Cotton Comments

OSU Southwest Oklahoma Research and Extension Center
Altus, OK

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Crop Update

We continue to obtain timely rainfall events to keep much of the Oklahoma cotton crop moving in the right direction. The Mesonet 10-day precipitation map indicates about 2.33 inches of rainfall has accumulated at Hollis, 3.61 at Altus, 2.17 at Tipton, but only 1.45 at Grandfield. Other areas further to the north have acquired around 2 inches. This is good news from the dryland cotton perspective and has allowed many producers to get a crop established. The bad news is that in spite of many days of somewhat seasonal temperatures, every now and then we get hit with a "haymaker day" such as June 10, where temperatures reached 109 at Altus. A considerable amount of early-to mid-May planted cotton is now beginning to square. Cotton in Caddo County that has been strip tilled and planted into terminated cover looks excellent, apart from some high wind events that occurred to slightly "rag up" an otherwise picturesque crop.

Plant Growth Regulators

With the excellent cotton in some areas where adequate moisture has been encountered, it will be important to be on point concerning the use of plant growth regulators. Mepiquat-based (such as Pix Plus, Mepex, Mepichlor, Mepiquat Chloride, Mepex GinOut, Stance, and others) plant growth regulators (PGRs) have been around for many years. Companies are constantly enhancing formulations, but the main active ingredient in nearly all of these products is mepiquat chloride.

Mepiquat chloride (MC) reduces production of gibberellic acid in plant cells that in turn reduces cell expansion, ultimately resulting in shorter internode length. MC will not help the plants compensate for earlier weather or disease damage. It does not increase growth rate, it essentially reduces plant size by reducing cellular expansion. It may, under good growing conditions, increase fruit retention, control growth and promote earliness. **MC should not be applied if crop is under any stresses including moisture; weather; severe spider mite, insect, or nematode damage; disease stress; herbicide injury including 2,4-D damage due to drift or from tank contamination; or fertility stress.**

Results from replicated testing indicates that a 5 to 20% reduction in plant height (compared to the control) can be obtained from 16 oz of 4.2% a.i. MC material applied in up to 4 sequential 4-oz/acre applications starting at match head square (MHS) and ending at early bloom. It is generally possible to reduce about one node from the growth of the main stem, which can result in about 3-5 days earlier cutout. **Low rate multiple applications beginning at MHS have generally provided more growth control than later higher rate applications made at first bloom or later.** Results have shown that statistically significant increases in yields are generally not obtained, but excellent growth control is provided. Many times we don't see a lot of differences in performance of these products when comes to growth control.

Available Products

Mepiquat based products have been around for many years. Several PGRs based on the same active ingredient are now available. Refer to the product labels or contact Extension personnel or company representatives or to ensure you understand the correct use of these products.

Mepex, Mepichlor, Mepiquat Chloride and other generics
4.2% active ingredient (a.i.)/gallon or 0.35 lb/gallon a.i.

Mepex Gin Out
4.2% a.i./gallon or 0.35 lb/gallon a.i. with 0.0025% Kinetin (a cytokinin).
Cytokinins are plant hormones that promote cell division and growth and delay the senescence of leaves. This product has use guidelines similar to other MC materials.

Pentia
Has a different molecular structure than MC.
9.6% a.i./gallon or 0.82 lb/gallon a.i. Typically Pentia has similar use rates when compared to 4.2% MC products.

Stance
Bayer CropScience's Stance product is an MC based PGR. It is a 4 to 1 ratio of MC and cyclanilide (0.736 lbs/gallon MC plus 0.184 lbs/gallon cyclanilide). Cyclanilide is an auxin synthesis and transport inhibitor. Auxins are generally referred to as compounds which have the capacity to induce cell elongation. The inhibition of auxins could reduce cell elongation and inhibit growth. **Producers should be aware that the mepiquat chloride concentration in Stance is about twice as high as most of the other materials we have become accustomed to applying. THEREFORE THERE IS A CORRESPONDING REDUCED RATE.**

What to Expect From Application

Consistent yield increases have not been observed from any of the MC materials we have investigated. A good boll load will normally help control plant growth. Fields with poor early-season fruit retention, excellent soil moisture, and high nitrogen fertility status may be candidates for poor vegetative/fruiting balance and should be watched carefully. Growers who have planted varieties with vigorous growth potential and have fields with excellent growing conditions may need to consider PGR application. For brush roll header stripper harvest, 28-32 inch tall plants optimize stripper-harvesting efficiency. If possible, target a maximum plant size of about 32 inches for varieties under high input irrigation (sub-surface drip or high capacity pivots). If plants get larger than 36 inches, harvest efficiency and productivity drop significantly. For spindle picker harvesters, larger plant size for high yielding cotton is not as much of a harvesting consideration. **Pickers can handle higher yielding, taller plants with much greater ease than stripper harvesters, especially when the stalks are still alive (or "green"). However, if weather constraints at harvest time delay harvesting after freezing weather, the large brittle plants can still result in picker harvesting difficulties.**

Application Rates and Production Environment

Determination of application rates is generally more "art" than "science" for these products. Applications should begin when 50% of the plants have one or more matchhead squares (see specific product label for more information). It is best to get a handle on excessive growth potential early if conditions favor excessive growth for an extended period of time. Herein lies an important dilemma: It is unknown at that time as to how weather will affect the crop in July and on into early August. Will we get 100+ degree temperatures, southwest winds at 30 mph at 10% relative humidity? If so, those conditions will limit plant growth in many fields with low irrigation capacity. Watch high growth potential varieties and fruit retention. If a high growth potential variety has been planted and has encountered low fruit retention, then MC rate should be increased, especially under high water, fertility, and good growth conditions. One should target

applications to fields with high growth potential. Some newer varieties may need aggressive management under high irrigation capacity and/or if heavy rainfall conditions are encountered. The situation that has arisen due to the release and availability of new genetics is challenging. Visit with your seed company representative to determine which new varieties should be watched closely for MC needs under field-specific conditions. Use MC to limit plant size. Sequential applications can be adjusted to meet subsequent crop conditions and growth potential. For more information concerning PGR use, use the link below.

Click here for Cotton Growth Regulators – Producer Handout

Plant Monitoring

A considerable amount of cotton is beginning to square and normally it takes about 21 days for a pinhead square to develop into a bloom. Retaining early fruit is an important component of managing for earliness. During the pre-bloom period, we like to see at least 75-85% square retention. Hopefully well maintained fields will retain nearly 100% of pre-bloom squares. 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). It will be important to check fields for nodes above white flower (NAWF) at early bloom to assess the yield potential and vigor at that time. 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 at least 85% square retention going into the first week of bloom. Plant mapping can be used to help monitor the progress of the crop and 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. 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 more 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 hard cutout date is known.**

Figure 1. Early bloom plant mapping using first position fruiting sites.

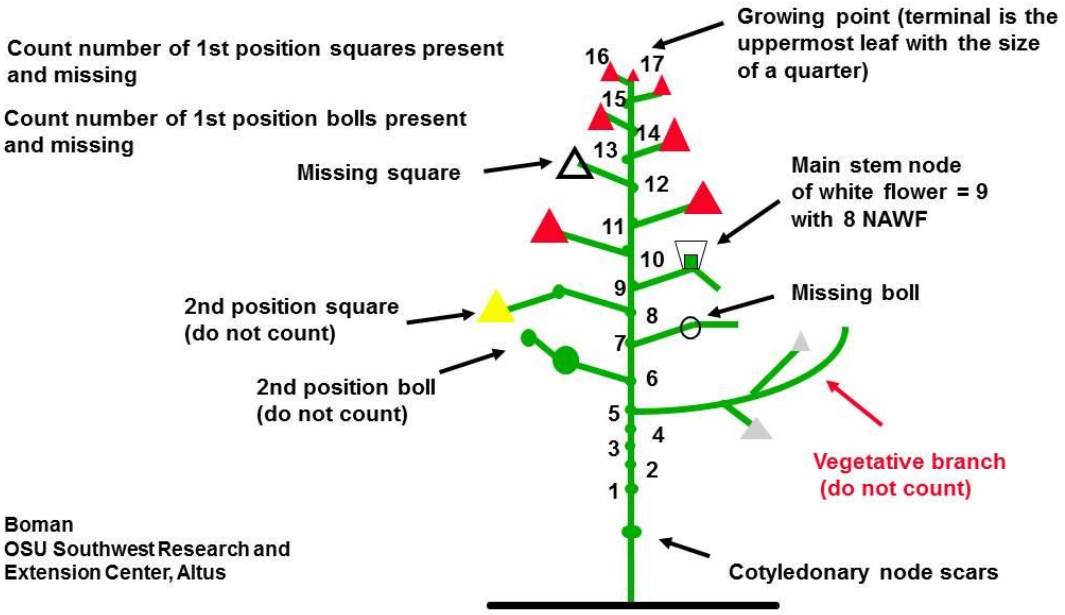

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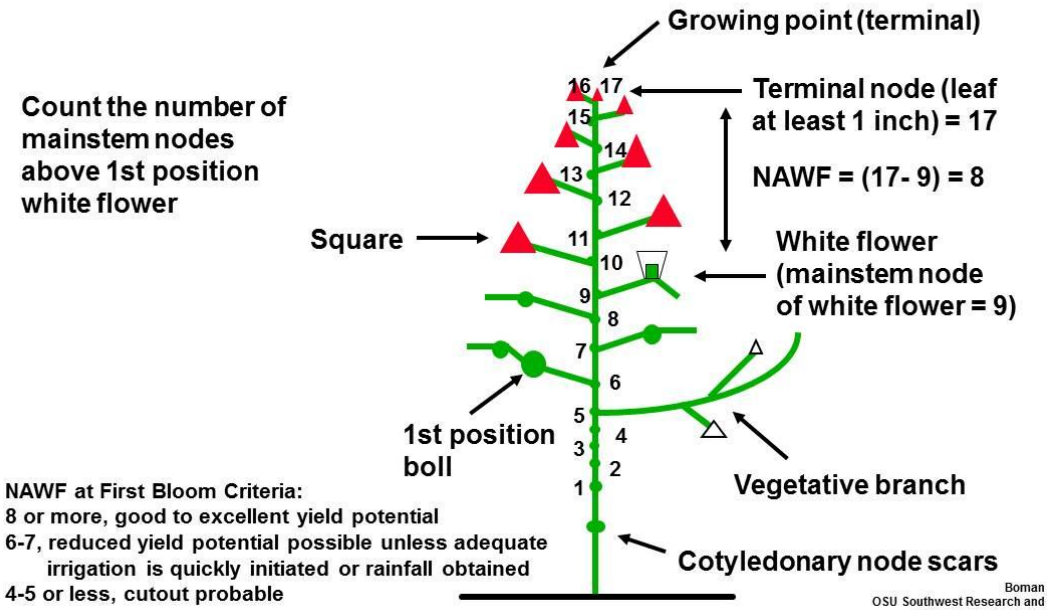
Figure 2. Nodes above white flower at early to mid-bloom.



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

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Nitrogen Fertility

A one-bale per acre cotton crop will remove about 45 lb of actual N per acre, but due to inefficiencies in uptake and in the soil, about 50 lb N/acre are actually required. Recently, with the assistance of our on-campus colleagues, the OSU recommendations have been reduced from 60 lb N per bale of yield goal to to 50 lb N per bale. This was noted in an earlier newsletter this year. For a copy of the OSU Fact Sheet where this is discussed and justified, use the link below.

Click here for Cotton Yield Goal – Nitrogen Rate Recommendation PSS2158

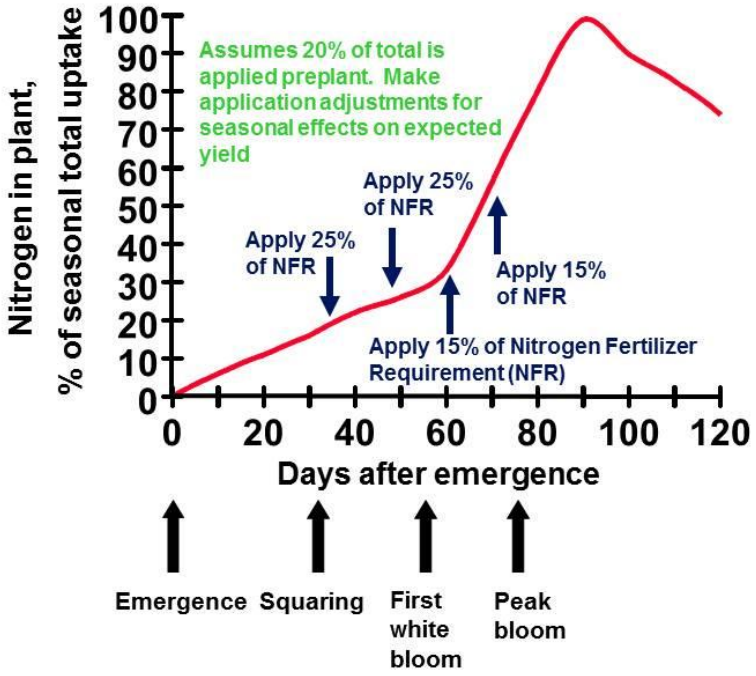
It is important to not over fertilize with N. This is due to the fact that it makes late cotton more difficult to manage on the back side of the season and may complicate earliness and harvest aid performance. Some late-season insect problems, such as aphids, can be aggravated by high N status plants, and incidence of Verticillium wilt may be increased. There is good evidence that excessive N in general can also result in delayed maturity with corresponding decreases in maturity of the fiber (micronaire). I seriously doubt that any high capacity irrigated field really needs more than about 175 total lbs N/acre for yields up to four bales/acre. That amount would also include any preplant residual nitrate-N to the 24 inch depth as well as from irrigation water. If irrigation water contains 10 ppm nitrate-N and 12 acre-inches are applied, this will provide 27 lbs N/acre to the crop during irrigation. Producers with alluvial aquifers such as the high nitrate Tillman Terrace should have their irrigation water tested and adjust fertilizer N rates accordingly. For a handout on the amount of N supplied by various irrigation amounts and water nitrate-N concentrations, use the following link.

Click here for Nitrogen Amount in Irrigation Water

The amount of organic residue of the previous crop is also important and will potentially adversely affect nitrogen availability. In no-till fields with a large amount of crop residue the N rate should be increased by 20 to 30 lbs of N per acre when fertilizer is surface applied. This will compensate for the N tied up in the residue due to immobilization. For those producers who have dryland cotton with optimism for good yield potential, fertilization should be performed soon. One way to accomplish this is to sidedress urea-ammonium nitrate (UAN - fluid 32-0-0) fertilizers as early as practical (but prior to bloom), and take care to minimize root pruning during knife application about 4-5 inches deep about 8 inches or so off to the side of the row. Applications could also be made in the furrow, but it is important to recognize that crop rooting will have to extend quite a ways toward the furrow for uptake. If 32-0-0 is dribbled in the furrow, make sure to keep the fertilizer off the young plants, as fertilizer burn damage can be expected. Solid urea (46-0-0) can be broadcast applied. Rainfall will be required to provide activation of any fertilizer application. If no rainfall occurs, no fertilizer uptake can be expected. Fertigation of 32-0-0 is a practical application method especially in center pivot and subsurface drip irrigated fields. This results in lower application cost. If a pivot rigged with spray nozzles has marginal water quality and extremely hot, dry conditions are encountered, then some salt burn may be encountered on foliage. To obtain maximum

utilization of applied N, the total amount of N should probably be injected between first square and peak bloom. This type of N management fertigation scenario has been used and validated for several years at the Texas A&M System research facilities at Lamesa AG-CARES and Halfway Helms Farm using alternate furrow LEPA irrigation. Figure 3 shows a typical N uptake curve for cotton and corresponding crop development stages. Suggestions for applications of approximate percentages of total N are also shown.

Figure 3. N fertigation strategy.



A knifing rig fitted with coulters would be a good way to accomplish N fertilization in fields with center pivots if fertigation injectors and tanks are not available. Apply the fertilizer to the side of the bed for fields with center pivots. For producers who are not injecting N fertilizer into their sub-surface drip irrigation systems, place the coulters to the side of the bed in the furrow with the drip tape, being extremely careful not to damage the tape. Since most drip tape has been placed 10-14 inches or so deep, placement of N fertilizer 4-5 inches deep should suffice.

Many producers may be tempted to cut fertilizer use by a certain percent or to use a gallon per acre of this or gallon per acre of that to replace a sound fertilizer program. Benefits from low rates of foliar fertilizers are questionable unless there is indeed a micronutrient deficiency and the product applied contains the deficient element. The cotton plant has a physiological need for nutrients. These nutrients have to come from somewhere if good to excellent yields are to be expected. If one does the math concerning what some of the "gallon per acre" products can supply, then it is fairly easy to determine that these products will not meet the needs of the crop. And they could be very expensive when comparing the "program price" with how many pounds of N the

same money could buy using conventional fertilizers. If good to excellent yields are obtained after cutting back on a recommended fertilizer management program, then the producer is actually "writing checks on the checking account" in the soil. If no deposits are made over time, then a shortage of fertility will occur and yields will be adversely affected.

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