



## **2016 High Plains Cotton Harvest-Aid Guide**

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Application of harvest-aids in cotton are utilized to remove foliage, prevent regrowth, and open bolls to allow for timely harvest operations to occur so that yield and quality losses due to weathering can be minimized. Defoliation and boll opening are natural processes governed by plant hormones, so harvest-aids are used to speed up these naturally occurring processes. The timing of harvest-aid applications is primarily governed by crop maturity, but environmental conditions also play a role in timing of application, the products used, as well as rates.

Recommendations regarding the timing of applications are based of crop maturity status and there are various methods or crop growth maturity characteristics utilized. The most common recommendations are timing applications at: 1. Four nodes from the uppermost first position cracked boll to the uppermost first position harvestable boll (4 NACB) and; 2. 60-70% of the harvestable bolls on the plant are open (60-70% open bolls). However, these two methods are often not correlated to the same time, in other words 4 NACB doesn't necessarily equate to 60-70% open bolls so a combination of the two may be used, and timing of harvest-aid applications should be made on a field by field basis. Boll distribution, variety maturity, and management practices can impact both of these measurements, and in-field variability of NACB and % open bolls can be high, so taking into account the status of the majority of the plants in the field is recommended. Both of these measurements should be based on the amount of harvestable bolls on the plants, so only mature bolls should be taken into account. While harvest-aids can hasten the natural process of defoliation and boll opening, they do not influence boll maturity. Boll maturity can be determined by slicing the boll horizontally to expose the developing lint and seeds. A mature boll should be firm and difficult to slice, with mature seeds (fully developed cotyledons with little liquid or "jelly" in the seeds) with a dark seed coat, with the lint stringing-out when the two halves are separated.

A wide array of harvest-aid products are available for use in cotton. These products typically fall into one of four general categories, boll openers, defoliant, regrowth control, and desiccants, although some products may serve multiple purposes. For example, boll openers (active ingredient – ethephon) will provide some defoliation, especially in warm sunny conditions. Product selection and use rates are dependent upon environmental conditions at

application and in the short-term (3 – 5 days) following application. The tables below provide harvest aid recommendations, and general information on the function of the different active ingredients, use rates, and some common names of products. As always, follow the label regarding use rates and adjuvants/surfactants. Many product labels will also include information on rates based on environmental conditions (mainly temperature and humidity).

Active ingredients, common trade names, and application considerations.

<b>Defoliants</b>		
Trade Names (Manufacturer)	Active Ingredients	Considerations
	<i>Organophosphate</i>	
Folex 6 EC (Amvac)	Tribufos	Reduced activity under low temps, low humidity, or stressed plants; higher rate may be required.
	<i>PPO Inhibitor</i>	
ETX (Nichino)	Pyraflufen-ethyl	Addition of COC recommended
Aim EC (FMC)	Carfentrazone-ethyl	NIS required at higher temps, COC required at lower temps.
Display (FMC)	Carfentrazone-ethyl + Fluthiacet-methyl	
Resource (Valent)	Flumiclorac pentyl ester	Addition of COC or MSO; NIS if warm, sunny conditions.
Sharpen (BASF)	Saflufenacil	Addition of MSO + AMS <b>or</b> UAN required.
<b>Defoliants/Regrowth Inhibitor</b>		
Freefall (Nufarm)	Thidiazuron	Higher use rates and addition of COC with temps < 65 F, or in drought conditions. Thidiazuron alone not typically recommended due to low overnight temps in the High Plains.
Daze (Winfield)		
Klean-Pik (Mana)		
Take Down (Loveland)		
Thidiazuron (Arysta)		
Ginstar EC (Bayer)	Thidiazuron + diuron	Minimum 12 hours rain-free after application for optimal performance. Higher rates required if low humidity is present.
Cutout (Nufarm)		
Adios (Arysta)		
Redi-Pik (Mana)		
<b>Boll Opening</b>		
Super Boll (Nurfarm)	Ethephon (6 lbs. ethephon/gal)	7 day PHI. Minimum 6 hour rain-free period for optimal performance. Higher rates under cool and/or dry conditions, or on toughened/drought stressed foliage.
Boll'd (Winfield)		
Boll Buster (Loveland)		
Ethephon 6 (Arysta)		
Several other trade names		
Flash (Helena)	Ethephon (3 lbs.)	
Finsih 6 Pro (Bayer)	Ethephon (6 lbs.) + cyclanilide	
First Pick (Nufarm)	Ethephon (2.28 lbs.) + urea sulfate	
<b>Desiccants</b>		
Gramoxone Inteon (Syngenta)	Paraquat (2 lbs. paraquat/gal)	Addition of NIS recommended.
Gramoxone SL2.0 (Syngenta)		
Firestorm (Chemtura)	Paraquat (3 lbs.)	
Parazone 3 SL (Adama)		
Several other trade names		

COC – crop oil concentrate; NIS – nonionic surfactant; MSO – methylated seed oil; AMS – ammonium sulfate; UAN – urea ammonium nitrate; PHI – pre-harvest interval.

Harvest-Aid Decision Table (all units in per acre basis). This lists several available options but is not mean to be exclusive.

Crop Condition	Harvest-Aid Options <sup>1</sup>
<b>Short stature (12 – 14 inches); low/limited yield potential (&lt; 500 lbs/acre).</b>	PPO inhibitor defoliant (rates vary) with or without the addition of a boll opener.
	PPO inhibitor defoliant (rates vary) FB <sup>2</sup> PPO inhibitor defoliant (rates vary). <sup>3</sup>
	Paraquat formulation at 8 – 16 oz (2 lb.) <b>or</b> Paraquat at 5.3 – 10.7 oz (3 lb.).
	Paraquat at 4 – 12 oz (2 lb.) FB paraquat up to 48 oz (2 lb.) <b>or</b> paraquat at 2.6 – 5.3 oz (3 lb.) FB paraquat up to 32 oz (3 lb.). <sup>4</sup>
	Paraquat at 6 – 24 oz (2 lb.) <b>or</b> Paraquat at 4 – 6.7 oz (3 lb.) + tribufos at 8 – 16 oz <b>or</b> PPO inhibitor defoliant (rates vary). <sup>5</sup>
<b>Medium stature (15 – 24 inches); 500+ lbs./acre yield potential.</b>	Ethephon (6 lb.) at 16 – 42 oz <b>or</b> (ethephon + cyclanilide) at 16 – 42 oz + tribufos at 8 – 16 oz.
	Ethephon (6 lb.) at 16 – 42 oz <b>or</b> (Ethephon + cyclanilide) at 16 – 42 oz + (thidiazuron + diuron) at 3 – 8 oz.
	Ethephon (6 lb.) at 16 – 42 oz <b>or</b> (ethephon + cyclanilide) at 16 – 42 oz + PPO inhibitor defoliant (rates vary). <sup>3</sup>
	PPO inhibitor defoliant (rates vary) <sup>3</sup> + tribufos at 8 – 16 oz <b>or</b> PPO inhibitor defoliant at 0.6 – 8 oz <sup>3</sup> + (thidiazuron + diuron) at 3 – 8 oz.
	PPO inhibitor defoliant (rates vary) <sup>3</sup> FB <sup>2</sup> PPO inhibitor defoliant (rates vary). <sup>3</sup>
	Paraquat at 6 -24 oz (2 lb.) <b>or</b> paraquat at 4 – 16 oz (3 lb.) + tribufos at 8 – 16 oz.
	Paraquat at 6 – 24 oz (2 lb.) <b>or</b> paraquat at 4 – 16 oz (3 lb.) + PPO inhibitor defoliant (rates vary). <sup>3</sup>
	Paraquat at 4 – 8 (2 lb.) oz FB paraquat up to 48 oz total (2 lb) <sup>3</sup> <b>or</b> paraquat at 2.6 – 5.3 oz (3 lb.) FB Paraquat up to 32 oz total (3 lb.). <sup>4</sup>
	(Ethephon + urea sulfate) at 48 – 64 oz + (thidiazuron + diuron) at 3 – 8 oz.

Harvest-Aid Decision Table continued (all units in per acre basis). This lists several available options but is not mean to be exclusive.

Crop Condition	Harvest-Aid Options <sup>1</sup>
<b>Tall stature (&gt; 24 inches); 1000+ lbs./acre yield potential.</b>	Ethephon (6 lb.) at 21 – 42 oz <b>or</b> (ethephon + cyclanilide) at 21 – 42 oz + tribufos at 8 – 16 oz.
	Ethephon (6 lb.) at 21 – 42 oz <b>or</b> (ethephon + cyclanilide) at 21 – 42 oz + (thidiazuron + diuron) 3 – 8 oz.
	(Ethephon + urea sulfate) at 48 – 112 oz + (thidiazuron + diuron) at 3 – 8 oz.
	Ethephon (6 lb.) at 21 – 42 oz <b>or</b> (ethephon + cyclanilide) at 21 – 42 oz + PPO inhibitor defoliant (rates vary). <sup>3</sup>
	(Ethephon + urea sulfate) at 48 – 112 oz + PPO inhibitor defoliant at 0.6 – 8 oz. <sup>3</sup>
<b>Conditioning Treatment for late maturing cotton. Apply after daily heat units drop below 5, but 7 days before average first killing freeze date.</b>	Paraquat at 4 – 16 oz (2 lb.) <b>or</b> paraquat at 2.6 to 10.7 oz (3 lb.).
	Ethephon (6 lb.) at 21 – 42 oz.

<sup>1</sup>Actual rates needed will depend on weather conditions (high and low temperatures, humidity). Higher label rates are typically recommended under cooler and dryer conditions. Check the label for specific details on rates.

<sup>2</sup>FB = followed by.

<sup>3</sup>Rates will depend on product selected; check the label for appropriate rates for the selected product. No more than: 3.2 oz/acre total of Aim EC, 2.0 oz/acre total of Display, 2.0 oz/acre total of Sharpen, 3.4 oz/acre total (no more than 2 applications) of ETX, and 14 oz/acre (no more than 2 applications, max of 8 oz per single application) of Resource may be applied during the growing season.

<sup>4</sup>No more than 0.75 lb./acre of parquat active ingredient may be applied (in up to 3 multiple applications in one season based on the Texas Special Local Need 24c label. The second application should depend on the green leaves remaining and the rate applied in the first application; use higher rates if excessive regrowth is present.

<sup>5</sup>Labeled tank mix partners for paraquat include Folex, ETX, and Sharpen.