Cotton Comments

OSU Southwest Oklahoma Research and Extension Center
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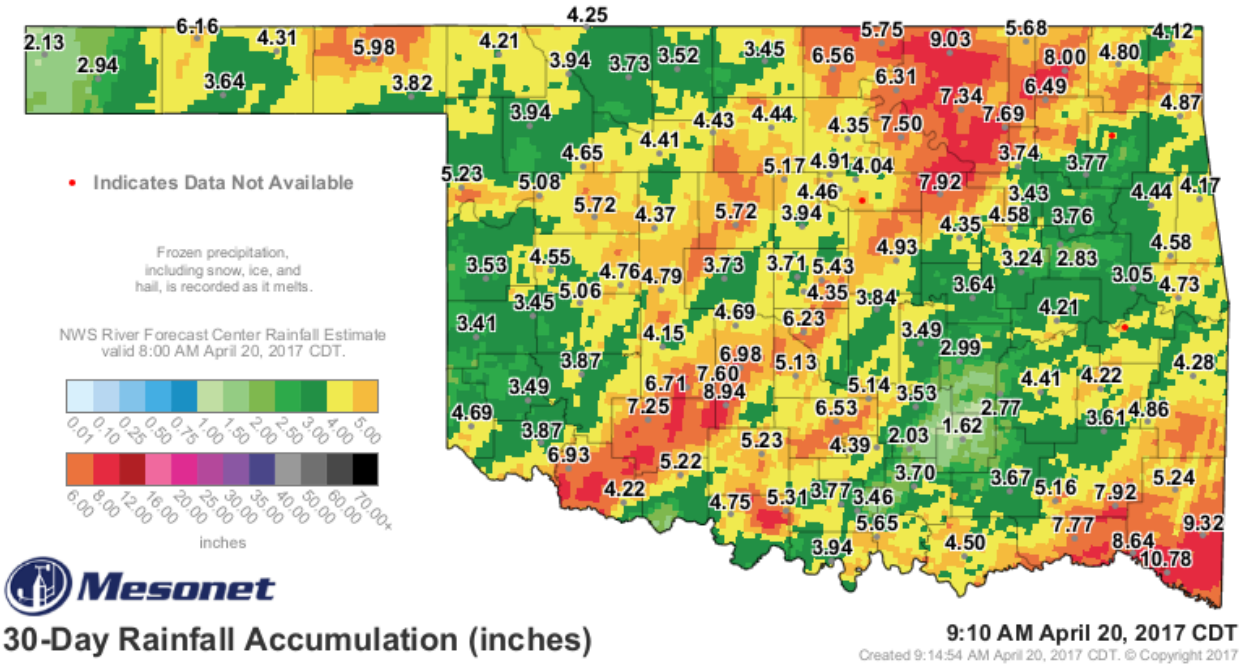
Current Situation

Recent rainfall has resulted in good to excellent preplant moisture conditions in most of the cotton area of Oklahoma, which is fantastic with respect to the calendar date. This indicates that subsoil moisture is favorable for 2017 crop prospects, especially for getting a good dryland crop going. The Mesonet graphic below shows the total rainfall for the state for the past 30 days. Other than preplant burndown herbicide applications and perhaps some fertilizer management issues, producers should keep focused on good early season management, which includes planting strategy, seeding rate, etc.



Successful Planting Strategy

Next to variety selection, most likely the next very important decision a producer makes is when to plant. The single most important issue to recognize is that cotton seedlings can be damaged by cool, wet soils. Depending upon the region of the U.S., many

producers typically begin planting based the calendar date. However, the long-term optimum planting window for most states is determined based on field trials and average soil temperatures. Although soil temperatures can sometimes be high outside of this window, many times they can drop, especially if precipitation is obtained and a cold front pushes through the region.

The optimum temperature for cotton germination is near 85 degrees F°. Cooler temperatures can lead to poor stands or stand failures if the correct conditions align. Under cool temperatures the physiological processes involved in germination can be very slow which can in turn result in slow growth and perhaps increased susceptibility to various seedling disease pathogens.

It is suggested that planting be delayed until 1) mid-morning temperatures in the rooting zone exceed 60 degrees F° at a 6-inch planting depth, and 68 degrees F° at the 2-inch depth; 2) the five-day forecast indicates dry conditions and at least 25 DD60 heat units; and 3) the five-day forecast projects low temperatures above 50 degrees F°.

The standard calculation for cotton DD60 heat units is:

((maximum air temperature, F° + minimum air temperature, F°) / 2) - 60 = DD60 heat units

Essentially, the average air temperature for the day is determined and the 60 degree F° developmental threshold for cotton is subtracted. The DD60s for each day are then totaled. If one has faith in the local forecast, then the projected high and low for the following several days can be used to calculate DD60s.

Table 1. The outlook for planting for various five-day forecast predictive DD60 accumulations.

Predictive DD60 Accumulation for Five Days Following Planting	Outlook for Planting
<10	Very poor
11-15	Poor
16-25	Marginal
26-50	Good
>51	Very good

Source: To download Cotton Physiology Today, Planting and Replanting Decisions, April, 2007 click here.

If it is recognized that equipment constraints and large acreages generally require producers to plant during less than optimum conditions, they should realize that seed quality and seeding rate become very important. The seeding rate can be adjusted on the planter. However, with transgenic seed prices and technology fees being expensive, increasing the seeding rate is not a palatable option for most producers. Therefore, seed quality becomes very important.

The Texas Cool Germination test was developed to specifically test cotton seed under cool soil temperature conditions. This germination data is NOT required on the state seed tag, but many seed companies will provide this information if asked. The state seed tag reports Standard Germination data and it is performed in a different manner. It is usually guaranteed on the seed tag at a minimum of 80%. Texas Cool Test data are obtained from a test conducted at 64 degrees Fº with seedlings counted after 7 days. Higher Cool Test data indicate higher vigor under temperature stressed conditions. If the Cool Test data for a specific lot of cotton seed is known, then potentially more vigorous seed lots can be identified. This can be used to determine the planting sequence and possible planting date. Producers should begin planting with higher vigor seed under cooler temperatures, and finish up with lower vigor seed under warmer temperatures.

Planting conditions for rapid germination and emergence include:

1) high quality seed with good to excellent Cool Germination Test data (>60%)
2) a favorable 5-day forecast
3) minimum air temperature of at least 50 degrees Fº, and maximum air temperature of at least 80 degrees
4) plant into a firm, moist seedbed about 1 inch deep but not more than 2 inches deep

Imbibitional Chilling Injury

Cool temperatures can adversely affect cotton seedlings. If excessively cool temperatures are encountered during the seed hydration phase, imbibitional chilling injury may occur. Imbibitional chilling injury occurs when cotton seed is subjected to cold conditions during the first 2-3 days after planting, or during the period of time when the seed is imbibing moisture from the surrounding soil. If seeds imbibe cool water too rapidly, embryo cells may be injured or killed due to membrane disruption. Cotton seed contains lipids which must be converted to energy during germination. The cell membranes must properly develop. Cool temperatures can also result in overall

slowing of the metabolic processes during germination. Soil temperatures of 50 degrees F° or below around the seed can damage seedlings during this time. Soil temperatures near 40 degrees F° or less may kill or severely injure the seedling.

The three seedlings below were subjected to chilling temperatures during the imbibition phase. During the first six hours of imbibition, the damaged seedlings were exposed to a temperature of 40 degrees F°. After the chilling period they were moved to a chamber set at 86 degrees F° for two to four days. The curling, shortening and thickening of the roots are typical of imbibitional chilling injury. The chilling during this phase of imbibition injures and typically kills the root tip meristematic tissue. This results in cessation of normal taproot growth. Subsequently, lateral roots develop to compensate for this loss. Typically these seedlings may survive and produce productive plants if additional stresses such as water deficit or disease are not encountered.

Cotton seedlings exhibiting chilling injury

The two seedlings below show normal root development. When the two groups are compared it may be noted that seedlings injured by chilling are often short with thickened hypocotyls and radicles, dead root tips, and show some signs of lateral root growth.

Normal cotton seedlings

Mesonet Soil Temperatures

Soil temperatures for cotton planting are very important and the Oklahoma Mesonet provides valuable information. It should be noted that the Mesonet 5-cm soil depth is equivalent to 2 inches, and the 10-cm depth is equivalent to 4 inches. Dry soils will warm up faster than moist soils. It is a good idea to have your own soil thermometer so you can check your own specific field situation.

To see the state map of 3-day average 4-inch bare soil temperatures, go to:
Mesonet 3-day 4-inch bare soil temperature map

To see the state map of current 4-inch bare soil temperatures, click here:
Mesonet Current 4-inch bare soil temperature map

Seeding Rate

Stand components consist of both uniformity and density. Uniformity of planting seed in the row is affected by planter type. The newer vacuum planters are extremely effective at controlling vertical distribution of the seed in the seed furrow and horizontal spacing down the row. These modern planters typically provide excellent seed to soil contact capability, which results in an increased likelihood of an individual planted seed being able to germinate. Seeding rate or density is controlled by producer. The newer vacuum planters coupled with the generally higher seed quality today than what we many times encountered in the past, have allowed most producers to successfully reduce seeding rates. However, because of the cost of transgenic varieties in addition

to cost of premium insecticide/fungicide/nematicide seed treatments, many producers are pushing the agronomic minimum and living on the edge, with little margin for error, so to speak. Many seeding rate trials have been conducted in southwestern Oklahoma and the Rolling and High Plains regions of Texas over the last several years. Results all point to the fact that seeding rates can be pushed to a lower level than what was generally accepted 10-15 years ago, however, the producer must have extreme faith in the planter and its adjustment, field-specific planting situation, seed quality, and environmental conditions after planting. From a crop insurance perspective, it is difficult to agronomically justify less than 2 seeds/row-ft in 40-inch rows (about 26,000 seeds/acre) as a best management practice in dryland cotton production.

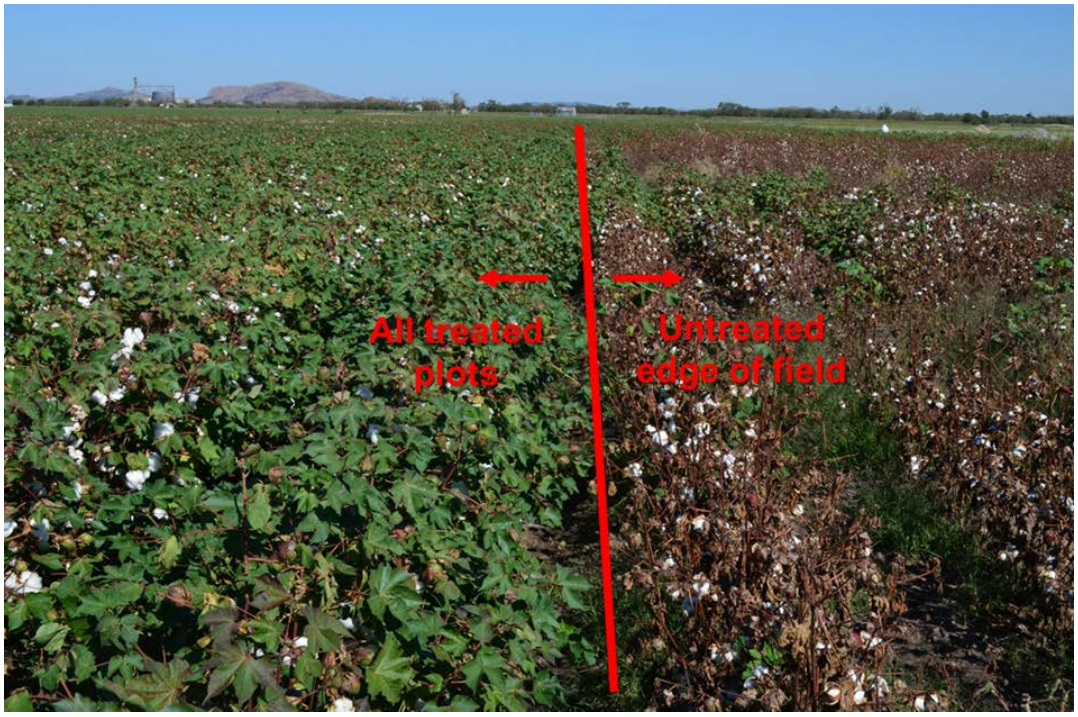
Cotton has a remarkable capacity to compensate yield across a fairly wide range of plant populations. Recent seeding rate studies have indicated that within the FINAL plant stand range of 1.5 to 4.5 plants per row-ft. in 40-inch rows, lint yield can remain reasonably unaffected. However, how a producer gets from a seed drop rate to a final plant stand can be a treacherous journey. Assuming that good soil conditions are present, and an excellent vacuum planter is used to control seed distribution both down the row and in planting depth, a range of 2-4 seed per row-ft. in 40-inch rows (about 26,000 to 52,000 seeds/acre) is probably acceptable. Under dryland conditions, the low end may be targeted. If poor planting conditions (such as low seed quality, marginal soil moisture in the seeding zone, a large amount of crop residue which may affect seed to soil contact, lack of precision planting equipment, or poor forecast conditions) exist, it may be more important to increase the seeding rate. If a low seeding rate is used, the producer must have high confidence in the seed quality and planter precision/adjustment.

Topguard Terra for Cotton Root Rot Control

On January 30, 2015, EPA granted a full section 3 label for the fungicide flutriafol (brand name Topguard Terra) to control Cotton Root Rot (CRR). This disease is caused by the soilborne fungus *Phymatotrichopsis omnivora*.

The disease is present in several cotton producing counties in the state including Comanche, Cotton, Kiowa, and Tillman. This pathogen can be found very deep in soils and is known to infect over 2,000 broadleaf plants, but does not affect grasses. Each year cotton plants begin dying in July or August which continues until the end of the growing season. Once infected, cotton is rapidly killed by this disease. This initially occurs in patches, and typically, eventually the patches coalesce into larger areas (see photograph taken on October 1, 2013 of Kiowa County irrigated trial site below). These dead areas provide a minimal amount of harvestable crop and the dead, decaying stalks become entangled and disrupt the flow of seed cotton in harvesting equipment,

especially stripper-type machines. This reduces the speed of harvest. This additional time required to harvest increases labor and fuel costs and at the end of the day, more expenses for producers. Later harvesting can result in both lower yield and lower quality due to field exposure to rainfall, and potentially ice and/or sleet events. Many of today's contemporary varieties, are susceptible to pre-harvest losses to some degree, if the harvesting is delayed much past the optimum.



Many cotton producers in these above-listed counties incorporate wheat/cotton rotations into their farm management scenarios. However, due to CRR presence in many fields, producers will generally not rotate to cotton or other susceptible (broadleaf) crops, but choose to instead remain in monoculture wheat production. This results in a less than ideal situation with respect to wheat production, because continuous wheat planting increases soil borne diseases and weed pressure in a monoculture situation. Under monoculture wheat production, disease and weed pressure can reduce yields and result in lower quality, and can potentially degrade soil health. Yield increases in wheat can potentially be substantial due to reduced wheat disease pressure and weed competition since these cycles can be broken with a cotton rotation.

Topguard Terra is a 4.16 lb/gallon flutriafol product. The labeled rate of Topguard Terra is 4-8 oz/acre. Flutriafol fungicide works by forming a protective barrier around the cotton root at the point of disease infection. Precipitation in the form of rainfall or irrigation is required to move the product into the infection zone. The amount of water required will vary with soil type, soil moisture, and rainfall or irrigation intensity.

In 2013 two (one irrigated, one dryland) Oklahoma flutriafol projects were conducted by Southwest Research and Extension Center personnel, in collaboration with Mr. Rick Minzenmayer (formerly with Texas A&M AgriLife Extension Service, San Angelo). Although the dryland trial failed due to drought, results from the irrigated project indicated that flutriafol was effective at reducing the negative impact of CRR. It should be noted that Topguard Terra contact with the seed should be minimized because delayed emergence can be encountered under certain circumstances. It is important to follow the application methods provided by the label as shown below.

Topguard Terra Use Directions (At-Plant Soil Application Only)

Rate: 4-8 fluid oz/acre

Overhead or Sprinkler Irrigation Fields:

• The T-Band application method is preferred under these cropping practices.

• Modified In-Furrow can be used. Effort should be made to avoid applying product in direct contact with seed.

Dryland Fields:

• The Modified In-Furrow application technique may provide more consistent control under low rainfall conditions.

• Application using a T-Band method requires rainfall to move the product into the disease infection zone below the soil surface.

Furrow and Drip Irrigated Fields:

• Apply in T-Band or Modified In-Furrow.

• When using the Modified In-Furrow application method sufficient irrigation must be applied to thoroughly wet the TOPGUARD Fungicide treated zone after cotton has emerged.

• For T-Band applications, the top of the bed must be thoroughly wetted after the cotton has emerged.

NOTICE for All Applications Methods and Field Conditions: Heavy rainfall or irrigation within 3 days after planting may delay emergence. AS ALWAYS, READ AND FOLLOW ALL LABEL DIRECTIONS. Below are links to the Topguard Terra label, an informative YouTube video, and other important information.

http://www.cdms.net/ldat/ldDJJ000.pdf

http://www.fmccrop.com/grower/Products/Fungicides/topguard-terra.aspx

Attention New Cotton Producers: Oklahoma Boll Weevil Eradication Organization Concerns for 2017 Season

Eradication of the boll weevil across most of the U.S. Cotton Belt, and in the state has been very successful and is a major contributing factor to the continued profitability of cotton production. It has been a long, difficult, and challenging task to rid our state and most of the Cotton Belt of this invasive species that for such a long time negatively impacted our production. There is still a difficult fight with this insect pest in south Texas, and we all need to do our part in keeping this pest from resurfacing in our state. Some new cotton producers may be unaware of this ongoing program. John Henderson, Director of the Oklahoma Boll Weevil Organization, based at Altus, provided the information below.

> *The Oklahoma Boll Weevil Eradication Organization (OBWEO) is preparing for the upcoming 2017 cotton season. It is our responsibility to ensure the continued success of this program. With all of the talk of a significant increase in cotton acres, there are some important issues with respect to OBWEO that you need to be aware of. If you have been growing cotton for the past 3-5 years, we know where those fields are located. However, if you are a new producer or have not grown cotton in the past several years, we need you to provide to us the legal descriptions of these new cotton fields.*
>
> *There is a boll weevil eradication assessment for harvested cotton acres. This assessment will be determined in September of 2017. For reference purposes, this assessment was $2.50 per harvested acre in 2016.*
>
> *The trapping density this year is one trap per 320 acres. In areas where planted cotton acreage density is high, not all fields will actually have a trap near it. In other areas where individual fields may be more isolated, these fields will need to be trapped.*
>
> *For the following counties including Tillman, Cotton, Comanche, Atoka, Bryan, and Stephens, please contact John Lamb at 580-335-7760 (office) or 580-305-1930 (cell).*
>
> *For all other counties in the state of Oklahoma, contact John Henderson at 580-477-4287 (office) or 580-471-7962 (cell).*
>
> *For any other questions contact Brenda Osborne at 580-471-7963 or Amanda Montgomery at 580-550-0050.*

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