

# COTTON DEFOLIATION/HARVEST AID SUGGESTIONS

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The following recommendations are guidelines for harvest aid application. 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 gal/A by ground. Fields should fit into one of the following categories based on Temperature and Harvest Aid need.

## I. EARLY SEASON (highs 90°F plus, lows 70°F plus)

### Defoliation Only

- E1. DEF/Folex @ 1.5 pt (reduce to 1.25 pt if above 94°F)
- E2. Aim EC @ 0.75 to 1 oz + NIS @ 0.25% v/v
- E3. ET @ 1.5 oz + crop oil @ 0.5% v/v
- E4. Harvade @ 8 oz + 1 pt crop oil
- E5. Resource @ 4 to 8 oz + crop oil @ 1 to 2 pt (use lower rates if above 94°F) - limited data, use precaution
- E6. Sodium Chlorate @ 3 lb (mature foliage only; do not mix with DEF/Folex or ethephon<sup>2</sup>)

### Regrowth control and defoliation

- E7. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.2 lb (for maximum regrowth control)
- E8. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb (for minimum regrowth control) + DEF/Folex @ 1 pt
- E9. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.125 lb (for good regrowth control) DEF/Folex @ 8 to 12 oz
- E10. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.15 lb (for superior regrowth control) DEF/Folex @ 4 to 6 oz
- E11. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 to 0.15 lb + (one of the following)
  - > Aim EC @ 0.75 to 1 oz + NIS @ 0.25% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Resource @ 4 to 8 oz + crop oil @ 1 to 2 pt (use lower rates if above 94°F) - limited data, use precaution
- E12. Leafless @ 10 oz + 1 pt crop oil
- E13. Ginstar<sup>2</sup> @ 6.4 to 8 oz
- E14. glyphosate<sup>3</sup> @ 1.2 to 2 pt + (one of the following)
  - > DEF/Folex @ 1 pt
  - > Harvade @ 8 oz + 1 pt crop oil

### Boll opening and defoliation

- E15. ethephon<sup>4</sup> @ 2.0 to 2.67 pt
- E16. ethephon<sup>4</sup> @ 1.33 to 1.5 pt + (one of the following)
  - > DEF/Folex @ 1 to 1.25 pt
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb
  - > Ginstar<sup>2</sup> @ 4 to 6 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz + NIS @ 0.25% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource @ 4 to 8 oz + crop oil @ 1 to 2 pt (use lower rates if above 94°F) - limited data, use precaution
- E17. FirstPick<sup>5</sup> @ 1.75 to 2 qt + (one of the following)
  - > DEF/Folex @ 4 to 6 oz
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb
  - > Ginstar<sup>2</sup> @ 4 to 6 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz
  - > ET @ 1.5 oz
  - > Resource @ 4 to 8 oz + crop oil @ 1 to 2 pt (use lower rates if above 94°F) - limited data, use precaution
- E18. Finish 6 Pro @ 1.33 pt + (one of the following)
  - > DEF/Folex @ 4 to 6 oz
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb
  - > Ginstar<sup>2</sup> @ 4 to 6 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz + NIS @ 0.25% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource @ 4 to 8 oz + crop oil @ 1 to 2 pt (use lower rates if above 94°F) - limited data, use precaution

### Boll opening, regrowth control, and defoliation

- E19. ethephon<sup>4</sup> @ 1.33 to 1.5 pt + (one of the following)
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 to 0.125 lb + DEF/Folex @ 4 to 6 oz
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.125 lb
  - > Leafless @ 10 oz
  - > Ginstar<sup>2</sup> @ 6.4 oz
- E20. FirstPick<sup>5</sup> @ 1.75 to 2 qt + (one of the following)
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 to 0.125 lb
  - > Leafless @ 10 oz
  - > Ginstar<sup>2</sup> @ 6.4 oz
- E21. Finish 6 Pro @ 1.33 pt + (one of the following)
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 to 0.125 lb
  - > Leafless @ 10 oz
  - > Ginstar<sup>2</sup> @ 6.4 oz

## COTTON DEFOLIATION/HARVEST AID SUGGESTIONS (continued)

### II. MID SEASON (highs 80 to 89°F plus, lows 60 to 70°F)

#### Defoliation Only

- M1. DEF/Folex @ 1.5 pt
- M2. Aim EC @ 0.75 to 1 oz + crop oil @ 1% v/v
- M3. ET @ 1.5 oz + crop oil @ 0.5% v/v
- M4. Harvade @ 8 oz + 1 pt crop oil
- M5. Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution
- M6. Sodium Chlorate @ 4 lb (mature foliage only; do not mix with DEF/Folex or ethephon<sup>2</sup>)

#### Regrowth control and defoliation

- M7. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.2 lb
- M8. Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.125 to 0.14 lb + (one of the following)
  - > DEF/Folex @ 1 pt
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz + crop oil @ 1% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution
- M9. Leafless @ 10 to 12 oz + 1 pt crop oil
- M10. Ginstar<sup>2</sup> @ 6.4 to 8 oz
- M11. glyphosate<sup>3</sup> @ 1.2 to 2 pt + (one of the following)
  - > DEF/Folex @ 1 pt
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz + crop oil @ 1% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution

#### Boll opening and defoliation

- M12. ethephon<sup>4</sup> @ 2 to 2.67 pt
- M13. ethephon<sup>4</sup> @ 1.5 to 2 pt + (one of the following)
  - > DEF/Folex @ 1 to 1.25 pt
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb
  - > Ginstar<sup>2</sup> @ 6.4 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz + crop oil @ 1% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution
- M14. FirstPick<sup>5</sup> @ 2 qt + (one of the following)
  - > DEF/Folex @ 8 to 12 oz
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb
  - > Ginstar<sup>2</sup> @ 6.4 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz
  - > ET @ 1.5 oz
  - > Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution
- M15. Finish 6 Pro @ 1.33 to 1.5 pt + (one of the following)
  - > DEF/Folex @ 8 to 12 oz
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.1 lb
  - > Ginstar<sup>2</sup> @ 6.4 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 0.75 to 1 oz + crop oil @ 1% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution

#### Boll opening, regrowth control, and defoliation

- M16. ethephon<sup>4</sup> @ 1.5 to 2 pt + (one of the following)
  - > Dropp<sup>1</sup>/Free Fall @ 0.125 to 0.14 lb + DEF/Folex @ 8 to 10 oz
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.125 to 0.16 lb
  - > Leafless @ 10 to 12 oz
- M17. FirstPick<sup>5</sup> @ 2.0 qt + (one of the following)
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.125 to 0.14 lb
  - > Leafless @ 10 to 12 oz
- M18. Finish 6 Pro @ 1.33 to 1.5 pt + (one of the following)
  - > Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W @ 0.125 to 0.14 lb
  - > Leafless @ 10 to 12 oz

### III. LATE SEASON (highs below 80°F, lows below 60°F) NOTE: Under these conditions, cotton should sometimes be preconditioned and then defoliated (see Section IV) or routinely defoliated with combinations which include ethephon<sup>2</sup>.

#### Defoliation only

- L1. DEF/Folex @ 1.5 pt + Gramoxone Max / Boa @ 4 to 6 oz
- L2. Harvade @ 8 oz + 1 pt crop oil
- L3. Ginstar<sup>2</sup> @ 8 to 10 oz
- L4. Aim EC @ 1 oz + crop oil @ 1% v/v
- L5. ET @ 1.5 oz + crop oil @ 0.5% v/v
- L6. Resource@ 4 to 8 oz + crop oil @ 1 to 2 pt - limited data, use precaution
- L7. Sodium Chlorate @ 4 lb

## COTTON DEFOLIATION/HARVEST AID SUGGESTIONS (continued)

### Boll opening and defoliation

- L8. ethephon<sup>1</sup> @ 2 to 2.67 pt
- L9. ethephon<sup>1</sup> @ 1.5 to 2.67 pt + (one of the following)
- > DEF/Folex @ 1.25 to 1.5 pt
  - > Ginstar<sup>2</sup> @ 8 to 10 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 1 oz + crop oil @ 1% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource@ 4 to 8 oz +crop oil @ 1 to 2 pt - limited data, use precaution
- L10. FirstPick<sup>5</sup> @ 2 qt + (one of the following)
- > DEF/Folex @ 1 to 1.5 pt
  - > Ginstar<sup>2</sup> @ 8 to 10 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 1 oz
  - > ET @ 1.5 oz
  - > Resource@ 4 to 8 oz +crop oil @ 1 to 2 pt - limited data, use precaution
- L11. Finish 6 Pro @ 1.5 pt + (one of the following)
- > DEF/Folex @ 1 to 1.5 pt
  - > Ginstar<sup>2</sup> @ 8 to 10 oz
  - > Harvade @ 8 oz + 1 pt crop oil
  - > Aim EC @ 1 oz + crop @ 1% v/v
  - > ET @ 1.5 oz + crop oil @ 0.5% v/v
  - > Resource@ 4 to 8 oz +crop oil @ 1 to 2 pt - limited data, use precaution

**IV. PRECONDITIONING:** Fields with 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 unopen bolls. The follow-up application should be made 7 to 10 days later when sufficient leaf drop has occurred to allow spray coverage of bolls with ethephon<sup>4</sup>, FirstPick<sup>5</sup>, or Finish 6 Pro.

#### Initial preconditioning treatment

- P1. DEF/Folex @ 0.5 to 1.25 pt
- P2. ethephon<sup>1</sup> @ 0.67 to 1.33 pt
- P3. glyphosate<sup>3</sup> @ 1.2 to 2 pt
- P4. ET @ 1.5 oz + crop oil @ 0.5% v/v
- P5. Aim EC @ 1 oz + crop oil @ 1% v/v
- P6. Resource@ 4 to 8 oz +crop oil @ 1 to 2 pt - limited data, use precaution

#### Follow-up treatments

Should include Boll Openers with harvest aid mixtures listed in Sections I, II, and III.

#### General Notes:

<sup>1</sup> If using the liquid formulation of thidiazuron, Dropp SC, – rate equivalent is 1 pt provides the same AI as 1 lb of 50WP

<sup>2</sup> Adios is a harvest-aid also containing thidiazuron and diuron in the same ratios as found in Ginstar. Limited data is currently available with Adios, use on limited acres until more experience is gained.

<sup>3</sup> Roundup or generic glyphosate products will NOT provide regrowth suppression on RR cotton.

<sup>4</sup> ethephon (Prep, Ethephon 6, Super Boll, Boll'd, Setup 6SL, etc.)

<sup>5</sup> FirstPick is a new formulation of CottonQuik, UGA Extension has had no experience with this formulation, use with precaution. Another 2 lb ai/gal formulation of ethephon, MFX marketed by Microflo, will also be available

Beware of off-target movement of harvest aid products, especially with aerial applications. Significant problems have been observed with mixtures that include glyphosate, paraquat, Aim, or ET.

Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W is sensitive to wash-off if rain occurs within 6 hours of application; addition of DEF/Folex improves rain-fastness. Ammonium sulfate @ 2 lb/A often improves activity of Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W and Harvade. DEF/Folex plus Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W combinations have a tendency to cause “leaf sticking” when temperatures exceed 94°F, in combinations with spray adjuvants, or where calibration errors occur. Consider reducing rates by 10 to 20% when temperatures exceed 94°F. Regrowth control is minimal with Dropp<sup>1</sup>/Free Fall/Thidiazuron/Klean-Pik 50W rates below 0.1 lb/A or Ginstar<sup>2</sup> rates below 6.4 oz. Ginstar includes the same active ingredients as in Dropp and diuron. Leafless includes the active ingredients in Dropp and Harvade. Lint-Plus is a formulation that includes dimethipin, the AI in Harvade, plus additional adjuvant. Its use rate is 20 oz/A and crop oil does not need to be added.

Adding spray adjuvant may enhance activity of treatments when temperatures are low. However, adjuvants may sometimes cause “leaf sticking” during periods of high temperature, and thus, these products should be used with caution early in the season.

Addition of Gramoxone Max or Firestorm @ 1 to 4 oz or Gramoxone Inteon @ 1.5 to 6 oz may aid defoliation and weed desiccation with standard harvest aid mixtures. Off-target movement may cause injury to sensitive plants such as pine trees.

Accelerate may be used as a tank-mix with either DEF/Folex or sodium chlorate to hasten leaf drop by approximately 2 to 3 days.

### V. HARVEST AID WEED MANAGEMENT

- W1. Gramoxone Max or Firestorm @ 1 to 4 oz or Gramoxone Inteon @ 3.1 to 5 oz in combination with standard defoliant mixtures. Use lowest rate during warm temperatures. Avoid off-target drift, especially to pines.
- W2. Glyphosate (Roundup, etc.) @ 1 to 2 pt in combination with DEF/Folex, Harvade, and/or ethephon<sup>4</sup>. Glyphosate provides fair suppression of regrowth in non-RR cotton. Avoid off-target drift.
- W3. Harvade @ 8 oz + crop oil 1 pt. Effective on mature weeds including morningglory, sicklepod, tropic croton, Florida beggarweed.
- W4. Aim EC @ 1 oz + crop oil @ 1% v/v. Effective on morningglory, coffee senna.
- W5. ET @ 1.5 oz + crop oil @ 0.5% v/v. Effective on morningglory.
- W6. a) Defoliate, then b) Desiccate with Gramoxone Max / Boa as listed below.

**COTTON DEFOLIATION/HARVEST AID SUGGESTIONS (continued)**

**Desiccants for Cotton Harvest Preparation**

Desiccant	lb AI/Gal	Formulation Rate/Acre	Spray Volume, gal/A	
			Ground	Air
Gramoxone Max and Firestorm	3.0	1 to 4 oz <sup>1</sup> 5.5 oz to 1.5 pt <sup>2</sup>	10 to 20	5
Gramoxone Inteon	2.0	3.1 to 5 oz <sup>1</sup> 1 to 2 pt	10 to 20	5
Sodium Chlorate	4 to 6	3 to 6 lb AI	15 to 30	5 to 10

<sup>1</sup> For addition to defoliant mixtures in cotton at least 75% open. Improves activity in colder, late season conditions. May cause crop desiccation (90°F and above) and damage to immature bolls.  
<sup>2</sup> For desiccation of weeds and cotton regrowth after defoliation. Rates of 8 to 16 oz are usually sufficient. Add surfactant at 1 to 2 qts/100 gals spray solution. Be prepared to harvest in a timely manner to minimize bark problems.

**VI. PERFORMANCE RATING OF HARVEST AIDS BY FUNCTION**

Product	Function				
	remove mature foliage	remove juvenile foliage	open bolls	suppress regrowth	desiccate weeds <sup>5</sup>
Aim, ET	G	G	P	P	F
DEF/ Folex	G-E	P-F	P	P	P
Dropp <sup>1</sup> /Free Fall/Thidiazuron/Klean-Pik	G-E	G	P	G-E	P
Ginstar <sup>2</sup>	G-E	G	P	G-E	P
Harvade	G-E	P	P	P	F-G
ethephon <sup>3</sup>	F-G	F	E	P	P
sodium chlorate	F	P	P	P	F-G
glyphosate	P	F	P	F-G	G
Gramoxone Max / Inteon Firestorm	F	F	F	P	G
FirstPick <sup>4</sup>	G	G	E+	P	F
Finish 6 Pro	G-E	G	E+	F	P

P=poor, F=fair, G=good, E=excellent

<sup>1</sup> A liquid formulation of thidiazuron Dropp SC is now available – rate equivalent is 1 pt provides the same AI as 1 lb of 50W.

<sup>2</sup> Adios is a harvest-aid also containing thidiazuron and diuron in the same ratios as found in Ginstar. Limited data is currently available with Adios, use on limited acres until more experience is gained.

<sup>3</sup> ethephon (Prep, Ethephon 6, Super Boll, Boll'd, Setup6SL etc.)

<sup>4</sup> FirstPick is a new formulation of CottonQuik, UGA Extension has had no experience with this formulation, use with precaution. Another 2 lb ai/gal formulation of ethephon, MFX marketed by Microflo, will also be available .

<sup>5</sup> refers to weed defoliation plus dry down to reduce harvest interference, green stain, and moisture