



Cotton Comments

OSU Southwest Oklahoma Research and Extension Center
Altus, OK



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Heat Units Past Cutout / Irrigation and Crop Termination Issues

Many irrigated fields this year cutout early due to extreme crop evapotranspiration (ET) demand and diminishing irrigation capacity during July. A large number of fields hit the five nodes above white flower physiological stage in late July or early August. We have been anticipating an early harvest this year based on these conditions. According to Mesonet data, since August 1, and through September 2, the Altus area has obtained about 760 heat units, Tipton had about 765, Hollis about 740, and Fort Cobb about 680. This is past the 500-600 heat units past NAWF=5 trigger for irrigation termination judgment calls. Even for fields that reached 5 NAWF by the end of the first week of August, unless an extremely large boll load is present, it is likely time to seriously consider irrigation termination. Fields which were still producing productive blooms by the middle of August (few based on my observations) may need continued irrigation support. Because of drought and associated high temperatures, fields will likely wilt fairly soon after irrigation termination. Based on the Mesonet Irrigation Planner tool, for the last several days and for a May 10 planting date at Hollis, cotton ET has averaged about 0.3 inches/day. Fort Cobb data indicate about 0.25 inches/day, whereas Tipton has averaged about 0.32. The crop coefficients change once open bolls begin to appear, and the cotton ET rates will diminish somewhat.

With the latest round of triple digit heat, many fields we observed last week are closing in on harvest aid level maturity. Typically, 850 heat units past NAWF=5 can be used as a guideline to assist with assessing field maturity. It is usually best to integrate several methods including percent open bolls (60%), sharp knife, and nodes above cracked boll (NACB) techniques. I was in one field planted in April near Carnegie which was approximately 40% open last week. April planted cotton near Hollis is also nearing harvest aid application level maturity at this time.

Yield Estimation

This is the time of year when we typically get a lot of phone calls related to cotton yield estimation. Although a very risky endeavor, estimation of cotton yields could be important this year. There is a Texas A&M AgriLife Extension Service publication which deals with this issue. This publication takes a fairly simple approach and is "user friendly."

[Click here to see the Texas AgriLife Extension yield estimation publication](#)

For a more complicated and somewhat more thorough treatment of the subject, an additional publication is available. It was generated several years ago by Dr. Will McCarty, former Extension cotton specialist from Mississippi State University.

[Click here to see the Mississippi State University Extension yield estimation publication](#)

This publication considers many more factors such as numerous row spacings, boll sizes, and two estimated lint percentage levels (35% and 38% picked lint percentages of the SEED COTTON). When looking at several years of boll sizes from drought stressed dryland sites in Texas, the 35% picked lint percentage (Table 1), and 2-3 g/boll boll size is probably a good base to use. In lower yielding irrigated cotton, the 38% chart (Table 2) and 3-4 g/boll boll size are probably acceptable. In my opinion, because of boll size, seed set, and other factors, yield estimation should be approached with trepidation, especially in drought years.

Basically it indicates that about 155,500 normal bolls are required to produce a 480-lb bale of cotton (average of 4.0 g seed cotton/boll = 1.4 g lint assuming a lint percent for seedcotton of 35%). This is equivalent to about 325 bolls per lb of lint. For 40-inch rows this calculates to 11.9 bolls per row-ft for a one bale/acre yield (155,500 bolls/13,068 row-ft per acre for 40-inch rows). This is very close to the “one boll per inch = one bale per acre” number that many crop watchers use to estimate yields in 40-inch rows. For 30-inch rows this works out to 8.9 bolls per row-ft for a one bale/acre yield (155,500 bolls/17,424 row-ft per acre for 30-inch rows). **For drought stressed bolls the boll number required will increase substantially.**

The USDA Cotton Loss Adjustment Standards Handbook released in 2010 describes the Boll Count Method which begins at the top of page 26. A chart is included at the top of page 28. This chart presents the “number of bolls per pound factor” based on predominant boll size and how the crop is planted. Although work is underway to possibly refine this technique, “picker” and “stripper” varieties are separated and have varying numbers of bolls per pound of lint for some boll diameters. Historically, “stripper” varieties tended to have somewhat larger bolls than “picker” types. This is true for predominant boll diameters of greater than 2.5 inches down to greater than 1.5 inches but less than 2 inches. Once boll diameter drops to smaller than 1.5 inches the number of bolls required to make a pound of lint is equal for both stripper and picker varieties. Based on this table, adjustments for cotton with 1.5 inch diameter open bolls would be based on an assumed 450 bolls per pound of lint. If boll size is extremely small, the value becomes 550 bolls per pound of lint.

[For a copy of the USDA Cotton Loss Adjustment Standards Handbook, click here.](#)

Texas A&M AgriLife Extension Cotton Harvest Decision Aid Tool

In Oklahoma, there will be a considerable amount of cotton acres that will make “something” in 2012, compared to 2011. Typically, insurance adjustment can move from the “stand count” procedure to the “boll count” procedure beginning in mid-September. Depending upon the insurance adjustment (pounds per acre from the adjustment) this may result in some difficult decisions by producers. Plains Cotton Growers (PCG) in Lubbock and Jay Yates, Extension Risk Management Specialist with Texas A&M AgriLife Extension Service developed an Excel spreadsheet to assist producers with these difficult decisions. The availability of this tool was announced in a PCG Newsletter that was sent to recipients on August 31 and is linked here:

<http://agrilife.org/southplainscotton/2012/08/31/to-harvest-or-not-to-harvest-that-is-the-question/>

Crop Insurance Boll Count Adjustment Date Nears

Surviving dryland fields with little or no yield as well as some very low yield potential irrigated fields will soon be eligible for crop insurance adjustment. The accepted date for moving from the stand count adjustment method to the boll count method is September 15. Many producers who have fought a hard battle with the elements this year should be lining up crop insurance adjusters to obtain a yield determination based on the boll count method. A large number of irrigated fields may also be lost due to low yield potential.

The main thing to remember from a soil stewardship perspective is to leave an acceptable amount of crop residue in the field. What this may mean is that for fields which have been released due to low yield potential, it would be a good idea to terminate this cotton with a high dose rate of paraquat or even shredding rather than running a disk for crop destruction. Any cover left will provide potential to reduce wind erosion. Hopefully it will rain soon and a cover crop can be planted.

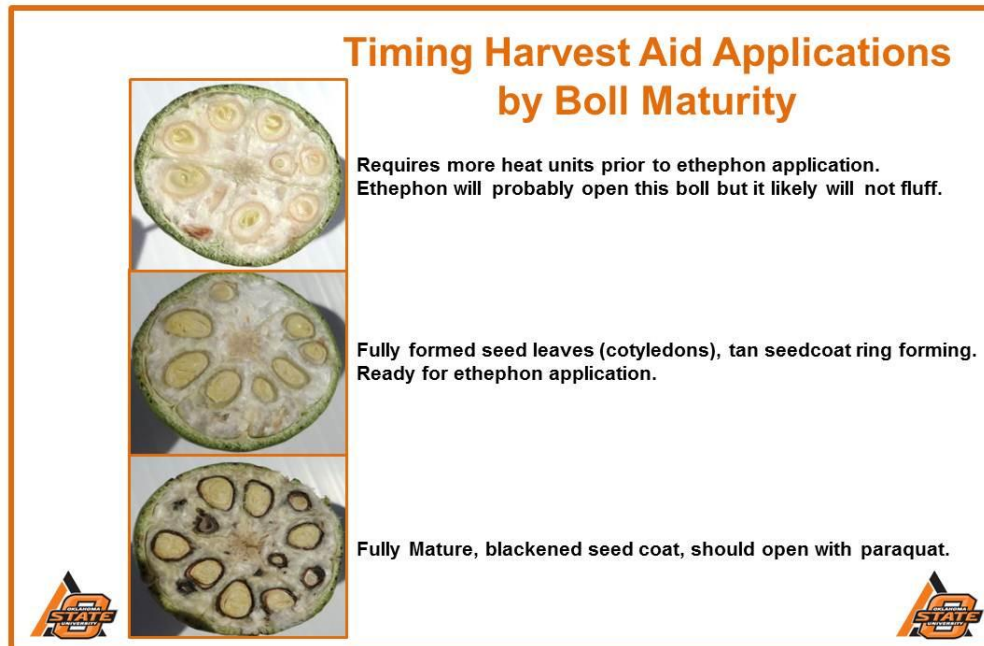
Crop Maturity Determination

Crop maturity determination is critical for a successful harvest-aid program. Premature crop termination has been shown to reduce lint yield, seed quality, micronaire, and fiber strength. Harvest-aid chemicals cannot increase the rate of fiber development. Only additional good growing weather including open skies and adequate heat units combined with functional leaves can mature cotton bolls.

3 Methods of Determining Crop Maturity:

- 1) Maturity can be determined by using a sharp knife to cut into the bolls. If the boll is watery or jelly like on the inside, then it is immature and needs more heat units.

If boll development is such that the knife cannot slice through the lint, then the boll is nearly mature. Close inspection of the seed will give further indication of boll maturity. If the seed coat is turning tan and the seed leaves (or cotyledons) are fully developed, the boll is mature. For an example of this, see below.



- 2) Percent open bolls is another method that can be used to determine crop maturity. This method is fairly easily accomplished, but can have limitations. One just needs to measure off a known number of row-feet in multiple areas of the field, then begin counting open bolls and unopened or “green bolls.” Track these separately. Once both types have been counted, simply add the green boll count and the open boll count to obtain the total number of bolls. After that, divide the open boll total by the total bolls and multiply times 100. This allows for a reasonable observation of percent open bolls. The limitation that occurs with this method arises when a “fruiting gap” exists in the plant. We have seen fields that exhibit this problem this year. If bolls are present at the bottom of the plant, none in the middle, and more bolls at the top, this can give a skewed representation of the maturity of the field.
- 3) Nodes above cracked boll (NACB) is a tool that can be used to time harvest aid application (Figure 1). A Beltwide cotton harvest aid timing project was conducted over multiple sites and years by a team of extension personnel across the Cotton Belt (Tom Kerby, James Supak, J.C. Banks, and C.E. Snipes). It was determined that if the uppermost first position-cracked boll is within three nodes of the uppermost harvestable first position boll then no lint weight will be lost if a defoliant-type harvest aid is applied at that time (Figures 1 and 2). However, if the uppermost harvestable first position boll is four or more nodes above the

uppermost first position cracked boll, then potential for some lint loss exists. The lint loss potential increases as the NACB increases. Micronaire reduction generally follows a similar pattern when using the nodes above cracked boll criterion. When defoliant type chemicals are applied, some slight subsequent fiber development may occur before defoliation. If applying desiccants, more bolls must be mature in order to reduce the risk of fiber weight loss or reduction of micronaire, thus two NACB would be a better target.

Figure 1. Determining nodes above cracked boll.

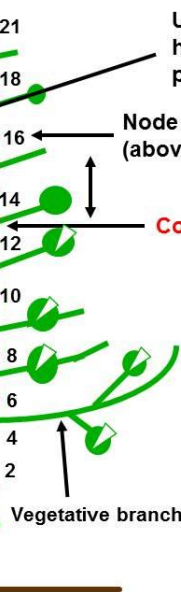
From the uppermost 1st position cracked boll on the plant, count the mainstem nodes above it to the uppermost harvestable 1st position boll. Sample at least 40 plants across the field, then average.

Uppermost 1st position cracked boll

2nd position boll (do not count)

1st position boll

Mainstem node number



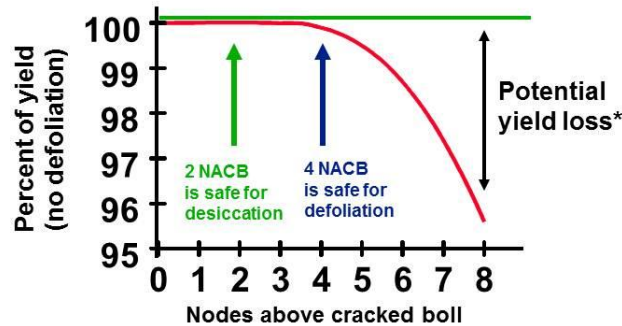
Uppermost harvestable 1st position boll

Node 4 (above cracked boll)

Count as node 1



Figure 2. Potential yield loss based on NACB method.



* when desiccating, add 2 to value for NACB to determine the effect on yield (desiccation at 2 NACB=percent of yield at 4 NACB for defoliation)



When determining boll maturity of adjacent fruit, one can consider the following. When moving up the plant from a first position boll that has just cracked to a first position unopened boll on the next fruiting branch, about 60 additional heat units (DD60s) are required to obtain similar boll maturity. If moving out from a first position boll to a second position boll on the same fruiting branch, about 120 heat units will be required to reach the same level of maturity. For an individual boll, a total of about 800-850 heat units are required after pollination to produce normal size and quality. However, bolls obtaining fewer heat units may still make productive lint of lower micronaire that may contribute to final yield.

[For a handout that helps explain the rate of crop maturity for the Altus vicinity, click here.](#)

Conditions Affecting Harvest Aid Performance

Proper harvest-aid product selection, tank-mix partners, and rates vary with environmental and crop conditions. What works best in one year is not necessarily the best for the next season. Effectiveness of harvest-aid chemicals is always a concern. Several factors affect the performance or lack of performance of harvest-aid chemicals.

These factors improve the performance of harvest-aid chemicals:

- Warm, calm, sunny weather
- Soil moisture relatively low but sufficient to maintain cotton plant in active growth condition without moisture stress
- Soil nitrogen levels relatively low
- Leaves active and uniformly expanded on plants
- Little or no secondary growth evident on plants
- Plants with a high percentage of open bolls that have shed some mature leaves

Conversely, here are some factors that negatively affect harvest-aid chemical performance:

- Applications made under cool (below 60° Fahrenheit), cloudy conditions
- Long periods of wet weather after treatment
- Plants in vegetative growth state with low fruit set
- Plants severely moisture stressed with tough, leathery leaves at time of treatment
- High soil moisture and nitrogen levels, which contribute to rank, dense foliage and delayed maturity
- Plants exhibiting secondary growth (regrowth) after a “cut-out” period
- Improper calibration of application rates and poor spray coverage

Harvest Aid Product Selection

In general, the yield and condition of the cotton crop should determine the choice of harvest-aid product. If the leaves are beginning to shed and are reddish to purple, they

will more easily drop off without too much “sticking” (when leaves do not drop and are frozen on the plant). The natural process that causes leaves to drop can be stopped by stress such as a freeze or desiccant application. Also, some cotton varieties do not defoliate properly. **Increased leaf content in the harvested cotton can potentially reduce lint quality by triggering lower quality leaf grades.** Drought-stressed leaves generally have a much thicker waxy coating, which can reduce harvest-aid performance.

Regrowth

Secondary growth (regrowth) sometimes occurs after the plants have “cut out” or stopped blooming due to drought stress or physiological maturity. If the weather is warm and rainy after an extended period of drought stress and cut out, the growth cycle can start again. One might see regrowth in the terminal and on many of the other nodes on the plant. Plants with unopened bolls or young, developing bolls are less likely to produce secondary growth. Regrowth is difficult to control because young foliage does not shed as older leaves do.

Spray Volume

Proper spray volume and coverage are also critical to the success of a harvest-aid program. Be sure to calibrate the sprayer to deliver the correct volume at the proper nozzle pressure to ensure adequate distribution and foliage penetration. **Read and follow the label directions for product use.** The harvest-aid label contains information based on many years of testing and results. Avoid applying on windy days to reduce the hazard of spray drift to non-target vegetation. Some harvest-aid chemicals are very toxic and should be properly handled and stored, especially around small children and pets.

Harvest Aid Chemical Types

Harvest-aid products are broadly classed in three categories: desiccants, defoliants, and boll openers. Some can be classed as both desiccants and defoliants depending upon the rate used.

Desiccants

Desiccants generally are paraquat formulations and may contain various tank-mixes with other products. These products dry down the plant by causing the cells to rupture. The old rule of thumb is that desiccants are normally applied when approximately 80% of the productive bolls are open, or at two to three nodes above cracked boll. **Do not use paraquat-based desiccants when seedling-stage small grains or other crops are near targeted cotton fields. Paraquat drift can severely damage developing**

small grains grown for cover or harvest. Gramoxone SL 2.0, Firestorm, and Parazone are similar products that have paraquat as the active ingredient. Paraquat applications made in the late afternoon before a bright, sunny day seem to boost the effectiveness of desiccation and tend to increase regrowth control. We suggest the use of nonionic surfactant (NIS) with paraquat. Use the NIS at a minimum rate of 0.125% or 0.25% volume/volume (v/v), depending on the percent concentration of surface-active agent (see individual product labels). You may need to increase the NIS rate to 1% v/v and spray late in the day to effectively desiccate some fields. In some years, protoporphyrinogen oxidase (PPO) inhibitor defoliant/desiccant products applied at **higher rates** work well to desiccate juvenile growth and regrowth, which is often difficult to do with paraquat. PPO inhibitor products include Aim, Blizzard, and ET. Unlike the problem with paraquat, drift from desiccant rates of PPO inhibitors should not injure small grains.

Defoliants

Defoliants cause plants to begin developing an “abscission layer,” or zone of cells that eventually break down and cause leaves to separate from the stem and drop. Abscission is a natural process, but it is enhanced by the defoliant. Some defoliants are classified as hormonal, some are herbicidal, and some are mixtures of both. Hormonal defoliants work two ways: (1) they enhance production of “ethylene,” a hormone that stimulates leaf abscission; or (2) they inhibit a plant’s ability to transport “auxin,” a plant growth hormone. Lower temperatures are more likely to reduce the effectiveness of hormonal defoliants than herbicidal defoliants. Hormonal defoliants include Dropp (thidiazuron) and related products. Because of fall temperatures, Dropp is not generally used in Oklahoma and north Texas. Herbicidal defoliants include Folex (tribufos) and related products, the PPO inhibitors (Aim, Blizzard, and ET), and low rates of paraquat or other desiccants (which at lower rates injure but do not kill the leaves). Some products may have mixtures of both hormonal and herbicidal defoliants. These products include Ginstar (thidiazuron plus diuron) and related products. To maximize leaf drop, defoliants require fairly healthy and active leaves that still function properly and are not severely drought stressed (tough and leathery). Warm air temperatures generally enhance a defoliant’s effectiveness. According to the commonly used rule of thumb, defoliants can be safely applied when 50-60% of the bolls are open and the remaining bolls are mature enough to obtain a good yield. Defoliation generally causes mature bolls to open, but green, unopened bolls can still remain a challenge. Frequently, a killing freeze or a follow-up application of paraquat or other desiccant product is needed to allow stripper harvest of the crop. Defoliant rates of PPO inhibitors disrupt plant cell membranes, triggering increased ethylene production in leaves and causing abscission. Research trials indicate that the PPO-inhibitor products can be effective defoliants, as well as effective desiccants in some instances when used at higher rates. These products tend to work equally well, but some may work better under certain crop conditions. PPO inhibitors can be tank-mixed with other products such as paraquat, Folex, Ginstar, Prep, Finish 6 Pro, FirstPick, and various other ethephon-based products. We suggest the use of a crop oil concentrate (COC) for the Aim EC, Blizzard, and ET spray mixtures. See specific product labels for details. Failure to

include proper adjuvants with these products will likely result in significantly reduced activity.

Boll Openers - Ethephon

Ethephon-based boll-opener products increase the rate of boll opening and defoliation to allow for more rapid harvesting of the crop. Primary ethephon materials include Prep and other related products such as Boll'd, Boll Buster, Setup, and SuperBoll. A few years ago, some enhanced boll-opener/defoliant products were marketed: Finish 6 Pro, which contains ethephon and cyclanilide; and FirstPick, which contains ethephon and urea sulfate. These products affect the natural boll-opening process, but they do not cause bolls or fiber to mature faster. Plants convert ethephon to ethylene, an aging-related hormone that speeds up abscission layer formation. Ethephon-based products usually reach a level of maximum effect within 14 days. Tank mixes of ethephon and defoliants are effective at opening bolls and dropping leaves in higher yielding cotton. Higher rates of ethephon products alone are often very effective for defoliation, but lower rates are generally effective only for boll opening. The maximum labeled rate for ethephon products is 2 pounds of active ingredient per acre. Defoliant chemicals can be tank-mixed with ethephon products to enhance defoliation.

Boll Maturity and Ethephon

Ethephon must be applied to an active plant to be effective, and temperatures generally drive its effectiveness. Ethephon product labels generally state that plants need “sufficient mature unopened bolls present to produce desired crop.” Mature bolls are defined as “too hard to be dented when squeezed between the thumb and fingers, too hard to be sliced with a sharp knife, and when the seedcoat becomes light brown in color.” If you apply boll-opening products when bolls are not mature enough, you will likely see reduced lint yield and micronaire. Results from several Texas High Plains studies indicate that lint yield and micronaire reductions occurred when applications were made at 25% open bolls but not at 50% open bolls. Lint yields were reduced at least 10%, and micronaire was decreased by about 5%. When one initially applies tank mixes of boll opener and defoliant products, one often needs a follow-up application of paraquat (or other product with desiccant activity) to sufficiently condition the cotton for stripper harvest. This step adds more expense to the overall harvest-aid program. For late maturing cotton (defined as cotton still needing maturity, but the long-term average heat units have gone to zero) ethephon can be used as a conditioning treatment. Late maturing cotton will be susceptible to potential yield and quality losses if a hard freeze is encountered. **An unfortunate judgment call will have to be made concerning harvest aid application 7-10 days before a freeze, not the day before a freeze is forecast.** Ethephon must have at least 70 degree temperatures for several days in order to provide benefits with respect to boll opening and potential reduction of lint staining. Many times severe lint color degradation is observed after a freeze when prior

to that a substantial number of unopened bolls remain in the field. Ethephon is ineffective AFTER a freeze based on the destruction of the physiological processes needed for benefit. Ethephon requires a functional plant. If a hard freeze is obtained the plant is dead. One can apply ethephon at higher rates at least 7 days prior to killing freeze date in order to get some activity, assuming 70 degree temperatures can be obtained. It should be noted that if a freeze is not encountered, ethephon applied to immature cotton will potentially reduce yield and fiber maturity as measured by micronaire. This is one box we need to stay out of and why we encourage producers to manage for earliness. However, ultimately we are at the mercy of Mother Nature.

Quick Reference Decision Aid Tables

Many irrigated fields are moving rapidly toward sufficient maturity to allow harvest aid application soon. The question remains what to use to bring down this cotton. I've always said that there is more than one way to get cotton harvest ready. What works this year may not work next year. It is very important to learn the strengths and weaknesses of the various products. Use rates, timing, weather, crop condition, etc. are all important for a successful harvest aid program.

A decision aid-table has been generated for three projected lint yield levels (less than 500 lb/acre, 500+ lb/acre, and 1000+ lb/acre) and four scenarios (dry with temperatures less than 80 degrees 0-3 days after treatment; dry with temperatures greater than 80 degrees 0-3 after treatment; wet with temperatures less than 75 degrees 0-3 days after treatment; and late maturing). **Make sure to read the footnotes at the end of the publication, as they contain important information.** Some products may be more difficult to obtain in the marketplace than others, but these tables are a worthwhile general guide because so many are available.

[For the 2012 cotton harvest aid decision table, click here.](#)

Sharpen – A New Harvest-Aid Product for 2012

Sharpen herbicide, a PPO inhibitor product, has been around for a few years. In 2011, BASF labeled Sharpen as a cotton harvest-aid in Texas. In 2012, a supplemental label was generated that included other states, including Oklahoma. One factor that should be noted concerning this product is that it has residual activity. It will take some time for us to be able to assess the proper fit and issues surrounding use of this product in Oklahoma.

[For the full Sharpen label, click here.](#)

[For the Sharpen Harvest Aid/Desiccation and Defoliation in Cotton Supplemental label for Oklahoma, click here.](#)

Display – Another New Harvest-Aid Product for 2012

A new harvest aid product is available this year. It is from FMC and is called Display. Display is a premix of two PPO inhibitor products: carfentrazone-ethyl, the active ingredient in Aim EC; and fluthiacet-methyl, the active ingredient in Blizzard. We have not worked with this product in the past, but do have some trials planned. It is expected to perform as other PPO products, but the use rate will need to be assessed for our cotton and conditions.

[For a copy of the FMC Display label, click here.](#)

Cotton Incorporated Harvesting Publications

Several publications have been generated by Cotton Incorporated in cooperation with a team of harvest engineers and agronomists. These include stripper harvesting, picker harvesting and seed cotton storage (module building). There is a huge amount of relevant information in these publications and they should not be overlooked.

Click for:

[Stripper Harvesting](#)

[The Spindle-Type Cotton Harvester](#)

[Seed Cotton Handling and Storage](#)

Also, more information concerning cotton harvesting and economics of the two harvester types can be found on the Cotton Incorporated Website at:

<http://cottoninc.com/fiber/AgriculturalDisciplines/AgriculturalEconomics/Cotton-Farming-Decision-Aids/EconomicDecisionAid/index.cfm>

Upcoming Meeting

Carnegie Gin Fall Tour – 9:00 a.m., September 13th , Merlin Schantz barn, Hydro.

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