



Pastures and Forage Crops

Insect and Weed Control Recommendations for 2007

INSECT PEST MANAGEMENT

Check forages regularly to detect insect infestations. They should be checked frequently during the active growing season, particularly during periods of drought. Three to four locations in each 10 acres should be monitored. Symptoms of insect infestation may be early visible chewing, or it may be less obvious. Insects may be on the foliage, may hide in the crowns of the plants, or may feed on the plant roots. Look for yellowing plants and spots where the grass may be dead or thinning.

A sweep-net helps in detecting insect infestations, particularly those of grasshoppers, the various armyworms, spittlebugs, blister beetles, and leafhoppers. These nets, often made of tapered muslin bags mounted on a 12- to 15-inch rim, can be bought for \$15 to 25. However, an old pillowcase mounted on a dip net makes a good substitute. If excessively large numbers of insects are detected in the sweep net, the area can then be examined more closely.

To find soil insects, check areas with poor growth or where soil surface has been disturbed. Use a shovel to dig or turn soil 10 inches deep. In late August, scout pastures where organic fertilizers have been used for green June beetles. Common insect pests of pastures—fall armyworms, white grubs (including green June beetles), spittlebugs, and fire ants—are discussed below.

See Tables 1 through 4 for chemical control recommendations. Insecticides used on forage sorghum differ from those on legumes or on perennial grasses. For forage sorghum, see http://www.ent.uga.edu/pmh/Agronomic/Agronomic_Crops.htm. Select Temporary Grazing, then Summer Insect Control.

Fall Armyworm

Fall armyworm caterpillars damage crops by chewing plant tissue. They prefer to feed on plants in the grass family, i.e., turf, corn, sorghum, and grass pastures. When hungry, however, they will also attack most field crops.

There are two strains of fall armyworm: one prefers to feed on rice and pasture grasses; the other prefers corn and sorghum. When fall armyworms eat all the available food in a field, they will migrate in large numbers to other fields.

The fall armyworm moths migrate north from Central America each year. By early summer, they are laying eggs in

Alabama pastures. Reports of damaging populations usually come in late July and early August when later generations of the pest are present. However, damaging populations can occur in June. Hot, dry weather is favorable for fall armyworm outbreaks. This insect has several generations per year. There can be considerable overlap between generations later in the season.

Fall armyworms can be found feeding on foliage at any time of day. When fully grown, they are 1.5 inches long. Fall armyworms are always striped, but their coloring is not always the same. Their background color ranges from light green to almost black. Fall armyworm caterpillars can be identified by four black dots on the back of the tip of the abdomen. Larger caterpillars typically have a light-colored, upside-down Y-shape on the head. More information on biology and habits of fall armyworms can be found in Alabama Cooperative Extension Circular ANR-1019, "Management of Fall Armyworms In Pastures And Hayfields."

Fall armyworms need to be treated when they are still small—about 0.5 to 1 inch long. Detecting infestations when the caterpillars are small gives more time for control measures to be implemented. When armyworms are fully grown, they are less susceptible to insecticides and, therefore, are harder to kill. In addition, if most of the caterpillars are nearly grown, most of the damage will already have been done. Then, there will be little benefit from control.

Scouting Pastures. Because of the need to detect infestations early, check perennial grass forages frequently to see if damaging numbers of fall armyworms or other pasture pests are present. Usually, late July through October is the recommended time for scouting. Scouting is particularly important when the weather has been hot and dry.

Walk into the pasture from all four sides or walk in an X across the field to make sure you check a large enough area. Stop at about ten places in the field and look closely for small caterpillars feeding on the grass. If you find them, estimate the number per square foot. Control of fall armyworms is justified when the population exceeds three 0.5-inch caterpillars per square foot.

Making Control Decisions. If damaging levels of fall armyworm are found and fields are almost ready to mow for hay, consider mowing earlier than usual. Insecticides are recommended if only part of a pasture is infested (treat the infested area only) or if the grass is too short to be cut for

hay. If considerable defoliation has already occurred, consider grazing or mowing whatever forage is left. If rain is forecast and it is not too late in the season, bermudagrass pastures can be fertilized to encourage another hay crop. Each generation of fall armyworms takes about one month under Alabama conditions. If a hay crop is lost to the insect, the next hay crop should be checked frequently, particularly in the time frame of 3 to 5 weeks from the time injury was noticed.

Fall armyworms can destroy a hay crop in bermudagrass and bahiagrass pastures, but they will rarely cause plant death. Fall armyworm infestation is most serious in fescue pastures. Defoliation by fall armyworm, particularly in drought-stressed conditions, can kill the fescue plants.

Chemical control recommendations for fall armyworm in grass pastures are included in this guide. Pay careful attention to the grazing interval—the time required from application until livestock can be put back in a pasture.

Some resistance of fall armyworm to Sevin has been reported. However, increasing the gallonage of water in the spray mixture can improve control of fall armyworm with Sevin. When treating perennial grass forages, try to improve coverage by using 25 to 30 gallons of water per acre. When treating by air, 3 to 5 gallons per acre is recommended.

If the efficacy of a chemical is in doubt, treat a small test area. The next day, check for control percentage.

Green June Beetles (Grubworms) and Other White Grubs

Four types of grubs are common in grass pastures. They are the larval stages of green June beetles, May beetles in the genus *Phyllophaga*, southern masked chafers (occasionally northern masked chafers), and Japanese beetles.

The green June beetle is an increasing problem in Alabama. The grubs of this beetle rarely feed on grass roots, but their extensive burrowing activities disrupt the root-soil contact. Once the soil around the roots is loosened, grazing cattle can easily uproot the plants. When green June beetle grubs are present, the pasture will seem to have thinned out. There will be areas where the soil is pulverized, and you may see 0.5-inch-diameter tunnels that the grubs have made. The green June beetle grub is stout, it has short legs, and it crawls on its back. This distinguishes it from other white grubs which have longer legs and typically curl up into a C-shape when disturbed. Grubs typically come to the surface at night to feed on organic matter.

Green June beetles have one generation per year. The green and gold adults fly in the daytime and are a familiar sight in July and August. Eggs hatch in August and early September. Best time to spray is in September and early October. They reach 2 inches by late fall or early spring.

Pastures in high-risk areas should be checked for green June beetle grubs. *High-risk pastures include (1) those in which manure has been applied as fertilizer, (2) fields on sandy or light soils, and (3) fields in fruit-growing regions. This is particularly important if winter forages will be interseeded.* The tunneling activities can tear up young plants. Green June beetle grubs tend to move along a drill row, pushing out seedlings as they go. The best way to scout for green June beetles is to look for tunneling holes or for thin

areas in pastures. Then, use a shovel to carefully dig out a square-foot surface area to a depth of 10 to 12 inches. Sift the soil carefully, looking for the grubs. Check at least five samples per field. Treat fescue with an insecticide (see Table 1) if more than two to four grubs per square foot are found. Bermudagrass should be treated if four to six grubs per square foot are found. Fields where winter annuals are planted should be treated if more than one green June beetle grub per square foot is found. See Extension Circular ANR-991 for more details on green June beetle biology.

May beetles, chafers, and Japanese beetle grubs feed on the roots of pasture grasses. They can prune the roots so intensively that the pasture sod can be rolled back like a carpet. In some years, pastures may not recover from this severe pruning. At least 2,000 acres of pasture were lost to May beetle grubs in 1985-1986.

Smaller populations of grubs can reduce plant stand, allowing invasion by broadleaf weeds. The broadleaf weeds, in turn, make it easier for Scarab females to get down to the soil to lay eggs, causing further damage to sod.

White grubs occur in mixed populations. It is rare that an infestation consists of a single species. If all species had similar life cycles, feeding impact, and response to insecticides, management decisions could be made without identifying species. However, this is not the case. Currently, there are no insecticides registered on pastures that are effective against May beetles, Japanese beetles, and southern masked chafers. Cultural practices to promote vigorous growth can help the grass sod recover. Weed control may be necessary for 1 to 2 years after damage has occurred.

Japanese beetles, southern masked chafers, and green June beetles have a single-year life cycle and their larvae are most damaging in late summer and fall. May beetles have 1- to 3-year life cycles, and their larvae are actively feeding except during the coolest months of the year.

Two-lined Spittlebugs

Two-lined spittlebugs can damage bermudagrass pastures. Spittlebugs have two generations per year in Alabama. Two-lined spittlebugs overwinter as eggs in sheltered places, such as in plant debris on soil, in hollow stems, and behind leaf sheaths. Humid conditions are required for egg hatch and development of young spittlebugs.

The adult is dark brown, about 0.375-inch long, with two horizontal red lines on its back. Young spittlebugs hide inside foamy masses of saliva. Nymphs and adults feed by sucking juices from the roots, stems, and leaves of bermudagrass. In heavy infestations, injured grasses tend to yellow and dry out. Damage occurs most frequently in dense, overgrown stands of bermudagrass. Populations of more than one adult spittlebug per square foot could present a problem.

Recommended control measures are to burn the affected areas to destroy the spittlebugs and the accumulated thatch. If burning is not possible, mow the pastures and then rake to reduce the amount of the accumulated thatch.

In fields where spittlebugs are a chronic problem or in fields with a heavy thatch build-up, burning in February may be used as a preventive measure.

Chinch Bugs

Chinch bugs can be a severe pest of summer grass forages. Problems are enhanced by minimum tillage rotations that plant summer annual grasses after a winter grain crop and by dry, hot weather. Chinch bugs suck plant juices out of the base of plants. Symptoms include brittle stems, reddening, or sudden wilting or browning.

Many times, chinch bugs cease to be a problem after a heavy rain. If drought conditions persist, apply insecticide in a spray directed at the base of the plants.

Fire Ants

The red imported fire ant, *Solenopsis invicta*, was accidentally introduced into Mobile sometime between 1933 and 1945. Today, this insect infests about 275 million acres in 11 southern states. In northern Alabama, the black imported fire ant, *Solenopsis richteri*, is also present. Imported fire ants are predators and scavengers and feed on a wide variety of foods. Their mounds are a familiar sight in Alabama pastures.

The impact of fire ants in pastures is hard to document because they affect different areas of the livestock operation. They injure both cattle and humans, and they also damage haying equipment, electrical equipment, and livestock feed. Insecticide-based management strategies have been quite effective for home lawns, golf courses, and other public areas. Controlling fire ants in livestock pastures, however, is more difficult because of the extensive land area involved, the high cost of insecticides, and because of livestock safety considerations.

A recent survey in Texas indicated that it may be economically feasible to treat calving pastures and hayfields but not feasible to treat pastures and rangeland. As an example, losses due to livestock injury or death in Texas pastures averaged seven cents per acre. The cost of treatment averaged 10 to 20 dollars per acre. However, fire ants are a distinct nuisance to humans, and their mounds cause equipment damage and lost work time due to that damage. Therefore, the decision to treat or not treat for fire ant mounds will probably be based more on human factors than on actual injury to livestock.

Fire ant colonies are initiated by individual winged queens which, after mating, dig chambers and begin to lay eggs. Flights of winged queens occur throughout the year but are most common in spring. As the colony develops, the typical fire ant mound usually appears. Single-queen fire ant colonies are territorial and tend to discourage new colonizers. Therefore, the single-queen fire ant mounds tend to stabilize at a density around 50 mounds per acre.

Unfortunately, there is a new form of red imported fire ant that is not as territorial. This form has many queens per colony, and mound densities can reach up to 800 per acre. The extent of these colonies that have many queens has not been determined in Alabama.

Cultural Practices. Currently, management options for fire ants in pastures and hayfields are cultural and chemical control. In hayfields, frequent mowing discourages the building of large mounds even though fire ants will still be present. Disc mowers are more practical than conventional sickle-bar mowers because they are less likely to break. In pastures on heavy soils, it is a good idea to go through with a

flail mower, such as a Bush-Hog, several times a year to reduce the height of the fire ant mounds.

Chemical Control Options. Chemical treatment for fire ants is probably not economical in most pasture situations. It may be prudent to treat pastures in which heavy calving activity will occur between March and September when fire ants are most active. It may also be prudent to treat hayfields and areas around equipment sheds.

As previously mentioned, most fire ants are territorial, and defensive actions tend to limit the number of mounds per acre. When insecticides are used to treat for fire ants, the number of mounds per acre may actually increase because there are no established colonies to discourage colonization. Therefore, chemical treatment for fire ants has to be a continuous process. Treatments control what is already there but cannot prevent reinfestation by incoming flights of queens.

Currently, the most economical treatment for pastures is to broadcast an insecticide-laced bait that will be picked up by the foraging ants and carried back to each colony. Broadcast applications of baits are better than individual mound treatments for pastures because the visible mounds are only the tip of the iceberg. There are other colonies that have not yet built mounds. Mound treatments may be useful follow-ups a few weeks after bait has been applied. See ANR-1185, "Getting The Most Out of Your Fire Ant Bait" and ANR-1248, "Management of Imported Fire Ants in Cattle Production Systems."

When a bait is broadcast, it will be picked up and carried back to all of the colonies, no matter how large or how small they are. The baits are carefully designed to be slow-acting so that they will be spread by the foraging ants to their nestmates before the foraging ants die. Because of this, death may take several days to two weeks. Baits must be attractive so that the ants will pick them up. They must be placed where the foraging ants will find them and recognize them as food. Spreading baits on top of mounds will not be effective because ants generally do not search for food on the mound.

Because baits must be carried back to the nest, they must be applied when ants are actually foraging. Winter applications will not be effective. Morning or late afternoon treatments (70°-90°F) are best because of high foraging activity in hot weather. Few ants forage during the heat of the day. Baits should be applied when the foliage is dry. Rain immediately following application will reduce efficacy. Unfortunately, there is often a conflict between late afternoon applications to dry foliage and Alabama's frequent late afternoon thundershowers. In such weather, it is best to wait until after the shower is over and the foliage has begun to dry. Baits are most effective when applied between May and September. Individual mound treatments may be useful after baits have been applied. However, it is important to wait a few days after applying bait before treating the mound so that the active ingredient in the bait will be distributed through the colony to the queen.

There are two kinds of fire ant baits: those containing a metabolic inhibitor, such as Amdro, and those containing an insect growth regulator, such as Award, Esteem, or Extinguish. Metabolic inhibitor baits act within 2 to 4 weeks, but the effect wears off fairly quickly (4 to 8 months). Insect growth regulator baits take longer to work (4 to 8 weeks) but tend to

give longer lasting control (8 to 12 months). Trials in Texas showed that mixing 0.75 pound of a metabolic inhibitor bait with 0.75 pound of an insect growth regulator bait worked faster than an insect growth regulator alone. It also lasted longer than a metabolic inhibitor alone.

Striped Ground Crickets

Striped ground crickets attack clover planted into grass sod. See Alabama Cooperative Extension Circular ANR-1133, "Controlling Insect Pests During Stand Establishment of Forage Legumes," for more information.

Clover Head Weevil

Clover head weevils are the most serious pests of crimson clover grown for seed. Larvae feed on developing seeds, destroying the germ. Controlling these pests is usually necessary to get acceptable seed yields.

One option is to scout fields for adult clover leaf beetles about two weeks before bloom. Applying a recommended pesticide at that time may reduce the number of eggs laid on the heads. Another strategy is to wait until 10- to 20-percent of the seed heads are infested. Carbaryl, the only effective treatment, is highly toxic to pollinating insects; treat fields late in the evening after bees are less active.

Table 1. Forage Grass Insect Control^{1,2}

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Comments
Armyworm, Fall Armyworm, Striped Grass Looper					
	carbaryl				
	SEVIN 80S	1.25-1.875	1-1.5	14	Treat when there are three or more 0.5-inch-long worms per square foot.
	Other trade names ³	lb.			
	diflubenzuron				
	DIMILIN 2L	2 oz.	0.12	1 (hay), 0 (g)	Diflubenzuron is an insect growth regulator that interferes with the normal molting process. It must be eaten by the young caterpillar. Use at first sign of hatch out and before larvae are 0.5 inch long. Effects are seen when caterpillars have molted at least once. Caterpillars die when they try to molt to the next size. Dimilin is a RESTRICTED USE pesticide.
	methomyl				
	LANNATE LV 2.4	0.75-3 pt.	0.22-0.9	3 (hay), 7 (g)	Use higher rate for heavy populations and larger larvae. Use lower rate for small larvae. FOR BERMUDAGRASS ONLY. Lannate is a RESTRICTED USE pesticide.
	Other trade names ³				
	methyl parathion				
	CHEMINOVA	1.5 pt.	0.75	15	Methyl parathion has little residual activity but is fast acting. Will not control large larvae. All formulations of methyl parathion are RESTRICTED USE pesticides.
	METHYL 4EC				
	spinosad				
	TRACER	1-2 fl.oz.	0.03-0.062	3 (h), 0 (g)	Target small larvae or eggs at hatching. Do not allow cattle to graze until foliage has dried.

¹ For forage sorghum, see http://www.ent.uga.edu/pmh/Agronomic/Agronomic_Crops.htm. Select Temporary Grazing, then Summer Insect Control.

² See Table 2 for a list of insecticides, formulations, restricted entry intervals, days to grazing or harvest, and maximum amount to apply.

³ See Table 2 for other trade names.

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Comments
Chinch Bugs					
	carbaryl				
	SEVIN 80S	1.25-1.875	1-1.5	14	Direct spray at base of plants. Use at least 20 to 30 gallons of water per acre.
	Other trade names ³	lb.			
Grasshoppers					
<i>General Comments: Apply pesticide when 50 percent or more foliage has been lost. It may be possible to spot-treat the edge of fields. Large, black and yellow lubber grasshoppers will probably not be controlled with any insecticide.</i>					
	carbaryl				
	SEVIN 80S	0.625-1.875	0.5-1.5	14	Apply 0.5 to 0.75 pounds active ingredient per acre for nymphs or small plants. Apply 1.0 to 1.5 active ingredient per acre for mature grasshoppers or application to dense foliage or if extended residual control is desired.
	Other trade names ³	lb.			
	diflubenzuron				
	DIMILIN 2L	1-2 oz.	0.12	1 (hay), 0 (g)	Diflubenzuron is an insect growth regulator that interferes with the normal molting process. It must be eaten by the young grasshopper. Dimilin is a RESTRICTED USE pesticide.
	malathion				
	MALATHION 5	1.5-2 pt.	0.93-1.25	0	Treat areas where young hoppers congregate before they reach the winged stage.
	Other trade names ³				
	methyl parathion				
	CEHMINOVA	1.5 pt.	0.75	15	See General Comments, above. This chemical is fast acting but has little residual effect. All formulations of methyl parathion are RESTRICTED USE pesticides.
	METHYL 4EC				
Green June Beetle Grubs					
	carbaryl				
	SEVIN 80S	1.875 lb.	1.5	14	Good control for green June beetle grubs ONLY . Use in at least 25 gallons of water per acre. Mow or graze to reduce height of forage before application. Effectiveness depends on getting carbaryl on the soil, not the foliage.
	Other trade names ³				

³ See Table 2 for other trade names.

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Comments
Imported Fire Ants—Baits on Active Pastures and Hayfields					
<i>See discussion for mixing baits for fire ants, under "Chemical Control Options," to optimize speed and longevity of control.</i>					
	fenoxycarb AWARD FIRE ANT BAIT	1-1.5 lb.	0.16-0.24 oz.	0	HORSE PASTURES ONLY: Apply when ants are foraging. DO NOT use where cattle, sheep, and other domestic animals are grazing. Award is an insect growth regulator. Noticeable results may take 4 to 8 weeks. Apply as a broadcast treatment when ants are actively foraging. Or treat the mound by applying 1 to 3 level tablespoons per mound, distributing material 3 to 4 feet around the mound.
	hydramethylnon AMDRO PRO FIRE ANT BAIT	1-1.5 lb.	0.12-0.18 oz.	7 (hay), 0 (g)	Broadcast bait uniformly. Treat when ants are foraging and when rain is not forecast for 24 hours. Or treat the mound by applying 2 to 5 level tablespoons per mound, distributing material 3 to 4 feet around the mound.
	pyriproxyfen ESTEEM ANT BAIT	1.5-2 lb.	0.12-0.16 oz.	1	Apply uniformly when ants are looking for food. Avoid application if rain is expected within 4 to 6 hours. Or apply as a mound treatment by sprinkling 2 to 4 level tablespoons around the mound. Noticeable results may take 4 to 8 weeks.
	s-methoprene EXTINGUISH PROFESSIONAL FIRE ANT BAIT	1-1.5 lb.	0.08-0.12 oz.	0	Extinguish is labeled for use in all forages. Apply as a broadcast treatment when ants are foraging and when rain is not forecast for 24 hours. Or apply as a mound treatment by sprinkling 3 to 5 tablespoons around each mound, distributing material 4 feet around the mound. Extinguish is an insect growth regulator. It may take several months to see noticeable results.
	<i>hopper blend</i> EXTINGUISH PROFESSIONAL FIRE ANT BAIT + another bait	0.75 lb. + 0.75 lb. other bait	---		Mix Extinguish Professional fire ant bait in a 50:50 mix with a hydramethylnon ant bait. Broadcast or treat the mound by applying 3 to 5 tablespoons per mound, distributing material 4 feet around the mound.

³ See Table 2 for other trade names.

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Comments
Imported Fire Ants—Contact Insecticide for Individual Mound Treatment					
	carbaryl				
	SEVIN XLR PLUS	---	---	---	Mix 0.75 fluid ounces per gallon of water. Apply a total of 2 gallons of the diluted solution over each mound or at least 1 quart per 6 inches of mound diameter, using a bucket or watering can. Thoroughly wet mound and surrounding area, distributing material 4 feet around the mound. Do not disturb the mound prior to treatment. Pour solution from a height of about 3 feet to give sufficient force to break the mound open and flow into tunnels. For best results apply when the temperature is between 65 and 80°F. Repeat application after 7 days if mound activity resumes. Pressurized sprays may reduce the effectiveness of the treatment by disturbing the ants and causing migration.
	Other products: SEVIN 4F				
	SEVIN 80S	---	---	14	Mix 0.33 ounce of Sevin 80S per gallon of water. Apply same as for diluted solution, above.
	Other products: CARBARYL 80S				
Striped Ground Crickets					
<i>General Comments: Apply an insecticide before overseeding clovers if excessive numbers of crickets (more than four or five crickets per square foot) are present.</i>					
	carbaryl				
	SEVIN 80S	1.25-1.875	1-1.5	14	
	Other trade names ³	lb.			
	methyl parathion				
	CHEMINOVA	1.5 pt.	0.75	15	All formulations of methyl parathion are RESTRICTED USE pesticides.
	METHYL 4EC				
Two-Lined Spittlebugs (On Coastal Bermudagrass)					
	See Comments.				No chemical control is recommended on coastal bermudagrass. Prevent a dense mat of grass from forming by grazing or by close mowing and raking. If spittlebugs should seriously damage a dense growth, the dead grass may be burned off immediately.
White Grubs (Other than Green June Beetle)					
	See Comments.				No effective insecticides are labeled for control of these insects. Rotate fields to crops where preplant or at-planting insecticides can be used to control these insects.

³ See Table 2 for other trade names.

NOTE: Read manufacturer's label carefully for specific information on all product use restrictions and safety.

Table 2. Insecticides Labeled for Use on Perennial Grass Pasture and Hayfields

Insecticide and Trade Name	A.I./ Formulated Product	Formulation	Restricted Entry Interval (hr)	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Maximum Amount per Crop
carbaryl					
SEVIN 4F	4 lb./gal.	liquid suspension	12	14	Two applications/year, at least 14 days apart
SEVIN XLR PLUS	4 lb./gal.	liquid suspension	12	14	Two applications/year, at least 14 days apart
CARBARYL 4L, others	4 lb./gal.	liquid suspension	12	14	Two applications/year, at least 14 days apart
SEVIN 80S	12.8 oz./lb.	wettable powder	12	14	3.75 lb./A/crop
CARBARYL 80S, others	12.8 oz./lb.	wettable powder	12	14	3.75 lb./A/crop
SEVIN 80WSP	12.8 oz./lb.	water soluble packet	12	14	3.75 lb./A/crop
diflubenzuron					
DIMILIN 2L	2 lb./gal.	liquid	12	1(h), 0(g)	2 fl.oz./A/cutting, 6 fl.oz./A/year
fenoxycarb (horse pastures only)					
AWARD FIRE ANT BAIT	1%	bait	12	Horse pastures only	
hydramethylnon					
AMDRO PRO FIRE ANT BAIT	0.73%	bait	12	7(h), 0(g)	8 lb./A/year, four applications/year, min. 90 days between treatments
malathion					
MALATHION 5, others	5 lb./gal.	emulsifiable concentrate	12	0	
MALATHION 8, others	8 lb./gal.	emulsifiable concentrate	12	1	
MALATHION ULV, others	9.8 lb./gal.	ULV concentrate	12	0	
FYFANON	5 lb./gal.	emulsifiable concentrate	12	0	
FYFANON ULV (AG)	9.9 lb./gal.	ULV concentrate	12	0	
methomyl (bermudagrass only)					
LANNATE LV (Restricted Use)	2.4 lb./gal.	water soluble liquid	48	3(h), 7(g)	3 pt./A/crop, four applications/crop
LANNATE SP (Restricted Use)	14.4 oz./lb.	water soluble powder	48	3(h), 7(g)	1 lb. (0.9 lb. a.i.)/A/crop, four applications/crop
methoprene					
EXTINGUISH PROFESSIONAL FIRE ANT BAIT	0.50%	bait	4	0	

Insecticide and Brand Name	A.I./ Formulated Product	Formulation	Restricted Entry Interval (hr)	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Maximum Amount per Crop
methyl parathion					
CHEMINOVA METHYL 4EC (Restricted Use)	4 lb./gal.	emulsifiable concentrate	48	15	
pyriproxyfen					
ESTEEM ANT BAIT	0.50%	bait	12	24	
spinosad					
ENTRUST	12.8 oz./lb.	wettable powder	4	3 (h), 0 (g) graze when spray is dry	3.75 oz. (0.186 lb. a.i.)/A/year
SUCCESS	2 lb./gal.	liquid	4	Same as above	1 fl.oz. (0.186 lb. a.i.)/A/year
TRACER	4 lb./gal.	liquid	4	Same as above	6 fl.oz. (0.186 lb. a.i.)/A/year

Other products may be available. Always read the label to make sure the specific crop is listed and to determine what rate to use.

Table 3. Clover Insect Control^{1,2}

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Comments
Alfalfa Weevils					
	carbaryl SEVIN 80S Other trade names ³	1.875 lb.	1.5	7	Observe bee caution. If pretreatment damage is extensive, cut clover and treat the stubble. To avoid plant injury to tender foliage.
Aphids					
	malathion FYFANON	1.5-2 pt.	0.93-1.25	0	Treat when one aphid per plant is found on seedlings or when honeydew is found on older stands. Avoid treating crops grown for seed with these insecticides when pollinating insects are visiting blooms.
Armyworms					
	spinosad TRACER	1-2 fl.oz.	0.031-0.062	3	Target eggs or small larvae. Heavy infestations may require repeated applications.
Blister Beetles					
	carbaryl SEVIN 80 S Other trade names ³	0.67-1.25 lb.	0.5-1	7	
Clover Head Weevils					
	carbaryl SEVIN 80S Other trade names ³	1.25-1.875 lb.	1-1.5	7	Treat when 10 to 20 percent of seed heads are infested with larvae. Bee hazard; avoid treating crops when pollinating insects are active.
Clover Leaf Weevils, Lesser Clover Leaf Weevils					
	carbaryl SEVIN 80S Other trade names ³	1.25-1.875 lb.	1-1.5	7	Apply when foliage feeding becomes severe. Avoid treating crops when pollinating insects are active.
Green Cloverworms					
	carbaryl SEVIN 80S Other trade names ³	1.25 lb.	1	7	Treat when worm population and foliage loss indicate control is needed.
Imported Fire Ants					
	s-methoprene EXTINGUISH PROFESSIONAL FIRE ANT BAIT	1-1.5 lb.	0.08-0.12	0	Apply uniformly when ants are looking for food. Avoid application if rain is expected within 4 to 6 hours. Or apply as a mound treatment by sprinkling 2 to 4 tablespoons around the mound.

¹See the Alfalfa IPM for insect control on alfalfa stands.² See Table 4 for a list of insecticides, formulations, restricted entry intervals, days to grazing or harvest, and maximum amount to apply.³ See Table 4 for other trade names.

Insect	Insecticide and Formulation	Amount of Formulation per Acre	Lb. Active Ingredient per Acre	Minimum Days from Last Application to Harvest (h) or Grazing (g)	Comments
Plant Bugs (<i>Lygus</i> species)					
	carbaryl SEVIN 80S Other trade names ³	1.25-1.625 lb.	1-1.3	7	Apply insecticide as soon as buds appear or in early bloom if seed yield is important and if plant bugs appear in large numbers. DO NOT apply insecticide when honey bees are present.
	malathion FYFANON Other trade names ³	1.5-2 pt.	0.93-1.25	0	Apply insecticide as soon as buds appear or in early bloom if seed yield is important and if plant bugs appear in large numbers. DO NOT apply insecticide when honey bees are present.
Striped Ground Crickets					
<i>General Comments: Apply an insecticide before overseeding clovers if excessive numbers of crickets (more than four or five crickets per square foot) are present.</i>					
	carbaryl SEVIN 80S	1.25-1.875 lb.	1-1.5	14	Bee hazard; avoid treating crops when pollinating insects are active.
Three-Cornered Alfalfa Hoppers					
	carbaryl SEVIN 80S	1.25 lb.	1	7	May cause injury to clovers that persist in the summer. Apply when insects become abundant.

³ See Table 4 for other trade names.

Table 4. Insecticides Labeled for Use on Clover

Insecticide and Trade Name	A.I./ Formulated Product	Formulation	Restricted Entry Interval (hr)	Minimum Days from Last Application to Harvest or Grazing	Maximum Amount per Crop
carbaryl					
SEVIN 4F	4 lb./gal.	liquid suspension	12	7	1.5 qt./A/crop
SEVIN XLR PLUS	4 lb./gal.	liquid suspension	12	7	1.5 qt./A/crop
CARBARYL 4L, others	4 lb./gal.	liquid suspension	12	7	1.5 qt./A/crop
SEVIN 80S	12.8 oz./lb.	wettable powder	12	7	1.78 lb./A/crop
CARBARYL 80S, others	12.8 oz./lb.	wettable powder	12	7	1.78 lb./A/crop
SEVIN 80WSP	12.8 oz./lb.	water soluble packet	12	7	1.78 lb./A/crop
malathion					
MALATHION 5, others	5 lb./gal.	emulsifiable concentrate	12	0	
MALATHION 8, others	8 lb./gal.	emulsifiable concentrate	12	0	
MALATHION ULV, others	9.8 lb./gal.	ULV concentrate	12	0	
FYFANON	5 lb./gal.	emulsifiable concentrate	12	0	
FYFANON ULV (AG)	9.9 lb./gal.	ULV concentrate	12	7	
methoprene					
EXTINGUISH PROFESSIONAL FIRE ANT BAIT	0.50%	bait	4	0	
spinosad					
ENTRUST	12.8 oz./lb.	wettable powder	4	3(h), 0(g) graze when spray is dry	3.75 oz. (0.186 lb. a.i.)/A/year
SUCCESS	2 lb./gal.	liquid	4	Same as above	12 fl.oz. (0.186 lb. a.i.)/A/year
TRACER	4 lb./gal.	liquid	4	Same as above	6 fl.oz. (0.186 lb. a.i.)/A/year

Other products may be available. Always read the label to make sure the specific crop is listed and to determine what rate to use.

Table 5. Properties of Insecticides Used on Forages That May Affect Worker Protection and Water Quality

Common Name	Surface-Loss Potential ¹	Leaching Potential ²
carbaryl	Medium	Small
diflubenzuron	Large	***
fenoxycarb	Small	Small
hydramethylnon	Small	Small
malathion	Small	Small
methomyl	Small	Medium
methyl parathion	Medium	Small
pyriproxyfin	---	---
s-methoprene	Small	Small

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.

*** The pesticide should not leach with percolating water.

NOTE: Differences in formulations, application mode (e.g., bare ground versus crop canopy), and soil type will affect how these ratings are used.

SOURCE: Ratings are based primarily on information obtained from USDA-ARS Interim Pesticide Database, Version 1.0, by R.D. Wauchope, August 5, 1988.

WEED CONTROL

Why Control Weeds?

There are several good reasons for controlling weeds in pastures and hayfields. Weeds reduce forage yields and lower the quality of the forage that is produced. Alabama's forage grasses and legumes have been bred and selected to produce high yields of good quality forage. Many weeds, of course, are lower in quality than most forage species; consequently, weed infestation lowers the overall quality of the forage produced per acre.

Probably the best reason for controlling weeds is that they compete with desirable forages for moisture, sunlight, nutrients, and space. Forage crops have just as much trouble competing with weeds as row crops do, often resulting in lower quality forage.

Also, some weeds in the state's forages may be toxic. An important publication from Auburn University lists more than 60 species of plants growing in Alabama that can be toxic to livestock. This list includes such common weeds as crotalaria, bracken fern, and jimsonweed.

Weeds can cause other problems as well. Little barley seed heads, for example, can irritate the eyes of cattle. Some weeds have thorns or burs which scratch the legs and faces of livestock. Others, such as wild onion, wild garlic, and bitterweed, can taint milk. It is clear that weeds are undesirable.

Three Ways to Control Weeds

There are three basic ways a forage producer can discourage or kill weeds while encouraging the growth of desirable species. The first method is to provide the proper soil pH and fertility levels for forage crops—both during establishment and, later, in maintenance. Each forage species has an optimum pH and fertility level at which it grows best. Most Alabama forage plants are fairly aggressive, and they

usually compete well with weeds at adequate pH and fertility levels. At lower levels, however, they often cannot compete. Competition from desirable forage species is usually the most effective method of controlling weeds.

A second method of weed control is to periodically clip pastures or forage crops. Clipping will kill annual broadleaf weed species if they are cut below their growing point. In addition, keeping weeds clipped prevents them from producing seed and causing more problems later. The frequent, non-selective clipping exercised in hayfields explains why there are fewer weed problems in those areas than in pastures. Clipping pastures also stimulates new forage growth, which is usually of higher quality than older, more mature forage.

The third way to control weeds in forage crops is to use herbicides. Herbicides have been widely used in crops such as cotton, corn, peanuts, and soybeans, but a large percentage of Alabama's forage crops have never received a herbicide treatment. The wise use of herbicides according to label directions is safe to humans, animals, and crops and can be very effective in controlling weeds.

In order to be effective, however, the correct herbicide must be applied to combat a specific weed problem. A particular herbicide will control some, though not all, weeds. Also, the herbicide must be applied at the right time. This is usually during warm weather while weeds are actively growing but still fairly small. Finally, the correct rate of herbicide must be used. It can be as ineffective to use too much herbicide as to use too little. This happens when the weed foliage is burned on contact with the high rate of herbicide, but the plant is not killed because an insufficient amount of herbicide is circulated through the plant. Also, desirable forage species may be killed or injured by an excessively high rate of a herbicide.

Table 6. Forage Crops Weed Control

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
PERENNIAL BERMUDAGRASS PASTURES AND HAYFIELDS DURING ESTABLISHMENT		
Preemergence		
DIURON 4L (0.8-2.4 qt.) [Makhteshin-Agan] or DIREX 4L (0.8-2.4 qt.) [Griffin LLC]	diuron (0.8-2.4 lb.)	Controls annual grasses and broadleaf weeds. Apply only during establishment after sprigs are planted but before emergence of bermudagrass or weeds. Plant sprigs 2 inches deep in a well-prepared seedbed. Do not treat areas where sprigs are planted less than 2 inches deep as crop injury may result. Do not graze or cut for hay within 70 days after treatment.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
PERENNIAL BERMUDAGRASS PASTURES AND HAYFIELDS DURING ESTABLISHMENT (cont.)		
Postemergence		
2,4-D AMINE (3 pt.)	2,4-D amine (1.5 lb.)	Controls dogfennel (summer cedar), pokeweed, common mullein, jimsonweed, and horseweed (marestail). Apply from April to late June. These rates may kill all legumes. Allow legumes to reseed before treating. Dogfennel should be 12 to 24 inches when treated. If taller, mow and spray regrowth at 12 to 24 inches. Apply when daytime temperature is 75°F or above.
ESTABLISHED PERENNIAL GRASS PASTURES AND HAYFIELDS		
Postemergence		
2,4-D AMINE or 2,4-D LV ESTERS (2-4 pt.)	2,4-D (1-2 lb.)	Apply to weeds 2 to 6 inches tall. Use low rate for small weeds and high rate for larger or perennial weeds. Apply low volatile esters from October through March. Apply only non-volatile amine forms from April through late June. Herbicide will severely injure all legume species except established white clover and lespedeza at the low rate. Treat thistles before flower stalk elongation and buttercups before bloom in late winter. Prevent drift.
2,4-D LV ESTERS (2 qt.)	2,4-D LV esters (2 lb.)	Controls wild onion, wild garlic, and other winter perennial weeds. Apply in November or December and repeat in late February or March. Apply when temperature is 65°F or above. This rate may kill all legumes. It may not kill all onion or garlic plants.
BANVEL 4L (1-3 pt.) VANQUISH 4L (1-3 pt.)	dicamba (0.5-1.5 lb.)	Controls giant ragweed, dogfennel, smartweed, red sorrel, and most weeds listed for 2,4-D alone. Apply in South Alabama from mid March to late May and in North Alabama from mid April to late June. Will kill all legumes. Soybeans are particularly susceptible to drift injury.
CIMARRON 60DF (0.1-0.4 oz.) + Non-ionic Surfactant	metsulfuron methyl (0.004-0.016 lb.) + non-ionic surfactant	Controls Pensacola bahiagrass, buttercups, henbit, wild garlic, thistles, and other broadleaf weeds. Apply in a minimum of 10 gallons of spray solution per acre with ground equipment only, using flat fan spray tips. Add 2 pints of a non-ionic surfactant per 100 gallons of spray mix. Calibrate carefully and prevent overlap of spray swaths. Make one application per year. DO NOT exceed 0.4 ounce per acre as broadcast treatment or 1 ounce per acre as spot treatment. Clean sprayer thoroughly before using in other areas or crops. There are no grazing or haying restrictions associated with the use of this product. Use an 0.3-ounce-per-acre rate to control bahiagrass. Apply 5 to 7 days after first cutting to control actively growing bahiagrass. DO NOT use more than 0.15 ounce per acre when treating fescue pastures. DO NOT add more than 1 pint of a non-ionic surfactant per 100 gallons of spray mix for fescue pastures. Rainfall within 4 hours of application will reduce herbicide effectiveness. See label for use rates for different broadleaf weeds.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
ESTABLISHED PERENNIAL GRASS PASTURES AND HAYFIELDS (cont.)		
Postemergence (cont.)		
CIMARRON MAX CIMARRON [PART A] (0.1-0.3 oz.) + 2,4-D + DICAMBA [PART B] (1-4 pt.)	metsulfuron methyl (0.004-0.012 lb.) + 2,4-D + dicamba (0.36-1.4 lb.) + (0.125-0.5 lb.)	Controls a number of broadleaf weeds and Pensacola bahiagrass in established bermudagrass. Add 1 quart of non-ionic surfactant per 100 gallons of spray mix. DO NOT apply more than 0.15 ounce of metsulfuron to tall fescue. DO NOT add more than 1 pint of surfactant per 100 gallons of spray mix that will be applied to fescue.
CROSSBOW (1-4 qt.)	2,4-D ester (0.5-2 lb.) + triclopyr (0.25-1 lb.)	Controls a number of annual and biennial broadleaf weeds and a few perennials when applied in the spring or early summer to actively growing weeds. See label for specific use rate. Woody weeds such as blackberry, willow, wild rose, and alder can be controlled by spot treatment of Crossbow using a 1.5-percent solution (1.5 gallons in 100 gallons of spray solution). See label for hay and grazing restrictions.
FOREFRONT R+P (1.5-2.6 pt.)	aminopyralid (0.06-0.11 lb.) + 2,4-D (0.5-0.87 lb.)	Controls a number of annual and perennial broadleaf weeds in perennial grass pastures and hayfields. DO NOT apply in areas with desirable legumes. Delay hay harvest for 7 days and do not make a second application within 30 days of first application. DO NOT apply more than 42 fluid ounces of Forefront per acre per year. Add a non-ionic surfactant to the spray mix at the rate of 1 to 2 quarts per 100 gallons of spray mix. See label for appropriate use rate for target weeds. DO NOT use treated hay or manures off-site.
GRAZON P+D (1-4 pt.) + Non-ionic Surfactant (2 pt./100 gal.)	picloram (0.067-0.27 lb.) + 2,4-D (0.25-1 lb.) + non-ionic surfactant	Make application only to <i>permanent grass pastures and hayfields</i> . Provides broad spectrum postemergence control of broadleaf weeds and residual activity on late-germinating weeds. Use 1 to 2 pints per acre to control small annual weeds in March or April. When application is made later or when weeds are taller than 3 inches, use 3 to 4 pints per acre. A rate of 4 pints per acre should be applied on perennial weeds taller than 4 inches. Apply in 10 to 15 gallons of spray mix per acre at a spray pressure of 20 to 25 psi. See label for higher use rates for control of wild rose and prickly pear cactus. Grazon provides poor control of blackberry and dewberry briars. Read and observe all replanting and grazing restrictions on label. DO NOT plant any other crop on treated land for 2 years after treatment. Grazon P+D is a RESTRICTED USE pesticide. Residues in hay and manure can cause off-site problems. See label for use restrictions.
MILESTONE (3-7 fl.oz.) + Non-ionic surfactant	aminopyralid (0.05-0.11 lb.) + non-ionic surfactant	Controls annual and perennial broadleaf weeds in perennial grass pastures and hayfields. DO NOT apply in areas with desirable legumes. Add a non-ionic surfactant to the spray mix at the rate of 1 to 2 quarts per 100 gallons of spray mix. See label for appropriate use rate for target weeds. DO NOT use treated hay or manures off-site.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
ESTABLISHED PERENNIAL GRASS PASTURES AND HAYFIELDS (cont.)		
Postemergence (cont.)		
OVERDRIVE 76WG (4-8 oz.)	diflufenzopyr (0.005-0.01 lb.) + dicamba (0.015-0.03 lb.) + Non-ionic surfactant	Controls annual and perennial broadleaf weeds. Use low rate for annuals and high rate for biennials and perennials. Add a non-ionic surfactant to spray mix at the rate of 1 quart per 100 gallons of spray mix. May be tank mixed with other herbicides to increase spectrum of weeds controlled. Overdrive is rainfast within 4 hours of application.
PASTUREGARD (3-8 pt.)	triclopyr (0.56-1.5 lb.) + fluroxypyr (0.19-0.5 lb.) + Non-ionic surfactant	Controls a number of broadleaf weeds and woody plants such as camphorweed, maypop, honeylocust, locust, and blackberries in permanent grass pastures and hayfields. Apply when weeds are small and actively growing. For woody plants, make applications when new leaves are fully expanded and terminal growth has slowed. After mowing, allow at least 9 to 12 months of regrowth before herbicide application. Add a non-ionic surfactant to the spray mix at the rate of 1 to 2 quarts per 100 gallons of spray mix. See label for weeds controlled and specific herbicide use rates.
REDEEM R+P (1.5-4 pt.)	triclopyr (0.42-1.125 lb.) + clopyralid (0.14-0.375 lb.) + Non-ionic Surfactant	Controls a broad spectrum of broadleaf weeds on established perennial grass pastures. A non-ionic surfactant at a rate of 1 to 2 quarts per 100 gallons of spray mix should be used when applying Redeem. Use higher surfactant rate when applying low spray volumes per acre. DO NOT apply more than 4 pints per acre per year. See label for specific rate for target weeds.
REMEDY (2 pt.)	triclopyr (1 lb.)	Provides control of many woody plants, such as blackberry and wild rose, as well as herbaceous broadleaf weeds. Make application using more than 10 gallons of spray solution per acre when target weeds are actively growing. Remedy may be mixed with 2,4-D ester for control of difficult weeds. See label for hay and grazing restrictions.
ROUNDUP WEATHER- MAX (11 fl.oz.)	glyphosate (0.47 lb.)	Apply immediately after the first bermudagrass hay cutting when bermudagrass has not yet initiated new growth. Controls crabgrass, sandbur, and seedling johnsongrass. DO NOT graze or cut for hay for 28 days after application. Make only one application per year. DO NOT apply after the first cutting if field previously received a glyphosate application during the winter months.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
ESTABLISHED PERENNIAL GRASS PASTURES AND HAYFIELDS (cont.)		
Postemergence (cont.)		
SURMOUNT (1.5-6 pt.)	picloram (0.19-0.89 lb.) + fluroxypyr (0.18-0.68 lb.) + Non-ionic surfactant	Controls a number of woody plants and broadleaf weeds, such as prickly pear, milkweed, horsenettle, tallowtree, wild rose, and osage orange in permanent grass pastures and hayfields. For woody plants, make application to new growth at least 4 feet tall and when new leaves are fully expanded and terminal growth has slowed. After mowing, allow at least 9 to 12 months of regrowth before herbicides application. On broadleaf weeds, apply when weeds are small and actively growing using the lower use rates. Add a non-ionic surfactant to spray mix at the rate of 1 to 2 quarts per 100 gallons of spray mix. See label for weeds controlled and specific herbicide use rates and directions. Surmount is a RESTRICTED USE pesticide.
VELPAR 75 DF (0.9-1.5 lb.) or VELPAR 2L (2.75-4.5 pt.)	hexazinone (0.67-1.12 lb.)	Controls smutgrass in established bermudagrass and bahiagrass pastures and hayfields. Use low rate on coarse, sandy soils and high rate on heavy, clay soils. Make ONLY one application per year using a ground-driven boom sprayer calibrated to deliver a minimum of 25 gallons per acre. Avoid excessive application rates or overlapping of spray swath. Make application when soil moisture is good, humidity is high, and when air temperature is above 80°F. Smutgrass should be treated in the spring or early summer when the new growth is 2 inches tall. Treated forage grasses should recover from the temporary burn or yellowing in 2 to 3 weeks. Fertilization soon after herbicide application helps pasture species recover. Treated forage grasses may not be grazed or harvested for hay until 60 days after application.
WEEDMASTER BRASH (2-4 pt.)	2,4-D (0.75-1.5 lb.) + dicamba (0.25-0.5 lb.)	Controls dogfennel, smartweed, pigweed, and all weeds listed for 2,4-D alone. Use high rate for horsenettle suppression and when other weeds are 12 to 24 inches tall. Apply in South Alabama from mid March to late May and in North Alabama from mid April to late June. Will kill all legumes.
DORMANT BERMUDAGRASS PASTURES		
GRAMOXONE INTEON 2 (16 fl.oz.) or FIRESTORM 3 (11 fl.oz.) + Non-ionic Surfactant	paraquat (0.25 lb.) + non-ionic surfactant	Controls little barley and other annual grasses and broadleaf weeds. Apply during late winter or early spring (February to March) but before "green-up." Bermudagrass must be dormant. Add 2 pints of non-ionic surfactant per 100 gallons of spray solution. For control of little barley, apply before seed heads emerge. DO NOT spray where winter annual forages or clovers are present in the pasture. DO NOT graze or cut hay until 40 days after treatment. Gramoxone and Firestorm are RESTRICTED USE pesticides.
ROUNDUP WEATHERMAX (11 fl.oz.)	glyphosate (0.47 lb.)	Apply in mid to late winter to dormant bermudagrass pastures and hayfields to control little barley, cheat, henbit, and Italian ryegrass (suppression). Bermudagrass not dormant at time of treatment will be injured, and green-up may be delayed up to 4 weeks. DO NOT graze or cut for hay for 60 days after application.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
FORAGE SORGHUMS		
Postemergence		
2,4-D AMINE (0.5-1 pt.)	2,4-D amine (0.25-0.5 lb.)	Controls annual broadleaf weeds. May be applied over-the-top when weeds are small and when sorghum plants are 4 to 6 inches tall. DO NOT spray over-the-top when sorghum plants are less than 4 inches tall or more than 10 inches tall.
ATRAZINE 90WDG AATREX 90WDG (2.2 lb.) or ATRAZINE 4L AATREX 4L (2 qt.)	atrazine (2 lb.)	Controls annual broadleaf weeds and grasses. Apply atrazine after sorghum has emerged but before weeds are 1.5 inches tall. DO NOT use on sandy loam or coarser soil textures. DO NOT graze or feed forage within 21 days after treatment. Atrazine is a RESTRICTED USE pesticide.
FESCUE CONVERSION*		
GRAMOXONE INTEON 2 (1-2 pt.) or FIRESTORM 3 (11-21 fl.oz.) + Non-ionic Surfactant	paraquat (0.25-0.5 lb.) + non-ionic surfactant	Controls or kills endophyte-infected fescue. Fall Application: Gramoxone: Apply 1 to 2 pints per acre followed by a second application of 1 to 2 pints per acre in 10 to 21 days, if necessary. Firestorm: Apply 11 to 21 fluid ounces per acre followed by a second application of 11 to 21 fluid ounces per acre in 10 to 21 days, if necessary. Spring Application: Gramoxone: Apply 2 pints per acre followed by a second application of 1 to 2 pints per acre in 10 to 21 days, if necessary. Firestorm: Apply 21 fluid ounces per acre followed by a second application of 11 to 21 fluid ounces per acre in 10 to 21 days, if necessary. Add a non-ionic surfactant to each spray solution at the rate of 1 quart per 100 gallons. In all cases, apply prior to planting endophyte-free fescue seed. DO NOT graze new planting for 60 days after last application or until new growth is at least 6 inches tall. Gramoxone and Firestorm are RESTRICTED USE pesticides.
ROUNDUP WEATHERMAX (22 fl.oz.)	glyphosate (0.9 lb.)	Apply Roundup in the fall to endophyte-infected fescue 3 to 4 weeks prior to planting fungus-free fescue. Apply Roundup at 22 fluid ounces per acre at planting to control escaped fescue and weeds. New growth 6 to 12 inches tall should be treated with 3 to 10 gallons of spray solution per acre.
PASTURE RENOVATION		
GRAMOXONE INTEON 2 (16 fl.oz.) or FIRESTORM 3 (11 floz.) + Non-ionic Surfactant	paraquat (0.25 lb.) + non-ionic surfactant	Provides chemical frost of bermudagrass sod. Apply in late summer or early fall to suppress bermudagrass sod that does not exceed 3 inches in height. Apply prior to or at time of seeding winter annuals. Apply 20 to 30 gallons of water per acre. DO NOT graze area until 60 days after treatment or until winter annual seedlings are 9 inches tall. Add 1 quart of non-ionic surfactant per 100 gallons of spray solution. Gramoxone Inteon and Firestorm are RESTRICTED USE pesticides.

* NOTE: Endophyte-infected fescue should not be allowed to make seed during the calendar year when non-infected seed is to be planted. Otherwise, the new non-infected fescue field will contain volunteer infected plants.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
WINTER GRAZING/GRAIN PRODUCTION (Wheat, Barley, Rye, Oats, Ryegrass)		
2,4-D AMINE (0.5-2 pt.)	2,4-D amine (0.25-1 lb.)	Controls winter broadleaf weeds such as wild mustard. Apply from late October to early March. Apply after grains are tillered with five or more leaves and are 5 to 8 inches tall. DO NOT exceed 1 pint per acre on oats. DO NOT apply before the fully tillered stage or from early boot through the milk stage. Treatment can be applied when the grain is in the dough stage to control weeds that will interfere with harvest. Use the high rate ONLY where some crop injury can be tolerated.
SERICA LESPEDEZA		
Preplant Incorporated		
EPTAM 7E (3.5 pt.)	EPTC (3 lb.)	Controls annual grasses and small-seeded broadleaf weeds and provides nutsedge suppression. Apply just prior to planting. Thoroughly incorporate into upper 3 inches of soil (disk 4 to 6 inches deep) immediately after application (within 30 minutes). Some temporary injury to Sericea seedlings may occur if conditions for germination and growth are not optimum.
RED CLOVER AND LADINO CLOVER		
Preplant Incorporated		
EPTAM 7E (3.5 pt.)	EPTC (3 lb.)	Controls annual grasses and small-seeded broadleaf weeds and provides nutsedge suppression. Apply just prior to planting. Thoroughly incorporate into upper 3 inches of soil (disk 4 to 6 inches deep) immediately after application (within 30 minutes). DO NOT use if grass nurse crop is to be planted. DO NOT use on white Dutch clover. Some temporary injury to alfalfa and clover seedlings should be expected if conditions for germination and growth are not optimum.
SEEDLING RED CLOVER AND LADINO CLOVER		
Postemergence		
BUTYRAC 200 (1-3 qt.)	2,4-DB amine (0.5-1.5 lb.)	Controls most annual and some perennial broadleaf weeds. For seedling legumes with two or more true leaves, apply when weeds are less than 3 inches tall. DO NOT graze or feed seedling legumes to livestock within 60 days of application. DO NOT use on clovers not specified or on legumes grown for seed. DO NOT apply when legumes are under heat or moisture stress. Use lower rate for red clover.
KERB 50W (1-3 lb.)	pronamide (0.5-1.5 lb.)	Controls winter grasses and broadleaf weeds. Apply from November through February. Use ONLY on established legume plantings or on new plantings after the legume has reached the trifoliolate stage. DO NOT use preplant or preemergence or before the trifoliolate leaf stage because injury to the legume will result. DO NOT graze or harvest for forage within 120 days after application. Kerb is a RESTRICTED USE pesticide.

Table 7. Estimated Effectiveness of Herbicides for Forage Crops on Selected Weeds and Characteristics That May Affect Water Quality ¹

WEEDS	NEW SEEDLINGS		ESTABLISHED	FORAGE SORGHUMS	
	Legume Only		FORAGE STANDS	Legume Only	
	Eptam (PPI)	2,4-DB (POST)	Kerb (POST)	2,4-D amine (POST)	Atrazine (POST)
GRASSES					
Crabgrass	E	P	F	P	F
Fall Panicum	E	P	P	P	F
Foxtails	E	P	P	P	G
Signalgrass	F	P	P	P	P
Texas Panicum	F	P	P	P	P
SEDGES					
Nutsedge	G	P	P	P	P
BROADLEAVES					
Bitterweed	P	F	P	G	P
Curly Dock	P	P	P	F	P
Dogfennel	P	F	P	G	P
Field Buttercup	P	F	P	G	P
Field Dodder	P	P	G	P	P
Goldenrod	P	P	P	F	P
Horsenettle	P	P	P	F	P
Horseweed	F	P	P	E	E
Musk Thistle	P	F	P	E	P
Plantains	P	G	P	E	E
Pokeberry	P	P	P	F	P
Redroot Pigweed	G	E	P	E	E
Shepherdspurse	P	E	G	E	E
Smartweed	P	P	P	F	E
Wild Garlic	P	P	P	F	F
Wild Mustard	F	E	P	E	E
Surface-Loss Potential²	M	S	L	M	M
Leaching Potential³	M	M	S	M	M

continued

¹Ratings are based on observations of research plots and field use under average weather conditions for several years by weed control workers in Alabama and the South. Leaching and surface-loss potential are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience.

²The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff.

³The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone into deep percolation.

KEY TO CONTROL RATINGS AND ABBREVIATIONS

E = Excellent control; G = Good control; F = Fair control; P = Poor control.

S = Small; M = Medium; L = Large. PPI = Preplant Incorporated; Post = Postemergence.

Table 7. Estimated Effectiveness of Herbicides for Forage Crops on Selected Weeds and Characteristics That May Affect Water Quality¹ (cont.)

WEEDS	ESTABLISHED FORAGE STANDS				
	Established Grass				
	2,4-D LVE (POST)	Banvel (POST)	Cimarron (POST)	Grazon P+D (POST)	Milestone (POST)
GRASSES					
Crabgrass	P	P	P	P	P
Fall Panicum	P	P	P	P	P
Foxtails	P	P	P	P	P
Signalgrass	P	P	P	P	P
Texas Panicum	P	P	P	P	P
SEDGES					
Nutsedge	P	P	P	P	P
BROADLEAVES					
Bitterweed	E	E	E	E	E
Curly Dock	F	E	G	G	G
Dogfennel	F	G	P	E	P
Field Buttercup	E	E	G	E	G
Field Dodder	P	P	P	P	P
Goldenrod	F	G	P	G	F
Horsenettle	P	F-P	F-P	F-G	G
Horseweed	E	E	G	E	E
Ironweed	F	F	F	P	E
Musk Thistle	E	E	E	E	E
Plantains	E	E	E	--	P
Pokeberry	F	G	--	E	--
Prickly Sida	P	P	P	P	G
Redroot Pigweed	F	E	G	E	G
Shepherdspurse	E	E	--	E	--
Smartweed	F	E	G	E	G
Wild Garlic	E	E	G	F-G	P
Wild Mustard	F	E	G	E	P
Surface-Loss Potential²	M	L	S	L	S
Leaching Potential³	S	S	S	L	S

continued

¹Ratings are based on observations of research plots and field use under average weather conditions for several years by weed control workers in Alabama and the South. Leaching and surface-loss potential are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience.

²The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff.

³The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone into deep percolation.

KEY TO CONTROL RATINGS AND ABBREVIATIONS

E = Excellent control; G = Good control; F = Fair control; P = Poor control; -- = Information not available.

S = Small; M = Medium; L = Large. POST = Postemergence.

Table 7. Estimated Effectiveness of Herbicides for Forage Crops on Selected Weeds and Characteristics That May Affect Water Quality¹ (cont.)

WEEDS	ESTABLISHED FORAGE STANDS				
	Overdrive (POST)	Pasturegard (POST)	Remedy (POST)	Surmount (POST)	Weedmaster (POST)
GRASSES			P		
Crabgrass	P	P	P	P	P
Fall Panicum	P	P	P	P	P
Foxtails	P	P	P	P	P
Signalgrass	P	P	P	P	P
Texas Panicum	P	P	P	P	P
SEDGES					
Nutsedge	P	P	P	P	P
BROADLEAVES					
Bitterweed	G	E	G	E	E
Curly Dock	E	F	E	E	E
Dogfennel	G	F	F	G	E
Field Buttercup	E	F	G	G	E
Field Dodder	P	P	P	P	P
Goldenrod	F	G	G	F-G	G
Horsenettle	P	F	P	E	P
Horseweed	G	G	G	E	E
Ironweed	--	B	F	--	P
Musk Thistle	G	--	G	E	E
Plantains	P	G	E	--	E
Pokeberry	--	P	F	G	G
Prickly Sida	--	P	--	P	P
Redroot Pigweed	G	P	G	E	E
Shepherdspurse	G	G	G	G	E
Smartweed	G	F	G	E	E
Wild Garlic	F	P	--	P	F
Wild Mustard	F	G	E	E	E
Surface-Loss Potential²	--	--	L	--	S
Leaching Potential³	--	--	M	--	L

¹Ratings are based on observations of research plots and field use under average weather conditions for several years by weed control workers in Alabama and the South. Leaching and surface-loss potential are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience.

²The surface-loss potential indicates the tendency of the pesticide to move with sediment in runoff.

³The leaching potential indicates the tendency of the pesticide to move in solution with water and to leach below the root zone into deep percolation.

KEY TO CONTROL RATINGS AND ABBREVIATIONS

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Table 8. Hay and Grazing Restrictions

Herbicide	Waiting Period, in Days			
	Grazing Beef/Non-Dairy Animals	Grazing Dairy Animals	Delay in Hay Cutting	Removal Ahead of Slaughter
2,4-D ¹	0-7	7-14	30	7
2,4-DB ²	60	60	60	--
Atrazine	21	21	21	--
Banvel ³	0	7-40	37-70	30
Cimarron	0	0	0	0
Crossbow ⁴	0	14	7	3
Eptam	45	45	45	--
Forefront	0	0	7	0
Gramoxone/Firestorm	--	--	40	--
Grazon P+D	0	7	30	3
Kerb	120	120	120	120
Milestone	0	0	0	0
Overdrive	0	0	0	0
Pasturegard	0	next season	14	3
Redeem	0	14	7 ⁵	3
Remedy ⁴	0	14	7	3
Surmount	0	14	7-14	3
Velpar	37	37	37	--
Weedmaster/Brash	0	7	37	30

¹Refer to product label for exact use restrictions.

²Waiting period is 30 days for established legume stands.

³For use rates of 1 to 4 pints per acre. See label for more lengthy time restrictions associated with higher use rates.

⁴For use rates higher than 2 gallons per acre of Crossbow or 2 quarts per acre of Remedy. See label for more lengthy time restrictions.

⁵Hay to be fed to lactating dairy animals should not be harvested until next growing season.

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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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