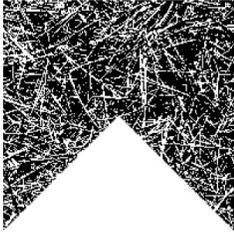


IPM



Commercial Vegetables

Insect, Disease, and Weed Control Recommendations
for 2008

INSECT AND DISEASE CONTROL

Current insecticide, miticide, and disease control recommendations for commercial vegetable crops in Alabama can be found in the **2008 Vegetable Crop Handbook for the Southeastern U.S.** Copies of this handbook are available through your county Extension office or can be downloaded by going the following link: http://www.aces.edu/dept/com_veg/. Scroll down towards the bottom of the page and look for the link **2008 Vegetable Crop Handbook for the Southeastern U.S.** and select it. You will need Adobe Reader to open the file.

The handbook contains the latest recommendations for fungicides, nematicides, fumigants, and herbicides as well as discussions and recommendations for all aspects of commer-

cial vegetable production including variety and fertilizer recommendations. Depending on the crop and pest, there may be other crop protectants or strategies available to aid in their management. In addition to conventional management methods for insect and mite pests, there are alternative management practices offered for several pests on many vegetable crops.

The handbook is a collaborative effort by Extension specialists and researchers from land grant institutions in the southeastern United States. The management practices presented in the handbook are considered the preferred or best management practices (BMPs).

Insect and Disease Control section prepared by Joseph Kemble, *Extension Horticulturist*, Associate Professor, Horticulture, Auburn University; and Edward J. Sikora, *Extension Plant Pathologist*, Professor, Entomology and Plant Pathology, Auburn University.

WEED CONTROL

Table 1. Commercial Vegetables Weed Control

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
BURNDOWN TREATMENTS (Prior to planting vegetables on bare ground)		
GLYPHOSATE (several brands)	glyphosate (1-5 lb.)	Apply before crop emergence to control annual and some perennial weeds (higher rates).
GRAMOXONE MAX FIRESTORM or GRAMOXONE INTEON (See label for rates)	paraquat (0.5-1.0 lb.)	Apply before crop emergence to control annual weeds.
BEANS, Dry, Lima, and Snap		
Preplant Incorporated		
COMMAND 3ME (0.4-0.67 pt.)	clomazone (0.15-0.25 lb.)	Make a single broadcast application prior to planting. Controls or suppresses annual grasses and some broadleaf weeds. DO NOT apply within 45 days of harvest. NOTE RECROP RESTRICTIONS on label prior to using this product. Use lower rate on coarse (sandy) soils.
PENDIMAX 3.3E (1.2-3.6 pt.) or PROWL H ₂ O (1-3 pt.)	pendimethalin (0.5-1.5 lb.)	Apply prior to planting and incorporate. See application Comments for Sonalan, below. Controls weed spectrum similar to that controlled by Treflan and Sonalan.
PURSUIT DG (0.7-1.0 oz.)	imazethapyr (0.33-0.04 lb.)	Apply preplant incorporated or after planting for control of some broadleaf weeds and suppression of annual grasses. May be tank mixed with grass herbicides such as Treflan or Prowl.
SONALAN 3EC (1.5-2.5 pt.)	ethalfluralin (0.5-1 lb.)	DRY BEANS ONLY. Apply prior to planting and thoroughly incorporate to a depth of 1 to 2 inches within 24 hours after application. Set the disc or other incorporation equipment to a depth of 3 to 4 inches in order to get effective incorporation of 1 to 2 inches. Controls annual grasses and some small-seeded broadleaf weeds.
TREFLAN 4EC or TRIFLURALIN EC or TRILIN (1-1.5 pt.)	trifluralin (0.5-0.75 lb.)	Apply prior to planting. Thoroughly incorporate to a depth of 1 to 2 inches within 8 hours after application. Controls annual grasses and some small-seeded broadleaf weeds. Use low rate on light soils. Injury may occur when cold, wet weather and seedling disease are present during seedling establishment.
Preemergence		
DUAL MAGNUM (1-1.33 pt.)	metolachlor (0.95-1.25 lb.)	Apply to soil surface after planting for control of annual grasses and some broadleaf weeds. Requires rainfall or sprinkler irrigation for activation. Use low rate on light soils.
SANDEA DG (0.5-1 oz.)	halosulfuron (0.024-0.048 lb.)	Apply after planting but before ground cracking. Use low rate on sandy soils. Controls yellow and purple nutsedge and pigweed. See label for insecticide interactions and recropping interval.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
BEANS, Dry, Lima, and Snap (cont.)		
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
ASSURE (6-12 fl.oz.) + Crop Oil Concentrate	quizalofop (0.04-0.08 lb.) + crop oil concentrate	For dry and snap beans only. Apply with 2 pints of crop oil concentrate per acre in 10 to 20 gallons spray volume for control of annual and perennial grasses. DO NOT apply within 15 days of harvest.
BASAGRAN 4 (1.5-2 pt.)	bentazon (0.75-1 lb.)	For use on beans (dry or succulent) as an early postemergence application after the third trifoliolate leaf has fully expanded. Basagran provides excellent control of cocklebur up to 10 inches tall. Fair to good control can be obtained of prickly sida (teaweed), dayflower, coffee senna, hemp sesbania, bristly starbur, and common ragweed up to 3 inches tall. DO NOT apply more than 1 quart of Basagran per acre in one season. DO NOT apply within 30 days of harvest.
POAST 1.5E (1-1.5 pt.) + Crop Oil Concentrate	sethoxydim (0.2-0.3 lb.) + crop oil concentrate	Apply with 2 pints of crop oil concentrate per acre in a spray volume of 10 to 20 gallons per acre for control of emerged annual and perennial grasses. DO NOT apply within 15 days of harvest.
COLE CROPS (Broccoli, Brussels Sprouts, Cabbage, and Cauliflower)		
Preplant Incorporated		
PREFAR 4E (5-6 qt.)	bensulide (4-6 lb.)	Apply before planting and incorporate to a depth of 1 to 2 inches or apply immediately after planting and apply sprinkler irrigation within 24 hours. Controls annual grasses and some small-seeded broadleaf weeds.
TREFLAN 4EC or TRIFLURALIN EC or TRILIN (1-2 pt.)	trifluralin (0.5-1 lb.)	Apply before seeding or transplanting and incorporate into soil according to label instructions. Controls annual grasses and some small-seeded broadleaf weeds. Use low rate on light soils. DO NOT use more than 1 pint of Treflan on any soil type where cole crops are direct seeded. Injury may occur when cold, wet weather and seedling disease area are present during seedling establishment.
Preemergence		
DACTHAL W-75 (6-14 lb.) or DACTHAL FLOWABLE (6-14 pt.)	DCPA (4.5-10.5 lb.)	Use low rate on sandy soils. Controls or suppresses annual grasses and some small-seeded broadleaf weeds. Apply prior to weed emergence. Can be incorporated prior to transplanting or sprayed directly over transplants.
DEVRINOL DG (2-4 lb.)	naproamide (1-2 lb.)	Apply to weed-free soil surface immediately after seeding or transplanting. Rainfall or sprinkler irrigation will be required within 24 hours. Controls annual grasses and small-seeded broadleaf weeds.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
COLE CROPS (Broccoli, Brussels Sprouts, Cabbage, and Cauliflower) (cont.)		
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
POAST 1.5E (1-1.5 pt.) + Crop Oil Concentrate	sethoxydim (0.2-0.3 lb.) + crop oil concentrate	Apply to cabbage, broccoli, or cauliflower for control of emerged annual grasses. Add 2 pints crop oil concentrate per acre; apply in a spray volume of 10 to 20 gallons per acre. DO NOT apply more than 3 pints per acre per season. DO NOT apply within 30 days of harvest. Thoroughly clean spray tank before use.
SELECT 2E (6-8 oz) + Crop Oil Concentrate	clethodim (0.09-0.13 lb.) + crop oil concentrate	Apply postemergence for control of emerged annual and perennial grasses in cole crops. Add crop oil concentrate at 1 percent by volume. DO NOT apply within 30 days of harvest.
CORN, Sweet		
Preemergence		
AATREX NINE-0 (1.8-2.2 lb.) or AATREX or ATRAZINE 4L (3.2-4 pt.)	atrazine (1.6-2 lb.)	Apply any time from immediately after up to a few weeks after planting but before weeds are 1.5 inches tall. Excellent control for most annual broadleaf weeds and good control of annual grasses (except fall panicum, Texas panicum, and signalgrass). The maximum rate on soils classified as highly erodible is 1.6 pounds per acre. On soils that are not highly erodible or where 30 percent or more plant residue is present, the maximum rate is 2 pounds active. Atrazine is a RESTRICTED USE pesticide.
DUAL MAGNUM (1-1.33 pt.)	metolachlor (0.95-1.25 lb.)	Apply to soil surface during or immediately after planting. Use lower rate on light soils. Best results are obtained when adequate moisture occurs within 5 to 7 days after application. Under dry conditions, shallow cultivation may improve control. Controls most annual grasses (except johnsongrass and Texas panicum) and small-seeded broadleaf weeds. Will not control cocklebur and morningglories.
INTRRO 4EC (2-3.25 qt.)	alachlor (2-3.25 lb.)	Same as for Dual Magnum, above. Intrro is a RESTRICTED USE pesticide.
OUTLOOK 6 (10-18 fl.oz.)	dimethenamid (0.47-0.84 lb.)	Controls most annual grasses and some broadleaf weeds. Can be applied preplant incorporated, preemergence, or early postemergence, but before weeds emerge. Use lower rates on coarse-textured (sandy) soils. May be tank mixed with atrazine.
PRINCEP CALIBER 90 (2.2-3.3 lb.) or PRINCEP or SIMAZINE 4L (4-6 pt.)	simazine (2-3 lb.)	Apply to soil surface immediately after planting. Controls most annual broadleaf weeds and annual grasses (except fall panicum, Texas panicum, johnsongrass, and signalgrass). Requires slightly more moisture for activation than atrazine and may persist slightly longer. NOTE: Several tank mixes are labeled and can be used where a broader spectrum of weed control is needed. Read each label for mixing instructions and rates when using the following tank mixes: INTRRO + ATRAZINE; AATREX + PRINCEP; DUAL + ATRAZINE

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
CORN, Sweet (cont.)		
Postemergence		
2,4-D AMINE (0.5-1 pt.)	2,4-D amine (0.25-0.5 lb.)	May be applied over-the-top of corn that is 4 to 8 inches tall. After corn is taller than 8 inches, apply high rate as a DIRECTED SPRAY to base of corn plants. Corn plants may become brittle after treating with 2,4-D. DO NOT cultivate for 7 to 10 days after application. DO NOT apply when corn is silking. DO NOT use in vicinity of susceptible plants such as tomatoes, grapes, or pecans since injury may occur from drift.
AIM 2EC (0.5 fl.oz.) +	carfentrazone (0.008 lb.) +	Apply over-the-top or directed to corn from emergence to the eight-leaf stage for control of several broadleaf weed species.
Non-ionic Surfactant (2 pt./100 gal.)	non-ionic surfactant	
BASAGRAN 4 (1.5-2 pt.)	bentazon (0.75-1 lb.)	May be applied over-the-top of corn to weeds that are small and actively growing. Corn is tolerant at all stages. DO NOT apply more than 4 pints per acre in one season. A tank mix of Basagran + atrazine is registered for postemergence use in sweet corn. See Basagran label for specific instructions.
SANDEA DG (0.66-1.33 oz.) +	halosulfuron (0.5-1 oz.) +	Controls many annual broadleaf weeds and nutsedge. Apply over-the-top or directed from spike to layby stages. DO NOT plant wheat for 3 months or soybeans for 10 months after application.
Non-ionic Surfactant (2 pt./100 gal.) or	non-ionic surfactant	
Crop Oil Concentrate (1 gal./100 gal.)	crop oil concentrate	
CUCURBITS (Cantaloupes, Cucumbers, Pumpkins, Squash, and Watermelons)		
Preplant Incorporated		
PREFAR 4E (5-6 qt.)	bensulide (5-6 lb.)	Apply and incorporate thoroughly into the soil according to product label. Controls annual grasses and some small-seeded broadleaf weeds. See label for rotation restrictions.
PREFAR 4E (4-6 qt.) +	bensulide (4-6 lb.)	DO NOT use on squash or pumpkins. Tank mix, apply, and incorporate lightly (0.5-1 inch) just prior to planting. Use lower rate on light, sandy soils and higher rate on heavier soils. Incorporation is not necessary if the application is followed by immediate irrigation. Combination controls a broader spectrum of weeds than either herbicide used alone.
ALANAP (4-8 qt.)	naptalam (2-4 lb.)	
Preemergence		
ALANAP (4-8 qt.)	naptalam (2-4 lb.)	DO NOT use on squash or pumpkins. Apply to weed-free surface immediately after planting. A second application, postemergence to crop, may be made to weed-free soil just as the crop is starting to vine. Alanap can also be used as a postemergence treatment immediately after transplanting these crops. Use lower rate on light sandy soils and higher rate on heavier soils. Weed control may be erratic if rainfall is lacking or if excessive rainfall occurs.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
CUCURBITS (Cantaloupes, Cucumbers, Pumpkins, Squash, and Watermelons) (cont.)		
Preemergence (cont.)		
DACTHAL W-75 (6-14 lb.) or DACTHAL FLOWABLE (6-14 pt.)	DCPA (4.5-10.5 lb.)	DO NOT use on pumpkins. Apply only when plants have four to five true leaves, are well established, and growing conditions favor good growth. If weeds have emerged, crop should be cultivated and weeded prior to application.
COMMAND 3ME (0.4-0.67 pt.)	clomazone (0.15-0.25 lb.)	DO NOT use on Jack-o'-lantern pumpkins. Make a single broadcast application prior to planting or transplanting. Controls or suppresses annual grasses and some broadleaf weeds. DO NOT apply within 45 days of harvest. NOTE RECROP RESTRICTIONS on label prior to using product. CONSULT LABEL for list of cultivars that are not tolerant to this product. Higher rates may be used on certain varieties.
CURBIT 3EC (3-4.5 pt.)	ethalfluralin (1.1-1.7 lb.)	DO NOT use on squash or pumpkins. Apply to weed-free soil surface at seeding or no later than 2 days after seeding. A single 0.5-inch rainfall or irrigation is needed within 5 days of application to activate the herbicide. Controls annual grasses and small-seeded broadleaf weeds.
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
POAST 1.5E (1-1.5 pt.)	sethoxydim (0.2-0.3 lb.)	Apply Poast with 2 pints crop oil concentrate in 10 to 20 gallons of spray solution per acre to control actively growing annual or perennial grasses in cucurbits. DO NOT apply more than 3 pints per acre per season. DO NOT apply within 14 days of harvest. Clean spray tank before use.
SANDEA DG (0.5-1 oz.) + Non-ionic Surfactant or Crop Oil Concentrate	halosulfuron (0.023-0.047 lb.) 1 pt./25 gal. spray mix crop oil concentrate	Sandea may be applied either preemergence or postemergence for suppression or control of nutsedge and several annual broadleaf weeds in cucumbers, cantaloupes, and honeydew melons grown on bare ground or under plastic. Preemergence only in watermelons. Better nutsedge control is obtained with foliar application. DO NOT apply postemergence until crop has reached the three- to five-true leaf stage. May be applied to row middles ONLY for pumpkins and squash . Sandea may be applied preemergence after planting direct-seeded watermelons but before ground cracking at a rate of 0.5 to 0.75 ounces per acre, or it may be applied before transplanting into a treated area. DO NOT apply to crops treated with soil-applied organophosphate insecticides. DO NOT apply a foliar organophosphate insecticide within 21 days before or 7 days after any Sandea application. Read the label for pre-harvest intervals and rotation restrictions.
SELECT 2E (6-8 oz.) + Crop Oil Concentrate	clethodim (0.09-0.013 lb.) + crop oil concentrate	Apply postemergence for control of emerged annual and perennial grasses in cole crops. Add crop oil concentrate at 1 percent by volume. DO NOT apply within 14 days of harvest.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
GREENS (Collards, Turnips, Mustard, Kale, and Spinach)		
Preplant Incorporated		
TREFLAN 4EC or TRIFLURALIN EC or TRILIN (1-1.5 pt.)	trifluralin (0.5-0.75 lb.)	DO NOT use on spinach. Apply preplant and thoroughly incorporate to a depth of 1 to 2 inches within 8 hours. Controls annual grasses and some small-seeded broadleaf weeds. Use low rate on light soils. Injury may occur when cold, wet weather and seedling disease are present during seedling establishment.
Preemergence		
DACTHAL W-75 (6-14 lb.) or DACTHAL FLOWABLE (6-14 pt.)	DCPA (4.5-10.5 lb.)	Use low rate on sandy soils. Apply uniformly to soil as a spray at time of seeding. Can be preplant incorporated. Controls or suppresses annual grasses and some small-seeded broadleaf weeds.
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
POAST 1.5E (1-1.5 pt.) + Crop Oil Concentrate	sethoxydim (0.2-0.3 lb.) + crop oil concentrate	Apply with 2 pints crop oil concentrate in 10 to 20 gallons of spray solution per acre to control actively growing grasses. DO NOT apply more than 3 pints per acre per season. DO NOT apply within 15 days of harvest for spinach and 30 days for other greens. Clean spray tank before use.
STINGER 3E (0.25-0.5 pt.)	clopyralid (0.09-0.19 lb.)	Apply postemergence to small weeds in spinach and turnip ONLY . Especially effective on legume weeds such as clover, vetch, etc. DO NOT apply within 30 days of harvest if turnip roots will be used or within 15 days if only turnip tops will be used.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
OKRA		
Preplant Incorporated		
TREFLAN 4EC or TRIFLURALIN EC or TRILIN (1-2 pt.)	trifluralin (0.5-1 lb.)	Apply prior to planting. Thoroughly incorporate to a depth of 1 to 2 inches within 8 hours after application. Controls annual grasses and some small-seeded broadleaf weeds. Use low rate on light soils. Injury may occur when cold, wet weather and seedling disease are present during seedling establishment.
Postemergence		
AIM 2EC (0.5-1.6 oz.)	carfentrazone (0.008-0.025 lb.)	Apply as a hooded spray to row middles. DO NOT allow herbicide to contact the crop. Controls some annual broadleaf weeds including morningglory and pigweed. Add non-ionic surfactant at 2 pints per 100 gallons of spray mix. May be mixed with glyphosate to increase weed spectrum.
ONIONS, Seeded, Sets, and Transplants		
Preemergence		
PROWL 3.3EC (1.2-3.6 pt.) or PROWL H ₂ O (1-3 pt.)	pendimethalin (0.5-1.5 lb.)	For annual grass and small-seeded broadleaf control. Apply to direct-seeded and transplanted dry bulb onions when onions have two to nine true leaves. DO NOT apply to green (bunching) onions. Will not control emerged weeds. Rainfall or overhead irrigation is needed within 7 days for optimum performance.
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
BUCTRIL 4EC (0.5-0.75 pt.)	bromoxynil (0.25-0.375 lb.)	For dry bulb onions. Apply in at least 50 gallons of water per acre when onions have two to five true leaves. Soil and onion foliage must be dry at time of application. Concentrated sprays kill onions. DO NOT add surfactants. Controls broadleaf weeds.
FUSILADE DX (0.38-0.75 pt.) + Crop Oil Concentrate	fluazifop (0.094-0.375 lb.) + crop oil concentrate	For bulb onions only. Apply over the top for control of emerged annual grasses. Add 2 pints crop oil concentrate per acre. DO NOT apply within 45 days of harvest.
GOAL 2XL (0.5 pt.)	oxyfluorfen (0.125 lb.)	Use as a postemergence spray to weeds after onions have at least two fully developed true leaves. Some injury may occur and will be more severe under cool wet conditions. DO NOT apply more than 2 pints per acre per year.
POAST 1.5E (1-1.5 pt.)	sethoxydim (0.2-0.3 lb.)	Apply to emerged grasses. Add 2 pints crop oil concentrate per acre. DO NOT apply on days that are very hot and humid. DO NOT apply within 30 days of harvest.
SELECT 2EC (0.25-1 pt.)	clethodim (0.1-0.25 lb.)	Apply as a directed or over-the-top spray to control actively growing grasses. Add 2 pints crop oil concentrate per acre to spray mix. DO NOT apply within 20 days of harvest.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
PEAS, Southern		
Preplant Incorporated		
PROWL 3.3 EC (1.2-3.6 pt.) or PROWL H ₂ O (1-3 pt.)	pendimethalin (0.5-1.5 lb.)	Apply and incorporate to a depth of 1 to 2 inches. Controls small-seeded broadleaf weeds and annual grasses. Use low rate on sandy soils and high rate on fine-textured soils. Injury may occur under cool, wet conditions.
TREFLAN 4EC or TRIFLURALIN EC or TRILIN (1-2 pt.)	trifluralin (0.5-1 lb.)	Apply and incorporate thoroughly before planting. Use low rate on coarse-textured soils. See Treflan under Beans for additional comments.
Preemergence		
COMMAND 3ME (1.3 pt.)	clomazone (0.5 lb.)	Make a single broadcast application after planting but before weeds emerge. Controls or suppresses annual grasses and some broadleaf weeds. DO NOT apply within 45 days of harvest. NOTE RECROP RESTRICTIONS on label prior to using this product. Use lower rate on coarse (sandy) soils.
DACTHAL W-75 (6-14 lb.) or DACTHAL FLOWABLE (6-14 pt.)	DCPA (4.5-10.5 lb.)	Use low rate on sandy soils. Controls or suppresses annual grasses and some small-seeded broadleaf weeds. Apply prior to weed emergence. Can be incorporated prior to planting.
DUAL MAGNUM (1-1.33 pt.)	metolachlor (0.95-1.25 lb.)	Apply to soil surface after planting for control of annual grasses and some broadleaf weeds. Requires rainfall or sprinkler irrigation for activation. Use low rate on light soils.
PURSUIT DG (1.44 oz.)	imazethapyr (0.063 lb.)	Apply preplant incorporated or after planting for control of some broadleaf weeds and suppression of annual grasses. May be tank mixed with grass herbicide.
Postemergence		
AIM 2EC (0.5-1.6 oz.)	carfentrazone (0.008-0.025 lb.)	Apply as a hooded spray to row middles. DO NOT allow herbicide to contact the crop. Controls some annual broadleaf weeds including morningglory and pigweed. Add non-ionic surfactant at 2 pints per 100 gallons of spray mix. May be mixed with glyphosate to increase weed spectrum.
ASSURE (6-12 fl.oz.) + Crop Oil Concentrate	quizalofop (0.04-0.08 lb.) + crop oil concentrate	Apply with 2 pints of crop oil concentrate per acre in 10 to 20 gallons spray volume for control of annual and perennial grasses. DO NOT apply within 15 days of harvest.
BASAGRAN 4 (1.5-2 pt.)	bentazon (0.75-1 lb.)	Apply after peas have three pairs of leaves. Even at the tolerant stages, yellowing, bronzing, and speckling may occur under certain conditions. Basagran provides excellent control of cocklebur up to 10 inches tall. Fair to good control can be obtained of prickly sida (teaweed), dayflower, coffee senna, hemp sesbania, bristly starbur, and common ragweed up to 3 inches tall. DO NOT apply more than 1 quart of Basagran per acre in one season. DO NOT apply within 30 days of harvest.
POAST 1.5E (1-1.5 pt.) + Crop Oil Concentrate	sethoxydim (0.2-0.3 lb.) + crop oil concentrate	Apply with 2 pints of crop oil concentrate per acre in a spray volume of 10 to 20 gallons per acre for control of emerged annual or perennial grasses. DO NOT apply within 15 days of harvest.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
POTATOES, Irish		
Preplant Incorporated		
EPTAM 7E See Comments.	EPTC (3 lb.)	Apply to well-prepared soil for control of many annual grasses, small-seeded broadleaf weeds, and yellow and purple nutsedges. Broadcast 1.75 pints Eptam 7E or 15 pounds Eptam 10G (1.5 pounds active) per broadcast acre over planted crop. Hill up IMMEDIATELY with appropriate equipment to cover with 3 to 4 inches of soil. Moving treated soil from middles during hilling will result in 3 pounds active rate per acre over the row. Another method is to treat an 18- to 20-inch band over the row using a rate of 3.5 pints Eptam 7E or 30 pounds Eptam 10G (3 pounds active) per broadcast acre. Hill or bed immediately after application with appropriate equipment to cover with 3 to 4 inches of soil. CAUTION: DO NOT fold in the band treatment. Be sure to adjust rate to particular band width. For example, 18-inch bands on 36-inch rows or 20-inch bands on 40-inch rows use 1.75 pints of Eptam 7E or 15 pounds of Eptam 10G per crop acre.
Preemergence		
DACTHAL W-75 (6-14 lb.) or DACTHAL FLOWABLE (6-14 pt.)	D CPA (4.5-10.5 lb.)	Apply after planting. If tops of beds are to be dragged off, apply after drag-off. Controls or suppresses annual grasses and some small-seeded broadleaf weeds. Needs moisture for activation. Will not control emerged weeds.
DUAL MAGNUM (1-2 pt.)	metolachlor (0.95-1.9 lb.)	Apply after final hilling or drag-off but before potatoes emerge. Controls some annual grasses and broadleaf weeds. Plant seed at least 2 inches deep. Needs moisture for activation. May delay maturity and/or reduce yield of Superior and other early maturing varieties if cold, wet soil conditions occur after treatment. If a band application is used, be sure to adjust rate.
PROWL H ₂ O (1-3 pt.)	pendimethalin (0.5-1.5 lb.)	Apply after planting but before drag-off. Controls or suppresses annual grasses and small-seeded broadleaf weeds. Must be activated by rainfall or sprinkler irrigation.
SENCOR DF (0.67-1.33 lb.) or SENCOR 4 (0.5-2 pt.)	metribuzin (0.5-1.5 lb.)	Apply preemergence after final hilling or drag-off but before potatoes emerge. May be used postemergence except on early maturing smooth-skinned, white varieties and all red-skinned varieties. With postemergence applications, add a non-ionic surfactant at 1 pint per 25 gallons of spray mix. Controls many broadleaf weeds and some annual grasses. Needs moisture for activation. Use lower rate on coarse-textured soils. Excessive rainfall will shorten length of weed control. Treat a small portion of crop the first year before adopting as a field-wide practice since varieties vary in their tolerance to metribuzin. DO NOT use on sands or loamy sands containing less than 1.5-percent organic matter or on any other soils containing less than 0.5-percent organic matter. Use lower rate on sandy soils. Can be used as an overlay where Eptam has been applied preplant incorporated. If a band application is used, be sure to adjust rate. See label for varietal tolerance, preharvest interval, and rotation restrictions.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
POTATOES, Irish (cont.)		
Preemergence (cont.)		
LOROX 50DF (1.5-2.5 lb.) or LINEX 4L (1.5-2.5 pt.)	linuron (0.75-1.25 lb.)	Apply after final hilling or drag-off but before potatoes emerge. Controls some annual grasses and broadleaf weeds. Plant seed at least 2 inches deep. Needs moisture for activation. If seedling weeds emerge prior to application, add surfactant for postemergence control. DO NOT use Lorox where potatoes have emerged. Can be used as overlay where Eptam has been applied preplant incorporated. If a band application is used, be sure to adjust rate. DO NOT use on soils lighter than sandy loam.
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
MATRIX 25DF (1-1.5 oz.)	rimsulfuron (0.016-0.023 lb.)	May be applied to the soil surface following planting. Or apply after potatoes emerge until 60 days prior to harvest. May be mixed with other registered herbicides. Check label for tank mix combinations. Provides control or suppression of several grasses and broadleaf weeds. With postemergence applications, add non-ionic surfactant at 2 pints per 100 gallons of spray mix.
POAST 1.5E (1-1.5 pt.) + Crop Oil Concentrate	sethoxydim (0.2-0.3 lb.) + crop oil concentrate	Apply over-the-top or as a directed spray to control emerged grasses. Apply with 2 pints of crop oil concentrate in 10 to 20 gallons of spray solution per acre. DO NOT apply within 30 days of harvest.
SELECT 2E (6-16 oz.) + Crop Oil Concentrate	clethodim (0.1-0.25 lb.) + crop oil concentrate	Apply over-the-top or as a directed spray to control emerged grasses. Apply with 2 pints of crop oil concentrate in 10 to 20 gallons of spray solution per acre. DO NOT apply within 30 days of harvest.
SWEET POTATOES		
Preemergence		
COMMAND 3ME (1.3-3.3 pt.)	clomazone (1-1.25 lb.)	Make a single ground application prior to or just after transplanting. Controls most annual grasses and several broadleaf weeds including ragweed, prickly sida, and common cocklebur. Obey all precautionary statements regarding distances to towns, subdivisions, and sensitive crops. A 125-day preharvest interval must be observed for rates over 3.3 pints. A 95-day preharvest interval can be used for lower rates. NOTE RECROP RESTRICTIONS on the label prior to using this product.
DACTHAL W-75 or DACTHAL FLOWABLE (6-14 pt.)	DCPA	Apply after transplanting to control or suppress annual grasses and small-seeded broadleaf weeds. May be applied directly over transplants. Layby applications can be made up to 6 weeks after transplanting. If weeds are present the crop should be weeded or cultivated prior to application. Needs moisture for activation.
VALOR SX (2.5 oz.)	flumioxazin (0.08 lb.)	Apply 2 to 5 days before transplanting to the pre-formed row. Minimize movement of soil during transplanting. Check product label for variety restrictions. Provides soil activity on several annual weeds.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
SWEET POTATOES (cont.)		
Postemergence		
AIM 2EC (0.5-2 fl.oz.) +	carfentrazone (0.008-0.031 lb.) +	Apply to row middles only. Apply using a hooded sprayer and keep spray off of crop. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. May be mixed with glyphosate to increase weed spectrum. Keep spray off of crop.
Non-ionic Surfactant	non-ionic surfactant	
FUSILADE DX (0.75 pt.) +	fluazifop (0.2 lb.) +	Apply as a directed or over-the-top spray to control actively growing grasses. Add 2 pints crop oil concentrate or 1 pint non-ionic surfactant per acre and apply in a spray volume of 15 to 25 gallons per acre. Use crop oil concentrate for perennial grasses. DO NOT apply more than 6 pints per acre per year. DO NOT apply within 55 days of harvest.
Crop Oil Concentrate (2 pt.) or	crop oil concentrate	
Non-ionic Surfactant (1 pt.)	non-ionic surfactant	
POAST 1.5E (1-1.5 pt.) +	sethoxydim (0.2-0.3 lb.) +	Apply over-the-top to control emerged annual and perennial grasses. Apply with 2 pints crop oil concentrate per acre in 10 to 20 gallons of spray solution. DO NOT apply within 30 days of harvest.
Crop Oil Concentrate	crop oil concentrate	
SELECT 2EC (0.25-1 pt.) +	clethodim (0.1-0.25 lb.) +	Apply as a directed or over-the-top spray to control actively growing grasses. Add 2 pints per acre crop oil concentrate to the spray mix. DO NOT apply within 20 days of harvest.
Crop Oil Concentrate	crop oil concentrate	
TOMATOES and PEPPERS, Transplants and Direct-Seeded		
Preplant Incorporated		
DUAL MAGNUM (1.0-1.33 pt.)	metolachlor (0.9-1.2 lb.)	Apply preplant incorporated or preplant before transplanting tomatoes. May also be applied post-directed to transplants after the first settling rain. DO NOT use in cool, wet conditions. DO NOT apply within 90 days of harvest.
SENCOR DF (0.33-0.67 lb.)	metribuzin (0.25-0.5 lb.)	Use ONLY on transplant tomatoes. Apply immediately before transplanting and shallowly incorporate less than 2 inches. Sencor will control such weeds as lambsquarter, purslane, pigweed, and goosegrass. This application may be made alone or in combination with Treflan. See label for specific rates.
TREFLAN 4EC or TRIFLURALIN EC or TRILIN (1-2 pt.)	trifluralin (0.5-1 lb.)	For direct-seeded tomatoes, apply Treflan at blocking and thinning as a broadcast spray directed to the soil between the rows and beneath the plants and incorporate. For transplant tomatoes and peppers, apply and incorporate before transplanting. DO NOT apply after transplanting. See Treflan under Beans for additional comments.
Preemergence		
COMMAND 3ME (0.67-2.67 pt.)	clomazone (0.25-1 lb.)	DO NOT USE on tomatoes or banana peppers. Make a single broadcast application prior to planting or transplanting. DO NOT apply within 45 days of harvest. Use low rate on coarse soils.

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
TOMATOES and PEPPERS, Transplants and Direct-Seeded (cont.)		
Preemergence (cont.)		
MATRIX (1-1.5 oz.)	rimsulfuron (0.016-0.023 lb.)	May be applied to the soil surface prior to transplanting or early postemergence after planting. Provides control or suppression of several grasses and broadleaf weeds. Add non-ionic surfactant at 2 pints per 100 gallons of spray mix with postemergence applications. DO NOT apply within 60 days of harvest.
SANDEA DG (0.5-1 oz.)	halosulfuron (0.024-0.048 lb.)	TOMATOES ONLY. Apply pre-transplant to bare ground before planting tomatoes. May be applied post-transplant until first bloom. Controls nutsedge and some broadleaf weeds. Sandea may be applied to ROW MIDDLES ONLY in peppers. (DO NOT allow spray to contact crop.) Add a non-ionic surfactant at 2 pints per 100 gallons of spray solution for this application. See label for insecticide interactions and recropping interval. DO NOT apply within 30 days of harvest.
Postemergence		
AIM 2EC (0.5-2 fl.oz.) + Non-ionic Surfactant	carfentrazone (0.008-0.031 lb.) + non-ionic surfactant	Apply to row middles only using a hooded sprayer. Add a non-ionic surfactant at 2 pints per 100 gallons spray solution. Keep spray off of crop.
DACTHAL W-75 (6-14 lb.) or DACTHAL FLOWABLE (6-14 pt.)	D CPA (4.5-10.5 lb.)	Apply 4 to 6 weeks after transplanting to control or suppress annual grasses and some small-seeded broadleaf weeds. May be sprayed directly over transplants. If weeds have emerged, the crop should be cultivated or weeded prior to application. Needs moisture for activation.
ENVOKE 75WDG (0.1-0.2 oz.) + Non-ionic Surfactant	trifloxysulfuron (0.024-0.48 lb.) + non-ionic surfactant	TOMATOES ONLY. Apply as a directed spray only to transplants that have been in the ground at least 2 weeks but before fruit set. Add a non-ionic surfactant at 2 pints per 100 gallons of spray mix.
GRAMOXONE MAX (1.25-2.5 pt.) or GRAMOXONE INTEON (2-4 pt.) + Non-ionic Surfactant	paraquat (0.47-0.94 lb.) + non-ionic surfactant	Apply as a directed, shielded spray to control emerged weeds and grasses in row middles. DO NOT allow spray to contact tomato plants. Add a non-ionic surfactant at 2 pints per 100 gallons spray mix.
POAST 1.5E (1-2 pt.) + Crop Oil Concentrate	sethoxydim (0.2-0.4 lb.) + crop oil concentrate	Apply as directed or over-the-top spray to control actively growing grasses in tomatoes and bell peppers. Add 2 pints crop oil concentrate per acre and apply in a spray volume of 10 to 20 gallons per acre. DO NOT apply more than 4.5 pints per season. DO NOT apply within 20 days of harvest. Thoroughly clean spray tank before applying Poast.
SELECT 2EC (6-8 oz.) + Crop Oil Concentrate	clethodim (0.1-0.13 lb.) + crop oil concentrate	Apply as a directed or over-the-top spray to control actively growing grasses. Add 2 pints crop oil concentrate per acre to spray mix. DO NOT apply within 20 days of harvest.
SENCOR 4L (0.5-1 pt.) or SENCOR DF (0.33-0.67 lb.)	metribuzin (0.25-0.5 lb.)	Use ONLY on tomatoes. Apply as a directed spray to established tomatoes for control of many broadleaf and grassy weeds. Allow at least 14 days between multiple applications. DO NOT apply more than 1.33 pounds of 75DF or 2 pints of 4L in total applications (PRE + POST).

Herbicide Trade Name (Rate/Acre Broadcast)	Herbicide Common Name (Active Herbicide/Acre)	Comments
CROPPING SYSTEMS		
ROUNDUP or TOUCHDOWN or GLYPHOSATE (other generic forms available)	glyphosate (1-4 lb.) glyphosate	Apply postharvest to vegetable fields as a foliar spray for control of rhizome johnsongrass and bermudagrass prior to planting beans (all types), peas (all types), and okra. Standard grass-control herbicides must be used for control of seedling grasses in the following crop (spring application). Allow a minimum of 10 days before disking or mowing treated area. Apply in 10 to 20 gallons of spray solution per acre. DO NOT graze treated area. DO NOT plant subsequent crops other than those on the label for 1 year following application. If the formulation used does not contain an adjuvant, then add a high quality non-ionic surfactant (greater than 80 percent active) at the rate of 1 pint per 25 gallons of spray mix.

Table 2. Herbicide Classification by Mode of Action

Mode of Action	Herbicide
AMINO ACID SYNTHESIS INHIBITOR	Roundup
CELL MEMBRANE DISRUPTERS	Buctril, Gramoxone
GROWTH REGULATOR	2,4-D
LIPID SYNTHESIS INHIBITORS	Fusilade, Poast
PHOTOSYNTHETIC INHIBITORS	Atrazine, Lexone/Sencor, Lorox, Princep
PIGMENT SYNTHESIS INHIBITOR	Command
ROOT GROWTH INHIBITORS	Curbit/Sonalan, Devrinol, Dual, Eradicane, Lasso, Prefar, Prowl, Sutan, Tillam, Treflan

Weed Control section prepared by Michael G. Patterson, *Extension Weed Scientist*, Professor, Agronomy and Soils, Auburn University; Joe Kemble, *Extension Horticulturist*, Associate Professor, Horticulture, Auburn University; Robert Boozer, *Area Extension Research Horticulturist*, Alabama Cooperative Extension System, Alabama A&M University and Auburn University; and John W. Everest, former *Extension Weed Scientist*, Professor Emeritus and Visiting Professor, Agronomy and Soils, Auburn University.

Table 3. Estimated Effectiveness of Recommended Herbicide Treatments on Important Weeds Infesting Vegetables in Alabama and Properties That May Affect Water Quality¹

WEEDS	HERBICIDES							
	Eptam (PPI)	Prowl, Treflan (PPI)	Pursuit (PPI)	Sonalan (PPI)	Tillam (PPI)	Alanap (PRE)	Atrazine (PRE)	Command (PRE)
GRASSES								
Crabgrass	9	9	5	9	9	6	8	7
Crowfootgrass	8	9	4	9	8	5	7	6
Fall Panicum	8	8	5	8	8	3	4	5
Goosegrass	8	9	5	9	8	5	6	6
Johnsongrass (rhizomes)	4	4	0	2	4	0	0	2
Johnsongrass (seedlings)	8	8	5	8	8	3	4	5
Purple Nutsedge	7	0	7	0	7	0	0	1
Yellow Nutsedge	7	0	7	0	7	0	0	1
BROADLEAVES								
Bristly Starbur	0	0	5	0	0	2	8	2
Cocklebur	2	0	6	0	1	4	8	5
Florida Pusley	8	9	5	9	8	7	9	4
Lambsquarter	7	9	5	8	7	7	9	7
Morningglory	4	2	6	4	4	6	8	4
Pigweed	8	8	7	8	8	7	9	2
Prickly Sida	4	0	7	0	2	5	9	7
Sicklepod	4	0	0	0	4	2	8	1
Spotted Spurge	0	1	6	0	0	4	9	4
Surface-Loss Potential²	M	M	S	M	M	S	M	M
Leaching Potential³	M	S	S	S	M	M	M	M

continued

¹ Ratings 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 potentials are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience.

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

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

KEY TO CONTROL RATINGS AND ABBREVIATIONS

Ratings on a scale of 0 to 10: 0 = No control; 10 = 100% control.

PPI = Preplant Incorporated; PRE = Preemergence.

S = Small; M = Medium.

Table 3. Estimated Effectiveness of Recommended Herbicide Treatments on Important Weeds Infesting Vegetables in Alabama and Properties That May Affect Water Quality¹ (cont.)

WEEDS	HERBICIDES								
	Dacthal (PRE)	Devrinol (PRE)	Dual, Lasso (PRE)	Lexone/ Sencor (PRE)	Lorox (PRE)	Prefar (PRE)	Princep (PRE)	Valor (PRE)	Envoke (POST)
GRASSES									
Crabgrass	8	8	9	8	8	8	8	8	0
Crowfootgrass	6	7	9	7	7	8	8	7	0
Fall Panicum	6	7	9	5	6	6	6	8	1
Goosegrass	7	2	9	7	7	8	8	1	0
Johnsongrass (rhizomes)	0	2	0	0	0	0	0	0	0
Johnsongrass (seedlings)	7	8	5	5	4	6	4	7	5
Purple Nutsedge	0	2	1	0	0	0	0	0	7
Yellow Nutsedge	0	3	6	0	1	0	0	1	7
BROADLEAVES									
Bristly Starbur	0	---	0	5	4	0	7	---	8
Cocklebur	0	3	0	5	4	0	7	2	8
Florida Pusley	8	8	9	8	8	8	9	9	6
Lambsquarter	8	9	6	9	9	7	9	9	4
Morningglory	0	3	0	4	3	0	7	9	8
Pigweed	7	2	9	9	9	7	9	9	7
Prickly Sida	0	2	4	9	6	0	9	9	1
Sicklepod	0	3	4	7	5	0	7	1	8
Spotted Spurge	7	3	4	5	3	0	9	8	--
Surface-Loss Potential²	M	---	M	M	L	L	M	M	M
Leaching Potential³	M	---	M	M	M	S	M	S	S

continued

¹ Ratings 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 potentials are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience.

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

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

KEY TO CONTROL RATINGS AND ABBREVIATIONS

Ratings on a scale of 0 to 10: 0 = No control; 10 = 100% control.

PRE = Preemergence.

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

Table 3. Estimated Effectiveness of Recommended Herbicide Treatments on Important Weeds Infesting Vegetables in Alabama and Properties That May Affect Water Quality¹ (cont.)

WEEDS	HERBICIDES								
	2,4-D (POST)	Aim (HOOD)	Basagran (POST)	Fusilade, Select (POST)	Boa, Gramoxone (POST)	Poast (POST)	Sandea (POST)	Stinger (POST)	Roundup (PPF)
GRASSES									
Crabgrass	0	0	0	8	5	9	0	0	7
Crowfootgrass	0	0	0	8	8	9	0	0	9
Fall Panicum	0	0	0	8	8	8	0	0	9
Goosegrass	0	0	0	8	8	9	0	0	9
Johnsongrass (rhizomes)	0	0	0	9	0	7	0	0	8
Johnsongrass (seedlings)	0	0	0	8	8	8	0	0	9
Purple Nutsedge	0	0	0	0	3	0	8	0	4
Yellow Nutsedge	0	0	0	0	3	0	8	0	4
BROADLEAVES									
Bristly Starbur	7	--	7	0	8	0	--	---	8
Cocklebur	9	6	9	0	7	0	8	9	9
Florida Pusley	7	0	5	0	8	0	--	---	8
Lambsquarter	9	9	--	0	9	0	--	---	9
Morningglory	9	8	4	0	7	0	4	---	9
Pigweed	9	6	5	0	9	0	9	---	9
Prickly Sida	6	5	7	0	7	0	--	---	8
Sicklepod	8	0	0	0	9	0	1	9	9
Spotted Spurge	5	5	0	0	7	0	--	---	8
Surface-Loss Potential²	S	S	S	M	S	M	M	---	S
Leaching Potential³	M	S	M	S	S	S	M	---	S

¹ Ratings 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 potentials are based in part on herbicide chemical characteristics and pesticide behavior models developed by USDA scientists as well as on field experience.

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

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

KEY TO CONTROL RATINGS AND ABBREVIATIONS

Ratings on a scale of 0 to 10: 0 = No control; 10 = 100% control; -- = Information not available.

POST = Postemergence; PPF = Preplant Foliar.

S = Small; M = Medium.

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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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