Cotton Comments

OSU Southwest Oklahoma Research and Extension Center
Altus, OK

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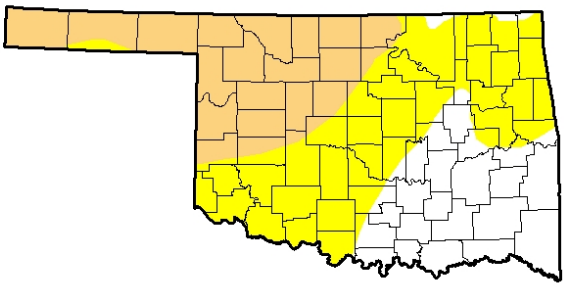
Current Situation

After a thus far somewhat lackluster spring, abnormally dry and moderate drought conditions are creeping back into western Oklahoma. The April 5 Drought Monitor graphic below denotes the region of concern.

U.S. Drought Monitor
Oklahoma



April 5, 2016
(Released Thursday, Apr. 7, 2016)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	26.84	73.16	31.31	0.00	0.00	0.00
Last Week 3/29/2016	41.06	58.94	19.88	0.00	0.00	0.00
3 Months Ago 1/5/2016	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 12/29/2015	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 9/29/2015	52.60	47.40	16.79	6.37	0.97	0.00
One Year Ago 4/7/2015	16.76	83.24	68.27	52.74	39.72	11.60

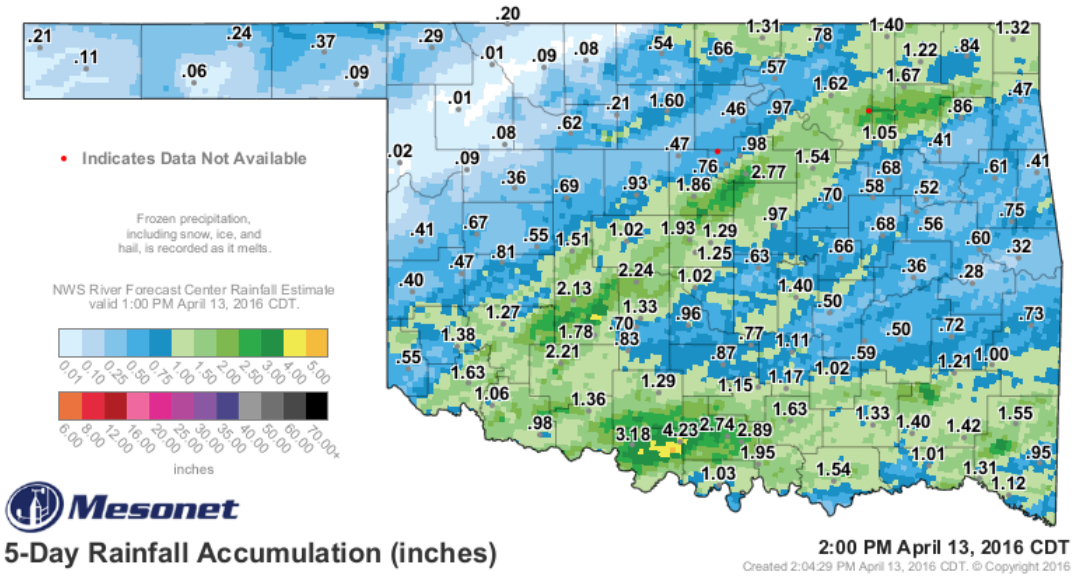
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

http://droughtmonitor.unl.edu/

Over the few days, rainfall in some areas in the southwestern corner of the state has been fairly good. For producers who have been working ground, recent rainfall has been a blessing. Other areas are still lacking needed amounts. We do have a forecast for substantial precipitation over the next several days.



Reminder Concerning Bollgard II© XtendFlex™ Varieties in 2016

More varieties with Bollgard II© caterpillar insect protection stacked with XtendFlex™ (triple-stacked for dicamba, glyphosate, and glufosinate herbicide tolerance) are available this year. The XtendFlex™ technology was approved in January, 2015, but the new low-volatility dicamba herbicide formulations have not yet been approved by EPA. The XtendFlex™ technology containing varieties are being sold in 2016, **but no in-season dicamba applications will be allowed, as there are currently no labeled products.** It is important that producers understand and follow all label conditions.

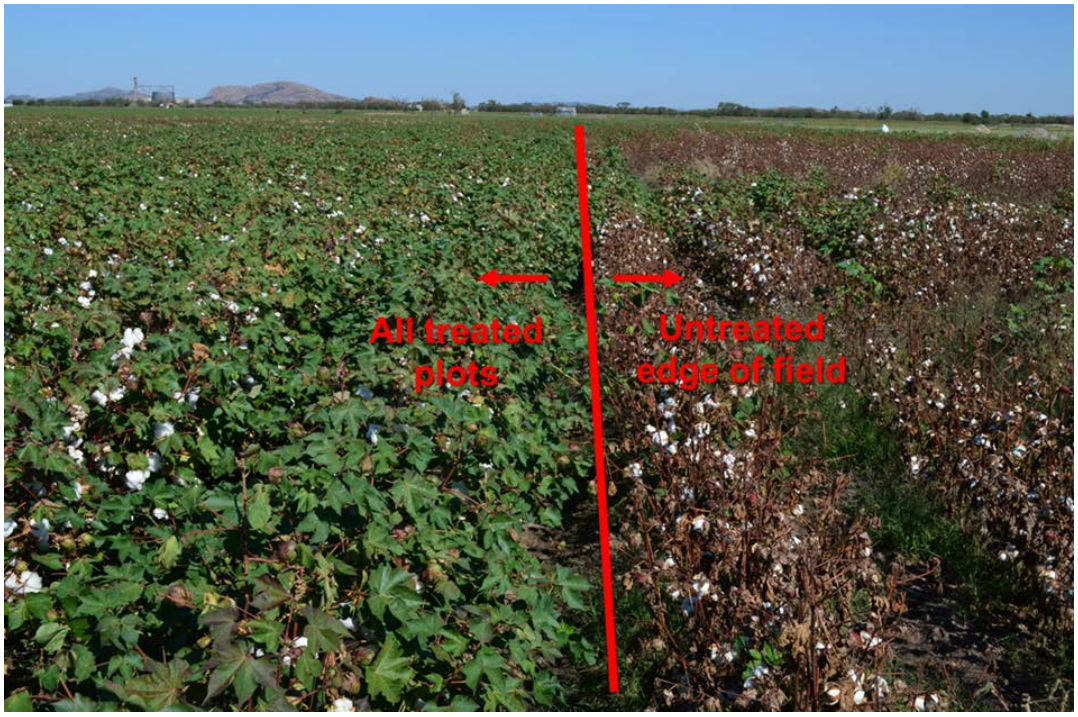
EPA Comment Period Open for Draft Label of Monsanto's Dicamba Formulations

The U.S. Environmental Protection Agency (EPA) is now accepting public comments on the draft label for Monsanto's dicamba formulations for use on deregulated dicamba-tolerant soybeans and cotton (Docket No. EPA-HQ-OPP-2016-0187). This comment period closes on April 30, 2016. For information from Monsanto concerning the comment period and process, click on the link: Click here for Monsanto Dicamba Comment Period.

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 discussed 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/ldC5C000.pdf

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

Successful Planting Strategy

Next to variety selection, the next 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 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 F 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 F, and maximum air temperature of at least 80 degrees
4) plant into a firm, moist seedbed 1-2 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 his planter and its adjustment, field-specific planting situation, seed quality, and environmental conditions after planting. It is difficult to agronomically justify less than 2 seeds/row-ft 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 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.

Reminder Concerning 2016 Texas A&M AgriLife Extension Profitability Spreadsheet

An Excel spreadsheet has been developed by Extension agricultural economist Dr. Jackie Smith at the Lubbock Center. See: http://agrilife.org/southplainsprofit/

The spreadsheet allows the users to select various crops and input their operation's data. This spreadsheet covers a multitude of summer crops including alfalfa, corn, corn silage, cotton, grain sorghum, sorghum silage, peanuts, sesame, sunflowers, etc. The user can enter prices, input costs, etc and calculate potential returns.

RB

Critical Weed Control ≤ 30 Days Before Planting

Eliminating weed competition ahead of and/or at planting reserves valuable resources for future cotton seedlings. The longer weeds exist in your field, the less cotton you produce.

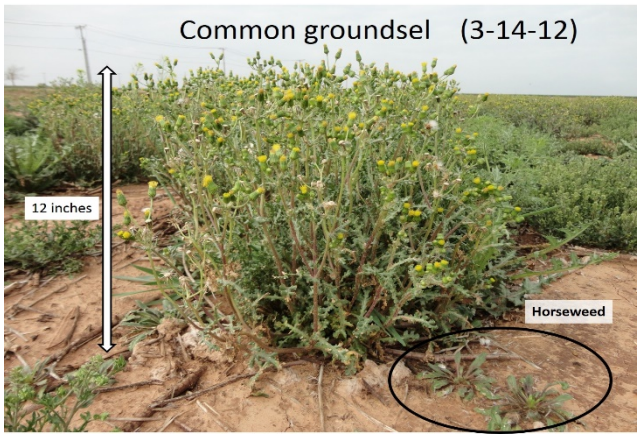
Along with horseweed (marestail), Russian thistle and common groundsel can also be real problems for cotton producers in this region. Dicamba or 2,4-D are key additions to glyphosate in the recipe for success as long as the application time (date) allows for the proper cotton plant back restrictions to be observed. The dicamba label states that for 0.25 lb a.i./acre, 21 days must pass after receiving one inch of rainfall or sprinkler irrigation following applications; for 1 lb a.i./acre of 2,4-D, planting may occur 30 days after application ***(see additional comments below discussing new auxin traits and additional 2016 use patterns)***. As we get closer to planting (inside of the auxin restrictions) our herbicide choices may need to change.

Two glyphosate resistant (GR) species often present at planting are horseweed (marestail) and Palmer amaranth (pigweed). If horseweed is still a concern close to or at planting there are a few options during this period but it should be noted that they are inferior to the previous recommendations including dicamba or 2,4-D. Since much of Oklahoma's horseweed has been confirmed GR, glyphosate alone is not an option. In addition, by this time of year horseweed has usually bolted (initiated erect growth) and

becomes very difficult to control. Gramoxone (paraquat) and Aim are two good burndown options during this period that can do a good job depending on circumstances (including weed species). Although they are often lumped together they are different animals.

Gramoxone 2.0 SL

Gramoxone is non-selective (active on both grass and broadleaf weeds) while Aim is only active on broadleaf weeds (no grass control). However, neither have any soil activity so cotton can be planted immediately before or after application. Also, both are considered contact herbicides, extremely dependent on good coverage. Likewise, both product labels recommend more water than most growers prefer (10-20 gallons per acre, so read labels closely) and medium spray droplets in order to deliver excellent coverage to weeds. When using any contact herbicide, poor coverage equals poor control. One key element (in addition to good coverage) to Gramoxone's success is dependent upon getting the rate correct for the size of the weed at application. While 0.5 lb ai/A typically does a great job on moderately sized (8-10 inch) Russian thistle (tumbleweed), controlling horseweed at this time typically requires a more aggressive approach. For horseweed that has already bolted I recommend a minimum 0.75 lb ai/A. Don't be surprised if larger horseweeds (> 8-10 inches in height) require a sequential application 7-14 days later for good control. Gramoxone will also do a good job on small pigweeds (≤ 6 inches) and morningglory when coverage is sufficient. In my experience Gramoxone typically performs best with a ¼ - ½ % (v/v) non-ionic surfactant. Also, I have seen good control of several other broadleaf weeds (various mustards, redstem filaree and **common groundsel**) when tank-mixing Gramoxone with FirstShot SG. According to the label, cotton can be planted 14 days after an application of FirstShot SG, however on light textured soils (sands, loamy sands, and sandy loams) or where the soil pH is greater than 7.9 an additional 7 days must pass. **This is one of the few products that list control of common groundsel on the label.** Common groundsel is an opportunistic weed that can occasionally cause real problems for growers in this region. While it can be a problem anywhere, it is typically more prevalent in minimum or no-till production systems. It should also be noted that it belongs to a genus (Senecio) that is normally associated with significant levels of livestock (horse and cattle) toxicity. For cotton producers that are able to bale a cover crop ahead of cotton planting this



could be important information. While Gramoxone can be very effective against this weed, one of the downsides to Gramoxone is its inability to effectively control some grass weeds. While it can be very effective on small annual grasses (usually < 6 inches), larger, dense populations of annual grasses and perennial grasses often regrow within a week or two after application. Fortunately, there are not many perennial grasses left (e.g. johnsongrass) due to glyphosate's effectiveness. The gradual elimination of residual herbicide use has allowed annual grasses (e.g. red sprangletop) to remain a problem. Adding those residuals (like Prowl H20 or Warrant) back to the program can help to prevent their emergence altogether.

Aim 2 EC

As mentioned above Aim is another broadleaf burndown herbicide that can be very helpful closer to the planting window. If growers are targeting both annual grasses and morningglory, Aim and Roundup can make very complimentary tank-mix partners. It is important to remember that Aim has no activity on grasses, so the glyphosate component is definitely required if grassy weeds are present. Also, it should be noted that with this tank-mix there is a label conflict among adjuvant requirements. Although Aim applications work best with crop oil concentrate, the Roundup label advises against any oil based adjuvant use. While this may leave growers in a quandary, in my opinion, the biggest problem should win the battle. In other words, controlling morningglory is much more difficult than controlling annual grasses. Therefore, the adjuvant that lends itself to the best morningglory control would be most appropriate. In this case it would be my recommendation to use crop oil with the Aim, even when tank-mixing with glyphosate. In my experience these tank-mixes have performed very well. However, a few reminders are noteworthy. If GR pigweeds are already emerged one should remember that only the Aim component would be working on that weed. Therefore close attention to label recommendations (1.6 oz/acre on 4 inch Palmer amaranth) is necessary. It should also be noted that this combination provides no residual activity, therefore extended weed control would not be expected.

Liberty

An additional option for weed control prior to planting and on into the season is Liberty herbicide. Utilizing this chemistry when possible allows growers to deviate from the usual glyphosate only routine. Liberty is a non-selective, group 10, contact herbicide. As with previously mentioned contact herbicides there are application specifics that contribute to the success of its use. It is highly recommended to consult the label. It may be used ahead of planting for burndown purposes (and can be effective for morningglory). It may also be used over-the-top in-season if your cotton variety contains the Liberty Link

trait (or tolerance to the chemistry). In my opinion, I prefer to save this herbicide for in-crop use, given the current state of affairs. Currently Bayer CropScience offers cotton varieties containing this trait alone or in combination with glyphosate tolerance (GlyTol trait). In addition, all XtendFlex and Enlist varieties have full tolerance to Liberty herbicide. Glufosinate based weed control programs (utilizing Liberty herbicide technology) have been very important in the fight against resistant weeds in the Southeast and Mid-south. In the Southwest, we are just now realizing the damaging effects of glyphosate resistant pigweed and as a result our adoption and utilization of the Liberty Link technology has started to increase. Currently Liberty is the only non-selective, over-the-top, in-crop herbicide option available for controlling GR pigweed. For that reason, those expecting to fight resistant pigweed should seriously consider choosing a variety with tolerance to Liberty herbicide. If you plan to be a first-time Liberty herbicide user there are some things to consider. Growers should be aware of some differences that exist between Southwest Oklahoma and Georgia or Tennessee as it relates to the use of Liberty herbicide. Here in the Southwest, Liberty has been very effective for the control of morningglory in cotton, which is an occasional weakness of glyphosate. However, with our low humidity and high temperatures Liberty has proven to be inconsistent on larger pigweed (> 4 inches) as compared to glyphosate. Following specific application requirements (always found on the product label) are critical for success. Weed size at application, water volume, droplet size, speed (dust), etc. In addition, effective season-long pigweed in a Liberty Link (or any other system) requires the use of multiple residuals. The old adage “start early and stay late” definitely applies to residual herbicide use in a cotton patch battling GR pigweed. The following suggestions apply regardless of the herbicide technology planted (Roundup Ready Flex, GlyTol, Liberty Link, or Glytol+Liberty Link, Xtendflex, Enlist). In my opinion a yellow herbicide is mandatory. Preplant or at-plant applications of a yellow herbicide offers growers the most flexibility when it comes to overall programs. While there are several at-plant residual herbicide options that control pigweed, the yellows get my vote for this timing because it provides growers with the best options for the remainder of the season. For instance, while Prowl H20 does have an over-the-top postemergence label, the restriction on that label limits the timeframe. Current labeling only allows for over-the-top broadcast applications of Prowl H20 from the 4 to 8 leaf stage…a window of 4 leaves of growth. Since cotton develops a new leaf every three days (in good conditions), this results in a window of approximately 12 days to apply Prowl H20. This type of squeeze can be avoided when the Prowl H20 is applied pre-plant or at-planting. Other products such as Warrant or Dual Magnum allow for a broader postemergence window of application with similar control. This strategy can ease some of the pressure often associated with making early postemergence applications in the midst of the usual challenges with the wind and weather. This is also a good time to point out that yellow herbicides provide absolutely no burndown or postemergence activity on weeds already emerged. In many cases where substantial residue is present, growers may fail to notice small weeds already emerged prior to the yellow herbicide application. If this is the case an effective postemergence herbicide is required in the tank with the Prowl H20 to get these weeds. Thorough scouting before application is recommended. Getting a clean start depends heavily on controlling these weeds early.

New Auxin Traits and 2016 Use

Many growers have recently been questioning plant-back restrictions due to the availability of dicamba and/or 2,4-D choline tolerant varieties. For those that are unaware, Monsanto, Americot, Croplan Genetics and Dow Agrosciences will have new herbicide tolerant varieties available for 2016. Monsanto, Americot and Croplan will be offering a moderate supply (when combined) of XtendFlex (dicamba tolerant) varieties (identifiable by the "XF" or "BGIIXF" designation), while Dow Agrosciences will have a limited supply of Enlist (2,4-D tolerant) cotton (one in particular designated by an "FE" or "W3FE") for planting in 2016. At this juncture neither system has an approved herbicide available for in-season use. Due to seed availability a common question continues to arise at meetings and during numerous phone conversations. "Since my seed has tolerance to dicamba or 2,4-D, do I have to follow the plant-back restrictions previously observed?" The answer is YES. "Why?" they ask. Here is the answer: the current plant-back restrictions that we observe are not connected in any way to variety selection. The herbicide product being used has a current (and legally binding) label. This label dictates the rules of its use. There currently is no product on the market that carries a label allowing for any deviation from current plant-back restrictions. Until we receive approvals for the new ultra-low volatility formulations of dicamba and 2,4-D choline, nothing has changed…we are bound by the labels of the products available.

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