Defoliation is the shedding of cotton leaves that naturally occurs when leaves become physiologically mature or the plant is damaged by light frost, insects, drought or mineral deficiency. However, naturally occurring defoliation is not adequate for a clean and timely harvest. U.S. cotton growers prefer to defoliate their cotton crop on their own schedule with harvest aids to optimize yield and cotton fiber quality.

The art of defoliation

Defoliation is as much an art as a science. It involves intuitive feelings about different aspects of the cotton crop and knowledge of the defoliation process, including timing, environment, application and materials (TEAM). Using sound judgment based on scouting and experience, growers can defoliate effectively and efficiently.

The TEAM approach to cotton defoliation lists not only the four things you need to know about defoliation but also the order in which you need to do them.

Timing

There are several ways to determine the best time to apply defoliants. To check the timing, growers will need to visually inspect cotton plants.

- **NAWF 5 + 850 DD60s**: While this technique is good for tracking maturity, researchers recommend using it in combination with other techniques. Calculating 60 degree-days after “cutout,” which is defined as a point when the cotton reaches node above white flower (NAWF = 5), is a good way to gauge crop maturity.

- **Percent open boll**: When 60 percent of bolls are open across the field. This method can be influenced by either environment- or insect-related stress.

- **Nodes above cracked boll (NACB)**: A count of 4 or less NACB is generally safe for defoliation.

- **Sharp-knife technique**: Take the highest harvestable boll on the plant and cross-section with a knife. It should be difficult to cut. Folded cotyledons, an absence of jelly and a darkened seed coat should be seen.
Environment
Assessing the environment and crop condition is the next step after using visual inspection techniques. Weather conditions at the time of the application of defoliants and three to five days following the application have a significant impact on cotton response to the application.

Crop condition: Defoliation works best in mature, well-fruited, uniform plants that are cutout but not completely inactive. The plant's nutrient supply, especially nitrogen, should be exhausted, and the crop shouldn't be under any drought stress. If these crop conditions are ignored and defoliants are applied to drought-stressed crops with tough foliage, results will likely be poor.

Weather conditions: Harvest aids are most effective when temperature, sunlight intensity and relative humidity are high. A night temperature warmer than 60 F is especially important. For temperatures warmer than 60 F, the rate of leaf drop roughly doubles for each 10-degree rise in temperature. At least one full day of clear weather following application is necessary to optimize leaf drop.

Application
The third step is selecting an application method for defoliants. The application method for defoliants may vary, but the recommended minimum water volume is 10 gallons per acre by ground and 5 gallons per acre by air. Defoliants work on contact, so adequate coverage is essential for proper performance. The two main methods of application are:

• Single application approach: In cutout or short-statured cotton, a single application typically will be sufficient to remove leaves and open bolls. The products most recommended are a combination of boll opener with leaf drop material with ethephon as the active ingredient. Hormonal leaf drop products also work well alone.

• Multiple application approach: Used mostly in rank cotton, two approaches are common. The first is to precondition by opening up the canopy to prepare for the second application and then determining what products are needed for a second application. A second application most often requires additional defoliant to finish removing leaves and adequate boll opener to stimulate boll opening. Product selection and application rates should be adjusted to match environmental conditions as they change during the harvest season to reduce occurrence of leaf desiccation.

Desiccation is drying of plant tissues due to disruption of cell membranes and rapid loss of moisture, which often results in “stuck leaves.”

Materials
The last step of this process is to pick which harvest aid material would be best for the selected cotton field.

• Hormonal defoliants: These increase ethylene synthesis, resulting in leaf drop, and are less likely to cause “leaf stick.”

• Herbicidal defoliants: These cause leaf injury, resulting in ethylene synthesis and leaf drop.

• Desiccants: Typically used in stripper cotton, they’re used to dry down plant tissue for harvest.

Do not defoliate all cotton fields at the same time. Apply defoliants 10 to 14 days prior to the anticipated harvest date for each field. Leaf drop should begin about four days after application and be complete in about 10 days. If it rains three to four hours after application, it will not lessen the effectiveness of most defoliants. To avoid a problem, check the label before applying.

For more information about defoliation timing and techniques, contact your state Extension cotton specialist. As always, your PhytoGen cotton development specialist is available to discuss options. Visit PhytoGen.com for contact information.