

# AGRONOMIC Spotlight



## Cotton Defoliation Application on Timing

When making the decision to defoliate cotton, careful consideration must be made with relation to crop maturity, field and environmental conditions. Defoliating a cotton crop too early or too late may have a negative impact on yield potential and fiber quality. Cotton fiber quality and yield can be maintained by paying close attention to maturity and understanding the growth characteristics of a variety.

When defoliating cotton, chemicals can be used to remove leaves, help open bolls and prepare the crop for harvest. Defoliation of cotton prior to harvest can improve fiber quality and picking and ginning efficiency. In regions where cool wet weather persists in the fall, defoliation and early harvest can also help reduce the risk of boll rots.

### Defoliation Process

As a cotton plant matures, a physiological process takes place which separates the living tissue near the leaf petiole, an area referred to as the abscission zone. Hormones within a plant regulate enzyme activity that causes the cell walls in the abscission zone to dissolve and eventually cause the leaf to drop. A defoliant can be used to cause injury to the leaf, which upsets the hormone balance and starts the abscission process. Correct application rates are important since too much chemical can cause the leaf to die before the abscission process, resulting in "stuck" leaves. Conversely, when too little defoliant is applied the abscission process may not begin, resulting in no leaf defoliation.



- Plants are severely stressed.
- High levels of soil nitrogen and moisture are present.

The use of plant growth regulators (PGRs) can also help aid in how well defoliants work. PGRs work to reduce vegetative and slow the development of new nodes, which can help plants mature early and prepare for defoliation. In high yielding cotton, a desiccant may be applied after a defoliant to help speed up the plant drying process.

Boll openers may also be used in combination with defoliants to enhance activity. Boll openers increase ethylene production within a boll to hasten opening and speed up dry out. If applied to cotton prior to maturity, micronaire and fiber length can be reduced. Cotton should be picked 7 to 14 days after the application of a boll opener.

### Factors Effecting Defoliation

When applying a defoliant, desiccant or boll opener many factors must be taken into consideration for successful application. Best results from an application occur when:

- Cotton has been managed for earliness and uniform maturity.
- Applications are made during warm, sunny weather. High humidity can also increase defoliant absorption into the plant.
- Soil and plant nitrogen levels are low.
- Cotton plants have at least 70 percent open bolls and few new leaves.

Poor results from a defoliant application can occur when:

- Cotton plants are still in a vegetative growth stage and bolls are not mature.
- Applications are made during cool (below 60°F), cloudy weather.

### Defoliation Application

A successful defoliation depends on sufficient leaf coverage by the chemical. Each leaf must receive enough chemical to begin the abscission process. Higher sprayer volumes may be recommended to achieve adequate coverage to all plant leaves. Research conducted in Louisiana and Tennessee suggests that defoliant activity increases as carrier volume increases. Volumes between 10 -15 GPA are recommended for most situations. It is also recommended for most defoliant applications that flat-fan or hollow cone nozzles be used, these types of nozzles provide excellent spray coverage. Drift-reduction nozzles, while excellent at controlling drift and spray placement, have been shown to decrease coverage within the crop canopy.



▶ from previous page

## Cotton Defoliation Application and Timing

### Timing Defoliant Application

When making the decision to defoliate cotton, there is as much art as science in maximizing yield and lint quality. By paying close attention to individual fields, fiber quality can be maintained while still preserving yield. There are several methods producers can use to help them determine when the best time is to apply a defoliant to their cotton crop. One or more of the following methods may be used to help make this decision.

#### Defoliation Timing Methods:

**Percent Open Bolls** – this is the most widely used method, and is based on determining the total percentage of open bolls in a field. The most common recommendation for defoliant application is when 60% of bolls in a given field are open. Research has shown that maximum yields can be obtained with defoliation applications ranging from 42% up to 81% open bolls.

**Nodes Above Cracked Boll (NACB)** – this method focuses on the unopened portion of the crop. NACB is determined by locating the uppermost first-position boll that is cracked open with visible lint, and counting the number of main-stem nodes to the uppermost harvestable boll. Most recommendations call for defoliation at four NACB. With low plant population and skip-row cotton, most recommendations call for three NACB.

**Accumulated Heat Units After Cutout** -this method is based upon the unopened portion of the crop and recommends defoliation after an accumulation of 850 heat units, or DD60's, after cutout (typically, NAWF=5). The main drawback to this method is that the amount of heat units required by each variety can vary. In addition, using this method requires a determination of cutout, which is often a moving target and can be different for every field.

**Visual Inspection** - Producers may also choose to visually inspect bolls for maturity. Bolls are generally considered mature when they are difficult to cut in a cross-section with a knife, and the seeds have begun to form a brown or black seed coat. Once a dark seed coat has formed, defoliation should not adversely affect those bolls.

No one defoliant or harvest aid, rate, or specific timing is the solution for every field. Selections should be based on prior experience, price, environmental and crop conditions, yield

potential, and the value of that crop in the field. Knowledge of the lint and growth characteristics of each individual variety is critical in finding the best harvest aid program, with respect to products and timing.

Defoliants do not contribute any to cotton yield potential or maturity, but are chemicals used to remove leaves from the plant. It is also important to recognize that problems can occur from the use of defoliants. Once a cotton plant is defoliated the fiber and seed development slows or stops. If cotton is defoliated too early, bolls may not mature which reduces fiber quality and yield potential. Defoliants should be applied only when a cotton crop has reached the desired maturity for harvest.

*Sources: Defoliation general discussion. Mississippi State University Extension Service. 2009. [www.msucare.com](http://www.msucare.com) (verified 7/12/10).*

*Miller, D. and D. Stephenson. 2009. 2009 Cotton Defoliation Guidelines for Louisiana. Louisiana State University Extension. Pub. 2927 <http://www.lsuagcenter.com/> (verified 7/12/10).*

*Siebert, J.D. et. al. Cotton defoliant efficacy: effect of carrier volume and nozzle type. Louisiana State University and University of Tennessee. [www.utextension.utk.edu](http://www.utextension.utk.edu) (verified 7/12/10).*

*Stichler, C/ et. al. The proper use of cotton harvest-aid chemicals. Texas Agricultural Extension Service. L-5142 <http://texasextension.tamu.edu>. (verified 7/14/10).*

**ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** Technology Development by Monsanto and Design(SM) is a servicemark of Monsanto Technology LLC. All other trademarks are the property of their respective owners. ©2010 Monsanto Company. 07122010CRB