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1980 Recommendations for Chemical Weed Control in Soybeans

Part 1 (PPI* and Sequential Applications)

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Federal regulations on the use of herbicides change frequently; thus farmers need to stay informed on the status of label clearance. Based on available information, recommendations in this guide conform to laws and regulations at the time of writing.

You must read and understand the label on herbicides you plan to use. Rates lower than indicated on label are legal to use.

About Recommendations

Recommendations in this guide are based on research and comparative performance over a period of years. However, herbicide performance depends on many factors that cannot be controlled or foretold. (See UMC Guide 4903, "Factors Affecting Herbicide Performance.") For that reason, results may vary widely from those normally expected. *Recommendations do not and cannot imply satisfactory performance in all cases.* There is some risk in using any herbicide.

Because herbicide prices vary widely from time to time, cost was not considered in these recommendations. Check the cost of alternative weed control treatments and compare the costs with expected performance for your specific situation.

Comparative performances, with emphasis on weed control and crop tolerance, are major factors in herbicide evaluation. Because no herbicide is superior to others in all circumstances, no effort has been made to list treatments in any order of preference in this guide.

About Application Rates

Herbicide rates are given on the basis of active ingredients (unless otherwise indicated) per acre actually treated. Treated acres will be fewer than acres of crop in the field if the herbicide is applied in a band. **LABEL RATES TAKE PRECEDENCE OVER RATES INCLUDED IN THIS GUIDE.**

The label on the container gives the amount of active ingredients in the commercial product. The amount of commercial product is easy to calculate when you know the active ingredient content of the commercial product. Divide the pounds of active ingredient needed by pounds per gallon (for liquids) or percent active ingredient expressed as a decimal (for dry materials).

Example 1: Lasso contains 4 lbs./gal. active ingredient (alachlor). How much Lasso do you apply to get 3 lbs. of alachlor per acre?

$$\frac{3 \text{ lbs. active ingredient needed}}{4 \text{ lbs./gal. in commercial product}} = \frac{3}{4} \text{ gal. or } 3 \text{ qts./A}$$

Example 2: Lorox contains 50% active ingredient. How much Lorox do you apply to get 0.75 lb./A linuron?

$$\frac{0.75 \text{ lb. active ingredient needed}}{.50 \text{ (% as decimal) in commercial product}} = 1.5 \text{ lbs. Lorox/A}$$

To compute the area actually treated when applying herbicides in a band, first divide the width of the band by the row width of the crop. For example:

$$\frac{\text{Band width: } 10 \text{ inches}}{\text{Row width: } 30 \text{ inches}} = \frac{1}{3}$$

This means $\frac{1}{3}$ of each acre of crop actually is treated. One-third x acres of crop in field = acres in field actually treated.

Preplanting Incorporated Treatments

Some herbicides should be incorporated into the soil to prevent their loss from the surface. Others may be incorporated to provide for a more convenient time of application or to improve their performance, especially when application is followed by insufficient rainfall for optimum activation of the herbicide.

Following the introduction of Treflan, several related dinitroanilines have become available as soybean herbicides. Dinitroanilines are more or less specific for control of seedling grasses; however, some control of small-seed broadleaved weeds can be expected. Included in this herbicide group are Basalin, Cobex, Prowl, Surflan, Tolban and Treflan.

Trifluralin (Treflan): Trifluralin does an excellent job of controlling annual grass weeds and is especially effective in controlling fall panicum, giant foxtail, shattercane, and johnsongrass seedlings. Most small-seeded broadleaved weeds are controlled, but deep-germinating or large-seeded weeds generally survive. These include weeds such as prickly sida, velvetleaf, ragweed, cocklebur, jimsonweed, sunflower and morning-glories. The following rates apply to both the

liquid 4 lbs./gal. formulation and the 5% granular formulation except the granular formulation is not labeled for the higher rate for shattercane control:

soil	lbs./A active ingredient		
	fall application	spring application general use	spring application shattercane control
light: sand and loamy sand	1	0.5	0.5
medium: loam, silt loam and silt	1	0.75	1
heavy: clay loam, silty clay and clay	1.25	1	1.25
soils with 2-5% organic matter (light)		0.75	
soils with 5-10% organic matter		1-1.25	

Trifluralin should be applied to the soil before planting and incorporated in the same operation as soon as practical (within 8 hours). Loss of trifluralin is most rapid when applied to warm wet soil. Trifluralin can be applied several weeks before planting without significant reduction in weed control. Fall applications have been used successfully in the Delta area. They have not been fully evaluated for other Missouri areas.

Proper incorporation of trifluralin is essential. Mix it thoroughly in the upper 2 inches of soil. Most tools do not thoroughly mix the chemical as deeply as they penetrate the soil, so they usually will need to be operated about 3-4 inches deep.

The most common method of incorporating trifluralin is to disk twice with a tandem disk. The first disking will satisfy the urgency of incorporation, getting most of the herbicide out of sunlight to prevent breakdown by light. A second disking will further mix the herbicide with the soil. The second disking can be done after the whole field has been disked the first time. The second disking should be done at a right angle to the first. If this is not practical, disking at any angle to the first is better than disking both times in the same direction.

For shattercane control, incorporate by cross disking with a tandem disk operating at a speed of 4-6 mph. Disk at a depth of 4-6 inches.

The "Do-All" bed conditioner and power-driven rotary cultivator will incorporate trifluralin satisfactorily. The power-driven rotary cultivator tends to destroy the physical structure of the soil; it may increase crusting and restrict seedling emergence. The field cultivator has not been fully evaluated as an incorporating tool for trifluralin. There is some evidence that it is satisfactory. The spike-toothed harrow or the rotary hoe alone are not satisfactory.

When soybeans follow wheat in a two-crop system, a tillage problem for seedbed preparation is created; this can reduce the effectiveness of trifluralin. Straw or residual carbon from burned straw absorbs the herbicide and makes less of it available to kill weeds. Adequate tillage for good seedbed preparation for soybeans may incorporate trifluralin too deeply. Thus, we suggest you partially prepare the seedbed to cover straw or carbon residue; then apply the herbicide and follow with the usual incorporating procedure.

Trifluralin has the advantage over some other herbicides of requiring less soil moisture to be effective. Research indicates that dependable shattercane control requires a higher rate of trifluralin than is required to control other weeds. The rates given in the table may cause some injury to soybeans, but the increased shattercane control will more than offset the crop injury in most cases.

Trifluralin (Treflan 2x Rate for Established Johnsongrass Control):

Trifluralin is registered for control of established johnsongrass. Application should be made for at least two consecutive years at twice the rate recommended for spring application for general use (except do not exceed 2 lbs./A). Treatment should be initiated no later than six weeks after seedling emergence. Soybeans should not be planted deeper than 2 inches. Planting should be delayed until stress from early season adverse weather is no longer a hazard. Control of johnsongrass will be improved by intensive tillage to break the rhizomes into small pieces before incorporation of trifluralin. Disk 4-6 inches deep in two directions. Repeated tillage during the crop season will contribute to control.

Acceptable control is not expected with only one year of trifluralin at the 2x rate. Be prepared to continue this program for a 3-year period. A longer time is required on sandy soil. Crop injury may occur, but the loss normally will be less than the loss from johnsongrass competition. Follow soybean crops given this double rate of trifluralin with only those crops for which trifluralin has been registered as a preplant treatment. Apply up to 10 weeks before planting or immediately before soybeans are planted.

Profluralin (Tolban) for Established Johnsongrass Control:

Use similar seedbed preparation as for Treflan.

<i>sandy loam</i>	<i>1.5 lb./A</i>
<i>silt loam</i>	<i>2.0 lb./A</i>
<i>clay loam</i>	<i>3.0 lb./A</i>

Do not use on muck or peat.

Trifluralin (Treflan) + Metribuzin (Sencor or Lexone):

This tank mixture is incorporated as described for trifluralin. It controls a wide spectrum of both grass weeds and broad-leaved weeds. Control of cocklebur, morning-glory and giant ragweed may be erratic. The safety margin is narrow. Occasional injury to the crop can be expected. Frequency of injury from this treatment is about equal to that resulting from the treatment in which the metribuzin is applied as a surface treatment after the trifluralin has been incorporated into the soil. Apply up to 10 days before planting. Rates:

soil	lbs./A active ingredient	
	trifluralin	metribuzin
loam sand, sandy loam	0.5	0.25.
loam, silt loam, silt, sandy clay, sandy clay loam	0.75	0.375
silty clay, silty clay loam, clay, clay loam	1	0.5

Do not use on sand, loamy sand or sandy loam with less than 1% organic matter or on other soils with a pH above 7.4. Do not use on Tracy, Semmes, Altona, Vansoy or Coker 102 varieties of soybeans. Injury to soybeans may occur if atrazine was used the previous year.

Do not use the immature plant or the plant residue after bean harvest for feed or forage. Follow all directions on the labels of both herbicides.

Dinitramine (Cobex): Incorporation may be combined or done in a separate operation within 24 hours of application. Apply as follows:

<i>light soils</i>	<i>0.3 lb./A</i>
<i>medium soils</i>	<i>0.5 lb./A</i>
<i>heavy soils</i>	<i>0.67 lb./A</i>

This is available as a 2 lbs./gal formulation. The margin of selectivity is narrow. No residue problems have been observed to date.

Fluchloralin (Basalin): Incorporate within 8 hours after application. Apply as follows:

The high rates for each soil texture above, where listed, should be used if heavy weed populations are anticipated. No feeding restrictions apply to the above.

Pendimethalin (Prowl), then Chloramben (Amiben): Check label for weed species controlled. Apply Prowl preplant incorporated and Amiben pre-emergence as follows:

soil	1 to 3% organic matter	more than 3% organic matter
	Prowl + Amiben	
loamy sands, sandy loams	do not use	do not use
loams, silt loams, silts, sandy clays, sandy clay loams	0.75-1.0 + 1 gal.	0.75-1.0 + 1 gal.
silty clays, silty clay loams, clay loams, clays	0.75-1.0 + 1 gal.	1.0-1.25 + 1 gal.

The high rate of Prowl for each soil texture above should be used if heavy weed populations are anticipated.

Livestock may graze or be fed forage following above treatment.

Profluralin (Tolban), then Linuron (Lorox): Apply a preplant incorporated treatment of Tolban 4E and a pre-emergence application of Lorox at rates as follows:

soil*	broadcast rate per acre		
	percent organic matter 2% to		
	less than 2%	less than 3%	3% or greater
	Tolban 4E PPI + Lorox 50W PRE		
loamy sand**	0.5 lb. +	0.75 lb. +	0.75 lb. +
sandy loam	1 lb.	1 lb.	1-1.5 lbs.
loam, silt loam, silt	0.75 lb. + 1-1.5 lbs.	1.0 lb. + 1-1.5 lbs.	1.0 lb. + 1.5-2 lbs.
silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	1.0 lb. + 2 lbs.	1.5 lbs. + 2 lbs.	1.5 lbs. + 2.5-3 lbs.

muck or peat DO NOT USE

*Do not use on sand, gravelly soils, or exposed subsoils.

**Do not use on loamy sand, except in the northeastern U.S. on loamy sand with over 1% organic matter.

Precaution: Do not use on soil with less than 0.5% organic matter.

Profluralin (Tolban), then NPA-Dinitro (Dyanap): Apply a preplant incorporated treatment of Tolban 4E as follows:

soil	Tolban 4E alone
sand, loamy sand, sandy loam	0.5-0.75 lb./A
loam, silt loam, silt	0.75-1.0 lb./A
sandy clay loam, silty clay loam, clay loam, silty clay, sandy clay, clay	1.0 lb.
muck or peat	do not use

Follow with a pre-emergence or at cracking (from soil cracking to before the soybean true leaves open) treatment of Dyanap at 4.5-6 qts./A as directed on label.

Profluralin (Tolban), then Metribuzin (Sencor or Lexone): Refer to table for Tolban 4E alone for preplant incorporated rates for Tolban. For metribuzin rates, refer to the table in the section titled "Trifluralin (Treflan), then Metribuzin (Sencor or Lexone)." If using Sencor 4 or Lexone 4L, substitute pints for pounds (1 pt. = 1 pound).

Vernolate (Vernam), then a Pre-emergence Herbicide: With each sequential treatment apply Vernam at 1.75-3 pts./A.

Vernam, then Amiben 3E:

<i>light soils</i>	2.0 lbs. Amiben
<i>medium soils</i>	2.1 lbs. Amiben
<i>heavy soils</i>	3.0 lbs. Amiben

Vernam, then Lorox 50W: Use 1-2.5 lbs./A.

Vernam, then Dyanap 3E: Apply 4.5 lbs. Dyanap after planting, but before emergence.

Vernam, then Basagran: Consult Basagran label for rates.

Treatments in Experimental Stage:

An "experimental" designation indicates that the treatment (1) is new and not adequately observed under Missouri conditions to allow an accurate description of its characteristics or (2) although not new, has been found to be marginal in weed control performance or crop safety, and a longer time is required to determine the degree of dependability. *We recommend "Experimental Treatments" be used on a limited basis until their performance has been determined.* Use rates on the label.

Incorporated + Pre-emergence (Sequential) Trifluralin, Then Bifenox (Treflan then Modown): This combination provides control of a wide variety of annual weeds. A temporary growth retarding effect may be evident. Apply rates on the labels of each component.

Bifenox (Modown) + Trifluralin (Treflan): Tank mix applied. Pre-plant incorporated. Check Modown label for rates.

Chloramben (Amiben) + Trifluralin (Treflan): This tank mix should be used as a spring preplant incorporated treatment. Incorporate immediately to an approximate depth of 2 inches. Apply Amiben at a rate of 1 gal. (2 lbs.)/A with Treflan at 1½ pts. for medium soils and 2 pts. for fine textured soils. Do not use on muck or charcoal soils.

of about 1½ inches and a speed of 6-8 mph can be used. Do not disturb the seed. Vernolate is manufactured as a 7 lbs./gal liquid. It is also sold as a 10% granule. Do not tank mix with insecticides or fungicides.

Incorporated Plus Pre-emergence (Sequential) Treatments

Sequential treatments consist of a preplanting incorporated treatment followed by a pre-emergence treatment after planting.

soil texture*	Broadcast rates lbs./A active ingredient			
	Dual**	Sencor or Lexone	Dual 6E	Sencor or Lexone
coarse:				
loamy sand (over 2% organic matter)				
sandy loam	1.25	¼	1.5	¾
medium:				
loam, silt loam, silt	1.5	¾	2.0	½
fine:				
silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	2.0	½	2.0-2.5	½
Mississippi Delta only: silty clay, clay	2.0	¾	2.0-2.5	¾
muck or peat soils	DO NOT USE			

*Do not use the tank mixture pre-emergence or the sequential treatment on any sand, or loamy sand with less than 2% organic matter.

**Dual alone (preplant incorporated) as specified for this tank mixture. Follow with a pre-emergence application of Sencor or Lexone during planting (behind the planter) or after planting (behind the planter) or after planting before weeds or soybeans emerge. Refer to the Sencor or Lexone labels for planting details and soybean variety restrictions.

Trifluralin (Treflan), then Chloramben (Amiben): This treatment combines the grass weed control of both herbicides and the broader spectrum broadleaved weed control by chloramben.

Apply and incorporate trifluralin at 0.5-1 lb./A within one week before applying chloramben. Plant soybeans. Apply chloramben to the soil surface at 2 lbs./A. Observe all instructions and cautions on the labels of both herbicides.

Trifluralin (Treflan), then Chlorpropham (Furloe): Chlorpropham in this combination generally adds control of smartweed and a few other broadleaved weeds. Use trifluralin at 0.5-1 lb./A. After planting, apply chlorpropham at 2 lbs./A on sandy loam and medium soils (loam, silt loam and silt) to 3 lbs./A on heavy soils (clay loam, silty clay and clay). Observe all instructions and cautions on the labels of both herbicides.

Trifluralin (Treflan) then Linuron (Lorox): This combination controls most annual grass weeds and many broadleaved weeds. A few large-seeded broadleaved weeds are not controlled well. Apply trifluralin as described above. Apply linuron after planting at the following rates:

soil*	lbs./A active ingredient	
	low organic matter (½-2%)	moderate organic matter (2-5%)
sandy loam	¼-¾	¾-¾
silt loam	¾-¾	¾-1
clay loam	¾-¾	¾-1¼**

*Do not use on sand or loamy sand

**Use 1½ lbs./A on clay loam with more than 5% organic matter

Plant soybeans at least 1¾ inches deep on the flat or on beds. Planting in a furrow or deep press wheel tracks may result in injury to the crop. This combination has a rather narrow safety margin for the crop. Observe all instructions and cautions on the labels of both herbicides.

Trifluralin (Treflan), then Metribuzin (Sencor or Lexone):

Metribuzin adds to annual broadleaved weed control in this combination. A few large-seeded broadleaved weeds are not controlled well. This combination has a narrow margin of safety to the crop. Apply trifluralin as described above. Plant the soybeans. Apply metribuzin at the following rates:

soil	lbs./A active ingredient		
	½-2% organic matter	2-4% organic matter	more than 4% organic matter
loamy sand, sandy loam	do not use	¾	½
loam, silt loam, silty clay, sandy clay, clay loam	¾-½	½-¾	¾-¾
silty clay, silty clay loam, clay, clay loam	½-¾	¾-¾	¾-¾
silty clay, silty clay loam, clay, clay loam, in Mississippi Delta only	¾	¾	1

Do not use on sand or on soils with less than 0.5% organic matter.

The effects on soybeans of carry-over atrazine residues in the soil and metribuzin are additive. Together, the two herbicides may cause more crop injury than expected.

Do not use the immature plants or the plant residue after bean harvest for feed or forage. Observe all instructions and cautions on the labels of both herbicides.

Pendimethalin (Prowl), then Metribuzin (Sencor or Lexone): Rates for this sequential treatment are the same for each herbicide as in the tank mix applied preplant incorporated.

Pendimethalin (Prowl), then Linuron (Lorox 50W): Prowl preplant incorporated followed by Lorox pre-emergence will control a wide spectrum of broadleaved and grass weeds. Apply Prowl preplant incorporated and Lorox pre-emergence as follows:

soil	Prowl + Lorox 50W	
	1 to 3% organic matter	more than 3% organic matter
sandy loams	0.5-0.75 + 1 lb.	0.75 + 1-1.5 lbs.
loams, silt loams, silts, sandy clays, sandy clay loams	0.75 - 1.0 + 1.5 lbs.	0.75 - 1.0 + 1.5-2 lbs.
silty clays, silty clay loams, clay loams, clays	0.75 - 1.0 + 1.5 lbs.	1.0 - 1.25 + 2-2.5 lbs.

light soils 0.5-1 lb./A
 medium soils 0.75-1.25 lbs./A
 heavy soils 1 - 1.5 lbs./A

Do not graze treated fields or feed treated plant parts to livestock. Do not rotate to crops other than corn or soybeans for one year.

Pendimethalin (Prowl): Prowl is a selective herbicide that provides excellent control of annual grasses and certain broadleaf weeds. Prowl should be applied to the soil before planting and incorporated within 7 days in the top 2 inches of soil. Prowl can be applied several weeks prior to planting without significant reduction in weed control. It should be applied as follows:

soil texture	lbs./A active ingredient	
	up to 3% organic matter	more than 3% organic matter
coarse: loamy sands, sandy loams	.5-1	1.5
medium: sandy clay loams, sandy clays, loams, silts, silt loams	.75-1.25	1.25-1.5
fine: clay loams, silty clay loams, clays	1-1.5	1.5

Do not plant any crop except soybeans for 12 months after application.

Pendimethalin (Prowl) + Metribuzin (Sencor or Lexone): This tank mixture is incorporated as described for Prowl. This combination provides broad spectrum annual weed control.

soil texture	organic matter	
	2-3% (pendimethalin + metribuzin)	above 3%
coarse	0.5 + 0.38 lb./A	0.75 + 0.38 lb./A
medium	0.75 + 0.38 lb./A	1.00 + 0.5 lb./A
fine	1.0 + 0.5 lb./A	1.00 + 0.5 lb./A

Do not use on sand, muck or soils with less than 2% organic matter.

Profluralin (Tolban) + Metribuzin (Sencor or Lexone): Apply within 10 days before planting. Rates:

soil texture	Tolban lbs./A active ingredient	Sencor or Lexone
		lbs./A active ingredient
coarse	0.5	0.25
medium	0.75	0.37
fine	1.0	0.5

Do not use on sand or soils with less than 1% organic matter.

Alachlor (Lasso): The activity of alachlor on weeds usually is reduced by incorporation. Use 2.5 lbs./A on heavy soils. Apply and incorporate within seven days of planting. Incorporate no more than 2 inches deep with equipment such as a disk.

Metholachlor (Dual 6E): Apply Dual 6E to the soil and incorporate into the top 2 inches of soil within 14 days before planting soybeans. Rates:

soil texture	broadcast rate per acre	
	Less than 3% organic matter	3% matter or greater
coarse: sand, loamy sand, sandy loam	1.5-2.0 lb.	2.0 lbs.
medium: loam, silt loam, silt	2.0-2.5 lbs.	2.5 lbs.
fine: silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	2.0-2.5 lbs.	2.5-3 lbs.
muck or peat soils	DO NOT USE	

Rotational Crops: 1) If treated crop is lost, corn or soybeans may be planted immediately. Do not make a second broadcast application of Dual 6E. If the original application was banded and the second crop is planted in the untreated row middles, a second banded treatment may be applied. 2) Small grains may be planted 4½ months following treatment. Corn, soybeans, root crops and small grains may be planted the spring following treatment. Do not graze or feed forage or fodder from small grains or soybeans to livestock. All other rotational crops may be planted 18 months after application without restriction.

Metolachlor (Dual 6E + Metribuzin (Sencor or Lexone):

soil texture*	Broadcast rates per acre			
	0.5% to less than 3% organic matter		3% organic matter or greater	
	Dual	Sencor or Lexone	Dual	Sencor or Lexone
coarse: loamy sand (over 2% organic matter) sandy loam	1.25 lbs.	¼ lb.	1.5 lbs.	¾ lb.
medium: loam, silt loam, silt	1.5 lbs.	¾ lb.	2.0 lbs.	½ lb.
fine: silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, clay	2.0 lbs.	½ lb.	2.0-2.5 lbs.	½ lb.
Mississippi Delta only: silty clay, clay	2.0 lbs.	¾ lb.	2.0-2.5 lbs.	¾ lb.
muck or peat soils	DO NOT USE			

*Do not use the tank mixture pre-emergence or the sequential treatment on any sand, or loamy sand with less than 2% organic matter.

Vernolate (Vernam): Vernolate gives excellent control of annual grasses and suppresses nut sedge, but it is less effective in controlling broadleaved weeds. It can be used to control shatter cane or johnsongrass seedlings. Rates:

light sandy 2 lbs./A
 sandy loam to clay loam 2.5 lbs./A
 heavy clays 3 lbs./A

Thoroughly incorporate at a shallow depth immediately (within minutes) after application. Operate disk 4-6 inches deep at 4-6 mph. Do not plant soybeans deeper than 2 inches.

Vernolate can be applied and incorporated after planting on light soils. A rotary hoe, for example, operating at a depth

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