Cotton Field Check

A Cotton Management Update from UC Cooperative Extension

Late-July Field Situations & Management Considerations

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Factors Affecting Fruit Set. After earlier mild weather, recent July weather has been hot enough to cause some significant water stress in fields subjected to delayed irrigations. In fields with at least adequate soil moisture, however, daytime highs and night temperatures have generally been very favorable for cotton growth, flowering and setting bolls. As in many years, there has been a wide variation in lygus populations across cotton fields in the SJV, and similar variation in timing of and persistence in fruit loss. Fields visited the past week or so were observed to have relatively good mid- and upper-canopy boll set (1st, 2nd position mostly in Acalas, 1st through 3rd position in Pimas), with upper canopy fruit retention in many fields average or even higher than typical most years at this point in the bloom period. While you need to maintain reasonable expectations of the likelihood of fruit retention in the mid to later bloom period, holding a good percentage of these current squares and small bolls, and continued bloom and boll set during the next two weeks could boost yield potential significantly, with less reliance on trying for those really-late top crops. With this in mind, there is real value in continuing to monitor plants for fruit set and to continue evaluations of fields for pest issues at least the next few weeks to assist in: (1) figuring out ways to limit losses of developing and recently-set fruit; and (2) watching for late-developing aphid or whitefly that could represent a quality threat since we have a long way to go with some of the later-developing fields this year. As Pete Goodell (UC IPM Advisor) pointed out in recent *"Field Check"* articles available via Mitefax and on the UC cotton website (http://cottoninfo.ucdavis.edu), the expected retention of squares and bolls is impacted not only by pest damage, but declines with plant age and can be impacted by earlier fruit retention levels as well as by plant vigor and ability to continue growing. It is a fact that plants at typical planting densities in production fields cannot hold fruit at all developing sites. However, it is important to also recognize that there is a lot of variability in factors impacting the timing and relative location of fruit that will be held on the plants. As a field crop manager, it is to your benefit to continue to monitor fields and try to respond to situations and opportunities.

Fields that were observed to have low (<30%) first and second position fruit retention in the bottom 5 to 8 fruiting nodes a few weeks ago in western Fresno County and Kern County associated with lygus populations > 5 to 10+ per 50 sweeps seem to be setting fruit more successfully where lygus populations have declined, but in some cases this is after repeated pesticide applications. In multiple areas, stubborn lygus populations took a few weeks or more to decline and stay at reduced levels. Overall, the message in at least some areas this year is that during this critical period of firming up crop fruit loads and yield potentials, pest populations have in many cases persisted and warrant continued monitoring for control decisions.

Growth Management. As little as a week or two ago, many sampled plants (particularly Pima) had lower than typical height:node ratios, indicating less vigorous growth. This is still true in many Pima fields, particularly where fruit set is very good, or where severe irrigation delays have stressed the plants and reduced new growth. Plants in those conditions may still not require plant growth regulator (PGR) applications, and excessive PGR rates might actually reduce fruiting site numbers and yields. In many of the cotton fields that were irrigated earlier (or that are drip irrigated) and show higher growth rates, some relatively easy to do, simple measurements may be helpful: (a) height:node ratio measurements; and (b) length of upper stem internodes (the distance on the main stem between where the petioles of the 4th and 5th leaves down from the terminal are attached to the main stem). This particular internode, between the 4th to 5th leaf down from the terminal (uppermost leaf > 1" diameter) is useful because that section of

the stem is fully grown and no longer lengthening, and is a relative indicator of the rate of growth occurring during the past 10 to 14 days. Relatively long internodes in the upper canopy indicate that vegetative growth rates are strong. Long internodes in the mid to later season are often associated with warm weather, irrigations, nitrogen applications of recent weeks, PLUS it can be a response to less completion from reproductive growth due to earlier square and boll losses. The fields with very rapid vegetative growth may still respond to PGR applications through perhaps peak bloom timing, but higher rates are required and may still not hold back fields with poor fruit retention when this occurs in combination with high soil water and nitrogen. Particularly where fruit retention is no better than moderate, avoid additional N applications and use moderate delays in irrigation if vegetative growth is very rapid and upper canopy internode lengths on the main stem remain in the 2.5 to 3+ inch range at this point in the growing season.

Field Situations. Useful assessments of developing field situations can best be done by observing field conditions and utilizing tools such as plant mapping and pest monitoring. This year there appears to be significant acreage of plants that could be described in one of the following ways:

MODERATE GROWTH, THINNER STANDS, RETENTION PROBLEMS. There are a lot of issues going on in these fields, and some variable plant populations to manage all in the same field. Variable plant populations mean that these fields arewill be hard to sample (for plant growth and insect counts) season long. During early to peak flower in particular, be flexible in making PGR decisions. If retention remains good in some of these weaker stands, PGR applications may be at lower rates. However, if good growth rates develop and fruit retention is highly variable, expect that more intensive sampling will be required to assess both plant growth and insect situations. Try to go back to the same zones within fields each time to better assess progress and problems.

STRONG GROWTH, VARIABLE RETENTION. Particularly with some of the later plantings, recent warm weather coupled with good soil moisture from recent irrigations has brought aggressive new growth in the upper canopy of plants, with long internode lengths (3” or more) in the upper 4-5 nodes in many fields. Where this strong vegetative growth occurs in combination with good fruit load, it can join together to produce some decent yield potentials, but still bears repeated observations and decisions at the right time. In these strong growing fields, watch carefully to assess the fruit retention situation, and be ready to again apply PGR's and/or utilize delays in irrigations if the situations change dramatically toward reduced retention.

MODERATE GROWTH, GOOD TO VERY GOOD MID-SEASON FRUIT SET. In some fields, even though we have been talking about a “late” year, there is some potential for them to move fairly rapidly toward cutout and perhaps and an earlier than anticipated stop in production of additional fruiting sites, reducing yield potential. For a certain portion of your fields, this may be a desirable outcome, allowing some fields to be ready for defoliation and harvest earlier than expected. However, if this happens too early in most of your fields, it may be a lost opportunity to go for somewhat higher yields. If the fields are still within the first 3 to no more than 4 weeks after first bloom, insect pests are under control and fruit retention remains good, you may be able to extend the fruiting period by moving up your next irrigation by a few days or more. If you scaled back your nitrogen fertilizer applications this year due to the late year and lousy starting conditions, and are now in the position of having plants with higher than expected fruit set on small to moderate-sized plants, if you are still in the first 3 weeks or so of bloom, you could have plants that could still respond to a foliar N or N and K application, or to a light water-run N application (<25-30 lbs N/acre). Later N applications are not generally a good idea, particularly in a year with later planting dates and a slow start, but we have seen some fields with the combination of high fruit load, small plants, quite low petiole nitrate-N, and potential for an earlier than expected cutout. Don’t get carried away with excessive irrigations and higher N applications, as it could result in a second “wave” of late-season growth that could continue for longer than you want in terms of need for irrigations and pest management needs. Check fields for nodes above white flower (yellow flower in Pima) – if you are approaching 4 to 5 nodes above white flower and you don’t see too much additional growth at the

terminal or on fruiting branches, the plants are moving rapidly toward cutout and are less likely to respond favorably to added N or K at this point.

Remaining Time to Develop Bolls. Part of the reason to focus on improving chances of fruit set during the next few weeks is based on what UC Cooperative Extension cotton studies have shown to be the difficulty in carrying later-season bolls out to full fiber maturity given average fall weather. These recommendations for August 20th or so being the last bloom date to count on carrying to maturity were largely developed using heat unit long-term averages combined with mapping data with Acala varieties. Although the tendency may be to assume that it would take longer (more heat units) to mature and open large, thick walled Acala bolls when compared with smaller Pima bolls, that generally has not been the case in field studies across a fairly wide range of varieties in each type of cotton (see Table 1). Remember that while more severe water stress or early, intense defoliation treatments can often-times open bolls with fewer heat units, those practices can also cause some negative fiber quality impacts.

Table 1. Ranges of heat units (base 60F) required from bloom date to cracked, open boll that can be machine-picked as determined from bloom-date tagged bolls in University of CA studies (1999-2007).

TYPE OF COTTON	Heat Units (base 60F) to Mature Early Season Blooms	Heat Units (base 60F) to Mature Late-Season Blooms
Acala	850 to 1025	800 to 875
Pima	900 to 1050	875 to 975
CA Uplands (thin boll walls)	800 to 950	775 to 850

Table 2. Long-term total degree days (or heat units) base 60F (calculated from 1974 through early 2000's data) for half-month/ two week intervals at Shafter REC in Kern County are as follows:

Time Period (in 15-16 day intervals)	Range in Total Degree Days (60F base) for this period in data sets	Average Total Degree Days (60F base) for this period across data sets	Cumulative Average Degree Days (60F base) accumulate at Shafter location (starting date of August 16)
August 16 to 31	176 to 352	264	264
September 1 to 15	150 to 330	230	494
September 16 to 30	75 to 255	177	671
October 1 to 15	75 to 225	126	797
October 16 to 31	32 to 144	90	887
November 1 to 15	15 to 90	38	925

Note that average degree-day accumulations differ with location in the SJV, and can be 5 to 15+% lower in the middle and northern SJV as compared with Shafter REC shown above. The primary use of this type of data is just to keep in mind the probability of how many heat units you are likely to have available (on average) for maturing out later-developing bolls. Of course, a long, dry and warm September/October will be above that long-term average and allows your crop to mature out many late-season bolls. The flip side is the chance that a cooler than normal fall might occur and make it even harder to mature late bolls. Growers have to decide on acceptable risks in going after late-season bolls.