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Cotton Defoliation Timing

*Chism Craig, Assistant Professor
Extension Cotton and Small Grains Specialist, Plant Sciences*

Defoliation is an often-overlooked process that, if done properly, can pay large dividends. Defoliation is relatively easy in some situations and extremely difficult in others. Defoliation is the application of chemicals to encourage or force cotton leaves to drop from the plant, allowing harvest of the crop in a timely manner. Proper defoliation requires a balancing act between killing the leaves too quickly or not affecting the leaf at all. Successful defoliation requires that the leaf must stay alive long enough to begin the formation of an abscission zone, resulting in leaf drop. Killing the leaf too rapidly results in a leaf that is frozen or “stuck” to the plant, creating unnecessary trash.

Proper defoliation is a profitable part of a total cotton management system. Benefits include:

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

When to defoliate?

Defoliant works best on mature cotton under warm, humid and sunny conditions. Cool temperatures prior to application and for the three to five days afterward can reduce the activity of defoliant. If possible, defoliant should not be applied during cool snaps. Better defoliation will occur when products are applied during a warm period that is predicted to last for at least three to four days. Sometimes, defoliation may not be justified. Cotton that is completely cutout and naturally shedding leaves may not need defoliation. However, in this situation, it is extremely important to schedule harvest when all dew is off and later in the day to avoid excess moisture. Moduling cotton that has not been defoliated is not recommended unless internal module temperature is checked regularly to avoid overheating. There are many ways to determine proper defoliation timing, but the following have proven to be effective:

1. NAWF 5 + 850 DD60s

$$\frac{(\text{Daily Max Temp.} + \text{Daily Min. Temp.})}{2} - 60 = \text{Daily DD60}$$

Calculating DD60s after [NAWF5](#) is a good way to gauge crop maturity, but should be used in combination with other techniques. Generally bolls are safe for defoliation after they have accumulated 850 or more DD60s, but some studies have shown that 950 DD60s may be safer. This method usually recommends defoliation sooner than other methods and can sometimes be too early. DD60 accumulation after NAWF should always be accompanied by percent open boll and the sharp knife technique to ensure that premature defoliation does not occur. Early defoliation can reduce micronaire, but it has also shown to reduce yield in many situations. One must first weigh the benefits of decreased micronaire vs. potential yield loss.

2. Percent Open Boll

Measuring percent open boll has been the standard defoliation technique for many years and is still the “old standby.” It is generally safe to defoliate when 60 percent of the bolls are open. However, this strategy may not work well in situations where fruit has been set over a varying period of time due to plant stresses. In some situations, defoliation at 60 percent open boll would be premature and cut short the development of the top bolls, therefore reducing yield and micronaire. On the other hand, a crop set in a short period of time could be safely defoliated at 40 to 50 percent open boll. Many producers under-estimate percent open boll and wait until 70-80 percent open to defoliate.

Measuring percent open boll from the truck will generally underestimate percent open boll. The best way to determine percent open boll is to measure 3 feet of row in 10 places in the field and actually count open and closed bolls.

3. Node Above Cracked Boll (NACB)

To use NACB, find the uppermost first position cracked boll and count upwards on the plant to the uppermost harvestable boll. A NACB of 4 is usually safe for defoliation. However, low plant populations (less than two plants per foot of row) may need a NACB count of 3 to be safe. Low plant populations result in a less evenly distributed crop with high numbers of bolls set on vegetative branches and outer positions of fruiting branches. Once the NACB has been determined, cut the uppermost harvestable boll to inspect the lint and seed. If the boll is mature, then defoliation is safe. If the uppermost harvestable boll is immature, wait until NACB of 3.

4. Sharp Knife Technique

The sharp knife technique should be used to validate all methods of defoliation timing. Choose the uppermost boll that has a chance of contributing to yield. Make a cross-section of the boll with a sharp knife. Bolls are generally safe when they are difficult to cut and a cross-section of the seed reveals folded cotyledons, absence of jelly and darkened seed coats. The boll on the left illustrates a cross section of an immature boll, revealing undeveloped cotyledons. The boll in the center is nearly mature, while the boll on the right is a fully mature boll.



5. Hal Lewis Method

The [Hal Lewis Method](#) of timing defoliation has become more popular over the last several years and has shown promise in predicting end-of-season micronaire. The system uses a representative sample of the bottom four first-position bolls and compares the micronaire to a chart that predicts whole-field micronaire. If whole field micronaire is predicted to be in the discount range, defoliation is recommended. The technique could save a producer from discounts while maintaining yields. The Web site highlighted above gives detailed sampling instructions for those producers interested in using this method.



Regardless of which method you prefer, a combination of these should be used. It is recommended that the entire field be observed to determine the overall maturity of the crop. Rarely do all portions of a field mature at the same time, but some of the risks of defoliating too early or late can be reduced by using a combination of the aforementioned techniques.

Harvest Scheduling

Defoliation should always be coordinated with picker availability. Applications should be timed so that harvesting can keep up with defoliation. In general, defoliate only as much acreage as can be harvested in about 12 days. Early defoliation of excess acreage can decrease yields, expose lint to weather more than necessary, and increase the likelihood of significant regrowth. When harvesting capacity is low for the acreage involved, consider abandoning the “once-over” strategy and plan to “scrap” or “second-pick” the acreage picked during the first week. This may improve grades and prevent losses should unfavorable weather shorten the harvest season.