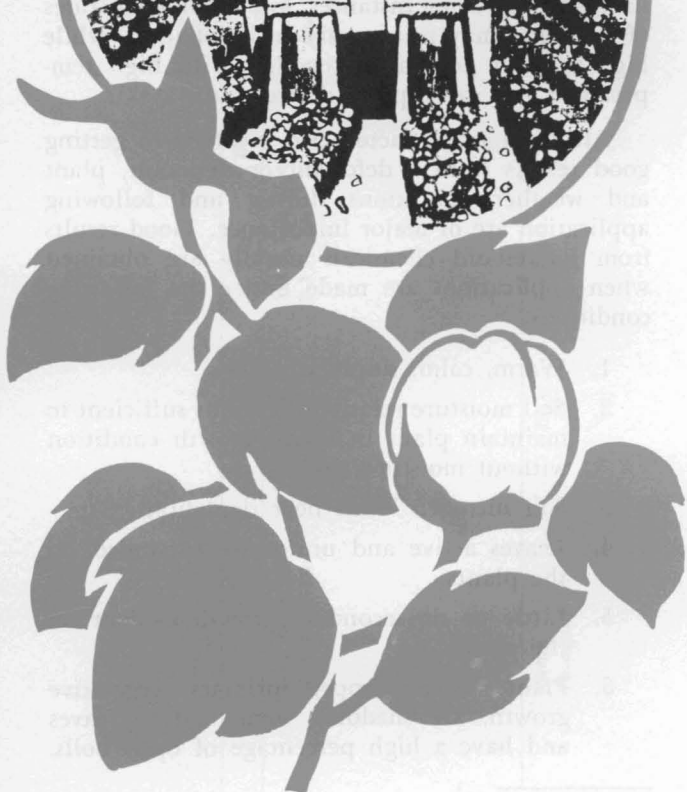
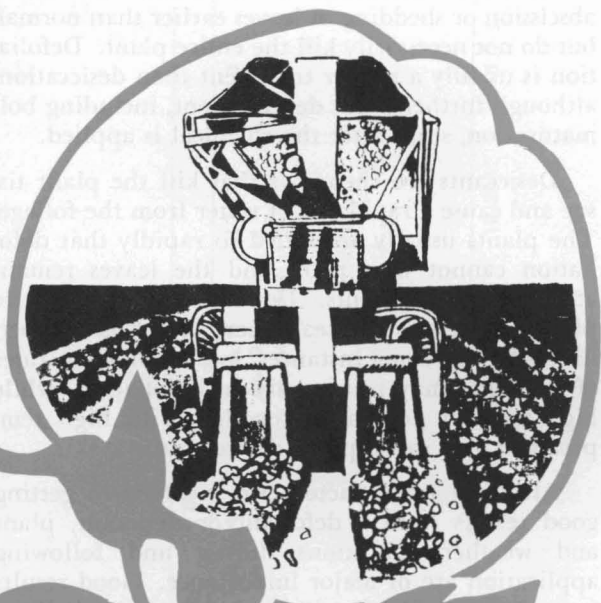


5W

# COTTON DEFOLIATION GUIDE



TEXAS AGRICULTURAL EXTENSION SERVICE

THE TEXAS A&M UNIVERSITY SYSTEM · John E. Hutchison, Director, College Station, Texas

## COTTON HARVEST-AID CHEMICALS

As the name implies, these chemicals prepare the cotton crop for harvest by reducing foliage and plant moisture that would otherwise interfere with harvesting operations. Harvest-aid chemicals are generally classified as either defoliant or desiccants.

The true defoliant are chemicals that cause abscission or shedding of leaves earlier than normal, but do not necessarily kill the entire plant. Defoliation is usually a milder treatment than desiccation, although further plant development, including boll maturation, stops after the chemical is applied.

Desiccants are chemicals that kill the plant tissue and cause a rapid loss of water from the foliage. The plants usually are killed so rapidly that defoliation cannot take place and the leaves remain attached to the plants. Desiccation of the entire plant is necessary in areas where cotton is stripper-harvested. In some instances, low application rates of desiccants may result only in defoliation, while high rates of defoliant, together with high temperature, can cause plant desiccation.

Although many factors are involved in getting good results from a defoliant or desiccant, plant and weather conditions during and following application are of major importance. Good results from harvest-aid chemicals usually are obtained when applications are made under the following conditions:

1. Warm, calm, sunny weather.
2. Soil moisture relatively low but sufficient to maintain plant in active growth condition without moisture stress.
3. Soil nitrogen levels near depletion.
4. Leaves active and uniformly expanded on the plants.
5. Little or no secondary growth evident on the plants.
6. Plants have stopped primary vegetative growth, are shedding some mature leaves and have a high percentage of open bolls.

---

\*Extension cotton specialist and area Extension agronomist-cotton, The Texas A&M University System.

Poor results with harvest-aid chemicals can frequently be attributed to the following conditions:

1. Applications made under cool (below 60°), cloudy conditions.
2. Prolonged periods of wet weather following treatment.
3. Plants are severely moisture stressed and have tough, leathery leaves at the time of treatment.
4. High soil moisture and nitrogen levels which contribute to rank, dense foliage and late maturity.
5. Plants with considerable secondary growth after a "cut out" period.
6. Improper calibration of application rates and poor spray coverage.

### **TIMING OF APPLICATION**

The percentage of open bolls is the best guide in determining when to apply harvest-aid chemicals. A defoliant may be applied when 60 percent or more of the bolls are open. Application of desiccants should be delayed until 75 percent or more of the bolls are open. Irrigated cotton should have at least 80 percent open bolls before desiccating. Mature, unopen bolls are firm, cannot be dented by pressure exerted between the thumb and forefinger and cannot be cut easily with a sharp knife. At this stage, fiber and seed development is essentially complete, and only minimal reduction in lint yield will be caused by chemical treatment. On the other hand, too early application of either a defoliant or desiccant can have the following adverse effect:

1. Reduced lint yield
2. Reduced micronaire value
3. Lower seed grade
4. Lower seed quality for planting purpose
5. Reduced fiber strength

The maturity of cotton *cannot* be hastened through the use of harvest-aid chemicals. Only time and favorable weather will mature cotton. However, harvest-aid chemicals will promote more rapid opening of mature bolls and prepare the crop for earlier harvesting.

## MANAGING HARVEST-AID PROGRAM

In extremely rank cotton, bottom defoliation may be helpful in reducing boll rot and harvesting losses. Usually such treatments are applied when only  $\frac{1}{3}$  to  $\frac{1}{2}$  of the bolls are fully mature. Consequently, producers should use extreme caution to avoid complete defoliation of the plant. For bottom defoliation use half the minimum rate given on the label for defoliant.

Treat only sufficient acreage to stay ahead of harvesting operations. If a second application is required, use a chemical with a different active ingredient to stay within the safe residue tolerance. When cotton has reached desired maturity, the operator should check weather forecasts to avoid as much unfavorable weather as possible during the application period. After applying a desiccant, a 1- or 2-week "curing out" period is required prior to stripper harvest. Regrowth and barky cotton can result from either stripping too early after applying a desiccant or delaying the stripping too long after desiccation. Seed cotton and all plant parts should be dry before stripping. Cotton is dry when it fluffs well, and plant parts are dry when they are crisp or brittle.

## SECONDARY GROWTH

Development of secondary growth is a frequent problem following harvest-aid treatments. Conditions that favor foliage regrowth are late season periods of warm, wet weather on a crop with a high percentage of open bolls. Plants with unopen bolls or young, developing bolls are less likely to produce secondary growth, yet application made at this stage would result in reduced lint quality and yield.

Secondary growth is difficult to control since the young foliage does not form abscission layers or shed like older leaves. The producer should be aware that several cotton varieties do not form adequate abscission layers and will not defoliate properly. Desiccants such as arsenic acid, which completely kill plant tissue, are fairly effective and could be used under these conditions. Combinations of some compounds such as paraquat with chlorate or phosphate-type defoliant are also being used to improve control of secondary growth. Be sure to read the label carefully before mixing different formulations of harvest-aid chemicals.

To reduce gin trash, harvesting is often scheduled after desiccation during a period when secondary growth is limp, but not yet brittle. Note: Harvesting must be delayed for the time period indicated on the chemical label.

## **INSECT CONTROL**

Harvest-aid chemicals play an important role in early stalk destruction for reducing boll weevil, pink bollworm, bollworm and tobacco budworm populations. Some insecticides can be added to certain harvest-aid chemicals to reduce overwintering boll weevil populations. For example, Guthion can be mixed with arsenic acid and phosphate-type defoliant. However, no organic compounds, including insecticides, should be added to chlorate-type defoliant unless the label specifically states that such mixtures are permissible. Once these mixtures become dry, they can be a potential fire hazard. Combinations of phosphate-type defoliant (Folex and DEF) and phosphate insecticides should be used with caution since greater toxicity may be encountered from the mixture than from either of the compounds used alone. See L-508 and L-561, guides for controlling cotton insects (Texas Agricultural Extension Service), for additional information regarding the use of insecticides in combination with harvest-aid chemicals.

## **CARE OF EQUIPMENT**

Prepare application equipment by thoroughly cleaning spray tanks, pumps, lines and nozzles to remove residue left from prior pesticide usage. Check for nozzle wear by measuring output and shape of spray pattern. Once in the field, flush the sprayer system with clean water after each day's operation.

If phosphorous-type insecticides have been used in the same spray equipment, thoroughly wash the spray tank and remove any dried deposits, especially if they occur on fabric of aerial application equipment. Likewise, if chlorate-type chemicals have been used in the same spray equipment, thoroughly clean equipment before applying phosphate-type defoliant.

## **SAFETY WITH CHEMICALS**

Avoid application on windy days to reduce the hazard of spray drift to desirable crops. Lowering spray pressure and correcting nozzle size and spray angle also help reduce drift. Protect the operator from spray drift. If chemicals come in contact with skin, wash immediately with soap and water. Store chemicals in a safe place out of reach of small children. Keep chemicals in their original, properly labeled containers, away from human food, animal feed, fertilizer, seed insecticides and fungicides. The storage area should be away from any fire hazard.

Rinse empty arsenic acid containers with water before burning or burying. When filling spray tanks, avoid back-siphoning by keeping the water delivery hose out of the arsenic acid and other harvest-aid chemicals. Never flush spray equipment into ditches or streams that could contaminate the water supply.

All harvest-aid chemicals used have a tolerance or an exemption from tolerance designated for their safe use. Until official federal regulations are issued governing the use of a specific harvest-aid chemical, it should not be used.

It is the responsibility of the manufacturer or formulator of a particular harvest-aid chemical to obtain registration with the Environmental Protection Agency.

## GUIDE FOR USE OF DEFOLIANTS AND DESICCANTS

Chemical name	Trade name	Percent active ingredient(s)	Suggested rate per acre	Maximum registered rates (lb. actual/acre)	Residue allowable (PPm)	Dilution data (gallons water per acre)		Comments and limitations*
						Ground machine	Airplane	
<b>DEFOLIANTS</b>								
Sodium Chlorates (with fire suppressants)	Oxy Leafex-3 Cotton Defoliant	28.0	1-1 1/3 gal.	5.0	Exempt	10-20	5-10	Do not apply within 7 days of harvest. Do not graze treated areas or feed gin waste to livestock. Do not add phosphate insecticides to sodium chlorate defoliant in late season weevil control, or any other chemicals under any condition unless specific direction for mixing appears on the label.
	Drop Leaf Defoliant	28.0	1-1 1/2 gal.	5.0	Exempt	10-20	5-10	
	Tide Chlorate	27.2	1-1 1/2 gal.	5.0	Exempt	20-30	4-7	
	Riverside Chlorates	29.5	1-1 1/4 gal.	5.0	Exempt	10-20	5-10	
	FMC Corporation Leaf Dropper Defoliant	18.2	1 1/2-2 gal.	5.0	Exempt	20-30	4-7	
	Super Leaf Dropper Defoliant	28.0	1-1 1/3 gal.	5.0	Exempt	20-30	7-10	
Sodium Cacodylate Cacodylic Acid	Bolls-Eye	28.4	2 - 3 pts.	1.3 of Cacodylic Acid	2.8 as As <sub>2</sub> O <sub>3</sub> on cotton- seed	15-25	5-10	Do not contaminate water used for domestic consumption or by animals, wildlife and aquatic life or for irrigation purposes. Apply 7 to 10 days prior to anticipated harvest. Do not feed treated foliage to livestock or graze treated areas. Do not reuse empty containers. Wash thoroughly with water and detergent. Crush containers and discard in safe place.
S, S, S - Tributyl Phosphorotrithidate	DEF-6	70.5	1 1/3 - 2 pts.	1.5	4.0 on cotton- seed, 6.0 on cottonseed hulls	10-20	5-10	Do not apply within 7 days of harvest. Apply specified rate per acre in recommended gallons of water or diesel oil to give thorough coverage. May be applied in diesel oil where night temperatures drop below 60°F on stripper varieties, or if cotton is moisture stressed. Higher rates may be necessary in rank cotton. Certain phosphate insecticides are compatible with DEF® or Folex® defoliant for late season weevil control. ** A second application of Tributyl Phosphorotrithioite of up to 1.25 pounds per acre (liquid) may be made 5 to 7 days following the initial application.
Tributyl Phosphorotrithioite	Folex	72	1 1/2 - 2 pts.	1.5	0.25 on cotton- seed	10-20	5-10	
<b>ADDITIVES</b>								
Endothall	Accelerate	15.9	1-1 1/2 pts.	0.13	0.1 on cotton- seed	15-25	5-12	This rate will not give satisfactory defoliation if used alone. Improves the activity of other harvest-aid chemicals. May be used with sodium chlorate (with suitable fire suppressant) or organic phosphate cotton defoliant. Avoid contact with or drift to other crops, trees or plants. Wash out sprayer immediately. Do not contaminate water.
<b>DESICCANTS</b>								
Arsenic Acid	L-10 Desiccant	75.0	1-1 1/2 qts.	4.4	4 as As <sub>2</sub> O <sub>3</sub> on cottonseed	10-15	5-10	Apply after 75 to 80 percent or more of bolls are open. Do not apply within 4 days of harvest. Do not graze treated area or feed gin trash from treated areas to livestock. Avoid contact with or drift to desirable plants or crops. Do not store in unlined metal containers. Destroy containers after use.
	Hi-Yield H-10	75.0	1-1 1/2 qts.					
Paraquat	Ortho Paraquat C1	29.1	1 - 2 pts.	0.5	0.5 on cottonseed	10-30	3-10	Apply after 85 percent or more of bolls are open and remaining bolls to be harvested are mature. Use a non-ionic surfactant at one pint per 100 gallons spray mix. Most effective in the western areas of the state. Do not apply within 3 days of harvest. Do not pasture livestock in treated field within 15 days after treatment. Remove livestock from treated areas 30 days before slaughter. Do not feed treated gin trash to livestock. Avoid getting in eyes or on clothing. This compound is extremely hazardous when ingested. Avoid getting the material in the mouth or in food or drink containers.

\*Consult chemical label for further comments and limitations.

\*\*For further information, consult leaflets L-508, L-218, L-561, L-1219, guides for controlling cotton insects.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied. No claim is made that this list is complete.

*Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socio-economic levels, race, color, sex, religion or national origin.*

Cooperative Extension Work in Agriculture and Home Economics, The Texas A&M University System and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.  
15M-8-75, Revised