COTTON: *COTTON INSECT CONTROL*

Phillip M. Roberts, Extension Entomologist and Mike Toews, Research Entomologist

PEST	INSECTICIDE	IRAC GROUP	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Aphid (Cotton)	*acetamiprid* Assail 30SG	4A	1.5-2.5 oz	0.028-0.047	12 hours/ 28 days	Apply when aphids are abundant and seedling leaves are severely curled, or when "honeydew" is present in older cotton. A naturally occurring fungal disease often eliminates the need for sprays, but this epidemic occurs only after aphid populations reach high levels and tends to be less effective late in the season.
	dicrotophos Bidrin 8	1B	4.0-8.0 oz	0.25-0.50	6 days/ 30 days	
	flonicamid Carbine 50WG	9C	1.4-2.8 oz	0.044-0.088	12 hours/ 30 days	
	imidacloprid Admire Pro 4.6	4A	0.9-1.7 oz	0.032-0.061	12 hours/ 14 days	
	sulfoxaflor Transform 50 WG	4C	0.75-1.0 oz	0.023-0.031	24 hours/ 14 days	
	thiamethoxam Centric 40 WG	4A	1.25-2.0 oz	0.031-0.05	12 hours/ 21 days	
Beet Armyworm	*emamectin benzoate* Denim 0.16	6	6-8 oz	0.0075-0.01	12 hours/ 21 days	Apply when 10% of squares, or terminals are damaged, 10% of blooms are damaged and/or infested, or when 10 active "hits" are observed per 300 row feet. Beet armyworms may infest Palmer amaranth and move to cotton as larvae develop; Bt cottons will not control large beet armyworms moving from Palmer amaranth.
	diflubenzuron Dimilin 2L	15	4-8 oz	0.0625-0.125	12 hours/ 14 days	
	flubendiamide Belt 4SC	28	2-3 oz	0.0625-0.094	12 hours/ 28 days	
	indoxacarb Steward 1.25EC	22	9.2-11.3 oz	0.09-0.11	12 hours/ 14 days	
	methoxyfenozide Intrepid 2F	18	4 oz	0.0625	4 hours/ 14 days	
	novaluron Diamond 0.83EC	15	6-12 oz	0.039-0.077	12 hours/ 30 days	
	chlorantraniliprole Prevathon 0.43	28	14-27 oz	0.047-0.09	4 hours/ 21 days	
	spinosad Blackhawk	5	2.4-3.2 oz	0.054-0.072	4 hours/ 28 days	
Bollworm/ Tobacco Budworm	**NON-PYRETHROIDS**					On non-Bt cotton apply when 8 small larvae are found per 100 terminals prior to first insecticide treatment, or when 5 larvae are found after first spray. Due to the threat of pyrethroid resistance, non-pyrethroid insecticides are recommended for control of tobacco budworm. Resistance management: Do not treat successive generations with insecticides that have the same mode of action. Bt Cotton containing the Bollgard II or WideStrike Bt genes are effective tools for use in bollworm and tobacco budworm management programs. Apply insecticide on Bt cotton when 8 larvae (1/4 inch or greater in length) are found per 100 plants.
	emamectin benzoate Denim 0.16	6	8-12 oz	0.01-0.015	12 hours/ 21 days	
	flubendiamide Belt 4SC	28	2-3 oz	0.063-0.094	12 hours/ 28 days	
	indoxacarb Steward 1.25EC	22	11.3 oz	0.11	12 hours/ 14 days	
	methomyl Lannate LV 2.4	1A	1.5-2 pt	0.45-0.6	72 hours/ 15 days	
	profenofos Curacron 8E	1B	0.75-1 pt	0.75-1.0	48 hours/ 30 days	

PEST	INSECTICIDE	IRAC GROUP	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Bollworm/ Tobacco Budworm (continued)	**NON-PYRETHROIDS**					
	chlorantraniliprole Prevathon 0.43	28	 14-27 oz	0.047-0.09	4 hours/ 21 days	
	spinosad Blackhawk	5	 2.4-3.2 oz	0.054-0.072	4 hours/ 28 days	
	PYRETHROIDS					
	alpha-cypermethrin Fastac 0.83	3A	2.6-3.6 oz	0.017-0.023	12 hours/ 14 days	
	beta-cyfluthrin Baythroid XL 1	3A	 1.6-2.6 oz	0.0125-0.02	12 hours/ 0 days	Tobacco budworm is resistant to pyrethroid insecticides. Pyrethroids should not be used for control of tobacco budworm.
	bifenthrin Brigade 2EC Discipline 2EC Fanfare 2EC	3A	 2.6-6.4 oz 2.6-6.4 oz 2.6-6.4 oz	 0.04-0.1 0.04-0.1 0.04-0.1	12 hours/ 14 days	
	cypermethrin Ammo 2.5EC Up-Cyde 2.5EC	3A	 2-5 oz 2-5 oz	 0.04-0.1 0.04-0.1	12 hours/ 14 days	
	esfenvalerate Asana XL 0.66	3A	 5.8-9.6 oz	0.03-0.0495	12 hours/ 21 days	
	gamma-cyhalothrin Prolex 1.25 Declare 1.25	3A	 1.28-2.05 oz 1.28-2.05 oz	 0.0125-0.02 0.0125-0.02	24 hours/ 21 days	
	lambda-cyhalothrin Karate w/ Zeon 2.08 Karate EC 1 Silencer 1	3A	 1.6-2.56 oz 3.2-5.12 oz 3.2-5.12 oz	 0.025-0.04 0.025-0.04 0.025-0.04	24 hours/ 21 days	
	zeta-cypermethrin Mustang Max 0.8	3A	 2.64-3.6 oz	0.0165-0.0225	12 hours/ 14 days	
Bollworm/Tobacco Budworm (ovicides)	*methomyl* Lannate LV 2.4	1A	 0.4-0.75 pt	0.12-0.22	72 hours/ 15 days	Apply in a tank-mix with a larvacide when large numbers of eggs are present.
	profenofos Curacron 8E	1B	 0.125-0.25 pt	0.125-0.25	48 hours/ 30 days	
Cutworm (seedling cotton)	*acephate* Orthene 97 Orthene 90S Acephate 97 Acephate 90	1B	 0.75 lb 0.80 lb 0.75 lb 0.80 lb	 0.72 0.72 0.72 0.72	24 hours/ 21 days	Apply when stand is threatened. Spot treatment is often adequate. Pyrethroids provide good control of cutworms at low rates. See insecticide label for use rate.
	chlorpyrifos Lorsban 4E Chlorpyrifos 4E	1B	 1.5-2 pt 1.5-2 pt	 0.75-1.0 0.75-1.0	24 hours/ 14 days	
	Pyrethroids	3A	see remarks			

PEST	INSECTICIDE	IRAC GROUP	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Fall Armyworm	*chlorantraniliprole* Prevathon 0.43	28	14-27 oz	0.047-0.09	4 hours/ 21 days	Apply when 15 larvae are found per 100 plants. Control of large larvae (›½ inch in length) is difficult; higher rates should be used.
	diflubenzuron Dimilin 2L	15	4-8 oz	0.0625-0.125	12 hours/ 14 days	
	emamectin benzoate Denim 0.16	6	8-12 oz	0.01-0.015	12 hours/ 21 days	
	flubendiamide Belt 4SC	28	2-3 oz	0.0625-0.094	12 hours/ 28 days	
	indoxacarb Steward 1.25EC	22	9.2-11.3 oz	0.09-0.11	12 hours/ 14 days	
	methomyl Lannate LV 2.4	1A	1.5-2 pt	0.45-0.6	72 hours/ 15 days	
	methoxyfenozide Intrepid 2F	18	4-10 oz	0.0625-0.156	4 hours/ 14 days	
	novaluron Diamond 0.83EC	15	6-12 oz	0.039-0.077	12 hours/ 30 days	
	profenofos Curacron 8E	1B	0.75-1.0 pt	0.75-1.0	48 hours/ 30 days	
	Pyrethroid	3A	See remarks			Pyrethroids at high rates provide good suppression of larvae less than 1/8 inch in length.
	spinosad Blackhawk	5	2.4-3.2 oz	0.054-0.072	4 hours/ 28 days	
Plant Bugs and Fleahoppers	*acephate* Orthene 97 Orthene 90S Acephate 97 Acephate 90	1B	 0.25-0.50 lb 0.25-0.50 lb 0.25-0.50 lb 0.25-0.50 lb	 0.24-0.49 0.225-0.45 0.24-0.49 0.225-0.45	24 hours/ 21 days	Apply insecticide when plants are retaining less than 80% of pinhead squares and numerous plant bugs are observed. Sweep nets and drop cloths may also be used to monitor plant bugs. Sweep nets (15 inch in diameter) are an effective tool for monitoring adult plant bug populations. Drop cloths are more effective for monitoring immatures. Thresholds: First 2 weeks of squaring: Sweep Net: 8 plant bugs per 100 sweeps. Drop Cloth: 1 plant bug per 6 row feet. Third week of squaring through bloom: Sweep Net: 8 plant bugs per 100 sweeps. Drop Cloth: 1 plant bug per 6 row feet.
	dicrotophos Bidrin 8	1B	4-8 oz	0.25-0.5	6 days/ 30 days	
	imidacloprid Admire Pro 4.6	4A	0.9-1.7 oz	0.032-0.061	12 hours/ 14 days	
	novaluron Diamond 0.83EC	15	9-12 oz	0.058-0.077	12 hours/ 30 days	Diamond is an insect growth regulator and will not control adults.
	oxamyl Vydate C-LV 3.77	1A	8.5-17 oz	0.25-0.50	48 hours/ 14 days	
	sulfoxaflor Transform 50 WG	4C	1.5-2.25 oz	0.047-0.071	24 hours/ 14 days	
	thiamethoxam Centric 40 WG	4A	2 oz	0.05	12 hours/ 21 days	

PEST	INSECTICIDE	IRAC GROUP	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Soybean Looper	*emamectin benzoate* Denim 0.16	6	8-12 oz	0.01-0.015	12 hours/ 21 days	Treatment is necessary when soybean loopers threaten to defoliate cotton with immature bolls.
	flubendiamide Belt 4SC	28	2-3 oz	0.0625-0.094	12 hours/ 28 days	
	indoxacarb Steward 1.25EC	22	6.7-9.2 oz	0.065-0.09	12 hours/ 14 days	
	methoxyfenozide Intrepid 2F	18	4-10 oz	0.0625-0.156	4 hours/ 14 days	
	novaluron Diamond 0.83EC	15	6-12 oz	0.039-0.077	12 hours/ 30 days	
	spinosad Blackhawk	5	2.4-3.2 oz	0.052-0.072	4 hours/ 28 days	
Spider Mites	*abamectin* Agri-Mek 0.15	6	8-16 oz	0.009-0.018	12 hours/ 20 days	Apply when mites are spreading. Spot treatment may be adequate. Thorough coverage is essential; a second application may be necessary. In fields where mites are observed, conservation of beneficial insects should be a priority; insecticides prone to flare mites should be avoided when targeting other pests. *Bifenthrin only provides suppression of mites.
	*bifenthrin** Brigade 2EC Discipline 2EC Fanfare 2EC	3A	 6.4 oz 6.4 oz 6.4 oz	 0.1 0.1 0.1	12 hours/ 14 days	
	etoxazole Zeal 72 WSP	10B	0.66-1.0 oz	0.03-0.045	12 hours/ 28 days	
	fepyroximate Portal 0.4	21A	16-32 oz	0.05-0.1	12 hours/ 14 days	
	propargite Comite II 6	12C	1.25-2.25 pt	0.937-1.687	6 hours/ 50 days	
	profenofos Curacron 8E	1B	0.5-0.75 pt	0.5-0.75	48 hours/ 30 days	
	spiromesifen Oberon 2SC	23	8-16 oz	0.125-0.25	12 hours/ 30 days	
Stink Bugs	**ORGANOPHOSPHATES**					The boll injury threshold should be adjusted up or down based on the number of susceptible bolls present. Use a 10-15% boll injury threshold during weeks 3-5 of bloom (numerous susceptible bolls present), 20% during weeks 2 and 6, and 30%(+) during weeks 7(+) of bloom (fewer susceptible bolls present). Detection of 1 stink bug per 6 row feet would also justify treatment. Higher stink bug populations are typically observed on late planted cotton compared with early planted cotton. Organophosphates should be used for control of brown stink bugs.
	acephate Orthene 97 Orthene 90S Acephate 97 Acephate 90	1B	 0.75 lb 0.8 lb 0.75 lb 0.8 lb	 0.72 0.72 0.72 0.72	24 hours/ 21 days	
	dicrotophos Bidrin 8	1B	4-8 oz	0.25-0.5	6 days/ 30 days	

PEST	INSECTICIDE	IRAC GROUP	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Stink Bugs (continued)	**PYRETHROIDS**					
	alpha-cypermethrin Fastac 0.83	3A	2.6-3.6 oz	0.017-0.023	12 hours/ 14 days	
	beta-cyfluthrin Baythroid XL 1	3A	1.6-2.6 oz	0.0125-0.0205	12 hours/ 0 days	
	bifenthrin Brigade 2EC Discipline 2EC Fanfare 2EC	3A	 2.6-6.4 oz 2.6-6.4 oz 2.6-6.4 oz	 0.04-0.1 0.04-0.1 0.04-0.1	12 hours/ 14 days	
	esfenvalerate Asana XL 0.66	3A	5.8-9.6 oz	0.03-0.0495	12 hours/ 21 days	
	gamma-cyhalothrin Prolex 1.25 Declare 1.25	3A	 1.28-2.05 oz 1.28-2.05 oz	 0.0125-0.02 0.0125-0.02	24 hours/ 21 days	
	lambda-cyhalothrin Karate w/ Zeon 2.08 Karate EC 1 Silencer 1	3A	 1.6-2.56 oz 3.2-5.12 oz 3.2-5.12 ozs	 0.025-0.04 0.025-0.04 0.025-0.04	24 hours/ 21 days	
	zeta-cypermethrin Mustang Max 0.8	3A	2.64-3.6 oz	0.0165-0.0225	12 hours/ 14 days	
Thrips (seedling cotton), At-Plant Treatments	*acephate* Orthene 97ST Orthene 97 Orthene 90S Acephate 97 Acephate 90	1B	 Commercial seed 1.0 lb 1.1 lb 1.0 lb 1.1 lb	 treatment 0.97 1.0 0.97 1.0	24 hours/ 21 days	Acephate 97—Apply acephate as a spray into the seed furrow at planting.
	imidacloprid Admire Pro4.6	4A	9.2 oz	0.33	12 hours/ 14 days	Apply Admire Pro as an in-furrow spray during planting directed on or below seed.
	thiamethoxam Cruiser	4A	Commercial seed	treatment	12 hours/ --	Thrips populations in some areas of the US have shown reduced susceptibility to neonicotinoid seed treatments (IRAC Group 4A). Neonicotinoid seed treatments are active for 14-21 days but may need a supplemental foliar insecticide application if thrips populations are high.
	imidacloprid Gaucho 600	4A	Commercial seed	treatment	12 hours/ --	
Thrips (seedling cotton), Foliar Spray	*acephate* Orthene 97 Orthene 90S Acephate 97 Acephate 90	1B	 3.0 oz 3.2 oz 3.0 oz 3.2 oz	 0.18 0.18 0.18 0.18	24 hours/ 21 days	Apply when 2-3 thrips per plant are counted and immatures are present. Expect higher thrips populations on early planted cotton. Thrips injury is more severe when seedlings are not growing rapidly (i.e. stress from cool temperatures or PRE herbicides). Rapidly growing seedlings can better tolerate thrips feeding.
	dicrotophos Bidrin 8	1B	1.6-3.2 oz	0.1-0.2	6 hours/ 30 days	

PEST	INSECTICIDE	IRAC GROUP	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Thrips (seedling cotton), Foliar Spray (continued)	*dimethoate* Dimethoate 4	1B	0.25-0.5 pt	0.125-0.25	48 hours/ 14 days	
Whitefly (banded winged)	*acephate* Orthene 97 Orthene 90S Acephate 97 Acephate 90	1B	 0.5-1.0 lb 0.5-1.0 lb 0.5-1.0 lb 0.5-1.0 lb	 0.49-0.97 0.45-0.90 0.49-0.97 0.45-0.90	24 hours/ 21 days	Apply when 50% of terminals in rapidly growing cotton are infested, or when honeydew is found on foliage or lint of older cotton with open bolls.
	thiamethoxam Centric 40 WG	4A	2 ozs	0.05	12 hours/ 21 days	
Whitefly (silverleaf)	*acetamiprid* Assail 30 SG	4A	4.0-5.3 oz	0.075-0.1	12 hours/ 28 days	Silverleaf whitefly is difficult to control with insecticides. Early detection and conservation of natural controls are important. Hairy leaf cottons are preferred by silverleaf whiteflies compared with smooth leaf varieties. Bifenthrin applied at high rates will suppress adults; tank-mixing with acephate will improve control.
	dinotefuron Venom 70WDG	4A	1-3 oz	0.045-0.134	12 hours/ 14 days	
	pyriproxyfen Knack 0.86	7D	8 oz 5 oz fb 5 oz	0.05375 0.033 fb 0.033	12 hours/ 28 days	Vegetative cotton; 5 ozs. followed by 5 ozs. See Label.
	spiromesifin Oberon 2	23	8-16 oz	0.125-0.25	12 hours/ 30 days	Bifenthrin applied at high rates will suppress adults; tank-mixing with acephate may improve control.
	buprofezin Courier 40SC	16	9-12.5 oz	0.25-0.35	12 hours/ 14 days	

Premixed or Co-Packed Insecticide Products:

Products listed below are available as premixes or co-packages of two insecticidal active ingredients. When using premixed or co-packaged products, be sure the use of all active ingredients is necessary. Unnecessary applications or use of reduced rates of an active ingredient may lead to or intensify insecticide resistance.

bifenthrin, avermectin B1 (Athena)
bifenthrin, imidacloprid (Brigadier)
dicrotophos, bifenthrin (Bidrin XP II)
flubendiomide, buprofezin (Tourismo)
imidacloprid, cyfluthrin (Leverage)
lambda-cyhalothrin, chlorantraniliprole (Besiege)
lambda-cyhalothrin, thiamethoxam (Endigo)
spinosad, gamma-cyhalothrin (Consero)
zeta-cypermethrin, bifenthrin (Hero)
chlorpyrifos, lambda-cyhalothrin (Cobalt Advanced)
zeta-cypermethrin, chlorpyrifos (Stallion)

COTTON DISEASE CONTROL

Bob Kemerait, Extension Plant Pathologist

DISEASE	CHEMICAL	RATE PER ACRE[a] (38" Row Basis)	REI/PHI (Hours/Days)	REMARKS AND PRECAUTIONS
Seedling Diseases	Quadris 2.08SC	5.5-11.0 fl oz	4 hours/ 45 days	Liquids gives better coverage than granular or hopperbox treatments. Liquid fungicides should be applied in-furrow using two cone-type nozzle tips. Mount the first behind the seed-drop tube to treat the soil around seed; direct the second to treat soil as it falls in to the seed furrow. Maximum rate is 27 fl oz/A/season.
		Hopper Box		Hopperbox treatments are considered less effective than granules or in-furrow sprays, but hopperbox treatments prevent m ore disease than seed treatments alone.
	Carboxin + Terraclor + Metalaxyl (=Prevail)	8 - 16 oz./cwt		
	System 3 (biological)	0.5 fl oz/cwt		NOTE: These seed treatments are in addition to fungicide treatments that are already applied to the seed by the supplier.
		Additional Seed Treatments	24 hours/ --	
	Kodiak HB (biological)	4.0 oz./cwt		
	System 3 (biological)	12.0 oz./cwt		
	Kodiak FL	0.5 fl oz./cwt		
	Chloroneb + Metalaxyl (=Delta Coat)	8.75 - 11.85 oz./cwt		
	Dynasty CST (azoxystrobin + fludioxonil + mefenoxam)	3.1 - 3.95 fl oz/cwt		
	Trilex 2000 (trifloxystrobin + metalaxyl)	2.0 fl. oz./cwt		
	Trilex Advanced (trifloxystrobin + metalaxyl + triademinol)	1.6 fl. oz./cwt		

[a] In furrow fungicide rates are presented on a per acre basis for cotton planted on 38" rows. To convert these rates to cotton planted on 36" rows, multiply the 38" rate by 1.05. To convert the rates to cotton planted on 4 0" rows, multiply the 38" rate by 0.95. To convert the rates from a per acre basis to a rate per 1000 feet of row, divide the 36" rate by 14.42, divide the 38" rate by 13.76, and divide the 40" rate by 13.07.
[b] Apply all liquids in 5-10 gallons of water per acre.

COTTON NEMATODE CONTROL

Bob Kemerait, Extension Plant Pathologist

NEMATICIDE TREATMENT	RATE/ACRE	oz/1000 ft of row (38-inch row basis)	REI/PHI (Hours/Days)	REMARKS AND PRECAUTIONS
Telone II[1]	3 gal	30 fl oz	5 days Post Application/ --	Apply Telone II at least 7 days prior to planting by injecting 12 inches below final soil surface. Temik may be used at planting or as a side-dress following the use of Telone II. NOTE: Telone II is now labeled for at-plant application in Georgia for nematode control on cotton. Growers who choose to apply Telone II at plant must ensure that soil conditions are correct (see label) else the at-plant fumigation may result in poor germination and plant stand.
Vydate C-LV	17 fl oz	1.24 fl oz	48 hours/ 14 days	Make one application between 2nd and 5th true leaf stage. Alternatively, sequential applications of Vydate C-LV may be made at 8.5-11.0 fl oz/A beginning at 2nd to 5th leaf stage of growth followed by a second 8.5-11.0 fl oz/A applied 10-14 days later. Applications of Vydate C-LV typically follow use of Telone II or nematicide seed treatments. Vydate C-LV is a supplemental application. Maximum rate is 102 fl oz/A/season.
AVICTA Duo Cotton	seed treatment		48 hours/ --	AVICTA Duo Cotton is a combination of abamectin (for nematode control) and Cruiser (thiamethoxam) for thrips control.
AERIS Seed-Applied System	seed treatment			AERIS Seed-Applied System is a combination of thiodicarb (nematode control) and imidacloprid (thrips control) with the option of adding the TRILEX Advanced Seed-Applied System for additional control of seedling diseases. AERIS Seed-Applied System should only be considered for use in fields with low-to-moderate populations of plant parasitic nematodes. Maximum rate of 25.6 fl oz/100 lbs of seed (delinted seed only).
N-Hibit	seed treatment	(1-5 oz/cwt)		NOTE: N-Hibit is labeled for "suppression of nematode egg production" but NOT for control of nematodes on cotton.
Velum Total	14-18 fl oz		12 hours/ 30 days	Velum Total is a combination of fluopyram and imidacloprid.

[1] If Telone II is used for nematode control, you must use an addition al chemical for thrips control.
[2] Temik applied at 3.5 lbs/acre is often recommended for insect management, but 3.5 lbs/acre will not provide sufficient nematode control in Georgia.

COTTON FOLIAR DISEASE CONTROL

Bob Kemerait, Extension Plant Pathologist

NEMATICIDE TREATMENT	RATE/ACRE	REI/PHI (Hours/Days)	REMARKS AND PRECAUTIONS
Headline	6.0-12.0 fl oz/A	12 hours/ 30 days	Headline, Twinline and Quadris are labeled for control of foliar diseases and boll rot of cotton. Contact your local Cooperative Extension office for efficacy data as it becomes available from the University of Georgia. Maximum rate is 36 fl oz/A/season.
Twinline	7.0-8.5 fl oz/A	12 hours/ 30 days	NOTE: Twinline is a pre-mix of pyraclostrobin and metconazole." Maximum rate is 26 fl oz/A/season.
Quadris	6.0-9.0 fl oz/A	4 hours/ 45 days	Based upon current research in Georgia, it appears that fungicides may have economic benefit in the control of a disease such as Corynespora leaf spot. (This disease is now often referred to as "target spot" because this name is commonly used in other crops where Corynespora causes similar diseases.) It is still uncertain whether the fungicides will be justified in the management of a disease like Stemphylium leaf spot which is primarily the result of a potassium deficieny in the plant. Significant research data will be available to cotton growers in 2014 to assist in the most appropriate us of fungicides for management of foliar diseases of cotton Maximum rate is 27 fl oz/A/season.
Topguard (flutriafol)	7-14 fl oz	12 hours/ 30 days	

COTTON WEED CONTROL

A. Stanley Culpepper, Extension Agronomist - Weed Science

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
EARLY PREPLANT BURNDOWN					
Burndown of emerged annual weeds but does not adequately control primrose, geranium, large radish, glyphosate-resistant horseweed, or glyphosate-resistant Palmer amaranth.	*glyphosate* 4.0SL (3 lb a.e.) 5.4SL (4 lb a.e.) 5.0SL (4.17 lb a.e.) 5.5SL (4.5 lb a.e.) 6.0SL (5.0 lb a.e.) MOA 9	4 hours/ N/A	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.13 (lb ae)	Apply up till planting; adjuvants needed with some products. Control of cover crops: Wheat < 12 in: 0.56 lb ae Wheat > 12 in: 0.75 lb ae Rye < 12 in: 0.56 lb ae Rye >12 in (no seed head): 0.75 lb ae Rye with seed head: 0.56 lb ae
Emerged primrose, wild radish, and spiderwort.	*2,4-D amine* 4L 4.7L 5L MOA 4	48 hours/ N/A	12-24 fl oz 10-20 fl oz 9-18 fl oz	0.38-0.75	The MOST CONSISTENT and effective burndown program for winter weeds in Georgia is a 2,4-D application in February when weeds are small and herbicide coverage is adequately followed by glyphosate or paraquat mixtures at or near planting. See label for plant back interval. PRIMROSE: Apply 0.24-0.38 lb ai/A RADISH: Apply 0.50.75 lb ai/A HORSEWEED: Apply 0.75+ lb ai/A
Burndown of most emerged weeds, 2,4-D rates are too low to control glyphosate-resistant horseweed.	*glyphosate* + *2,4-D amine* 4L 4.7L 5L MOA 9 + 4	48 hours/ N/A	see glyphosate + 8-16 fl oz 6-12 fl oz 6-11 fl oz	0.75-1.13 (lb ae) + 0.24-0.48	Most, but not all, brands of 2,4-D may be applied at least 30 days ahead of cotton planting. 2,4-D is the most effective option available for burndown of primrose and 2,4-D at 0.24 lb ae/A will provide control. Use amine formulations of 2,4-D. This mixture may not control Carolina geranium.
Aim improves control of emerged morningglory, tropical spiderwort, and very small (<1") glyphosate-resistant Palmer amaranth.	*glyphosate* + *carfentrazone* Aim 2EC MOA 9 + 14	12 hours/ N/A	see glyphosate + 0.5-1.0 fl oz	0.75-1.13 (lb ae) + 0.008-0.016	May be applied as a burndown treatment anytime prior to planting. Aim does not provide residual weed control.
Dicamba improves primrose, morningglory, and glyphosate-resistant horseweed control. Suppresses geranium and curly dock.	*glyphosate* + *dicamba* Clarity 4SL MOA 9 + 4	24 hours/ N/A	see glyphosate + 8 fl oz	0.75 to 1.13 (lb ae) + 0.25	Following application of dicamba AND a minimum of 1 in. of rainfall, a waiting period of at least 21 days is required before planting. Dicamba can be applied alone with little to no effect on the small grain cover crop. Dicamba is less effective than 2,4-D on primrose but more effective on horseweed.

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WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
EARLY PREPLANT BURNDOWN					
Diuron improves control of emerged Palmer amaranth and provides residual control if it reaches the ground and is activated.	*glyphosate* + *diuron* Direx 4F MOA 9 + 7	12 hours/ N/A	see glyphosate + 1-1.5 pt	0.75-1.13 (lb ae) + 0.5-0.75	A state label allows Direx to be applied up to the day ahead of planting if strip tillage implement is run between application and planting. If no tillage occurs between application and planting then one should wait at least 10 days prior to planting. This label ends Dec. 31 of each year, confirm the label has not expired prior to following these guidelines. Do not apply on sand or loamy sand soils. If following shortened plant-back interval, suggest avoid using diuron again PRE. The addition of 2,4-D or Valor will likely improve weed control; follow most restrictive plant-back interval for tank mixture chosen.
Valor improves emerged primrose and radish control. Valor at 2 oz/A provides residual control of pigweed, pusley, smallflower morningglory and other sensitive weeds for up to 6 to 8 weeks if it reaches the soil and is activated. Valor and/or Diuron should be used on all reduced tillage acres.	*glyphosate* + *flumioxazin* Valor SX 51WDG MOA 9 + 14	12 hours/ N/A	see glyphosate + 2 oz	0.75-1.13 (lb ae) + 0.063	In strip till cotton, Valor can be applied 10 days ahead of planting as long as the strip till operation occurs between applying Valor and planting. In no-tillage production or when the strip is implemented prior to application. Valor plant-back interval should be as follows: 1) <30% ground cover wait 28 days PLUS 1 inch of rain; 2) >30% ground cover wait 21 days PLUS 1 inch of rain. **If Reflex (or generic) will be applied PRE; suggest adding an additional 7 days to no-tillage planting intervals.** Add a non-ionic surfactant or crop oil concentrate (preferred), regardless of glyphosate brand. **For PPO-resistance management, make only 2 applications of Reflex or Valor in 2 years. CAREFULLY follow label directions for cleaning out the sprayer after each day's use!**
Most weeds except rate of 2,4-D must be increased for glyphosate-resistant horseweed.	*glyphosate* + *flumioxazin* Valor SX 51WDG + 2,4-D amine 4L, 4.7L, 5L MOA 9 + 14 + 4	48 hours/ N/A	see glyphosate + 2 oz + 6-16 oz	0.75-1.13 (lb a.e) + 0.63 + 0.24-0.48	See comments above regarding plant-back intervals when using Valor or 2,4-D. No adjuvuant needed unless very dry; then add non-ionic surfactant or crop oil concentrate. **For PPO-resistance management, make only 2 applications of Reflex or Valor in 2 years. CAREFULLY follow directions cleaning out sprayer after each day's use!**
ET improves control of emerged morningglory and small (< 1") glyphosate-resistant Palmer amaranth.	*glyphosate* + *pyraflufen ethyl* ET 0.208EC MOA 9 + 14	12 hours/ N/A	see glyphosate + 0.5-2.0 fl oz	0.75-1.13 (lb ae) + 0.0008-0.003	May be applied as a burndown treatment anytime prior to planting. ET does not provide residual weed control.

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WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
EARLY PREPLANT BURNDOWN					
Improved control of henbit, chickweed, Carolina geranium, and wild radish compared to glyphosate alone. Use Harmony Extra or Nimble to improve control of curly dock. 2,4-D is more effective on primrose. Dicamba and 2,4-D are more effective on horseweed.	*glyphosate* + *thifensulfuron* + *tribenuron* FirstShot SG 50SG MOA 9 + 14	12 hours/ N/A	see glyphosate + 0.5-0.8 oz	0.75-1.13 (lb ae) + 0.008-0.013 + 0.008-0.013	Apply at least 14 days prior to planting. Include nonionic surfactant at 1 to 2 qt per 100 gal spray or crop oil concentrate at 1 to 2 gal per 100 gal spray.
	glyphosate + *thifensulfuron* + *tribenuron* Harmony Extra SG with TotalSol 50SG Harmony Extra, Nimble 75WDG MOA 9 + 2 + 2	12 hours/ N/A	see glyphosate + 0.75 oz 0.5 oz	0.75-1.13 (lb ae) + 0.0156 + 0.0078	
Burndown of emerged annual weeds. Does not control immature primrose, large horseweed, curly dock, swinecress, immature radish, or large grasses.	*paraquat* Gramoxone 2SL Firestorm, Parazone 3SL MOA 22	24 hours/ N/A	 2.5-4.0 pt 1.7-2.7 pt	0.63-1.0	Apply any time prior to planting to control emerged weeds. Add nonionic surfactant at 2 pt per 100 gal of spray mix or crop oil concentrate at 1 gal per 100 gal spray mix. **The addition of diuron is strongly encouraged.** Apply 0.63 lb ai for wheat and 0.5 lb ai for rye cover crop. Cover crops must be mature (seedheads present) for adequate control.
Burndown of emerged annual weeds and provides residual control if diuron reaches the soil and is activated. Effective on <u>mature</u> primrose and wild radish. <u>BY FAR the most effective option for emerged glyphosate-resistant pigweed.</u> *Diuron and/or Valor should be applied on every reduced tillage cotton acre.*	*paraquat* Gramoxone 2SL Firestorm, Parazone 3SL + *diuron* Direx 4F MOA 22 + 7	24 hours/ N/A	 2.5-4.0 pt 1.7-2.7 pt + 1.5-2.0 pt	0.63-1.0 + 0.75-1.0	A Georgia 24(c) label allows Direx (only Direx) to be applied up to the day ahead of planting if a strip tillage implement is run between Direx application and planting. If no tillage occurs between Direx application and planting then one should wait at least 10 days prior to plant- ing. This label ends Dec. 31 of each year, confirm the label has not expired before following these guidelines. Do not apply on sand or loamy sand soil. If following shortened plant-back interval, suggest avoid using diuron again PRE. **Add crop oil concentrate at 1 gal per 100 gal spray mix.** When mixed with crop oil concentrate and applied in May when winter weeds are mature, control is much greater than when applied on immature winter weeds.

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WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
EARLY PREPLANT BURNDOWN					
Paraquat mixtures with diuron are more effective on emerged Palmer amaranth; however, Valor is more effective in providing residual Palmer amaranth control. Diuron and/or Valor should be applied on every reduced tillage acre.	*paraquat* Gramoxone 2SL Firestorm, Parazone 3SL + flumioxazin Valor SX 51WDG MOA 22 + 14	12 hours/ N/A	2.5-4 pt 1.7-2.7 pt + 2 oz	0.63-1 + 0.063	Follow preplant intervals noted in the glyphosate plus Valor section above. Include crop oil concentrate with mixture. When spraying immediately after rolling rye with seedheads, paraquat (3SL) rate can be to reduced to 10 oz/A; as long as no other weed is present. Contact your local county Extension office for the latest bulletin on this system. **For PPO-resistance management, make only 2 applications of Valor or Reflex in 2 years. CAREFULLY follow label directions for cleaning out the sprayer after each day's use.**
Winter annual broadleaf weeds such as henbit, chickweed, small wild radish, and curly dock. DO NOT anticipate residual control for Palmer amaranth.	*rimsulfuron* + *thifensulfuron* Leadoff 33SG MOA 2 + 2	4 hours/ N/A	1.5 oz/A	0.0156 + 0.0156	Apply at least 30 days prior to planting. Can increase rate to 2 oz/A if applying at least 60 days prior to planting. Also suggest at least 1 inch of rain accumulation prior to planting. Mixing 2,4-D with Leadoff will improve control of problematic weeds such as radish, primrose, and horseweed.
EARLY PREPLANT BURNDOWN OF GLYPHOSATE-RESISTANT HORSEWEED					
Glyphosate-resistant horseweed.	*glyphosate* + *2,4-D amine* numerous brands + flumioxazin Valor SX 51WDG MOA 9 + 4 + 14	48 hours/ N/A	see glyphosate + see label + 2 oz	0.75-1.13 (lb ae) + 0.95 (lb ae) + 0.063	Glyphosate plus 2,4-D plus Valor SX, or glyphosate plus dicamba plus Valor are the **preferred treatments.** See previous comments concerning waiting intervals after applying each product. The 2,4-D or dicamba is needed in the mixture to control emerged resistant horseweed while the Valor provides residual control for seeds that may germinate after the application. **For PPO-resistance management, make only 2 applications of Valor or Reflex in 2 years.** **CAREFULLY follow label directions for cleaning out the sprayer after each day's use!**
	glyphosate + *dicamba* Clarity 4SL + *flumioxazin* Valor SX 51WDG MOA 9 + 4 + 14	24 hours/ N/A	see glyphosate + 8 fl oz + 2 oz	0.75-1.13 (lb ae) + 0.25 + 0.063	

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
EARLY PREPLANT BURNDOWN OF GLYPHOSATE-RESISTANT HORSEWEED					
Glyphosate-resistant horseweed (continued)	*paraquat* Gramoxone Inteon 2SL Firestorm, Parazone 3SL + *diuron* Direx 4 F MOA 22 + 7	24 hours/ N/A	4.0 pt 2.7 pt + 1.5-2.0 pt	1.0 + 0.75-1.0	A Georgia 24(c) label allows Direx (only Direx) to be applied up to the day ahead of planting if a strip tillage implement is run between Direx application and planting. If no tillage occurs between Direx application and planting then one should wait at least 10 days prior to plant- ing. This label ends Dec. 31 of each year, confirm the label has not expired before following these guideline. Do not apply on sand or loamy sand soil. Suggest avoiding diuron PRE if following shortened plantback interval. Spray when daytime temps exceed 70° F. Add 1 gal of crop oil concentrate per 100 gal of spray mix. May add 2,4-D or Clarity to improve control of emerged plants; follow proper plant backintervals.
	glufosinate Liberty 280 SL 2.34L Reckon 280 SL 2.34L MOA 10	12 hours/ N/A	29-43 fl oz	0.53-0.79	Recommended for fields where growers have failed to control glyphosate-resistant horseweed. Best results obtained if sprayed in full sunlight with daytime temperatures above 80° F. If greater than 29 oz/A is applied preplant, the season total applied cannot exceed 72 fl oz/A. Do not apply within 1 hour of sunset or 2 hour of sunrise. Use a spray volume of at least 15 GPA. Do not apply glufosinate more than twice a year.
PREPLANT: AT OR JUST PRIOR TO PLANTING					
Burndown of emerged annual weeds and cover crops. Inadequate control of primrose, radish, geranium and resistant pigweed or horseweed often noted.	*glyphosate* 4.0SL (3 lb ae) 5.4SL (4 lb ae) 5.0SL (4.17 lb ae) 5.5SL (4.5 lb ae) 6.0SL (5.0 lb ae) MOA 9	4 hours/ N/A	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 11-29 fl oz	0.75-1.13 (lb ae)	Apply glyphosate or paraquat alone just prior to planting or in mixture with residual herbicides within 24 hr after planting. Add nonionic surfactant at 2 pt per 100 gal or crop oil concentrate at 1 gal per 100 gal spray mix for paraquat. Need for adjuvants with glyphosate depend upon brand used. <u>Control of mature cover crops with seedheads:</u> Wheat < 12 in.: glyphosate 0.75 lb ae or paraquat 0.63 lb Wheat > 12 in: glyphosate 0.75 lb ae or paraquat 0.75 lb Rye < 18 in: glyphosate 0.56 lb ae or paraquat 0.6 lb Rye > 18 in: glyphosate 0.75 lb ae or paraquat 0.75 lb When spraying immediately after rolling rye with seedheads, paraquat (3 SL) at 10 oz/A or glyphosate at 0.56 lb is adequate as long as Valor is included in the mixture. Contact your local county Extension office for the latest bulletin on this system.
Burndown of emerged annual weeds. Does not control immature primrose, large horse-weed, curly dock, swinecress, immature radish, or large grasses. or pigweeds over 3”	*paraquat* Gramoxone 2SL Firestorm, Parazone 3SL MOA 22	24 hours/ N/A	2.5-4.0 pt 1.7-2.7 pt	0.63-1	
Burndown of mature primrose and morningglory. Inadequate control of immature radish, pigweeds over 3” or grain cover crops.	*glufosinate-ammonium* Liberty 280 SL 2.34L Reckon 280 SL 2.34L MOA 10	12 hours/ N/A	29-43 fl oz	0.53-0.79	Applications may be made prior to cotton emergence;mix with ammonium sulfate for burndown. Do not apply within 1 hr of sunset or 1.5 hr of sunrise. Apply in at least 15 GPA. Do not apply Liberty (or generic) more than twice a year.

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
PREPLANT INCORPORATED					
Annual grasses, pigweeds and Florida pusley. Controls glyphosate-resistant Palmer amaranth much more effectively than when applied preemergence. PRE herbicide still required for adequate Palmer amaranth control.	*pendimethalin* Prowl 3.3EC Pendimax 3.3EC Prowl H20 3.8AS MOA 3	24 hours/ N/A	 1.2-2.4 pt 1.2-2.4 pt 2 pt	 0.5-1 0.5-1 0.95	Soil incorporate in top 2 inches of the soil within 24 hours of application. Application and incorporation within a week of planting is preferred. Pendimethalin is less volatile than trifluralin and is a better option if incorporation is delayed, although delayed incorporation will reduce control. For Treflan 4 L, rate should not exceed 1.5 pt/A for most fields.
	trifluralin Treflan, others 4.0EC MOA 3	12 hours/ N/A	 1-2 pt	0.5-1	
Glyphosate-resistant Palmer amaranth and yellow nutsedge	*fomesafen* Reflex 2L MOA 14	24 hours/ N/A	16 fl oz	0.25	Suggest mixing with pendimathlin or trifluralin and always follow with a PRE as noted below in the split program just below. Currently a Section 2 (ee) label allows for a preplant application of Reflex in Georgia. Incorporate Reflex to a SHALLOW (2 inch or less) depth while the soil is moist. For Palmer amaranth, less control is noted with Reflex alone incorporated when compared to preemergence applications when activated immediately by rainfall or irrigation; less injury potential is noted with incorporated application. Greater control will occur with the split Reflex program as compared to a Reflex PPI only system.
SPLIT PROGRAM WITH PREPLANT INCORPORATED (PPI) FOLLOWED BY PRE APPLICATIONS					
The SINGLE MOST effective approach for the control of Palmer amaranth while also offering the least injury potential from Reflex.	**PPI:**				PPI: Shallow (2 inch) incorporation is required. Plant within 1 week of application and incorporation if possible
	trifluralin or pendimethalin + *fomesafen* Reflex 2L	24 hours/ N/A	See rates in preplant incorporated + 10-12 oz	See rates in preplant incorporated + 0.16-0.19	
	PRE:				PRE: 1) Be sure to include Gramoxone PRE if glyphosate-resistant Palmer amaranth is emerged. 2) Warrant offers greater residual control when compared to diuron while diuron offers greater control of emerged weeds. If mixing Reflex + Warrant + diuron, the rate of diuron at 8 oz/A is ideal for most fields.
	fomesafen Reflex 2L + *acetochlor* Warrant 3ME OR *diuron* Direx, diuron 4F MOA 3 + 14 + 15 or 7	24 hours/ N/A	 8-10 oz + 32-40 oz pt OR 10-20 oz	 0.125-0.16 + 0.75-0.94 OR 0.31-0.63	

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
PREEMERGENCE-BROADLEAF AND GRASS CONTROL					
Residual control of annual grasses, Palmer amaranth, and tropical spiderwort.	*acetochlor* Warrant 3ME MOA 15	12 hours/ N/A	3 pt	1.125	Warrant must be applied in combination with fomesafen (Reflex, others), diuron, or fluometuron depending on Palmer population and technology grown; add paraquat and adjuvant if Palmer is up. Apply within 24 hr of planting.
Annual broadleaf weeds and suppression of annual grasses. More effective than fluometuron on pigweed, less effective on most other broadleaf weeds.	*diuron* Direx, diuron 80DF Direx, diuron 4L MOA 7	12 hours/ N/A	0.38-0.78 lb 10-20 oz	0.31-0.62	Diuron must be applied in combination with fomesafen (Reflex, others) or Warrant depending on Palmer population and technology grown; add paraquat and adjuvant if Palmer is up. Apply within 24 hr of planting. See label for specific rate on soils but in general lower rate on sandier soils and/or intense irrigation. Label restricts use on sands or soils with < 1% organic matter; also suggest to not use Di-Syston or Thimet.
Annual broadleaf weeds, suppression of annual grasses. The most effective single residual material for sicklepod, cocklebur, and morningglory control. Less effective than diuron on Palmer amaranth.	*fluometuron* Cotoran 4F MOA 7	12 hours/ N/A	2-3 pt	1-1.5	Cotoran must be applied in combination with fomesafen (Reflex, others) or Warrant depending on Palmer population and technology grown; add paraquat and adjuvant if Palmer is up. Apply within 24 hr of planting. See label for specific rate on soils but in general lower rate on sandier soils and/or intense irrigation. A maximum of 2 pt/A is ideal for most GA soils.
The most effective residual herbicide for the control of glyphosate-resistant Palmer amaranth. Good control of yellow nutsedge and poinsettia.	*fomesafen* Reflex 2L Others 2L MOA 14	24 hours/ N/A	12-16 oz 12-16 oz	0.19-0.25	Reflex or generics must be applied in combination with Warrant, diuron, or Cotoran depending on Palmer population and technology grown; add paraquat and adjuvant if Palmer is up. Apply within 24 hr of planting. Research suggests 12 oz/A is an appropriate rate when mixed with Warrant or diuron in RR cotton and 10-12 oz/A is the appropriate rate for these mixtures in cotton tolerant to Liberty. Application only to coarse-textured soils; however on sandy soils with low organic matter use lower rates. Injury may occur in treated fields especially if heavy rains occur as cotton is emerging. Wet/moist conditions during emergence (rainfall or irrigation) can cause significant necrosis and bronzing with occasional stand reduction. Fomesafen provides good residual pigweed control even if the first rain does not occur until 15 days after treatment. Pigweed that emerges before activation will not be controlled. **For PPO resistance management, make only 2 applications of fomesafen or Valor in 2 years.**
Annual grasses and Florida pusley; suppression of Palmer amaranth only.	*pendimethalin* Prowl 3.3EC Pendimax 3.3EC Prowl H20 3.8AS MOA 3	24 hours/ N/A	1.8-3.6 pt 1.8-3.6 pt 2-3 pt	0.75-1.5 0.75-1.5 0.95-1.42	Preemergence applications are far less consistent than incorporated treatments; tank mixtures are needed. Wet/moist conditions during emergence (rainfall or irrigation) can cause significant plant stunting, leaf/stem malformation, and stem swelling with eventual breaking; especially if used in combination with Reflex (generic). Apply within 24 hours of planting.

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
PREEMERGENCE-BROADLEAF AND GRASS CONTROL					
Controls non-ALS resistant pigweeds, lambsquarters, prickly sida, spurge, and smartweed. Suppresses morningglory, except tall.	*pyrithiobac* Staple LX 3.2SL MOA 2	4 hours/ N/A	1.7-2.1 fl oz	0.0425-0.053	Staple is an excellent residual herbicide but cotton injury, especially on irrigated acres, has become a serious concern. Thus, a delayed PRE or early POST use of Staple is being recommended by UGA; contact your local extension office for the bulletin. Do not apply on soils with less than 0.5% organic matter. Can tank mix with diuron, fluometuron, pendimethalin, or Reflex; apply within 24 hr of planting. The addition of paraquat or glyphosate is needed if weeds are emerged. **Palmer amaranth biotypes resistant to Staple are common. For ALS-resistance management, make only 1 timely application of Staple and/or Envoke per season.**
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ANY CULTIVAR Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Annual broadleaf weeds. **Poor control** of Palmer amaranth larger than 2 inch.	*fluometuron* Cotoran 4F MOA 7	12 hours/ 60 days	2-2.5 pt	1-1.25	Apply overtop of cotton 3-6 in. tall. Add surfactant at 1 qt per 100 gal. **Salvage treatment.** Cotton usually injured, maturity delayed, and yield can be reduced. Rates greater than 1 lb ai/A not advised.
Very small pigweed, morningglory (excluding tall mg), coffee senna, and redweed. Suppresses sicklepod and will not control ALS-resistant pigweed. Appropriate weed sizes (less than 3 inches) and favorable growing conditions are essential. Provides good residual control of many species if reaches the ground and is activated.	*pyrithiobac* Staple LX 3.2SL MOA 2	4 hours/ 60 days	2.7-3.0 fl oz	0.06-0.07	Apply overtop of cotton from cotyledonary stage up to 60 days of harvest. Avoid applying during periods of cool, wet weather. Include nonionic surfactant at 1 qt per 100 gal spray mix. Label al- lows two applications per year, not exceeding a total of 5.1 fl oz. Label also allows increasing rate to 3.8 fl oz but injury is a concern. Residual control of non-ALS resistant Palmer has been good even if the first activating rain does not occur for 15 days after application, plants emerging before activation will not be controlled. Do not mix with grass control herbicides. May mix with most insecticides, but do not tank mix with any product containing malathion. **Do not mix with any Dual product or Warrant.** Separate Staple and Dual/Warrant applications by 5 or more days. See label for rotational restrictions. **Palmer amaranth biotypes resistant to Staple and Envoke are common. For ALS-resistance management, make only 1 TIMELY application of Staple and/or Envoke per season.**
Annual broadleaf weeds including sicklepod, *Ipomoea* morningglory, and nutsedge. Will not control smallflower morningglory or ALS-resistant pigweed. Also provides residual control of sensitive species if contacts soil and is activated.	*trifloxysulfuron* Envoke 75WDG MOA 2	12 hours/ 60 days	0.1 oz	0.0047	Apply overtop after cotton has at least 6 (prefer 7) true leaves up until 60 days of harvest. Direct application on larger cotton for improved weed coverage and less injury. Add nonionic surfactant at 1 qt per 100 gal; do not use other types of adjuvants. May mix with Centric, Karate Z, Denim or Staple, see label. Do not mix with other pesticides including plant growth regulators. In an attempt to avoid injury, do not apply to cotton under stress, such as very dry, wet, or cool conditions. Envoke may be directed to cotton 6 in. or larger at rates of 0.1 to 0.25 oz/A. See label for details and rotational restrictions. Rainfast in 3 hr. **Palmer amaranth biotypes resistant to Staple and Envoke are common. For ALS-resistance management, make only 1 TIMELY application of Staple and/or Envoke per season.**

COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR LIBERTY LINK COTTON ONLY Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Most broadleaf weeds. Poor control of tropic croton, copperleaf and ALS-resistant pigweed. Provides broadleaf residual control of sensitive species if products contact the soil and are activated.	*trifloxysulfuron* Envoke 75WDG + *pyrithiobac* Staple LX 3.2SL MOA 2 + 2	12 hours/ 60 days	0.1 oz + 1.3-1.9 fl oz	0.0047 + 0.03-0.05	Apply overtop or directed after cotton has at least 6 (prefer 7) true leaves up until 60 days of harvest. Add non-ionic surfactant at 1 qt per 100 gal. spray mix. See comments and restrictions for each product applied alone. To avoid the potential for severe injury, do not apply to cotton under stress, such as very dry, wet, or cool conditions. **Palmer amaranth biotypes resistant to Staple and Envoke are common. For ALS-resistance management, make only 1 TIMELY application of Staple and/or Envoke per season.**
Timing for pigweed and most grasses are critical use residual at-plant herbicides. Control of pusley, spiderwort, and goosegrass are not consistent. In general, broadleaf weeds should be 3 inches or less and grasses no larger than 2 inches Excellent control of morningglory including moonflower morningglory. *Do not make more than 2 Liberty applications a year.*	*glufosinate-ammonium* Liberty 280SL 2.34L MOA 10	12 hours/ 70 days	29-43 fl oz	0.53-0.79	**LIBERTY LINK CULTIVARS ONLY** Can be applied overtop or directed from cotton emergence up to early bloom. On larger cotton, directed application may give better spray coverage on weeds. Apply in a minimum of 15 GPA delivering the herbicide in a medium spray droplet size according to the label. Do not exceed 43 fl oz/A per application. Also, do not exceed 87 fl oz/A per season with individual applications of 29 fl oz/A or less and do not exceed 72 oz/A per season if any individual application greater than 29 oz/A is made. Control is improved with warm temperatures, high humidity, and bright sunlight. Mixtures with residual herbicides are usually needed to assist in the control of grasses, pusley, and pigweed. **For Palmer amaranth, apply 29 oz/A when less than 3 inch; 32 oz/A when 3 inch; 36 oz/A when 4 inch; and 43 oz/A when taller than 4 inch.** Adjuvant not needed for in crop use. ***Wait until 1.5 hours after sunrise to begin spraying and stop at least 1 hour before sunset.*** Rainfast within 4 hours. Grass control herbicides, such as Select, should not be mixed with Liberty.
Staple may improve emerged pigweed control (non ALS-resistant) and provides residual activity on sensitive weeds if spray contacts soil and is activated. *Do not make more than 2 Liberty applications a year.*	*glufosinate-ammonium* Liberty 280SL 2.34L + *pyrithiobac* Staple LX 3.2SL MOA 10 + 2	12 hours/ 70 days	29 fl oz + 1.3-1.9 fl oz	0.53-0.58 + 0.03-0.05	**LIBERTY LINK CULTIVARS ONLY** Apply topically from full cotyledonary cotton through the 7 leaf stage; suggest sloppy directed application after that time to improve weed control and reduce injury potential. Leaf speckling/burn/chlorosis will likely occur. Palmer amaranth needs to be no more than 3 inches when treated.. Do not mix with any metolachlor (Dual) product or Warrant. **Make only 1 TIMELY application of Staple or Envoke per year and make no more than 2 applications of Liberty per year.**

[1]Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR LIBERTY LINK COTTON ONLY Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Dual or Warrant provides residual control of grasses, spiderwort, and pigweeds if spray contacts soil and is activated. *Do not make more than 2 applications of Liberty per year.*	*glufosinate-ammonium* Liberty 280SL 2.34L + *S-metolachlor* Dual Magnum 7.62EC OR *acetochlor* Warrant 3ME MOA 10 + 15	24 or 12 hours/ 80 or 70 days	29-32 fl oz + 1 pt OR 3 pt	0.53-0.58 + 0.95 OR 1.125	**LIBERTY LINK CULTIVARS ONLY** Apply topically once cotton is fully emerged through the 7 leaf stage; suggest sloppy directed application after that time to improve weed control and reduce injury potential. Warrant can be applied through bloom. Dual Magnum can be applied overtop until 100 days before harvest and directed until 80 d before harvest. Some leaf speckling/burn will likely occur. Cotton should recover rapidly. **Palmer amaranth needs to be no more than 3 inches at time of application. Do not mix with Staple. Apply in 15 GPA but not within 1.5 hr of sunrise and 1 hr of sunset.**
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL IN PHYTOGEN WIDESTRIKE COTTON Application of postemergence herbicide treatments to moisture stressed weeds usually result in poor control.					
Glyphosate-resistant Palmer amaranth in Widestrike cotton. Do not make more than 2 applications of Liberty per year.	*glufosinate-ammonium* Liberty 280SL 2.34L MOA 10	12 hours/ 70 days	29 fl oz	0.53	Phytogen cultivars with the Widestrike trait are tolerant to Liberty. Tolerance in these cultivars is not complete, and varying levels of crop injury are often noted. Greater injury can be expected when Liberty is mixed with AMS, mixed with other pesticides, or applied at higher rates. **Grower assumes the liability of crop injury.** Make no more than two topical applications with the second application being made prior to 8 leaf cotton. See above comments for use of Liberty in Liberty Link cotton, including statement on application time of day.
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ROUNDUP READY FLEX COTTON Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Controls most annual weeds; exceptions include glyphosate-resistant Palmer amaranth, dayflower, Florida pusley, tropical spiderwort, doveweed and hemp sesbania. Timely applications critical for purslane and morningglory. Conventional at plant and directed herbicide options must be used even in a Roundup Ready Flex program for the control of Palmer amaranth.	*glyphosate* 4.0SL (3 lb ae) 5.4SL (4 lb ae) 5.0SL (4.17 lb ae) 5.5SL (4.5 lb ae) 6.0SL (5.0 lb ae) MOA 9	4 hours/ 7 days	 32-48 oz 24-36 oz 23-34 oz 22-32 oz 19-29 oz	0.75-1.12 (lb ae)	**ROUNDUP READY <u>FLEX</u> CULTIVARS** WeatherMax or PowerMax (4.5 lb ae) may be applied overtop or directed to Flex cotton anytime from cotton emergence until 7 days prior to harvest. The maximum rate for any single application between emergence and 60% open bolls is 32 fl oz (1.12 lb ae). Do not exceed a total of 128 fl oz (4.5 lb ae) applied from emergence through 60% open bolls. Do not exceed a maximum of 44 fl oz (1.55 lb ae) applied between layby and 60% open bolls. Do not exceed a maximum of 44 fl oz between 60% open bolls and harvest. Directed applications may be more effective in larger cotton to allow better coverage of weeds under canopy or to allow for tank mixes with other herbicides. **Glyphosate should never be applied alone and a sound management program over lapping residual herbicides throughout the season is required to manage glyphosate-resistant Palmeramaranth. Obtain programs from the local extension office or at gaweed.com.**

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ROUNDUP READY FLEX COTTON **Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.**					
Compared to glyphosate alone, a tank mix provides residual control of grasses, pigweeds (including glyphosate-resistant Palmer amaranth) and tropical spiderwort, if the acetochlor contacts the soil and is activated.	*glyphosate* + *acetochlor* Warrant 3ME MOA 9 + 15	12 hours/ do not apply after bloom	see glyphosate + 3 pints	0.75-1.12 + 1.125	**ROUNDUP READY <u>FLEX</u> CULTIVARS** The label allows a topical application once cotton is completely emerged up until it reaches bloom; however, UGA research suggest topical applications be made from emergence through the 7 leaf stage of cotton development with directed applications made afterward. A topical and directed application may be made as long as Warrant was not applied PRE; if Warrant was applied PRE then one POST application can be made. Use loaded glyphosate formulation; do not add adjuvants or other pesticides including Staple. Avoid heavy dew on cotton plant and extreme, hot conditions. **A sound management program over lapping residual herbicides throughout the season is required to control glyphosate-resistant Palmer amaranth.**
Staple improves control of hemp sesbania, morningglory, tropical spiderwort, and glyphosate-resistant Palmer amaranth. Staple will provide residual control of pigweeds, prickly sida, smartweed, spurred anoda, and velvetleaf if it contacts the soil and is activated. Will not control ALS + glyphosate resistant Palmer.	*glyphosate* + *pyrithiobac* Staple LX 3.2SL MOA 9 + 2	4 hours/ 60 days	see glyphosate + 2-3 fl oz	0.75-1.12 + 0.05-0.07	**ROUNDUP READY <u>FLEX</u> CULTIVARS** See comments for glyphosate and Staple alone. Apply overtop from cotton cotyledonary stage until 60 days prior to harvest, however, sloppy directed applications encouraged after the 7 leaf stage to improve weed control and reduce injury potential. Do not mix with any Dual/metolachlor products or Warrant. For Palmer amaranth, apply Staple at 2.6 to 3 oz/A when Palmer is 2 inches or less; rate can be increased to 3.8 oz/A but injury is a concern. **Palmer amaranth biotypes with resistance to glyphosate AND ALS chemistry (Staple, Envoke, etc.) have been confirmed in GA and will not be controlled with this mixture.** **Make only one TIMELY application of Staple and/or Envoke per season.**
Compared to glyphosate alone, tank mix provides residual control of annual grasses, pigweeds including glyphosate-resistant Palmer amaranth, doveweed, Florida pusley, and tropical spiderwort and suppression of yellow nutsedge if the metolachlor contacts the soil and is activated.	*glyphosate* + *S-metolachlor* Dual Magnum 7.62EC Brawl 7.62EC MOA 9 + 15	24 hours/ 100 days	see glyphosate + 1-1.33 pt 1-1.33 pt	0.75 -1.12 + 0.95-1.27	**ROUNDUP READY <u>FLEX</u> CULTIVARS** Dual Magnum can be applied overtop of cotton until 100 days of harvest and directed until 80 days of harvest. Suggest making topical applications until the 7 leaf stage and then making sloppy directed application to improve control and reduce injury potential. Do not mix with Staple and do not apply within 5 d of Staple. Avoid applications when dew is on cotton plants and during extreme, hot weather. **A sound management program over lapping residual herbicides throughout the season is required to control glyphosate-resistant Palmer amaranth.**
	glyphosate + *S-metolachlor* Sequence 5.25L	24 hours/ 100 days	2.5 pt	0.7 + 0.94	**ROUNDUP READY FLEX CULTIVARS** Apply from cotyledon stage cotton to the 10 leaf stage (not to exceed 12 inches tall) cotton. Do not harvest within 100 days of application. Do not add adjuvants and do not mix with other pesticides. Avoid applying when dew is on cotton plants and during extreme, hot weather.

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ROUNDUP READY FLEX COTTON Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Envoke will improve control of *Ipomoea* morningglory and nutsedge Will not control ALS + glyphosate resistant Palmer.	*glyphosate* + *trifloxysulfuron* Envoke 75WDG MOA 9 + 2	24 hours/ 60 days	see glyphosate + 0.1 oz	0.75-1.12 + 0.0047	**ROUNDUP READY FLEX CULTIVARS** See comments for glyphosate and Envoke applied alone. Tank mix can be applied from 7 leaf stage until 60 days of harvest; however, sloppy directed application strongly encouraged for improved weed control and less injury. **A sound management program over lapping residual herbicides throughout the season is required to control glyphosate-resistant Palmer amaranth.** **Make only 1 TIMELY application of Staple and/or Envoke per season.**
Volunteer Roundup Ready corn **in Roundup Ready Flex cotton**	*glyphosate* + *clethodim* Select 2 EC Select Max 0.97EC MOA 9 + 1	24 hours/ 60 days	see glyphosate + 4-8 fl oz 6-12 fl oz	0.75-1.12 + 0.06-0.09	**ROUNDUP READY FLEX CULTIVARS** For corn up to 12 in. tall, apply 4-6 oz of Select or 6 oz of Select Max; for corn up to 24 in. tall, apply 6-8 oz of Select or 9 oz of Select Max; for corn up to 36 in. tall, apply 12 oz of Select Max. Add 2.5 lb/A ammonium sulfate or equivalent and make sure glyphosate brand used contains adjvuant. Numerous generic formulations of clethodim are available.
	glyphosate + *fluazifop -p-butyl* Fusilade DX 2 EC MOA 9 + 1	12 hours/ 90 days	see glyphosate + 4-6 fl oz	0.75-1.12 + 0.06-0.09	**ROUNDUP READY FLEX CULTIVARS** Apply 4 oz Fusilade for corn less than 12 in. Increase rate to 6 oz for corn up to 24 in. Add 0.25% by volume of crop oil concentrate.
	glyphosate + *quizalofop-p-ethyl* Assure II 0.88EC MOA 9 + 1	12 hours/ 80 days	see glyphosate + 5-8 fl oz	0.75-1.12 + 0.03-0.05	**ROUNDUP READY FLEX CULTIVARS** See comments for glyphosate alone. Apply Assure at 4 oz to corn up to 12 in., 5 oz for corn up to 18 in., and 8 oz to corn up to 30 in. Add 0.125% nonionic surfactant by volume.
Volunteer Roundup Ready soybean	*glyphosate* + *trifloxysulfuron* Envoke 75 WDG MOA9 + 2	12 hours/ 60 days	see glyphosate + 0.1 oz	0.75-1.12 + 0.0047	**ROUNDUP READY FLEX CULTIVARS** See comments above on glyphosate plus Envoke, especially regarding crop injury. Cotton should be 6 (prefer 7) leaves, and soybean should have no more than 4 to 5 trifoliate leaves. Not adequately effective on soybean with the STS trait. Consider the addition of Cotoran PRE at planting to control soybean. **Make only 1 timely Envoke and/or Staple /Pyrimax application per season.**

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE OVER-THE-TOP GRASS CONTROL FOR ANY COTTON CULTIVAR Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Annual grasses	*clethodim* Select, others 2EC Select Max 0.97EC Tapout 0.97EC MOA 1	24 hours/ 60 days	 6-8 fl oz 9-16 fl oz 9-16 fl oz	 0.09-0.13 0.07-0.12 0.07-0.12	Apply to actively growing grasses not under stress. Mixtures with other herbicides other than glyphosate will likely reduce grass control. Do not cultivate within 7 d of application. A 2nd application may be made. Numerous generic formulations are available. For Select: Add crop oil concentrate at 1 qt/A . For Select Max: add nonionic surfactant at 1 qt per 100 gal solution, crop oi concentrate at 1 gal per 100 gal solution, or methylated seed oil at 1 gal per 100 gal solution.For Fusilade: Apply with crop oil concentrate (preferred) at 1 gal per 100 gal solution or nonionic surfactant at 1 qt per 100 gal solution. For Assure: Apply with crop oil concentrate (preferred) at 1 gal per 100 gal solution or nonionic surfactant at 1 qt per 100 gal solution. For Poast: Add crop oil concentrate at 1 qt/A.
	fluazifop p-butyl Fusilade DX 2EC MOA 1	12 hours/ 90 days	8-12 fl oz	0.125 to 0.188	
	quizalofop p-ethyl Assure II 0.88EC MOA 1	12 hours/ 80 days	7-8 fl oz	0.05-0.06	
	sethoxydim Poast 1.53EC Poast Plus 1.0EC MOA 1	12 hours/ 40 days	 16 fl oz 24 fl oz	0.19	
Perennial grasses	*clethodim* Select, others 2EC Select Max 0.97EC Tapout 0.97EC MOA 1	24 hours/ 60 days	 8-16 fl oz 12-32 fl oz 12-32 fl oz	 0.13-0.25 0.09-0.24 0.09-0.24	Apply to actively growing johnsongrass 12-24 in tall or to bermudagrass with runners up to 6 in. A second application of 8-16 oz of Select or 12-32 oz of Select Max may be applied to bermudagrass when regrowth is up to 6 in. For johnsongrass, a second application of 6-8 oz of Select or 9-24 oz of Select Max may be applied when regrowth is 6-18 in. Add crop oil concentrate at 1 qt per acre to Select. To Select Max, add nonionic surfactant at 1 qt per 100 gal solution, crop oil concentrate at 1 gal per 100 gal solution, or methylated seed oil at 1 gal per 100 gal solution. Do not mix with other herbicides. Do not cultivate within 7 days before or after application. Generic brands are available.
	fluazifop p-butyl Fusilade DX 2EC MOA 1	12 hours/ 90 days	10-12 fl oz	0.156-0.188	Apply when johnsongrass is 8-18 inches or when bermudagrass runners are 4-8 inches. If needed, make a second application of 8 fl oz/A when johnsongrass regrowth or new plants are 6-12 inches or when bermudagrass stolon (runner) regrowth or new plants are 3-6 inches. Apply with crop oil concentrate (preferred) at 1 gal per 100 gal solution or nonionic surfactant at 1 qt per 100 gal solution. Do not mix with other herbicides. Do not cultivate within 7 days of application.

[1]Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE OVER-THE-TOP GRASS CONTROL FOR ANY COTTON CULTIVAR Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Perennial grasses (continued)	*quizalofop p-ethyl* Assure II 0.88EC MOA 1	12 hours/ 80 days	10 fl oz	0.07	Apply when johnsongrass is 10-24 inches or bermudagrass runners are 3-6 inches. A second application for treating regrowth or new plants can be made with 7 fl oz per acre when johnsongrass reaches 6-10 inches or bermudagrass reaches 3-6 inches. Apply with crop oil concentrate (preferred) at 1 gal per 100 gal solution or nonionic surfactant at 1 qt per 100 gal solution. Do not mix with other herbicides. Do not cultivate within 7 days of application. Generic brands are available.
	sethoxydim Poast 1.53EC Poast Plus 1.0EC MOA 1	12 hours/ 40 days	24 fl oz 36 fl oz	0.28	Apply to johnsongrass up to 25 inches and before bermudagrass runners exceed 6 inches. If regrowth occurs or new plants emerge, make a second application of 16 fl oz/A of Poast when johnsongrass reaches 6-10 inches and bermudagrass reaches 3-6 inches. Add 1 qt of crop oil concentrate per acre. Do not tank mix with other herbicides. Do not cultivate within 7 days of application. Generic brands are available.
POSTEMERGENCE DIRECTED – ANY COTTON CULTIVAR Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Effective control of many broadleaf weeds and nutsedge. Grasses should be 1 inch or less. Residual control of many weeds if activated. **Diuron plus MSMA is the best directed option to control emerged glyphosate-resistant Palmer amaranth.** Diuron is more effective in controlling emerged pigweed than is Cotoran or Valor. Valor provides the most effective residual control of pigweed.	*diuron* Direx, Diuron, other 4L + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 7 + 17	12 hours/ 7 days	1.6-2.4 pt + 2 pt 2 pt	 0.8-1.2 + 1.5-1.65	Apply as directed spray to cotton at least 12 inches tall. Addition of an adjuvant is strongly encouraged. Label prohibits use on sand or loamy sand soils, or any soils with less than 1% organic matter. Higher rates of diuron provide greater residual weed control but extended rotational concerns, see rotational restrictions. If soil type allows, use at least 2 pt/A of diuron for control of emerged Palmer amaranth. Label prohibits applying MSMA after 1st bloom. The addition of Envoke, Aim, or ET will improve morningglory control. Envoke at 0.1-0.15 oz/A poses no additional injury concern and the mixture can be applied to 12 inch or larger cotton. For Aim or ET at 0.5-1 fl oz/A, cotton should be at least 20 inches tall having 3 inches of bark with spray not contacting green portion of stem. Aim will also improve spiderwort control. The addition of S-metolachlor or Warrant with diuron plus MSMA is recommended for managing tropical spiderwort.
	diuron + linuron Layby Pro 4L + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 7 + 7 + 17	24 hours/ 76 days	 2 pt + 2 pt 2 pt	0.5 + 0.5 + 1.5-1.65	Apply as a directed spray to cotton at least 16 in. tall. Add crop oil concentrate at 1 gal per 100 gal spray mix. Label prohibits use on sand or loamy sand soils, or on any soil with less than 1% organic matter. Label prohibits applying MSMA after first bloom.

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE DIRECTED – ANY COTTON CULTIVAR **Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.**					
Effective control of many broadleaf weeds and nutsedge. Grasses should be 1 inch or less. Residual control of many weeds if activated. Diuron is more effective in controlling emerged pigweed than is Cotoran or Valor. Valor provides the most effective residual control of pigweed.	*flumioxazin* Valor SX 51WDG + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 14 + 17	12 hours/ 60 days	 2 oz + 2.67 pt 2.5 pt	0.064 + 2	Apply as a directed spray to cotton at least 18 in tall. Direct spray to the lower 2 inches of the cotton stem and do not contact the green portion of the cotton stem. May apply to 6 inch cotton under a hood. Add nonionic surfactant at 1 qt per 100 gal spray mix. DO NOT use crop oil concentrate, methylated seed oil, organo-silicone adjuvant, or any adjuvant containing any of these. Label prohibits applying MSMA after bloom. IN HOODED APPLICATIONS when no contact of the cotton crop occurs: The addition of S-metolachlor or Warrant is recommend for managing tropical spiderwort **and** glyphosate- resistant Palmer amaranth. **For PPO-resistance management, make only 2 applications of Valor or Reflex in 2 years.**
Currently, the single best layby mixture for both control of emerged glyphosate-resistant Palmer amaranth and extended residual control.	*diuron* Direx, Diuron, other 4L + *flumioxazin* Valor SX 51WDG + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 7 + 14 + 7	12 hours/ 60 days	 2.0 pt + 1 oz + 2 pt 2 pt	1 + 0.03 + 1.5-1.65	**See restrictions for each product applied alone.** Cotton should be at least 20 in tall. Apply as a directed spray to the lower 2 inches of the cotton stem. ***Experiment with this mixture on limited acreage*** as crop injury is of some concern. Valor may not improve control of emerged pigweed but will provide excellent residual control. Add nonionic surfactant at 1 qt per 100 gal spray mix. DO NOT use crop oil concentrate, methylated seed oil, organo-silicone adjuvant, or any adjuvant containing any of these. Label prohibits applying MSMA after bloom.
Effective control of many broadleaf weeds, nutsedge, and small annual grasses. Residual control of many weeds. Much less effective than diuron + MSMA in controlling emerged pigweed and less residual than diuron or Valor.	*fluometuron* Cotoran 4F + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 7 + 17	12 hours/ 60 days	 2.0-3.2 pt + 2.67 pt 2.5 pt	1-1.6 + 2	Apply as a directed spray to cotton at least 3 in. tall. Label prohibits applying MSMA after first bloom. The addition of S-metolachlor or Warrant is recommended for managing tropical spiderwort and Palmer amaranth.
Effective control of many broadleaf weeds, yellow nutsedge, and small annual grasses. Limited residual control.	*linuron* Linex 4L + *MSMA* 6.0 lb/gal 6.6 lb/gal MOA 7 + 17	24 hours/ 76 days	 2 pt + 2.67 2.5	1 + 2	Apply as a directed spray to cotton that is at least 20 inches tall. See precautions on label. Add 2 qt nonionic surfactant per 100 gal spray solution. Label prohibits applying MSMA after first bloom. Any crop may be planted 4 months after application except for cereals OTHER THAN barley, oats, rye, and wheat.

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE DIRECTED – ANY COTTON CULTIVAR Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Effective control of many broadleaf weeds, nutsedge, and small annual grasses. Limited residual control especially on pigweeds. Much less effective than diuron + MSMA in controlling emerged pigweed and less residual than diuron or Valor.	*prometryn* Caparol 4F + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 5 + 17	12 hours/ unknown	 1.3-2.4 pt + 2.67 pt 2.5 pt	0.65-1.2 + 2	Apply as a directed spray. Use 1.3 pt/A Caparol in 8-12 in. cotton and up to 2.4 pt/A in cotton at least 12 in. Add nonionic surfactant at 2 qt per 100 gal spray solution. See label for rotational restrictions. Label prohibits applying after 1st bloom. The addition of Envoke, Aim, or ET will improve morningglory control. Envoke at 0.1-0.15 oz/A poses no additional injury concern and the mixture can be applied to 12 inch or larger cotton. For Aim or ET at 0.5-1 fl oz/A, cotton should be at least 20 inches tall having 3 inches of bark with spray not contacting green portion of stem. Aim will also improve spiderwort control. The addition of S-metolachlor with prometryn plus MSMA is recommended for managing tropical spiderwort.
Effective control of many broadleaf weeds, yellow nutsedge and small annual grasses. Excellent residual control of sensitive species.	*prometryn* + *trifloxysulfuron* Suprend 80WDG + *MSMA* (several brands) 6.0 lb/gal 6.6 lb/gal MOA 5 + 2+ 17	12 hours/ 60 days	 1-1.25 lb + 2.67 pt 2.5 pt	0.8-1 + 0.007-0.009 + 2	Apply as directed spray in cotton at least 8 in tall. Add nonionic surfactant at 1 qt per 100 gal spray mix. See rotation restrictions on label. Label prohibits applying MSMA after first bloom. Do not exceed 0.0188 lb ai/A per year of trifloxysulfuron from the combined use of Envoke and Suprend. Suprend is formulated as 79.3% prometryn plus 0.7% trifloxysulfuron.
POSTEMERGENCE DIRECTED - ROUNDUP READY FLEX CULTIVARS ONLY Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Controls most annual weeds; exceptions include glyphosate-resistant Palmer amaranth, dayflower, doveweed, Florida pusley, tropical spiderwort, and hemp sesbania. Timely application is critical for controlling morningglory and purslane.	*glyphosate* 4.0SL (3 lb ae) 5.4SL (4 lb ae) 5.0SL (4.17 lb ae) 5.5SL (4.5 lb ae) 6.0SL (5.0 lb ae) MOA 9	4 hours/ 7 days	 32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.12	**ROUNDUP READY FLEX CULTIVARS Glyphosate should never be applied alone but label allows directed application up to 7 d prior to harvest. Contact with RR Flex cotton is not of concern; the primary reason to direct is to obtain better coverage of weeds under canopy.** The addition of conventional herbicide chemistry is STRONGLY suggested. **A sound management program over lapping residual herbicides throughout the season is required to manage glyphosate-resistant Palmer amaranth. Obtain programs from the local extension office or at gaweed.com.**
Warrant does not improve control of emerged weeds, but can give residual control of annual grasses, pigweed species, and spiderwort.	*glyphosate* + *acetochlor* Warrant 3.0 ME MOA 9 + 15	12 hours/ do not apply after bloom	see glyphosate + 3 pt	0.75-1.12 (lb ae) + 1.125	**Can be directed to cotton up to first bloom.** Add surfactant according to label of glyphosate brand used. Make only 2 applications of Warrant in a season.

[1]Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE DIRECTED - ROUNDUP READY <u>FLEX</u> CULTIVARS ONLY Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
Mixture improves control of larger morningglory and tropical spiderwort. No residual weed control.	*glyphosate* + *carfentrazone* Aim EC 2EC MOA 9 + 14	12 hours/ 7 days	see glyphosate + 0.8-1.6 fl oz	0.75-1.12 (lb ae) + 0.013-0.025	**ROUNDUP READY FLEX CULTIVARS** <u>Cotton should be at least 20 in. tall.</u> Extreme care should be exercised in application; see directions and precautions on the Aim label. Contact on green stem will lead to severe injury. Avoid contact of the spray with desirable vegetation.
Mixture improves morningglory and glyphosate-resistant Palmer amaranth control and provides residual control of small-seeded broadleaf weeds, such as pigweed. The tank mix may give less grass control than glyphosate alone.	*glyphosate* + *diuron* Direx, Diuron 4L MOA 9 + 14	12 hours/ 7 days	see glyphosate + 1-1.5 pt	0.75-1.12 (lb ae) + 0.5-0.75	**ROUNDUP READY FLEX CULTIVARS** Use 1 pt of Direx or diuron on cotton 8-12 inches and up to 1.5 pt of Direx or diuron on cotton greater than 12 inches. DO NOT reduce the rate of glyphosate because of the potential for antagonism. See diuron rotational restrictions.
Mixture improves morningglory and tropical spiderwort control and provides residual control of broadleaf weeds including pigweeds, purslane, and Florida pusley. Poor control of glyphosate-resistant Palmer amaranth over 1 inch.	*glyphosate* + *flumioxazin* Valor SX 51WDG MOA 9 + 14	12 hours/ 60 days	see glyphosate + 1-2 oz	0.75-1.12 (lb ae) + 0.031-0.063	**ROUNDUP READY FLEX CULTIVARS** Cotton should be at least 18 inches. Direct spray to the lower 2 inches of cotton stem; minimize cotton contact. Do not allow spray to contact green portion of stem. Add nonionic surfactant at 1 qt per 100 gal spray mix but only if glyphosate brand requires adjuvant. DO NOT use crop oil concentrate, methylated seed oil, organo-silicone adjuvants, or any adjuvant product containing these.
Mixture improves morningglory control and provides residual control of sensitive species. The tank mix may give less grass control than glyphosate alone.	*glyphosate* + *prometryn* Caparol 4F MOA 9 + 5	12 hours/ --	see glyphosate + 1-2 pt	0.75-1.12 (lb ae) + 0.5-1	**ROUNDUP READY FLEX CULTIVARS** Cotton should be at least 8 inch for Caparol rate between 1 and 1.3 pt and at least 12 inch for Caparol rate above 1.3 pt. Add surfactant but only if glyphosate brand requires it. DO NOT reduce the rate of glyphosate because of the potential for antagonism.
Mixture improves control of larger morningglory. Provides no residual weed control.	*glyphosate* + *pyraflufen ethyl* ET 0.208L MOA 9 + 14	12 hours/ 7 days	see glyphosate + 0.5-1.0 fl oz	0.75-1.12 (lb ae) + 0.0008-0.0016	**ROUNDUP READY FLEX CULTIVARS** <u>Cotton should be at least 20 in. tall.</u> Exercise extreme care with this application; see directions and precautions on the ET label. Contact on green stem will lead to severe injury. Avoid contact of the spray with desirable vegetation.

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COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE DIRECTED - ROUNDUP READY <u>FLEX</u> CULTIVARS ONLY Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.					
S-metolachlor does not improve control of emerged weeds, but can give residual control of annual grasses, pigweed species, doveweed, tropical spiderwort and other dayflower species plus suppression of yellow nutsedge.	*glyphosate* + *S-metolachlor* Dual Magnum 7.62EC Brawl 7.62 EC MOA 9 + 15	24 hours/ 80 days	see glyphosate + 1-1.33 pt 1-1.33 pt	0.75-1.12 (lb ae) + 0.95-1.27	**ROUNDUP READY FLEX CULTIVARS** Can be applied to emerged cotton up through 80 days prior to harvest. Do not apply to sands or loamy sand soils.
	glyphosate + *S-metolachlor* Sequence 5.25L MOA 9 + 15	24 hours/ 100 days	see glyphosate + 2.5 pt	0.70 (lb ae) + 0.94	**ROUNDUP READY FLEX CULTIVARS** Direct to cotton up to 12 in. tall and minimize contact with the cotton stems and leaves. Do not add adjuvants or mix with any other product.
Mixing Envoke with glyphosate improves *Ipomoea* morningglory and nutsedge control and provides some residual control of sensitive species.	*glyphosate* + *trifloxysulfuron* Envoke 75DF MOA 9 + 2	12 hours/ 60 days	see glyphosate + 0.1-0.2 oz	0.75-1.12 (lb ae) + 0.005-0.009	**ROUNDUP READY FLEX CULTIVARS** Direct to cotton from 6 in tall through layby and minimize contact with cotton stems and leaves. Add nonionic surfactant according to Envoke label. Excellent tolerance when directed. **Palmer amaranth biotypes with resistance to glyphosate AND ALS chemistry (Staple, Envoke, etc.) have been confirmed in GA and will not be controlled with this mixture.**
Mixing Suprend with glyphosate improves control of morningglory, pigweeds, and nutsedge. Also provides residual weed control of sensitive species.	*glyphosate* + *prometryn* + *trifloxysulfuron* Suprend 80WDG MOA9+5+2	24 hours/ 60 days	see glyphosate + 1-1.25 lb	0.75-1.12 (lb ae) + 0.8-1.0 + 0.007-0.0088	Direct to cotton at least 8 inch tall. Add surfactant according to label of glyphosate brand used. See precautions and rotational restrictions on Suprend label.
Zidua does not improve control of emerged weeds, but can give residual control of annual grasses, pigweeds, and some other small-seeded broadleaf weeds.	*glyphosate* + *pyroxasulfone* Zidua 85DF MOA 9 + 15	12 hours/ do not apply after bloom	0.75-1.5	0.75-1.12 (lb ae) + 0.04-0.08	Mixture can be directed to cotton from 7-leaf to 1st bloom. Label prohibits application to coarse-textured soils.

[1]Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
POSTEMERGENCE-HOODED SPRAYER					
Controls most annual weeds; exceptions include glyphosate-resistant Palmer amaranth, dayflower, doveweed, Florida pusley, tropical spiderwort, and hemp sesbania. Timely application is critical for controlling morningglory and purslane.	*glyphosate* 4.0SL (3 lb ae) 5.4SL (4 lb ae) 5.0SL (4.17 lb ae) 5.5SL (4.5 lb ae) 6.0SL (5.0 lb ae) MOA 9	4 hours/ 7 days	 32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.12 (lb ae)	In non-Roundup Ready cotton, hoods should be kept as close to the ground as possible preventing spray from contacting stems or foliage. Apply in 5-10 GPA at a maximum of 25 PSI. Do not exceed 5 MPH. Suggest that cotton be at least 8 inches tall. Glyphosate is especially effective for prostrate, running species such as citron, burgherkin, and annual grasses. See label of brand used for adjuvant recommendations and use of ammonium sulfate. SUGGEST NOT USING LIQUID NITROGEN AS ENTIRE CARRIER. Other herbicides such as Aim, Caparol, diuron, ET, or Valor may be mixed with certain glyphosate formulations to improve burndown in larger cotton. Caparol, Valor or diuron will also offer residual weed control for several troublesome weeds. Grass control may be reduced with tank mixes of glyphosate plus Caparol or diuron. **A sound management program over lapping residual herbicides throughout the season is required to manage glyphosate-resistant Palmer amaranth. Obtain programs from the local extension office or at gaweed.com.**
Annual grass and broadleaf weeds; suppression of nutsedge. *Mixtures with diuron would be the most effective option to control emerged pigweed in row middles*.	*paraquat* Gramoxone 2SL MOA 22	24 hours/ 3 days	19-38 fl oz	0.3-0.6	DO NOT CONTACT COTTON STEMS OR FOLIAGE. Apply in a minimum of 10-5 GPA at a maximum of 25 PSI. Do not exceed 5 MPH. Hoods should be kept as close to the ground as possible. Cotton should be at least 8 inches. Add nonionic surfactant at 2 pt per 100 gal. of spray mix or crop oil concentrate at 1 gal. per 100 gal spray mix. Caparol or diuron (Direx, diuron) may be mixed with paraquat. Mixtures are usually more effective.
Timing for pigweed and grasses are critical. Control of pusley, spiderwort, and goosegrass is not consistent. Generally, treat broadleaf weeds prior to 3" and grasses prior to 2". Excellent control of morning-glory including moonflower morningglory. Make no more than 2 applications of Liberty per year.	*glufosinate-ammonium* Liberty 280 SL 2.34 L MOA 10	12 hours/ 70 days	29 fl oz	0.53	On non-glufosinate tolerant cotton, keep hoods close to ground to avoid contact with cotton stem. Suggest cotton be at least 8 inches. The addition of diuron or other residual herbicide strongly encouraged. Adjuvant not needed. For maximum activity, wait until 1.5 hours after sunrise to begin spraying and stop at least 1 hour before sunset. Rainfast within 4 hours. Do not apply within 70 d of harvest. Control is improved with warm temperatures, high humidity, and bright sunlight. Mixtures with residual herbicides are often needed to assist in the control of grasses, pusley, and pigweed. **Palmer amaranth should be less than 3 inches when treated with Liberty; diuron + MSMA is more effective.**

[1]Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

COTTON WEED CONTROL

WEED	HERBICIDE & MODE OF ACTION	REI/PHI (Hours or Days)	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)	
HARVEST AID					
Mature morningglory	*carfentrazone-ethyl* Aim 2EC MOA 14	12 hours/ 7 days	up-1.5 fl oz	up-0.024	Apply as a harvest aid when 60-70% of the cotton bolls are open AND when the morningglory are mature (seedpods are visible). May be an additive with other defoliants – see label. See label for addition of adjuvant. See cotton defoliation section.
	pyraflufen ethyl ET 0.208EC MOA 14	12 hours/ 7 days	up-2.75 oz	up-0.0044	Apply as a harvest aid when 60-70% of the cotton bolls are open AND when the morningglory are mature (seedpods are visible). May be an additive with other defoliants – see label. See label for addition of adjuvant. See cotton defoliation section.
Desiccation of most weeds. Regrowth of many weeds occurs soon after application.	*paraquat* Gramoxone Inteon 2SL MOA 22	24 hours/ 3 days	16-32 fl oz	0.25-0.5	Defoliate cotton as normal. After at least 75% of bolls are open, the remainder of bolls expected to harvest are mature, and most of the cotton leaves have dropped, apply paraquat in a minimum of 20 GPA. Add nonionic surfactant at 1 pt per 100 gal spray mix. Wait 3-5 days and pick the cotton as soon as possible. Expect additional trash. An additional option is to add 2-6 oz of Gramoxone Inteon with standard defoliation mixtures. Be aware of potential pine tree injury with drift. Generic brands of paraquat containing 3 lb active per gallon may be labeled. These productswould be applied at 11-21 fl oz for 0.25-0.5 lb ae, respectively. See cotton defoliation section.
Annual grasses and broadleaf weeds	*glyphosate* 4.0 SL (3 lb ae) 5.4 SL (4 lb ae) 5.0 SL (4.17 lb ae) 5.5 SL (4.5 lb ae) 6.0 SL (5.0 lb ae) MOA 9	4 hours/ 7 days	 32-64 fl oz 24-48 fl oz 23-46 fl oz 22-44 fl oz 19-38 fl oz	0.75-1.5 (lb ae)	Apply after at least 60% of bolls are open in non-Roundup Ready cotton. May be tank mixed with defoliants. See label and defoliant section. Include nonionic surfactant according to the label of glyphosate brand used. May apply in Roundup Ready Flex cotton up to 7 days before harvest. See cotton defoliation section.

[1]Mode of Action (MOA) code can be used to delay weed resistance by increasing herbicide diversity in a management program.

WEED RESPONSE TO BURNDOWN HERBICIDES USED IN COTTON

A. Stanley Culpepper, Extension Agronomist-Weed Science

WEED SPECIES	BURNDOWN TREATMENT[1]									
	2,4-D[3]	glyphosate	glyphosate[2] + 2,4-D[3]	glyphosate[2] + Clarity[4]	glyphosate[2] + Aim or ET	glyphosate[2] + diuron[7]	glyphosate[2] + Harmony Extra[5]	glyphosate[2] + Valor SX[6]	paraquat	paraquat + Direx[7]
GRASSES / SEDGES										
annual bluegrass	N	E	E	E	E	E	E	E	G-E	E
bermudagrass	N	F	F	F	F	F	F	F	P	P
crabgrass	N	E	G-E	E	E	G	E	E	F-G	G
goosegrass	N	E	G-E	E	E	G	E	E	F-G	G
Italian ryegrass	N	G	G	G	G	F	G	G	F	F-G
johnsongrass	N	G-E	G	G	G-E	F-G	G-E	G-E	P	P
little barley	N	E	E	E	E	E	E	E	G	G-E
sandbur	N	E	G-E	G-E	E	G	E	E	G	G
Texas panicum	N	E	G-E	E	E	G	E	E	G	G-E
volunteer corn (not RR vol.corn)	N	E	E	E	E	E	E	E	F	F-G
purple nutsedge	N	F-G	F-G	F-G	F-G	F-G	F-G	G	P-F	F
yellow nutsedge	N	P-F	P-F	P-F	P-F	F	P-F	F	P-F	F
BROADLEAVES										
bristly starbur	G	E	E	E	E	E	E	E	E	E
buttercup	G	G-E	E	E	G-E	G-E	G-E	G-E	E	E
Carolina geranium	F	P-F	F-G	G	F-G	G	G-E	G	G-E	E
chickweed	P	E	E	E	E	E	E	E	E	E
citronmelon	F	G-E	E	E	E	G-E	G-E	E	F	G
cocklebur	E	E	E	E	E	E	E	E	G-E	E
coffee senna	G	E	E	E	E	E	E	E	F	G
corn spurry	P-F	G-E	G-E		G-E	G-E		E	F-G	G-E
cowpea	G	E			E	E		E	E	E
cudweed	P	G-E	E	E	G-E	E	E	E	F-G	G
curly dock	P-F	F	F-G	G-E	F	P-F	E	F	N-P	P
cutleaf primrose	E	P-F	E	G	F	F-G	F	F-G	F[8]	G-E[8]
eclipta	P	G-E			G-E	G-E		G-E	F	F
Florida beggarweed	P-F	E	E	E	E	E	E	E	E	E
Florida pusley	F	F	G	G	G	F-G	F	F-G	F	F-G
field pansy	P-F	F	F-G	F-G			F	G	G	G-E
hemp sesbania	G-E	P-F	E		G-E	F-G			F	F-G
henbit	P	F	F-G	G	F-G	G	E	G-E	G[8]	E[8]

WEED RESPONSE TO BURNDOWN HERBICIDES USED IN COTTON

WEED SPECIES	BURNDOWN TREATMENT[1]									
	2,4-D[3]	glyphosate	glyphosate[2] + 2,4-D[3]	glyphosate[2] + Clarity[4]	glyphosate[2] + Aim or ET	glyphosate[2] + diuron[7]	glyphosate[2] + Harmony Extra[5]	glyphosate[2] + Valor SX[6]	paraquat	paraquat + Direx[7]
BROADLEAVES (continued)										
horsenettle	F	F	F-G		P-F	F	F		P-F	F
horseweed	G-E[9]	G-E[10]	E[10]	E[10]	G-E[10]	G-E[10]	G-E[10]	G-E[10]	P-F	F-G
lambsquarters	E	F-G	E	E	G-E	G-E			F-G	G
morningglory, *Ipomoea*	G-E	F	E	E	E	G	F	E	F-G	G-E
morningglory, smallflower	F-G	G	E	E	G-E	G-E	G	E	P	F-G
Palmer amaranth	F[9]	E	E	E	E	E	E	E	F-G	G-E
Palmer amaranth (glyphosate-resistant)	F[9]	N	F[9]	F	P-F	G	P	P-F	F-G	G-E
Pennsylvania smartweed	F	G	G	E	G-E	G	E		P-F	F-G
prickly sida	F-G	F-G	G	E	F-G	F-G	F-G		P-F	F-G
purslane	G-E	F	G-E	E	F-G	G	F	G	G	G-E
ragweed	E	G	E	E	G-E	G			G	G
redweed	F	G		G-E	G-E	G			F	G
shepherdspurse	G	G		G	G				G	G
sicklepod	F-G	G-E	E	E	G-E	E	G-E	E	E	E
speedwell	P-F	E	E	E	E	E	E	E	G	E
spurred anoda	F-G	G			G	G			F-G	F-G
swinecress	F	F-G	G	F-G	F-G	G	G-E	F-G	P-F	F-G
tropic croton	F	G-E	G-E	G-E	G-E	G-E		E	F	F-G
tropical spiderwort	G-E	P	G-E	P-F	Aim = G-E ET = P-F	F	P	G	G	G-E
velvetleaf	F-G	G			G-E	G			P	P

Key:
E = 90% or better control
G = 80% to 90% control
F = 60% to 80% control
P = 30% to 60% control
N = < 30% control.

[1]Application rates per acre: Clarity: 0.5 pt; 2,4-D: 1 pt; Aim: 1 oz; ET: 1-2 oz; diuron: 0.5-1.0 lb a.i.; glyphosate acid: 0.75-1.12 lb a.e.; paraquat: 0.75-1.0 lb a.i.; Harmony Extra TotalSol: 0.75 oz; Valor: 2 oz.
[2]Mixing herbicides with glyphosate occasionally reduces grass control (including covercrops). This is more likely with large weeds in dry conditions.
[3]Labels for 2,4-D are ambiguous concerning the waiting period between application and planting, see label of specific brand used.
[4]Following application of Clarity and a minimum of 1 inch of rainfall, a minimum 21-day waiting period before planting is required.
[5]Harmony Extra or Express should be applied at least 14 days prior to planting.
[6]See plant back restrictions noted in the previous section or on the label for Valor.
[7]See previous cotton section on state label for reduced plant back interval for Direx.
[8]This level of control requires plants to be in full bloom with seed forming when treated.
[9]This level of control requires 1.5-2 pt of 2,4-D (4 lb a.i. product).
[10]Glyphosate will not control glyphosate-resistant horseweed, see previous section on controlling this weed.
[11]Small grain must have visible seedheads for this level of control.
Note: Ratings based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.

WEED SPECIES	BURNDOWN TREATMENT[1]									
	2,4-D[3]	glyphosate	glyphosate[2] + 2,4-D[3]	glyphosate[2] + Clarity[4]	glyphosate[2] + Aim or ET	glyphosate[2] + diuron[7]	glyphosate[2] + Harmony Extra[5]	glyphosate[2] + Valor SX[6]	paraquat	paraquat + Direx[7]
BROADLEAVES (continued)										
vines (maypop, trumpet creeper)	F	P-F			P-F	F			P	P
Virginia pepperweed	G-E	G	E	G-E	G	G	G	G-E	G	G
volunteer peanuts	P	P-F	P-F	F-G	F-G	F-G	F	F-G	P	P-F
wild lettuce	G	G-E	G-E	G-E	G-E	G-E	G-E	E	P	F
wild poinsettia	F-G	G			G-E	G-E			G-E	G-E
wild radish	G-E	F-G	E	G-E	G	G	E	G	F-G	G-E
COVER CROPS										
clover	F	F	F-G	F-G	F	F-G			F-G	G-E
lupine	G	G	G		G	G			F-G	F-G
small grains	N	E	E	E	E	F-G	E	E	G[11]	G-E[11]
vetch	G-E	F	E	E	F	F-G	G	F-G	P-F[8]	F-G[8]

Key:
E = 90% or better control
G = 80% to 90% control
F = 60% to 80% control
P = 30% to 60% control
N = < 30% control.

[1]Application rates per acre: Clarity: 0.5 pt; 2,4-D: 1 pt; Aim: 1 oz; ET: 1-2 oz; diuron: 0.5 to 1.0 lb a.i.; glyphosate acid: 0.75 to 1.12 lb a.e.; paraquat: 0.75 to 1.0 lb a.i.; Harmony Extra TotalSol: 0.75 oz; Valor: 2 oz.
[2]Mixing herbicides with glyphosate occasionally reduces grass control (including covercrops). This is more likely with large weeds in dry conditions.
[3]Labels for 2,4-D are ambiguous concerning the waiting period between application and planting, see label of specific brand used.
[4]Following application of Clarity and a minimum of 1 inch of rainfall, a minimum 21-day waiting period before planting is required.
[5]Harmony Extra or Express should be applied at least 14 days prior to planting.
[6]See plant back restrictions noted in the previous section or on the label for Valor.
[7]See previous cotton section on state label for reduced plant back interval for Direx.
[8]This level of control requires plants to be in full bloom with seed forming when treated.
[9]This level of control requires 1.5 to 2 pt of 2,4-D (4 lb a.i. product).
[10]Glyphosate will not control glyphosate-resistant horseweed, see previous section on controlling this weed.
[11]Small grain must have visible seedheads for this level of control.
Note: Ratings based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.

WEED RESPONSE TO HERBICIDES USED IN COTTON

A. Stanley Culpepper, Extension Agronomist-Weed Science

WEED SPECIES	PREPLANT INCORPORATED		PREEMERGENCE						
	Prowl	Treflan others	Prowl[1]	Command	Cotoran others	Direx others	Reflex	Staple	Warrant
PERENNIALS									
bermudagrass	N	N	N	P-F	N	N	N	N	N
johnsongrass (rhizome)	P	P	P	N	N	N		N	P
yellow nutsedge	N	N	N	N	N	N	G-E	F	P
purple nutsedge	N	N	N	N	N	N	P-F	F	P
ANNUAL GRASSES									
broadleaf signalgrass	G	G	F	E	P	P	F-G	P	F-G
crabgrass	E	E	G	E	F-G	F-G	F-G	P	E
crowfootgrass	E	E	G	G	F-G	F-G			E
fall panicum	G	G	F-G	G-E	F	P		P-F	G
foxtails	E	E	G	E	F-G			P	E
goosegrass	E	E	G	E	F	F		P-F	E
johnsongrass (seedling)	E	E	G	G	P	P		F-G	F
sandbur	E	E	G	F-G	G	G			F-G
Texas panicum	G	G	F	F	P	P	F	N	P-F
ANNUAL BROADLEAVES									
bristly starbur	N	N	N	P	G-E	F-G	G-E	F-G	P
burgherkin	N	N	N	P	F-G	F		F-G	P
citronmelon	N	N	N	P	F-G	F		F-G	P
cocklebur	N	N	N	F	F-G	F	G	N-P	P
coffee senna	N	N	N	P	F-G	F	N	G	P
cowpea	N	N	N	N-P	P	P		F-G	P
crotalaria	N	N	N		G	G			P
eclipta	P	P	P		G		G-E		
Florida beggarweed	P	P	P	F-G	G-E	G	P	G	P-F
Florida pusley	E	E	F-G	F-G	F-G	P-F	P	F	G
hemp sesbania	N	N	N	F	P	P	P	P	P

Key:
E = 90% or better control
G = 80% to 90% control
F = 60% to 80% control
P = 30% to 60% control
N = < 30% control

[1]Assumes irrigation or rainfall occurs within 48 hrs.
[2]Fair on pitted morningglory.
[3]Staple does not control tall morningglory or ALS-resistant Palmer amaranth.
Note: Ratings based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.

WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	PREPLANT INCORPORATED		PREEMERGENCE						
	Prowl	Treflan others	Prowl[1]	Command	Cotoran others	Direx others	Reflex	Staple	Warrant
ANNUAL BROADLEAVES (continued)									
jimsonweed	N	N	N	G	G	G		F-G	
lambsquarters	G-E	G-E	G	G	G-E	G-E	E	G	F
morningglories									
Ipomoea	P	P	P	P-F[2]	G	F	P-F	F[3]	P
smallflower	P	P	P	P	G-E	G	G-E	E	P
Palmer amaranth	F-G	F-G	P-F	N-P	F	G	E	G-E[3]	G
pigweeds: redroot or smooth	G-E	G-E	F-G	P	G-E	G-E	E	E	G-E
prickly sida	N	N	N	E	G	F		G	F
purslane	E	E	G	G-E	E	E	G	G	G
ragweed	N	N	N	G	E	G	G	N-P	P
redweed	N	N	N	G-E	E	G-E		G-E	
smartweed:									
ladysthumb	N	N	N	N	G	G		G	
Pennsylvania	N	N	N	E	G	G		G	
sicklepod	N	N	N	P	G	F	P	P-F	P
spurge	N	N	N	N	P-F	F		G	P-F
tropic croton	N	N	N	E	F-G	F-G	F-G	F-G	P
tropical spiderwort	N	N	N	F	F	P-F	N	P	E
volunteer peanuts	N	N	N	N	P-F	P	P	P	N
wild poinsettia	N	N	N	F	N	N	G-E	G	P

Key:
E = 90% or better control
G = 80% to 90% control
F = 60% to 80% control
P = 30% to 60% control
N = < 30% control

[1]Assumes irrigation or rainfall occurs within 48 hrs.
[2]Fair on pitted morningglory.
[3]Staple does not control tall morningglory or ALS-resistant Palmer amaranth.
Note: Ratings based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.

WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	Residual Control by POST Applied Herbicides (Assuming soil contact)			
	Dual Magnum	Staple	Envoke	Warrant
PERENNIALS				
bermudagrass	N	N	N	N
johnsongrass (rhizome)	P	N	N	P
yellow nutsedge	F	P-F		P
purple nutsedge	P	F		P
ANNUAL GRASSES				
broadleaf signalgrass	F-G	P	P	F-G
crabgrass	E	P	P	E
crowfootgrass	E		P	E
fall panicum	G	P-F	P	G
foxtails	E	P	P	E
goosegrass	E	P-F	P	E
johnsongrass (seedling)	F	F	P	F
sandbur	F-G		P	F-G
Texas panicum	P-F	N	P	P-F
ANNUAL BROADLEAVES				
bristly starbur	P	G	G-E	P
burgherkin	P	F-G		P
citronmelon	P	F-G		P
cocklebur	P	N-P		P
coffee senna	P	G		P
cowpea	P	F-G		P
crotalaria	P			P
eclipta	P-F			
Florida beggarweed	P-F	G	F-G	P-F
Florida pusley	G	F	P-F	G
hemp sesbania	P	P		P
jimsonweed		F-G		
lambsquarters	F	G		F
morningglorie				
Ipomoea	P	F[3]		P
smallflower	P	E	P-F	P
Palmer amaranth	G	G-E[3]	P-F	G
pigweeds: redroot or smooth	G-E	G-E	F	G-E

WEED SPECIES	Residual Control by POST Applied Herbicides (Assuming soil contact)			
	Dual Magnum	Staple	Envoke	Warrant
ANNUAL BROADLEAVES				
prickly sida	F	G		F
purslane	G	G		G
ragweed	P	N-P		P
redweed		G-E		
smartweed:				
ladysthumb		G		
Pennsylvania		G		
sicklepod	P	P	P-F	P
spurge	P-F	G		P-F
tropic croton	P	F		P
tropical spiderwort	E	P		E
volunteer peanuts	N	P	P	N
wild poinsettia	P	G		P

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[1]Assumes irrigation or rainfall occurs within 48 hrs.
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Note: Ratings based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.

WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	POST OVER-THE-TOP					
	Assure	Fusilade	Poast	Select/Select Max	MSMA	Cotoran
PERENNIALS						
bermudagrass	G	G	F	G	N	N
johnsongrass (rhizome)	E	G-E	G	G-E	P	N
purple nutsedge	N	N	N	N	N-P	N
yellow nutsedge	N	N	N	N	P	N
ANNUAL GRASSES						
broadleaf signalgrass	G	G-E	E	E	P	P
crabgrass	G	G	G-E	G-E	P	P-F
crowfootgrass	G	F	F-G	G	P	P-F
fall panicum	G-E	G-E	E	E	P	P-F
foxtails	E	E	E	E		
goosegrass	G	G	G-E	G-E	P	P-F
johnsongrass (seedling)	E	G-E	G-E	E	P	P
sandbur		G	G	G	P	P
Texas panicum	G	G	E	E	N-P	N
ANNUAL BROADLEAVES						
bristly starbur	N	F-G	N	N	P	G
burgherkin	N	N	N	N	P-F	F-G
citronmelon	N	N	N	N	P-F	G
cocklebur	N	N	N	N	E	F-G
coffee senna	N	N	N	N	P-F	F-G
cowpea	N	N	N	N	F	F-G
crotalaria	N	N	N	N	F	G
eclipta	N	N	N	N		
Florida beggarweed	N	N	N	N	E	G
Florida pusley	N	N	N	N	N-P	P-F
hemp sesbania	N	N	N	N		
jimsonweed	N	N	N	N	P	G

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WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	POST OVER-THE-TOP					
	Assure	Fusilade	Poast	Select/Select Max	MSMA	Cotoran
ANNUAL BROADLEAVES (continued)						
lambsquarters	N	N	N	N	P	G
morninglories	N	N	N	N	P-F	G
Palmer amaranth	N	N	N	N	P	P-F
pigweeds: smooth and redroot	N	N	N	N	P	F
prickly sida	N	N	N	N	P	F-G
purslane	N	N	N	N	P-F	F-G
ragweed	N	N	N	N	P-F	G
redweed	N	N	N	N	N	F-G
sicklepod	N	N	N	N	P-F	F-G
smartweed: ladysthumb Pennsylvania	 N N	 N N	 N N	 N N	 N-P N-P	 F-G F-G
spider flower	N	N	N	N		F
spurge	N	N	N	N	N	P-F
tropic croton	N	N	N	N	F	F-G
tropical spiderwort	N	N	N	N	P	P
volunteer peanuts	N	N	N	N	P	F
wild poinsettia	N	N	N	N	P	F

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WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	POST OVER-THE-TOP						
	Staple	Envoke	Envoke + Staple	glyphosate[2]	glyphosate[2] + Staple	glyphosate[2] + Envoke	Liberty[3]
PERENNIALS							
bermudagrass	N	N	N	F	F	F	N
johnsongrass (rhizome)	N-P	P	N-P	G-E	G-E	G-E	F
purple nutsedge	P-F	F-G	F-G	F-G	F-G	G	P
yellow nutsedge	P-F	G	G	F	F-G	G-E	P
ANNUAL GRASSES							
broadleaf signalgrass	N	N	N	E	E	E	G
crabgrass	N	P	P	E	E	E	G
crowfootgrass	N	N	N	E	E	E	G
fall panicum	N	N-P	P	E	E	E	G
foxtails	N-P	N-P	N-P	E	E	E	G
goosegrass	N-P	N-P	N-P	E	E	E	P
johnsongrass (seedling)	P	P	P-F	E	E	E	G
sandbur	P			E	E	E	G
Texas panicum	N	N-P	P	E	E	E	G
ANNUAL BROADLEAVES							
bristly starbur	G	G-E	G-E	E	E	E	G
burgherkin	G			G-E	G-E	G-E	
citronmelon	G-E	G-E	G-E	G-E	E	E	G
cocklebur	G	G-E	E	E	E	E	E
coffee senna	G			E	E	E	G
cowpea	G	G	G-E	E	E	E	G
crotalaria				G	G	G	
eclipta	G	P-F		E	E	E	G
Florida beggarweed	G	G-E	G-E	E	E	E	G
Florida pusley	N-P	P	P	P-G	P-G	P-G	F
hemp sesbania	G-E			P-F	G-E		

Key:
E = 90% or better control
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[1]Staple does not control tall morningglory.
[2]Glyphosate should be applied only to glyphosate-resistant cultivars. All formulations of glyphosate are not labeled for this use.
[3]Liberty should be applied to cotton tolerant to Liberty such as Liberty Link cotton.
Key: E = 90% or better control; G = 80% to 90% control; F = 60% to 80% control; P = 30% to 60% control; N = < 30% control.
Note: Ratings based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.

WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	POST OVER-THE-TOP						
	Staple	Envoke	Envoke + Staple	glyphosate[2]	glyphosate[2] + Staple	glyphosate[2] + Envoke	Liberty[3]
ANNUAL BROADLEAVES (continued)							
jimsonweed	E	N		E	E	E	E
lambsquarters	N	G		G	G	E	E
Ipomoea morningglories	G[1]	G	G-E	F-G	G-E	E	E
Smallflower morningglory	E	N	E	G	E	G	E
Palmer amaranth	F	P-F	F	E	E	E	F-G
Palmer amaranth (glyphosate-resistant)	F	P-F	F	N	F	P-F	F-G
Palmer amaranth (glyphosate-and ALS resistant)	N	N	N	N	N	N	F-G
pigweed: smooth and redroot	G	F-G	G	E	E	E	G
prickly sida	F	N	F	F-G	G	G	F
purslane	F			F-G	G	G	F-G
ragweed, common	P	G		E	E	E	E
redweed	G			E	E		
sicklepod	P-F	E	E	E	E	E	E
smartweed: ladysthumb Pennsylvania	G G	G G		G G	E E	E E	E G
spider flower							
spurge	F-G			G	G	G	F-G
tropic croton	P	P-F	P-F	E	E	E	G
tropical spiderwort	F	P-F	F	P-G	G	P-G	P-F
volunteer peanuts	P	P-F		F-G	F-G	F-G	G-E
wild poinsettia	F	G		G-E	G-E	E	P-F

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WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	POSTEMERGENCE-DIRECTED							
	MSMA	Cotoran + MSMA	Caparol + MSMA	Direx, others + MSMA	Direx + Linex + MSMA	Cobra + MSMA	Valor + MSMA	Suprend + MSMA
PERENNIALS								
bermudagrass	N	N	N	N	N	N	N	N
johnsongrass (rhizome)	P	P	P	P	P	P	P	P
purple nutsedge	F	F	F	F	F	F	F-G	E
yellow nutsedge	F-G	F-G	F-G	G	G	F-G	G	E
ANNUAL GRASSES								
broadleaf signalgrass	F	F	F-G	G	G	P-F	F	F-G
crabgrass	F	F	F-G	G	G	P-F	F	F-G
crowfootgrass	F	F	F-G	F-G	F-G	P-F	F	F-G
fall panicum	F	F	F-G	F-G	F-G	P-F	F	F-G
foxtails	F	F	F-G	F-G	F-G	P-F	F	F-G
goosegrass	F	F	F-G	F-G	F-G	P-F	F	F-G
johnsongrass (seedling)	F	F	F-G	F-G	F-G	P-F	F	F-G
sandbur	F	F	F-G	F-G	F-G	P-F	F	F-G
Texas panicum	P	P	F	F	F	P	P-F	F
ANNUAL BROADLEAVES								
bristly starbur	P-F	G	G	G	G	G	G	G-E
burgherkin	F	F-G	G	G	G	G		
citronmelon	F	G	F-G	G	G	G		
cocklebur	E	E	E	E	E	E	E	E
coffee senna	F	G	G	G	G	F	G	
cowpea	F-G	G	G	G	G	F-G	G	
crotalaria	G	G	G	G	G	G		
eclipta		G	G	E	E	E	E	E
Florida beggarweed	E	E	E	E	E	E	E	E

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WEED SPECIES	POSTEMERGENCE-DIRECTED							
	MSMA	Cotoran + MSMA	Caparol + MSMA	Direx, others + MSMA	Direx + Linex + MSMA	Cobra + MSMA	Valor + MSMA	Suprend + MSMA
ANNUAL BROADLEAVES (continued)								
Florida pusley	P	F	F	F	F	F	F-G	F
hemp sesbania	N	P-F	P-F	P-F		F		
jimsonweed	F	G-E	G	G	G	G-E	E	G
lambsquarters	P-F	G	G	G	G	F	F-G	G-E
morninglories	P-F	F-G	G	G	G-E	E	E	E
Palmer amaranth	P	F	F	G-E	G-E	F	F-G	G-E
pigweeds: redroot or smooth	P-F	G	G	G-E	G-E	G	G-E	G-E
prickly sida	P	F-G	G-E	G-E	G-E	G-E	G-E	G-E
purslane	P-F	F-G	F-G	G	G	G	G	
ragweed, common	F	G-E	E	E	E	E	G-E	E
redweed	N	F-G	G	G-E		F		
sicklepod	F	G	G-E	G-E	G-E	P-F	G-E	E
smartweed: ladysthumb & Penn	P	G	F	F	F	F	G	
spider flower	G-E (in bloom)	G-E (in bloom)	G-E (in bloom)	G-E (in bloom)	G-E (in bloom)	G-E (in bloom)		
spurge	N	P-F	G	G		G	G	
tropic croton	F	G	G	G	G	E	E	G-E
tropical spiderwort	F	G	F-G	G	G	F-G	G-E	F-G
volunteer peanuts	P-F	F-G	F-G	G	G	P-F	F-G	G
wild poinsettia	P-F	F	P-F	P-F		G	G	

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WEED RESPONSE TO HERBICIDES USED IN COTTON

WEED SPECIES	POSTEMERGENCE-DIRECTED							HOOD
	glyphosate[1]	glyphosate[1] + Direx	glyphosate[1] + Aim	glyphosate[1] + Envoke	glyphosate[1] + Staple	glyphosate[1] + Valor	Liberty[2]	Gramoxone + Direx
PERENNIALS								
bermudagrass	F	F	F	F	F	F	N	P
johnsongrass (rhizome)	G-E	G	G-E	E	G-E	G-E	F	P
purple nutsedge	F-G	G	F-G	E	F-G	G	P	P-F
yellow nutsedge	F	F-G	F	E	F-G	G	P	P-F
ANNUAL GRASSES								
broadleaf signalgrass	E	G-E	E	E	E	E	G	G-E
crabgrass	E	G-E	E	E	E	E	F-G	G
crowfootgrass	E	G-E	E	E	E	E	G	G
fall panicum	E	G-E	E	E	E	E	G	G
foxtails	E	G-E	E	E	E	E	G	G
goosegrass	E	G-E	E	E	E	E	P	G
johnsongrass (seedling)	E	G-E	E	E	E	E	G	G
sandbur	E	G-E	E	E	E	E	G	G
Texas panicum	E	G-E	E	E	E	E	G	G
ANNUAL BROADLEAVES								
bristly starbur	G-E	G-E	G-E	G-E	G-E	E	G	E
burgherkin	G	G	G		G			F
citronmelon	G-E	G-E	G-E	E	E	E	G	G
cocklebur	E	E	E	E	E	E	E	G
coffee senna	E	E	E	E	E	E	G	F
cowpea	G-E	G-E	G-E	G-E	G-E	E	G	G
crotalaria	G	G	G		G			
eclipta	E	E	E	E	E	E	G	F
FL beggarweed	E	E	E	E	E	E	G	E
Florida pusley	P-G	G	G	P-G	P-G	G-E	F	P-F
hemp sesbania	P-F		G-E		G-E			

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[1]Glyphosate should be applied only to glyphosate-resistant cotton.
[2]Liberty should be applied to cotton tolerant of Liberty such as Liberty Link cotton.
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WEED SPECIES	POSTEMERGENCE-DIRECTED							HOOD
	glyphosate[1]	glyphosate[1] + Direx	glyphosate[1] + Aim	glyphosate[1] + Envoke	glyphosate[1] + Staple	glyphosate[1] + Valor	Liberty[2]	Gramoxone + Direx
ANNUAL BROADLEAVES (continued)								
jimsonweed	E	E	E	E	E	E	E	G
lambsquarters	G	G-E	G-E	G-E	G-E	G-E	E	F
morning glory - *Ipomoea*	F-G	G-E	E	G-E	G-E	E	E	F-G
morningglory - smallflower	G	E	E	G	E	E	E	P-F
Palmer amaranth	E	E	E	E	E	E	F-G	G-E
Palmer amaranth (glyphosate-resistant)	N	F-G	P-F	P	F	P-F	F-G	G-E
Palmer amaranth (glyphosate & ALS resis.)	N	F-G	P-F	N	N	P-F	F-G	G-E
pigweed: redroot or smooth	E	E	E	E	E	E	G	G-E
prickly sida	F-G	G	F-G	F-G	G	G-E	F-G	P-F
purslane	F-G	G-E	G			G-E	F-G	G
ragweed, common	E	E	E	E	E	E	E	F
redweed	G-E	G-E	G-E		G-E			F-G
sicklepod	E	E	E	E	E	E	E	G-E
smartweed:	G	G	G-E	E	E	G	G-E	G
spider flower			G			G		
spurge	G	G-E	G-E	G	G	G	F-G	
tropic croton	E	E	E	E	E	E	G	F
tropical spiderwort	P-F	F-G	G-E	P-F	F-G	G-E	P-F	G-E
volunteer peanuts	F	G	F-G	F-G	F	F-G	G-E	P
wild poinsettia	G	G	G-E	E	G	G-E	P-F	G

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COTTON DEFOLIATION / HARVEST AID OPTIONS

Jared Whitaker, Extension Agronomist & Guy Collins, Extension Agronomist

The following are basic guidelines for harvest aid application. Rates indicated are amount per acre. Specific rates should be adjusted according to temperature, humidity, day-length, plant leaf condition and maturity, expected weather, and desired effects such as defoliation, regrowth control, boll opening and/or weed control. Defoliants should be applied in a minimum spray volume of 5 gallons per acre by air and 10 to 20 gallons per acre by ground. Reduced performance issues are often related to low spray volume and poor canopy penetration. Fields should be fit into one of the following categories based on temperature and harvest aid function. Preparing cotton for harvest is often difficult and is influenced by many factors, therefore the guidelines below should be considered as basic recommendations. Always observe label restrictions before using cotton harvest aids.

HARVEST-AID FUNCTION	**PRODUCT COMMON NAME (BRAND NAME)**	**BROADCAST RATE/ACRE**	**REMARKS AND PRECAUTIONS** *(The rates below are given in the broadcast amount per acre unless otherwise noted)*
EARLY-SEASON (highs 90°F plus, lows 70°F plus)			
Defoliation Only (combinations provide more consistent defoliation than a single product)	*carfentrazone* Aim EC	0.75-1 oz.	Add non-ionic surfactant at 0.25% v/v. The potential for leaf sticking is greater during periods of high temperatures.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add crop oil at 1 to 2 pt/A. Limited data, use precaution. The potential for leaf sticking is greater during periods of high temperatures.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add crop oil at 1 pt/A. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add crop oil at 0.5% v/v. The potential for leaf sticking is greater during periods of high temperatures.
	sodium chlorate	3 lb. ai	Apply to mature foliage only. Do not mix with products containing tribufos or ethephon.
	tribufos Def/Folex	1.5 pt.	Reduce rate to 1.25 pt. if above 94°F.
Regrowth Control and Defoliation	*thidiazuron* (numerous brands)	3.2 oz.	For maximum regrowth control. Thidiazuron is sensitive to wash-off when rain occurs within 6 to 12 hours after application. Addition of tribufos (4 to 8 oz.) or ammonium sulfate (2 lb./A) enhances rainfastness.
	thidiazuron (numerous brands) + *tribufos* Def/Folex	1.6-2.5 oz. + 4-16 oz.	For minimum regrowth control apply thidiazuron at 1.6 oz. plus tribufos at 8 to 12 oz. For good regrowth control apply thidiazuron at 2.5 oz. plus tribufos at 8 to 12 oz. For superior regrowth control apply thidiazuron at 3.2 oz. plus tribufos at 6 to 8 oz. These combinations may cause "leaf sticking" when temperatures exceed 94°F, when combined with spray adjuvants, or when calibration errors occur. Consider reducing higher rates of tribufos by 10-20% when temperatures exceed 94°F. Regrowth control or suppression is minimal when thidiazuron is applied at rates below 1.6 oz. Higher rates (2.5 to 3.2 oz.) or sequential applications increase time of effectiveness.
	thidiazuron (numerous brands) + **ONE OF THE FOLLOWING:**	1.6-2.5 oz. +	
	carfentrazone Aim EC	0.75 oz	Add 0.25 % v/v non-ionic surfactant.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add crop oil at 1 pt/A. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add crop oil at 1 pt/A. Limited data, use precaution. The potential for leaf sticking is greater during periods of high temperatures.
	pyraflufen ethyl ET	1.5 oz.	Add 0.5% v/v crop oil.

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME (BRAND NAME)	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS (*The rates below are given in the broadcast amount per acre unless otherwise noted)*
EARLY-SEASON (highs 90°F plus, lows 70°F plus)			
Regrowth Control and Defoliation (continued)	*thidiazuron + diuron* (numerous brands)	6.4-8 oz.	Limited data are available with these products. Regrowth control is minimal when some brand products are applied at rates below 6.4 oz. Likelihood of leaf sticking may occur when temperatures exceed 94°F or when high rates are used.
	glyphosate (numerous brands) + *tribufos* Def/Folex	1.2-2 pt. + 8-16 oz.	Glyphosate WILL NOT provide regrowth suppression when applied to RF cotton. See specific labels for product rates.
Boll Opening and Defoliation	*ethephon* (numerous brands)	2.0-2.67 pt.	
	ethephon (numerous brands) + **ONE OF THE FOLLOWING:** *carfentrazone* Aim EC	1.33-1.5 pt. + 0.75 oz.	Add 0.25 % v/v non-ionic surfactant.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 0.5% v/v crop oil.
	tribufos Def/Folex	1-1.25 pt.	
	thidiazuron (numerous brands)	1.6 oz.	
	thidiazuron + diuron (numerous brands)	4-6 oz.	Likelihood of "leaf sticking" is increased when applied at or above 5 oz in combinations of defoliants. Rate of 4 oz. suggested during periods of high temperatures.
	ethephon + urea sulfate FirstPick + **ONE OF THE FOLLOWING:**	1.75-2 qt. +	Likelihood of leaf sticking is increased during periods of high temperatures.
	carfentrazone Aim EC	0.75 oz.	
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	
	thidiazuron (numerous brands)	1.6 oz.	
	thidiazuron + diuron (numerous brands)	4-6 oz.	Likelihood of "leaf sticking" increases when applied at or above 5 oz. in combinations of defoliants. Rate of 4 oz. recommended during early season.
	tribufos Def/Folex	4-6 oz.	

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME (BRAND NAME)	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS (*The rates below are given in the broadcast amount per acre unless otherwise noted)*
EARLY-SEASON (highs 90°F plus, lows 70°F plus)			
Boll Opening and Defoliation (continued)	*ethephon + cyclanilide* Finish 6 Pro + **ONE OF THE FOLLOWING:**	1.33-1.5 pt. +	
	carfentrazone Aim EC	0.75 oz.	Add 0.25 % v/v non-ionic surfactant.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 0.5% v/v crop oil.
	thidiazuron (numerous brands)	1.6 oz.	
	thidiazuron + diuron (numerous brands)	4-6 oz.	Likelihood of "leaf sticking" increases when applied at or above 5 oz. in combinations of defoliants. Rate of 4 oz. recommended during early season.
	tribufos Def/Folex	4-6 oz.	
Boll Opening, Regrowth Control, and Defoliation	*ethephon* (numerous brands) + **ONE OF THE FOLLOWING:**	1.33-1.5 pt. +	Limited data are available for some products. Regrowth control is minimal when these products are applied at rates below 6.4 oz.
	thidiazuron (numerous brands)	2.0-2.5 oz.	
	thidiazuron + diuron (numerous brands)	6.4 oz.	
	ethephon (numerous brands) + *thidiazuron* (numerous brands) + **ONE OF THE FOLLOWING:**	1.33-1.5 pt. + 2.0-2.5 oz. +	
	carfentrazone Aim EC	0.75 oz.	Add 0.25 % v/v non-ionic surfactant.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 0.5% v/v crop oil.
	tribufos Def/Folex	6-12 oz.	

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME (BRAND NAME)	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS (*The rates below are given in the broadcast amount per acre unless otherwise noted)*
EARLY-SEASON (highs 90°F plus, lows 70°F plus)			
Boll Opening, Regrowth Control, and Defoliation (continued)	*ethephon + urea sulfate* FirstPick **OR** *ethephon + cyclanilide* Finish 6 Pro +	1.75-2 qt. 1 0.33-1.5 pt. +	Likelihood of "leaf sticking" is increased when temperatures exceed 94°F.
	ONE OF THE FOLLOWING: *thidiazuron* (numerous brands)	 1.6-2.0 oz.	Limited data are available with some products. Regrowth control is minimal when these products are applied at rates below 6.4 oz.
	thidiazuron + diuron (numerous brands)	6.4 oz.	
MID-SEASON (highs 80 to 89°F plus, lows 60 to 70°F)			
Defoliation Only (combinations provide more consistent defoliation than a single product)	*carfentrazone* Aim EC	0.75-1 oz.	Add 1% v/v crop for 0.75 oz. rate. Add 0.25% non-ionic surfactant for 1.0 oz. rate
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	sodium chlorate	4 lb. ai	Apply to mature foliage only. Do not mix with products containing tribufos or ethephon.
	tribufos Def/Folex	1-1.5 pt.	
Regrowth Control and Defoliation	*thidiazuron* (numerous brands)	3.2 oz.	
	thidiazuron (numerous brands) **OR** *glyphosate* + **ONE OF THE FOLLOWING:**	2.0-2.5 oz. 1.2-2 pt. +	Glyphosate WILL NOT provide regrowth suppression when applied to RF cotton. See specific labels for product rates.
	carfentrazone Aim EC	0.75-1 oz.	
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	tribufos Def/Folex	1 pt.	Add 0.25% v/v non-ionic surfactant to the 0.75 oz. rate or 1% v/v crop oil to the 1.0 oz. rate.
	thidiazuron + diuron (numerous brands)	6.4-8 oz.	Limited data are available with these products. Regrowth control is minimal when these products are applied at rates below 6.4 oz.

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME (BRAND NAME)	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS *(The rates below are given in the broadcast amount per acre unless otherwise noted)*
MID-SEASON (highs 80 to 89°F plus, lows 60 to 70°F)			
Boll Opening and Defoliation	*ethephon* (numerous brands)	2-2.67 pt.	
	ethephon (numerous brands) + **ONE OF THE FOLLOWING:**	1.5-2.0 pt. +	
	carfentrazone Aim EC	0.75-1 oz.	Add 0.25% v/v non-ionic surfactant to the 0.75 oz. rate or 1% v/v crop oil to the 1.0 oz. rate.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	tribufos Def/Folex	1-1.25 pt.	
	thidiazuron (numerous brands)	1.6 oz.	
	thidiazuron + diuron (numerous brands)	6.4 oz.	Limited data are available with some of these products
	ethephon + urea sulfate FirstPick + **ONE OF THE FOLLOWING:**	2.0 qt. +	
	carfentrazone Aim EC	0.75-1.0 oz.	
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	
	thidiazuron	1.6 oz.	
	thidiazuron + diuron (numerous brands)	5 oz.	Limited data are available with some of these products.
	tribufos Def/Folex	6-8 oz.	

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME (BRAND NAME)	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS (*The rates below are given in the broadcast amount per acre unless otherwise noted)*
MID-SEASON (highs 80 to 89°F plus, lows 60 to 70°F)			
Boll Opening and Defoliation (continued)	*ethephon + cyclanilide* Finish 6 Pro + **ONE OF THE FOLLOWING:**	1.33-1.5 pt. +	
	carfentrazone Aim EC	0.75-1.0 oz.	Add 0.25% v/v non-ionic surfactant to the 0.75 oz. rate or 1% v/v crop oil to the 1.0 oz. rate.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	tribufos Def/Folex	6-8 oz.	
	thidiazuron (numerous brands)	1.6 oz.	
	thidiazuron + diuron (numerous brands)	5 oz.	Limited data are available with some of these products.
Boll Opening, Regrowth Control, and Defoliation	*ethephon* (numerous brands) + **ONE OF THE FOLLOWING:**	1.5-2 pt. +	
	thidiazuron (numerous brands)	2.0-2.5 oz.	
	thidiazuron + diuron (numerous brands)	6.4-8 oz.	Limited data are available with some of these products.
	ethephon (numerous brands) + *thidiazuron* (numerous brands) + **ONE OF THE FOLLOWING:**	1.5-2 pt. + 2.0-2.5 oz. +	
	carfentrazone Aim EC	0.75-1.0 oz.	Add 0.25% v/v non-ionic surfactant to the 0.75 oz. rate or 1% v/v crop oil to the 1.0 oz. rate.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	tribufos Def/Folex	8-12 oz.	

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS (*The rates below are given in the broadcast amount per acre unless otherwise noted)*
LATE-SEASON (highs below 80°F, lows below 60°F) In these conditions, proper defoliation may require a preconditioning treatment (see preconditioning section)			
Boll Opening, Regrowth Control, and Defoliation (continued)	*ethephon + urea sulfate* FirstPick **OR**	2 qt.	
	ethephon + cyclanilide Finish 6 Pro + **ONE OF THE FOLLOWING:**	1.5-2 pt. +	
	thidiazuron (numerous brands)	2.0-2.5 oz.	
	thidiazuron + diuron (numerous brands)	6.4-8 oz.	Limited data are available with some of these products.
Defoliation Only (combinations provide more consistent defoliation than a single product)	*carfentrazone* Aim EC	1 oz.	
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	
	sodium chlorate	4 lb. ai	
	thidiazuron + diuron (numerous brands)	8-10 oz.	Limited data are available with some of these products.
	tribufos Def/Folex + *paraquat* (numerous brands)	1.5 pt. + 1 to 6 oz.	May cause crop desiccation and damage to unopened bolls.
Boll Opening and Defoliation	*ethephon* (numerous brands)	2-2.67 pt.	
	ethephon (numerous brands) + **ONE OF THE FOLLOWING:**	2-2.67 pt. +	
	tribufos Def/Folex	1-1.25 pt.	
	thidiazuron + diuron (numerous brands)	6 oz.	Limited data are available with some of these products.
	carfentrazone Aim EC	1 oz.	Add 1% v/v crop oil.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6	Add 1 pt./A crop oil. Limited data, use precaution.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.

COTTON DEFOLIATION / HARVEST AID OPTIONS

HARVEST-AID FUNCTION	PRODUCT COMMON NAME	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS (*The rates below are given in the broadcast amount per acre unless otherwise noted)*
LATE-SEASON (highs below 80°F, lows below 60°F) In these conditions, proper defoliation may require a preconditioning treatment (see preconditioning section)			
Boll Opening and Defoliation (continued)	*ethephon + cyclanilide* Finish 6 Pro	1.75-2 pt.	
	+	+	
	ONE OF THE FOLLOWING:		
	carfentrazone Aim EC	1 oz.	Add 1% v/v crop oil.
	carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	flumiclorac Resource	4-6 oz.	Add 1 to 2 pt./A crop oil. Limited data, use precaution.
	fluthiacet-methyl Blizzard	0.5-0.6 oz.	Add 1 pt./A crop oil. Limited data, use precaution.
	pyraflufen ethyl ET	1.5 oz.	Add 1% v/v crop oil.
	thidiazuron + diuron (numerous brands)	6 oz.	
	tribufos Def/Folex	8-12 oz.	Limited data are available with some of these products.

PRECONDITIONING: Fields with a dense canopy of foliage and significant numbers of green bolls may require two applications. The goal is to remove much of the foliage with an initial application, exposing un-open bolls to sunlight and improving air circulation within the canopy. The follow-up application should be made 7 to 10 days later when sufficient leaf drop has occurred to allow spray coverage with boll opening products containing ethephon. However, premature preconditioning or defoliation may increase the risk of halting development of younger or immature bolls, rendering them unharvestable.

TREATMENT	PRODUCT COMMON NAME	BROADCAST RATE/ ACRE	REMARKS AND PRECAUTIONS *(The rates below are given in the broadcast amount per acre unless otherwise noted)*
Initial Preconditioning Treatment	*carfentrazone* Aim EC	1 oz.	Add 1% v/v crop oil.
	carfentrazone + fluthiacet-methyl Display	2up-1 oz.	Limited data, adhere to label restrictions, use precaution.
	ethephon (numerous brands)	0.67-1.33 pt.	
	flumiclorac Resource	4 oz.	Add 1 to 2 pt. crop oil.
	fluthiacet-methyl Blizzard	0.5 oz.	Add 1 pt. crop oil
	glyphosate (numerous brands)	1.2-2 pt.	Glyphosate WILL NOT provide regrowth suppression when applied to RF cotton. See specific labels for product rates.
	pyraflufen ethyl ET	1.5 oz.	Add 0.5% v/v crop oil when temperatures are above 90°F. Add 1% v/v crop oil when temperatures are 89°F or below.
	tribufos Def/Folex	0.5-1.25 pt.	
Follow-up Treatments	**Should include products containing ethephon with harvest aid mixtures listed in the previous table.**		

HARVEST AID WEED MANAGEMENT

PRODUCT COMMON NAME	BROADCAST RATE/ ACRE	REMARKS AND PRECAUTIONS *The rates below are given in the broadcast amount per acre unless otherwise noted.*
carfentrazone Aim EC	1 oz.	Add 1% v/v crop oil. Effective on morningglory, coffee senna, and tropical spiderwort.
carfentrazone + fluthiacet-methyl Display	up-1 oz.	Limited data, adhere to label restrictions, use precaution.
glyphosate (numerous brands)	1.2-2 pt.	Use in combination with Def/Folex, dimethipen (Harvade) and/or ethephon. Glyphosate provides fair regrowth suppression of cotton. However, glyphosate WILL NOT provide regrowth suppression when applied to RF cotton. See specific labels for product rates.
paraquat Gramoxone Max, Firestorm, or Parazone	1-4 oz.	Use in combinations with standard defoliation applications. May cause crop desiccation and damage to unopened bolls.
Gramoxone Inteon	3-5 oz.	
pyraflufen ethyl ET	1.5 oz.	Add 0.5% v/v crop oil when temperatures are above 90°F. Add 1% v/v crop oil when temperatures are 89°F or below. Effective on morningglory.
Follow-up Treatments Desiccants paraquat or sodium chlorate	See "Desiccants for Cotton Harvest Preparation" next page.	

DESICCANTS FOR COTTON HARVEST PREPARATION

DESICCANT COMMON NAME	FORMULATION (lb. a.i./gal.)	BROADCAST RATE/ACRE (AMOUNT OF FORMULATION)	SPRAY VOLUME (gal./A)		REMARKS AND PRECAUTIONS *The rates below are given in the broadcast amount per acre unless otherwise noted.*
			Ground	Air	
paraquat					For addition to defoliant mixtures in cotton at least 75% open. Improves activitiy in colder, late-season conditions. May cause crop desiccation and damage to unopened bolls.
Firestorm	3.0				
Gramoxone Inteon	2.0	3-5 oz.	10-20	5	
Gramoxone Max	3.0	1-4 oz.	10-20	5	
Parazone	3.0				
paraquat					For desiccation of weeds and cotton regrowth after defoliation. Add surfactant at 1-2 qt per 100 gal. of spray solution. Be prepared to harvest in a timely manner to minimize bark problems. May cause crop desiccation and damage to unopened bolls.
Gramoxone Max	3.0	5.5 oz.-1.5 pt.	10-20	5	
Firestorm	3.0				
Parazone	3.0				
Gramoxone Inteon	2.0	1-2 pt.	10-20	5	
sodium chlorate	4-6	3-6 lb. ai	15-30	5-10	

PERFORMANCE RATING OF HARVEST AIDS BY FUNCTION

COMMON NAME	FUNCTION				
	Removal of Mature Foliage	Removal of Juvenile Foliage	Boll Opening	Regrowth Suppression	Weed Desiccation
ethephon (numerous brands)	F-G	F	E	P	P
ethephon + urea sulfate First Pick	G	G	E+	P	F
ethephon + cyclanilide Finish 6 Pro	G-E	F-G	E+	F	P
paraquat Gramoxone Max, Gramoxone Inteon, Parazone, Firestorm	F	F	P-F	P	G
PPO inhibitors Aim, ET, Resource, Blizzard	G	F	P	P	F
sodium chlorate	F	P	P	P	F-G
thidiazuron (numerous brands)	G-E	G	P	G-E	P
thidiazuron + diuron (numerous brands)	G-E	G	P	G-E	P
tribufos Def/Folex	G-E	P-F	P	P	P

P = Poor, F = Fair, G = Good, E = Excellent