

# COTTON: COTTON INSECT CONTROL

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PEST	INSECTICIDE	MOA	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Aphid (Cotton)	<i>acetamiprid</i> Assail 30SG	4A	1.5-2.5 oz	0.028-0.047	12 H/ 28 D	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.
	<i>dicrotophos</i> Bidrin 8 Dicromax 8	1B	4-8 oz 4-8 oz	0.25-0.5 0.25-0.5	6 H/ 30 D	
	<i>flonicamid</i> Carbine 50WG	9C	1.4-2.8 oz	0.044-0.088	12 H/ 30 D	
	<i>imidacloprid</i> Admire Pro 4.6	4A	0.9-1.7 oz	0.032-0.061	12 H/ 14 D	
	<i>thiamethoxam</i> Centric 40 WG	4A	1.25-2.0 oz	0.031-0.05	12 H/ 21 D	
Beet Armyworm	<i>emamectin benzoate</i> Denim 0.16	6	6-8 oz	0.0075-0.01	12 H/ 21 D	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.
	<i>diflubenzuron</i> Dimilin 2L	15	4-8 oz	0.0625-0.125	12 H/ 14 D	
	<i>indoxacarb</i> Steward 1.25EC	22	9.2-11.3 oz	0.09-0.11	12 H/ 14 D	
	<i>methoxyfenozide</i> Intrepid 2F	18	4 oz	0.0625	4 H/ 14 D	
	<i>novaluron</i> Diamond 0.83EC	15	6-12 oz	0.039-0.077	12 H/ 30 D	
	<i>chlorantraniliprole</i> Prevathon 0.43	28	14-27 oz	0.047-0.09	4 H/ 21 D	
	<i>spinosad</i> Blackhawk	5	2.4-3.2 oz	0.054-0.072	4 H/ 28 D	
Bollworm/ Tobacco Budworm	<b>NON-PYRETHROIDS</b>					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, TwinLink, 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” or greater in length) are found per 100 plants.
	<i>emamectin benzoate</i> Denim 0.16	6	8-12 oz	0.01-0.015	12 H/ 21 D	
	<i>indoxacarb</i> Steward 1.25EC	22	11.3 oz	0.11	12 H/ 14 D	
	<i>methomyl</i> Lannate LV 2.4	1A	1.5-2 pt	0.45-0.6	72 H/ 15 D	
	<i>profenofos</i> Curacron 8E	1B	0.75-1 pt	0.75-1.0	48 H/ 30 D	
	<i>spinetoram</i> Radiant 1 SC	5	4.25-8 oz	0.0332-0.0625	4 H/ 28 D	

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Bollworm/ Tobacco Budworm  (continued)	<b>NON-PYRETHROIDS (continued)</b>					
	<i>chlorantraniliprole</i> Prevathon 0.43	28	14-27 oz	0.047-0.09	4 H/ 21 D	
	<i>spinosad</i> Blackhawk	5	2.4-3.2 oz	0.054-0.072	4 H/ 28 D	
	<b>PYRETHROIDS</b>					
	<i>alpha-cypermethrin</i> Fastac 0.83	3A	2.6-3.6 oz	0.017-0.023	12 H/ 14 D	
	<i>beta-cyfluthrin</i> Baythroid XL 1	3A	1.6-2.6 oz	0.0125-0.02	12 H/ 0 D	Tobacco budworm is resistant to pyrethroid insecticides. Pyrethroids should not be used for control of tobacco budworm.
	<i>bifenthrin</i> 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 H/ 14 D	
	<i>cypermethrin</i> Up-Cyde 2.5EC	3A	2-5 oz	0.04-0.1	12 H/ 14 D	
	<i>esfenvalerate</i> Asana XL 0.66	3A	5.8-9.6 oz	0.03-0.0495	12 H/ 21 D	
	<i>gamma-cyhalothrin</i> 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 H/ 21 D	
<i>lambda-cyhalothrin</i> Warrior II Zeon 2.08 Silencer 1	3A	1.6-2.56 oz 3.2-5.12 oz	0.025-0.04 0.025-0.04	24 H/ 21 D		
<i>zeta-cypermethrin</i> Mustang Max 0.8	3A	2.64-3.6 oz	0.0165-0.0225	12 H/ 14 D		
Bollworm/ Tobacco Budworm (ovicides)	<i>methomyl</i> Lannate LV 2.4	1A	0.4-0.75 pt	0.12-0.22	72 H/ 15 D	Apply in a tank-mix with a larvacide when large numbers of eggs are present.
	<i>profenofos</i> Curacron 8E	1B	0.125-0.25 pt	0.125-0.25	48 H/ 30 D	
Cutworm (seedling cotton)	<i>acephate</i> Orthene 97 Acephate 97	1B	0.75 lb 0.75 lb	0.72 0.72	24 H/ 21 D	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.
	<i>chlorpyrifos</i> Lorsban 4E Chlorpyrifos 4E	1B	1.5-2 pt 1.5-2 pt	0.75-1 0.75-1	24 H/ 14 D	
	<i>Pyrethroids</i>	3A	See Remarks			

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Fall Armyworm	<i>chlorantraniliprole</i> Prevathon 0.43	28	14-27 oz	0.047-0.09	4 H/ 21 D	Apply when 15 larvae are found per 100 plants. Control of large larvae (>1/2" in length) is difficult; higher rates should be used.
	<i>diflubenzuron</i> Dimilin 2L	15	4-8 oz	0.0625-0.125	12 H/ 14 D	
	<i>emamectin benzoate</i> Denim 0.16	6	8-12 oz	0.01-0.015	12 H/ 21 D	
	<i>indoxacarb</i> Steward 1.25EC	22	9.2-11.3 oz	0.09-0.11	12 H/ 14 D	
	<i>methomyl</i> Lannate LV 2.4	1A	1.5-2 pt	0.45-0.6	72 H/ 15 D	
	<i>methoxyfenozide</i> Intrepid 2F	18	4-10 oz	0.0625-0.156	4 H/ 14 D	
	<i>novaluron</i> Diamond 0.83EC	15	6-12 oz	0.039-0.077	12 H/ 30 D	
	<i>profenofos</i> Curacron 8E	1B	0.75-1 pt	0.75-1	48 H/ 30 D	
	<i>Pyrethroid</i>	3A	See Remarks			
	<i>spinosad</i> Blackhawk	5	2.4-3.2 oz	0.054-0.072	4 H/ 28 D	
Plant Bugs and Fleahoppers	<i>acephate</i> Orthene 97 Acephate 97	1B	0.25-0.50 lb 0.25-0.50 lb	0.24-0.49 0.24-0.49	24 H/ 21 D	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" 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/100 sweeps. Drop Cloth: 1 plant bug/6 row feet.  Third week of squaring through bloom: Sweep Net: 15 plant bugs/100 sweeps. Drop Cloth: 3 plant bugs/6 row feet.  Diamond is an insect-growth regulator and will not control adults.
	<i>dicrotophos</i> Bidrin 8 Dicromax 8	1B	4-8 oz 4-8 oz	0.25-0.5 0.25-0.5	6 H/ 30 D	
	<i>imidacloprid</i> Admire Pro 4.6	4A	0.9-1.7 oz	0.032-0.061	12 H/ 14 D	
	<i>novaluron</i> Diamond 0.83EC	15	9-12 oz	0.058-0.077	12 H/ 30 D	
	<i>oxamyl</i> Vydate C-LV 3.77	1A	8.5-17 oz	0.25-0.50	48 H/ 14 D	
	<i>thiamethoxam</i> Centric 40 WG	4A	2 oz	0.05	12 H/ 21 D	

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Soybean Looper	<i>emamectin benzoate</i> Denim 0.16	6	8-12 oz	0.01-0.015	12 H/ 21 D	Treatment is necessary when soybean loopers threaten to defoliate cotton with immature bolls.
	<i>indoxacarb</i> Steward 1.25EC	22	6.7-9.2 oz	0.065-0.09	12 H/ 14 D	
	<i>methoxyfenozide</i> Intrepid 2F	18	4-10 oz	0.0625-0.156	4 H/ 14 D	
	<i>novaluron</i> Diamond 0.83EC	15	6-12 oz	0.039-0.077	12 H/ 30 D	
	<i>spinosad</i> Blackhawk	5	2.4-3.2 oz	0.052-0.072	4 H/ 28 D	
Spider Mites	<i>abamectin</i> Agri-Mek 0.15	6	8-16 oz	0.009-0.018	12 H/ 20 D	Apply when 50 percent of plants are symptomatic and populations are increasing. 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 may provide suppression of mites.
	<i>etoxazole</i> Zeal 72 WSP	10B	0.66-1 oz	0.03-0.045	12 H/ 28 D	
	<i>feproximate</i> Portal 0.4	21A	16-32 oz	0.05-0.1	12 H/ 14 D	
	<i>propargite</i> Comite II 6	12C	1.25-2.25 pt	0.937-1.687	6 D/ 50 D	
	<i>profenofos</i> Curacron 8E	1B	0.5-0.75 pt	0.5-0.75	48 H/ 30 D	
	<i>spiromesifen</i> Oberon 2SC	23	8-16 oz	0.125-0.25	12 H/ 30 D	
Stink Bugs	<b>ORGANOPHOSPHATES</b>					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 2-6, and 30%(+) during weeks 7+ of bloom (fewer susceptible bolls present). Detection of 1 stink bug/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.
	<i>acephate</i> Orthene 97 Acephate 97	1B	0.75 lb 0.75 lb	0.72 0.72	24 H/ 21 D	
	<i>dicrotophos</i> Bidrin 8 Dicromax 8	1B	4-8 oz 4-8 oz	0.25-0.5 0.25-0.5	6 H/ 30 D	

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PEST	INSECTICIDE	MOA	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Stink Bugs (continued)	<b>PYRETHROIDS</b>					
	<i>alpha-cypermethrin</i> Fastac 0.83	3A	2.6-3.6 oz	0.017-0.023	12 H/ 14 D	
	<i>beta-cyfluthrin</i> Baythroid XL 1	3A	1.6-2.6 oz	0.0125-0.0205	12 H/ 0 D	
	<i>bifenthrin</i> 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 H/ 14 D	
	<i>esfenvalerate</i> Asana XL 0.66	3A	5.8-9.6 oz	0.03-0.0495	12 H/ 21 D	
	<i>gamma-cyhalothrin</i> 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 H/ 21 D	
	<i>lambda-cyhalothrin</i> Warrior II Zeon 2.08 Silencer 1	3A	1.6-2.56 oz 3.2-5.12 oz	0.025-0.04 0.025-0.04	24 H/ 21 D	
	<i>zeta-cypermethrin</i> Mustang Max 0.8	3A	2.64-3.6 oz	0.0165-0.0225	12 H/ 14 D	
Thrips (seedling cotton), At-Plant Treatments	<i>acephate</i> Orthene 97ST Orthene 97 Acephate 97	1B	Commercial Seed Treatment 1 lb 1 lb	0.97 0.97	24 H/ 21 D	Apply acephate as a spray into the seed furrow at planting.
	<i>imidacloprid</i> Admire Pro4.6	4A	9.2 oz	0.33	12 H/ 14 D	Apply Admire Pro as an in-furrow spray during planting directed on or below seed.
	<i>thiamethoxam</i> Cruiser	4A	Commercial Seed Treatment		12 H/ -	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.
	<i>imidacloprid</i> Gaucho 600	4A	Commercial Seed Treatment		12 H/ -	
Thrips (seedling cotton), Foliar Spray	<i>acephate</i> Orthene 97 Acephate 97	1B	3 oz 3 oz	0.18 0.18	24 H/ 21 D	Apply when 2-3 thrips per plant are counted and immatures are present. Expect higher thrips populations on early planted cotton. Seedlings are most susceptible to thrips during early growth stages; economic damage rarely occurs once seedlings reach the 4-leaf stage and are growing rapidly. 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.
	<i>dicrotophos</i> Bidrin 8 Dicromax 8	1B	1.6-3.2 oz 1.6-3.2 oz	0.1-0.2 0.1-0.2	6 H/ 30 D	
	<i>dimethoate</i> Dimethoate 4	1B	0.25-0.5 pt	0.125-0.25	48 H/ 14 D	

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PEST	INSECTICIDE	MOA	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REI/PHI (Hours or Days)	REMARKS
Whitefly (banded winged)	<i>acephate</i> Orthene 97 Acephate 97	1B	0.5-1 lb 0.5-1 lb	0.49-0.97 0.49-0.97	24 H/ 21 D	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.
	<i>thiamethoxam</i> Centric 40 WG	4A	2 ozs	0.05	12 H/ 21 D	
Whitefly (silverleaf)	<i>acetamiprid</i> Assail 30 SG	4A	4-5.3 oz	0.075-0.1	12 H/ 28 D	Apply when 50% of sampled leaves (sample 5th expanded leaf below the terminal) are infested with multiple immatures. 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.
	<i>dinotefuron</i> Venom 70WDG	4A	1-3 oz	0.045-0.134	12 H/ 14 D	
	<i>flupyradifurone</i> Sivanto Prime 1.67	4D	10.5-14 oz	0.1369-0.1826	4 H/ 14 D	
	<i>pyriproxyfen</i> Knack 0.86	7C	8 oz 5 oz fb 5 oz	0.05375 0.033 fb 0.033	12 H/ 28 D	Vegetative cotton; 5 oz followed by 5 oz. See Label.
	<i>spiromesifin</i> Oberon 2	23	8-16 oz	0.125-0.25	12 H/ 30 D	
	<i>buprofezin</i> Courier 3.6SC	16	9-12.5 oz	0.25-0.35	12 H/ 14 D	

### 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)

*imidacloprid, cyfluthrin* (Leverage)

*lambda-cyhalothrin, chlorantraniliprole* (Besiege)

*lambda-cyhalothrin, thiamethoxam* (Endigo)

*methoxyfenozide, spinetoram* (Intrepid Edge)

*spinosad, gamma-cyhalothrin* (Consero)

*zeta-cypermethrin, bifenthrin* (Hero)

*chlorpyrifos, lambda-cyhalothrin* (Cobalt Advanced)

*zeta-cypermethrin, chlorpyrifos* (Stallion)

*chlorpyrifos, bifenthrin* (Tundra Supreme)

*fluppyram, imidacloprid* (Velum Total)

## INSECT PEST RESPONSE TO INSECTICIDES USED IN COTTON

INSECTICIDE	SOUTHERN GREEN STINK BUG	BROWN STINK BUG	CORN EARWORM	TOBACCO BUDWORM**	FALL ARMYWORM	BEE T ARMYWORM	SOYBEAN LOOPER	PLANT BUGS	APHIDS	SPIDER MITES	SILVERLEAF WHITEFLY	CUTWORMS	THRIPS	PREDATORS***	PARASITES***	CHEMICAL CLASS (MOA)	REI (Hours)*
<i>abamectin</i> Agri-Mek 0.15	-	-	-	-	-	-	-	-	-	1	-	-	-	M	M	6	12
<i>acephate</i> Orthene 97	2	2	5	4	4	5	4	1	5	5	5	2	1	H	H	1B	24
<i>acetamiprid</i> Assail 30SG	4	4	5	5	5	5	5	3	1	5	1	5	3	E	E	4A	12
<i>alpha-cypermethrin</i> Fastac 0.83	2	4	1	3	4	5	4	3	4	5	5	2	4	H	M	3A	12
<i>beta-cyfluthrin</i> Baythroid XL 1	1	3	1	3	3	5	4	2	4	5	5	2	4	H	M	3A	12
<i>bifenthrin</i> Brigade 2, Discipline 2, Fanfare 2	1	2	1	3	3	5	4	2	3	3	3	2	4	H	M	3A	12
<i>buprofezin</i> Courier 40 SC	-	-	-	-	-	-	-	-	-	-	1	-	-	E	E	16	12
<i>chlorantraniliprole</i> Prevathon 0.43	5	5	1	1	2	1	2	5	5	5	4	4	5	E	E	28	4
<i>chlorpyrifos</i> Lorsban 4	4	4	4	4	3	3	4	3	4	3	5	1	3	H	H	1B	24
<i>cypermethrin</i> Up-Cyde 2.5EC	2	4	1	3	4	5	4	3	4	5	5	2	4	H	M	3A	12
<i>dicrotophos</i> Bidrin 8	1	1	5	5	5	5	5	1	3	4	5	5	1	H	H	1B	6 days

**Efficacy Ratings:**

1 – Very Effective

5 – Not Effective

\* Read and follow label directions.

\*\* Pyrethroid resistant tobacco budworm has been observed in Georgia, efficacy may be improved if resistance levels are low.

\*\*\* Effects on beneficial insects: E – Easy; M – Moderate; and H – Hard

Effects of some insecticides are highly rate sensitive.

Insecticide ratings found in this table are based on research across the Cotton Belt and on field experiences and observations by entomologists. Ratings assume standard rates of insecticides applied at proper times. Ratings should be considered only as general guidelines for comparison purposes.

**INSECT PEST RESPONSE TO INSECTICIDES USED IN COTTON**

<b>INSECTICIDE</b>	<b>SOUTHERN GREEN STINK BUG</b>	<b>BROWN STINK BUG</b>	<b>CORN EARWORM</b>	<b>TOBACCO BUDWORM**</b>	<b>FALL ARMYWORM</b>	<b>BEE T ARMYWORM</b>	<b>SOYBEAN LOOPER</b>	<b>PLANT BUGS</b>	<b>APHIDS</b>	<b>SPIDER MITES</b>	<b>SILVERLEAF WHITEFLY</b>	<b>CUTWORMS</b>	<b>THRIPS</b>	<b>PREDATORS***</b>	<b>PARASITES***</b>	<b>CHEMICAL CLASS (MOA)</b>	<b>REI (Hours)*</b>
<i>diflubenzuron</i> Dimilin 2L	5	5	5	5	3	3	4	5	5	5	5	5	5	E	E	15	12
<i>dimethoate</i> Dimethoate 4	4	4	5	5	5	5	5	3	3	3	5	5	2	M	H	1B	48
<i>dinotefuron</i> Venom 70 WDG	-	-	-	-	-	-	-	-	-	-	2	-	-	M	M	4A	12
<i>emamectin benzoate</i> Denim 0.16	4	4	2	2	2	1	1	4	5	3	5	4	4	M	E	6	12
<i>esfenvalerate</i> Asana XL 0.66	2	4	1	3	4	5	4	3	4	5	5	2	4	H	M	3A	12
<i>etoxazole</i> Zeal 72 WSP	-	-	-	-	-	-	-	-	-	-	1	-	-	E	E	10B	12
<i>fepyrroximate</i> Portal 0.4	-	-	-	-	-	-	-	-	-	1	3	-	-	E	E	21A	12
<i>flonicamid</i> Carbine 50 WG	4	4	5	5	5	5	5	2	1	5	5	5	3	E	E	9C	12
<i>gamma-cyhalothrin</i> Declare 1.25, Prolex 1.25	1	3	1	3	3	5	4	2	4	5	5	2	4	H	M	3A	24
<i>imidacloprid</i> Admire Pro 4.6	4	4	5	5	5	5	5	3	2	5	4	5	3	M	M	4A	12
<i>indoxacarb</i> Steward 1.25	4	4	2	1	2	1	1	3	5	5	5	4	5	M	E	22A	12
<i>lambda-cyhalothrin</i> Warrrior II Z 2.08, Silencer 1	1	3	1	3	3	5	4	2	4	5	5	2	4	H	M	3A	24

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\*\* Pyrethroid resistant tobacco budworm has been observed in Georgia, efficacy may be improved if resistance levels are low.

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Effects of some insecticides are highly rate sensitive.

Insecticide ratings found in this table are based on research across the Cotton Belt and on field experiences and observations by entomologists. Ratings assume standard rates of insecticides applied at proper times. Ratings should be considered only as general guidelines for comparison purposes.



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INSECTICIDE	SOUTHERN GREEN STINK BUG	BROWN STINK BUG	CORN EARWORM	TOBACCO BUDWORM**	FALL ARMYWORM	BEEET ARMYWORM	SOYBEAN LOOPER	PLANT BUGS	APHIDS	SPIDER MITES	SILVERLEAF WHITEFLY	CUTWORMS	THRIPS	PREDATORS***	PARASITES***	CHEMICAL CLASS (MOA)	REI (Hours)*
<i>methomyl</i> Lannate LV 2.4	4	4	3	3	3	4	3	3	4	5	5	3	5	H	M	1A	72
<i>methoxyfenozide</i> Intrepid 2F	5	5	4	4	2	1	2	5	5	5	5	4	5	E	E	18	4
<i>novaluron</i> Diamond 0.83EC	3	3	4	4	1	2	2	3	5	5	4	5	5	M	3	15	12
<i>oxamyl</i> Vydate C-LV 3.77	3	3	5	5	5	5	5	2	5	5	5	5	3	M	M	1A	48
<i>profenofos</i> Curacron 8E	4	4	3	3	3	4	4	3	4	3	5	3	4	H	H	1B	48
<i>propargite</i> Comite II 6	5	5	5	5	5	5	5	5	5	1	5	5	5	M	E	12C	6 days
<i>pyriproxifen</i> Knack 0.86	5	5	5	5	5	5	5	5	5	5	1	5	5	E	E	7C	12
<i>spinosad</i> Blackhawk	5	5	2	1	2	2	2	5	5	5	5	4	4	E	M	5	4
<i>spiromesifen</i> Oberon 2 SC	–	–	–	–	–	–	–	–	–	1	2	–	–	E	E	23	12
<i>thiamethoxam</i> Centric 40 WG	3	4	5	5	5	5	5	1	1	5	3	5	3	M	M	4A	12
<i>zeta-cypermetherin</i> Mustang Max 0.8	1	3	1	3	3	5	4	2	4	5	5	2	4	H	M	3A	12

**Efficacy Ratings:**

1 – Very Effective

5 – Not Effective

\* Read and follow label directions.

\*\* Pyrethroid resistant tobacco budworm has been observed in Georgia, efficacy may be improved if resistance levels are low.

\*\*\* Effects on beneficial insects: E – Easy; M – Moderate; and H – Hard

Effects of some insecticides are highly rate sensitive.

Insecticide ratings found in this table are based on research across the Cotton Belt and on field experiences and observations by entomologists. Ratings assume standard rates of insecticides applied at proper times. Ratings should be considered only as general guidelines for comparison purposes.

# COTTON DISEASE CONTROL

Bob Kemeraït, Extension Plant Pathologist

DISEASE	CHEMICAL	MOA	RATE PER ACRE <sup>a</sup> (38" Row Basis)	REI/PHI (Hours/Days)	REMARKS AND PRECAUTIONS	
Seedling Diseases	Quadris 2.08SC	11 + 7	5.5-11 fl oz	4 H/ 45 D	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 treatments are considered less effective than granules or in-furrow sprays, but prevent more disease than seed treatments alone.  <b>NOTE:</b> These seed treatments are in addition to fungicide treatments that are already applied to the seed by the supplier.	
	<b>HOPPER BOX</b>					
	<i>carboxin + terraclor + metalaxyl</i> Prevail		8016 oz/cwt			
	System 3 (biological)		0.5 fl oz/cwt			
	<b>ADDITIONAL SEED TREATMENTS</b>					
	<i>azoxystrobin + fludioxonil + mefenoxam</i> Dynasty CST		3.1-3.95 fl oz/cwt	24 H/ –		
	<i>chloroneb + metalaxyl</i> Delta Coat		8.75-11.85 oz/cwt			
	Kodiak FL		0.5 fl oz/cwt			
	Kodiak HB (biological)		4 oz/cwt			
	System 3 (biological)		12 oz/cwt			
<i>trifloxystrobin + metalaxyl</i> Trilex 2000		2 fl oz/cwt				
<i>trifloxystrobin + metalaxyl + triademinol</i> Trilex Advanced		1.6 fl oz/cwt				

<sup>a</sup> 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 40" 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.

<sup>b</sup> Apply all liquids in 5-10 gal of water/A.

# COTTON NEMATODE CONTROL

Bob Kemeraït, Extension Plant Pathologist

NEMATICIDE TREATMENT	RATE/ACRE	oz/1000 ft of row (38" row basis)	REI/PHI (Hours/Days)	REMARKS AND PRECAUTIONS
<i>abamectin+thiamethoxam</i> AVICTA Duo Cotton	seed treatment		48 H/ –	
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 lb of seed (delinted seed only).
<i>aldicarb</i> AgLogic 15G	3.5-7 lb/A			Apply granules in seed furrow and immediately cover with soil by mechanical means. OR Apply granules in a 4-6" band (T-Band) over open seed furrow and immediately cover with soil by mechanical means.  In the States of AL, FL, GA and SC, if a vulnerable soil is present and the water table is less than 25 feet below ground surface, do not apply within 700 feet of a drinking water well unless it is known or reasonably believed based upon authoritative sources that such wells are either cased to 100 feet below the ground level or a minimum of 30 feet below the water table. If it is not known whether the water table is greater than 25 feet below ground surface, assume that the water table is less than 25 feet below ground surface.
<i>aldicarb</i> AgLogic 15G sidedress application	5 lb/A			<b>Side Dress Application:</b> From 3 weeks after planting through first squaring. Side dress granules in a furrow that is 6-10" to one or both sides of plant row to a depth of 2- 3". Adjust applications to minimize root pruning.
<i>fluopyram+imidacloprid</i> Velum Total	14-18 fl oz		12 H/ 30 D	<b>Apply specified dosage in the following methods:</b> 1) In-furrow spray during planting directed on or below seed; 2) Chemigation into the root-zone through low pressure drip or trickle irrigation. DO not apply more than 19 fl oz/A of Velum Total per year. Do not apply Velum Total within 30 days of harvest. Regardless of formulation or method of application, apply no more than 0.5 lb imidacloprid or 0.45 lb fluopyram active ingredient per acre per year/A/year, including seed treatment, soil and foliar uses.
Telone II <sup>1</sup>	3 gal	30 fl oz	5 D Post Application/ –	Apply Telone II at least 7 days prior to planting by injecting 12" 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) otherwise the at-plant fumigation may result in poor germination and plant stand.
Vydate C-LV	17 fl oz	1.24 fl oz	48 H/ 14 D	Make one application between 2nd and 5th true leaf stage. Alternatively, sequential applications of Vydate C-LV may be made at 8.5-11 fl oz/A beginning at 2nd-5th leaf stage of growth followed by a second 8.5-11 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.

<sup>1</sup> If Telone II is used for nematode control, you must use an additional chemical for thrips control.

<sup>2</sup> Temik applied at 3.5 lb/A is often recommended for insect management, but 3.5 lb/A will not provide sufficient nematode control in Georgia.

## COTTON FOLIAR DISEASE CONTROL

Bob Kemeraït, Extension Plant Pathologist

FUNGICIDE TREATMENT	RATE/ACRE	REI/PHI (Hours/Days)	REMARKS AND PRECAUTIONS
<i>flutriafol</i> Topguard	7-14 fl oz	12 H/ 30 D	
<i>pyraclostrobin</i> Headline	6-12 fl oz/A	12 H/ 30 D	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.
<i>pyraclostrobin</i> + <i>metconazole</i> Twinline	7-8.5 fl oz/A	12 H/ 30 D	Maximum rate is 26 fl oz/A/season.
<i>azoxystrobin</i> Quadris	6-9 fl oz/A	4 H/ 45 D	Based on current research in Georgia, it appears that fungicides may have economic benefit in the control of a disease such as <i>Corynespora</i> leaf spot. (This disease is now often referred to as “target spot” because this name is commonly used in other crops where <i>Corynespora</i> causes similar diseases.) It is still uncertain whether the fungicides will be justified in the management of a disease like <i>Stemphylium</i> leaf spot which is primarily the result of a potassium deficiency in the plant. Significant research data will be available to cotton growers in 2016 to assist in the most appropriate use of fungicides for management of foliar diseases of cotton. Maximum rate is 27 fl oz/A/season.
<i>azoxystrobin</i> + <i>benzobendiflupyr</i> (solatenol) Elatus	5-7.3 fl oz/A	12 H/ 45 D	Do not apply more than 14.6 fl oz/A per season.
<i>pyraclostrobin</i> + <i>fluxapyroxad</i> Priaxor	4-8 fl oz/A	12H/ 30 D	Do not apply more than 24 fl oz/A per season.

# COTTON WEED CONTROL

A. Stanley Culpepper, Extension Agronomist - Weed Science

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>EARLY PREPLANT BURNDOWN</b>						
Burndown of emerged annual weeds but does not adequately control primrose, geranium, large radish, glyphosate-resistant horseweed, or glyphosate-resistant Palmer amaranth.	<i>glyphosate</i> 4 S (3 lb ae) 5.4 S (4 lb ae) 5 S (4.17 lb ae) 5.5 S (4.5 lb ae) 6 S (5 lb ae)	9	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)	4 H/ N/A	Apply any time prior to planting; adjuvant needs vary by brand.  <b><u>Control of cover crops:</u></b>  Wheat < 12": 0.56 lb ae Wheat > 12": 0.75 lb ae Rye < 12": 0.56 lb ae Rye >12" (no seed head): 0.75 lb ae Rye with seed head: 0.56 lb ae
Emerged primrose, wild radish, spiderwort, very small horseweed.	<i>2,4-D amine</i> 4 S 4.7 S 5 S	4	12-24 fl oz 10-20 fl oz 9-18 fl oz	0.38-0.75	48 H/ N/A	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 adequate followed by glyphosate or paraquat mixtures at or near planting. Most, but not all brands, may be applied 30 days prior to planting.  PRIMROSE: Apply 0.24-0.38 lb ai/A RADISH: Apply 0.5-0.75 lb ai/A HORSEWEED: Apply 0.75+ lb ai/A GLYPHOSATE-RESISTANT HORSEWEED: Apply 0.95 + lb ai/A
Burndown of most emerged weeds, 2,4-D rates are too low to control glyphosate-resistant horseweed.  Mixture may not control Carolina geranium.	<i>glyphosate</i> + <i>2,4-D amine</i> 4 S 4.7 S 5 S	9 + 4	see glyphosate  +  8-32 fl oz 6-24 fl oz 6-22 fl oz	0.75-1.13 (lb ae)  +  0.24-0.95	48 H/ N/A	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. For glyphosate-resistant horseweed the rate of 0.95 lb ai/A will control small plants.  2,4-D is more effective than dicamba on primrose; less effective on horseweed.  Use amine formulations of 2,4-D to reduce potential for off-target movement; no differences in control compared to other formulations when mixed with glyphosate.  <b><i>2,4-D volatility occurs and is influenced by environment, soil conditions, and formulations used; avoid off-target issues.</i></b>
Aim improves control of emerged morningglory, tropical spiderwort, and very small (<1") glyphosate-resistant Palmer amaranth.	<i>glyphosate</i> + <i>carfentrazone</i> Aim 2 EC	9 + 14	see glyphosate  +  0.5-1.0 fl oz	0.75-1.13 (lb ae)  +  0.008-0.016	12 H/ N/A	May be applied as a burndown treatment anytime prior to planting.  Aim does not provide residual weed control.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>EARLY PREPLANT BURNDOWN (continued)</b>						
Dicamba improves primrose, morningglory, and glyphosate-resistant horseweed control. Suppresses geranium and curly dock.  At this rate, likely will not control Palmer amaranth larger than 1.5”.	<i>glyphosate</i> + <i>dicamba</i> Clarity, other 4S	9 + 4	see glyphosate + 8 fl oz	0.75-1.13 (lb ae) + 0.25	24 H/ N/A	Following application of dicamba AND a minimum of 1” 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 and wild radish; but more effective on horseweed.  Numerous formulations of dicamba exist. Clarity is formulated as a diglycolamine salt of dicamba, which is preferred over the dimethylamine salt. <b><i>Dicamba volatility occurs and is influenced by environmental conditions, soil types, and formulations selected; avoid off-target issues.</i></b>
Diuron improves control of emerged Palmer amaranth and provides residual control if it reaches the ground and is activated.  The addition of 2,4-D or Valor will likely improve weed control; follow most restrictive plant-back interval.	<i>glyphosate</i> + <i>diuron</i> Direx 4F	9 + 7	see glyphosate + 1-1.5 pt	0.75-1.13 (lb ae) + 0.5-0.75	12 H/ N/A	A Georgia 24 C Direx label allows applications 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 wait at least 10 days prior to planting. Do not apply on sand or loamy sand soils. If following shortened plant-back interval, suggest avoid using diuron again PRE.  <b>Many diuron formulations are available but have longer plant-back interval, see labels.</b>
Valor improves emerged primrose and radish control. Valor also provides residual control of pigweed, pusley, smallflower morningglory and other sensitive weeds for up to 6-8 weeks if it reaches the soil and is activated.  The addition of 2,4-D (8-16 oz/A of 3.8 lb ai material) improves control of radish and primrose; follow most restrictive plant-back interval.  <b>For PPO-resistance management, make only 3 applications of Reflex or Valor (including generics) on a field in 3 years.</b>	<i>glyphosate</i> + <i>flumioxazin</i> Valor SX 51 WDG	9 + 14	see glyphosate + 2 oz	0.75-1.13 (lb ae) + 0.063	12 H/ N/A	A Georgia 24 c Valor label allows reduced plant-back intervals and provides safer use patterns for Valor in cotton. Outflank, Panther, and Rowel have been tested and perform similarly to Valor but do not have the state label allowing the following use patterns:  <b>In strip-till cotton</b> , Valor can be applied 10 days ahead of planting as long as the strip-till operation occurs between applying Valor and planting.  <b>In no-tillage production</b> 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” of rain; 2) >30% ground cover wait 21 days PLUS 1” of rain.  <b>If Reflex (or generic) will be applied PRE; suggest adding an additional 7 days to no-tillage and 4 days to strip-tillage planting intervals.</b>  Add a non-ionic surfactant or crop oil concentrate (preferred), regardless of glyphosate brand.  <b>CAREFULLY follow label directions for cleaning sprayer after each use!</b>
ET improves control of emerged morningglory and small (< 1”) glyphosate-resistant Palmer amaranth.	<i>glyphosate</i> + <i>pyraflufen ethyl</i> ET 0.208 EC	9 + 14	see glyphosate + 0.5-2 fl oz	0.75-1.13 (lb ae) + 0.0008-0.003	12 H/ N/A	May be applied as a burndown treatment anytime prior to planting.  ET does not provide residual weed control.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>EARLY PREPLANT BURNDOWN (continued)</b>						
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.	<i>glyphosate</i> + <i>thifensulfuron + tribenuron</i> FirstShot SG 50 SG	9 + 14	see glyphosate + 0.5-0.8 oz	0.75-1.13 (lb ae) + 0.008-0.013 + 0.008-0.013	12 H/ N/A	Apply at least 14 days prior to planting.  Include nonionic surfactant at 1-2 qt/100 gal spray or crop oil concentrate at 1-2 gal/100 gal spray.
2,4-D is more effective on primrose.  Dicamba and 2,4-D are more effective on horseweed. Valor and diuron are more effective providing residual control.	<i>glyphosate</i> + <i>thifensulfuron + tribenuron</i> Harmony Extra SG with TotalSol 50 SG  Harmony Extra, Nimble 75WDG	9 + 2 + 2	see glyphosate +  0.75 oz  0.5 oz	0.75-1.13 (lb ae) + 0.0156 + 0.0078	12 H/ N/A	
Burndown of emerged annual weeds; best control with annual weeds 3" or less. Does not control immature primrose, large horseweed, curly dock, swinecress, immature radish, or large grasses.  Mixtures with diuron are usually far more effective.	<i>paraquat</i> Gramoxone 2S Firestorm, Parazone 3S	22	2.5-4 pt 1.7-2.7 pt	0.63-1	24 H/ N/A	Apply any time prior to planting to control emerged weeds. Add nonionic surfactant at 2 pt/100 gal of spray mix or crop oil concentrate at 1 gal/100 gal spray mix.  <b>The addition of diuron is strongly encouraged.</b>  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.  Gramoxone, Firestorm, and Parazone have been tested; however, numerous other brands of paraquat are also available, see labels.
Burndown of emerged annual weeds and provides residual control if diuron reaches the soil and is activated. Effective on mature primrose and wild radish. BY FAR the most effective option for emerged pigweed.  Option for emerged glyphosate-resistant pigweed. If extended residual control is desired, consider adding Valor to the mixture.	<i>paraquat</i> Gramoxone 2S Firestorm, Parazone 3S + <i>diuron</i> Direx 4F	22 + 7	2.5-4 pt 1.7-2.7 pt  +  1.5-2 pt	0.63-1  + 0.75-1	24 H/ N/A	A Georgia 24(c) Direx label allows applications 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 planting.  Do not apply on sand or loamy sand soil. If following shortened plant-back interval, suggest avoid using diuron again PRE.  <b>Add crop oil concentrate at 1 gal/100 gal spray mix.</b> 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.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>EARLY PREPLANT BURNDOWN (continued)</b>						
Paraquat mixtures with diuron are more effective on emerged Palmer amaranth; however, Valor is more effective in providing residual Palmer amaranth control.  The addition of diuron is suggested if pigweed is larger than 3".  <b>For PPO-resistance management, make only 3 applications of Valor or Reflex (including generics) on a field in 3 years.</b>	<i>paraquat</i> Gramoxone 2 SL Firestorm, Parazone 3 SL + <i>flumioxazin</i> Valor SX 51 WDG	22 + 14	2.5-4 pt 1.7-2.7 pt + 2 oz	0.63-1 + 0.063	12 H/ N/A	A Georgia 24 c Valor label allows reduced plant-back intervals and provides safer use patterns for Valor in cotton. Outflank, Panther, and Rowel have been tested and perform similarly to Valor but do not have the state label allowing the following use patterns:  <b>In strip-till cotton</b> , Valor can be applied 10 days ahead of planting as long as the strip-till operation occurs between applying Valor and planting.  <b>In no-tillage</b> 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" of rain; 2) >30% ground cover wait 21 days PLUS 1" of rain.  <b>If Reflex (or generic) will be applied PRE; suggest an additional 7 days to no-tillage and 4 days to strip-till planting intervals.</b>  Add a non-ionic surfactant or crop oil concentrate (preferred).  <b>Carefully follow label directions for cleaning sprayer after each use!!</b>
Winter annual broadleaf weeds such as henbit, chickweed, small wild radish, and curly dock.  DO NOT anticipate residual control for Palmer amaranth.	<i>rimsulfuron</i> + <i>thifensulfuron</i> Leadoff 33 SG	2 + 2	1.5 oz	0.0156 + 0.0156	4 H/ N/A	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. May also mix with glyphosate for improved control of numerous weed species.
<b>EARLY PREPLANT BURNDOWN OF GLYPHOSATE-RESISTANT HORSEWEED</b>						
Glyphosate-resistant horseweed is becoming more common across Georgia. Research from other states suggests dicamba may be more effective than 2,4-D on larger horseweeds.	<i>glyphosate</i> + <i>2,4-D amine</i> Numerous brands + <i>flumioxazin</i> Valor SX, other 51 WDG	9 + 4 + 14	see glyphosate + see label + 2 oz	0.75-1.13 (lb ae) + 0.95 (lb ae) + 0.063	48 H/ N/A	Glyphosate plus 2,4-D plus Valor SX, or glyphosate plus dicamba plus Valor are the <b>preferred treatments</b> .  See sections above on plant back intervals.  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.
Applications should be made prior to April for maximum timeliness.  <b>For PPO-resistance management, make only 3 applications of Valor or Reflex (or generics) on a field in 3 years.</b>	<i>glyphosate</i> + <i>dicamba</i> Clarity, other 4 SL + <i>flumioxazin</i> Valor SX, other 51 WDG	9 + 4 + 14	see glyphosate + 8 fl oz + 2 oz	0.75-1.13 (lb ae) + 0.25 + 0.063	24 H/ N/A	<b>Carefully follow label directions for cleaning sprayer after each use!</b>  Clarity is formulated as a diglycolamine salt of dicamba that is preferred over the dimethylamine salt. Other brands of flumioxazin are also available including Outflank, Panther, and Rowel; however, these products do not have the same plant-back intervals as Valor, see label.  <b>2,4-D and dicamba volatility occurs and is influenced by environmental conditions, soil types, and formulations selected; avoid off-target issues.</b>

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>EARLY PREPLANT BURNDOWN OF GLYPHOSATE-RESISTANT HORSEWEED (continued)</b>						
Glyphosate-resistant horseweed <i>(continued)</i>	<i>paraquat</i> Gramoxone Inteon 2S Firestorm, Parazone 3S + <i>diuron</i> Direx 4 F	22 + 7	4 pt 2.7 pt + 1.5-2 pt	1 + 0.75-1	24 H/ N/A	A Georgia 24(c) Direx label allows applications 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 wait at least 10 days prior to planting. Do not apply on sand or loamy sand soil.  Suggest avoiding diuron PRE if following shortened plant-back interval. Spray when daytime temps exceed 70°F. Add 1 gal of crop oil concentrate/100 gal of spray mix. May add 2,4-D or dicamba to improve control of emerged plants; follow proper plant-back intervals.
<b>For resistance management, do not apply glufosinate on a field more than 2 times a year.</b>	<i>glufosinate</i> Liberty 2.34S	10	29-43 fl oz	0.53-0.79	12 H/ N/A	Recommended for fields where growers have failed to control glyphosate-resistant horseweed and it is too late for 2,4-D or dicamba. If greater than 29 oz/A is applied preplant, the season total applied cannot exceed 72 fl oz/A.  <b>To maximize control:</b> >15 GPA water volume, medium spray droplet, warm temperatures, high humidity, bright sunlight, good soil moisture, and do not spray within 1.5 hours of sunrise or 1 hour of sunset.  Cheetah, and Interline have been tested and performed similarly to Liberty, see labels. Other brands are available.
<b>PREPLANT: AT OR JUST PRIOR TO PLANTING</b>						
Burndown of emerged annual weeds and cover crops. Inadequate control of primrose, radish, geranium and resistant pigweed or horseweed often noted.	<i>glyphosate</i> 4S (3 lb ae) 5.4S (4 lb ae) 5S (4.17 lb ae) 5.5S (4.5 lb ae) 6S (5 lb ae)	9	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)	4 H/ N/A	<b>If Palmer is emerged at time of planting, better control with paraquat is most often achieved with applications prior to planting as the planting process may cover them with dirt.</b> Add nonionic surfactant at 2 pt/100 gal or crop oil concentrate at 1 gal/100 gal spray mix for paraquat. Need for adjuvants with glyphosate depend upon brand used.
Burndown of emerged annual weeds. Does not control immature primrose, large horseweed, curly dock, swinecress, immature radish, or large grasses or pigweeds over 3”.	<i>paraquat</i> Gramoxone 2S Firestorm, Parazone 3S	22	2.5-4 pt 1.7-2.7 pt	0.63-1	24 H/ N/A	<b>Control of mature cover crops with seedheads:</b>  Wheat < 12”: glyphosate 0.75 lb ae or paraquat 0.63 lb Wheat > 12”: glyphosate 0.75 lb ae or paraquat 0.75 lb Rye < 18”: glyphosate 0.56 lb ae or paraquat 0.6 lb Rye > 18”: glyphosate 0.75 lb ae or paraquat 0.75 lb Rye with seed head: 0.56 lb ae
Burndown of mature primrose and morningglory. Inadequate control of immature radish, pigweeds over 3” or grain cover crops. <b>For resistance management, do not apply glufosinate on a field more than 2 times a year.</b>	<i>glufosinate</i> Liberty 2.34S	10	29-43 fl oz	0.53-0.79	12 H/ N/A	Applications can be made prior to cotton emergence. <b>To maximize control:</b> >15 GPA water volume, medium spray droplet, warm temperatures, high humidity, bright sunlight, good soil moisture, and do not spray within 1.5 hours of sunrise or 1 hour of sunset. <b>For Palmer amaranth, apply 29 oz/A when less than 3”; 32 oz/A when 3”; 36 oz/A when 4”; and 43 oz/A when taller than 4”.</b>  Cheetah and Interline have been tested and performed similarly to Liberty, see labels. Other brands are available.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>PREPLANT INCORPORATED</b>						
Annual grasses, pigweeds and Florida pusley.  Controls glyphosate-resistant Palmer amaranth much more effectively than when applied preemergence.	<i>pendimethalin</i> Prowl 3.3 EC Prowl H20 3.8 AS	3	1.2-2.4 pt 2 pt	0.5-1 0.95	24 H/ N/A	Soil incorporate in top 2" of the soil within 24 hours of application; consider mixing with Reflex. 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.  The need for a PRE herbicide as noted with the split program below is critical.
	<i>trifluralin</i> Treflan, others 4 EC	3	1-2 pt	0.5-1	12 H/ N/A	
Glyphosate-resistant Palmer amaranth and yellow nutsedge  <b>For PPO-resistance management, make only 3 applications of Valor or Reflex (including generics) on a field in 3 years.</b>	<i>fomesafen</i> Reflex 2S	14	16 fl oz	0.25	24 H/ N/A	A Georgia Section 2 (ee) Reflex label allows a preplant application by incorporating Reflex to a SHALLOW (2" or less) depth while the soil is moist; suggest including pendimethalin or trifluralin. The need for a PRE herbicide as noted with the split program below is critical; <b>reduce Reflex rate accordingly if implementing split PPI and PRE program.</b>  For Palmer amaranth, less control is noted with Reflex alone incorporated when compared to preemergence applications if activated immediately by rainfall or irrigation; less injury potential is also noted with incorporated application. Thus the split program, below, is usually the best option.
<b>SPLIT PROGRAM WITH PREPLANT INCORPORATED (PPI) FOLLOWED BY PREEMERGENCE (PRE) APPLICATIONS</b>						
The SINGLE MOST effective approach for the control of Palmer amaranth while also offering the least injury potential from fomesafen.  Very beneficial on dryland production.	<b>PPI:</b>					<b>PPI:</b> Shallow (2") incorporation is required. Plant within 1 week of application and incorporation if possible.  Numerous formulations of fomesafen are available; however, they may not support this use pattern, see label.
	<i>trifluralin or pendimethalin</i> + <i>fomesafen</i> Reflex 2S		See rates in preplant incorporated  + 10-12 oz	See rates in preplant incorporated  + 0.16-0.19	24 H/ N/A	
<b>For PPO-resistance management, make only 3 applications of Valor or Reflex (including generics) on a field in 3 years.</b>	<b>PRE:</b>					<b>PRE:</b> 1. Be sure to include paraquat 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. 3. If mixing Reflex + Warrant + diuron, the rate of diuron for most fields should not exceed 10 oz/A.  Numerous formulations of fomesafen and diuron are available; see label.
	<i>fomesafen</i> Reflex 2S + <i>acetochlor</i> Warrant 3ME <u>OR</u> <i>diuron</i> Direx, diuron 4F	3 + 14 + 15 <u>OR</u> 7	8-10 oz + 32 fl oz <u>OR</u> 10-20 fl oz	0.125-0.16 + 0.75 <u>OR</u> 0.31-0.63	24 H/ N/A	

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**COTTON WEED CONTROL**

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>PREEMERGENCE-BROADLEAF AND GRASS CONTROL</b>						
Residual control of annual grasses, Palmer amaranth, and tropical spiderwort.	<i>acetochlor</i> Warrant 3 ME	15	2-3 pt	0.75-1.125	12 H/ N/A	Warrant should be applied in combination with fomesafen (Reflex, others), diuron, or Cotoran depending on Palmer population and technology grown; add paraquat and adjuvant if Palmer is up. Apply within 24 hr of planting. A rate of 2-2.5 pt/A is in order when 1) tank mixing with another effective residual herbicide, 2) applying on light soil textures, and/or 3) using intense irrigation during the first 2 wk of planting.
Residual control of many annual grasses and broadleaves including Palmer amaranth and tropical spiderwort; suppression of yellow nutsedge.	<i>acetochlor</i> + <i>fomesafen</i> Warrant Ultra 3.45 CS	15 + 14	2.4 pt	0.84 + 0.19	24 H/ N/A	Apply within 24 hr of planting; add paraquat plus adjuvant if Palmer is up. Warrant Ultra at 2.4 pt/A provides 2.2 pt of Warrant and 0.19 lb ai of fomesafen (equivalent to 12 oz/A of Reflex). This rate is ideal for lighter soil textures, under intense irrigation, and when used in dicamba- or 2,4-D-based programs. On heavier soils when implementing Roundup- or Liberty-based programs, the addition of Warrant at 0.5 pt/A to this mix may be in order.
Residual suppression of annual broadleaf weeds and grasses. More effective than Cotoran on pigweed, less effective on most other weeds.	<i>diuron</i> Direx, others 80 DF Direx, others 4L	7	0.38-0.78 lb 10-20 oz	0.31-0.62	12 H/ N/A	Diuron should 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. Numerous generic formulations are available, see label.
Residual suppression of annual broadleaf weeds and annual grasses. The most effective single residual material for sicklepod, cocklebur, and morningglory control. Less effective than diuron on Palmer amaranth.	<i>fluometuron</i> Cotoran 4F	7	2-3 pt	1-1.5	12 H/ N/A	Cotoran should 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 use lower rate on sandier soils and/or with intense irrigation. A maximum of 2 pt/A is ideal for most GA soils.
Excellent residual control of Palmer amaranth if activated. New herbicide chemistry for a cotton grower.	<i>fluridone</i> + <i>fomesafen</i> Brake F16	12 + 14	16 fl oz	0.15 + 0.1875	24 H/ N/A	Contains fluridone plus the equivalent of 0.1875 lbs of fomesafen, which would equal 12 oz of Reflex. Although the fomesafen requires around 0.3" rainfall/irrigation for activation, fluridone requires a minimum of 0.5" rainfall/irrigation. Carryover to small grains and soybeans 8 months; sorghum, peanut, corn 10 months; tobacco and most veggies at least 18 months.
The most effective residual herbicide for the control of glyphosate-resistant Palmer amaranth. Good control of poinsettia and suppression of yellow nutsedge.  <b>For PPO resistance management, make only 3 applications of fomesafen or Valor (including generics) on a field in 3 years.</b>	<i>fomesafen</i> Reflex, Dawn 2S	14	12-16 fl oz	0.19-0.25	24 H/ N/A	Reflex or generics should be applied in combination with Warrant, diuron, or Cotoran for maximum control depending on Palmer population and technology grown; add paraquat and adjuvant if Palmer is up. Apply within 24 hr of planting. <b>Research suggests 12 oz/A is an appropriate rate when mixed with Warrant or diuron on most soils.</b> Apply only to coarse-textured soils; however on sandy soils with low organic matter use lower rates. Injury more often occurs when initial rains or irrigation occur as cotton is emerging; follow irrigation program on the 2017 Palmer Circular. 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. Reflex and Dawn have been tested intensely; other brands are available.

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## COTTON WEED CONTROL

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>PREEMERGENCE-BROADLEAF AND GRASS CONTROL</b> <i>(continued)</i>						
Annual grasses and Florida pusley; suppression of Palmer amaranth only. Irrigation or rainfall needed within 24 hours.	<i>pendimethalin</i> Prowl 3.3 EC Prowl H20 3.8 AS	3	1.8-3.6 pt 2-3 pt	0.75-1.5 0.95-1.42	24 H/ N/A	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.
Controls non-ALS resistant pigweeds, lambsquarters, prickly sida, spurge, and smartweed.  Suppresses morningglory, except tall. <b>Make only 1 timely application of Staple and/or Envoke per season.</b>	<i>pyrithiobac</i> Staple LX, Pyrimax 3.2S	2	1.7-2.1 fl oz	0.0425-0.053	4 H/ N/A	Staple or Pyrimax are excellent residual herbicides but cotton injury, especially on irrigated light textured soils is a serious concern. Thus, a delayed PRE or early POST use of Staple is recommended by UGA; contact your local Extension office for a circular or go to <a href="http://gaweed.com">gaweed.com</a> .  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.
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ANY CULTIVAR</b> Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.						
Pigweed less than 1", morningglory (excluding tall mg), coffee senna, and redweed. Suppresses sicklepod and will not control ALS-resistant pigweed.  Provides good residual control of many species if reaches the ground and is activated. <b>Make only 1 TIMELY application of Staple and/or Envoke per season.</b>	<i>pyrithiobac</i> Staple LX, Pyrimax 3.2S	2	2.7-3 fl oz	0.06-0.07	4 H/ 60 D	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/100 gal spray mix. Label allows 2 applications per year, not exceeding a total of 5.1 fl oz. Label also allows increasing rate of an application 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. <b>Do not mix with any Dual product or Warrant.</b> Separate Staple and Dual/Warrant applications by 5 or more days. See label for rotational restrictions.
Annual broadleaf weeds including sicklepod, Ipomoea morningglory, and nutsedge.  Will not control smallflower morningglory or ALS-resistant pigweed, jimsonweed, copperleaf, or prickly sida. <b>Make only 1 TIMELY application of Staple and/or Envoke per season.</b>	<i>trifloxysulfuron</i> Envoke 75 WDG	2	0.1 oz	0.0047	12 H/ 60 D	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/100 gal; do not use other types of adjuvants. 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" or larger at rates of 0.1-0.25 oz/A. See label for details and rotational restrictions. Rain fast in 3 hr.  <b>Also provides residual control of sensitive species if contacts soil and is activated.</b>

**COTTON WEED CONTROL**

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ANY CULTIVAR (continued)</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
Most broadleaf weeds. Poor control of tropic croton, copperleaf and ALS-resistant pigweed. Good residual if activated.	<i>trifloxysulfuron</i> Envoke 75 WDG + <i>pyrithiobac</i> Staple LX 3.2 SL	2 + 2	0.1 oz + 1.3-1.9 fl oz	0.0047 + 0.03-0.05	12 H/ 60 D	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/100 gal spray mix. See comments and restrictions for each product applied alone.
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR LIBERTYLINK, GLYTOL LIBERTYLINK, or XTENDFLEX COTTON ONLY</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control</b>						
An at-plant residual herbicide should always be used in a Liberty system.  Control of pusley, spiderwort, and goosegrass are not consistent. In general, broadleaf weeds should be <3" and grasses < 2".  Excellent control of morningglory including moonflower.  <b>For Palmer amaranth, apply 29 oz/A when less than 3"; 32 oz/A when 3"; 36 oz/A when 4"; and 43 oz/A when taller than 4".</b>  <b>For resistance management, do not make more than 2 applications of glufosinate per year on a field; include two herbicides PRE, residual mixtures POST, and a directed layby.</b>	<i>glufosinate</i> Liberty 2.34S	10	29-43 fl oz	0.53-0.79	12 H/ 70 D	<b>Liberty Link, Glytol LibertyLink, or XtendFlex Cultivars</b> Label allows application from full cotyledonary cotton through early bloom; however, UGA recommends applications after 7 leaf cotton be sloppy directed to reduce injury potential while improving weed control. 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.  <b>To maximize control:</b> >15 GPA water volume, medium spray droplet, warm temperatures, high humidity, bright sunlight, good soil moisture, and do not spray within 1.5 hours of sunrise or 1 hour of sunset. Mixtures with residual herbicides are usually needed to assist in the control of grasses, pusley, spiderwort, and pigweed.  Cheetah and Interline are formulations of glufosinate that have been tested; other brands are available. Research has shown in some environments, especially saturated soils, that more injury from Liberty is observed with XtendFlex cotton compared to LibertyLink cotton; however, injury with XtendFlex cotton is less than that of Widestrike cotton.  Rain fast within 4 hours. Do not tank mix with grass herbicides.
Staple may improve emerged pigweed control (non ALS-resistant) and provides residual activity on sensitive weeds if spray contacts soil and is activated.  <b>For resistance management, do not make more than 2 applications of glufosinate per year in a field; include 2 herbicides PRE and a directed layby. Also do not make more than 1 Staple and/or Envoke application per year in a field.</b>	<i>glufosinate</i> Liberty 2.34S + <i>pyrithiobac</i> Staple LX 3.2 SL	10 + 2	29 fl oz + 1.9 fl oz	0.53-0.58 + 0.03-0.05	12 H/ 70 D	<b>LibertyLink, Glytol LibertyLink, or XtendFlex Cultivars</b> See information for glufosinate alone just above.  Leaf speckling/burn/chlorosis will occur. Avoid dew, extremely high temperatures, saturated soils, and mixtures with other pesticides or adjuvants to reduce injury potential. Do not mix with any metolachlor (Dual) product or Warrant.  Cheetah and Interline are formulations of glufosinate that have been tested; other brands are available.  Research has shown in some environments, especially saturated soils, that more injury from Liberty is observed with XtendFlex cotton compared to LibertyLink cotton; however, injury with XtendFlex cotton is less than that of Widestrike cotton.

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**COTTON WEED CONTROL**

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR LIBERTYLINK, GLYTOL LIBERTYLINK, or XTENDFLEX COTTON (continued)</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
<p>Dual or Warrant provides residual control of grasses, spiderwort, and pigweeds if spray contacts soil and is activated. Outlook provides residual control of grasses and pigweeds; spiderwort has not been studied.</p> <p>Comparing Dual and Warrant, Dual activity begins more quickly with immediate activation while Warrant is more stable waiting on activation.</p> <p><b>For Palmer amaranth, apply Liberty at 29 oz/A when less than 3"; 32 oz/A when 3"; 36 oz/A when 4"; and 43 oz/A when taller than 4".</b></p> <p><i>For resistance management, do not make more than 2 applications of glufosinate per year in a field; include 2 herbicides PRE and a directed layby.</i></p>	<i>glufosinate</i> Liberty 2.34S + <i>acetochlor</i> Warrant 3 ME	10 + 15	29-43 fl oz + 2-3 pt	0.53-0.79 + 0.75-1.125	24 H/ 70 D	<p><b>LibertyLink, Glytol LibertyLink, or XtendFlex Cultivars</b></p> <p><i>Warrant</i> mixture can be applied from cotton being fully emerged through early bloom. <i>Dual Magnum</i> mixture can be applied from cotton being fully emerged through 100 days before harvest if applied overtop, up to 80 days before harvest if directed or early bloom, whichever is more restrictive. <i>Outlook</i> mixture can be applied from 1-leaf cotton through second week of bloom.</p> <p><b>UGA research strongly encourages these mixtures to be directed after 8-leaf cotton for reduced injury and better weed control.</b></p>
	<i>glufosinate</i> Liberty 2.34S + <i>S-metolachlor</i> Dual Magnum 7.62 EC	10 + 15	29-43 fl oz + 1 pt	0.53-0.79 + 0.95	24 H/ 80 D	<p>Some leaf speckling/burn will likely occur. Injury may be enhanced if applied to cotton with dew, under extremely high temperatures, saturated soils, or when mixed with insecticides or adjuvants. Research has shown in some environments, especially saturated soils, that more injury from Liberty is observed with XtendFlex cotton compared to LibertyLink cotton; however, injury with XtendFlex Cotton is less than that of Widestrike cotton.</p>
	<i>glufosinate</i> Liberty 2.34S + <i>dimethenamid-P</i> Outlook 6 EC	10 + 15	29-43 fl oz + 12-16 fl oz	0.53-0.79 + 0.56-0.75	12 H/ N/A	<p><b>To maximize control:</b> &gt;15 GPA water volume, medium spray droplet, warm temperatures, high humidity, bright sunlight, good soil moisture, and do not spray within 1.5 hours of sunrise or 1 hour of sunset.</p> <p>Several products containing metolachlor (not S-metolachlor) are available. Metolachlor products are less effective per unit of formulated product than those with S-metolachlor. In general it takes 1.5 pt of a metolachlor product to give the activity one gets from 1 pt of S-metolachlor.</p> <p>Cheetah and Interline are available formulations of glufosinate that have been tested; other brands are available.</p>
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL IN PHYTOGEN WIDESTRIKE COTTON</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
<p>Glyphosate-resistant Palmer amaranth in Widestrike cotton.</p> <p><i>For resistance management, do not make more than 2 applications of glufosinate per year in a field; include 2 herbicides PRE and a directed layby.</i></p>	<i>glufosinate</i> Liberty 2.34S	10	29 fl oz	0.53	12 H/ 70 D	<p>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. <b>Grower assumes the liability of crop injury.</b></p> <p>Make no more than two topical applications with the second application being made no later than 8 leaf cotton. See above comments for use of Liberty in Liberty Link cotton, including statement on application time of day.</p>

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**COTTON WEED CONTROL**

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ROUNDUP READY FLEX, GLYTOL LIBERTYLINK, XTENDFLEX COTTON</b> Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. <i>(continued)</i>						
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.  <i>Never apply glyphosate alone. Obtain sound management programs from your Extension office or at gaweed.com.</i>	<i>glyphosate</i>  4S (3 lb ae) 5.4S (4 lb ae) 5S (4.17 lb ae) 5.5S (4.5 lb ae) 6S (5 lb ae)	9	32-48 oz 24-36 oz 23-34 oz 22-32 oz 19-29 oz	0.75-1.12 (lb ae)	4 H/ 7 D	<b>Roundup Ready Flex, Glytol LibertyLink or XtendFlex Cultivars</b> 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.  <b>A glyphosate-based program should include: 1) no weeds emerged at planting; 2) two residual herbicides at planting; 3) residual herbicides with Roundup POST and a conventional directed layby.</b>
Warrant provides residual control of grasses, pigweeds and tropical spiderwort, if the acetochlor contacts the soil and is activated.	<i>glyphosate</i> + <i>acetochlor</i> Warrant 3 ME	9 + 15	see glyphosate + 2-3 pts	0.75-1.12 + 0.075-1.125	12 H/ do not apply after bloom	<b>Roundup Ready Flex, Glytol LibertyLink, or XtendFlex Cultivars</b> See comments for glyphosate alone. Label allows a topical application once cotton is completely emerged until it reaches bloom; however, UGA research suggests making directed applications after the 8-leaf stage to reduce injury potential while improving weed control. 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, saturated soils, and extreme, hot conditions.

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## COTTON WEED CONTROL

WEED	HERBICIDE	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ROUNDUP READY FLEX, GLYTOL LIBERTYLINK, XTENDFLEX COTTON</b> Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. <i>(continued)</i>						
Outlook provides residual control of annual grasses and pigweeds if it reaches the soil and is activated; no current data on spiderwort.	<i>glyphosate</i> + <i>dimethenamid-P</i> Outlook 6 EC	9 + 15	see glyphosate + 12-16 fl oz	0.75-1.12 + 0.56-0.75	12 H/ N/A	<b>Roundup Ready Flex, Glytol LibertyLink, or XtendFlex Cultivars</b> See comments for glyphosate alone. Label allows a topical application from 1-leaf cotton through 2nd week of bloom; however, UGA research suggests making directed applications after the 8-leaf stage to reduce injury potential while improving weed control. Only one application of Outlook per year.  Suggested rate is 12 oz/A on coarse soils or under intense irrigation. Some leaf speckling/burn will likely occur. Avoid heavy dew on cotton plant, saturated soils, and extreme, hot conditions.
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.  <b>Will not control ALS + glyphosate resistant Palmer.</b>	<i>glyphosate</i> + <i>pyrithiobac</i> Staple LX, Pyrimax 3.2SL	9 + 2	see glyphosate + 2-3 fl oz	0.75-1.12 + 0.05-0.07	4 H/ 60 D	<b>Roundup Ready Flex, Glytol LibertyLink, or XtendFlex Cultivars</b> See comments for glyphosate and Staple alone. Apply overtop from cotton cotyledonary stage until 60 days prior to harvest, however, UGA research suggests making directed applications after the 7-leaf stage to reduce injury potential while improving weed control.  Some leaf speckling/burn will likely occur. Avoid heavy dew on cotton plant, saturated soils, and extreme, hot conditions. Do not mix with any Dual/metolachlor products or Warrant.  For Palmer amaranth, apply Staple at 2.5-3 oz/A when Palmer is 2" or less; rate can be increased to 3.8 oz/A but injury is a concern. For residual control, a rate of 1.9-2.1 oz/A should perform very well.  <b>Make only 1 TIMELY application of Staple and/or Envoke per season.</b>
Metolachlor controls annual grasses, pigweeds, doveweed, Florida pusley, tropical spiderwort and suppresses yellow nutsedge if it contacts the soil and is activated.  Several products containing metolachlor (not S-metolachlor) are available and labeled. Metolachlor products are less effective per unit of formulated product than those with S-metolachlor. In general it takes 1.5 pt of a metolachlor product to give the activity one gets from 1 pt of S-metolachlor.	<i>glyphosate</i> + <i>S-metolachlor</i> Dual Magnum 7.62 EC Brawl 7.62 EC	9 + 15	see glyphosate + 1 pt 1 pt	0.75-1.12 + 0.95	24 H/ 100 D	<b>Roundup Ready Flex, Glytol LibertyLink, or XtendFlex Cultivars</b> See comments for glyphosate alone. Dual Magnum can be applied overtop of cotton until 100 days before harvest and directed until 80 days of harvest; however, UGA research suggests making directed applications after the 8-leaf stage to reduce injury potential and improve weed control.  Some leaf speckling/burn will likely occur. Avoid heavy dew on cotton plant, saturated soils, and extreme, hot conditions.  Do not mix with Staple and do not apply within 5 days of Staple application.
	<i>glyphosate</i> + <i>S-metolachlor</i> Sequence 5.25L		2.5 pt	0.7 + 0.94	24 H/ 100 D	<b>Roundup Ready Flex, Glytol LibertyLink, or XtendFlex Cultivars</b> Label allows application from cotyledon stage cotton to the 10 leaf stage (not to exceed 12" tall). Do not harvest within 100 days of application. See comments above for glyphosate + Dual Magnum.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR ROUNDUP READY FLEX, GLYTOL LIBERTYLINK, XTENDFLEX COTTON</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. (continued)</b>						
<p>Envoke will improve control of Ipomoea morningglory and nutsedge. It will also provide some residual control of sensitive weeds if it reaches the soil and is activated.</p> <p><b>Will not control ALS + glyphosate resistant Palmer.</b></p>	<p><i>glyphosate</i></p> <p>+</p> <p><i>trifloxysulfuron</i> Envoke 75 WDG</p>	9 + 2	<p>see glyphosate</p> <p>+</p> <p>0.1 oz</p>	<p>0.75-1.12</p> <p>+</p> <p>0.0047</p>	24 H/ 60 D	<p><b>Roundup Ready Flex, GlyTol LibertyLink, XtendFlex Cultivars</b></p> <p>See comments for glyphosate and Envoke applied alone. Tank mix can be applied from 6 (prefer 7) leaf stage until 60 days of harvest; however, directed application strongly encouraged for improved weed control and much less injury.</p> <p><b>Make only 1 TIMELY application of Staple and/or Envoke per season.</b></p>
<p>Volunteer Roundup Ready corn in Roundup Ready <b>Flex</b> cotton</p>	<p><i>glyphosate</i></p> <p>+</p> <p><i>clethodim</i> Select 2 EC Select Max 0.97EC</p>	9 + 1	<p>see glyphosate</p> <p>+</p> <p>4-8 fl oz 6-12 fl oz</p>	<p>0.75-1.12</p> <p>+</p> <p>0.06-0.09</p>	24 H/ 60 D	<p><b>Roundup Ready Flex, GlyTol LibertyLink, XtendFlex Cultivars</b></p> <p>For corn up to 12" tall, apply 4-6 oz of Select or 6 oz of Select Max; for corn up to 24" tall, apply 6-8 oz of Select or 9 oz of Select Max; for corn up to 36" tall, apply 12 oz of Select Max. Add 2.5 lb/A ammonium sulfate or equivalent and make sure glyphosate brand used contains adjuvant. Numerous generic formulations of clethodim are available.</p>
	<p><i>glyphosate</i></p> <p>+</p> <p><i>fluazifop -p-butyl</i> Fusilade DX 2 EC</p>	9 + 1	<p>see glyphosate</p> <p>+</p> <p>4-6 fl oz</p>	<p>0.75-1.12</p> <p>+</p> <p>0.06-0.09</p>	12 H/ 90 D	<p><b>Roundup Ready Flex, GlyTol LibertyLink, XtendFlex Cultivars</b></p> <p>See comments for glyphosate alone. Apply Assure at 4 oz to corn up to 12", 5 oz for corn up to 18", and 8 oz to corn up to 30". Add 0.125% nonionic surfactant by volume.</p>
	<p><i>glyphosate</i></p> <p>+</p> <p><i>quizalofop-p-ethyl</i> Assure II 0.88 EC</p>	9 + 1	<p>see glyphosate</p> <p>+</p> <p>5-8 fl oz</p>	<p>0.75-1.12</p> <p>+</p> <p>0.03-0.05</p>	12 H/ 80 D	<p><b>Roundup Ready Flex, GlyTol LibertyLink, XtendFlex Cultivars</b></p> <p>See comments for glyphosate alone. Apply Assure at 4 oz to corn up to 12", 5 oz for corn up to 18", and 8 oz to corn up to 30". Add 0.125% nonionic surfactant by volume.</p>
<p>Volunteer Roundup Ready soybean</p>	<p><i>glyphosate</i></p> <p>+</p> <p><i>trifloxysulfuron</i> Envoke 75 WDG</p>	9 + 2	<p>see glyphosate</p> <p>+</p> <p>0.1 oz</p>	<p>0.75-1.12</p> <p>+</p> <p>0.0047</p>	12 H/ 60 D	<p><b>Roundup Ready Flex, GlyTol LibertyLink, XtendFlex Cultivars</b></p> <p>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 4-5 trifoliolate leaves. Not adequately effective on soybean with the STS trait.</p> <p>Consider the addition of Cotoran PRE at planting to control soybean.</p> <p><b>Make only 1 timely Envoke and/or Staple application per season.</b></p>

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP BROADLEAF AND GRASS CONTROL FOR GLYTOL LIBERTYLINK and XTENDFLEX COTTON ONLY</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
Mixing glyphosate with Liberty will not influence weed control by Liberty alone; however, grass control will often be more than Liberty alone but often less than that by glyphosate alone.	<i>glufosinate</i> Liberty 2.34 S + glyphosate Numerous brands	10 + 9	32 fl oz + varies	0.59 + 0.75	12 H/ 70 D	<b>Glytol LibertyLink and XtendFlex Cultivars</b>  See comments for Liberty and for glyphosate alone. Injury on Glytol LibertyLink is almost always negligible; injury on XtendFlex is often increased slightly above glufosinate applied alone.  Some leaf speckling/burn will likely occur. Injury may be enhanced if applied to cotton with dew, under extremely high temperatures, during times of saturated soils, or when mixed with insecticides or adjuvants. Research has shown in some environments, especially saturated soils, that more injury from Liberty is observed with XtendFlex cotton compared to LibertyLink cotton.
<b>POSTEMERGENCE OVER-THE-TOP GRASS CONTROL FOR ANY COTTON CULTIVAR</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
Annual grasses	<i>clethodim</i> Select, others 2 EC Select Max 0.97 EC Tapout 0.97 EC	1	6-8 fl oz 9-16 fl oz 9-16 fl oz	0.09-0.13 0.07-0.12 0.07-0.12	24 H/ 60 D	Apply to actively growing grasses not under stress. Mixtures with herbicides other than glyphosate will likely reduce grass control. Do not cultivate within 5 days of application. A 2nd application may be made.  <b>For Select:</b> Add crop oil concentrate at 1 qt/A . <b>For Select Max:</b> Add nonionic surfactant at 1 qt/100 gal solution, crop oil concentrate at 1 gal/100 gal solution, or methylated seed oil at 1 gal/100 gal solution.
	<i>fluazifop p-butyl</i> Fusilade DX 2 EC	1	8-12 fl oz	0.125 to 0.188	12 H/ 90 D	<b>For Fusilade:</b> Apply with crop oil concentrate (preferred) at 1 gal/100 gal solution or nonionic surfactant at 1 qt /100 gal solution. <b>For Assure:</b> Apply with crop oil concentrate (preferred) at 1 gal/100 gal solution or nonionic surfactant at 1 qt/100 gal solution. <b>For Poast:</b> Add crop oil concentrate at 1 qt/A.
	<i>quizalofop p-ethyl</i> Assure II 0.88 EC	1	7-8 fl oz	0.05-0.06	12 H/ 80 D	Numerous generic formulations for each active ingredient are available.
	<i>sethoxydim</i> Poast 1.53 EC Poast Plus 1 EC	1	16 fl oz 24 fl oz	0.19	12 H/ 40 D	
Perennial grasses	<i>clethodim</i> Select, others 2 EC Select Max 0.97 EC Tapout 0.97 EC	1	8-16 fl oz 12-32 fl oz 12-32 fl oz	0.13-0.25 0.09-0.24 0.09-0.24	24 H/ 60 D	Apply to actively growing johnsongrass 12-24" tall or to bermudagrass with runners up to 6". A second application at the provided rates may be made to bermudagrass when regrowth is up to 6" or when johnsongrass has regrowth of 6-18". Add adjuvant as provided above in annual grass section. Do not mix with other herbicides. Do not cultivate within 7 days before or after application.
	<i>fluazifop p-butyl</i> Fusilade DX 2 EC	1	10-12 fl oz	0.156-0.188	12 H/ 90 D	Apply when johnsongrass is 8-18" or when bermudagrass runners are 4-8". 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". Apply with crop oil concentrate (preferred) at 1 gal/100 gal solution or nonionic surfactant at 1 qt/100 gal solution. Do not mix with other herbicides. Do not cultivate within 5 days of application.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE OVER-THE-TOP GRASS CONTROL FOR ANY COTTON CULTIVAR</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. (continued)</b>						
Perennial grasses (continued)	<i>quizalofop p-ethyl</i> Assure II 0.88 EC	1	10 fl oz	0.07	12 H/ 80 D	Apply when johnsongrass is 10-24" or bermudagrass runners are 3-6". A second application for treating regrowth or new plants can be made with 7 fl oz/A when johnsongrass reaches 6-10" or bermudagrass reaches 3-6". Apply with crop oil concentrate (preferred) at 1 gal/100 gal solution or nonionic surfactant at 1 qt/100 gal solution. Do not mix with other herbicides. Do not cultivate within 5 days of application.
	<i>sethoxydim</i> Poast 1.53 EC Poast Plus 1 EC	1	24 fl oz 36 fl oz	0.28	12 H/ 40 D	Apply to johnsongrass up to 25" and before bermudagrass runners exceed 6". If regrowth occurs or new plants emerge, make a second application of 16 fl oz/A of Poast when johnsongrass reaches 6-10" and bermudagrass reaches 3-6". Add 1 qt of crop oil concentrate/A. Do not tank mix with other herbicides. Do not cultivate within 5 days of application.
<b>POSTEMERGENCE DIRECTED – ANY COTTON CULTIVAR</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
Effective control of many broadleaf weeds and nutsedge.  Grasses should be < 1".  Residual control of many weeds if activated.  <b>Diuron plus MSMA is the best directed option to control emerged glyphosate-resistant Palmer amaranth.</b>  Diuron is more effective in controlling emerged pigweed than Cotoran or Valor.  Valor provides the more effective residual control of pigweed.	<i>diuron</i> Direx, Diuron, other 4F + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	7 + 17	1.6-2.4 pt + 2 pt 2 pt	0.8-1.2 + 1.5-1.65	12 H/ 1st Bloom	Apply as directed spray to cotton at least 12" 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 have extended rotational concerns. See rotational restrictions.  <u>If soil type allows, use at least 2 pt/A of diuron for control of emerged Palmer amaranth.</u> Label prohibits applying MSMA after 1st bloom.  <b>To Improve Emerged Morningglory Control Consider Adding:</b>  1) Envoke at 0.1 oz/A which poses no additional injury concern with 12" or taller cotton; or 2) Aim or ET at 0.5-1 fl oz/A where cotton should be at least 20" tall and having 3" of bark with spray only contacting barky portion of the stem. Aim will also improve spiderwort control.  <b>To Improve Spiderwort and Grass Residual Control Consider Adding:</b>  1) Dual Magnum 1 pt/A; or 2) Warrant 2-3 pt/A; or 3) Zidua 0.75-1.5 oz/A as long as cotton has at least 7 leaves.  Numerous formulations of diuron and MSMA are available.
	<i>diuron + linuron</i> Layby Pro 4F + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	7 + 7 + 17	2 pt + 2 pt 2 pt	0.5 + 0.5 + 1.5-1.65	24 H/ 1st Bloom	Apply as a directed spray to cotton at least 16" tall. Add crop oil concentrate at 1 gal/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.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE DIRECTED – ANY COTTON CULTIVAR</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. (continued)</b>						
Effective control of many broadleaf weeds and nutsedge; grasses should be 1” or less. Palmer amaranth should be 2” or less. Residual control of many weeds if activated.  Diuron is more effective in controlling emerged pigweed than Cotoran or flumioxazin; flumioxazin provides the most effective residual control of Palmer amaranth.	<i>flumioxazin</i> Valor SX, others 51 WDG + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	14 + 17	2 oz + 2.67 pt 2.5 pt	0.064 + 2	12 H/ 1st Bloom	Apply as a directed spray to cotton at least 18” tall. Direct spray to the lower 2” of the cotton stem and do not contact the green portion of the cotton stem. May apply to 6” cotton under a hood.  Add nonionic surfactant at 1 qt/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 1st bloom.  IN HOODED APPLICATIONS when no contact of the cotton crop occurs; the addition of Dual type product or Warrant is recommend for managing tropical spiderwort and glyphosate- resistant Palmer amaranth.  Outflank, Panther, and Rowel have been tested and perform similarly to Valor.  <b>For PPO-resistance management, make only 3 applications of Valor or Reflex (including generics) in 3 years.</b>
Currently, the single best layby mixture for both control of emerged glyphosate-resistant Palmer amaranth and extended residual control.	<i>flumioxazin</i> Valor SX, others 51 WDG + <i>diuron</i> Direx, others 4F + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	14 + 7 + 17	2 oz + 1 pt + 2 pt 2 pt	0.064 + 0.5 + 1.5 1.65	12 H/ 1st Bloom	See restrictions for each product applied alone. Cotton should be at least 20” tall. Apply as a directed spray to the lower 2” of the barky portion of the cotton stem.  Experiment with this mixture on limited acreage as crop injury is of some concern. Add nonionic surfactant at 1 qt/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 1st bloom.
Effective control of many broadleaf weeds and nutsedge; grasses should be less than 1” and Palmer 2” or less.  Will not improve control of emerged weeds but better residual control when compared to flumioxazin alone.	<i>flumioxazin</i> + <i>pyroxasulfone</i> Fierce 76 WDG + <i>MSMA</i> 6 lb/gal 6.6 lb/gal	14 + 15 + 17	3 oz + 2.67 pt 2.5 pt	0.063+0.08 + 2	12 H/ 1st Bloom	Apply as a directed spray to cotton at least 18” tall. Direct spray to the lower 2” of a barky cotton stem; do not contact the green portion of the cotton stem. May apply to 6” cotton under a hood.  Add nonionic surfactant at 1 qt/100 gal spray mix. <b>DO NOT</b> use crop oil concentrate, methylated seed oil, organo-silicone adjuvant, or any adjuvant containing any of these. Label prohibits applying MSMA 1st bloom.
Effective control of many broad-leaf 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.	<i>fluometuron</i> Cotoran 4F + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	7 + 17	2-3.2 pt + 2.67 pt 2.5 pt	1-1.6 + 2	12 H/ 1st Bloom	Apply as a directed spray to cotton at least 3” tall; cotton has very good tolerance. Label prohibits applying MSMA after 1st bloom.  The addition of a Dual type product or Warrant is recommended for managing tropical spiderwort and Palmer amaranth.

\*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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE DIRECTED – ANY COTTON CULTIVAR</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. (continued)</b>						
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.	<i>prometryn</i> Caparol 4F + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	5 + 17	1.3-2.4 pt + 2.67 pt 2.5 pt	0.65-1.2 + 2	12 H/ 1st Bloom	Apply as a directed spray. Use 1.3 pt/A Caparol in 8-12" cotton and up to 2.4 pt/A in cotton at least 12". Add nonionic surfactant at 2 qt/100 gal spray solution. Label prohibits applying after 1st bloom.  The addition of Envoke, Aim, or ET will improve morningglory control. Envoke at 0.1 oz/A poses no additional injury concern and the mixture can be applied to 12" or larger cotton. For Aim or ET at 0.5-1 fl oz/A, cotton should be at least 20" tall having 3" of bark with spray not contacting green portion of stem. Aim will also improve spiderwort control. The addition of a Dual type product or Warrant is recommended for managing tropical spiderwort.
Effective control of many broadleaf weeds, yellow nutsedge and small annual grasses.  Excellent residual control of sensitive species.	<i>prometryn</i> + <i>trifloxysulfuron</i> Suprend 80 WDG + <i>MSMA</i> (several brands) 6 lb/gal 6.6 lb/gal	5 + 2 + 17	1-1.25 lb + 2.67 pt 2.5 pt	0.8-1 + 0.007-0.009 + 2	12 H/ 1st Bloom	Apply as directed spray in cotton at least 8" tall. Add nonionic surfactant at 1 qt/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.
<b>POSTEMERGENCE DIRECTED—ROUNDUP READY FLEX, GLYTOL LIBERTY LINK, XTENDFLEX CULTIVARS ONLY</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
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.	<i>glyphosate</i> 4S (3 lb ae) 5.4S (4 lb ae) 5S (4.17 lb ae) 5.5S (4.5 lb ae) 6S (5 lb ae)	9	32-48 fl oz 24-36 fl oz 23-34 fl oz 22-32 fl oz 19-29 fl oz	0.75-1.12	4 H/ 7 D	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars:</b> Glyphosate should never be applied alone but label allows directed application up to 7 days prior to harvest. Improved weed coverage with a directed application generally occurs after 8-leaf cotton.  <b>A glyphosate-based program should include: 1) no weeds emerged at planting; 2) two residual herbicides at planting; and 3) residual herbicides with Roundup POST and a conventional directed layby. Obtain programs from the local Extension office or at gaweed.com.</b>
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. Residual Palmer control by diuron alone will last 7-10 days in most conditions.	<i>glyphosate</i> + <i>diuron</i> Direx, Diuron 4F	9 + 14	see glyphosate + 1-1.5 pt	0.75-1.12 (lb ae) + 0.5-0.75	12 H/ 7 D	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars:</b> Use 1 pt/A of diuron on cotton 8-12" and up to 1.5 pt/A of diuron on cotton greater than 12".  <b>To Improve spiderwort, pigweed, and grass residual control consider adding:</b> 1) Dual Magnum 1 pt/A; 2) Warrant 2-3 pt/A; 3) Zidua 0.75-1.5 oz/A as long as cotton has at least 7 leaves; or 4) Outlook 12-16 oz/A.  <b>To Improve Morningglory Control Consider Adding:</b> 1) Envoke 0.1 oz/A, no additional restrictions; 2) Valor 1-1.5 oz/A, cotton should be at least 18" tall with spray contacting only bottom 2" of bark stem; or 3) Aim or ET 0.5-1 oz/A, cotton should be at least 20" with spray contacting bottom 2" of bark stem only.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE DIRECTED - ROUNDUP READY FLEX, GLYTOL LIBERTY LINK, XTENDFLEX CULTIVARS ONLY</b> Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control. (continued)						
Mixture improves morningglory and tropical spiderwort control and provides residual control of broadleaf weeds including pigweeds, purslane, and Florida pusley.  Often poor control of glyphosate-resistant Palmer amaranth over 1".	<i>glyphosate</i> + <i>flumioxazin</i> Valor SX 51WDG	9 + 14	see glyphosate + 1-2 oz	0.75-1.12 (lb ae) + 0.031-0.063	12 H/ 60 D	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars:</b> Cotton should be at least 18". Direct spray to the lower 2" of barky cotton stem. Do not allow spray to contact green portion of stem.  <i>The addition of diuron will improve control of emerged pigweed.</i>  Add nonionic surfactant at 1 qt/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.  Outflank, Panther, and Rowel have been tested and perform similarly to Valor.  <b>For PPO-resistance management, make only 3 applications of Valor or Reflex (including generics) on a field in 3 years.</b>
Provides similar postemergence control as glyphosate + Valor but provides greater residual control for many weeds including spiderwort and Palmer amaranth.	<i>glyphosate</i> + <i>flumioxazin</i> + <i>pyroxasulfone</i> Fierce 76 WDG	9 + 14 + 15	see glyphosate + 3 oz/A	0.75-1.12 (lb ae) + 0.063-0.08	12 H/ 60 D	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars:</b> Apply as a directed spray to cotton at least 18" tall. Direct spray to the lower 2" of a barky cotton stem; do not contact the green portion of the cotton stem. May apply to 6" cotton under a hood.  Add nonionic surfactant according to the Fierce label. DO NOT use crop oil concentrate, methylated seed oil, organosilicone adjuvant, or any adjuvant containing any of these.
Mixture improves morningglory control and provides residual control of sensitive species.  The tank mix may give less grass control than glyphosate alone.	<i>glyphosate</i> + <i>prometryn</i> Caparol 4F	9 + 5	see glyphosate + 1-2 pt	0.75-1.12 (lb ae) + 0.5-1	12 H/ -	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars</b> Cotton should be at least 8" for Caparol rate between 1-1.3 pt and at least 12" for Caparol rate above 1.3 pt. Add surfactant but only if glyphosate brand requires it.  <i>To Improve Spiderwort, Pigweed, and Grass Residual Control Consider Adding:</i> 1) Dual Magnum 1 pt/A; 2) Warrant 2-3 pt/A; 3) Zidua 0.75-1.5 oz/A as long as cotton has at least 7-leaf; or 4) Outlook 12-16 oz/A.  <i>To Improve Morningglory Control Consider Adding:</i> 1) Envoke 0.1 oz/A, no additional restrictions; 2) Valor 1-1.5 oz/A, cotton should be at least 18" tall with spray contacting only bottom 2" of barky stem; or 3) Aim or ET 0.5-1 oz/A, cotton should be at least 20" with spray contacting bottom 2" of barky stem only.  Occasionally, directed applications to succulent cotton stems cause chlorosis from Caparol throughout the plant.

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE DIRECTED - ROUNDUP READY FLEX, GLYTOL LIBERTY LINK, XTENDFLEX CULTIVARS ONLY (continued)</b>						
<b>Application of postemergence herbicide treatments to moisture stressed weeds usually results in poor control.</b>						
Mixing Envoke with glyphosate improves <i>Ipomoea</i> morningglory and nutsedge control and provides some residual control of sensitive species.	<i>glyphosate</i> + <i>trifloxysulfuron</i> Envoke 75 WDG	9 + 2	see glyphosate + 0.1-0.2 oz	0.75-1.12 (lb ae) + 0.005-0.009	12 H/ 60 D	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars</b> Direct to cotton from 6" tall through layby; minimize contact on small cotton. Add nonionic surfactant according to Envoke label. Excellent tolerance when directed.  The addition of diuron would greatly improve control of emerged Palmer amaranth.  <b>Make no more than 1 application of Envoke or Staple per season.</b>
Mixing Suprend with glyphosate improves control of morningglory, pigweeds, and nutsedge. Also provides residual weed control of sensitive species.	<i>glyphosate</i> + <i>prometryn</i> + <i>trifloxysulfuron</i> Suprend 80 WDG	9 + 5 + 2	see glyphosate + 1-1.25 lb	0.75-1.12 (lb ae) + 0.8-1 + 0.007-0.0088	24 H/ 60 D	<b>Roundup Ready Flex, GlyTol LibertyLink, and XtendFlex Cultivars:</b> Direct to cotton at least 8" tall. Add surfactant according to label of glyphosate brand used. See precautions and rotational restrictions on Suprend label.
<b>POSTEMERGENCE-HOODED SPRAYER</b>						
Glyphosate as a hooded application is especially effective for prostrate, running species such as citron, burgherkin, and annual grasses.  SUGGEST NOT USING LIQUID NITROGEN AS ENTIRE CARRIER.	<i>glyphosate</i> 4S (3 lb ae) 5.4S (4 lb ae) 5S (4.17 lb ae) 5.5S (4.5 lb ae) 6S (5 lb ae)	9	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)	4 H/ 7 D	In varieties not resistant to glyphosate, 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" tall.  Other herbicides such as Aim, Caparol, diuron, Dual Magnum, Envoke, ET, Staple, Valor, and Warrant may be mixed with certain glyphosate formulations to improve burndown in larger cotton. All of these products except Aim or ET will also offer residual weed control for some troublesome weeds. Grass control may be reduced with tank mixes of glyphosate plus Caparol or diuron.  <b>A glyphosate-based program should include: 1) no weeds emerged at planting; 2) two residual herbicides at planting; 3) residual herbicides with Roundup POST and a conventional directed layby. Obtain programs from the local Extension office or at gaweed.com.</b>
Annual grass and broadleaf weeds; suppression of nutsedge.  <i>Mixtures with diuron would be the most effective option to control emerged pigweed in row middles.</i>	<i>paraquat</i> Gramoxone 2S	22	19-38 fl oz	0.3-0.6	24 H/ 3 D	<b>DO NOT CONTACT COTTON STEMS OR FOLIAGE.</b> Apply in a minimum of 10 GPA at a maximum of 25 PSI. Do not exceed 5 MPH. Hoods should be kept on the ground. Cotton should be at least 8". Add nonionic surfactant at 2 pt/100 gal of spray mix or crop oil concentrate at 1 gal/100 gal spray mix.  Caparol, Cotoran, or diuron (Direx, diuron) mixed with paraquat will likely improve control of emerged weeds while also providing residual control.  <b><i>If paraquat contacts the cotton stem severe damage is to be expected!</i></b>

<sup>1</sup>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	MOA	BROADCAST RATE/ACRE		REI/PHI (Hours or Days)	REMARKS AND PRECAUTIONS
			AMOUNT OF FORMULATION	LBS ACTIVE (AI or AE)		
<b>POSTEMERGENCE-HOODED SPRAYER (continued)</b>						
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 morningglory including moonflower morningglory.  <b>Make no more than 2 applications of Liberty per year.</b>	<i>glufosinate-ammonium</i> Liberty 2.34 S	10	29 fl oz	0.53	12 H/ 70 D	On non-glufosinate tolerant cotton, keep hoods close to ground to avoid contact with cotton stem. Suggest cotton be at least 8". The addition of diuron or other residual herbicide strongly encouraged. Adjuvant not needed.  <b>To maximize control:</b> >15 GPA water volume, medium spray droplet, warm temperatures, high humidity, bright sunlight, good soil moisture, and do not spray within 1.5 hours of sunrise or 1 hour of sunset.  <b>Palmer amaranth should be less than 3" when treated with glufosinate at this rate; diuron + MSMA is more effective on emerged pigweed.</b>  Numerous other brands of glufosinate are available.
<b>HARVEST AID</b>						
Mature morningglory	<i>carfentrazone-ethyl</i> Aim 2 EC	14	up-1.5 fl oz	up-0.024	12 H/ 7 D	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 defoliant – see label. See label for addition of adjuvant. See cotton defoliation section for potential negative influence on defoliation activity.
	<i>pyraflufen ethyl</i> ET 0.208 EC	14	up-2.75 oz	up-0.0044	12 H/ 7 D	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 defoliant – see label. See label for addition of adjuvant. See cotton defoliation section for potential negative influence on defoliation activity.
Desiccation of most weeds.  Regrowth of many weeds occurs soon after application.	<i>paraquat</i> Gramoxone Inteon 2S	22	16-32 fl oz	0.25-0.5	24 H/ 3 D	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/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. <b>Be aware of potential pine tree and other sensitive crop/plant injury with drift.</b> Generic brands of paraquat containing 3 lb ai/gal may be labeled. These products would be applied at 11-21 fl oz for 0.25-0.5 lb ae, respectively. See cotton defoliation section.
Annual grasses and broadleaf weeds	<i>glyphosate</i> 4 SL (3 lb ae) 5.4 SL (4 lb ae) 5 SL (4.17 lb ae) 5.5 SL (4.5 lb ae) 6 SL (5 lb ae)	9	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)	4 H/ 7 D	Apply after at least 60% of bolls are open in non-Roundup Ready cotton. May be tank mixed with defoliant. See label and defoliant section. Include nonionic surfactant according to the label of glyphosate brand used.  May apply in Roundup Ready Flex cotton until 7 days before harvest. See cotton defoliation section.

<sup>1</sup>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 <sup>1</sup>									
	2,4-D <sup>3</sup>	glyphosate	glyphosate <sup>2</sup> + 2,4-D <sup>3</sup>	glyphosate <sup>2</sup> + dicamba <sup>4</sup>	glyphosate <sup>2</sup> + Aim or ET	glyphosate <sup>2</sup> + Direx <sup>7</sup>	glyphosate <sup>2</sup> + Harmony Extra <sup>5</sup>	glyphosate <sup>2</sup> + Valor SX <sup>6</sup>	paraquat	paraquat + Direx <sup>7</sup>
<b>GRASSES / SEDGES</b>										
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
<b>BROADLEAVES</b>										
bristly starbur	G	E	E	E	E	E	E	E	E	E
buttercup	G	E	E	E	E	E	E	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	E	E	E	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 <sup>8</sup>	G-E <sup>8</sup>
eclipta	P	G-E			G-E	G-E		G-E	F	F

**WEED RESPONSE TO BURNDOWN HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	BURNDOWN TREATMENT <sup>1</sup>									
	2,4-D <sup>3</sup>	glyphosate	glyphosate <sup>2</sup> + 2,4-D <sup>3</sup>	glyphosate <sup>2</sup> + dicamba <sup>4</sup>	glyphosate <sup>2</sup> + Aim or ET	glyphosate <sup>2</sup> + Direx <sup>7</sup>	glyphosate <sup>2</sup> + Harmony Extra <sup>5</sup>	glyphosate <sup>2</sup> + Valor SX <sup>6</sup>	paraquat	paraquat + Direx <sup>7</sup>
<b>BROADLEAVES (continued)</b>										
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 <sup>8</sup>	E <sup>8</sup>
horseweed	G-E <sup>9</sup>	G-E <sup>10</sup>	E <sup>10</sup>	E <sup>10</sup>	G-E <sup>10</sup>	G-E <sup>10</sup>	G-E <sup>10</sup>	G-E <sup>10</sup>	P-F	F-G
lambsquarters	E	F-G	E	E	G-E	G-E			F-G	G
morningglory, <i>Ipomoea</i>	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 <sup>9</sup>	E	E	E	E	E	E	E	F-G	G-E
Palmer amaranth (glyphosate- resistant)	F <sup>9</sup>	N	F <sup>9</sup>	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

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

**Note:** Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

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

**WEED RESPONSE TO BURNDOWN HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	BURNDOWN TREATMENT <sup>1</sup>									
	2,4-D <sup>3</sup>	glyphosate	glyphosate <sup>2</sup> + 2,4-D <sup>3</sup>	glyphosate <sup>2</sup> + dicamba <sup>4</sup>	glyphosate <sup>2</sup> + Aim or ET	glyphosate <sup>2</sup> + Direx <sup>7</sup>	glyphosate <sup>2</sup> + Harmony Extra <sup>5</sup>	glyphosate <sup>2</sup> + Valor SX <sup>6</sup>	paraquat	paraquat + Direx <sup>7</sup>
<b>BROADLEAVES (continued)</b>										
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
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
<b>COVER CROPS</b>										
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 <sup>11</sup>	G-E <sup>11</sup>
vetch	E	F	E	E	F	F-G	G	F-G	P-F <sup>8</sup>	F-G <sup>8</sup>

Key:  
 E – 90% or better control  
 G – 80%-90% control  
 F – 60%-80% control  
 P – 30%-60% control  
 N – < 30% control.  
**Note:** Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

- Application rates per acre: Clarity (dicamba): 0.5 pt; 2,4-D: 1 pt; Aim: 1 oz; ET: 1-2 oz; diuron: 0.5-1.0 lb ai; glyphosate acid: 0.75-1.12 lb ae; paraquat: 0.75-1.0 lb ai; Harmony Extra TotalSol: 0.75 oz; Valor: 2 oz.
- Mixing herbicides with glyphosate occasionally reduces grass control (including covercrops). This is more likely with large weeds in dry conditions.
- Labels for 2,4-D are ambiguous concerning the waiting period between application and planting, see label of specific brand used.
- Following application of dicamba and a minimum of 1" of rainfall, a minimum 21-day waiting period before planting is required.
- Harmony Extra should be applied at least 14 days prior to planting.
- See plant-back restrictions noted in the previous section or on the label for Valor.
- See previous cotton section on state label for reduced plant back interval for Direx.
- This level of control requires plants to be in full bloom with seed forming when treated.
- This level of control requires 2 pt of 2,4-D (4 lb ai product).
- Glyphosate will not control glyphosate-resistant horseweed, see previous section on controlling this weed.
- Small grain must have visible seedheads for this level of control.

# WEED RESPONSE TO HERBICIDES USED IN COTTON

A. Stanley Culpepper, Extension Agronomist-Weed Science

WEED SPECIES	PREPLANT INCORPORATED	PREEMERGENCE							
	Prowl Treflan others	Prowl <sup>1</sup> , others	Brafe F16	Command	Cotoran	Direx, others	Reflex, Dawn	Staple, Pyrimax	Warrant
<b>PERENNIALS</b>									
bermudagrass	N	N		P-F	N	N	N	N	N
johnsongrass (rhizome)	P	P		N	N	N		N	P
yellow nutsedge	N	N	G	N	N	N	G-E	F	P
purple nutsedge	N	N	F	N	N	N	P-F	F	P
<b>ANNUAL GRASSES</b>									
broadleaf signalgrass	G	F		E	P	P	F-G	P	G
crabgrass	E	G		E	F-G	F-G	F-G	P	E
crowfootgrass	E	G		G	F-G	F-G			E
fall panicum	G	F-G		G-E	F	P		P-F	G
foxtails	E	G		E	F-G			P	E
goosegrass	E	G		E	F	F		P-F	E
johnsongrass (seedling)	E	G		G	P	P		F-G	F
sandbur	E	G		F-G	G	G			F-G
Texas panicum	G	F		F	P	P	F	N	P-F
<b>ANNUAL BROADLEAVES</b>									
bristly starbur	N	N		P	G-E	F-G	G-E	F-G	P
burgherkin	N	N		P	F-G	F		F-G	P
citronmelon	N	N		P	F-G	F		F-G	P
cocklebur	N	N		F	F-G	F	G	N-P	P
coffee senna	N	N		P	F-G	F	N	G	P
cowpea	N	N		N-P	P	P		F-G	P
crotalaria	N	N			G	G			P

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

Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

<sup>1</sup> Assumes irrigation or rainfall occurs within 48 hrs.

<sup>2</sup> Fair on pitted morningglory.

<sup>3</sup> Staple does not control tall morningglory or ALS-resistant Palmer amaranth.

**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	PREPLANT INCORPORATED	PREEMERGENCE							
	Prowl Treflan others	Prowl <sup>1</sup> , others	Brake F16	Command	Cotoran	Direx, others	Reflex, Dawn	Staple, Pyrimax	Warrant
<b>ANNUAL BROADLEAVES (continued)</b>									
eclipta	P	P			G		G-E		
Florida beggarweed	P	P		F-G	G-E	G	P	G	P
Florida pusley	E	F-G		F-G	P-F	P	F	G	
hemp sesbania	N	F		P	P	P	P	P	
jimsonweed	N	N		G	G	G		F-G	
lambsquarters	G-E	G		G	G-E	G-E	E	G	F
morningglories <i>Ipomoea</i> smallflower	P P	P P	F G-E	P-F <sup>2</sup> P	G G-E	F G	P-F G-E	F <sup>3</sup> E	P P
Palmer amaranth	F-G	P-F	E	N-P	F	G	E	G-E <sup>3</sup>	G
pigweed: redroot or smooth	G-E	F-G	E	P	G-E	G-E	E	E	G-E
prickly sida	N	N		E	G	F		G	F
purslane	E	G		G-E	E	E	G	G	G
ragweed	N	N		G	E	G	G	N-P	P
redweed	N	N		G-E	E	G-E		G-E	
smartweed: ladysthumb Pennsylvania	N N	N N		N E	G G	G G		G G	
sicklepod	N	N	P	P	G	F	P	P-F	P
spurge	N	N		N	P-F	F		G	P-F
tropic croton	N	N		E	F-G	F-G	F-G	F-G	P
tropical spiderwort	N	N		F	F	P-F	N	P	E
volunteer peanuts	N	N	P	N	P-F	P	P	P	N
wild poinsettia	N	N		F	N	N	G-E	G	P

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

Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

<sup>1</sup> Assumes irrigation or rainfall occurs within 48 hrs.

<sup>2</sup> Fair on pitted morningglory.

<sup>3</sup> Staple does not control tall morningglory or ALS-resistant Palmer amaranth.

WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)

WEED SPECIES	Residual Control by POST Applied Herbicides (Assuming soil contact and activation)			
	Dual Magnum	Staple	Envoke	Warrant
<b>PERENNIALS</b>				
bermudagrass	N	N	N	N
johnsongrass (rhizome)	P	N	N	P
yellow nutsedge	F	P-F		P
purple nutsedge	P	F		P
<b>ANNUAL GRASSES</b>				
broadleaf signalgrass	G	P	P	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
<b>ANNUAL BROADLEAVES</b>				
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 <i>Ipomoea</i>	P	F <sup>3</sup>		P
smallflower	P	E	P-F	P

WEED SPECIES	Residual Control by POST Applied Herbicides (Assuming soil contact and activation)			
	Dual Magnum	Staple	Envoke	Warrant
<b>ANNUAL BROADLEAVES (continued)</b>				
Palmer amaranth	G	G-E <sup>3</sup>	P-F	G
pigweed: redroot or smooth	G-E	G-E	F	G-E
prickly sida	F	G		F
purslane	G	G		G
ragweed	P	N-P		P
redweed		G-E		
smartweed: ladysthumb Pennsylvania		G 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

Key:

E – 90% or better control  
 G – 80%-90% control  
 F – 60%-80% control  
 P – 30%-60% control  
 N – < 30% control.

Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

<sup>1</sup> Assumes irrigation or rainfall occurs within 48 hrs.

<sup>2</sup> Fair on pitted morningglory.

<sup>3</sup> Staple does not control tall morningglory or ALS-resistant Palmer amaranth.

**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POST OVER-THE-TOP					
	Assure, others	Fusilade, others	Poast	Select/Select Max, others	MSMA	Cotoran
<b>PERENNIALS</b>						
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
<b>ANNUAL GRASSES</b>						
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
<b>ANNUAL BROADLEAVES</b>						
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		

<p><b>Key:</b>  E – 90% or better control  G – 80%-90% control  F – 60%-80% control  P – 30%-60% control  N – &lt; 30% control.</p>	<p><b>Note:</b> Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.</p>
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**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POST OVER-THE-TOP					
	Assure, others	Fusilade, others	Poast	Select/Select Max, others	MSMA	Cotoran
<b>ANNUAL BROADLEAVES (continued)</b>						
jimsonweed	N	N	N	N	P	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
lambsquarters	N	N	N	N	P	G
morningglories	N	N	N	N	P-F	G
Palmer amaranth	N	N	N	N	P	P-F
pigweed: 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	N	N	N	N	N-P	F-G
Pennsylvania	N	N	N	N	N-P	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

<p>Key:</p> <p>E – 90% or better control</p> <p>G – 80%-90% control</p> <p>F – 60%-80% control</p> <p>P – 30%-60% control</p> <p>N – &lt; 30% control.</p>	<p>Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.</p>
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**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POST OVER-THE-TOP						
	Staple, Pyrimax	Envoke	Envoke + Staple	glyphosate <sup>2</sup>	glyphosate <sup>2</sup> + Staple, Pyrimax	glyphosate <sup>2</sup> + Envoke	Liberty <sup>3</sup> , others
<b>PERENNIALS</b>							
bermudagrass	N	N	N	F	F	F	N
johnsongrass (rhizome)	N-P	P	N-P	G-E	G-E	G-E	F <sup>4</sup>
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
<b>ANNUAL GRASSES</b>							
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
<b>ANNUAL BROADLEAVES</b>							
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

**Key:**

E – 90% or better control  
 G – 80%-90% control  
 F – 60%-80% control  
 P – 30%-60% control  
 N – < 30% control.

**Note:** Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

<sup>1</sup> Staple does not control tall morningglory.

<sup>2</sup> Glyphosate should be applied only to glyphosate-resistant cultivars. All formulations of glyphosate are not labeled for this use.

<sup>3</sup> Glufosinate (Liberty, others) should be applied only to tolerant cotton.

<sup>4</sup> Good johnsongrass control can be obtained with two applications of Liberty.

**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POST OVER-THE-TOP						
	Staple, Pyrimax	Envoke	Envoke + Staple	glyphosate <sup>2</sup>	glyphosate <sup>2</sup> + Staple, Pyrimax	glyphosate <sup>2</sup> + Envoke	Liberty <sup>3</sup> , others
<b>ANNUAL BROADLEAVES (continued)</b>							
Florida pusley	N-P	P	P	P-G	P-G	P-G	F
hemp sesbania	G-E			P-F	G-E		
jimsonweed	E	N		E	E	E	E
lambsquarters	N	G		G	G	E	E
<i>Ipomoea</i> morningglories	G <sup>1</sup>	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	F-G	G	F
purslane	F			F-G	G	G	F
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

**Key:**

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**Note:** Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

<sup>1</sup> Staple does not control tall morningglory.

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<sup>3</sup> Glufosinate (Liberty, others) should be applied only to tolerant cotton.

<sup>4</sup> Good johnsongrass control can be obtained with two applications of Liberty.

**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POSTEMERGENCE-DIRECTED							
	MSMA	Cotoran + MSMA	Caparol + MSMA	Direx, others + MSMA	Direx + Linex + MSMA	Cobra + MSMA	Valor, others + MSMA	Suprend + MSMA
<b>PERENNIALS</b>								
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
<b>ANNUAL GRASSES</b>								
broadleaf signalgrass	F	F	F	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
<b>ANNUAL BROADLEAVES</b>								
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	E
crotalaria	G	G	G	G	G	G		E
eclipta		G	G	E	E	E	E	E
Florida beggarweed	E	E	E	E	E	E	E	E

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

Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POSTEMERGENCE-DIRECTED							
	MSMA	Cotoran + MSMA	Caparol + MSMA	Direx, others + MSMA	Direx + Linex + MSMA	Cobra + MSMA	Valor, others + MSMA	Suprend + MSMA
<b>ANNUAL BROADLEAVES (continued)</b>								
Florida pusley	P	F	F	F	F	F	F-G	F
hemp sesbania	N	P-F	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
morningglories	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
pigweed: 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	

<p><b>Key:</b>  E – 90% or better control  G – 80%-90% control  F – 60%-80% control  P – 30%-60% control  N – &lt; 30% control</p>	<p><b>Note:</b> Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.</p>
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**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POSTEMERGENCE-DIRECTED							HOOD
	glyphosate <sup>1</sup>	glyphosate <sup>1</sup> + Direx, diuron	glyphosate <sup>1</sup> + Aim	glyphosate <sup>1</sup> + Envoke	glyphosate <sup>1</sup> + Staple, Pyrimax	glyphosate <sup>1</sup> + Valor, others	Liberty <sup>2</sup> , others	Gramoxone + Direx, diuron
<b>PERENNIALS</b>								
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
<b>ANNUAL GRASSES</b>								
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
<b>ANNUAL BROADLEAVES</b>								
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			

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

Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

**WEED RESPONSE TO HERBICIDES USED IN COTTON (continued)**

WEED SPECIES	POSTEMERGENCE-DIRECTED							HOOD
	glyphosate <sup>1</sup>	glyphosate <sup>1</sup> + Direx, diuron	glyphosate <sup>1</sup> + Aim	glyphosate <sup>1</sup> + Envoke	glyphosate <sup>1</sup> + Staple, Pyrimax	glyphosate <sup>1</sup> + Valor, others	Liberty <sup>2</sup> , others	Gramoxone + Direx, diuron
<b>ANNUAL BROADLEAVES (continued)</b>								
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 - <i>Ipomoea</i>	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

Key:  
 E – 90% or better control  
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 N – < 30% control

Note: Ratings based on average to good soil and weather conditions for herbicide performance and on proper application rate, technique, and timing.

- <sup>1</sup> Glyphosate should be applied only to glyphosate-resistant cotton.
- <sup>2</sup> Glufosinate (Liberty, others) should be applied only to tolerant cotton.

## COTTON DEFOLIATION / HARVEST AID OPTIONS

Jared Whitaker, Extension Agronomist, and 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. Defoliant should be applied in a minimum spray volume of 5 gal/A by air and 10-20 gal/A by ground.

Reduced performance issues are often related to low spray volume and poor canopy penetration. Fields should 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	HERBICIDE	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS <i>(The rates below are given in the broadcast amount per acre unless otherwise noted)</i>
<b>EARLY-SEASON (highs 90°F plus, lows 70°F plus)</b>			
Defoliation Only (combinations provide more consistent defoliation than a single product)	<i>carfentrazone</i> 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.
	<i>carfentrazone</i> + <i>fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>flumiclorac</i> Resource	4-6 oz	Add crop oil at 1-2 pt/A. Limited data, use precaution. The potential for leaf sticking is greater during periods of high temperatures.
	<i>fluthiacet-methyl</i> Blizzard	0.5-0.6 oz	Add crop oil at 1 pt/A. Limited data, use precaution.
	<i>pyraflufen ethyl</i> ET	1.5 oz	Add crop oil at 0.5% v/v. The potential for leaf sticking is greater during periods of high temperatures.
	<i>sodium chlorate</i>	3 lb ai	Apply to mature foliage only. Do not mix with products containing tribufos or ethephon.
	<i>tribufos</i> Def/Folex	1.5 pt	Reduce rate to 1.25 pt if above 94°F.
Regrowth Control and Defoliation	<i>thidiazuron</i> (Numerous brands)	3.2 oz	For <u>maximum</u> regrowth control. Thidiazuron is sensitive to wash-off when rain occurs within 6-12 hours after application. Addition of tribufos (4-8 oz) or ammonium sulfate (2 lb/A) enhances rainfastness.
	<i>thidiazuron</i> (Numerous brands) + <i>tribufos</i> Def/Folex	1.6-2.5 oz + 4-16 oz	For <u>minimum</u> regrowth control apply thidiazuron at 1.6 oz plus tribufos at 8-12 oz. For <u>good</u> regrowth control apply thidiazuron at 2.5 oz plus tribufos at 8-12 oz. For <u>superior</u> regrowth control apply thidiazuron at 3.2 oz plus tribufos at 6-8 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 (2.5-3.2 oz) or sequential applications increase time of effectiveness.
	<i>thidiazuron</i> (Numerous brands) + <b>ONE OF THE FOLLOWING:</b> <i>carfentrazone</i> Aim EC	1.6-2.5 oz + 0.75 oz	Add 0.25 % v/v non-ionic surfactant.
	<i>carfentrazone</i> + <i>fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>flumiclorac</i> Resource	4-6 oz	Add crop oil at 1 pt/A. Limited data, use precaution.
	<i>fluthiacet-methyl</i> 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.
	<i>pyraflufen ethyl</i> ET	1.5 oz	Add 0.5% v/v crop oil.

**COTTON DEFOLIATION / HARVEST AID OPTIONS**

<b>HARVEST-AID FUNCTION</b>	<b>HERBICIDE</b>	<b>BROADCAST RATE/ACRE</b>	<b>REMARKS AND PRECAUTIONS</b> <i>(The rates below are given in the broadcast amount per acre unless otherwise noted)</i>
<b>EARLY-SEASON (highs 90°F plus, lows 70°F plus) (continued)</b>			
Regrowth Control and Defoliation <i>(continued)</i>	<i>thidiazuron + diuron</i> (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.
	<i>glyphosate</i> (Numerous brands) + <i>tribufos</i> 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	<i>ethephon</i> (Numerous brands)	2-2.67 pt	
	<i>ethephon</i> (Numerous brands) + <b>ONE OF THE FOLLOWING:</b>	1.33-1.5 pt +	Add 0.25 % v/v non-ionic surfactant.
	<i>carfentrazone</i> Aim EC	0.75 oz	
	<i>carfentrazone + fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>flumiclorac</i> Resource	4-6 oz	Add 1-2 pt/A crop oil. Limited data, use precaution.
	<i>fluthiacet-methyl</i> Blizzard	0.5-0.6 oz	Add 1 pt/A crop oil. Limited data, use precaution.
	<i>pyraflufen ethyl</i> ET	1.5 oz	Add 0.5% v/v crop oil.
	<i>tribufos</i> Def/Folex	1-1.25 pt	
	<i>thidiazuron</i> (Numerous brands)	1.6 oz	
	<i>thidiazuron + diuron</i> (Numerous brands)	4-6 oz	Likelihood of “leaf sticking” is increased when applied at or above 5 oz in combinations of defoliant. Rate of 4 oz suggested during periods of high temperatures.
	<i>ethephon + urea sulfate</i> FirstPick + <b>ONE OF THE FOLLOWING:</b>	1.75-2 qt +	Likelihood of leaf sticking is increased during periods of high temperatures.
	<i>carfentrazone</i> Aim EC	0.75 oz	
	<i>carfentrazone + fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>flumiclorac</i> Resource	4-6 oz	Add 1-2 pt/A crop oil. Limited data, use precaution.
	<i>fluthiacet-methyl</i> Blizzard	0.5-0.6 oz	Add 1 pt/A crop oil. Limited data, use precaution.
	<i>pyraflufen ethyl</i> ET	1.5 oz	
	<i>thidiazuron</i> (Numerous brands)	1.6 oz	
	<i>thidiazuron + diuron</i> (Numerous brands)	4-6 oz	Likelihood of “leaf sticking” increases when applied at or above 5 oz in combinations of defoliant. Rate of 4 oz recommended during early season.
	<i>tribufos</i> Def/Folex	4-6 oz	



**COTTON DEFOLIATION / HARVEST AID OPTIONS**

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

**COTTON DEFOLIATION / HARVEST AID OPTIONS**

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

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

**COTTON DEFOLIATION / HARVEST AID OPTIONS**

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

**COTTON DEFOLIATION / HARVEST AID OPTIONS**

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

**COTTON DEFOLIATION / HARVEST AID OPTIONS**

HARVEST-AID FUNCTION	HERBICIDE	BROADCAST RATE/ACRE	REMARKS AND PRECAUTIONS <i>(The rates below are given in the broadcast amount per acre unless otherwise noted)</i>
<b>LATE-SEASON (highs below 80°F, lows below 60°F) (continued)</b> In these conditions, proper defoliation may require a preconditioning treatment (see preconditioning section)			
Boll Opening and Defoliation	<i>ethephon</i> (Numerous brands)	2-2.67 pt	
	<i>ethephon</i> (Numerous brands) + <b>ONE OF THE FOLLOWING:</b>	2-2.67 pt +	
	<i>tribufos</i> Def/Folex	1-1.25 pt	
	<i>thidiazuron + diuron</i> (Numerous brands)	6 oz	Limited data are available with some of these products.
	<i>carfentrazone</i> Aim EC	1 oz	Add 1% v/v crop oil.
	<i>pyraflufen ethyl</i> ET	1.5 oz	Add 1% v/v crop oil.
	<i>flumiclorac</i> Resource	4-6 oz	Add 1-2 pt/A crop oil. Limited data, use precaution.
	<i>fluthiacet-methyl</i> Blizzard	0.5-0.6	Add 1 pt/A crop oil. Limited data, use precaution.
	<i>carfentrazone + fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>ethephon + cyclanilide</i> Finish 6 Pro + <b>ONE OF THE FOLLOWING:</b>	1.75-2 pt +	
	<i>carfentrazone</i> Aim EC	1 oz	Add 1% v/v crop oil.
	<i>carfentrazone + fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>flumiclorac</i> Resource	4-6 oz	Add 1-2 pt/A crop oil. Limited data, use precaution.
	<i>fluthiacet-methyl</i> Blizzard	0.5-0.6 oz	Add 1 pt/A crop oil. Limited data, use precaution.
	<i>pyraflufen ethyl</i> ET	1.5 oz	Add 1% v/v crop oil.
<i>thidiazuron + diuron</i> (Numerous brands)	6 oz		
<i>tribufos</i> Def/Folex	8-12 oz	Limited data are available with some of these products.	

## COTTON DEFOLIATION / HARVEST AID OPTIONS

**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 7-10 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	HERBICIDE	BROADCAST RATE/ ACRE	REMARKS AND PRECAUTIONS <i>(The rates below are given in the broadcast amount per acre unless otherwise noted)</i>
Initial Preconditioning Treatment	<i>carfentrazone</i> Aim EC	1 oz	Add 1% v/v crop oil.
	<i>carfentrazone</i> + <i>fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
	<i>ethephon</i> (Numerous brands)	0.67-1.33 pt	
	<i>flumiclorac</i> Resource	4 oz	Add 1-2 pt crop oil.
	<i>fluthiacet-methyl</i> Blizzard	0.5 oz	Add 1 pt crop oil
	<i>glyphosate</i> (Numerous brands)	1.2-2 pt	Glyphosate WILL NOT provide regrowth suppression when applied to RF cotton. See specific labels for product rates.
	<i>pyraflufen ethyl</i> 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.
	<i>tribufos</i> Def/Folex	0.5-1.25 pt	
Follow-up Treatments	<b>Should include products containing ethephon with harvest aid mixtures listed in the previous table.</b>		

## HARVEST AID WEED MANAGEMENT

HERBICIDE	BROADCAST RATE/ ACRE	REMARKS AND PRECAUTIONS <i>The rates below are given in the broadcast amount per acre unless otherwise noted.</i>
<i>carfentrazone</i> Aim EC	1 oz	Add 1% v/v crop oil. Effective on morningglory, coffee senna, and tropical spiderwort.
<i>carfentrazone</i> + <i>fluthiacet-methyl</i> Display	up-1 oz	Limited data, adhere to label restrictions, use precaution.
<i>glyphosate</i> (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.
<i>paraquat</i> 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	
<i>pyraflufen ethyl</i> 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.
<i>Follow-up Treatments</i> Desiccants paraquat or sodium chlorate	See “Desiccants for Cotton Harvest Preparation” next page.	

## DESICCANTS FOR COTTON HARVEST PREPARATION

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

## PERFORMANCE RATING OF HARVEST AIDS BY FUNCTION

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

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