MONITORING POST-BLOOM COTTON FRUITING IN OKLAHOMA

Dr. Randy Boman
OSU Southwest Research and Extension Center, Altus

Monitoring fruiting is an important management consideration. First position fruit is very quickly counted, and is generally adequate for "getting a handle on the crop" (see Figure 1). At early bloom, up to 80% of the harvestable crop will be on the plant in the form of squares and blooms. We like to see 85% square retention going into the first week of bloom. Plant mapping can be used to help monitor the progress of the crop and to determine some important crop factors.

Important plant mapping data at early bloom are:

1. Total 1st position squares present and missing:
   (retained squares / total square sites = % square retention)

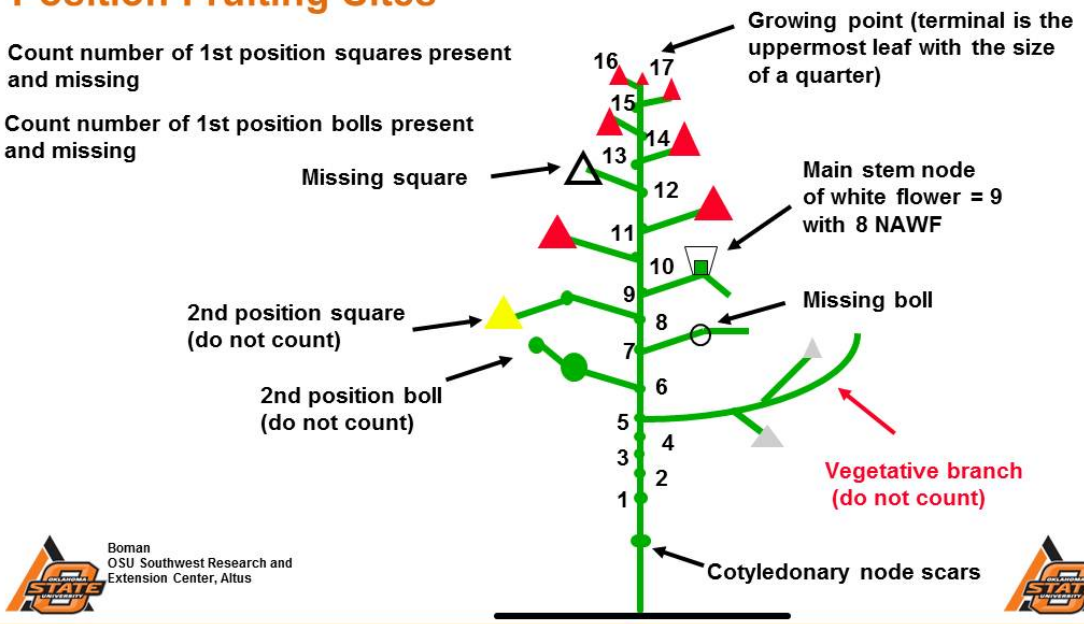
   Square retention goal is 75 - 85% 14 days after early bloom

2. Total 1st position bolls present and missing:
   (retained bolls / total boll sites = % boll retention)

3. Nodes above white flower (NAWF). To determine NAWF see Figure 2.

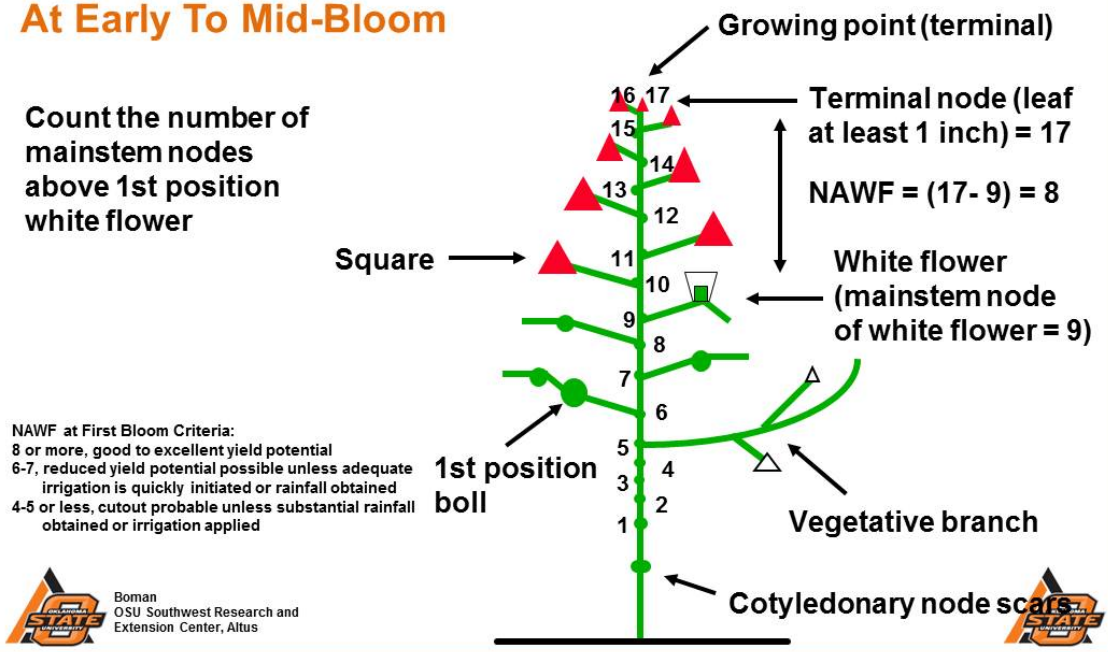
Nodes above white flower at first bloom gives an indication of crop vigor and yield potential. Typically, NAWF should be high at first bloom and then decrease as the boll load ties down the plant, and mainstem node production rate slows or ceases. New cotton genetics vary substantially in their response to moisture stress; therefore, the guidelines below are generalized. Greater than 8 NAWF could be considered excellent, 6-7 – reduced yield potential possible unless adequate irrigation is quickly initiated or rainfall obtained, 4-5 or less - cutout imminent on determinate varieties. Many fields that are stressed for moisture may have a short bloom period due to few NAWF at early bloom, unless timely rainfall or irrigation is obtained. It will be important to track NAWF averages weekly for each field, as key management decisions later in the season can be assisted if the cutout date is known. Recording the date of cutout in addition to heat unit accumulation past that date will become important. **The date at which the field enters NAWF=5 is important and should be noted!**

Figure 1. Early Bloom Plant Mapping Using First Position Fruiting Sites



Boman
OSU Southwest Research and Extension Center, Altus

Figure 2. Nodes Above White Flower At Early To Mid-Bloom



NAWF at First Bloom Criteria:
8 or more, good to excellent yield potential
6-7, reduced yield potential possible unless adequate irrigation is quickly initiated or rainfall obtained
4-5 or less, cutout probable unless substantial rainfall obtained or irrigation applied

Boman
OSU Southwest Research and Extension Center, Altus

COTMAN Program and Utility

The Cotton Incorporated funded COTMAN program defines cutout as nodes above white flower (or NAWF) = 5. To realistically meet the overall COTMAN criteria and to be able to use the advantages of this system, "hard cutout" or "blooming out the top" (terminal) of the plant must occur soon after NAWF=5 is encountered. In some situations, if good to excellent soil moisture levels, healthy plant conditions, and adequate heat are obtained, the progression of the mainstem node with a first position white flower can be matched by terminal growth. I refer to this as "hovering" at a certain NAWF. Others call this "suspended cutout" when it occurs around NAWF=5.

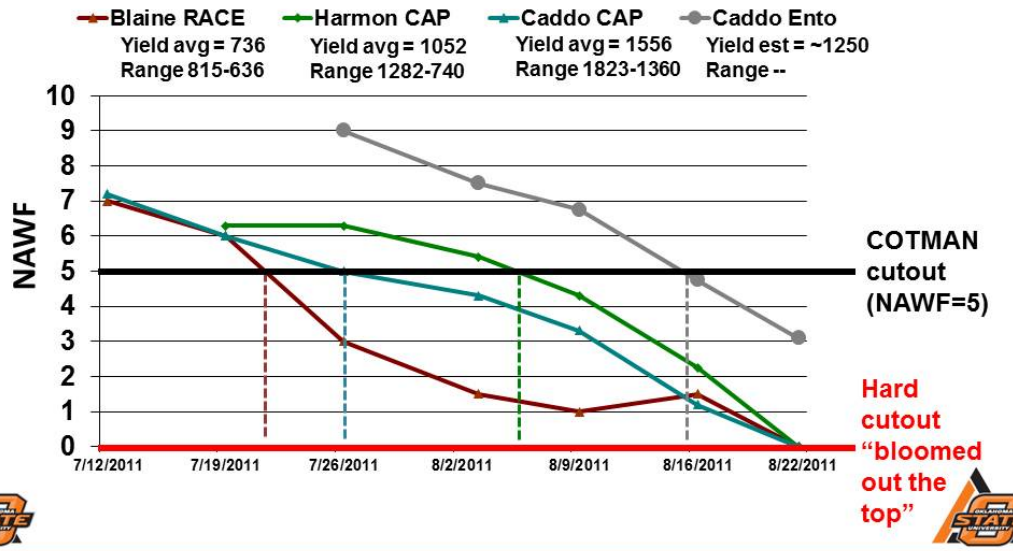
We generally cannot predict what will occur in September and October of any particular growing season, but we can learn from what has occurred based on past observations. Several years ago, researchers at the University of Arkansas were provided historical long-term temperature data for Altus. COTMAN assumes that 850 heat units past bloom is the point at which a bloom can make a "normal" boll. This is based on numerous observations that fruit set above the mainstem node where NAWF=5 occurs seldom contributes a large percentage of final yield. Based on research conducted in the Texas High Plains, this is not necessarily always true. However, this concept is still useful and understanding this can be beneficial in improving crop management and potentially risk management. In other words, understanding these fundamental concepts can improve decisions NOT to expend resources in pursuit of late-set fruit that is generally high risk.

Based on the University of Arkansas calculations, the COTMAN 50% probability date for Altus is August 20th for the 1948-2007 time period. This indicates that in 50% of the years of record (in this instance 1948-2007), 850 heat units were obtained before the end of the growing season for a bloom set on August 20th. According to COTMAN criteria, this should result in a "normal" boll. The 85% probability date for Altus is August 13th. This means that in 85% of the period of record (again, 1948-2007) 850 heat units could be obtained after that date and before the end of the growing season. Other factors besides heat unit accumulation can negatively affect cotton maturity in September and October. Those can include cloudy conditions (reduced solar radiation), *Verticillium* wilt infection, and very likely excessive nitrogen fertility. Also, there has been plenty of discussion surrounding the heat unit definition, and some believe that the 60 degree developmental threshold may be somewhat high.

Based on research conducted in other states, tracking the date when NAWF=5 followed by hard cutout occurs can be useful for center pivot or sub-surface drip irrigation termination decisions. Generally speaking, producers should use 400-600 heat units past cutout to key in on this management decision. For extremely high yielding crops, this criterion is still not well understood based on research trials conducted in the Texas High Plains. COTMAN project results indicate that ~500 heat units past NAWF=5 can be a key observation point. Reliance upon this criterion depends upon site-specific conditions such as profile moisture, crop yield potential, and weather conditions.

Harvest aid application decisions can also be helped by knowing the cutout date. The 850 heat units past cutout criterion can be used along with other methods such as the sharp knife test and percent open bolls to help time harvest aid applications. For an example of what occurred in several IPM Program fields in 2011, see Figure 3 below.

Figure 3. Irrigated Field NAWF Surveys - 2011



Producer NAWF Tracking Form

Field ID: _____