

Cotton Field Check

A Cotton Management Update from UC Cooperative Extension

Late Season Management / Harvest Aid Considerations

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Defoliation is necessary to prevent leaf stain and trash from contaminating cotton lint. A well timed and effective defoliation can pay off in multiple ways. An earlier start will be advantageous not only for defoliation but also for advancing the start of harvest and reducing potential for more established late-season whitefly and aphid infestations. Other advantages of an earlier start include: (1) defoliants are more effective when temperatures are warm (>80 F if possible); (2) harvest in October with longer, warmer days is much more effective and efficient in use of harvest crew time than during shorter, cooler, and possibly wet days of November; (3) fiber quality has a better chance of being preserved; and (4) an earlier finish results in the completion of more post-harvest groundwork before winter rains typically start.

The effectiveness of defoliation varies from season to season and often from field to field depending on relative vigor of the crop and fruit maturity. These are influenced by factors such as water and nitrogen status of the crop, boll load, irrigation timing and termination, prevailing day and night temperatures, and impacts of soil types and condition on rooting depth and relative access to soil water and nutrients. With these factors in mind, and based upon field experiences and harvest aid research trials, the following rough guidelines are presented to give ideas on how to manage crops under certain situations:

- Two basic crop “**Conditions**” described as (1) plants with good boll load, relatively even fruit distribution, and well-managed plant vigor; versus (2) late plantings or plants with lower fruit retention, uneven fruit distribution and more problems with higher vigor vegetative growth
- Within the second “condition” described (#2 above) where there are more problems with fruit retention, later-developing bolls and crop vigor issues, also described here are several **strategies** to consider as harvest aid options for these fields.

Although some recommendations may apply in general to Pima as well as Acala types of cotton, some comments are made that are specific to the type of cotton if based on results of field research trials.

TYPES OF FIELD CONDITIONS TO CONSIDER IN SELECTING DEFOLIATION STRATEGIES.

Condition 1. Fields with heavy boll load, abrupt and fairly obvious vegetative cutout, and warm temp (>80 F) at 1st application. Fields at 4 nodes above cracked boll or > 55 to 60% open boll.

- Lower rates (4 to 6 oz) of Ginstar should be effective. Def/Folex plus a boll opener should also work well. Tank mixing materials containing ethephon for boll opening (Prep, Finish, Cotton Quick) will be useful for faster and more complete leaf drop. This is especially important in areas with developing whitefly or aphid problems late-season. Some recent research has also shown that under some conditions use of Def or Folex can also provide additional help in reducing stickiness associated with silverleaf whitefly infestations.
- On Upland varieties standard rates of sodium chlorate plus paraquat, ET, or Shark or as split applications should be effective but less so than Ginstar combinations or Def/Folex plus ethephon.

Condition 2. Later plantings with later-developing fruit, or plants with lower fruit retention and/or rank growth in Acala or Pima. These later maturity conditions also increase chances that harvest aids will be applied when air temperatures cool down (to <80 F daily high) at 1st harvest aid application.

Problems with vigorous, late-maturing fields with variable boll distribution in the canopy and smaller boll loads have occurred broadly in prior years (2006, 2005, 2003, 1998, 1995), so there is a good level of prior experience on what works and what doesn't under these conditions. A key variable to note in making decisions about harvest aid management in these fields is the relative maturity of fruit that you are trying to get ready for harvest in these fields (ie.):

- Are you preparing mostly for later-developing bolls, with 20-30% open bolls or less? Or
- Are you already at 50% open boll or better?

With these more vigorous plants, if they also have a high proportion of later-maturing bolls, it may be desirable to consider different practices to improve chances for acceptable defoliation, desiccation, to control regrowth, and to improve chances of getting later-maturing bolls open. If temperatures continue higher than normal as you progress through October, that will help the most in maturing these bolls. As usual, there is no "magic bullet" that will make all late bolls mature and open. Growers need to look at the calendar, judge the likelihood that good weather will continue, and decide which bolls they really can afford to wait for. Some general approaches to consider in these later-maturing fruit situations include:

- Higher Ginstar rates (7 to 10 oz. on Acala and 10-13 oz. on Pima) tank mixed with a boll opener. The addition of Shark or ET at low label rates may help in some cases.
- Sequential applications will most likely be required for effective defoliation and desiccation. The first application aims to open up and start to penetrate a dense leaf canopy. A second application of chlorate plus paraquat, ET, or Shark is needed to defoliate or desiccate remaining leaves.
- A 2-step approach starting at higher nodes above cracked boll / lower % open boll, starting with: (1) a low rate (3-6 oz) of Ginstar plus an ethephon-containing material (Prep, Cotton Quik, Finish); followed by (2) a second application and higher rate of Ginstar plus an ethephon-containing material. This approach may be worth consideration and is described in more detail below.

Strategy One For Late-Maturing Fields - Beginning at 6 Nodes Above Cracked Boll (NACB):

In some fields it can be necessary to start defoliation earlier than the typical recommendation for 3-4 NACB in Pima and 4-5 NACB in Acala due to concerns about late season insect control or because it is getting late in the calendar year and risks of adverse weather will be getting unacceptable. Several UCCE field studies conducted during the 1990's and again recently demonstrated a benefit in defoliation and boll opening by applying a pre-treatment of 3-6 oz of Ginstar at 6 nodes above cracked boll (NACB) followed by later treatments (at about 4 NACB) of: (1) Ginstar at 8 oz. in combination with a boll opener material (such as Prep, Cotton Quick, Finish or others); or (2) Def/Folex plus a boll opener. Ginstar rates should be adjusted if major changes in air temperatures occur at application or are anticipated in the days following application. In many cases in both Acala and Pima, a final application of sodium chlorate and Gramoxone or Shark or ET will also be useful in desiccating remaining leaves and improving opening of last-remaining bolls. UC studies showed that applying ethephon at 6 NACB in normal maturity fields reduced yields slightly (<2-3% in Acala) and impacted quality (mostly micronaire) compared to applications first made at 4 NACB. This season because of the missing bolls in the middle canopy, the NACB technique may not be as useful. However, 6 NACB is approximately = 30 to 40 % open boll and 4 NACB = 55 to 65 % open boll.

Strategy Two For Late-Maturing Fields - Beginning at 8 NACB:

An approach for vigorous, late-maturing cotton fields, particularly when there are concerns that fields are not making progress in opening up bolls, involves use of glyphosate as a pre-treatment in non RR varieties. UCCE studies done on Acala varieties during the 1990's looked at several timings for these pre-treatment glyphosate applications. The treatment combinations in these studies consisted of glyphosate pre-treatments at 1 qt/acre rates tested at timings of 8, 9 or 10 nodes above cracked boll, followed 7-10 days later by standard defoliation treatments involving Def/Folex or Ginstar with or without boll openers. Results showed some advantages in earlier opening of later-developing bolls with the glyphosate pre-treatments. However, care should be exercised to make sure of the average NACB status of the field and relative percentages of the total field at various stages of maturity. Glyphosate should not be applied before about 8 NACB for these pre-treatments in Acala varieties, since the research showed yield losses of 5 to 12% with earlier applications at 10 NACB. Field studies that followed the 8 NACB with a Ginstar application at 6 NACB as mentioned above and then a 3rd application with the full rate of Ginstar plus ethephon was very effective on late, rank fields in 2005. Some PCA's experienced better results in 2005 though by skipping the glyphosate and starting on the 6 node application of Ginstar instead.

Strategy Three For Late-Maturing Fields: Another approach is to closely pay attention to the calendar, the weather, and consider how much risk you want to take in choosing a final harvest date. Consider these steps:

1. Keep an eye on predicted trends in the weather over the next couple of weeks.
2. Consider your own experience with how many days of harvest will likely be needed from harvest of your first field to the last field.
3. Decide what you think is the last harvest date you consider to be an acceptable risk based on potential for weather-related problems.
4. Count back about 21 days from those desired harvest dates, and start with your defoliation program on those dates no matter what maturity stage (what NACB) the crop is in.

University Acala and Upland cotton defoliation trials in the 1980's and 1990's demonstrated that, on the average, defoliations initiated at 8 NACB resulted in yield losses of about 5% when compared with initiation at 4 NACB, while those initiated at 6 NACB reduced yields 2 to 3%. However, those same studies acknowledged that when a very large percentage of the total crop consists of bolls on the upper 6 to 9 fruiting branches, losses from early defoliant applications can be substantially more (over 10%). Particularly under circumstances of mostly a mid-canopy and top-crop, the closer you can get to 4 to 6 NACB prior to first defoliant application, the lower the potential yield loss.

Results of Related 2006-2007 Research at the West Side REC (Fresno County, clay loam soil). In Acala defoliation trials, Ginstar treatments at the 3 to 6 oz rate applied at the 6 nodes above cracked boll (NACB) followed by a secondary treatment of 6 to 8 oz of Ginstar or Sodium Chlorate gave an average of 20 percent higher defoliation ratings, 30 percent higher desiccation, and 15 percent improved open boll compared to similar treatments applied at the standard 4 NACB stage. The 4 NACB treatments did not improve open boll percent even at 32 days after treatments. Yield data showed a yield reduction associated with an early application of ethephon at 6 or 8 NACB and a slight loss with an early application of Ginstar in 2007 but not in 2006. Micronaire was slightly reduced with the 6 NACB timing but not to a discount level.

Additional details and summaries of 2007 HARVEST AID MANAGEMENT trials conducted by University of California staff are available at:

<http://cottoninfo.ucdavis.edu>