Cotton Comments

OSU Southwest Oklahoma Research and Extension Center
Altus, OK

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Crop Update

The Great Drought of 2011 continues its disastrous effects on agriculture in southwestern Oklahoma. The Altus Mesonet station weather results for May and June paint a terrible picture. Some missing data points were encountered so we substituted data for the Hollis station. For the month of May, the data indicate that the Altus daily maximum temperature was 89 degrees, the average maximum wind speed was 35 mph, and the average daily wind speed was 15 mph. The 1971-2000 "normal" average high temperature for May is 83 degrees. Moving into the first 27 days of June, the data indicate that the Altus daily maximum temperature was 105 degrees, the average maximum wind speed was 39 mph, and the average daily wind speed was 17 mph. The "normal" average temperature for the first 27 days of June is about 92 degrees. Therefore, May was somewhat hotter than normal, and June resulted in excruciating heat for the first 27 days. Thus far in 2011, we have already encountered 34 days with at least 100 degrees on the thermometer, 16 days of 105 or greater, and 4 days in June with at least 110 degrees. Accumulated rainfall at the Altus Mesonet for June was only 0.12 inches. Forecasts indicate that we are going to continue with the triple-digit temperatures, but winds may decrease compared to what we experienced earlier in the month.

Click here for Altus Mesonet Wind and Temperature Graph for June.

Monthly summaries for April 1–June 22 for thirteen Mesonet stations in southwestern Oklahoma are available. To access these Click here.

Furrow irrigated fields in the Lugert-Altus Irrigation District have struggled from the beginning. The Altus Irrigation District is not accepting requests for irrigation at this time, and it is expected that the current run will be complete soon. There will be a possibility of getting the remainder of allocated water after July 4th if requests total 96 CFS. It has been a tough year for southwestern Oklahoma. Crop insurance adjusters have begun assessing many of these fields which have poor stands. Dryland cotton, if emerged is going to need rain soon, while the non-emerged is headed for insurance adjustment after July 5th. In addition to the drought and wind

misery, a storm event on the evening of June 16-17 resulted in damage or loss of several thousand acres in a band running from northwest of Altus to the southeast. This storm crossed Highway 62 and affected fields several miles to the south. Some of this affected area already had poor stands and many of these fields have been released by insurance adjusters. Some Tillman County cotton fields were also affected during this same time frame. It is my understanding that 7 center pivots were overturned by high winds and several fields experienced damage.

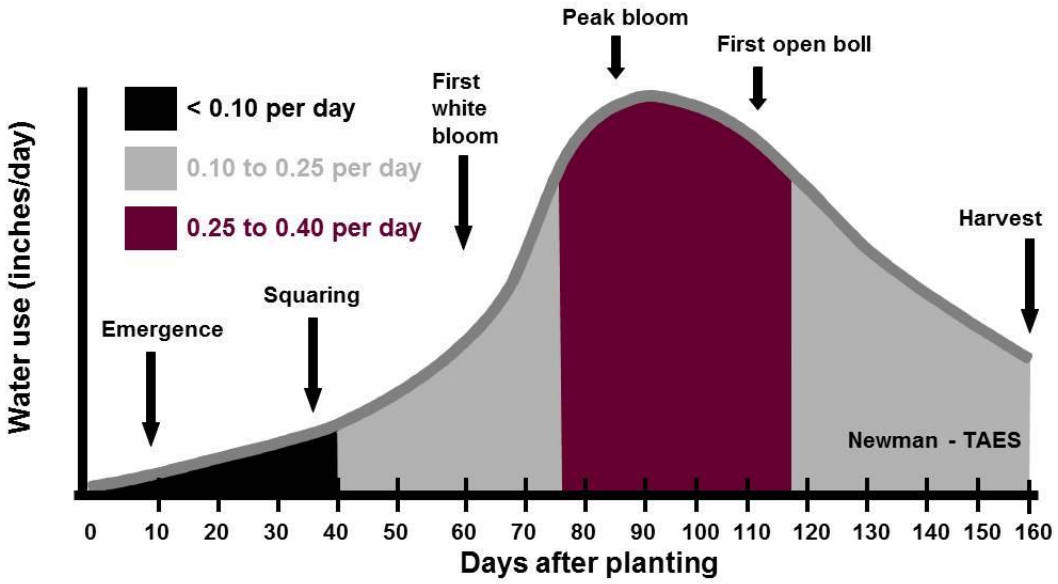
Fields with high capacity center pivots, furrow, or sub-surface drip irrigation have continued to make excellent progress in spite of the battering from high winds. Cotton in the Hollis area has managed to continue on track, and some has actually reached the bloom stage.

Crop Water Use Patterns

Seasonal water use for adequately watered cotton is probably about 24 inches in southwestern Oklahoma. Figure 1 illustrates the typical seasonal water use pattern for cotton produced in the Texas High Plains region, and this should be reasonably similar in our area.

From planting to square initiation (a period of about 40 days) evapotranspiration (ET) is generally less than 0.1 inches per day. Plant water requirements are low due to the limited leaf area. Most of the water used is extracted from the top foot of soil. The bulk of the water loss during this period is due to evaporation.

Figure 1. Rate of water use in relation to cotton development.



Water use (ET) increases to 0.1 to 0.3 inches per day during the square to early bloom stage (40 to 75 days after planting). At this stage leaf canopy and roots develop rapidly, and transpiration exceeds evaporation. Moisture extraction occurs mainly from the top 2 feet of soil although the taproot and some feeder roots extend to deeper depths if unimpeded.

From early bloom to the opening of the first bolls (usually 75 to 120 days after planting), ET values of 0.25 to 0.35 inches per day are common. ET values may exceed 0.4 inch per day during the peak bloom period. At this stage, plants have attained their maximum leaf canopies and root densities. Moisture may be extracted from deeper in the entire soil profile if available.

Following the opening of the first bolls until crop termination, ET generally declines from about 0.25 inches per day to as little as 0.1 inch per day. Actual water use will vary with the condition of the plant, soil moisture status and general growing conditions. If regrowth occurs during periods of ample moisture and warm temperatures, ET levels can increase dramatically, thereby rapidly depleting soil moisture reserves which otherwise could be utilized by subsequent crops.

Stress Sensitive Periods

Fruit production, retention and shedding are closely related to availability of soil moisture. Production is optimized with an available moisture status that allows uninterrupted development of fruiting positions while avoiding excessive vegetative development on the one hand, or fruit shedding on the other. In the past, it has been a common

practice to allow cotton to "stress" before applying the first irrigation in order to slow vegetative growth, force root system expansion and enhance early fruit development. However, research has shown that even moderate stress prior to the first irrigation may impede the development of fruiting sites and can ultimately reduce yields.

High moisture stress during the peak flowering period can have a pronounced negative effect on yield. However, stress either early or late in the blooming period also result in significant yield reductions. Severe moisture stress should be avoided throughout the crop development period. Early irrigations may be justified to maintain adequate but not excessive vegetative growth. Late season water stress may be acceptable or even desirable because it hastens cut-out and results in shedding of fruit that would not normally mature and potentially contribute to low micronaire if a cooler than normal fall is encountered.

Irrigation Issues

Most producers with groundwater resources (center pivot, furrow or drip) have been watering since planting. Total pan evaporation at the Altus Center was over 17 inches from June 1st through 27th. On some individual days with extremely high winds and temperatures this approached one inch. Crop evapotranspiration (combined losses of water due to evaporation and crop transpiration) models can generally do a good job of predicting crop water use. However, with the extended extreme environment resulting in huge evaporative demand, the evapotranspiration (ET) estimates are falling short, as the amount of soil evaporation immediately following an irrigation event is very likely underestimated. The Mesonet provides a good tool that can be useful to estimate crop ET. It can be found on the AgWeather page.

First go to:

Agweather: Oklahoma Mesonet weather for agriculture

Then select Crop on the top menu. Then select Cotton on the left side menu. Another menu will pop up on the left side, then select Irrigation Planner. This will take you to a page where you can select the Mesonet site nearest your location. You can also input the planting date for the field. Then click on Get Cotton Data. A page with a table will be generated. This table will provide a quick estimate of daily crop ET, accumulated ET, rainfall, accumulated rainfall, and the water balance. The modeled crop ET for each day is listed in one column, then Accumulated Evaportranspiration total in inches will be listed in another.

For most producers with irrigation, a decision on “when to initiate irrigation” will not have to be made this year; we have already been irrigating for stand establishment and to meet evaporative demand of this difficult environment. However, for

those fields with adequate irrigation capacity and efficient delivery systems (pivots, sub-surface drip), the Irrigation Planner can be of great value to determine how much water to apply, especially if the high winds cease and the crop gets some size. It should be noted that the pumping capacity and efficiency of a particular system needs to be considered.

Irrigation systems vary in terms of application efficiency and can be negatively impacted by adverse environmental conditions. High temperatures and high winds can reduce application efficiencies for all systems with the exception of well managed sub-surface drip. Center pivot spray irrigation with short drops under high wind conditions will have lower efficiency than a system with longer drops which deliver water closer to the crop canopy.

When determining how much irrigation water to apply, several factors must be considered. One is irrigation capacity. Higher capacity irrigation wells allow producers to apply more water in less time. Some “catch up” is possible if the system “gets behind.” With lower irrigation capacity, it will be necessary to keep the system applying water to meet crop requirement. This requires knowledge of the irrigation system capacity, nozzle package and groundspeed travel of the pivot. These are vitally important in order to fine tune irrigation application rates to meet crop ET demand without over or under applying water. Crop ET demand (which can be reasonably estimated by the Mesonet site described above) will increase substantially once the squaring stage is reached and will continue through late boll set then will diminish once open bolls appear. Another factor is irrigation system type. Application efficiency information provided by Jim Bordovsky, Research Engineer with Texas AgriLife Research at Halfway indicates that flood/furrow typically ranges from 40-80%, center pivot sprinkler/spray ranges from 65-90%, center pivot low energy precision application (LEPA) ranges from 85-95%, and sub-surface drip ranges from 85-99%. An important consideration is water quality. High salinity water can affect crop performance, if it is the sole source of water input for the crop. This can vary with seasonal rainfall, therefore it is difficult to determine the potential effects.

If using a spray system make sure to use nozzle applicators that generate large droplet sizes. This should reduce evaporation losses during application. Apply as high a quantity as possible without generating unacceptable runoff. Apply at least 1 inch per application in order to get even a "minimum" amount of water into the soil. This amount can be applied using a system with slightly less than 3 gpm per acre. Temperatures of 100 degrees, high winds, and low relative humidity can result in ET values of up to 0.5 inch/day. For a table that provides good information concerning irrigation capacity and delivery click here.

Cotton growth and development indicates that a mainstem node

should develop on the plant every 3 days and with excellent conditions (good plant health, water) perhaps every 2.7 days. The critical issue here is how well rooted the plants are and whether roots are into good soil moisture. With the high winds recently experienced, moisture losses from irrigation amounts of less than one inch during that time did not allow much water to accumulate in the soil profile.

Plant Growth Regulators

Questions concerning mepiquat-based (Pix, Pix Plus, Mepex, Mepichlor, Mepiquat Chloride, Mepex GinOut, Stance, and others) plant growth regulators (PGRs) are being asked in areas that have had adequate rainfall or excellent irrigation capacity.

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 by increasing growth rate. 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 likely possible to "shave" about 1 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. 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.**

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. With the significant amount of drought stress we have encountered up to this point, I submit that few fields would meet this criterion. 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 picker varieties under high input irrigation (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.**

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.

Plant Monitoring

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 2). 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 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)

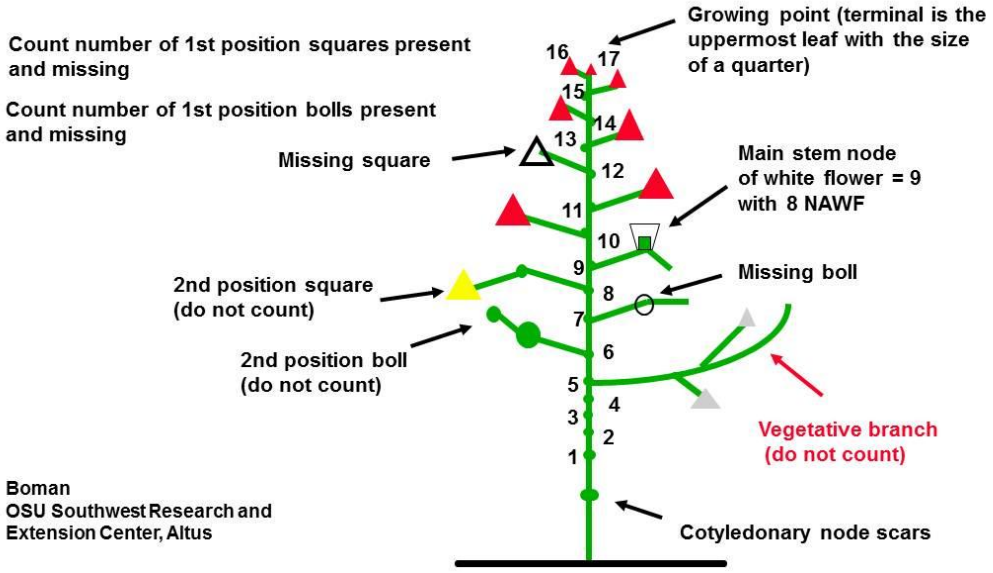
Square retention goal is 75 - 85% 14 days after early bloom

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 3.

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 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 2. Early bloom plant mapping using first position fruiting sites.



Boman
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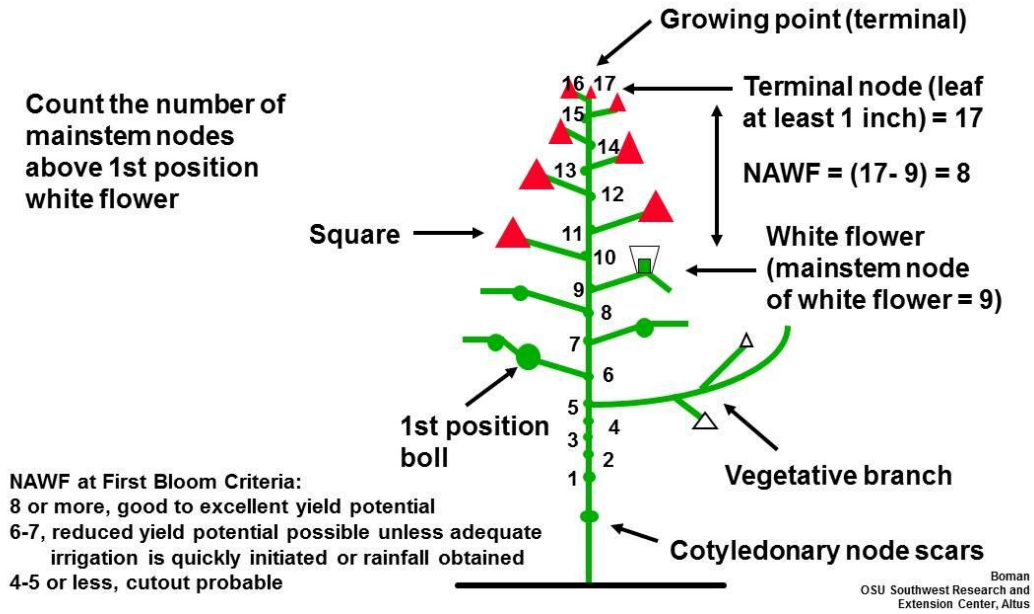
Figure 3. Nodes above white flower at early to mid-bloom.



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 50-60 lb N/acre are actually required. Our recommendations are to apply 50 lb N per bale of yield goal. It is important to not over fertilize with N if reduced yield potential is anticipated. 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 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 fields really needs more than about 150 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 lb 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. Any preplant applied N should be subtracted from the overall N requirement for the designated yield goal for the field.**

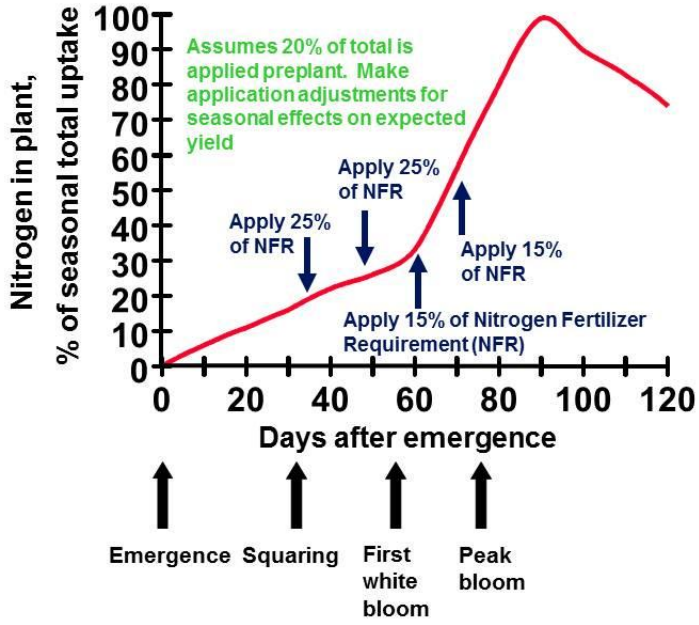
The amount of organic residue of the previous crop is also important and will potentially adversely affect nitrogen availability. If the previous crop was grain sorghum or if cotton was planted into terminated small grains cover then based on Texas research, producers should consider increasing nitrogen fertilizer rates by around 20-30 pounds per acre in order to have adequate nitrogen for the cotton crop due to microbial immobilization of crop residue.

Most of the dryland is non-existent or in poor condition. This would indicate that yield potential is severely reduced. For those producers who have dryland cotton with good yield potential, fertilization should be performed immediately. Apply 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 off to the side of the row about 8 inches or so or in the furrow. 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. Urea (46-0-0) can be broadcast applied. Rainfall will be required to provide activation. 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 the last several years at the Texas A&M System research facilities at Lamesa AG-CARES and Halfway Helms Farm using alternate furrow LEPA irrigation. Figure 4 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 4. 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. 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.

Insect Update

After conversations with various consultants and conducting surveys of fields in seven counties this week, the insect outlook is as follows:

Thrips: Are no longer a major concern due to cotton development moving past the point where economic damage can occur. The crop is entering squaring stage in nearly all areas.

Cotton fleahopper: Although light to non-existent populations are observed, a small population was found in the Harmon county area. Several fields have already been sprayed for fleahoppers triggered by growth stage rather than population number. Every field needs to be scouted and evaluated separately. (Please refer to the June 17 newsletter for more information).

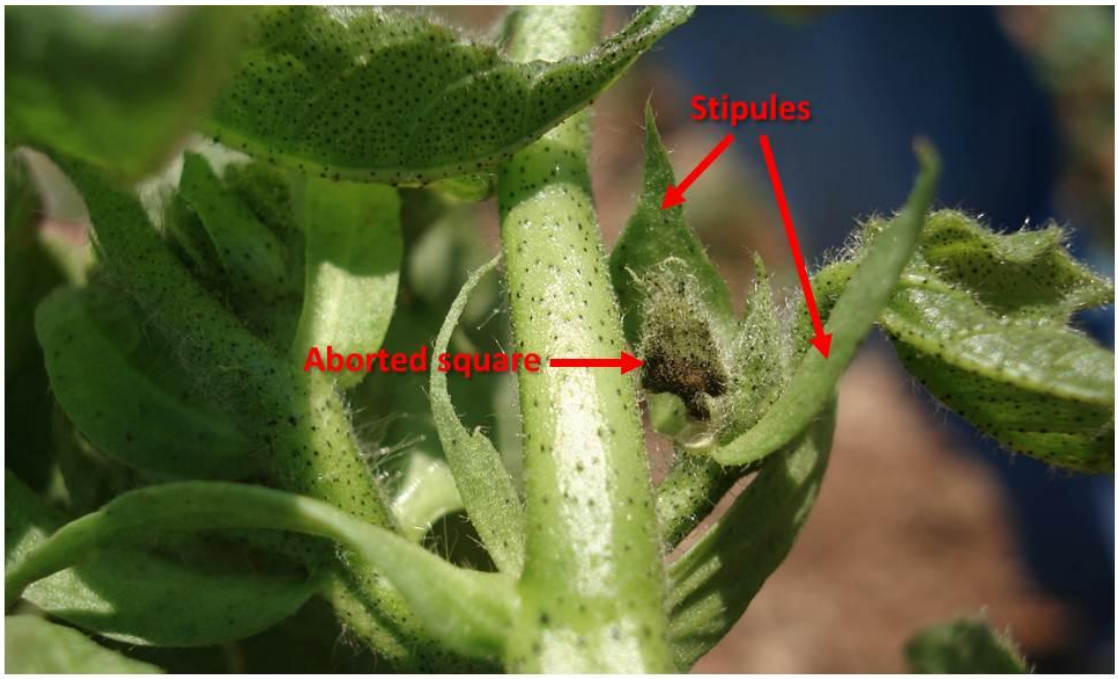


Photo courtesy of Shane Osborne

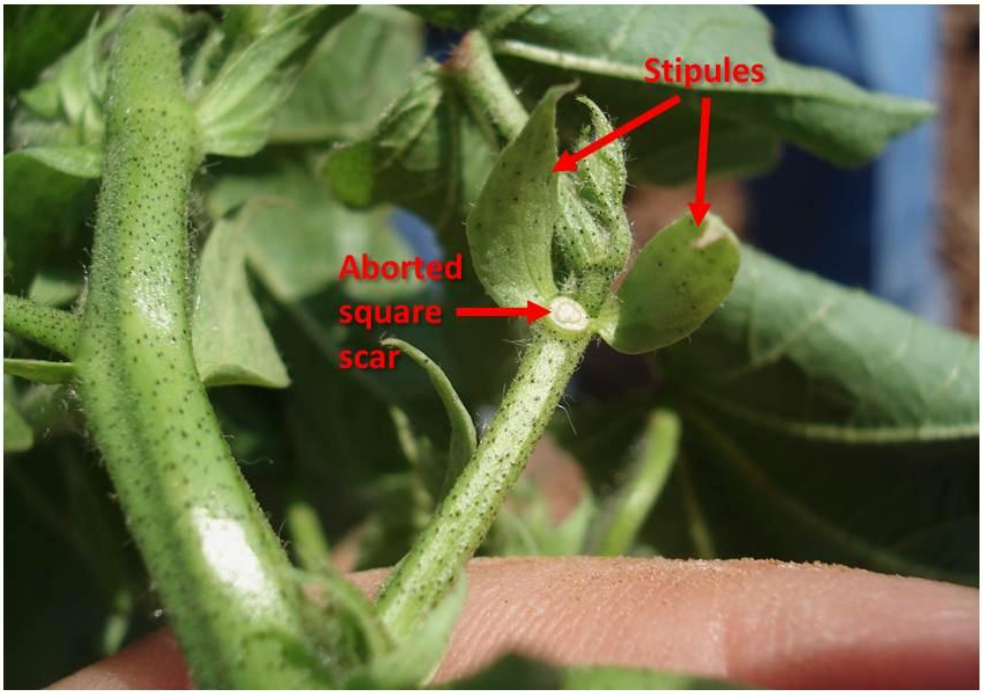


Photo courtesy of Shane Osborne

Grasshoppers: Populations have been found in two counties where control measures may be considered (Kiowa and Tillman counties). Texas AgriLife Extension personnel suggest Bidrin at 4 oz/acre or Lorsban at 0.5-1.0 pt/acre. Both products have short residual. More persistent products are available (pyrethroids), but the danger of flaring secondary pests should be a consideration. Dimilin may also be used when immature grasshoppers are targeted. Timing is critical for all treatments, as immature grasshoppers are much easier to control than mature ones. Take into consideration the habitat around the field. You may spray the field, but with pasture bordering it will likely not take long to re-infest the cotton.

No other pest activity has been observed. Please contact your local county extension educator or this office for any questions.

Editors

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SEND US A COMMENT BY EMAIL

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