.	This is a new product. It is a very active herbicide. Read the label carefully before using. Do not apply to wet foliage. Do not apply in an enclosed structure. Before moving plants into an enclosed structure, apply 1-inch of irrigation water and wait 7 days. Can severely injure bedding plants and herbaceous perennials, and immature foliage on woody plants.
oryzalin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Surflan AS** 2 to 4 lb/A.	Postplant but preemergence to weeds.	May be applied over-top or as a directed spray on field- and container-grown ornamentals. Will not control established weeds. Irrigate to improve weed control. XL is granular formulation that contains Surflan and Balan.
trifluralin @ 2 to 4 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Treflan 5G, Preen** 40 to 80 lb/A.	Preemergence or preplant incorporated.	Use lower rate if incorporated, higher rate if irrigation is used for activation.
prodiamine @ 0.5 to 1.5 lb/A	Annual grasses and some small-seeded broadleaves.	**RegalKade G** 132 to 300 lb/A.	Preemergence to weeds.	Apply before weeds germinate. Do not apply more than 300 lb per year.
oxadiazon + prodiamine @ 2.0 + 0.4 lb/A	Annual grasses and some small-seeded broadleaves.	**RegalStar G** 200 lb/A.	Preemergence to weeds.	Apply before weeds germinate. Do not apply when foliage is wet.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
ORNAMENTALS				
Postemergence to Weeds				
bentazon @ 0.75 to 1.0 lb/A	Broadleaf weeds, annual sedges and yellow nutsedge.	**Basagran, Lescogran** 1.5 to 2.0 pt/A.	Early postemergence for broadleaf annuals, during active growth for yellow nutsedge.	Apply as a directed spray to small, actively growing weeds and away from the foliage of desirable plants. Add a crop oil or nonionic surfactant. A second application 7-10 days later may be needed for acceptable yellow nutsedge control.
glufosinate @ 0.75 to 1.5 lb/A	Most annual weeds, top burn on perennials.	**Finale 2S** 3 to 6 pt/A.	During active growth.	Finale is a nonselective herbicide. Post-directed spray only. Use as an edging treatment. Avoid contact with desirable plants including foliage and green bark. Use shield to prevent spray from contacting desirable plants.
fluazifop-P @ 0.09 to 0.38 lb/A	Grasses.	**Fusilade II** 6 to 24 oz/A.	Early postemergence for annual grasses, johnsongrass 8-18", bermudagrass 4-8" runners.	May be applied over-top to selected ornamentals and as a directed spray to others. Do not apply to grass weeds under environmental stress. Use nonionic surfactant for ornamentals (0.5 fl oz/gal water), not crop oil concentrate.
imazaquin @ 0.38 to 0.5 lb/A	Broadleaf annuals, yellow and purple nutsedge.	**Image 1.5 LC** 2 to 3 pt/A.	Postemergence also has soil activity.	Add nonionic surfactant. Do not apply over the roots of species that are not approved on the label.
glyphosate @ 0.75 to 4.0 lb/A	Grasses and broadleaf weeds.	**Glyphosate** (4 lb/gal formulations) 3 to 8 pt/A.	Postemergence.	Apply as a directed spray in established plantings. Avoid contact with bark or foliage of desirable plants. Cleared for site preparation before planting nursery stock.
sethoxydim @ 0.19 to 0.47 lb/A	Grasses.	**Segment 1 EC** 2.25 to 3.75 pt/A.	Early postemergence for annual grasses, johnsongrass 8-18", bermudagrass 4-8" runners.	Apply over-top of ornamentals to actively growing grasses. Retreatment may be needed for perennial grasses. Do not apply to grass weeds under environmental stress. Add a crop oil concentrate.
clethodim @ 0.125 to 0.25 lb/A	Annual and perennial grasses.	**Envoy 0.94 EC** 17 to 34 oz/A.	Postemergence to actively growing grasses.	Add 0.25% nonionic surfactant (1 pt in 50 gal). Crop oil concentrate is not recommended.
halosulfuron @ 0.063 lb/A	Purple nutsedge, yellow nutsedge, green kyllinga.	**Sedgehammer 75 DF** 1.33 oz/A.	Postemergence to weeds, start applications in late May to early June, repeat 6 to 8 weeks later.	Add as a post-directed spray around any established woody ornamental plants. Wait 3 months after transplanting before using this product. Begin nutsedge treatment program in May to early June to reduce tuber formation. Manage injured foliage of azalea, crape myrtle, cotoneaster and Japanese holly.

Ornamental Weed Control Tips:

1. None of the preemergence herbicides will give complete control of all weed species. Tank mixing herbicides will usually broaden the spectrum of control. Typical combinations are a grass herbicide such as Surflan or Pendulum plus a broadleaf herbicide such as Princep or Gallery. If a chemical application kills all but one species, that species will multiply, resulting in a shift in the weed population. The resulting shift will eventually render that product ineffective. Rotate chemical usage to reduce the buildup of tolerant weeds. Directed sprays of nonselective herbicides such as Roundup or Gramoxone and cultivation will help provide control of escapes.
2. A single application of a preemergence herbicide will not provide season-long control. Late fall or winter applications of Gallery, Princep or Casoron will provide weed control well into the growing season. When control begins to break, the area may be clean cultivated or treated with a nonselective postemergence herbicide, and an application of one of the other preemergence herbicides can be made.
3. Always use a new herbicide on a trial basis until sufficient experience is gained to feel comfortable with its use. Leave an untreated area for comparison when using new product so that weed control and crop injury comparisons are possible.
4. Small, shallow-rooted plants are more susceptible to herbicide injury than mature, deep-rooted plants. Other factors that increase the chances of injury are (1) sandy soils and excessive watering and (2) failure to use irrigation to remove granular herbicides from the foliage.
5. Use a separate sprayer for herbicides only. It is very difficult to completely remove all traces of some chemicals from sprayers.
6. Consult the label precautions before using any ornamental herbicide since specific cultivars within a genus and species may have varying degrees of sensitivity to a herbicide. In addition, be certain the herbicide is approved for the use that you have chosen, i.e., propagation beds, container, transplanted liners or rooted cuttings, or large, well-established plants.

LIST OF FORESTRY HERBICIDES WITH AN ESTIMATE OF POTENTIAL WEED CONTROL

HERBICIDES	Application	Rate Per Acre	Ash	Bay (Magnolia)	Birch	Black Cherry	Blackberry	Blackgum	Cedar, Red	Dogwood	Elm	Hackberry	Hawthorn	Hickory	Honeysuckle	Hornbeam	Kudzu	Locust	Maple, Red	Oak	Peppervine	Persimmon	Pine	Privet	Sassafrass	Sumac	Sweetgum	Trumpetcreeper	Waxmyrtle	Willow
Arsenal A.C.	Foliar Spray	24 oz	E	P	G	P	P	E	P	G	P	P	E	E	F	G	F	P	G	E	G	G	P	G	G	E	E	G	P	E
Arsenal A.C. + Accord XRT II	Foliar Spray	20 oz + 4 qt	E	P	G	G	E	E	P	G	G	E	E	E	G	G	F	G	G	E	G	G	G	G	G	E	E	E	F	E
Arsenal A.C. + Escort	Foliar Spray	24 oz + 1 oz	E	P	G	G	E	E	F	G	G	-	E	G	G	G	G	E	E	E	G	G	P	G	G	E	E	G	F	E
Arsenal A.C. + Garlon 4 Ultra	Foliar Spray	20 oz + 2 qt	E	F	G	F	E	E	P	G	G	-	E	E	G	G	G	-	G	E	G	G	G	G	G	E	E	G	G	E
Arsenal A.C. + Tordon 22K**	Foliar Spray	16 oz + 2 qt	E	P	-	G	E	E	G	G	F	-	E	E	G	-	G	E	G	E	G	G	G	G	G	E	E	G	-	E
Tordon 22K** + Garlon 4 Ultra	Foliar Spray	2 qt + 2 qt	E	F	G	G	E	E	G	G	G	-	E	G	G	G	G	E	G	E	G	G	G	G	G	E	E	G	G	E
Velpar, Pronone	Soil Treatment	3 lb ai	P	P	G	E	E	G	F	F	E	P	G	G	G	G	P	P	F	E	P	P	P	F	P	E	G	P	F	E
Arsenal A.C.	Cut Surface	20% chemical + 80% water	G	E	E	E	-	E	G	E	F	G	E	E	-	E	-	P	G	E	-	E	P	E	E	E	E	-	-	E
Glyphosate	Cut Surface	50% chemical + 50% water	F	F	G	F	-	E	E	E	G	G	G	G	-	E	-	G	F	G	-	G	E	E	G	E	E	-	-	E

Weed Control Estimates: E = Excellent, G = Good, F = Fair, P = Poor, - = No data;
*Additional products are available, the products listed provide a reference. For detail see UACES MP553. ** Picloram is a restricted use herbicide.

For more information on forestry herbicide recommendations, please scan the QR code.

FORESTRY HERBICIDES USED FOR HERBACEOUS WEED CONTROL: ESTIMATE OF POTENTIAL CONTROL

HERBICIDES	Bahiagrass	Bermudagrass	Bitterweed	Broomsedge	Buttercup	Cocklebur	Crabgrass	Dogfennel	Fescue	Fleabane	Goldenrod	Johnsongrass	Horseweed	Ragweed	Tickseed Sunflower
Arsenal A.C. (4 oz)**	P	P	G	P	G	F	P	F	F	G	F	F	G	G	G
Arsenal A.C. + Oust XP (4 oz + 2 oz)	G	P	E	P	E	F	E	G	G	G	G	G	G	G	G
Arsenal A.C. + Oust Extra (4 oz + 4 oz)	E	P	E	P	E	E	E	E	G	G	E	G	G	G	G
Oust XP (2 oz)	G	P	E	P	E	F	G	G	G	G	F	G	G	G	G
Oust XP + Velpar DF (2 oz + 1.33 lb/A)	G	P	E	P	E	P	G	G	G	G	F	F	G	G	G
Pronone 10 MG (7 lb/A)	F	P	E	P	E	P	F	G	E	G	F	P	G	G	G

Weed Control Estimates: E = Excellent, G = Good, F = Fair, P = Poor, - = No data;
* Additional products are available, the products listed provide a reference. For more detail see UACES MP553.
** After July of 1st growing season, rates may be increased (see label). *** Susceptibility of grasses depends on improved status.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Forestry Herbicide Use in Hardwoods Herbaceous Weed Control Postplant but Preemergence to Weeds				
sulfometuron @ 0.06 lb/A	Many herbaceous species.	**Oust XP** 2 oz/A.	Apply soon after transplanting. Late dormant season.	Apply while hardwood seedlings, transplants or cuttings are dormant. Application after bud break or leaf-out may cause injury to the hardwoods. Do not add surfactant. Broadcast or band with a ground sprayer. Approved for use on 23 hardwood species including oaks. Do not use on marshy sites .
Forestry Herbicide Use in Pines Site Preparation - Foliar Spray				
imazapyr @ 0.75 lb/A	Most brush species except blackberry, elm, locust and pine. Controls many herbaceous plants.	**Arsenal A.C.*** 24 oz/A.	Late summer to fall before leaves begin to change color.	May be applied by helicopter, ground equipment and backpack sprayers. Apply as a foliar spray. Add nonionic surfactant at 0.5%. Brownout is very slow with this treatment. Used on sites with dense brush where no burn is planned and mechanical site prep is likely. Do not spray when wind exceeds 5 mph.
imazapyr @ 0.75 lb/A	Most brush species including: gum, cherry, maple and many vines, grasses and broadleaf weeds.	**Chopper Gen 2*** 48 oz/A.	Late summer to fall, but before leaves begin to change color.	Chopper may be mixed with water, diesel oil or recommended seed oils and penetrating oils. Chopper may be mixed as an emulsion carrier. Mix with water first and then make up the rest of the carrier volume with 12 to 50% seed oil on a volumetric basis. Use a seed oil with at least 50% esterified seed oil by volume.
imazapyr + glyphosate @ 0.75 + 4.0 lb/A	Most woody species and many herbaceous plants.	**Chopper Gen 2 + Accord XRT II*** 24 oz + 128 oz/A.	Late summer to fall before leaves begin to change color.	May be applied by helicopter, ground equipment and backpack sprayers. Apply as a foliar spray. Add nonionic surfactant at 0.5% or 1 qt/A. Do not spray when wind exceeds 5 mph. Considered to be one of the most consistent treatments available over a wide range of conditions.

* Sulfometuron Methyl + Metsulfuron Methyl can be added fall mix.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
imazapyr + triclopyr @ 0.5 to 1.0 + 0.5 to 1.5 lb/A	Most woody species and many herbaceous plants.	**Arsenal A.C. + Garlon 4** 16 to 32 oz/A + 16 to 48 oz/A.	Late summer to fall before leaves begin to change color.	Provides rapid brownout, especially on sites with a high percentage of waxy leaf species.
picloram or (picloram + 2,4-D) + triclopyr @ 1 or (0.8 + 3) + 2 to 3 lb/A	Most brush species and many broadleaf weeds but no grass control.	**Tordon 22K or Graslan L + Garlon XRT** 2 qt/A or 4 qt/A + 2 to 3 qt/A.	Apply after full leaf development in the spring.	Do not burn or cut treated plants for 6 to 8 weeks after application. Apply by ground or air. Add 0.5% nonionic surfactant. Use on bottomland hardwood sites where there is little grass competition.
picloram + imazapyr @ 1 + 0.5 lb/A	Most brush species including residual pines and many grasses and broadleaf weeds.	**Tordon 22K+ Arsenal AC** 64 oz/A + 24 oz/A.	June to July.	Ground or aerial application. Used on sites where there is a high percentage of undesirable pines.
Forestry Herbicide Use in Pines Site Preparation				
hexazinone @ 3 to 4 lb/A	Most woody plants.	**Velpar ULW** 4.0 to 5.33 lb/A.	In the spring after danger of frost has passed. Apply from bud swell to early leaf-out.	Velpar ULW is generally applied by helicopter. Rates depend on soil type and species present. Uniform, accurate application is essential.
Forestry Herbicide Use in Pines Pine Release - Foliar Spray				
imazapyr @ 0.38 to 0.5 lb/A	Most brush species except blackberry, elm, cherry, locust and pine.	**Arsenal AC** 12 to 20 fl oz/A.	Late summer to fall, but before leaves begin to change color. Change in leaf color of blackgum is a reliable indicator of when to spray.	May be applied by helicopter, ground equipment, backpack sprayers and injection equipment. Apply as a foliar spray. Add nonionic surfactant at 0.25%. Brownout is very slow with this treatment. Do not spray when wind exceeds 5 mph.
imazapyr + metsulfuron @ 0.38 to 0.5 + 0.06 lb/A	Most brush species including blackberry.	**Arsenal AC + Escort** 12 to16 fl oz/A + 1.0 oz/A.	Same as above. Escort is safe to use on non-hardened off pines.	Commonly used on sites with blackberry infestation. May be applied by helicopter, ground equipment and backpack sprayers. Do not spray when wind exceeds 5 mph. Apply as a foliar spray. Add nonionic surfactant at 0.25% or 1 qt/A. Brownout is slow with this treatment.
imazapyr	Most brush species.	**Arsenal AC** 1 to 3 fl oz/A per gallon of water.	Same as above.	Apply as a directed foliar spray in a low volume backpack application. Add 0.25% nonionic surfactant. See label for instructions for making more concentrated mixtures for hard to kill species.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Forestry Herbicide Use in Pines Pine Release - Soil Treatment				
hexazinone @ 1.5 to 2.25 lb/A	Many brush species.	**Velpar DF** 1.33 to 2 lb/A.	Mid-March to early May.	Do not use on a ripped site. For use in natural stands employing all-age management. Excessive injury may occur when applications are made to loblolly pines less than 4 years of age when planted in coarse-textured soils and less than 3 years of age when planted in fine-textured soils.
Forestry Herbicide Use in Pines Herbaceous Weed Control				
sulfometuron + hexazinone @ 0.06 + 1.0 lb/A	Many herbaceous species.	**Oust + Velpar DF** 2 oz/A + 1.33 lb/A.	February to April.	Soil and foliar activity. Broadcast, ground or aerial.
hexazinone + sulfometuron @ 0.4 to 0.63 + 0.07 to 0.11 lb/A	Annual grasses and broadleaf weeds.	**Oustar** 10 to 16 oz/A.	Preemergence to weeds.	Loblolly pines only. Use lower rate on coarse-textured soils. Rainfall is needed for activation.
sulfometuron + atrazine @ 0.047 to 0.094 + 2 lb/A	Sicklepod, morningglory, cocklebur and other species likely to be found on former agricultural land.	**Oust + AAtrex 4L** 2 oz/A + 2 qt/A.	Early spring after the soil has settled around the base of the transplants (February - April).	Soil and foliar activity. Broadcast aerial or ground application.
imazapyr + sulfometuron @ 0.13 to 0.19 + 0.06 lb/A	Many herbaceous species including bermudagrass suppression.	**Arsenal A.C. + Oust XP** 4 oz/A + 2 oz/A.	Early spring to newly emerged weeds.	Soil and foliar activity. Broadcast aerial or ground application.
imazapyr + metsulfuron @ 0.13 + 0.038 to 0.076 lb/A	Bahiagrass control and many other herbaceous species.	**Arsenal A.C. + Escort** 4 fl oz/A + 1 to 2 oz/A.	Late spring (May) when bahiagrass is actively growing.	Add 0.25% nonionic surfactant. Arsenal may cause some temporary growth inhibition of young pines.
sulfometuron @ 0,14 lb/A	Fescue and other herbaceous species.	**Oust XP** 3 oz/A.	Early spring after the soil has settled around the base of the transplants (March - April).	Foliar and soil activity. For fescue pastures planted in pines. Band or broadcast application.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Pine Release - Cut Surface, Frill and Injection (dilute solutions)				
picloram 5.4% + 2,4-D amine 20.9%	Most woody plants.	**Pathway** 1 ml undiluted per 1-inch of stem diameter, or to wet frill completely.	Apply during period of active growth.	Hatchet and squirt bottle. Make cuts at a convenient height around stem and evenly distributed around the tree. Completely circle the stem of difficult to kill species such as dogwood, hickory and red maple with over-lapping cuts. Avoid treating during periods of heavy sap flow. Do not leave more than 1-inch between cuts.
imazapyr 4 lb/gal	Most woody plants.	**Arsenal A.C.** Add 6 fl oz to 1 gal of water and use 1 ml per 1-inch of stem diameter.	Apply during period of active growth.	Hatchet and squirt bottle. Make cuts at a convenient height around stem. Completely circle the stem of difficult to kill species such as dogwood, hickory and red maple. Avoid treating during periods of heavy sap flow. Do not leave more than 1-inch between cuts.
Pine Release and Hardwood TSI – Frill and Injection (concentrated solutions)				
imazapyr 4 lb/gal	Most woody plants.	**Arsenal A.C.** 20% concentrate + 80% water and use 1 ml per 3 inches of stem diameter.	Add anytime excluding spring green-up. Best results apply in fall.	Hatchet and squirt bottle. Make 1 hack per 3 inches diameter. Make cuts at a convenient height around stem. Avoid treating during periods of heavy sap flow.

Right-of-Way
Guide to Woody Plant Response to Herbicides*

HERBICIDES	Ash	Birch	Blackberry	Buckbrush	Cedar	Dogwood	Elm	Greenbrier	Hawthorn	Hickory	Honey Locust	Honeysuckle	Kudzu	Maple	Mulberry	Multiflora Rose	Oaks	Osage Orange	Persimmon	Pines	Poison Ivy	Poplar	Sassafras	Sumac	Sweetgum	Sycamore	Trumpet Creeper	Willow	Grazing land	Forestry	Noncropland	Ditch Banks
2,4-D amine (FS)	P	F	P	G	P	P	F	P	F	F	P	P	P	P	P	P	F	P	P	P	P	F	P	F	P	F	P	P	L	L	L	L
2,4-D amine (CS)	P	F	P	P	P	F	G	P	F	F	F	P	P	P	F	P	F	F	F	F	F	G	G	F	F	F	F	G	L	L	L	L
2,4-D ester (FS)	P	-	P	G	P	P	P	P	-	P	P	P	P	P	P	P	P	P	P	P	P	-	P	F	P	-	P	P	L	L	L	L
Arsenal (FS)	G	P	P	P	P	G	P	G	G	G	G	G	G	G	G	G	G	P	F	P	G	F	G	G	G	F	G	G	N	N	L	L
Banvel (FS)	P	-	F	F	F	F	F	P	F	P	P	F	G	P	N	F	F	P	G	G	F	-	F	F	F	-	F	F	L	N	L	L
Crossbow (FS)	F	F	G	F	P	P	F	P	F	F	F	P	P	F	P	F	F	F	F	F	F	F	F	G	F	F	P	F	L	N	L	L
Escort (FS)	F	P	F	G	P	F	F	P	P	P	G	G	E	F	P	F	F	P	P	P	P	P	P	P	P	P	P	P	N	N	L	N
Garlon 3A (FS)	F	F	G	P	P	F	F	P	F	F	F	P	P	F	F	F	G	P	F	G	F	F	F	G	G	F	P	F	N	L	L	L
Garlon 3A (CS)	F	F	P	P	F	F	F	P	F	F	F	P	P	G	F	F	G	F	F	F	G	F	F	G	G	F	P	F	N	L	L	L
Garlon 4 (FS)	F	F	G	P	P	F	F	P	F	F	F	P	P	F	F	F	G	P	F	G	F	F	F	G	G	F	P	F	N	L	L	N
Garlon 4 (BS)	F	F	G	P	F	G	F	P	F	G	F	P	P	G	F	F	G	P	F	G	P	F	F	G	G	F	P	F	N	L	L	L
Glyphosate (FS)	F	F	F	F	P	P	F	P	F	P	P	F	F	P	P	F	G	P	F	P	F	F	P	F	F	P	F	F	L	L	L	L
Glyphosate (CS)	F	F	F	P	F	F	F	P	F	F	F	F	P	F	F	P	G	F	F	G	G	F	F	F	G	G	P	F	L	L	L	L
Hyvar X-L (FS)	F	F	F	F	F	F	F	P	F	F	F	F	P	F	F	F	F	F	P	F	F	F	P	F	F	F	P	F	N	N	L	L
Hyvar X-L (ST)	F	F	F	F	F	F	F	P	F	F	F	P	P	F	F	F	F	F	P	F	F	F	P	F	F	F	P	F	N	N	L	L
Krenite (FS)	F	F	F	F	P	F	F	P	P	P	F	F	G	F	F	F	F	F	F	G	P	F	P	F	F	F	F	F	N	L	L	L
Pathway	F	F	P	P	F	F	F	P	F	F	F	F	P	F	P	P	F	P	F	G	P	P	P	P	F	P	P	P	N	L	L	N
Spike (ST)	F	F	F	F	P	G	G	F	P	F	G	G	P	F	F	G	G	P	P	F	P	F	P	G	F	F	F	F	L	N	L	L
Transline (FS)											G		G																N	N	L	N
Velpar (ST)	F	F	F	F	F	F	F	P	P	P	G	P	P	F	F	G	G	F	P	P	F	F	P	F	F	F	P	F	L**	L	L	L

Weed Control: G = Good F = Fair *** P = Poor - = No data available
FS = Foliar Spray BS = Basal Spray CS = Cut Surface ST = Soil Treatment L = Labeled N = Not labeled

* Repeated herbicide applications over several years may be necessary for complete control of woody plants.

** Basal soil or cut-surface applications only.

*** Fair = Partial control or defoliation.

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.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Woody Plant Control in Non-Cropland (Right-of-ways, fencerows, industrial sites, etc.)				
Foliar Spray				
imazapyr @ 0.5 to 1.5 lb/A	Hickory, honeylocust, honeysuckle, kudzu, maple, mulberry, multiflora, rose, oaks, poison ivy, sassafras, sumac, sweetgum, willow, other broadleaf plants.	**Arsenal 2S** 2 to 6 pt of 2 lb/gal.	Apply to actively growing vegetation not under stress.	Apply during warm weather after full leaf-out and before leaf drop. Apply to foliage in 10 to 60 gal/A if using ground equipment. Use 0.5 to 1% for low volume hand application. Spray to wet but do not allow runoff. Keep away from foliage or roots of desirable plants.
metsulfuron @ 0.038 to 0.15 lb/A	Kudzu, honeysuckle, black locust, sericea lespedeza, privet, bodark.	**Escort 60 DF** 1 to 4 oz/A.	During periods of active growth.	Use the 4 oz rate for kudzu and add 0.25% nonionic surfactant. Wet the kudzu canopy thoroughly, using at least 60 gpa. Make a follow-up treatment one year later to control escapes and misses. Failure to do so will result in reinfestation.
triclopyr @ 2.25 to 4 lb/A	Blackberry, oaks, pines, sumac, sweetgum and other broadleaf plants.	**Garlon 3A or 4** 0.75 to 1 gal/A.	Apply uniformly as a foliar spray after leaves are fully developed until 3 weeks before a frost.	Wet foliage to point of runoff with a backpack sprayer. Apply in 100 to 400 gallons per acre with a hydraulic sprayer. See label for application directions for specific brush species.
bromacil @ 4.4 to 24 lb/A	Controls many brush and tree species.	**Hyvar X-L** 2.25 to 12 gal/A.	Apply to actively growing brush.	Do not apply to brush standing in water; do not use in irrigation ditches nor on right of ways or other sites where marketable timber or other desirable trees or shrubs are immediately adjacent to the treated areas.
fosamine @ 6 to 12 lb/A	Kudzu, pines and other woody plants.	**Krenite S + Surfactant (nonionic)** 1.5 to 3 gal/A + 1 qt/100 gal of water.	Apply as a foliar spray from July until the first frost in the fall.	Complete coverage is required for control. See label for application directions for specific brush species.
glyphosate @ 1.5 to 3.75 lb/A	Most annual weeds and many perennials such as johnsongrass, bermudagrass, curly dock, milkweed, horsenettle, honeysuckle, lespedeza, brambles, multiflora rose and trumpetcreeper.	**Roundup Pro 4L + Surfactant (nonionic)** 2 to 5 qt/A + 2 qt/100 gal of water.	When plants are actively growing. Perennial plants are best controlled when sprayed at growth stages nearing maturity. Brush control is best when applications are made in fall to nonstressed trees.	Follow instructions and precautions listed on the label. Adding 0.5% nonionic surfactant has improved control of some perennials. Surfactant must be added to Accord. Tank mix with Arsenal improves perennial grass control.
picloram + 2,4-D amine @ 0.54 + 2 lb to 2.2 + 8 lb/A	Dogwood, honeylocust, honeysuckle, persimmon, pines and other woody plants.	**Tordon 101 Mixture** 1 to 4 gal/A.	Apply to actively growing plants.	Use 15 to 25 gpa spray mix. See label for use rates for specific woody plant species. **Restricted use pesticide.**

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Woody Plant Control in Non-Cropland (Right-of-ways, fencerows, industrial sites, etc.)				
Soil Treatments				
bromacil @ 4.5 to 24 lb/A	Many woody plant species.	**Hyvar X-L** 2.25 to 12 gal/A.	Apply before or during the period of active growth when rainfall can be expected for activation.	Use higher rates (greater than 5 gpa) on high organic soils. Use as a soil treatment or basal treatment. For use on drainage ditches, use only as basal treatment. Apply broadcast treatment. Apply broadcast treatments using at least 200 gal per acre of water. Basal treatment may be applied undiluted using a handgun applicator, or mixed with water in a ratio of 1 gal Hyvar in 5 gal of water. Do not apply near desirable vegetation. See label for use roles for specific woody plant species.
tebuthiuron @ 2 to 6 lb/A	Dogwood, elm, honeylocust, honeysuckle, multiflora rose, oaks, sumac and other woody plants.	**Spike 20P or 80W** 10 to 30 or 2.5 to 7.5 lb/A.	Before or during the period of active growth. Best applied in mid-March.	Apply in 15 to 150 gal of water per acre before or during the period of active growth of target plants. See label for use rates for specific plant species to be controlled. Do not broadcast where maintenance of a grass cover is desired. Has some postemergence activity on some herbaceous weeds. May be used as an individual plant treatment on forage or pasture area when used at less than 5 lb/A. Do not cut for hay for 1 year after application.
hexazinone @ 2 to 12 lb	Honeylocust, multiflora rose, oaks and other woody plants.	**Velpar L** 1 to 6 gal/A.	Apply in late winter or early spring before rainfall that is needed for activation.	Direct spray to the soil beneath woody plants to be controlled.
indaziflam @ 0.045 to 0.091 lb/A	Annual grasses including crabgrass and goosegrass and some broadleaf weeds.	**Esplanade 200 SC** 3.5 to 7.0 fl oz/A.	Preemergence.	Do not exceed 7 fl oz/A in a single application or 10 fl oz per year. Tank mix with postemergence herbicides to control existing weeds.
indaziflam @ 0.089% + diquat 0.89% + glyphosate 20.46%	Most broadleaf weeds and grasses.	**Esplanade EZ** 8.0 to 16.0 oz per gallon of water.	Postemergence.	Not for use on turfgrass. Avoid tracking the spray on desirable vegetation. Do not apply more than 5.4 gallons per acre per year.
Cut Surface (frill, injection, hypo-hatchet, stump)				
2,4-D amine (4 lb/gal formulation)	Elm, poplar, sassafras, willow and many woody species.	**2,4-D amine** (4 lb/gal formulation) Undiluted. 1 to 2 ml of concentrate per injection.	May to October.	Make injections as near the root collar as possible. See label for instructions for specific woody plant species.
imazapyr	Many woody plant species.	**Arsenal 2S** 2 qt per 1 qt of water (concentrated), or 8 to 12 fl oz per gal of water (dilute).	During active growth.	May be used as a cut stump, injection, frill or girdle treatment. See label for instructions for specific uses and rates.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
imazapyr	Many woody plant species.	**Chopper RTU** Undiluted.	During active growth.	Spray or brush the undiluted solution onto the cambium area of freshly cut stump surface and the bark of the cut stump. Insure that the cambium area (wood just inside the bark) is thoroughly wetted, but not to the point of puddling.
triclopyr	Maple, oaks, poison ivy, sumac, sweetgum and other woody plant species.	**Garlon 3A, Tahoe 3A** Undiluted.	Apply in spring or summer.	Apply in 1 ml of concentrate to cuts spaced 3 inches apart around the tree trunk. May also be applied with frill or girdle method.
glyphosate	Oaks, pines, poison ivy, sweetgum, sycamore and other woody plant species.	**Glyphosate** (4 lb/gal formulations) Undiluted.	Apply during active growth.	Apply 1 ml in cuts spaced 2 to 3 inches apart around the tree trunk.
picloram + 2,4-D amine	Pines and other woody plant species.	**Pathway** Undiluted.	Any time except during heavy sap flow.	Apply 0.5 ml of undiluted solution to cuts spaced 3 inches apart around the trunk. Or use 1 ml of 50% solution of Tordon 101 in a continuous cut girdling the trunk. Use undiluted Tordon RTU for frill method. **Restricted use pesticide.**
Basal Spray				
imazapyr (see label)	Many brush species.	**Stalker 2L** (See label.)	Spring or Fall.	For thinline and low-volume basal bark treatments. See label for specifics. Imazapyr is soil active and may be taken up by the roots of desirable vegetation.
2,4-D ester + triclopyr	Many woody plant species.	**Crossbow** 4 gal in enough diesel oil, No. 1 or No. 2 fuel oil, or kerosene to make 100 gal of spray mixture.	Apply any time except when snow or water prevent spraying the groundline.	Spray basal parts of brush or trees to a height of 15 to 20 inches from the ground. Thoroughly wet all the basal bark area including crown buds and ground sprouts. Best results have been obtained with winter to early spring applications.
triclopyr	Blackberry, dogwood, hickory, maple, oaks, pines, sumac, sweetgum and other woody plant species.	**Garlon 4** 4 gal in enough Arborchem Basal Oil, diesel fuel, No. 1 or No. 2 fuel oil, or kerosene to make 100 gal of spray mixture.	Apply any time except when snow or water prevent spraying the groundline.	For control of weedy plants with stems less than 6 inches in diameter. Spray the basal parts of trunks to a height of 12 to 15 inches from the ground. May be mixed in oil-water mixtures as well. Refer to label for rates and directions.
triclopyr @ 1.0 lb/gal	Many woody plants.	**Pathfinder II** Ready to use.	Apply any time except when snow or water prevent spraying the groundline.	Use on plant with basal stem diameter less than 6 inches. Thoroughly wet the lower 12 to 15 inches of stems including the root collar, but not to runoff. See label for streamline basal bark instructions.
aminopyralid + triclopyr @ 0.83 to 1.23 lb/A	Many herbaceous and woody broadleaf weeds.	**Capstone** 6 to 9 pt/A.	Postemergence to actively growing weeds.	No grazing or haying restrictions. Do not use treated hay for mulch. Do not use manure from animals grazing treated pastures around sensitive plants.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Woody Plant Control in Non-Cropland (Right-of-ways, fencerows, industrial sites, etc.)				
Basal Spray [cont.]				
clopyralid @ 0.5 lb	Kudzu, honeylocust, black locust, sericea lespedeza.	**Transline 3 lb/gal** 1.33 pt/A.	Late June to early October.	Clopyralid is a chemical which can travel (seep or leach) through soil and, under certain conditions, has the potential to contaminate groundwater which may be used for irrigation and drinking purposes. Users are advised not to apply picloram where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow or to soils containing sinkholes over limestone bedrock, severely fractured surfaces and substrates which would allow direct introduction into an aquifer. Your local county Extension office can provide further information of the type of soil in your area and the location of groundwater.
aminocyclopyrachlor + metsulfuron + imazapyr @ 0.5 to 0.77 lb/gal	Many broadleaf herbaceous and woody plants and some grasses.	**Viewpoint 61.7 DF** 13 to 20 oz/A.	Postemergence.	Read the label carefully before using Viewpoint. Very low rates of this herbicide can injure crops. Do not use on lawns, walks, driveways, tennis courts or similar areas. Do not apply more than 20 oz/A per year.
General Herbaceous Weed Control in Non-Cropland (Right-of-ways, fencerows, industrial sites, etc.)				
imazapyr @ 0.5 to 3 lb/A	Ash, dogwood, greenbrier, hawthorne and many other grass, broadleaf and brush weeds.	**Arsenal 2S** 2 to 6 pt/A.	May be applied preemergence or as postemergence spray.	Post sprays are usually more effective. Apply to wet foliage. Apply to actively growing vegetation.
2,4-D amine 1 to 4 lb/A	Many annual and perennial broadleaf weeds.	**2,4-D amine** 1 to 4 qt/A.	Postemergence.	Apply as a foliar spray in 15 to 30 gpa of water to young, vigorously growing weeds. Avoid drift to susceptible crops or other desirable vegetation.
dicamba @ 0.5 to 8 lb/A	Many annual and perennial broadleaf weeds.	**Vanquish 4S** 1 pt to 2 gal/A.	Postemergence.	Apply to actively growing weeds and brush. May be tank mixed with 2,4-D, Karmex, Dalapon, Princep, Tordon, Amitrole, Hyvar, Velpar, Spike, Garlon and other herbicides to broaden spectrum of weed and brush control. See label for more information.
prodiamine @ 0.65 to 1.5 lb/A	Annual grasses.	**Endurance 65 DF** 1 to 2.3 lb/A.	Preemergence.	Tank mix with Roundup Pro or Arsenal for control of emerged weeds.
DSMA or MSMA @ 2.7 to 5.4 lb/A	Johnsongrass control in other perennial grasses.	**DSMA or MSMA** Many formulations.	Postemergence.	Apply when johnsongrass is 6 inches tall until early head stage. Two broadcast applications are allowed per year. A 100-ft buffer is required between treated sites and permanent water bodies.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
sulfosulfuron @ 0.062 to 0.13 lb/A	Johnsongrass, nutsedge, buttercup, others.	**Outrider 75 DF** 1.33 to 2.66 oz/A.	Postemergence to actively growing weeds. Treat johnsongrass at 12 to 18 inches.	Excellent for johnsongrass control in bermudagrass. Does not injure actively growing bermudagrass. Add 0.5% nonionic surfactant or methylated seed oil. May be tank mixed with Roundup Pro, Escort, Oust or other herbicides to broaden the spectrum of control.
triclopyr @ 1.0 to 4.5 lb/A	Many annual and perennial broadleaf weeds.	**Tahoe 3A, Garlon 3A or 4 + Nonionic Surfactant** 0.33 to 1.5 gal/A of Garlon 3A, or 1 to 4 qt/A of Garlon 4 + 0.25 to 1 pt per 20 to 100 gal of water.	Postemergence.	Apply any time during growing season. May be tank mixed with 2,4-D or Tordon 22K to broaden spectrum of weed and brush control. See labels for more information.
fosamine @ 6 to 12 lb/A	Blackberry, multiflora rose, sumac and other brush and woody plant species.	**Krenite S + Nonionic Surfactant** 1.5 to 3 gal/A.	Postemergence.	Apply as a foliar spray from July through first frost. Complete coverage is essential for good control.
sulfometuron-methyl @ 0.5 to 0.56 lb/A	Johnsongrass, fescue, most annual grass and broadleaf weeds.	**Oust 75 DF** 1 to 12 oz/A.	Preemergence or postemergence.	Apply preemergence or early postemergence in late spring to early summer. Use nonionic surfactant for postemergence applications. Do not apply where runoff water may flow onto agricultural land or where other desirable vegetation is growing. May be tank-mixed with Karmex, Velpar and other herbicides for broader spectrum weed control. See label for more information.
sulfometuron + chlorsulfuron @ 0.14 to 0.048 to 0.35 + 0.12 lb/a	Many broadleaf weeds and grasses.	**Landmark XP** 4 to 9 oz/A.	Preemergence and postemergence.	Premix of Oust + Telar.
glyphosate @ 0.75 to 3.75 lb/A	Johnsongrass, bermudagrass, fescue, dandelion, multiflora rose, thistles, most annual weeds and many perennial plants.	**Glyphosate** (4 lb/gal formulations) 2 to 5 qt/A.	Postemergence.	Apply as foliar spray to actively growing plants. See label for use rates for specific plant species.
imazapic @ 0.032 to 0.188 lb/A	Johnsongrass, ragweed, tall fescue, prickly sida, trumpetcreeper.	**Plateau 2S** 2 oz to 12 oz/A.	Postemergence.	Provides weed control and growth suppression.
imazapic + glyphosate @ 0.023 + 0.063 to 0.188 + 0.5 lb/A	Johnsongrass, crabgrass, sandbur, sedges, tall fescue control or seedhead suppression.	**Journey** 4 to 32 oz/A.	Postemergence.	Do not use unless bermudagrass injury can be tolerated.
pendimethalin @ 2 to 4 lb/A	Annual grasses.	**Pendulum 60 DF** 3.3 to 6.6 lb/A.	Preemergence.	Tank mix with Roundup Pro or Arsenal for control of emerged weeds.
aminocyclopyrachlor + chlorsulfuron @ 0.06 to 0.38 lb/A	Many broadleaf herbaceous and woody plants.	**Perspective 55.3 DF** 1.75 to 11 oz/A.	Postemergence.	Read the label carefully before using Perspective. Very low rates of this herbicide can injure crops. Do not use on lawns, walks, driveways, tennis courts or similar areas. Do not apply more than 11.5 oz/A per year.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Soil Sterilants (Right-of-ways, fencerows, industrial sites, etc.)				
triclopyr @ 1.0 to 4.5 lb/A	Many annual and perennial broadleaf weeds.	**Tahoe 3A, Garlon 3A or 4 + Nonionic Surfactant** 0.33 to 1.5 gal/A of Garlon 3A, or 1 to 4 qt/A of Garlon 4 + 0.25 to 1 pt per 20 to 100 gal of water.	Postemergence.	Apply any time during growing season. May be tank mixed with 2,4-D or Tordon 22K to broaden spectrum of weed and brush control. See labels for more information.
bromacil + diuron @ 1.6 + 1.6 to 18.4 + 18.4 lb/A	Many annual and perennial broadleaf and grass weeds.	**Krovar II DF** 2 to 23 lb/A.	Preemergence or early postemergence.	Apply just before weed emergence or in early stages of weed growth. See label for use rates for specific weeds.
prometon @ 8 to 20 lb/A	Many annual and perennial broadleaf and grass weeds.	**Pramitol 25E** 4 to 10 gal/A.	Preemergence or postemergence.	Apply prior to emergence until 3 months after weed emergence. Will give residual control for over 1 year. See label for use rates for specific weeds and uses.
prometon + simazine + sodium chlorate + sodium metaborate	Many annual and perennial broadleaf and grass weeds.	**Pramitol 5 PS** 0.35 to 0.92 lb/100 sq ft.	Preemergence or postemergence.	Apply prior to emergence until 3 months after weed emergence. Will give residual control for over 1 year. See label for use rates for specific weeds and uses.
tebuthiuron @ 1 to 4 lb/A	Many annual and perennial broadleaf and grass weeds.	**Spike 20P** 10 to 20 lb/A of 20P.	March.	May be applied any time except when ground is frozen or the soil is saturated with moisture. Do not apply near desirable vegetation where roots may come in contact with the herbicide. Avoid contamination of irrigation water. See label for use rates for specific weeds.
dichlobenil @ 4 to 8 lb/A	Many annual and perennial weeds and woody plant species.	**Casoron 4G** 100 to 200 lb/A.	Preemergence.	See label for application instructions, use rates and specific weeds.
bromacil @ 3 to 24 lb/A	Many annual and perennial broadleaf and grass weeds.	**Hyvar X-L** 1.5 to 12 gal/A.	Preemergence or postemergence.	Apply as spray in 100 to 200 gal of water per acre. See label for use rates for specific weeds.
diuron @ 4 to 12 lb/A	Many annual and perennial broadleaf and grass weeds.	**Karmex 80DF** 5 to 15 lb/A.	Preemergence or early postemergence.	Apply to soil shortly before weed growth begins. See label for use rates for specific weeds.
bromacil + diuron @ 1.6 + 1.6 to 12 + 12 lb/A	Many annual and perennial broadleaf and grass weeds.	**Krovar IDF** 4 to 30 lb/A.	Preemergence or early postemergence.	Apply just before weed emergence or in early stages of weed growth. See label for use rates for specific weeds.
hexazinone @ 6 to 12 lb/A	Many annual and perennial broadleaf and grass weeds.	**Velpar L** 3 to 6 gal/A.	Preemergence or early postemergence.	Apply to soil from late winter to early summer, or in fall. Needs rainfall for activation. See label for use rates for specific weeds.
imazapyr + diuron @ 1.0 + 8.0 to 1.5 + 12.0 lb/A	Most herbaceous weeds.	**Sahara DG** 13 to 19 lb/A.	Pre or postemergence.	Tank mix with Roundup Pro for faster burndown of emerged vegetation. Do not apply over or near the roots of desirable trees.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
WILDLIFE FOOD PLOTS				
Burndown, Preplant				
glyphosate @ 1.0 to 2.0 lb/A	Emerged weeds.weeds including woody plants.	**Glyphosate** (4 lb/gal formulations) 1 to 2 qt/A.	Apply at least 14 days before seedbed preparation.	Contains surfactant. May be applied as a foliar directed spot spray. Field must be free of standing water. Avoid drift to sensitive crops.
Austrian Winter Pea [dry pea]				
pendimethalin @ 0.5 to 1.49 lb/A	Annual grasses and small-seeded broadleaves.	**Prowl 3.3 EC** 1.2 to 3.6 pt/A. Apply lower rate to coarse soils and higher rate to fine (clay) soils	Preplant incorporated.	May be applied immediately before planting or up to 60 days prior to planting. Must be incorporated. DO NOT APPLY pre-emergence.
sethoxydim @ 0.2 to 0.3 lb/A	Annual grasses and johnsongrass.	**Poast 1.5 EC** 6 to 8 oz/A + crop oil concentrate @ 1% v/v.	Small annual grasses. Johnsongrass 15 to 20 inches. Do not apply to grass under stress.	See comments for Poast in soybean section. Do not apply more than 5 pt/A per year. Split application most effective for johnsongrass. 1.5 pt/A followed by 1 pt/A.
imazethapyr @ 0.047 lb/A	Annual grasses and broadleaves.	**Pursuit 70 DG** 1.08 oz/A.	Can be applied preplant incorporated, preemergence or early postemergence (fall).	Add nonionic surfactant at 0.25% v/v with postemergence applications. Apply after plants reach 3 inches in height, but prior to five nodes. Needs rainfall for optimum activity.
imazamox @ 0.031 lb/A	Annual grasses and broadleaves.	**Beyond Xtra** 4 oz/A + nonionic surfactant @ 0.25% v/v.	Postemergence (fall).	Apply when peas have at least three pairs of leaves, but prior to bloom stage. Apply when crop and weeds are actively growing.
Clover				
benefin @ 1.12 to 1.5 lb/A	Summer annual grasses and some broadleaves.	**Balan 60 DF** 2 lb/A.	From 10 weeks prior to planting up to planting.	Thoroughly incorporate into upper 3 inches of soil immediately after application.
sethoxydim @ 0.2 to 0.3 lb/A	Annual grasses and johnsongrass.	**Poast 1.5 EC** 6 to 8 oz/A + crop oil concentrate @ 1% v/v.	Small annual grasses. Johnsongrass 15 to 20 inches. Do not apply to grass under stress.	See comments for Poast in soybean section. Do not apply more than 5 pt/A per year. Split application most effective for johnsongrass. 1.5 pt/A followed by 1 pt/A.
2,4-DB amine @ 0.5 lb/A	Annual and perennial broadleaf weeds.	**Butyrac, Butoxone** 1.15 qt/A of 0.875 lb/gal 2,4-DB or 1 qt/A of 2 lb/gal.	When legumes (seedlings or established stands) have two or more true leaves with weeds in seedling stage.	Best control is achieved with weeds in the 2- to 4-leaf stage. Will not control henbit or chickweed. Safe on clovers and grasses.
Greens [collards, kale, mustard, turnips]				
sethoxydim @ 0.2 to 0.3 lb/A	Annual grasses and johnsongrass.	**Poast 1.5 EC** 6 to 8 oz/A + crop oil concentrate @ 1% v/v.	Small annual grasses. Johnsongrass 15 to 20 inches. Do not apply to grass under stress.	See comments for Poast in soybean section. Do not apply more than 5 pt/A per year. Split application most effective for johnsongrass. 1.5 pt/A followed by 1 pt/A.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
Oats				
carfentrazone-ethyl @ 0.008 to 0.031 lb/A	Annual broadleaf weeds.	**Aim 2 EC** 1.0 to 1.9 oz/A.	Postemergence to weeds up to 4 inches tall.	Use a nonionic surfactant at 0.25% v/v. Coverage is essential for good control. Do not apply more than 1.9 oz/A per year.
dicamba @ 0.063 to 0.125 lb/A	Annual broadleaf weeds.	**Clarity** 2.0 to 4.0 oz/A.	At planting or postemergence prior to 5-leaf stage on spring-seeded oats or prior to jointing on fall-seeded oats.	
thifensulfuron-methyl + tribenuron-methyl @ 0.014 to 0.01875 lb/A	Annual broadleaf weeds.	**Harmony Extra 75 XP** 0.3 to 0.4 oz/A.	Make application after the 2-leaf stage, but before flag leaf in fall-seeded oat and after 3-leaf stage but before jointing in spring-seeded oat.	Add a nonionic surfactant at 0.25% v/v. Check rotation intervals.
2,4-D amine @ 0.25 to 1.0 lb/A	Annual and perennial broadleaf weeds.	**2,4-D amine** 0.5 to 2 pt/A of 4 lb/gal 2,4-D. Use the higher rate for late applications and high infestations.	Apply after oat is fully tillered but not forming joints in the stem.	Apply 0.25 to 0.5 pt/A if underseeded with legume. Use higher rate only if weed infestation is severe and legume injury can be tolerated.
Millet (Japanese, Proso, Others)				
glyphosate @ 1 lb/A	Annual grass and broadleaf weeds. Weak on morningglories.	**Glyphosate** (4 lb/gal formulations) 2 pt/A.	Use prior to planting for vegetation knockdown.	Apply to actively growing weeds.
2,4-D amine @ 0.5 lb/A	Morningglory, cocklebur, and most other broadleaf weeds.	**2,4-D 4L** 1 pt/A. Add 0.25% v/v nonionic surfactant.	4- to 6-inch millet.	Do not apply when heading.
dicamba @ 0.25 lb/A	Morningglory, cocklebur, and most other broadleaf weeds, horseweed and ragweeds.	**Banvel or Clarity 4SL** 0.5 pt/A.	2- to 5-leaf stage.	Do not apply when heading.
prosulfuron @ 0.027 lb/A	Most broadleaf weeds.	**Peak** 0.75 oz/A. Add 0.25% v/v nonionic surfactant.	Apply to actively growing millet 8 to 10 inches tall.	Will not control ALS-resistant weeds. Do not apply to millet under stress.
SUNFLOWERS (Grown for Doves) **Note: Sunflower recommendations are based on drilled or planted sunflowers with adequate seed coverage. Broadcast seeding may result in an increased risk of herbicide injury.** **Preplant Incorporated**				
S-metolachlor @ 1.27 lb/A	Annual grasses, nutsedge, and small-seeded broadleaf weeds.	**Dual Magnum** 1.33 pt/A.	Prior to planting.	Avoid high rates.
pendimethalin @ 0.5 to 1.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Prowl 3.3 EC or Pendimax 3.3 EC** 1.2 to 3.6 pt/A.	Up to 14 days prior to planting.	Incorporate within 7 days. Use low rate on sandy soils.

Crop, Situation, and Active Chemical Per Broadcast Acre	Weeds Controlled	Formulated Material Per Broadcast Acre	Time of Application	Method of Application and Precautions
ethalfluralin @ 0.56 to 1.125 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Sonalan HFP** 1.5 to 3 pt/A.	Prior to planting.	Incorporate with two passes in opposite directions no more than 48 hours after application. See label for improved groundcherry control program.
trifluralin @ 0.5 to 1.0 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Treflan, Trilin, Trifluralin 4 EC** 1.0 to 2.0 pt/A.	Up to 14 days prior to planting.	Incorporate immediately. Use 1 pt/A on sandy soils.
Preemergence				
S-metolachlor @ 1.27 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Dual Magnum** 1.33 pt/A.	Immediately after planting.	Do not apply POST. Avoid high rates.
pendimethalin @ 0.5 to 1.5 lb/A	Annual grasses and small-seeded broadleaf weeds.	**Prowl or Pendimax 3.3** 1.2 to 3.6 pt/A.	Immediately after planting.	Must receive activating rainfall within 7 days. Do not apply POST.
pyroxasulfone @ 0.05 to 0.2 lb/A	Grasses and broadleaves, including pigweed.	**Zidua 4.17 SC** Pre-plant/PRE 1.75 to 6.50 oz/A POST 1.75 to 3.25 oz/A See label for specifics.	Zidua may be applied preplant surface, preemergence or early postemergence to sunflower for residual preemergence weed control.	Do not exceed 1.5 oz on sandy soils or 5.0 oz on other soils. Do not apply PPI, or at crack/cotyledon stages. **Do not tank mix POST with Beyond Xtra on CL sunflowers.** 60 day PHI.
pyroxasulfone + carfentrazone @ 0.06 + 0.004 to 0.21 + 0.015 lb/A	Grasses and small-seeded broadleaves, pigweed.	**Anthem Flex 4 SC** 2.0 to 7.3 oz/A	Preplant or prior to emergence.	Do not exceed 9.12 oz/A per year. Do not exceed 7.3 oz/A per application.
sulfentrazone + carfentrazone @ 0.12 + 0.014 to 0.15 to 0.016 lb/A	Annual broadleaf weeds.	**Spartan Charge** 5 to 6 oz/A.	Up to 3 days after planting.	Do not use POST. Tank mixtures of Prowl or Dual with Spartan have performed well in University trials.
sulfentrazone + *S*-metolachlor @ 0.13 + 1.2 lb/A	Grass and broadleaf weeds.	**BroadAxe 7 EC or Authority Elite** 24 oz/A.	Immediately after planting.	Do not apply POST.
sulfentrazone + pyroxasulfone @ 0.1 + 0.1 to 0.21 + 0.21 lb/A or 0.09 + 0.05 to 0.25 + 0.139 lb/A	Grasses and broadleaves, including pigweed.	**Authority Supreme** 6 to 13 oz/A or **Authority Edge** 4.4 to 11.7 oz/A.	Up to 3 days after planting.	Rainfall required for activation. Rate depends on soil type. Do not apply POST.
Postemergence				
clethodim @ 0.125 lb/A	Annual grasses, johnsongrass, and weedy rice.	**Select Max 0.97 EC** 16 oz/A. Use 1 qt/A or 1.0% v/v crop oil concentrate.	2- to 6-inch tall grass weeds.	Must add crop oil concentrate. Avoid applications during periods of drought.
Clearfield and Clearfield Plus Sunflowers				
imazamox @0.039 lb/A	Annual grasses, suppression of johnsongrass and certain broadleaf weeds. Good on broadleaf signalgrass and foxtail.	**Beyond Xtra 1 AS** 4 oz/A for Clearfield varieties; 4-6 oz/A for Clearfield Plus varieties. Surfactant and liquid nitrogen are required as adjuvants.	3- to 4-inch weeds and grass. Apply when sunflower is 2-leaf to 8-leaf.	**Use on Clearfield hybrids only!** Avoid applications during dry periods. Preliminary research has shown that a soil-applied program is needed prior to making POST Beyond Xtra applications in Arkansas. Do not use COC or MSO on Clearfield varieties. They can be used on Clearfield Plus varieties only.

SUPPLEMENTAL PUBLICATIONS

* MP169, *Weeds of Arkansas Lawns, Turf, Roadsides and Recreation Areas*
MP192, *Arkansas Rice Production Handbook*
MP197, *Arkansas Soybean Handbook*
MP519, *Row Crop Plant-Back Intervals for Common Herbicides*
MP521, *Turfgrass Weed Control*
MP522, *Pasture Weed Control in Arkansas*
MP544, *Herbicide Resistance Traits: Quick Reference Guide*
MP503, *Mid-South Cotton Defoliation Guide*
MP566, *Application Cut-off Timings for Common Herbicides*
MP567, *Max Use Rates per Application and per Season for Common Herbicides*

FSA3054, *Musk Thistle*
FSA6123, *Weed Control in Container Nurseries*
FSA6124, *Woody Plant Control in Home Landscapes*
FSA6127, *Weed Control in Field Nurseries*
FSA6137, *Weed Control in Landscape Plantings*
FSA2185, *Metolachlor Herbicides: What are the Facts?*
FSA2149, *Ryegrass Identification Keys*
FSA2150, *Sunflowers Grown for Dove Hunting*
FSA2171, *Spread of Herbicide-Resistant Weeds: What Should Growers Know?*
FSA2172, *Answers to Frequently Asked Questions on HR Management*
FSA2173, *Identification and Control of Problematic Sedges in Arkansas Rice*
FSA2177, *Zero Tolerance: A Community-Based Program for GR Palmer Amaranth Management*
FSA2181, *Dicamba in Arkansas – Frequently Asked Questions*
FSA2188, *Distribution and Management of HR Palmer Amaranth in Arkansas*
FSA2191, *Management of Italian Ryegrass in Agronomic Crops*

(Check for current revisions of the above publications at https://www.uaex.uada.edu/publications/order.aspx.)

Scan the QR code to find a complete listing of available publications from the University of Arkansas System Division of Agriculture Cooperative Extension Service.

FOR FURTHER INFORMATION ON HERBICIDES,
SEE YOUR COUNTY EXTENSION AGENT.

A suggested equipment cleanup procedure to follow immediately after applying phenoxy formulations is:

(1) Flush system completely with detergent water; drain.

(2) Flush system with ammonia solution (1 quart ammonia per 25 gallons water); drain.

(3) Fill system completely with above concentration ammonia solution; let stand overnight.

(4) Drain system next day; flush with excess water.

(5) Flush system the day before next use.

(6) Clean outside of equipment and nozzle assemblies in above manner.

This method is not foolproof but should reduce the hazards involved in applying phenoxy amine herbicides.

Some chemicals used for weed control can be injurious to man if handled carelessly. They can also be injurious to desirable plants, livestock, wildlife and fish if improperly applied. Care should be exercised in the use of herbicides and the disposal of unused herbicides to avoid polluting streams and water supplies. Precautions for handling and applying that are printed on the container label should be followed.

*For sale only.

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See MP44 on the web at www.uaex.uada.edu.

Cooperative Extension Service, University of Arkansas, U.S. Department of Agriculture, and County Governments Cooperating

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