Cotton Defoliant Application and Timing—Southeast

Cotton defoliant and harvest aid application timing should be guided by crop maturity, crop condition, weather and the desired harvest schedule. Growers must also determine which materials to apply, the application rate, and timing of application. Defoliating too early can lower yield potential and micronaire. Defoliating too late may increase the likelihood of boll rot and weather-related lint damage. Late defoliation may expose the crop to cooler temperatures which may reduce defoliant activity.

Defoliation Process

As a cotton plant matures, a physiological process takes place which separates the leaf from the stem, in an area called the abscission zone. Hormones within the 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 defoliant application rates are important, since too much chemical can cause the leaf to die before the abscission process takes place, resulting in “stuck” leaves that can create unnecessary trash in the harvested lint. When too little defoliant is applied, the abscission process may not begin, resulting in no leaf defoliation.

Defoliant Application

Whether chemicals are applied by ground or air, successful defoliation depends on sufficient leaf coverage by the chemical. Each leaf must receive enough chemical to begin the abscission process. Defoliants should be applied in the early morning or late afternoon, when humidity is generally higher and winds are calm. Spray volumes of 10 to 20 gallons per acre should be applied by ground equipment and 4 to 12 gallons per acre by air. Research indicates that cone-type nozzles provide better coverage than flat-fan or flood nozzles for ground application. Aerial applicators should use disk and core-type, hollow-cone nozzles to achieve medium-sized droplets. Drift-reduction nozzles, while excellent at controlling drift and spray placement, have been shown to decrease coverage within the crop canopy.

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 a defoliant application is when 60% of the bolls in a 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 un-opened portion of the crop. NACB is determined by locating the uppermost first-position boll that is cracked 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 populations (two plants per foot of row), most recommendations call for three NACB.

Benefits of Proper Defoliation

- Elimination of the main source of stain and trash, resulting in better grades.
- Faster and more efficient picker operation.
- Quicker drying of dew, allowing picking to begin earlier in the day.
- Straightening of lodged plants for more efficient picking.
- Retardation of boll rot.
- Potential stimulation of boll opening, which can increase earliness, yield and profit potential.

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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 DD60s, after cutout (typically, nodes above white flower (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 sharp 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 provides the solution for every field. Selections should be based on prior experience, price, environmental and crop conditions, yield potential, and the value of the crop. Knowledge of the lint and growth characteristics of each individual variety is critical in finding the best harvest aid program for each field.

Defoliants do not contribute 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 can reduce fiber quality and yield potential. Defoliants should be applied only when a cotton crop has reached the desired maturity for harvest.

Factors Affecting Defoliation

Many factors must be taken into consideration for successful application of a defoliant, desiccant or boll opener. 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 60 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.
- Plants are severely stressed.
- High levels of soil nitrogen and moisture are present.

Sources:

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