

## Herbicides for soybeans

Zane R. Helsel, Harold D. Kerr  
E. J. Peters, David Goethle, L. E. Anderson  
James A. Schaffer, and O'Hale Fletchall  
Department of Agronomy  
College of Agriculture

Soybean herbicides can be soil incorporated before planting (PPI). They can be applied to the soil surface at planting time or before crop emergence (pre-emergence). Or they can be applied in a *split application* (sequential) where the first product is incorporated and followed by a pre-emergent applied over the row or broadcast. A final application method is post-emergence treatment.

Tables 1, 2, and 3 list individual herbicides, tank mix combinations, and sequential and postemergence applications. Application rates include both *product* (liquid or dry from container) and *active ingredient*, which is the amount of actual chemical to be applied per acre. In some instances, the range of rates covers rates for different organic matter levels. **However, label rates take precedence over rates included in this guide sheet.** This publication is meant only as a guide to selecting and comparing herbicides, not to provide recommendations. The University of Missouri does not warrant commercial products and regrets any errors or omissions in this guide.

Several abbreviations are used in Tables 1, 2, and 3: L means Liquid; E or EC means emulsifiable concentrate; F or FL mean flowable liquids; and MTF means multiple temperature flowables. Dry formulations which can be mixed in water are: DF which means dry flowable and W or WP which mean wettable powders. Granules (G) are dry formulations that cannot be mixed with water but must be applied as purchased.

**Herbicide performance.** Information included in this guide sheet is 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.") Results may vary widely from those normally expected.

This information does not and cannot imply satisfactory performance in all cases. An element of risk is involved in the use of any herbicide. We have made no effort to list treatments in order of preference.

Comparative performance with emphasis on weed control and crop tolerance is a major factor in herbicide evaluation. Consult UMC Guide 4909, "Herbicides responses of common weeds" for detailed information on the efficacy of the various herbicides used in soybeans.

### Preplant incorporated treatments

Some herbicides should be incorporated into the soil promptly to prevent loss from the surface. Others may be incorporated at a more convenient time. Incorporation may improve performance when there is insufficient rainfall to activate the herbicide.

Proper incorporation is essential. Mix the herbicide thoroughly into the upper 2 inches of soil according to the label. Most tools do not thoroughly mix the chemical as deeply as they penetrate the soil. They usually will need to be operated about 3 to 4 inches deep.

An effective method of incorporation is to disk twice with a tandem disk. The first disking will satisfy the urgency of incorporation and cover most of the herbicide with soil to prevent the breakdown by light of some herbicides. A second disking will more uniformly mix the herbicide with the soil.

After the entire field has been disked once, disk the second time 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. Speed in excess of 4 mph improves mixing.

The *Do-All* bed conditioner or power-driven rotary cultivator incorporate herbicides satisfactorily. The power-driven rotary cultivator may destroy physical structure of the soil. This method may increase crusting and hamper seedling emergence. The field cultivator with sweeps properly spaced is an excellent incorporation tool. The spike-toothed harrow or the rotary hoe alone is not satisfactory.

## Product information

### Amiben (Chloramben)

Amiben herbicide is effective applied preplant incorporated, pre-emergence, and post-emergence. When used pre-emergence, it is most effective applied at planting time when spraying and planting are done in the same operation. Rain, irrigation water, or mechanical incorporation moves Amiben into the soil where weed seeds sprout.

Amiben remains active and effective for several weeks, long enough for crops to fill row middles and shade out the late-season weed growth.

Amiben controls several important broadleaf weeds and some annual grasses. Deep germinating annual weeds and sprouts from established perennial weeds are not controlled.

### Dual (Metolachlor)

Dual 8E is a selective herbicide recommended as a preplant incorporated or pre-emergence, surface-applied treatment in water or fluid fertilizer for control of most annual grasses and certain broadleaf weeds in soybeans. If Dual 8E is incorporated, any supplemental tillage before planting must not exceed the specified depth of incorporation. Dry weather after pre-emergence application of 8E or a tank mixture may reduce effectiveness. Cultivate if weeds develop.

### Furloe (CIPC)

Furloe acts as a selective pre-emergence and early-postemergence herbicide. It effectively controls some annual grassy and broadleaf weeds in soybeans. It is particularly effective on winter annuals and smartweed and can control nightshade at higher rates.

### Lasso (Alachlor)

This product controls most annual grasses and some broadleaf weeds. It may be applied either as a surface application after planting or shallowly incorporated before planting to blend the herbicide treatment into the upper 1 to 2 inches of soil. Except for minimum or conservation tillage systems, the seedbed should be fine, firm and free of clods and trash.

### Lexone or Sencor (Metribuzin)

These products are both Metribuzin but marketed by different companies. Metribuzin is applied as a spray for selective control of numerous problem broadleaf weeds and some grasses in soybeans. It may be incorporated or applied pre-emergence or split into two applications, one by each method. Moisture is necessary to activate the herbicide. Best results are obtained if treatment is made to moist soil or if moisture is supplied by rainfall or sprinkler irrigation ( $\frac{1}{4}$  to  $\frac{1}{2}$  inch) within two weeks after application. If moisture is insufficient to activate the herbicide, a shallow cultivation (rotary hoe is preferable) should be made after emergence of the crop while weeds are

small enough to be controlled by mechanical means. If heavy rains occur soon after application, injury to the crop may result. Metribuzin may also be used as a directed post-emergence spray to kill certain tough broadleaf weeds.

### Lorox or Linex (Linuron)

These products are both Linuron but marketed by two different companies. Linuron is applied pre-emergence to control many broadleaf and some grassy weeds. The degree of control and duration of effect vary with the amount of chemical applied, soil texture, rainfall, and other conditions. Moisture is required to activate the chemical. Best results occur if rainfall (or irrigation) occurs within two weeks of application.

Linuron may also be used post-directed to control emerged weeds. Results vary with rate applied and environmental conditions. Best results are obtained on succulent weeds growing under conditions of high humidity and temperatures of 70 degrees F or higher.

### Modown (Bifenox)

This herbicide can be applied lightly incorporated or pre-emergence. It controls numerous broadleaves and some annual grasses. Soil organic matter or clay content have little effect on Modown activity, with the best suitability on light or variable soils. Intense rains may splash product onto crop causing injury.

### Prowl (Pendimethalin)

Prowl can be applied preplant incorporated or pre-emergence. It controls most annual grasses and certain broadleaf weeds as they germinate but will not control established weeds. Unusually cold, excessively wet, or hot and dry conditions that delay or extend germination can reduce weed control.

Over-application or application when plants are under stress can result in crop stand loss, crop injury, or soil residues. Uneven application or improper soil incorporation can decrease weed control or cause crop injury. Deeper-than-recommended soil incorporation can reduce weed control.

### Sonalan (Ethalfuralin)

This preplant incorporated herbicide affects seed germination and related growth processes. It controls many annual grasses and some broadleaf weeds. Sonalan has shown activity on black nightshade. Sonalan should be incorporated within 48 hours after application.

### Surflan (Oryzalin)

This is a selective pre-emergent herbicide that will provide long-lasting control of several annual grasses and some broadleaf weeds. Apply pre-emergence but shallowly incorporate if no rainfall occurs within seven to 10 days.

#### Treflan (Trifluralin)

Treflan is a herbicide which is incorporated into the soil to provide long-lasting control of many annual grasses and broadleaf weeds. Treflan controls weeds as they germinate. Treflan will not control established weeds.

Treflan must be uniformly incorporated. Soil and moisture conditions should be such to allow large clods to be broken up during the incorporation process and allow for good soil mixing.

#### Vernam or Reward (Vernolate)

Vernolate is an incorporated herbicide that controls several annual grasses, nutsedge, and certain broad-

leaf weeds. During soybean germination and early seedling growth, extended periods of cold and wet or hot and dry weather may create conditions which result in a lack of tolerance. Reward is a modified form of vernolate that may provide extra crop tolerance and slightly better performance.

#### Zorial (Norflurazon)

Applied as a split application (incorporate and pre-emergence), Zorial controls grasses and sedges. Zorial, which is root absorbed and translocated, does not leach rapidly in soil. It should not be applied on coarse textured soils because injury may result.

Table 1. P.P.I. or Pre-emergent application

Herbicide	Formulation	Soil type	Rate/Acre	Incorporate	Weeds controlled		Notes/ Limitations
			Product (Active Ingredient)		Annual Grass	Broad- leaf	
Amiben (Chloramben)	2 lbs./gal.	loam clay	1.25 gal. (3 lbs.) 1.5 gal. (3.6 lbs.)	yes	yes	yes	No feeding restriction if Amiben is used alone.
Amiben 10G	10% active	loam clay	30 lbs. (3 lbs.) 36 lbs. (3.6 lbs.)	yes	yes	yes	Same as above.
Dual 8E (Metolachlor)	8 lbs./gal.	coarse medium fine	1.5-2 pts. (1.5-2 lb.) 2.5 pts. (2.5 lbs.) 2.5-3 pts. (2.5-3 lb.)	yes	yes	some	Do not apply where runoff will occur. Do not apply when drift may occur.
Lasso (Alachlor)	4 lbs./gal.	coarse medium fine	2.5-3 qts. (2.5-3 lbs.) 3 qts. (3.0 lbs.) 3.5-4 qts. (3.5-4 lbs.)	surface blend	yes	some	Do not apply by air. Use 4-qt. rate on any soil type to reduce competition from persistent weeds.
Lasso II	15% active	medium heavy	16-20 lbs. (2.4-3.0 lbs.) 20-26 lbs. (3.0 lb.-3.9 lbs.)	surface blend	yes	some	Soil surface should be freshly worked and free of weed growth. Seed bed should be firm and smooth.
Lexone (Metribuzin)	75% D.F.	coarse medium fine	.5 lb. (.37 lb.) .5-.67 lb. (.37-.5 lb.) .67-.67 (.5 lb)	no	several	yes	Do not use treated vines for feed or forage. Injury may occur if Atrazine was used previous year or on soils with high pH.
Lexone	50% W.P./4L	coarse medium fine	.75 lbs./pts. (.37 lb.) .75-1.0 lbs./pts. (.37-.5 lb.) 1.0-1.0 lbs./pts. (.5 lb.)	no	several	yes	Same as above.
Lorox-50W (Linuron)	50% W.P.	sandy loam silt loam clay loam	1-3 lbs. (.5-1.5 lbs.) 1.25-4 lbs. (.62-2 lbs.) 1.3-5 lbs. (.65-2.5 lbs.)	no	several	yes	Do not apply over top of emerged beans. Avoid drift to desirable plants.
Lorox-L/Linex 4L	4 lbs./gal.	sandy loam silt loam clay loam	1-3 pts. (.5-1.5 lb.) 1.25-4 pts. (.62-2 lbs.) 1.3-5 pts. (.65-2.5 lbs.)	no	several	yes	If weeds have emerged add 1 pt. surfactant to each 25-gal. spray mix.
Prowl (Pendimethalin)	4 lbs./gal.	coarse medium fine	1.2 pts. (.5-1.0 lb.) 1.5-3 pts. (.75-1.5 lb.) 2-3 pts. (1.0-1.5 lb.)	yes	yes	some	Livestock can be fed soybean bean forage from prowl-treated fields. Use 3-pt. rate on heavy clay soils.

Sencor (Metribuzin)	75% D.F.	coarse medium fine	.5-.67 lb. (.37-.5 lb.) .5-1.0 lb. (.37-.75 lb.) .67-1.2 lb. (.50-.9 lb.)	no	several	yes	Treated forage may be graded or fed to livestock 40 days after application. Injury may occur if Atrazine was used during one previous year, or on soils with high pH.
Sencor	50% W.P./4L	coarse medium fine	.75-1.0 lbs./pts. (.37-.5 lb.) .75-1.5 lbs./pts. (.37-.75 lb.) 1.0-1.75 lbs./pts. (.5-.87 lb.)	no	several	yes	Same as above.
Reward 6E (Vernolate)	6 lbs./gal.	coarse medium fine	2.7 pts. (2.0 lbs.) 3.3 pts. (2.5 lbs.) 4.0 pts. (3.0 lbs.)	yes	yes	some	May provide better crop tolerance than Vernam.
Sonalan 3 EC (Ethalfuralin)	3 lbs./gal.	coarse medium fine	1.5-2 pts. (.56-.75 lbs.) 2-2.5 pts. (.75-.93 lbs.) 2.5-3 pts. (.93-1.12 lbs.)	yes	yes	some	Increase rates for night-shade.
Surflan AS (Oryzalin)	4 lbs./gal.	coarse medium fine	75. qt. (.75 lb.) 1.0 qt. (1.0 lb.) 1.5 qt. (1.5 lb.)	if no rain	yes	some	Do not feed treated forage to livestock. Do not plant root crops for 12 months after application.
Surflan	75W	coarse medium fine	1.0 lb. (.75 lb.) 1.3 lb. (.98 lb.) 2.0 lbs. (1.5 lb.)	if no rain	yes	some	Same as above.
Treflan MTF (Trifluralin)	4 lbs./gal.	coarse medium fine	1.0 pt. (0.5 lb.) 1.5 pt. (.75 lb.) 2.0 pts. (1.0 lb.)	yes	yes	some	May be fall applied. Do not contaminate any body of water in any manner.
Treflan pro-5	5 lbs./gal.	coarse medium fine	0.8 pt. (0.5 lb.) 1.2 pt. (.75 lb.) 1.6 pt. (1.0 lb.)	yes	yes	some	Cool, wet weather during early growth may result in stress to beans.
Treflan TR10	10% granule	coarse medium fine	5 lbs. (0.5 lb.) 7.5 lbs. (.75 lb.) 10 lbs. (1.0 lb.)	yes	yes	some	Same as above.
Vernam 7E (Vernolate)	7 lbs./gal.	coarse medium fine	2.3 pts. (2.0 lbs.) 3.0 pts. (2.6 lbs.) 3.5 pts. (3.0 lbs.)	yes	yes	some	Incorporate immediately after application.
Vernam 10G	10% granule	light medium heavy	20 lbs. (2.0 lbs.) 25 lbs. (2.5 lbs.) 30 lbs. (3.0 lbs.)	yes	yes	some	Do not mix 10G with insecticides or fungicides. Do not contaminate water.
Dyanap, Kleen-Krop, Naptro, Ancrack and others (Naptalam + Dinoseb)	3 lbs./gal.	light medium heavy	4.5 qts. (3.8 lbs.) 4.5 qts. (3.8 lbs.) 6 qts. (4.5 lbs.)	no	no	yes	Do not graze or feed forage from any treated crop.

Table 2. Tank mix pre-emergents or sequential rate/acre.  
Check label for proper sequence.

Herbicide	Formulation	Se- quential	Soil type	Rate/Acre Product (Active ingredient)	Incor- porate	Weeds controlled		Limitations
						An- nual grass	Broad- leaf	
Amiben (Chloramben) + Dual (Metolachlor)	2 lbs./gal. 8 lbs./gal.	yes	coarse medium fine	4 qts. + 1.5 pt. (2.0 + 1.5 lb.) 4 qts. + 1.5 pt. (2.0 + 1.5 lb.) 6 qts. + 1 qt. (3.0 + 2.0 lbs.)	yes	yes	yes	No feeding restriction.
Amiben + Lasso (Alachlor)	2 lbs./gal. 4 lbs./gal.	no	coarse medium fine	3 qts. + 1.5 qt. (1.5 + 1.5 lb.) 4 qts. + 2.0 qts. (2.0 + 2.0 lbs.) 4 qts. + 2.0 qts. (2.0 + 2.0 lbs.)	yes	yes	yes	No feeding restriction.
Amiben + ‡Lorox (Linuron)	2 lbs./gal. 50% W.P.	no	sandy loam silt loam clay loam	3 qts. + 2.0 lbs. (1.5 + 1.0 lb.) 3 qts. + 2.5 lbs. (1.5 + 1.3 lb.) 4 qts. + 3.0 lbs. (2.0 + 1.5 lb.)	no	yes	yes	Plant beans at least 1.75 inches deep. No feeding restriction.
Amiben + Sencor or Lexone (Metribuzin)	2 lbs./gal. 50% W.P.	no	loamy sand clay loam silty loam	3 qts. + .75 lb. (1.5 + .38 lb.) 3 qts. + 1.0 lb. (1.5 + .5 lb.) 4 qts. + 1.0 lb. (2.0 + .5 lb.)	no	yes	yes	Do not use treated forage to feed livestock. Injury may occur if applied to soils with a pH of 7.5 or higher.
Amiben + Surflan (Oryzalin)	2 lbs./gal. 4 lbs./gal.	no	coarse medium fine	4 qts. + .75 qts. (2.0 + .75 lb.) 4 qts. + 1.0 qt. (2.0 + 1.0 lb.) 4 qts. + 1.25 qt. (2.0 + 1.25 lb.)	no	yes	yes	Do not use treated vines for feed or forage.
Dual (Metolachlor) + Dyanap (Naptalam + Dinoseb)	8 lbs./gal. 3 lbs./gal.	yes	coarse medium fine	1.25 pt. + 4.5 qts. (1.25 + 3.8 lbs.) 1.5 pt. + 6.0 qts. (1.5 + 4.5 lbs.) 2.0 pts. + 6.0 qts. (2.0 + 4.5 lbs.)	no	yes	yes	Do not apply tank mix in liquid fertilizer.
Dual + Sencor or Lexone	8 lbs./gal. 50% W.P.	yes	coarse medium fine	1.25 pt. + .5 lb. (1.25 + .25 lb.) 1.5 pt. + .75 lb. (1.5 + .37 lb.) 2.0 pts. + 1.0 lb. (2.0 + .5 lb.)	yes	yes	yes	Do not use on soils with less .5% organic matter or with a pH of over 7.4.
Dual + ‡Lorox	8 lbs./gal. 50% W.P.	no	coarse medium fine	1.25 pt. + 1.0 lb. (1.25 + .5 lb.) 1.5 pt. + 1.5 lb. (1.5 + .75 lb.) 2.0 pt. + 1.0 lb. (2.0 + 1.0 lb.)	no	yes	yes	Do not use on soils with less than .5% organic matter.
Dual + Treflan (Trifluralin)	8 lbs./gal. 4 lbs./gal.	yes	coarse medium fine	1.5 pt. + 1.0 pt. (1.5 + .5 lb.) 2.5 pts. + 1.5 pt. (2.5 + .75 lb.) 2.5 pts. + 2.0 pts. (2.5 + 1.0 lb.)	yes	yes	some	May be applied and incorporated up to 14 days before planting.

Furloe 4 EC (CIPC) +	4 lbs./gal.	yes	coarse	2 qts. + 1 pt. (2.0 + .5 lb.)	yes	yes	yes	Plant soybeans 1-2 inches deep. Do not feed forage to livestock.
Treflan MTF	4 lbs./gal.		medium fine	2.5 qts. + 1-1.5 pt. (2.5 + .5-.75 lb.) 3 qts. + 2 pt. (3 + 1 lb.)				
Furloe +	4 lbs./gal.	yes	coarse	2 qts. + 2.33 pts. (2.0 + 2.0 lb)	yes	yes	yes	Same as above.
Vernam (Vernolate)	7 lbs./gal.		medium fine	2.5 qts. + 3 pts. (2.5 + 2.6 lb.) 3 qts. + 3.5 pt. (3.0 + 3.1 lb.)				
Lasso +	4 lbs./gal.	no	coarse	2 qts. + 4.5 qts. (2 + 3.3 lbs.)	no	yes	yes	Apply within 5 days after last tillage operation.
Dyanap	3 lbs./gal.	no	medium to fine	2 qts. + 6.0 qts. (2 + 4.5 lbs.)				
Lasso +	4 lbs./gal.	no	coarse	0.5 qt. + 1.25 qts. (0.5 + .62 lb.)	no	yes	yes	Do not use on soil with less than 1% organic matter.
Furloe	4 lbs./gal.		medium fine	2.0 qts. + 3.0 qts. (2.0 + 3.0 lbs.) 3.0 qts. + 3.0 qts. (3.0 + 3.0 lbs.)				
Lasso +	4 lbs./gal.	no	coarse	2 qts. + .75 pt. (2.0 + .38 lb.)	no	yes	yes	Apply within 5 days after tillage operation. Do not apply over top of emerged beans.
†Lorox	4 lbs./gal.		medium fine	2 qts. + 2.0 pts. (2.0 + 1.0 lb.) 2.25 qts. + 3.0 pts. (2.25 + 1.5 lb.)				
Lasso +	4 lbs./gal.	no	coarse	2.0 qts. + 4.0 qts. (2.0 + 3.0 lbs.)	no	yes	yes	Do not apply on sand or loamy sand soils.
Premerge (Dinoseb)	3 lbs./gal.		medium fine	2.0 qts. + 6.0 qts. (2.0 + 4.5 lb.) 2.5 qts. + 6.0 qts. (2.5 + 4.5 lbs.)				
Lasso +	4 lbs./gal.	no	coarse	2 qts. + .75 lb. (2.0 + .38 lb.)	yes	yes	yes	Do not apply on soils with a pH of 7.4 or greater.
Sencor or Lexone	50% W.P.		medium fine	2 qts. + 1.0 lb. (2.0 + .5 lb.) 2 qts. + 1.0 lb. (2.0 lbs. + .5 lb.)				
Premerge 3 (Dinoseb)	3 lbs./gal.	no	all but sandy soils	2.2-5 gal. (6-7.5 lbs.)	no	few	yes	
Premerge 3 +	3 lbs./gal.	no	all but sandy soils	4-6 qts. + 3-4 qts. (3-4.5 + 1.5-2 lbs.)	no	yes	yes	Use the higher rates on clay loam and clay soils.
Amiben	2 lbs./gal.							
Prowl (Pendimethalin) +	4 lbs./gal.	yes	coarse	Do not use	yes	yes	yes	Forage from treated fields can be fed to livestock.
Amiben	2 lbs./gal.		medium fine	1.5 pt. + 1.0 gal. (.75 + 2 lbs.) 2.0 pts. + 1.0 gal. (1.0 + 2 lbs.)				
Prowl +	4 lbs./gal.	yes	coarse	1 pt. + 1 pt. (.5 + .5 lb.)	shallow	yes	yes	Forage may be fed to livestock. Do not use on soils of less than .5% organic matter.
†Lorox	4 lbs./gal.		medium fine	1.5 pt. + 1.5 pt. (.75 + .75 lb.) 1.5 pt. + 2.0 pts. (.75 + 1.0 lb.)				
Prowl +	4 lbs./gal.	yes	coarse	1.0 pt. + .5 lb. (.5 + .37 lb.)	yes	yes	yes	Forage can be fed to livestock 40 days after application.
Sencor or Lexone	75% D.F.		medium fine	1.5 pt. + .5 lb. (.75 + .37 lb.) 1.5 pt. + .67 lb. (.75 + .5 lb.)				

Table 2. Continued.

Herbicide	Formulation	Se- quen- tial	Soil type	Rate/Acre Product (Active ingredient)	Incor- porate	Weeds controlled		Limitations
						An- nual grass	Broad- leaf	
Sonalan (Ethalfluralin) + Amiben	3 lbs./gal.	yes	coarse	1.25-2 pts. + 4-6 qts. (.5-.75 + 2-3 lbs.)	yes	yes	yes	In case of crop failure replant only the crop on label. Do not graze or use forage for livestock. Do not apply to wet or flood-prone soils.
	2 lbs./gal.		medium	1.75-2.5 pts. + 4-6 qts. (.65-.94 + 2-3 lbs.)				
			fine	2.25-3 pts. + 4-6 qts. (.85-1.12 + 2-3 lbs.)				
Sonalan + Dual	3 lbs./gal.	yes	coarse	1.25-2 pts. + 1.5-2 pts. (.5-.75 + 1.5-2.0 lbs.)	yes	yes	yes	Same as above.
	8 lbs./gal.		medium	1.75-2.5 pts. + 2-2.5 pts.) (.65-.94 + 2.0-2.5 lbs.)				
			fine	2.25-3 pts. + 2-3 pts. (.85-1.12 + 2.0-3.0 lbs.)				
Sonalan + Lasso	3 lbs./gal.	yes	coarse	1.25-2 pts. + 2-2.5 qts. (.5-.75 + 2.0-2.5 lbs.)	yes	yes	yes	Same as above.
	4 lbs./gal.		medium	1.75-2.5 pts. + 2.5-3.5 qts. (.65-.94 + 2.5-3.5 lbs.)				
			fine	2-25-3-.65-.94 + 2.5-3.5 lbs. (.85-1.12 + 3.0-4.0 lbs.)				
Sonalan + Sencor or Lexone	3 lbs./gal.	yes	coarse	1.25-2 pts. + .5 lb. (.5-.75 + .25 lb.)	yes	yes	yes	Same as above.
	50% WP		medium	1.75-2.5 pts. + .75 lb. (.65-.94 + .37 lb.)				
			fine	2.25-3 pts. + 1 lb. (.84-1.12 + .50 lb.)				
Sonalan + Lorox L	3 lbs./gal.	yes	coarse	1.25-2 pts. + 1-3 pts. (.5-.75 + .5-1.5 lb.)	no	yes	yes	Same as above.
	4 lbs./gal.		medium	1.75-2.5 pts. + 1.25-4 pts. (.65-.94 + .63-2.0 lb.)				
			fine	2.25-3 pts. + 1.33-5 pts. (.85-1.12 + .67-2.5 lb.)				
Sonalan + Vernam	3 lbs./gal.	no	coarse	1.25-2 pts. + 2.33 pt. (.5-.75 + 2.0 lb.)	yes	yes	yes	Same as above.
	7 lbs./gal.		medium	1.75-2.5 pts. + 3 pt. (.65-.94 + 2.6 lb.)				
			fine	2.25-3 pts. + 3 pt. (.85-1.12 + 2.6 lb.)				
Surflan + ‡Lorox	4 lbs./gal.	no	coarse	0.5 qt. + 1.25 pts. (0.5 + .62 lb.)	no	yes	yes	Do not use treated vines for feed or forage.
	4 lbs./gal.		medium	.75 qt. + 1.67 pts. (.75 + .83 lb.)				
			fine	1.0 qt. + 2.0 pts. (1.0 + 1.0 lb.)				



Surflan + Dyanap or Klean-Krop	4 lbs./gal. 3 lbs./gal.	yes	coarse medium fine	1.0 pt. + 6 qts. (0.5 + 4.5 lbs.) 1.5 pt. + 6 qts. (.75 + 4.5 lb.) 2.0 pts. + 6 qts. (1.0 + 4.5 lbs.)	no	yes	yes	Apply within 2 days after planting. Do not apply over top of emerged beans. Do not use treated vines for feed or storage.
Surflan + Sencor or Lexone	4 lbs./gal. 50% W.P.	no	coarse medium fine	1.0 pt. + .5 lb. (0.5 + .25 lb.) 1.5 pt. + .75 lb. (.75 + .37 lb.) 2.0 pts. + 1.0 lb. (1.0 + .5 lb.)	no	yes	yes	Do not use treated vines for feed or forage. Do not plant any crop other than soybeans within 4 months after application.
Treflan + Amiben	4 lbs./gal. 2 lbs./gal.	yes	coarse medium fine	1.0 pt. + 4 qts. (0.5 + 2 lbs.) 1.5 pt. + 4 qts. (.75 + 2 lbs.) 2.0 pts. + 4 qts. (1.0 + 2 lbs.)	yes	yes	yes	Use as a spring preplant incorporated application.
Treflan + Sencor or Lexone	4 lbs./gal. 50% W.P.	yes	coarse medium fine	1.0 pt. + .5 lb. (0.5 + .25 lb.) 1.5 pt. + .75 lb. (.75 + .38 lb.) 2.0 pts. + 1.0 lb. (1.0 + .5 lb.)	yes	yes	yes	Do not feed forage. Soybean stress may result if soil pH is above 7.5.
Treflan + Vernam*	4 lbs./gal. 7 lbs./gal.	no	coarse medium fine	1.0 pt. + 1.75 pt. (0.5 + 1.5 lb.) 1.5 pt. + 2.3 pts. (.75 + 2.0 lbs.) 2.0 pts. + 3.0 pts. (1.0 + 2.6 lbs.)	yes	yes	some	Incorporate immediately after application.
Vernam* + Amiben	7 lbs./gal. 2 lbs./gal.	yes	no distinction	2.3 pts. + 3.0 qts. (2.0 + 1.5 lb.)	yes	yes	yes	Same as above.
Vernam* + Prowl	7 lbs./gal. 4 lbs./gal.	no	coarse medium fine	1.75 pt. + .75 pt. (1.5 + .37 lb.) 2.3 pts. + 1.0 pt. (2.0 + .5 lb.) 3.0 pts. + 1.5 pt. (2.6 + .75 lb.)	yes	yes	yes	Same as above.
Vernam* + Lasso	7 lbs./gal. 4 lbs./gal.	no	coarse medium fine	1.75 pts. + 2 pts. (1.5 + 1 lb.) 2.33 pts. + 3 pts. (2.0 + 1.5 lb.) 3 pts. + 4 pts. (2.6 + 2.0 lb.)	yes	yes	yes	Same as above.
Vernam* + Dyanap	7 lbs./gal. 3 lbs./gal.	yes yes	coarse medium fine	1.75 pts. + 6 qts. (1.5 + 4.5 lbs.) 2.33 pts. + 6 qts. (2.0 + 4.5 lbs.) 3 pts. + 6 qts. (2.6 + 4.5)	no	yes	yes	Same as above.
Vernam* + Lorox 50W	7 lbs./gal. 50% WP	no	coarse medium fine	1.75 pts. + 1-1.5 lbs. (1.5 + .5-.75 lbs.) 2.33 pts. + 1-1.5 lbs. (2.0 + .5-.75 lbs.) 3 pts. + 1-1.5 lbs. (2.6 + .5-.75 lbs.)	no	yes	yes	Same as above.

\*Reward may be substituted for Vernam at the appropriate rate.

†Griffin Corp., carries a label for Linex 4L (linuron) with Amiben, Lasso, Prowl, Dual, Ramrod, and Surflan.

## Postemergence herbicides

### Alanap-L (Naptalan)

This herbicide predominately controls broadleaf weeds. Use Alanap-L as a pre-emergence spray immediately after seeding or as an overtop application when soybeans are about 18 inches tall (just before bloom and bloom) and are growing actively. A band treatment may also be used.

Do not apply Alanap-L to an area where crop seeds are exposed or shallowly planted. The usual depth of planting to ensure a stand is sufficient if the crop seeds are well covered with soil. If weather factors make replanting necessary after Alanap-L has been applied, thoroughly disk the area before replanting.

### Basagran (Bentazon)

Basagran selective herbicide is intended for the post-emergence control of certain broadleaf weeds and sedges. Basagran does not control grasses. Basagran is effective mainly through contact action; therefore, weeds must be thoroughly covered with spray.

Basagran applications should be made when weeds are small and actively growing and before weeds reach the maximum size listed in the table. Such applications generally correspond to the soybean growth stages of unifoliolate through two expanded trifoliolate leaves. Soybeans are tolerant to Basagran at all stages of growth. Slight leaf-yellowing, bronzing, speckling, or burning may occur under certain conditions but are generally outgrown within 10 days. Oil concentrate should be added to the spray tank under certain conditions. Consult label for details.

### Blazer (Acifluorfen)

Blazer 2L is a selective broad-spectrum herbicide recommended for postemergence applications to soybeans to control susceptible broadleaf weeds. Blazer may also provide burndown of very young grass seedlings. Optimum control with Blazer is achieved when young, actively growing weed seedlings are treated. It is important to cover all weed parts thoroughly with Blazer because it works primarily by contact action. Failure to follow the suggested dosages on maximum leaf stage limits may result in unsatisfactory control. See the weed charts and special use directions for recommended rates and timing of applications.

Soybeans are tolerant to postemergence applications of Blazer when it is applied at the recommended growth stages and suggested dosage rates. Soybean leaves may respond to Blazer and exhibit burning, crinkling, and bronzing, particularly on the youngest leaves present at the time of application. Soybeans

outgrow this condition and continue to develop normally.

Use of an 80%+ non-ionic surfactant such as Triton AG-98 is recommended to improve control. Specific uses are detailed on the label.

A tank mix of Blazer + Basagran controls pigweed, morningglory, lambsquarters, and cocklebur better than either weaker herbicide applied alone.

### Butyrac or Butoxone (2,4-DB)

This 2,4-DB product made by two different companies is designed primarily for directed band application when beans are at least 8 inches tall. Adjust the nozzle height to allow spray to contact no more than the bottom one-third of soybean plants. Do not allow spray drift to contact growing terminals of beans because excessive crop injury will result.

For best results treat when the cocklebur and morningglory are no more than 3 inches tall. All leaves and growing terminals of weeds should be contacted by the spray. Do not use more than two applications per season to avoid stunting soybeans.

To ensure proper placement of spray on the lower one-third of soybean plants, apply with sprayer nozzles mounted on skid shoes, oiling shoes, or cultivators with gauge wheels. Do not mount on booms with drop nozzles or on cultivators without gauge wheels. Use fan nozzles (8001 or larger, or their equivalent). Nozzle pressure should be less than 40 psi to reduce spray drift.

Drought beans should not be sprayed. Do not use this product on soybeans that show symptoms of disease such as *Phytophthora* root rot. Do not add any wetting agents or detergents to the spray solution.

### Dyanap (Naptalan + Dinoseb)

Dyanap can be applied anytime after planting through the crook stage and postemergence. Dyanap can also be applied after using preplant incorporated herbicides. The area to be treated should be well prepared and as free as possible from stubble and litter.

As an early postemergence treatment, Dyanap may be applied beginning when the first trifoliolate soybean leaf is fully expanded (in all soybean-growing areas). This treatment will provide effective control of the following broadleaf weeds: cocklebur, annual morningglory, jimsonweed, common ragweed, giant ragweed, ground cherry, pigweed, wild sunflower, and mustard.

Do not apply Dyanap when temperatures are higher than 75 degrees F during periods of low humidity. Injury may be more pronounced.

### Fusilade (Fluazfop)

Fusilade 4E is a selective postemergence herbicide for control of annual and perennial grasses. Fusilade does not control broadleaf weeds or sedges (nutgrass). Soybeans show no injury to Fusilade.

Fusilade is a systemic herbicide that moves from the treated foliage into the rhizomes, stolons, and growing points of grasses. Excellent control of a wide range of annual and perennial grasses will be obtained from Fusilade when applied at the proper stage of weed growth as recommended on this label.

Growth of treated grasses stops soon after application. Symptoms include loss of vigor, yellowing or reddening, and necrosis. Symptoms are generally observed within one to three weeks, depending on grass species and environmental conditions. Always add either a crop oil concentrate or a nonionic surfactant. Add crop oil concentrate at 1 percent (1 quart per 25 gallons) of the finished spray volume. Use only nonphytotoxic crop oil concentrates that contain 15 to 20 percent surfactant. Add a nonionic surfactant at 0.25 percent (½ pint per 25 gallons) of the finished spray volume. Use only nonionic surfactants that contain at least 80 percent surface-active agent.

### Hoelon (Diclofop)

Hoelon 3EC is a selective postemergence herbicide for annual grass control. It should be applied when the majority of annual grassy weeds are in the one-to-four leaf stage of growth. For best control of crabgrass and yellow foxtail, applications should be made before the second leaf fully emerges. The stage of weed growth is more important than the number of weeds. Thorough uniform spray coverage of weeds is essential.

Heavy infestations of volunteer corn (especially when uneven emergence is occurring from ears buried at varying soil depths) should be treated as a special weed problem. Apply Hoelon after **all** the volunteer corn has emerged but before the first emerged corn grows to a height where thorough coverage is not possible. Spray boom height and pressures should be adjusted to obtain total coverage of the entire volunteer corn plant. Thorough coverage of the volunteer corn foliage and penetration of clumps is essential.

The delayed broadcast application of Hoelon to control heavy infestations of volunteer corn will give

greatly reduced control of any annual grassy weeds that have grown beyond the recommended leaf stages. Do not apply more than one application of Hoelon in a growing season.

### Poast (Sethoxydin)

Poast is a selective broad-spectrum postemergence herbicide for control of annual and perennial grass weeds in soybeans. Poast does not control sedges or broadleaf weeds. Soybeans at all stages of growth are tolerant to Poast.

Poast rapidly enters the plant through the foliage and translocates throughout the plant. Control symptoms exhibited by the grass plant progress from a slowing or stopping of growth, to leaf tip burn, and to reddening of the foliage. Subsequently, burn back of the foliage occurs. These symptoms will generally be observed within three weeks depending on environmental conditions.

Apply Poast herbicide postemergence to actively growing grasses before they exceed the recommended stage of growth given in the rate tables. Always add a nonphytotoxic oil concentrate to the spray solution at 1 quart per acre for ground applications and 1 pint per acre for aerial applications. Oil concentrates are sold under many brand names and should consist of 80 percent paraffin-base petroleum oil with 20 percent various surfactants and inert ingredients.

### Premerge (Dinoseb)

Dinoseb controls seedling weeds in soybeans. Pre-plant, pre-emergence, postemergence or directed postemergence applications are possible, depending upon weed problem and Dinoseb formulation.

### Rescue (Alanap-L + 2,4-DB)

Rescue is a selective mid-late season postemergence product used to control or suppress cocklebur, morningglory, giant ragweed, sunflower, and marshelder. Apply to soybeans about 18 inches tall (seven to 10 days before bloom through mid-bloom). Position spray boom 18 to 24 inches above the tops of the soybean plants or weeds. It should be equipped with hollow cone nozzles. Maintain a high spray pressure (40 to 50 psi) during application. Misapplication or where plants are under stress may cause substantial crop injury.

Table 3. Postemergence.

Herbicide	Formulation	Rate/Acre Product (Active Ingredient)	Weeds Controlled		Limitations
			Grass	Broadleaf	
Amiben (Chloramben) + crop oil conc.	2.0 lbs./gal.	5.0 to 6.0 qts. (2.5 to 3.0 lbs.)	no	yes	Do not feed straw or green fodder treated with Amiben. Do not apply later than 33 days after planting.
Amiben + Butyrac-200 or Butoxone (2,4 DB)	2.0 lbs./gal. 2.0 lbs./gal.	5.0 qts. + 2 oz. (2.25 lbs. + 2 oz.)	no	yes	same as above
Amiben + Alanap-L	2.0 lbs./gal. 2.0 lbs./gal.	5.0 qts. + 2.0 qts. (2.25 + 1.0 lb.)	no	yes	Do not use forage for live-stock feed.
Basagran (Bentazon)	4.0 lbs./gal.	0.75 qts. to 1.0 qt. (0.70 to 1.0 lb.)	no	yes	Weed size determines rate applied. Use crop oil for some applications.
Basagran + Butyrac-200 or Butoxone	4.0 lbs./gal. 2.0 lbs./gal.	0.75 qt. + 2.0 oz. (0.75 lb. + 2.0 oz.)	no	yes	Do not apply within 60 days of harvest.
Blazer (Acifluorfen)	2.0 lbs./gal.	1.5-2.0 pts. (0.37-0.5 lb.) (plus surfactant)	no	yes	Do not apply within 50 days of harvest. Do not feed forage to livestock.
Blazer + Poast	2.0 lbs./gal. 1.53 lbs./gal.	1.5-2.0 pts. + 1.5 pts. (.37-.5 + .19 lb.) (plus 1 qt. crop oil conc.)	yes	yes	
Blazer + Basagran	2.0 lbs./gal. 4.0 lbs./gal.	1.5 pt. + 1.0 pt. or 1.0 + 1.5 pt. (plus surfactant or oil)	no	yes	Poast can be added to this tank mix at 1.5 pts./A.
Blazer + Butyrac-200 or Butoxone	2.0 lbs./gal. 2.0 lbs./gal.	1.5 pt. + 2.0 oz. (0.38 lb. + 2.0 oz.)	no	yes	Do not apply within 60 days before harvest.
Butyrac-200 or Butoxone	2.0 lbs./gal.	0.7 pt. to 0.9 pt. (0.175 to .22 lb.)	no	yes	Directed spray.

Dyanap (Naptalan + Dinoseb)	3.0 lbs./gal.	2.0 qts. to 4.0 qts. (1.5 lb. to 3.0 oz.)	no	yes	Do not apply after beans are 20 inches tall.
Dyanap + Butyrac-200 or Butoxone	3.0 lbs./gal. 2.0 lbs./gal.	2.0 qts. + 1.75 oz. (1.5 lb. + 1.75 oz.)	no	yes	Do not use surfactants.
Fusilade (Fluazfop)	4.0 lbs./gal.	0.25 - 0.5 pt. (.125-.25 lb.)	yes	no	Do not graze livestock in treated area.
Fusilade + Blazer	4.0 lbs./gal. 2.0 lbs./gal.	0.25-0.5 + 1.5-2.0 pts. (1.25-.25 + 0.37-0.5 lb.) (use surfactant or crop oil)	yes	yes	Certain conditions may result in reduced performance of Fusilade when tank-mixed.
Hoelon (Diclofop)	3.0 lbs./gal.	2.0 to 3.3 pts. (0.75 to 1.25 lb.)	yes	no	Do not graze or feed treated forage.
Lexone or Sencor (Metribuzin)	4.0 lbs./gal.	.5 pt. + 1 pt. (.25 + .5 lb.)	no	yes	Rate depends on weed species spray on lower ¼ - ½ of plant; do not use on susceptible varieties.
Lorox 50W alone or + 2,4-DB	50% W 2.0 lbs./gal.	.5-1 lb. (.25-.5 lb.) 1 lb. + 13 oz./1 pt. (0.5 lb. + ½ lb.)	no no	yes yes	Post directed only check specified weed and crop height. Add surfactant except with 2,4-DB.
Lorox 50W + Premerge 3 (Dinoseb)	50% W 3 lbs./gal.	1 lb. + 2 qts. (0.5 lb. + 1.5 lb.)	no	yes	
Orthro Paraquat + or Gramoxone (Paraquat)	2.0 lbs./gal.	4-8 oz. (.063-.125 lbs.)	yes	yes	Post directed only. Use higher rate for larger weeds. Use X-77 or non-ionic surfactant.
Poast (Sethoxydin)	1.53 lb./gal.	1.0 to 1.5 pt. (0.1 to 0.19 lb.)	yes	no	Always add a non-phytotoxic oil concentrate. Do not graze or feed forage.

Table 3. Continued.

Herbicide	Formulation	Rate/Acre Product (Active Ingredient)	Weeds Controlled		Limitations
			Grass	Broadleaf	
Premerge 3	3.0 lbs./gal.	early post = 2-3 qts. (1.5-2.0 lbs.) late post salvage = 1-2 pts. (.37-.75 lbs.) post directed = 2-4 qts. (1.5-3.0 lbs.)	some	yes	Apply as early post before terminal bud of soybean is exposed. Use the higher rate when below 75°F, the lower rate between 75-95°F. Use Rescue treatment on small weeds when soybeans are between 1st trifoliolate and bloom. Apply post directed between 5-6" tall soybeans and bloom.
Rescue (Alanap + 2, 4-DB)	2.06 lbs./gal.	2.0 to 3.0 qts. (1.05 to 1.59 lb.)	no	yes	Do not apply after mid bloom. Do not graze or feed forage.
Roundup (Glyphosate)	3.0 lbs./gal.	2.0:1.0 ratio, water carrier	yes	yes	Apply with wick wiper or recirculating sprayer.

## Tank mixes

Generally, unless label directions state otherwise, add herbicides to the tank in the following order: First: wetttable powders. Second: flowables. Third: water solubles. Fourth: surfactants and emulsifiable concentrates. Spray tanks should be half filled with water before the herbicides are added. If the mixture foams excessively, separates, or becomes syrupy, do not apply the mixture. Compatibility agents are available which may be added to improve mixing ability. Even if all components appear compatible, the tank mixture should have constant, vigorous agitation to prevent separation.

### Three-way tank mixes

The following is a list of known three-way herbicide combinations. Consult label for rates and uses.

Amiben + Lasso + Lexone or Sencor  
Amiben + Dual + Lexone or Sencor  
Amiben + Treflan + Lexone or Sencor  
Prowl + Amiben + Lexone or Sencor  
Sencor + Lasso + Dyanap  
Treflan + Amiben + Lexone or Sencor  
Vernam + Treflan + Metribuzin  
Lexone + Lorox + Dual  
Lexone + Lorox + Lasso

## Fertilizers as herbicide carriers (Mixes)

Check label for approved mixes. Because of the variability among fertilizer forms and grades, make compatibility checks with each batch of fertilizer-herbicide mixes made.

To check compatibility with liquid fertilizers, put 1 pint of liquid fertilizer in a quart jar and add 2 teaspoons of the liquid form of herbicide (if a wetttable powder, add 2 teaspoons to enough water to form a slurry). Cover, shake well, and observe the mixture for 30 seconds. Check again after 30 minutes. If the mixture does not separate, it is compatible. Check compatibility if water source changes, as water pH and mineral content influence compatibility. Some general compatibilities are listed below:

Herbicide	Fertilizer
Amiben	Liquid (not dry)
Dual	Fluid
Lasso	Fluid or dry bulk
Lexone	Fluid
Lorox	Fluid
Sencor	Fluid or dry bulk
Surflan	Not on label
Treflan	Not on label
Vernam/Reward	Fluid or dry bulk

(Check label for compatibility tests)

## Tests for herbicide carryover

Carryover problems have frequently been reported for two groups of herbicides, the Triazines and the Dinitroanilines. To test for these or others, consider the following steps.

1. Collect soil samples from several locations in the field to the depth the field has been or will be tilled. About 5 pounds of soil are needed. Collect an equal amount of soil from an adjacent field where it is known that no herbicide has been applied. This sample is used as a "check."

2. If soil is wet, allow it to dry so it can be worked easily. If the soil is cloddy, crush the clods, but do not pulverize. Start the test within one or two weeks after soil is collected to prevent the loss of herbicide under warm conditions.

3. Partially fill two containers with soil—one with the soil being tested and the other with soil from the "check" field. Punch holes in the bottom of the containers to allow drainage. Tin cans or milk cartons make good containers.

4. Plant 15 seeds of a sensitive crop, such as oats, in each container and cover with ½ inch of soil. Wet the soil but do not saturate. Know the exact number of seeds planted. Do not plant too many seeds or the seedlings may compete for the herbicide and decrease the injurious effects.

5. Place containers in a warm place (70 to 75 degrees F) with about 15 hours of light. Water plants sparingly.

6. Determine plant emergence and monitor plant growth for at least three weeks after planting. Compare "check" plants with those in the soil being tested.

## Use of soy and other vegetative oils in herbicide application

There has been much interest in the use of vegetable oils—particularly soybean oil—for use in herbicide application. Research supported by grower check-off funds in Missouri and other states has provided some of the following observations. Application of some herbicides in low volumes (less than 3 gal/A) of oil or oil-water mixes through some ground application devices have not given consistently good weed control. As an additive (for example, 1 quart oil, plus herbicides in 20 gallons of water), soy oil has not appeared to improve the performance of preplant or pre-emergence soil applied herbicides.

However, with postemergence chemicals requiring the use of crop oil concentrates, soy oil has generally proven to be an adequate substitute for petroleum-based concentrates. Once refined, soy oils with 7 percent or more emulsifiers appear to be the minimum quality crop oil concentrate that can be

used as an additive. More research is being conducted to further define the use of vegetable oils in herbicide applications.

Consult labels or company representatives if you don't know whether soy oil can be used. Be aware of the following Environmental Protection Agency statements. Soy oil used as the oil component in a crop oil concentrate may be used where a crop oil concentrate is called for on the herbicide label *if* the label does not prohibit it. Also "under FIFRA Section 12(a)(2)(g), it is unlawful to use any registered pesticide in a manner inconsistent with its labeling. If the label specifies a substance as the product's diluent, the use of any other substance as a diluent is considered a use inconsistent with the label and constitutes a violation under Section 12(a)(2)(g). In instances where no diluent is specified on the label, water must be used as the diluent."

### Weed control in no-till soybeans

Controlling existing vegetation is the first step in effective weed control. Paraquat can be used to control small annual vegetation. Roundup is preferred when planting in fields with perennial vegetation or a large growth of annuals. Banvel or 2,4-D are generally not recommended for burndown. Some

pre-emergence chemicals may be applied several weeks prior to planting to prevent weeds from growing. If effective, a burndown treatment would not be needed.

Many of the pre-emergence chemicals available to control weeds under conventionally tilled production can also be used for no-till crop production. Check the labels for compounds that can be used in no-till fields. With most of these chemicals, it's advantageous to *use the upper end of the range of the rates listed*. The higher rate ensures enough chemical is available to go through the residue and into the soil. Organic matter may also build up on the surface after several years. These fields may require higher chemical rates.

Postemergence chemicals are available to control most escaped grass or broadleaf weeds. Except in a double crop situation with heavy straw, these chemicals can be applied as you would on conventionally tilled soils.

Coverage is important, especially with contact herbicides. Increasing the pressure or gallonage may help. In all cases when using herbicides, **read the label** for information on proper application techniques. For more information on the use of herbicides for conservation tillage, consult UMC Guide 4905, "Herbicides for conservation tillage cropping system."