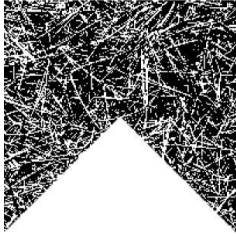


IPM

Soybean



Insect, Disease, Nematode, and Weed Control Recommendations for 2010

INSECT CONTROL

For effective and economical insect control on soybeans, check beans periodically for the presence of insects. Scouting is especially important from the time of blooming until the beans are mature in the pods. Examine both foliage and pods to determine the number and kinds of insects present. The count will enable you to decide when sufficient numbers are present to justify control. The kinds of insects present will indicate which insecticide to use.

Seedling- and Stem-Feeding Insects

Cutworms are the larvae of night-flying moths. When fully grown, they are nearly 2 inches long. Several species attack soybeans. Larvae are fat, greasy, and dark-colored. They hide beneath the soil's surface during the day and then emerge at night to feed. Cutworms usually feed on portions of the stem rather than the foliage. Feeding results in leaves being clipped or plants being cut.

Three-cornered alfalfa hoppers are green, triangular insects that jump when disturbed. Both nymphs and adults suck juice from plants and can occur in damaging numbers on soybeans. The nymphs are particularly damaging because they gradually work their way around the stems as they feed. Their feeding girdles the plants and either kills them outright or weakens them so that they later fall over and die. The girdling takes place near ground level. Cruiser Maxx and Gaucho 600 insecticide seed treatments provide early season control. Once beans are 10 inches tall, feeding can occur on petioles of leaves, stems, and pods.

Lesser cornstalk borers are the slender, brownish-green, cross-striped, active larvae of small, brownish-gray moths. The eggs are laid on the stems of seedling plants. After hatching, the larvae bore into the young stems and burrow up and down inside the stems. The burrowing weakens the stems and causes the plants to fall over and die. The larvae construct tubes of sand, silk, and excrement which lie horizontally in the soil and are attached to the stems at the worms' entrance holes. The larvae leave the plants through these tubes when the plants die.

Grasshoppers have emerged as a pest of soybeans in recent years, primarily in conservation tillage systems. They chew the main stems of young plants, causing a reduction in stands. Soybeans are most susceptible to grasshopper injury from the time they emerge until the plants have about six leaves. Both the immature and the adult stage may cause

injury. Controls are warranted when stands are threatened or more than one-third of the leaves are lost.

Foliage-Feeding Insects

Velvetbean caterpillars are the larvae of small night-flying moths which overwinter in the tropics and in southern Florida. Adults migrate into Alabama in June and begin laying eggs on soybeans. The larvae are slender and multicolored with faint white stripes down the sides. They wiggle freely when disturbed. They are serious foliage feeders.

Fall armyworms are similar in appearance to corn earworms and are the larvae of small, night-flying moths. The larva has a prominent white inverted Y-shape on its head. Fall armyworms generally eat foliage and are easily seen and collected. They occur sporadically. Also, they are voracious feeders and can strip off leaves and tender stems very rapidly.

Soybean loopers (cabbage loopers) are serious defoliators of soybeans in Alabama. They are the larvae of small, dark-gray, night-flying moths. The larva is a slender, "cabbage green" worm that forms loops or humps as it crawls. When fully grown, it is 1 to 1.5 inches long. It feeds on foliage and is most often a pest from late August through September. However, it may occur earlier in the season.

Green cloverworms are semi-loopers. The worm is green with three pairs of prolegs. It has two narrow, white stripes down the side. It is about 1.25 inches long when fully grown. The worm is very active when disturbed.

Blister beetles are elongated, soft-winged beetles about 0.5 to 0.75 inch long. They are usually black and yellow striped but may be black or gray. They are generally foliage feeders that occur occasionally. Large populations may occur in isolated parts of a soybean field. These beetles feed gregariously and are easily seen.

Mexican bean beetles are reddish to yellow with sixteen black spots on the back and are about 0.25 inch long. Both the adult beetle and the spiny, orange or yellow larva skeletonize soybean leaves and sometimes feed on the pods. Mexican bean beetles are larger than the beneficial ladybug beetle, which they resemble. High populations are a serious pest.

Bean leaf beetles are reddish to yellow, usually with three or four black spots on each wing cover and a black border on the outside edge. They feed on soybean leaves and also on small pods.

Beet armyworms, close relatives of fall armyworms, are general feeders that attack soybean foliage and stems. The beet armyworm overwinters as a pupa in most of Alabama. In warmer areas, such as Baldwin County, it may overwinter as the adult moth. It has a wingspread of about 1.25 inches. The forewings are grayish brown with a pale spot in the mid-front margin. The hind wings are white with a dark front margin. The female begins to lay eggs in early spring. She deposits them in masses of about 80 eggs covered with hairs and scales from her body. She may lay as many as 500 to 600 eggs over a 4- to 10-day period. The eggs hatch in 2 to 5 days, and the larvae feed for about 3 weeks, spinning light webs over the foliage and passing through five stages.

The mature larva, about 1.25 inches long, is green with dark lateral stripes and a black dot above the second pair of legs behind the head. It usually pupates in the upper 0.25 inch of the soil in a cell made by putting soil particles and trash together with a sticky solution. The entire life cycle from egg to adult is about 36 days at 80°F. There usually are three to four generations each year in Alabama. They are extremely difficult to control with insecticides.

Pod-Feeding Insects

Podworms and stink bugs are perhaps the most important insects that attack soybeans. They may attack the beans from bloom (pod set) to pod maturity.

Podworms (bollworms, corn earworms) are probably the most destructive soybean insects because their feeding directly reduces yields. They usually occur from late July until mid September after the adults (small brown moths) have left corn fields. The small worms usually start feeding on the blooms and then eat into immature pods and destroy many beans. One worm can attack many pods. Podworms vary from green to brown and are about 1.25 inches long when fully grown. They roll up, drop to the soil, and play dead when touched.

Stink bugs include several shield-shaped bugs that may be brown or green, depending on the species. Both nymphs and adults suck juice from soybean pods, causing discoloration of the beans and subsequent reduction in grade. Heavy populations of stink bugs may occur in isolated parts of a soybean field; unless fields are closely examined, such infestations may go unnoticed. Beans are susceptible to stink bug damage up to maturity.

How to Identify Worms in Soybeans

You can distinguish the more important species of worms that attack soybeans by looking at their prolegs. Most caterpillars have four pairs. Green cloverworms have only three pairs and loopers have two pairs.

Table 1. When to Treat for Soybean Insects

Insects	When to Treat
Seedling- and Stem-Feeders	When pests or damage is noted and stands are threatened. Once soybeans become 10 inches tall, treat three-cornered alfalfa hoppers when you catch an average of one hopper per sweep with a 15-inch diameter sweep net.
Foliage-Feeders	<p>DURING PRE-BLOOM: Prevent greater than 35-percent leaf loss.</p> <p>FROM POD SET TO MATURITY: Prevent greater than 20-percent leaf loss. Treat prior to 20-percent leaf loss when five to eight soybean loopers or velvetbean caterpillars, 0.25 inch long or longer, are present per foot of row. Treat when you catch an average of 1.5 worms per sweep. Soybean loopers are harder to dislodge with a sweep net and each looper should be counted twice. Each larva eats a high percentage of the total amount of foliage it consumes during the last 4 to 5 days of the larval cycle.</p>
Pod-Feeders	
<i>Podworms</i>	BETWEEN BLOOMING AND POD MATURITY: When they average one per row foot or three per 15 sweeps.
<i>Stink Bugs</i>	<p>BLOOM TO MID-POD FILL: When they average one per 3 row feet or two per 15 sweeps</p> <p>AFTER MID-POD FILL: When they average one per row foot or three per 15 sweeps.</p>

Table 2. Soybean Insect Control

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest	Comments
Beet Armyworms					
	indoxacarb STEWARD 1.25 SC	9.2 oz.	0.09	14	TREATMENT: Pre-Bloom —Prevent greater than 35-percent leaf loss. Pod Set to Maturity —Prevent greater than 20-percent leaf loss.
	methomyl LANNATE 2.4LV LANNATE 90SP	1.5 pt. 0.6 lb.	0.45 0.45	14 14	
	methoxyfenozide INTREPID 2F	4-8 oz.	0.06-0.12	14	
	spinosad TRACER 4SC	1.5-2 oz.	0.047-0.062	28	
	thiodicarb LARVIN 3.2F	1.5 pt.	0.6	28	
Blister Beetles					
	beta-cyfluthrin BAYTHROID XL 1EC	1.6-2.8 oz.	0.0125-0.02	45	TREATMENT: Pre-Bloom —Prevent greater than 35-percent leaf loss. Pod Set to Maturity —Prevent greater than 20-percent leaf loss.
	gamma-cyhalothrin PROLEX	3.2-3.8 oz.	0.0125-0.015	30	
	lambda cyhalothrin KARATE Z 2.08 CS	1.5-1.8 oz.	0.025-0.03	45	
	methyl parathion METHYL PARATHION 4EC	1 qt.	1	60	
	zeta-cypermethrin MUSTANG MAX 0.8EC	2.8-4 oz.	0.0175-0.025	21	
Cutworms					
	beta-cyfluthrin BAYTHROID XL 1EC	0.8-1.6 oz.	0.007-0.013	45	Treat when pests or damage is noted and stands are threatened
	bifenthrin BRIGADE 2EC DISCIPLINE 2EC	2.1-6.4 oz. 2.1-6.4 oz.	0.033-0.1 0.033-0.1	18 18	
	chlorpyrifos LORSBAN 4EC	1 qt.	1	28	
	esfenvalerate ASANA 0.66EC	5.8 oz.	0.03	21	
	gamma-cyhalothrin PROLEX	1.9-3.2 oz.	0.0075- 0.0125	30	
	lambda cyhalothrin KARATE Z 2.08 CS	0.9-1.5 oz.	0.015-0.025	45	

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest	Comments
Cutworms (cont.)					
	permethrin				
	AMBUSH 2EC	3.2-6.4 oz.	0.05-0.1	60	
	POUNCE 3.2EC	2-4 oz.	0.05-0.1	60	
	thiodicarb				
	LARVIN 3.2F	1.2-1.9 pt.	0.5-0.75	28	
	zeta-cypermethrin				
	MUSTANG MAX 0.8EC	1.28-4 oz.	0.008-0.025	21	
Fall Armyworms					
	bifenthrin				TREATMENT:
	BRIGADE 2EC	2.1-6.4 oz.	0.033-0.1	18	Pre-Bloom —Prevent greater than 35-percent leaf loss.
	DISCIPLINE 2EC	2.1-6.4 oz.	0.033-0.1	18	Pod Set to Maturity —Prevent greater than 20-percent leaf loss.
	chlorpyrifos				
	LORSBAN 4EC	1-1.5 pt.	0.5-0.75	28	
	indoxacarb				
	STEWARD 1.25 SC	9.2 oz.	0.09	14	
	gamma-cyhalothrin				
	PROLEX	3.2-3.8 oz.	0.0125-0.015	30	
	lambda cyhalothrin				
	KARATE Z 2.08CS	1.5-1.8 oz.	0.025-0.03	45	
	methomyl				
	LANNATE 2.4LV	1.5 pt.	0.45	14	
	LANNATE 90SP	0.6 lb.	0.45	14	
	methoxyfenozide				
	INTREPID 2F	4-6 oz.	0.06-0.12	14	
	spinosad				
	TRACER 4SC	1.5-2 oz.	0.047-0.062	28	
	thiodicarb				
	LARVIN 3.2F	1 pt.	0.4	28	
	zeta-cypermethrin				
	MUSTANG MAX 0.8EC	3.2-4 oz.	0.02-0.025	21	

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest	Comments
Grasshoppers					
	beta-cyfluthrin BAYTHROID XL 1EC	2.0-2.8 oz.	0.017-0.02	45	TREATMENT: <i>Seedling</i> —Treat when stands are threatened. <i>Pre-Bloom</i> —Prevent greater than 35-percent leaf loss. <i>Pod Set to Maturity</i> —Prevent greater than 20-percent leaf loss.
	bifenthrin BRIGADE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	DISCIPLINE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	carbaryl SEVIN 4F, XLR	1 qt.	1	0	
	SEVIN 80S	0.63 lb.	1	0	
	gamma-cyhalothrin PROLEX	3.2-3.8 oz.	0.0125-0.015	30	
	lambda cyhalothrin KARATE Z 2.08 CS	1.5-1.8 oz.	0.025-0.03	45	
	methyl parathion METHYL PARATHION 4EC	1.5 pt.	0.75	20	
	PENNCAP-M 2FM	2-3 pt.	0.5-0.75	20	
	zeta-cypermethrin MUSTANG MAX 0.8EC	3.2-4 oz.	0.02-0.025	21	
Lesser Cornstalk Borers					
	chlorpyrifos LORSBAN 4EC	1-4 pt.	0.5-2	28	Treat when pests or damage is noted and stands are threatened.
Mexican Bean Beetles, Bean Leaf Beetles					
	beta-cyfluthrin BAYTHROID XL 1EC	1.6-2.8 oz.	0.013-0.02	45	TREATMENT: <i>Pre-Bloom</i> —Prevent greater than 35-percent leaf loss. <i>Pod Set to Maturity</i> —Prevent greater than 20-percent leaf loss.
	bifenthrin BRIGADE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	DISCIPLINE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	carbaryl SEVIN 4F, XLR	1 qt.	0.5	0	
	SEVIN 80S	0.63 lb.	0.5	0	
	chlorpyrifos LORSBAN 4EC	1-1.5 pt.	0.5-0.75	28	
	esfenvalerate ASANA 0.66EC	1.7-3.4 oz.	0.025-0.05	21	

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest	Comments
Mexican Bean Beetles, Bean Leaf Beetles (cont.)					
	gamma-cyhalothrin PROLEX	1.9-3.2 oz.	0.0075-0.0125	30	
	lambda cyhalothrin KARATE Z 2.08 CS	0.9-1.5 oz.	0.015-0.025	45	
	methomyl LANNATE 2.4LV	0.75 pt.	0.22	14	TREATMENT: <i>Pre-Bloom</i> —Prevent greater than 35-percent leaf loss.
	LANNATE 90SP	0.25 lb.	0.22	14	
	methyl parathion METHYL PARATHION 4EC	1 pt.	0.5	20	<i>Pod Set to Maturity</i> —Prevent greater than 20-percent leaf loss.
	PENNCAP-M 2FM	1 qt.	0.5	20	
	permethrin AMBUSH 2EC	3.2-6.4 oz.	0.05-0.1	60	
	POUNCE 3.2EC	2-4 oz.	0.05-0.1	60	
	zeta-cypermethrin MUSTANG MAX 0.8EC	2.8-4 oz.	0.0175-0.025	21	
Podworms (Bollworms, Corn Earworms)					
	beta-cyfluthrin BAYTHROID XL 1EC	1.6-2.8 oz.	0.013-0.02	45	
	bifenthrin BRIGADE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	DISCIPLINE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	carbaryl SEVIN 4F, XLR	1-1.5 qt.	1-1.5	0	
	SEVIN 80S	1.25-1.88 lb.	1-1.5	0	
	esfenvalerate ASANA 0.66EC	5.8 oz.	0.03	21	
	indoxacarb STEWARD 1.25SC	9.2 oz.	0.09	14	
	gamma-cyhalothrin PROLEX	1.9-3.2 oz.	0.0075-0.0125	30	
	lambda cyhalothrin KARATE Z 2.08 CS	0.9-1.5 oz.	0.015-0.025	45	
	methomyl LANNATE 2.4LV	1.5 pt.	0.45	14	
	LANNATE 90SP	0.5 lb.	0.45	14	
	methyl parathion METHYL PARATHION 4EC	1 qt.	1	20	
	permethrin AMBUSH 2EC	6.4 oz.	0.1	60	
	POUNCE 3.2EC	4 oz.	0.1	60	

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest	Comments
Podworms (Bollworms, Corn Earworms) (cont.)					
	spinosad TRACER 4SC	1.5-2 oz.	0.047-0.062	28	
	thiodicarb LARVIN 3.2F	10-24 oz.	0.25-0.6	28	
	zeta-cypermethrin MUSTANG MAX 0.8EC	2.8-4 oz.	0.0175-0.025	21	
Soybean Loopers					
	indoxacarb STEWARD 1.25 SC	6.7 oz.	0.065	14	
	methoxyfenozide INTREPID 2F	4-8 oz.	0.06-0.12	14	
	spinosad TRACER 4SC	1-2 oz.	0.031-0.062	28	
Stink Bugs					
	beta-cyfluthrin BAYTHROID XL 1EC	1.6-2.8 oz.	0.013-0.02	45	Treat between bloom and mid-podfill when stink bugs average one per three feet of row. After mid-podfill until pod maturity, treat when stink bugs average one per one foot of row.
	bifenthrin BRIGADE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	DISCIPLINE 2EC	2.1-6.4 oz.	0.033-0.1	18	
	carbaryl SEVIN 4F, XLR	1-1.5 qt.	1-1.5	0	
	SEVIN 80S	1.25-1.88 lb.	1-1.5	0	
	gamma-cyhalothrin PROLEX	3.2-3.8 oz.	0.0125-0.015	30	
	lambda cyhalothrin KARATE Z 2.08 CS	1.5-1.8 oz.	0.025-0.03	45	
	methyl parathion METHYL PARATHION 4EC	1-2 pt.	0.5-1	20	
	PENNCAP-M 2FM	1.3 pt.	0.25-0.75	20	
	parathion 4EC	1-1.6 pt.	0.5-0.8	15	
	zeta-cypermethrin MUSTANG MAX 0.8EC	3.2-4 oz.	0.02-0.025	21	
Three-Cornered Alfalfa Hoppers					
	beta-cyfluthrin BAYTHROID XL 1EC	1.6-2.8 oz.	0.013-0.02	45	Treat when pests or damage is noted and stands are threatened.
	carbaryl SEVIN 4F, XLR	1 qt.	1	0	
	SEVIN 80S	1.25 lb.	1	0	

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest	Comments
Three-Cornered Alfalfa Hoppers (cont.)					
	gamma-cyhalothrin PROLEX	1.9-3.2 oz.	0.0075-0.0125	30	
	lambda cyhalothrin KARATE Z 2.08 CS	0.9-1.5 oz.	0.015-0.025	45	
	zeta-cypermethrin MUSTANG MAX 0.8EC	2.8-4 oz.	0.0175-0.025	21	
Velvetbean Caterpillars, Green Cloverworms					
	<i>Bacillus thuringiensis</i> *				TREATMENT: Pre-Bloom —Prevent greater than 35-percent leaf loss. Pod Set to Maturity —Prevent greater than 20-percent leaf loss by treating when five to eight soybean loopers or velvetbean caterpillar larvae, 0.25 inch or larger, are present per foot of row. Each larva consumes a high percentage of its total foliage during the last 4 to 5 days of its larval cycle.
	DIPEL ES KETCH DF	Use label rates.		0	
	beta-cyfluthrin BAYTHROID XL 1EC	1.6-2.8 oz.	0.013-0.02	45	
	carbaryl SEVIN 4F, XLR SEVIN 80S	1 pt. 0.63 lb.	0.5 0.5	0 0	
	chlorpyrifos LORSBAN 4EC	0.5-1 lb.	0.3-0.5	28	
	diflubenzuron DIMILIN 25W, 2F, 2L	0.1-0.2 lb.	0.03-0.06	21	
	esfenvalerate ASANA 0.66EC	0.85 oz.	0.0125	21	
	gamma-cyhalothrin PROLEX	1.9-3.2 oz.	0.0075-0.0125	30	
	lambda cyhalothrin KARATE Z 2.08 CS	0.9-1.5 oz.	0.015-0.025	45	
	methomyl LANNATE 2.4LV LANNATE 90SP	0.75 pt. 0.2 lb.	0.22 0.22	14 14	
	methoxyfenozide INTREPID 2F	4-8 oz.	0.06-0.12	14	
	methyl parathion METHYL PARATHION 4EC PENNCAP-M 2FM	1 pt. 1 qt.	0.5 0.5	20 20	
	permethrin AMBUSH 2EC POUNCE 3.2EC	3.2 oz. 2 oz.	0.5 0.5	60 60	
	spinosad TRACER 4SC	1-2 oz.	0.031-0.062	28	
	thiodicarb LARVIN 3.2F	10 oz.	0.25	28	
	zeta-cypermethrin MUSTANG MAX 0.8EC	2.8-4 oz.	0.0175-0.025	21	

* A delay in larval mortality may be expected.

Table 3. Properties of Insecticides and Acaricides Used on Soybeans That May Affect Water Quality

Common Name	Trade Name	Surface-Loss Potential ¹	Leaching Potential ²
<i>Bacillus thuringiensis</i>	Dipel, Ketch	*	*
beta-cyfluthrin	Baythroid XL	Large	Small
bifenthrin	Brigade, Discipline	Large	Small
carbaryl	Ortho, Sevimol, Sevin	Medium	Small
chlorpyrifos	Dursban, Lorsban	Medium	Small
dicrotophos	Bidrin	Small	Medium
diflubenzuron	Dimilin	Large	*
esfenvalerate	Asana	Large	Small
indoxacarb	Steward	Small	Small
gamma-cyhalothrin	Prolex	Large	Small
lambda cyhalothrin	Karate Z	Large	Small
malathion	Cythion, Malathion	Small	Small
methomyl	Lannate	Small	Medium
methoxyfenozide	Intrepid	Large	Medium
methyl parathion	Methyl Parathion, Penncap-M	Medium	*
permethrin	Ambush, Pounce	Large	Small
spinosad	Tracer	Small	Small
thiodicarb	Larvin	Medium	NA
zeta-cypermethrin	Mustang Max	Large	Small

¹ The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff.

² The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone.

NA = Information not available.

* = Pesticide should not leach with percolating water.

DISEASE AND NEMATODE CONTROL

Seed and Seedling Diseases

Seed and seedling diseases are caused by pathogenic fungi, but the extent of the damage is determined by seed quality and soil conditions. To reduce the risk of these diseases this spring, follow these suggestions.

- **Use “Certified Seed” or high quality, vigorous seed** sold by a reliable dealer. This is one of the most important factors in obtaining good stands.
- **Plant on a good seedbed.** A well-prepared seedbed is important for good germination and seedling emergence.
- **Avoid planting on low, poorly drained soils.** These soils slow seed germination and seedling growth, making them more susceptible to attack by seed and soil-borne fungi.
- **Avoid planting too deep.** Optimum planting depth for soybeans in Alabama is 1 to 1.5 inches.

- **Rotate soybeans with non-leguminous crops** such as cotton, corn, sorghum, and small grains to avoid buildup of soil-borne fungi, nematodes, insects, and weeds, which can reduce yields.

- **Treat seed with a fungicide.** Seed treatment is beneficial in controlling seedling diseases and is especially effective in improving seed germination and seedling vigor in seeds of poor quality. Since complete seed coverage is necessary for best results, commercially applied seed treatments are preferred. Hopper-box treatments are generally not as effective because the fungicide is poorly distributed. However, farmers who take extra precautions to see that the fungicide is evenly distributed in hopper boxes can benefit from the treatment. Remember, no fungicide is effective unless it comes in contact with the disease organism.

Table 4. Soybean Seedling Disease Control

Disease (Causal Agent)	Common name	Formulation per 100 Lb. of Seed	Comments
Seed rot	azoxystrobin		
Seedling disease	PROTEGE-FL	0.2-0.27 fl.oz	Slurry or mist type treatment
Damping off	DYNASTY 0.8F	0.15-0.46 fl.oz.	Slurry or mist type treatment
Phytophthora root rot	<i>Bacillus subtilis</i> KODIAK HB 0.3D	4-8 oz.	Biological treatment that can be used in combination with a fungicide treatment. Planter box treatment. Slurry or mist type treatment
	captan		
	CAPTAN 400 4F	1.5-2.5 fl.oz.	Slurry or mist type treatment
	DYNA SHIELD CAPTAN 4F	1.5-2.5 fl.oz.	Slurry or mist type treatment
	CAPTAN MOLY 50D	3.5 oz.	Planter box treatment
	HI MOLY/CAPTAN-D 50D	3.3 oz.	Planter box treatment
	captan + carboxin		
	VITAVAX M DC 36.9D	3.3 oz.	Dry planter box treatment
	ENHANCE 40D	5 oz.	Dry planter box treatment
	captan + carboxin + metalaxyl		
	BEAN GUARD/ ALLEGIANCE 41.25D	3.3 oz.	Dry planter box treatment
	captan + thiram		
	VITAVAX CT FLOWABLE	12 fl.oz.	Slurry, mist type, or planter box treatment
	RTU-VITAVAX-THIRAM	6.8 fl.oz.	Slurry, mist type, or planter box treatment
	VITAVAX M	12 fl.oz.	Slurry, mist type, or planter box treatment
	VITAVAX 200	4 fl.oz.	Slurry or mist type treatment
	VITAFLO 280	4 fl.oz.	Slurry or mist type treatment
	VITAVAX M DC 36.9D	3.3 oz.	Planter box treatment
	cloroneb + mefenoxam		
	CATAPULT XL 3.09F	5.5-7 fl.oz.	Slurry, mist type, or planter box treatment
	fludioxanil		<i>Rhizoctonia</i> and <i>Fusarium</i> only.
	MAXIM 4FS	0.08-0.16 fl.oz.	Commercial slurry or mist type treatment

Disease (Causal Agent)	Common name	Formulation per 100 Lb. of Seed	Comments
Seed rot	metalaxyl or mefenoxam		<i>Pythium</i> and <i>Phytophthora</i> only
Seedling disease	ALLEGIANCE FL 2.65F	0.75-1.5 fl.oz.	Slurry or mist type treatment
Damping off	APRON TL 1F	2-4 fl.oz.	Slurry or mist type treatment
Phytophthora root rot	REPLICA TL 1F	2-4 fl.oz.	Slurry or mist type treatment
	APRON XL LS 3F	0.16-0.64 fl.oz.	Slurry or mist type treatment
	ALLEGIANCE DRY 12.5D	1.5-2 fl.oz.	Planter box or dry seed treatment
	metalaxyl + PCNB + carboxin		
	PREVAIL 33.1D	3.3-6.7 oz.	Planter box or dry seed treatment
	metalaxyl + thiram		
	PROTECTOR L/ ALLEGIANCE	6.7 fl.oz.	Planter box or dry seed treatment
	mefenoxam + fludioxonil		
	APRONMAXX RFC 0.52F	1.5 fl.oz.	Slurry or mist type treatment
	APRONMAXX RTA	5 fl.oz.	Slurry or mist type treatment
	WARDEN RTA	5 fl.oz.	Slurry or mist type treatment
	thiabendazole		
	MERTECT 340F	0.08-0.16 fl.oz.	Slurry or mist treatment for Phomopsis seed rot and damping off. Apply with metalaxyl/mefenoxam and/or fludioxonil for broad-spectrum control
	thiram		
	FLOSAN 4F	2 fl.oz.	Slurry or mist type treatment
	42S THIRAM 4F	2 fl.oz.	Slurry or mist type treatment
	THIRAM 75DF	2.2 oz.	Slurry or mist type treatment
	THIRAM GRANUFLO 75WDG	2.2 oz.	Slurry or mist type treatment
	PROTECTOR-D 35D	3.3 oz.	Planter box treatment
	trifloxystrobin		
	TRILEX FLOWABLE	0.32 fl.oz.	Slurry or mist type treatment
	trifloxystrobin + metalaxyl		
	TRILEX AL	5.7 fl.oz.	Slurry or mist type treatment
	TRILEX 2000 1.15F	1 fl.oz.	Slurry or mist type treatment

Soybean Rust

Soybean rust is a disease caused by the fungus *Phakospora pachyrhiza*. The disease was first identified in Alabama and the continental United States in 2004. Soybean rust produces lesions on infected plants that can lead to premature defoliation and decreased yields. Early diagnosis and treatment for the disease is crucial.

Symptoms on soybeans begin on the lower leaves of the plant as small lesions that increase in size and change in color from gray to tan or reddish brown on the underside of the leaves. Lesions are most common on leaves but may also occur on petioles, stems, and pods. Under close examination, tiny bumps can be seen within the lesions. The bumps are spore-producing structures called *uredinia* that give the leaf a rusty appearance. The *uredinia* are primarily found on the underside of the leaf, through smaller *uredinia* may be found on the upper side. Once pod set begins, infections can spread rapidly to the middle and upper leaves of the plant. The spores of the fungus are called *urediniospores* and are transported by air currents to other soybean plants. Rust-infected leaves eventually turn yellow and fall off the plant. Premature defoliation and a reduction in the number of days to maturity will cause infected plants to have lower seed weight and fewer pods and seeds.

All commercial varieties of soybeans currently available are highly susceptible to soybean rust. Management of soybean rust will depend on early detection of the disease. Monitoring soybean fields and adjacent areas is recommended throughout the growing season. Fungicides may reduce yield losses depending on the plant developmental stage, time when soybean rust is detected, and fungicide applications.

Fungicide Use Guidelines for Soybean Rust

Several fungicides are available for use against soybean rust. These can be divided into three groups: strobilurins, triazoles, and premixes (or tank mixes) of strobilurins and triazoles.

Strobilurins should be used as protectants and must be applied prior to infection to be effective. The products **Quadris** and **Headline** are strobilurins. Triazoles have protectant and curative activity and include the products **Alto**, **Domark**, **Folicur**, **Laredo**, **Orius**, **Proline**, **Tilt**, and **Topguard**. Premixes of strobilurin and triazole materials include **Quilt**, **Stratego**, and **Quadris Xtra**. Growers also have the option of tank mixing a strobilurin with a triazole on their own.

When to spray: Your first spray should not be applied prior to bloom. Data suggest that applications prior to bloom are not economical. Make your first application when there is a risk of rust in your region. This disease can spread rapidly so growers need to be aware of new rust outbreaks in the southeastern United States. If growers wait for the disease to show up in their fields before applying a fungicide, chances are their fungicide program will not be as effective.

Growers can keep informed of rust movement by visiting the soybean rust ipmPIPE Web site at <http://sbr.ipmpipe.org/cgi-bin/sbr/public.cgi>. Growers without Internet access can also call the Auburn University Soybean Rust Hotline at 1-800-446-0388 for updates on the disease and control recommendations.

Growers who follow rust movement closely could initially use a strobilurin fungicide such as **Headline** or **Quadris** in a protectant program (before the disease arrives in their area), then follow up with a triazole or a premix or a tank mix (triazole plus strobilurin) 21 days later if a second application is needed. In situations where the risk from soybean rust is relatively low, delaying your initial fungicide application until the R3-R4 growth stage may be most effective in managing other foliar disease as well as protecting against rust infection later in the season.

If there is a likelihood that rust has moved into your field prior to your first fungicide application, applying a triazole fungicide with its curative activity would be the most effective option available. A second application of a premix may be needed in 14 to 21 days. Consecutive applications of either a triazole or strobilurin should never be made due to resistance concerns. Refer to fungicide labels for specific directions and restrictions.

Spraying **after** the R5 growth stage is not recommended due to lack of yield response. In addition, many fungicides have preharvest intervals or growth stage restrictions. Refer to fungicide labels for specific directions and restrictions.

Fungicide Use Strategies for Soybean Rust:*

Fungicide use strategy 1 –low rust risk:

- No disease detected in immediate area or in sentinel plots; no rust forecasting alerts.
- Crop between R1 and R6.
- DO NOT SPRAY.
- Reevaluate at regular intervals through R6.

Fungicide use strategy 2 –high rust risk, preventive program:

- High rust risk based on observations from regional sentinel plots and rust forecasting.
- Rust not detected in local soybean crop.
- Crop between R1 and R6.
- **Fungicide applications:**
 - 1) Chlorothalonil or premix (tank mix) or strobilurin.
 - 2) Premix (tank mix) or strobilurin¹ or triazole.

Fungicide use strategy 3 –rust detected, curative program:

- Rust detected at low levels (1 to 10 percent of leaves in lower crop canopy) in your field or your neighbor's field.
- Crop between R1 and R6.
- **Fungicide applications:**
 - 1) Premix (tank mix) or strobilurin¹ + triazole or triazole..
 - 2) Premix (tank mix) or triazole² or strobilurin¹.

Fungicide use strategy 4 –rust detected in mid-canopy:

- Crop between R1 and R6.
- Weather favorable for rust development.
- Crop may not respond to treatment; fungicide application may not be economical.
- Triazoles may provide some level of control.
- DO NOT apply a strobilurin.

*Information obtained from the *Fungicide Manual for Soybean Rust*, Dorance, Draper, and Hershman, 2007.

¹If first application was not a strobilurin; ²If no more than one other premix has been applied; ³If no more than one other strobilurin has been applied and the second application was not a strobilurin; ⁴If the second application was not a triazole.

Table 5. Soybean Rust Fungicides

Fungicides	Active Ingredient	Rate/Acre	Chemical Class	Spray Interval (days)	Preharvest Interval (days)
Alto	cyproconazole	4 fl.oz.	Triazole	14-21	30
Bravo WeatherStik	chlorothalonil	16-36 fl.oz.	Benzonitrile	14	42
Domark 230ME	tetraconazole	4-6 fl.oz.	Triazole	14-21	28
Echo 720	chlorothalonil	16-40 fl.oz.	Benzonitrile	14	42
Folicur	tebuconazole	3-4 fl.oz.	Triazole	14	21
Headline	pyraclostrobin	6-12 fl.oz.	Strobilurin	7-21	21
Laredo EC	myclobutanil	4-8 fl.oz.	Triazole	14	28
Proline	prothioconazole	2.5-3 fl.oz.	Triazole	14	30
Quadris	azoxystrobin	6.2-15.4 fl.oz.	Strobilurin	7-21	14
Quadris Xtra	azoxystrobin + cyproconazole	4 fl.oz.	Strobilurin and Triazole	14-21	30
Quilt	azoxystrobin + propiconazole	14-20 fl.oz.	Triazole and Strobilurin	14-21	21
Stratego	propiconazole + trifloxystrobin	5.5-10 fl.oz.	Triazole and Strobilurin	14-21	21
Tilt	propiconazole	4-8 fl.oz.	Triazole	14	28
Topguard	flutriafol	7 fl.oz.	Triazole	21	21

Other Major Pod and Stem Diseases

Other major pod and stem diseases that attack soybeans in Alabama include brown spot (*Septoria glycines*), pod and stem blight (*Diaporthe phaseolorum*), frog-eye leaf spot (*Cercospora sojina*), anthracnose (*Collectotrichum dematium* var. *truncata*), downy mildew (*Peronospora manshurica*), purple stain (*Cercospora kukuchii*), and aerial blight (*Rhizoctonia solani*).

Control measures, including disease-free seed treated with a fungicide and a 2- to 3-year crop rotation with non-leguminous crops, will help reduce pod and stem diseases.

Foliar fungicides can produce a profitable yield increase in soybean fields that have a good yield potential and are subjected to conditions favoring disease development. Soybeans exposed to periods of rainy weather or heavy dews during bloom to early pod set have the highest incidence of foliar, pod, and stem diseases. Fungicides applied to soybeans during this developmental stage or just after the occurrence of these wet periods produce the best results.

Current recommendations for foliar fungicides are:

1. Apply fungicides only to soybean fields that have a potential yield exceeding 25 bushels per acre or to fields where seed beans are produced.

2. Make first application to soybeans that are in mid-bloom to early-pod-set stages and that have been exposed to 2 to 3 days of rain or heavy dew. Do not apply less than 5 gallons of water per acre for aerial applications and no less than 20 gallons of water per acre for ground applications. Make a second application 2 weeks later. However, if dry weather pre-

vails during the 2-week period following the first application, omit the second application.

Stem canker (*Diaporthe phaseolorum* f. sp. *meridionalis*) is a destructive fungal disease of soybeans that has become widespread throughout most of the state. The degree of damage caused depends on the stage of plant growth when infection occurs, the soybean cultivar, crop stress, and the climatic conditions. Severely infected fields may be completely wiped out. Slightly infected fields, on the other hand, may suffer little or no yield loss.

Stem canker is believed to spread from one region to another by means of infected seeds or contaminated equipment. Once the disease is introduced into an area, it spreads from field to field on farm equipment and windblown rain.

The first noticeable signs of stem canker occur on soybeans during pod fill. At this stage, many of the plants may be dead but still erect with dead leaves attached.

The main stem of the infected plant usually has large, reddish brown lesions located at the base of a petiole or on the lower node. Each lesion is surrounded by green tissue. The pith or the central portion of the main stem tissue is brown or dead several inches above and below the lesion. The leaves on a recently infected plant exhibit a distinctive yellowing and, later, browning between the veins.

Suggested practices to help control stem canker are:

1. Avoid replanting soybeans in fields infested with stem canker whenever possible. Plant a non-host crop (any non-leguminous crop) for at least 2 years.

2. Do not use soybeans for seed which have been harvested from stem-canker infested fields.

3. Treat seeds with Vitavax or a similar fungicide that contains carboxin and thiram.

4. Delay planting date until the end of the recommended planting period. Research indicates that later-maturing cultivars suffer less from stem canker injury when planted late. According to research at Auburn University, late-maturing

cultivars suffered little injury when planted on or after June 15 in fields infested with stem canker in Central Alabama; however, late planting can result in yield losses due to dry weather and heat stress.

5. If stem-canker fields must be replanted in soybeans the following year, plant a cultivar that has shown some tolerance to the disease. Most seed companies have literature ranking tolerance of their varieties.

Table 6. Soybean Pod and Stem Disease Control

Disease	Fungicide and Formulation	Amount of Formulation per 100 Lb. of Seed	Comments
Aerial Blight, Alternaria Leaf Spot, Brown Spot, Cercospora Blight and Leaf Spot, Frogeye Leaf Spot, Rust, Southern Blight			
	azoxystrobin		Applications should begin prior to disease development. Use higher rates under conditions favorable for severe disease development. A non-ionic surfactant is recommended with lower use rates with Quadris. DO NOT make more than one application before alternating to a fungicide with a different mode of action.
	QUADRIS 2.08F	6.2-15.4 oz.	
	HEADLINE	6-12 oz.	
Aerial Blight, Anthracnose, Brown Spot, Frogeye Leaf Spot, Purple Seed Stain (Cercospora), Pod and Stem Blight (Diaporthe, Phomopsis)			
	thiophanate-methyl		Apply from full bloom to when pods are 0.125- to 0.25-inch long. Make a second application 14- to 21-days later. DO NOT make the second application later than 14 days after pods average 0.25 inch in length or when beans form in pods. Use the high rate under severe disease pressure. DO NOT make more than two applications per year.
	TOPSIN M 70WP	0.5-1 lb.	
	TOPSIN M WSB	0.5-1 lb.	
Anthracnose, Cercospora Leaf Blight, Frogeye Leaf Spot, Pod and Stem Blight (Diaporthe, Phomopsis), Purple Seed Stain, Rust			
	chlorothalonil		Apply in sufficient water to obtain full coverage, using at least 5 gallons of water per acre for aerial application. Use the three-application program in areas having a history of moderate to severe disease intensity. DO NOT exceed three applications per season. DO NOT apply within 6 weeks of harvest. Two-Application Program: Make first application when a majority of pods are 0.125 to 0.75 inch in length and the second at the beginning of seed formation (about 14 days later). Three-Application Program: Make first application at the beginning of flowering, the second when the majority of pods are 0.125 to 0.75 inch in length, and the third at the beginning of seed formation.
	BRAVO ULTREX	Two-Application Program: 1.4-2.2 lb. Three-Application Program: 0.9-1.4 lb.	
	ECHO 720	See label.	

Nematodes

The most important nematode species that attack soybeans in Alabama are cyst, root-knot, lance, reniform, and lesion. Fields should be sampled for nematodes every 2 to 3 years unless problem areas develop. Recommended sampling period is from August through October. Contact your county Extension System office for information sheets and shipping cartons. Mail samples to Plant Diagnostic Laboratory, ALFA Services Building, 961 South Donahue Drive, Auburn University, AL 36849-5624. A \$10.00 fee is required for each sample.

Chemical Control

Nematicides are not generally recommended because, in most instances, they are too expensive to use in soybeans.

Cultural Control: Cyst Nematodes

Control cyst nematodes by using non-host crops and resistant soybean cultivars. The cyst nematode will attack and multiply on only relatively few plant species (Table 7).

Several non-host crops can be used in a rotation system to control cyst nematodes (Table 7). In fields with moderate to high cyst populations, follow a 3- or 4-year rotation using non-host crops and resistant cultivars.

At the end of this period, a nematode analysis should be made. If the population is low, plant a susceptible cultivar for 1 year; then, repeat the rotation. When rotating with non-host crops or resistant soybean cultivars, an effective weed control program is necessary because cyst nematodes can survive and multiply on several weed species (Table 7).

Cultural Control: Root-Knot Nematodes

Crop Rotation with Non-Host Crops. Several root-knot (*Meloidogyne*) species attack and severely damage soybeans in Alabama. Southern root-knot (*M. incognita*) and peanut root-knot (*M. arenaria*) are the two most common and are responsible for most nematode damage on soybeans.

Root-knot species have a wide host range, but some non-host crops can be used effectively in a crop rotation scheme to reduce populations. Grain sorghum, coastal bermuda, and some cultivars of pearl millet are considered good rotation crops. Cotton, although susceptible to southern root-knot races three and four, is an effective rotation crop in fields with southern root-knot races one and two or in fields with peanut root-knot.

Since root-knot species and race determinations cannot be made in the state nematology laboratory, growers will have to determine by trial and error which non-host crops are best suited for their root-knot infested fields.

Root-Knot Resistant Cultivars. Several soybean cultivars have claimed root-knot resistance. However, some appear to be losing this resistance in certain areas of the state, particularly in South Alabama. Growers should, therefore, carefully observe the performance of these root-knot resistant cultivars if they are grown in fields with severe root-knot infestations.

Soybean Cyst Nematode (SCN) Varieties. Varieties with resistance to SCN in maturity groups 00 through VIII are listed at: www.ag.aiae.edu/~wardt/cover.htm.

Table 7. Soybean Cyst Nematode (*Heterodera glycines*)

Hosts

Host Crops*	Weed Hosts	Non-Host Crops
Soybeans	Chickweed	Corn
Snap Beans	Coffee Bean	Cotton
Lima Beans	Hemp Sesbania	Peanuts
Crimson Clover	Henbit Deadnettle	Grain Sorghum
Cowpeas	Lowhop Clover	Oats
Common Lespedeza	Mullein	Wheat
Hairy Lespedeza	Pokeweed	Fescue
Sericea Lespedeza	Sicklepod	Rye
Common Vetch		
Hairy Vetch		
Korean Lespedeza		

* List prepared by Dr. Ralph Motsinger, Georgia Cooperative Extension Service.

Table 8. Properties of Fungicides and Nematicides Used on Soybeans That May Affect Water Quality

Common Name	Trade Name	Surface-Loss Potential ¹	Leaching Potential ²
captan	Captan	NA	NA
carboxin	Vitavax	Small	Small
etridiazole	Terrazole	Large	Small
metalaxyl	Apron	Small	Medium
PCNB	Terraclor	Large	Small
thiobendazole	Mertect	NA	NA
thiophanate-methyl	Topsin	Small	Medium
thiram	Thiram	Medium	Medium

¹The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff.

²The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone.

NA = Information not available.

WEED CONTROL

Herbicides used for weed control in soybeans can generally be classified according to their method of application. Three broad categories are described below.

Preplant Incorporated. These are herbicides applied and incorporated before planting. They are generally effective on grasses and small-seeded broadleaf weeds.

Preemergence. This class of herbicides is applied to the soil surface either broadcast or banded at or shortly after planting.

Postemergence. These are the herbicides that are used after soybeans have emerged. They may be applied as over-the-top, semi-directed, or directed spray.

Table 9. Soybean Weed Control

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Preplant Incorporated		
PENDIMAX 3.3 (1.2-2.4 pt.) or PROWL 3.3EC (1.2-2.4 pt.) or PROWL H ₂ O (1.5-2 pt.)	pendimethalin (0.5-1 lb.) (0.5-1 lb.) (0.7-1 lb.)	Controls annual grasses and some small-seeded broadleaf weeds. Use low rate on coarse soils, intermediate rate on medium soils, and high rate on fine-textured clay soils. Pendimax should not be incorporated deeper than 2 inches.
PURSUIT 70DG (1.44 oz.) or PURSUIT 2L (4 fl.oz.)	imazethapyr (0.063 lb.)	Pursuit may be applied preplant incorporated, preemergence, or postemergence. When applied as a preplant incorporated treatment, it should be shallowly and uniformly incorporated into soil. DO NOT apply to dry soil, especially if significant rain is expected after planting. It may be tank mixed with Prowl, Treflan, or Pendimax. DO NOT use more than a total of 1.4 ounces per acre per growing season. Pursuit-treated areas should not be treated with products containing Classic or Scepter during the same growing season. Since Pursuit can injure sensitive crops, see label for recropping restrictions.
PURSUIT PLUS EC (2.5 pt.)	pendimethalin (0.84 lb.) + imazethapyr (0.063 lb.)	Apply and incorporate Pursuit Plus in the top 2 inches of soil within 45 days of planting, or apply as a preemergence treatment within 45 days of planting. This product controls most annual grasses and several annual broadleaf weeds, and it suppresses nutsedge. DO NOT apply Classic, Scepter, Scepter OT, or Pursuit postemergence to fields previously treated with Pursuit Plus. See label for recropping restrictions.
SCEPTER 70DG (2.8 oz.)	imazaquin (0.125 lb.)	Controls many annual broadleaf weeds. Incorporate uniformly into the top 1 to 2 inches of soil prior to planting. Apply 10 or more gallons of water per acre with a spray pressure of 20 to 40 psi with ground equipment or in 5 or more gallons of water per acre with aerial equipment. Scepter applied in this manner provides more consistent annual morningglory control than when applied preemergence. This herbicide applied preplant incorporated or preemergence followed by an additional postemergence treatment provides consistent control of sicklepod. Before using the product, read and note the recropping restrictions on the label.
TREFLAN 4HLP TRIFLUREX HFP TRIFLURALIN 4EC (1-2 pt.)	trifluralin (0.5-1 lb.)	Controls annual grasses and some small-seeded broadleaf weeds. Use low rate on coarse soils, intermediate rate on medium soils, and high rate on fine-textured clay soils. Herbicide should not be incorporated deeper than 3 inches.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Preemergence		
BOUNDARY 6.5EC (1.2-2.1 pt.)	s-metolachlor (0.78-1.38 lb.) + metribuzin (0.19-0.33)	For control of many annual grasses and broadleaf weeds. Apply as a preplant incorporated or preemergence treatment. Soybeans should be planted at least 1.5 inches deep. Application to sandy soils, low in organic matter, or to soils with pH of 7.5 or higher will result in soybean injury. Consult label for soybean varieties known to be highly sensitive to Boundary. Soil moisture is needed for herbicide activation. Use low rate on sandy loam soils and high rate on heavy acid soils. See Sencor label for additional precautionary statements.
CANOPY 75DG (6-10 oz.)	metribuzin (0.24-0.4 lb.) + chlorimuron (0.04-0.07 lb.)	Canopy may be soil incorporated or applied preemergence for control of broadleaf weeds. The use rate varies with soil type. DO NOT use on sands. Canopy can be mixed with dinitroaniline herbicide and incorporated. Some soybean varieties are highly sensitive to metribuzin. Consult seed suppliers for tolerance ratings. See Sencor label for additional precautionary statements.
DUAL II MAGNUM 7.64 DUAL MAGNUM 7.62 CINCH (1-1.67 pt.)	s-metolachlor (0.95-1.6 lb.)	Provides good to excellent control of many annual grasses and some small-seeded broadleaf weeds. Yellow nutsedge control has been acceptable when applied at the higher rate and preplant incorporated. Not effective on broadleaves such as cocklebur and morningglory. Best results are obtained when rainfall occurs within 7 days after application. If rainfall does not occur, shallow incorporation may improve control and remove existing weeds. Use low rate on coarse soils, intermediate rate on medium soils, and high rate on fine-textured (clay) soils. Failure to calibrate properly may result in excessive herbicide rate.
OUTLOOK 6 (10-18 fl.oz.)	dimethenamid (0.47-0.84 lb.)	Provides good to excellent control of many annual grasses, some small-seeded broadleaf weeds, and yellow nutsedge suppression. Can be applied preplant incorporated up to 2 weeks before planting to medium- to heavy-textured soils. Rainfall, irrigation, or shallow incorporation into the top 2 inches of soil is needed for consistent control. DO NOT apply more than 21 fluid ounces per acre per year.
INTRRO EC (4-6 pt.) or MICRO-TECH (2-3 qt.)	alachlor (2-3 lb.)	Gives good to excellent control of many annual grasses and some small-seeded broadleaf weeds. It is not effective on broadleaves such as cocklebur and morningglory. Best results are obtained when rainfall occurs within 7 days after application. If rainfall does not occur, shallow incorporation may improve control. Soybeans have good tolerance. Use low rate on coarse soils, intermediate rate on medium soils, and high rate on fine-textured soils. Alachlor is a RESTRICTED USE pesticide.
LOROX 50DF (1-2 lb.) or LINEX 4L (1-2 pt.)	linuron (0.5-1 lb.) (0.5-1 lb.)	Controls many annual grasses and common ragweed, pigweed, and teaweed. Common cocklebur, morningglory, and sicklepod control is poor. Rain is needed after application to move into the soil. Some stunting and stand reduction may occur if heavy rains closely follow treatment. DO NOT use on extremely sandy soils or soils with less than 1 percent organic matter. Use lower rates on medium soils low in organic matter and higher rates on medium- to fine-textured soils.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Preemergence (cont.)		
PREFIX 5.29EC (2 pt.)	s-metolachlor (1.09 lb.) + fomesafen (0.24 lb.)	Can be applied preemergence in reduced tillage systems or can be shallowly incorporated. Useful in control of glyphosate and ALS-resistant Palmer amaranth as well as yellow nutsedge. See label for recropping restrictions.
PYTHON 80WDG (0.8-1.33 oz.)	flumetsulam (0.04-0.06 lb.)	Can be applied preplant incorporated or preemergence. Controls many broadleaf weeds. Can be tank mixed with other herbicides to control additional broadleaf weeds and annual grasses. See label for recropping restrictions.
SCEPTER 70DG (2.8 oz.)	imazaquin (0.125 lb.)	Controls many annual broadleaf weeds. Apply in 10 or more gallons of water per acre with a spray pressure of 20 to 40 psi with ground equipment or in 5 or more gallons of water per acre with aerial equipment. Rainfall of 1 to 2 inches after application is required for activation. This herbicide applied preplant incorporated or preemergence followed by an additional postemergence treatment provides consistent control of sicklepod. Before using the product, read and note the recropping restrictions on the label.
SENCOR 75DF (0.33-0.67 lb.) or METRIBUZIN 75DF (0.33-0.67 lb.)	metribuzin (0.25-0.5 lb.)	Provides early-season control of sicklepod, coffee senna, Florida beggarweed, teaweed, and sesbania. Control of common cocklebur is erratic. Heavy rainfall shortly after application may cause leaching and increase soybean injury. Potential for injury is greater when used on soils having pH of 7.5 or higher or if used with soil-applied organophosphate pesticides. DO NOT use on sands. Can be used on sandy loam and loamy sand soils which contain at least 0.5-percent organic matter. Closely follow instructions and restrictions on herbicide label. Some soybean varieties are highly sensitive to metribuzin. Consult seed supplier for tolerance ratings.
VALOR SX (51WDG) (2.5 oz.)	flumioxazin (0.08 lb.)	Provides good to excellent control of broadleaf weeds. Use rate is dependent on target weeds. Valor will not control sicklepod, nutsedge, or grasses. Apply as a preemergence treatment only. DO NOT incorporate Valor. DO NOT tank mix with Intro, Dual, or Outlook herbicides or severe injury will occur. Application must be made within 3 days after planting. Delay in application, splashing, or heavy rain at cracking may result in severe crop injury. See label for recropping restrictions.
VALOR XLT (3-4 oz.) [40.3 WDG]	flumioxazin (0.056-0.075 lb.) + chlorimurion (0.019-0.026 lb.)	Provides better sicklepod and cocklebur control than Valor alone. Plant soybeans at least 1.5 inches deep and cover seed completely with soil. DO NOT apply later than 3 days after planting. DO NOT incorporate. DO NOT tank mix with Dual, Outlook, or Intro. See label for tank-mix partners and recropping restrictions.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Preemergence or Preplant Incorporated Tank-Mix Combinations		
<p>The following herbicide combinations, listed by trade name, are labeled for preemergence (PRE) or preplant incorporated (PPI) application as tank mixtures. Tank mixtures may be justified in specific instances in order to obtain broader spectrum weed control, to decrease risk of crop injury, or to simplify application. Should you have a situation where a tank mix would be advisable, follow closely the instructions on the product labels.</p> <p>The following are tank-mix combinations that have performed well in Alabama.</p>		
Prowl/Pendimax + Scepter (PPI)		Dual + Lorox/Linex (PRE)
Prowl/Pendimax + Sencor/Metribuzin (PPI)		Dual + Sencor/Metribuzin (PRE)
Treflan + Dual (PPI)		Intrro + Lorox/Linex (PRE)
Treflan + Scepter (PPI)		Intrro + Sencor/Metribuzin (PRE)
Treflan + Sencor/Metribuzin (PPI)		Prowl/Pendimax + Sencor/Metribuzin (PRE)
<p>NOTE: Sencor applied preemergence rather than preplant incorporated has given more consistent sicklepod weed control and less injury.</p>		
Postemergence		
ASSURE II 0.88EC (7-10 oz.) + Crop Oil Concentrate (4 qt./100 gal. spray mix) or Non-ionic Surfactant (1 qt./100 gal. spray mix)	quizalofop (0.05-0.07 lb.) + crop oil concentrate or non-ionic surfactant	Apply postemergence to actively growing grasses. Apply in a minimum of 10 gallons of water per acre with ground equipment using flat fan nozzle tips. Use the lower rates for annual grasses and the high rate for perennial grasses such as bermudagrass and johnsongrass. May be applied by air. See label for instructions. If regrowth of perennial grasses occurs, a second application can be made at the low rate when the grass reaches the appropriate size. DO NOT apply after pod set or within 80 days of harvest. DO NOT rotate to crops other than cotton or soybeans within 120 days of last application.
BASAGRAN 4 (1.5-2 pt.)	bentazon (0.75-1 lb.)	For best results, apply over-the-top when weeds are small and actively growing. Such weed growth stages generally correspond to soybean growth stages of two to four trifoliolate leaves. Gives excellent control of cocklebur. Early application and control provide the most beneficial effect on crop yields. Allow adequate spray coverage. For best results, treat before weeds reach the size limits listed on the label. Delayed applications may allow weeds and crop to become too large for adequate spray coverage, and unsatisfactory control may result. Best results are obtained with three nozzles per row (one over-the-top and one directed on each side of the row). Refer to label for correct rate to use. DO NOT apply more than 4 pints per acre in one season. A non-phytotoxic crop oil concentrate (1 quart per acre) should be added, depending on the weed species as specified on the label (yellow nutsedge).
CLASSIC 25DF (0.5-0.75 oz.) + Non-ionic Surfactant (1 qt./100 gal. spray mix) or Crop Oil Concentrate (1 qt./25 gal. spray mix)	chlorimuron (0.008-0.012 lb.) + non-ionic surfactant or crop oil concentrate	Apply over-the-top after soybeans have their first trifoliolate leaf. For best results, apply when weeds are actively growing and at the appropriate growth stage listed on the label. Apply in a minimum of 10 gallons of water per acre with a spray pressure of 25 to 40 psi. A second application at 0.5 ounce per acre may be made 2 to 3 weeks after the first, if needed. DO NOT apply more than 1 ounce per acre of Classic per season. Consistent sicklepod control is obtained when Sencor is applied preplant incorporated or preemergence before the postemergence Classic treatment. DO NOT apply Classic to soybeans growing in soil with a pH greater than 7.0. Before using this product, read and note the recropping restrictions on the label. DO NOT apply within 60 days of maturity.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Postemergence (cont.)		
COBRA 2EC (12.5 oz.) + Crop Oil Concentrate (1-2 pt./100 gal. spray mix) or Non-ionic Surfactant (2 pt./100 gal. spray mix)	lactofen (0.2 lb.) + crop oil concentrate or non-ionic surfactant	Apply over-the-top of soybeans in the first or second trifoliolate leaf stage to control small actively growing weeds. Application made while soybeans are under stress may result in leaf burn or crop growth suppression. This injury or growth suppression may be excessive if application is made to late-planted soybeans and a drought period follows application. DO NOT apply after R6 (full seed) stage or within 45 days of harvest. Apply in 20 to 30 gallons of water per acre at 40 to 60 psi spray pressure. See label concerning instructions for aerial application.
FIRSTRATE 84WDG (0.3 oz.) + Non-ionic Surfactant (1 qt./100 gal. spray mix) or Crop Oil Concentrate (1.25 gal./100 gal. spray mix)	cloransulam (0.016 lb.) + non-ionic surfactant or crop oil concentrate	Apply over-the-top of soybeans after crop reaches the first trifoliolate leaf stage but before flowering. Apply in a minimum of 15 gallons of water per acre with ground equipment at 20 to 40 psi of spray pressure. See label for possible tank-mix partners. Make only one FirstRate application per season. DO NOT apply in areas where soil pH is greater than 7.8 or in areas where iron chlorosis is a problem for soybeans. See label for recropping restrictions.
FLEXSTAR 1.88L (1-1.5 pt.)	fomesafen (0.24-0.35 lb.)	Contains same active ingredient as Reflex, but is formulated with a surfactant system. Controls larger cocklebur, morningglories, and pigweed. Causes soybean foliar burn, which is usually of short duration. Addition of surfactant or crop oil concentrate will increase activity on large weeds or under dry conditions. See label.
FUSILADE DX (0.75 pt.) + Crop Oil Concentrate (2 pt./25 gal. spray mix) or Non-ionic Surfactant (2 pt./100 gal. spray mix)	fluazifop-butyl (0.2 lb.) + crop oil concentrate or non-ionic surfactant	Apply over-the-top of soybeans for control of annual and perennial grasses. Annual grasses should be treated when they are 2 to 4 inches tall. Johnsongrass should be 12 to 18 inches tall; bermudagrass should be no taller than 3 inches and its runners no longer than 4 to 8 inches. A second application may be necessary if regrowth of perennial grasses occurs. Use a minimum of 10 gallons of spray mix per acre and 40 to 60 psi pressure to ensure complete coverage. Mixing Fusilade with other herbicides will reduce the weed control effectiveness of Fusilade. See label for additional information on crop oils and surfactants. Fusilade does not control sedges (nutgrass).
FUSION 2.56E (8-10 fl.oz.) + Crop Oil Concentrate (4 qt./100 gal. spray mix) or Non-ionic Surfactant (1 qt./100 gal. spray mix)	fluazifop (0.125-0.156 lb.) + fenoxypop (0.035-0.044 lb.) + crop oil concentrate or non-ionic surfactant	Apply over-the-top of soybeans for control of annual and perennial grasses. Most annual grasses should be treated when they are 2 to 4 inches tall. Mixing Fusion with other herbicides will reduce herbicide effectiveness. Fusion does not control sedges (nutgrass).

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Postemergence (cont.)		
IGNITE 280SL (22-36 fl.oz.) [2.34 lb./gal.]	glufosinate (0.4-0.66 lb.)	Apply over-the-top of soybean varieties that are designated as Liberty-Link soybean cultivars. Severe injury or death of soybeans will occur if Ignite is applied to non-Liberty-Link cultivars. Apply to actively growing weeds from time of crop emergence to just before bloom. A single application use rate can be as high as 36 fluid ounces per acre. Do not apply more than 44 fluid ounces of Ignite to soybean in a single season. Sequential application (22-fluid-ounces-per-acre use rate) should be made at least 10 to 14 days apart.
POAST PLUS 1E (1.5-2.25 pt.) or POAST 1.5E (1-1.5 pt.) + Crop Oil Concentrate (2 pt.)	sethoxydim (0.2-0.28 lb.) or (0.19-0.28 lb.) + crop oil concentrate	Apply over-the-top of soybeans for control of annual and perennial grasses. Annual grasses should be treated when they are 4 to 8 inches tall, except crabgrass and goosegrass which should be treated before reaching 4 inches tall. Johnsongrass should be 15 to 20 inches and bermudagrass runners should not exceed 6 inches in length for Poast application. Use the low rate for annual grass control and the high rate for bermudagrass and johnsongrass control. A second application may be necessary if regrowth of perennial grasses occurs. Use a minimum of 10 gallons of spray mix per acre and 40 psi pressure at the nozzle to ensure thorough spray coverage of foliage. Mixing with other herbicides will reduce weed control effectiveness. Does not control sedges (nutgrass).
PURSUIT 70DG (1.44 oz.) + Non-ionic Surfactant	imazethapyr (0.0625 lb.) + non-ionic surfactant	Apply over-the-top of soybeans to control small, actively growing broadleaf weeds and a few grasses. Except in a few cases, sensitive weeds should be less than 3 inches tall at time of treatment. Pursuit does not control sicklepod or Florida beggarweed. Use a non-ionic surfactant at a rate of 1 quart per 100 gallons of spray mix. DO NOT apply within 85 days of harvest. DO NOT apply more than a total of 1.44 ounces per acre per growing season. Pursuit-treated areas should not be treated with products containing either Scepter or Classic during the same growing season. Before using this product, read and note the recropping restrictions on the label.
REFLEX 2LC (1.5 pt.) + Non-ionic Surfactant (1 qt./100 gal. spray mix) or Crop Oil Concentrate (4 qt./100 gal. spray mix)	fomesafen (0.375 lb.) + non-ionic surfactant or crop oil concentrate	Apply over-the-top of soybeans until bloom to control many small actively growing broadleaf weeds. Make application in a minimum of 10 gallons per acre at 40 to 60 psi. In heavy weed growth, apply in a minimum of 20 gallons per acre at 60 psi spray pressure. Timely cultivation 2 to 3 weeks after application will improve overall weed control. DO NOT graze small grain or forage planted in Reflex-treated fields. Prior to use, read and note all recropping restrictions on the label.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Postemergence (cont.)		
ROUNDUP WEATHERMAX (22 fl.oz.) [5.5 lb./gal.] or GLYFOS X-TRA GLYPHOMAX PLUS Other Generics (1.5-2 pt.) [4 lb./gal.] or GLYPHOSATE 41% RATTLER Other Generics (1.5-2 pt.) [4 lb./gal.] or TOUCHDOWN TOTAL (1.5-2 pt.) [4 lb./gal.]	glyphosate (0.95 lb.) (0.75-1 lb.) (0.75-1 lb.) (0.75-1 lb.)	Apply over-the-top of soybean varieties that are designated as soybeans with the Roundup Ready gene. Severe injury or death of soybeans will result if soybeans without the Roundup Ready gene are sprayed. Controls a wide range of grasses and broadleaf weeds. May be applied from seedling through R2 or before R3 flowering stage (when pods are 3/16 inch long at one of the top four nodes.) Use low rate on weeds up to 3 inches tall. Higher rate is needed for larger weeds. Apply herbicide to morningglories when they are less than 3 inches tall. Sequential treatments can be used, but rate should not exceed 2 pounds active ingredient per acre per year. DO NOT feed or graze treated soybean foliage. Glyphosate 41% and Rattler require a non-ionic surfactant at a rate of 2 quarts surfactant per 100 gallons of spray mix. The addition of Classic to spray mix will improve sicklepod and morningglory control.
RESOURCE EC (4 fl.oz.) [0.86 lb./gal.] + Non-ionic Surfactant	flumiclorac (0.027 lb.) + non-ionic surfactant	Apply as a tank mix with glyphosate for improved control of tall, ivyleaf, and entireleaf morningglory in Roundup Ready soybeans. Must be applied with a non-ionic surfactant (1 quart per 100 gallons of spray mix). Apply to actively growing weeds. Do not apply more than a total of 16 fluid ounces of Resource per acre per growing season. Do not make application within 60 days of harvest.
SCEPTER 70DG (2.8 oz.) + Non-ionic Surfactant (2 pt./100 gal. spray mix)	imazaquin (0.125 lb.) + non-ionic surfactant	Apply over-the-top of soybeans before actively growing cocklebur and pigweeds exceed 12 inches in height. DO NOT apply within 90 days of soybean harvest. Before using this product, read and note the recropping restrictions on the label.
SELECT 2EC ARROW (6-8 oz.) + Crop Oil Concentrate (2 pt.)	clethodim (0.09-0.125 lb.) + crop oil concentrate	Apply over-the-top of actively growing soybeans to control small annual grasses and perennial grasses such as johnsongrass and bermudagrass. Use low rate on small annual grasses and medium rate in areas with heavy annual grass pressure. Use high rate on perennial grasses in the labeled size range. See label for higher use rates for controlling heavy infestations of perennial grasses. A second application may be necessary if regrowth occurs. For ground application, apply in a minimum of 10 gallons and a maximum of 40 gallons of spray mix per acre using a spray pressure in the 20- to 60-psi range. May be tank mixed with Basagran, Ultra Blazer, Classic, and Reflex.
SEQUENCE (3-3.5 pt./A) [5.25 lb./gal.]	s-metolachlor (1.13-1.31 lb.) + glyphosate (0.84-0.98 lb.)	Apply Sequence to Roundup Ready soybeans. Make application to soybeans from cracking through the third trifoliolate leaf stage. Do not apply more than 3.5 pints per acre as a single application or exceed 3.5 pints per acre total during season. Apply no later than 90 days before harvest.
STORM (1.5 pt.) + Crop Oil Concentrate	bentazon (0.5 lb.) + acifluorfen (0.25 lb.) + crop oil concentrate	Storm is a prepackaged mixture of Basagran and Blazer. Apply over-the-top of soybeans to small weeds that are actively growing. Soybeans should be in the unifoliolate leaf stage at time of application. A crop oil concentrate should be added to the spray mix at a rate not to exceed 1 pint per acre. Use a spray volume of 5 to 20 gallons per acre. See Comments for Basagran and for Ultra Blazer alone for additional instructions.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Postemergence (cont.)		
ULTRA BLAZER 2L (0.5-1.5 pt.) + Non-ionic Surfactant (1 pt./100 gal. spray mix)	aciflurofen (0.125-0.375 lb.) + non-ionic surfactant	Apply over-the-top after soybeans have their second trifoliolate leaf. For best results, apply when weeds are in the two- to four-leaf stage and actively growing. An application made during a period of dry weather when soybeans and weeds are stressed and not actively growing can result in poor weed control. Apply the high rate for broad spectrum weeds, including morningglory and cocklebur. Use hollow cone or flat fan nozzles calibrated to deliver a minimum of 20 gallons of spray mix per acre at a spray pressure of 40 psi. Use an 80-percent active non-ionic surfactant. Additional surfactant is required for the control of certain weeds. Refer to the label for specific use directions. In large beans under poor growing conditions, apply in a semi-directed or directed manner to keep the spray off the top of soybean plants and to ensure good coverage of weeds. DO NOT apply more than 2 pints of Ultra Blazer per acre per year.
Postemergence (Post Directed)		
BUTYRAC 200 (0.7-1.6 pt.) or BUTYRAC 175 (0.8-1.8 pt.) or BUTOXONE 175 (1-1.75 pt.) or BUTOXONE 7500 (0.3-0.5 pt.) or BUTOXONE 200 (0.9-1.6 pt.)	2,4-DB (0.175-0.41 lb.) (0.2-0.45 lb.) (0.22-0.38 lb.) (0.22-0.38 lb.) (0.22-0.4 lb.)	Apply as a postemergence directed spray to soybeans at least 12 inches tall for common cocklebur and morningglory control. Allow spray to contact no more than the bottom one-third of soybean plants. Repeat in 7 to 10 days for effective morningglory control. Plants infected with root rot disease or growing under poor conditions may show injury following treatment. DO NOT apply to drought-stressed soybeans. DO NOT harvest beans within 60 days after application.
GRAMOXONE INTEON 2 (8 fl.oz.) or FIRESTORM 3 (5.3 fl.oz.) + Non-ionic Surfactant (1 pt./25 gal. spray mix)	paraquat (0.124 lb.) + non-ionic surfactant	Apply as a postemergence directed spray after soybeans are at least 15 inches tall. Spray no higher than the lower 3 inches of the soybean plant. DO NOT spray over-the-top of beans. Use low pressure (30 psi or less). CAUTION: DO NOT exceed recommended rate. Gramoxone and Firestorm are RESTRICTED USE pesticides.
LOROX 50DF (1 lb.) + BUTOXONE 200 (0.8 pt.) + Non-ionic Surfactant (1 pt./25 gal. spray mix)	linuron (0.5 lb.) + 2,4-DB (0.2 lb.) + non-ionic surfactant	Apply as a postemergence directed spray when soybeans are at least 12 inches tall and when weeds are less than 4 inches high. Allow spray to contact no more than the lower 3 inches of soybean plants. Controls many hard-to-control annual broadleaf weeds and many annual grass seedlings. Good agitation is required to keep the mixture in suspension. A second application may be used if needed. DO NOT make more than two applications per season. Controls wide spectrum of broadleaf weeds.
SENCOR 75DF (0.33-0.5 lb.) + Non-ionic Surfactant (1 pt./25 gal. spray mix)	metribuzin (0.25-0.375 lb.) + non-ionic surfactant	Apply as a postemergence directed spray after soybean plants are at least 12 inches tall and when weeds do not exceed 3 inches in height. Spray no higher than the lower 3 inches of the soybean plant. Provides contact kill of small weeds and residual control of weeds like sicklepod. May cause temporary discoloration to soybeans, but it is not reflected in a reduction in yield.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Harvest Aid		
AIM 2EC (1.4 fl.oz.) + Crop Oil Concentrate	carfentrazone-ethyl (0.023 lb.) + crop oil concentrate	Apply after soybeans are fully developed and leaves are dropping. Apply as a broadcast spray in sufficient spray volume to give complete coverage of crop and weeds such as morningglories, pigweed, and velvetleaf. Use a crop oil concentrate at rate of 1 gallon per 100 gallons of spray solution. A minimum of 3 days must be allowed between Aim application and crop harvest. Control of sicklepod is poor.
GRAMOXONE INTEON 2 (16 fl.oz.) or FIRESTORM 3 (11 fl.oz.) + Non-ionic Surfactant (1 pt./25 gal. spray mix)	paraquat (0.25 lb.) + non-ionic surfactant	Apply when plants are mature, beans are fully developed, half of the soybean leaves have dropped, and the remaining leaves are yellowing. Mature cocklebur are tolerant of herbicide, and desiccation will not be complete. DO NOT apply within 15 days of harvest. DO NOT graze or harvest treated area for forage or hay. Gramoxone and Firestorm are RESTRICTED USE pesticides.
TOUCHDOWN TOTAL (1.5 pt.) [4 lb./gal.]	glyphosate (0.75 lb.)	Apply at least 14 days prior to harvest. Apply to mature soybeans when pods have lost their color. DO NOT graze or harvest treated foliage. This application is not recommended for use on soybeans grown for seed since reduction in germination and/or vigor may occur.
ROUNDUP WEATHERMAX (22 fl.oz.) [5.5 lb./gal.] or Generics (See label.)	glyphosate (0.95 lb.)	Apply after soybean pods have set and lost all green color. Allow a minimum of 7 days between application and harvest. This application is not recommended for use on soybeans grown for seed since reduction in germination and/or vigor may occur. DO NOT graze or harvest treated forage for livestock feed within 25 days of preharvest application. For aerial application, see label for rate of herbicide needed.
SODIUM CHLORATE 3.0 (2 gal.) or SODIUM CHLORATE 6.0 (1 gal.)	sodium chlorate (6 lb.) or sodium chlorate (6 lb.)	Apply as a harvest aid to dry down weeds in early-maturing soybeans. Make application 7 to 10 days before anticipated harvesting date when beans are mature and ready for harvest. DO NOT graze treated fields or treated soybean foliage. See label for additional precautions and restrictions.
Perennial Grass Control		
ASSURE II 0.88 EC (10-12 oz.) + Non-ionic Surfactant or Crop Oil Concentrate	quizalofop (0.07-0.08 lb.) + non-ionic surfactant or crop oil concentrate	Apply postemergence to actively growing grasses. Apply in a minimum of 10 gallons of water per acre with ground equipment using flat fan nozzle tips. Use the lower rates for annual grasses and the high rate for perennial grasses such as bermudagrass and johnsongrass. May be applied by air. See label for instructions. If new plants or regrowth of perennial grasses occurs, a second application can be made at the low rate when the grass reaches the appropriate size. DO NOT apply within 80 days of harvest. DO NOT rotate to crops other than soybeans within 120 days of last application.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Perennial Grass Control (cont.)		
FUSILADE DX (0.75 pt.) + Crop Oil Concentrate (2 pt./25 gal. spray mix)	fluazifop-butyl (0.2 lb.) + crop oil concentrate	Apply over-the-top of soybeans for control of annual and perennial grasses. Annual grasses should be treated when they are 2 to 4 inches tall. Johnsongrass should be 12 to 18 inches tall; bermudagrass should be no taller than 3 inches and its runners no longer than 4 to 8 inches. A second application may be necessary if new plants or regrowth of perennial grasses occurs. Use a minimum of 10 gallons of spray mix per acre and 40 to 60 psi pressure to ensure complete coverage. Mixing Fusilade with other herbicides will reduce the weed control effectiveness of Fusilade. See label for additional information on crop oils and surfactants. Fusilade does not control sedges (nutgrass).
FUSION 2.56E (10-12 fl.oz.) + Non-ionic Surfactant (2 qt./100 gal. mix) or Crop Oil Concentrate (1 gal./100 gal. mix)	fluazifop (0.156-0.187 lb.) + fenoxaprop (0.04-0.052 lb.) + non-ionic surfactant or crop oil concentrate	Apply over-the-top of soybeans to control small rhizome johnsongrass and bermudagrass. Use the low rate on rhizome johnsongrass less than 10 inches tall. Use the high rate on johnsongrass 10 to 18 inches tall. Bermudagrass should be treated with the high rate when runners are 4 to 8 inches long. A second application can be made at 8 fluid ounces per acre when johnsongrass regrowth is 6 to 12 inches tall or bermudagrass runner regrowth is 4 to 8 inches long.
POAST PLUS 1E (2.25 pt.) or POAST 1.5E (1.5 pt.) + Crop Oil Concentrate (2 pt.)	sethoxydim (0.28 lb.) + crop oil concentrate	Apply over-the-top of soybeans for control of annual and perennial grasses. Annual grasses should be treated when they are 4 to 8 inches tall, except crabgrass and goosegrass which should be treated before reaching 4 inches tall. Johnsongrass should be 15 to 20 inches and bermudagrass runners should not exceed 6 inches in length for Poast application. Use the low rate for annual grass control and the high rate for bermudagrass and johnsongrass control. A second application may be necessary if new plants or regrowth of perennial grasses occurs. Use a minimum of 10 gallons of spray mix per acre and 40 psi pressure at the nozzle to ensure thorough spray coverage of foliage. Mixing with other herbicides will reduce weed control effectiveness. Does not control sedges (nutgrass).
ROUNDUP WEATHERMAX (33% solution)	glyphosate (wipe on)	Roundup may be used in a ROPE-WICK APPLICATOR to control isolated stands of johnsongrass. The recommended mixture ratio is 2 gallons of water to 1 gallon of Roundup (2:1 mixture). Best results have been obtained when application is made at 3 mph with two trips in opposite directions. Roundup may be applied with a recirculating sprayer in a carrier volume of 20 to 30 gallons per acre. Defoamers may be necessary to reduce foam and possible crop injury. Weeds must be a minimum of 6 inches taller than the soybeans.
ROUNDUP WEATHERMAX (0.8-4 pt.) [5.5 lb./gal.]	glyphosate (0.55-2.75 lb.)	Apply preplant to foliage of perennial weeds such as rhizome johnsongrass, bermudagrass, and nutsedge. Use lower rate for rhizome johnsongrass and higher rate for bermudagrass and nutsedge. Apply in 20 or more gallons of water. Allow at least 7 days after application before tillage. Johnsongrass must be at least 12 inches tall at time of application. Much better results are obtained if treatment can be delayed until early-head stage of johnsongrass, bermudagrass, and nutsedge.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
Perennial Grass Control (cont.)		
SELECT 2EC ARROW (0.5-1 pt.) + Crop Oil Concentrate (2 pt.)	clethodim (0.125-0.25 lb.) + crop oil concentrate	Apply over-the-top of actively growing soybeans to control small annual and perennial grasses, such as bermuda and johnsongrass. Use low rate on small annual grasses; medium rate in areas with heavy annual grass pressure; and high rate on perennial grasses in the labeled size range. See label for higher use rates to control heavy infestations. For ground application, apply in a minimum of 10 and a maximum of 40 gallons of spray mix per acre, using a spray pressure in the 20- to 60-psi range. May be tank mixed with Basagran, Ultra Blazer, Classic, and Reflex. A second application may be needed if new plants or regrowth occurs.
Conservation Tillage Systems		
Weed control—more specifically, poor grass control—is a major problem in no-till situations. DO NOT use no-till in fields infested with perennial and troublesome		weeds, such as johnsongrass, bermudagrass, nutsedge, and bahiagrass.
Preplant Burndown		
GRAMOXONE INTEON 2 (2-4 pt.) or FIRESTORM 3 (1.33-2.66 pt.) + Non-ionic Surfactant	paraquat (0.5-1 lb.) + non-ionic surfactant	For control of most annual weeds and top-kill of perennials. Apply before, during, and after planting but prior to emergence of soybeans for control of emerged vegetation. Good coverage is essential for effective control. Apply at 40 to 60 gallons of spray mix per acre. Add a non-ionic surfactant to spray mix at a rate of 1 pint per 25 gallons of spray mix. Gramoxone and Firestorm are RESTRICTED USE pesticides. Will not supply residual control and should be used in conjunction with a residual herbicide. Residual herbicides may be applied as a separate application or tank mixed. If tank mixed, refer to the label for specific mixing instructions.
ROUNDUP WEATHERMAX (22-44 fl.oz.)/[5.5 lb./gal.] Generic Brands (2-3 pt.) or	glyphosate (0.95-1.9 lb.) (1-1.5 lb.) or	Apply low rate to control annual weeds less than 6 inches tall. Apply in 10 to 20 gallons of water per acre. See postemergence section for other glyphosate products and for the appropriate need for surfactant. Use higher rates to control perennial or troublesome weeds.
TOUCHDOWN TOTAL (1.5-4.4 pt.) [4 lb./gal.]	glyphosate (0.75-2.2 lb.)	For control of most annual and perennial weeds. Apply as a broadcast application before, during, or after planting, but prior to soybean emergence. Make applications in 10 to 30 gallons of water per acre. Can be mixed with other pesticides. Refer to label for specific instructions. See label for necessary surfactant.

Table 10. Herbicide Classification by Mode of Action

Mode of Action	Herbicide
AMINO ACID SYNTHESIS INHIBITORS	Canopy, Classic, FirstRate, Python, Roundup WeatherMax, Scepter, Sequence, Squadron, Touchdown
CELL MEMBRANE DISRUPTERS	Cobra, Firestorm, Flexstar, Gramoxone Inteon, Prefix, Reflex, Storm, Ultra Blazer, Valor XLT
GROWTH REGULATORS	Butyrac/Butoxone (2,4-DB)
LIPID BIOSYNTHESIS INHIBITORS	Assure II, Fusilade, Fusion, Poast/Poast Plus, Select/Arrow
PHOTOSYNTHESIS INHIBITORS	Boundary, Canopy, Lorox, Sencor
PIGMENT SYNTHESIS INHIBITOR	Resource, Valor, Valor XLT
ROOT/SHOOT GROWTH INHIBITORS	Boundary, Dual, Intro, Micro-Tech, Outlook, Prefix, Prowl/Pendimax, Sequence, Squadron, Treflan

Weed Control section prepared by John W. Everest, Professor Emeritus, Agronomy and Soils, Auburn University; Michael G. Patterson, *Extension Weed Scientist*, Professor, Agronomy and Soils, Auburn University; and Dennis Delaney, *Extension Specialist*, Alabama Cooperative Extension System, Alabama A&M University and Auburn University; in cooperation with Harold H. Walker, Professor, Department of Agronomy and Soils, Auburn University.

Table 11. Estimated Effectiveness of Recommended Preplant Incorporated and Preemergence Herbicide Treatments on Important Weeds in Alabama Soybeans and Properties That May Affect Water Quality¹

WEEDS	HERBICIDES						
	Pendimax, Treflan (PPI)	Scepter (PPI)	Outlook (PPI/PRE)	Pursuit (PPI/PRE)	Python (PPI/PRE)	Canopy (PRE)	Dual (PRE)
GRASSES							
Crabgrass	9+	5	9	8	0	6	9+
Crowfootgrass	9	3	9	--	0	7	8
Fall Panicum	8-9	2	8	4	0	7	8
Goosegrass	9	5	9	5	0	7	9
Johnsongrass (rhizomes)	3	2	0	2	0	0	0
Johnsongrass (seedlings)	9	6-7	5	--	0	7	6
Junglerice	9	4	5	6	0	--	8
Texas Panicum	8-9	3	5	6	0	--	4
SEDGES							
Purple Nutsedge	0	5	1	8	0	5	2
Yellow Nutsedge	1	7	7	7-8	0	7	8
BROADLEAF WEEDS							
Balloonvine	0	--	0	--	0	7-8	0
Bristly Starbur	0	7	0	7	8	8-9	0
Cocklebur	0	9	0	7-8	8	9	0
Coffee Senna	0	7	0	6	6	8	0
Common Ragweed	2	8	0	4	8	8	6
Crotalaria	0	6	0	3	0	7-8	0
Florida Beggarweed	1	5	4	3	7	8	6
Florida Pusley	9+	8	9	8	8	7-8	9
Hemp Sesbania	0	4	0	0	0	8	0
Morningglory	3	7-8	0	8	7	7-8	0
Pigweed	9	8	9	8	9	6	8-9
Prickly Sida	0	7	4	8	8	7-8	6
Purslane	9	--	8	--	--	9	8
Sicklepod	0	7	5	0	7	8	3
Smartweed	3	8	0	--	8	8	3
Tropic Croton	0	--	4	4	--	8	3
Surface-Loss Potential²	M	M	--	--	--	M	M
Leaching Potential³	S	M	--	--	--	M	M

continued

¹ Effectiveness ratings are based on observations of research plot and field use under average weather conditions for several years by weed control workers in Alabama. Leaching and surface-loss potential ratings are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience. Control may vary depending on factors such as time and method of application, weather conditions, size of weeds, etc.² The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff. ³ The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone.

KEY TO CONTROL RATINGS AND ABBREVIATIONS 0 = No control; 10 = 100% control; -- = Information not available. PPI = Preplant Incorporated; PRE = Preemergence. S = Small; M = Medium.

Table 11. Estimated Effectiveness of Recommended Preplant Incorporated and Preemergence Herbicide Treatments on Important Weeds in Alabama Soybeans and Properties That May Affect Water Quality¹ (cont.)

WEEDS	HERBICIDES					
	Intrro (PRE)	Linex, Lorox (PRE)	Prefix (PRE)	Scepter (PRE)	Sencor (PRE)	Valor XLT (PRE)
GRASSES						
Crabgrass	9+	8	9	0	7	0
Crowfootgrass	9	8	8	0	7	0
Fall Panicum	8	8	8	0	6	0
Goosegrass	9	8	9	0	7	0
Johnsongrass (rhizomes)	0	0	0	0	0	0
Johnsongrass (seedlings)	6	4	0	6-7	5	0
Junglerice	8	7	--	0	7	0
Texas Panicum	4	1	6	0	1	0
SEDGES						
Purple Nutsedge	0	0	4	2	6	0
Yellow Nutsedge	6	0	8-9	5	7	7-8
BROADLEAF WEEDS						
Balloonvine	0	6	--	--	7-8	--
Bristly Starbur	0	7	--	--	7	7-8
Cocklebur	0	3	8	9	9	7-8
Coffee Senna	5	6	5	7	7	8
Common Ragweed	3	8	8	8	8	8-9
Crotalaria	0	0	--	--	2	8
Florida Beggarweed	7	7	6	4	8	8-9
Florida Pusley	9	8	8	7-8	8	8-9
Hemp Sesbania	0	6	4	4	8	8
Morningglory	0	7	6-7	6-8	4	7-8
Pigweed	8	8	8	8	7	8-9
Prickly Sida	8	7	--	8	8-9	8-9
Purslane	8	8	8	--	8-9	8-9
Sicklepod	4	3	--	7	8	7
Smartweed	4	6	--	8	8	--
Tropic Croton	3	--	7	--	8	8
Surface-Loss Potential²	M	L	--	M	M	--
Leaching Potential³	M	M	--	M	M	--

¹ Effectiveness ratings are based on observations of research plot and field use under average weather conditions for several years by weed control workers in Alabama. Leaching and surface-loss potential ratings are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience. Control may vary depending on factors such as time and method of application, weather conditions, size of weeds, etc.² The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff. ³ The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone.

KEY TO CONTROL RATINGS AND ABBREVIATIONS 0 = No control; 10 = 100% control; -- = Information not available. PPI = Preplant Incorporated; PRE = Preemergence. S = Small; M = Medium.

Table 12. Estimated Effectiveness of Recommended Post Emergence and Post-Directed Herbicide Treatments on Important Weeds in Alabama Soybeans and Properties That May Affect Water Quality¹

WEEDS	HERBICIDES							
	Arrow, Assure, Select (POST)	Basagran (POST)	Classic (POST)	Cobra (POST)	First-Rate (POST)	Flexstar, Reflex (POST)	Fusilade, Poast (POST)	Fusion (POST)
GRASSES								
Crabgrass	8	0	0	0	0	0	8	8
Crowfootgrass	9	0	0	0	0	0	8	8
Fall Panicum	8	0	0	0	0	0	9	8
Goosegrass	8	0	0	0	0	0	8	8
Johnsongrass (rhizomes)	8-9	0	0	0	0	0	8	0
Johnsongrass (seedlings)	9	0	0	0	0	0	8	8
Junglerice	8	0	0	0	0	0	8	7
Texas Panicum	7-8	7	0	0	0	0	9	8
SEDGES								
Purple Nutsedge	0	0	5	2	6	4	0	0
Yellow Nutsedge	0	7	7	2	6	6	0	0
BROADLEAF WEEDS								
Balloonvine	0	1	6	9	--	7	0	0
Bristly Starbur	0	9	8	8	9	4	0	0
Cocklebur	0	9+	9	8-9	9	7-8	0	0
Coffee Senna	0	8	2	4	--	3	0	0
Common Ragweed	0	7	8	8	9	8	0	0
Crotalaria	0	4	--	9	--	8	0	0
Florida Beggarweed	0	0	8	6	7	4	0	0
Florida Pusley	0	5	5	7	7	8	0	0
Hemp Sesbania	0	5	8	9	5	8	0	0
Morningglory	0	5-8	4-9	7-9	8	8-9	0	0
Pigweed	0	7	6	9	4	9	0	0
Prickly Sida	0	8	2	8	4	2	0	0
Purslane	0	8	--	9	--	--	0	0
Sicklepod	0	0	7-8	5	7	4	0	0
Smartweed	0	7	7	6	7	--	0	0
Tropic Croton	0	0	4	8	--	--	0	0
Surface-Loss Potential²	M	S	S	M	--	M	M	--
Leaching Potential²	S	M	M	M	--	L	S	--

continued

¹ Effectiveness ratings are based on observations of research plot and field use under average weather conditions for several years by weed control workers in Alabama. Leaching and surface-loss potential ratings are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience. Control may vary depending on factors such as time and method of application, weather conditions, size of weeds, etc. ² The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff. ³ The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone.

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Table 12. Estimated Effectiveness of Recommended Post Emergence and Post-Directed Herbicide Treatments on Important Weeds in Alabama Soybeans and Properties That May Affect Water Quality¹ (cont.)

WEEDS	HERBICIDES							
	Ignite (POST)	Scepter (POST)	Sequence (POST)	Ultra Blazer (POST)	Firestorm Gramoxone (PDS)	Butyrac Butoxone (PDS)	Lorox+ Butoxone (PDS)	Sencor (PDS)
GRASSES								
Crabgrass	7-8	0	9	2	7	0	7	8
Crowfootgrass	8	0	--	5	8	0	7	8
Fall Panicum	8	0	9	5	6-8	0	6	8
Goosegrass	5	0	8	0	8	0	6	7
Johnsongrass (rhizomes)	7	0	9	0	2	0	0	0
Johnsongrass (seedlings)	8	0	9+	3	8	0	5	6
Junglerice	--	0	--	6	8	0	6	7
Texas Panicum	8	0	--	1	8	0	6	7
SEDGES								
Purple Nutsedge	4	2	3	2	4	0	2	3
Yellow Nutsedge	5	6	7	3	5	0	2	5
BROADLEAF WEEDS								
Balloonvine	--	--	8	9	3	5	8	8
Bristly Starbur	8	--	--	6	8	7	8-9	8-9
Cocklebur	9	9	9+	7-8	7	7-8	8-9	8
Coffee Senna	8	7	--	6	5	6	7-8	7-8
Common Ragweed	--	8	9	8-9	8	6	7-8	7-8
Crotalaria	--	--	8	9+	8	--	8-9	7-8
Florida Beggarweed	8	2	--	6	6-8	1	8	8-9
Florida Pusley	6-7	6	7	9	6	4	8	7-8
Hemp Sesbania	--	4	7	9+	2	5	9	8
Morningglory	9	4-7	7-8	8-9	7	7-8	8-9	7
Pigweed	7-8	9	9	9+	8	7	8	8
Prickly Sida	8-9	6	7	2	3	4	7-8	7-8
Purslane	7	--	8	9	8	7	8	8
Sicklepod	9	6-7	8	2	7	8	8	7
Smartweed	--	7	8	7-8	4	4	8	8
Tropic Croton	8	--	--	9	7	4	8	8
Surface-Loss Potential²	--	M	--	M	S	M	L	L
Leaching Potential²	--	M	--	M	S	M	M	M

¹ Effectiveness ratings are based on observations of research plot and field use under average weather conditions for several years by weed control workers in Alabama. Leaching and surface-loss potential ratings are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience. Control may vary depending on factors such as time and method of application, weather conditions, size of weeds, etc. ² The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff. ³ The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone.

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For more information, call your county Extension office. It is listed in your telephone directory under your county's name.

Use pesticides **only** according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency or the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply **any** pesticide, check with your county Extension agent for the latest information.

Trade names are used **only** to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

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