WINDSTAR GINS

Edcot Gin – Edmonson, TX
Phillip Kidd, Manager
(806) 864-3335

Tule Creek Gin – Tulia, TX
Jaime Subealdea, Manager
(806) 627-4287

Lakeview Gin – Tulia, TX
Joe Borchardt, Manager
(806) 627-4227

Johnson Gin – Silverton, TX
Daniel Jenkins, Manager
(806) 823-2224

Top of Texas Gin – Hereford, TX
Billy Sam Borchardt, Co-Manager
Steven Birkenfeld, Co-Manager
(806) 258-7466

Adobe Walls Gin – Spearman, TX
Jerrell Key, Manager
(806) 659-2574

Lonestar Gin – Pampa, TX
Carey McKinney, Manager
(806) 665-0677

Cotton Insights Newsletter

A service provided by Windstar, Inc. affiliated gins.

September 16, 2019

Randy Boman, Ph.D.
Windstar Cotton Agronomics Manager
(580) 481-4050
rboman@windstarinc.com
www.windstarinc.com

Yield Estimation

Estimating yield by counting bolls can often be misleading due to several factors. Variation in boll size, variation in lint percentage, future weather conditions, harvest losses and ginning losses can all affect how boll counts relate to final yield. Boll size and boll weight are interchangeable terms and both are defined as grams of seed cotton per boll. Note that varieties genetically differ with respect to boll weight, and this can be highly variable. Varieties have changed a lot over the past couple of decades. Boll weight also varies by fruiting site location (mainstem node of fruiting branch and position of the boll on the fruiting branch). Environment plays a significant role and might allow, or might not allow, the average boll weight for a particular variety to reach its genetic potential. In my opinion, because of these and other factors, yield estimation should be approached with trepidation, especially in drought years.

- After going through a lot of mathematical gymnastics, and assuming a 38% picked lint percentage for bolls, Table 1 (see page end of newsletter) indicates that about 143,240 bolls are required to produce a 480-lb bale of cotton (average of 4.0 g seed cotton per boll = 1.52 g lint per boll assuming a lint percent for seedcotton of 38%). This is equivalent to just under 300 bolls to produce a pound of lint.
- For 40-inch rows this calculates to 11.0 bolls per row-ft for a one bale/acre yield (143,240 bolls per 13,068 row-ft per acre for 40-inch rows). This is very close to the “one boll per inch = one bale per acre” number that many crop watchers have historically used to estimate yields in 40-inch rows.
- For 30-inch rows this works out to 8.2 bolls per row-ft for a one bale/acre yield (143,240 bolls/17,424 row-ft per acre for 30-inch rows).
- For drought stressed bolls the number of bolls required per row-ft to produce a bale of cotton lint will increase substantially.

Traditional Boll Count Method

- Take boll counts from at least 10 feet of row from several representative places in the field. At least four to five locations are recommended.
- Count harvestable bolls in the 10 ft long area on whole plants within the sampling area.
- Any unopened bolls should be larger than a quarter in diameter, and be able to contribute to final yield.
- Divide the total count by 10 in order to calculate the average number of bolls per row-ft. Record the value.
- Refer to Table 1 for the proper row spacing in the field, and assume an average boll weight (for example, perhaps 4 grams of seed cotton per boll for dryland and 5 grams of seed cotton per boll for irrigated).
- Divide the sampled area's average bolls per row-ft (from step 3 above) by the respective bolls per linear row-ft required for 1 bale (480) per acre for the proper row spacing and assumed boll weight.
- This value is the estimated lint yield in bales per acre.
- To convert to pounds per acre, multiply bales per acre times 480.
- If a smaller boll weight is assumed than what is actually present, then the yield projection will be biased toward a lower yield (yield estimate too low).
- Conversely, if a larger boll weight is assumed than what is actually present, then the yield projection will be biased toward the high side (yield estimate too high).
- It is probably better to underestimate than to overestimate boll weight.

.

Harvest-Aid Chemical Types

Harvest-aid products are broadly classed in three categories: desiccants, defoliants, and boll openers. Some can be classed as both desiccants and defoliants depending upon the rate used.

1) Desiccants

- Desiccants generally are paraquat formulations and may contain various tank-mixes with other products. These products dry down the plant by causing the cells to rupture.
- The old rule of thumb is that desiccants are normally applied when approximately 80% of the productive bolls are open, or at two to three nodes above cracked boll.
- **Do not use paraquat-based desiccants when seedling-stage small grains or other crops are near targeted cotton fields. Paraquat drift can severely damage developing small grains grown for cover or harvest.**
- Paraquat applications made in the late afternoon before a bright, sunny day seem to boost the effectiveness of desiccation and tend to increase regrowth control. We suggest the use of nonionic surfactant (NIS) with paraquat. Use the NIS at a minimum rate of 0.125% or 0.25% volume/volume (v/v), depending on the percent concentration of surface-active agent (see individual product labels). You may need to increase the NIS rate to 1% v/v and spray late in the day to effectively desiccate some fields.
- In some years, protoporphyrinogen oxidase (PPO) inhibitor defoliant/desiccant products applied at higher rates work well to desiccate juvenile growth and regrowth, which is often difficult to do with paraquat. PPO inhibitor products include Aim, ETX, Sharpen, and others. Unlike the problem with paraquat, drift from desiccant rates of PPO inhibitors should not injure small grains.

2) Defoliants

- Defoliants cause plants to begin developing an “abscission layer” or zone of cells that eventually break down and cause leaves to separate from the stem and drop. Abscission is a natural and LIVING process, but it is enhanced by the defoliant.
- Herbicidal defoliants include Folex (tribufos) and related products, the PPO inhibitors (e.g. Aim, ETX, Display, and Sharpen), and low rates of paraquat or other desiccants (which at lower rates injure but do not kill the leaves).
- Some products may have mixtures of both hormonal and herbicidal defoliants. These include Ginstar (thidiazuron plus diuron and surfactants) and related products.
- To maximize leaf drop, defoliants require fairly healthy and active leaves that still function properly and are not severely drought stressed (tough and leathery). Warm air temperatures generally enhance a defoliant’s effectiveness.
- According to the commonly used rule of thumb, defoliants can be safely applied when 50-60% of the bolls are open and the remaining bolls are mature enough to obtain a good yield. Defoliation generally assists in opening some mature bolls, but green, unopened bolls can still remain a challenge. Frequently, a killing freeze or a follow-up application of paraquat or other desiccant product is needed to allow stripper harvest of the crop.

- Defoliant rates of PPO inhibitors disrupt plant cell membranes, triggering increased ethylene production in leaves and thus causing abscission. Research trials indicate that the PPO-inhibitor products can be effective defoliants, as well as effective desiccants in some instances when used at higher rates.
- These products tend to work equally well, but some may work better under certain crop conditions. PPO inhibitors can be tank-mixed with other products such as paraquat, Folex, Ginstar, ethephon, Finish 6 Pro, and various other ethephon-based products.
- It is suggested that crop oil concentrate (COC) be used for the Aim, Display and ETX spray mixtures. Sharpen has special adjuvant needs which includes methylated seed oil (MSO) and ammonium sulfate (AMS). ***See specific product labels for details. Failure to include proper adjuvants with these products will likely result in significantly reduced activity.***

3) Boll Openers - Ethephon

- Ethephon-based boll-opener products increase the ***rate of boll opening*** and defoliation to allow for more rapid harvesting of the crop.
- Ethephon product labels state that plants need "sufficient mature unopened bolls present to produce desired crop." Mature bolls are defined as "too hard to be dented when squeezed between the thumb and fingers, too hard to be sliced with a sharp knife, and when the seedcoat becomes light brown in color."
- ***These products accelerate the natural boll-opening process, but they do not cause bolls or fiber to mature faster.*** Plants convert ethephon to ethylene, an aging-related hormone that speeds up abscission layer formation in boll sutures between locks. To be most effective, bolls must have ethephon deposition during application.
- My experience is that ethephon, when applied under good temperature conditions and when given plenty of time will open nearly all bolls. This includes most immature bolls ("juicy bolls") on the plants. Smaller non-productive bolls are often shed.
- ***Ethephon must be applied to an active plant to be effective, and warm temperatures drive its effectiveness.***
- Ethephon-based products usually reach a level of maximum effect within 14 days. This response is driven by temperatures. The warmer the temperatures, the faster the response.
- Tank mixes of ethephon and defoliants are effective at opening bolls and dropping leaves in higher yielding cotton. Higher rates of ethephon products alone are often very effective for defoliation, but lower rates are generally effective only for boll opening.
- Many ethephon products are available including Boll'd, Boll Buster, Setup, SuperBoll, and others. Some enhanced boll-opener/defoliant products are available: Finish 6 Pro, which contains ethephon with a synergist called cyclanilide; and CottonQuik, which contains ethephon and urea sulfate.
- The maximum labeled rate for ethephon products is 2 pounds of active ingredient per acre, or about 42 oz/acre of 6-lb/gallon ethephon product. Defoliant chemicals can be tank-mixed with ethephon products to enhance defoliation.

- If one applies boll-opening products when bolls are not mature enough, reduced lint yield and micronaire are possible, so proper maturity determination is important.
- After applying tank mixes of boll opener and defoliant products, a follow-up application of paraquat (or other product with excellent desiccant activity) or a freeze should be obtained to sufficiently condition the cotton for stripper harvest.

When the "Clock Runs Out"

- ***Late maturing cotton*** will be susceptible to potential yield and quality losses if ***a hard freeze*** is encountered. Many times severe lint color degradation is observed after a freeze when prior to that a substantial number of unopened immature bolls remained in the field. Low micronaire is also to be expected.
- Ethephon application will not improve micronaire as it does not increase fiber maturity. It only opens bolls given appropriate temperatures and time after application.
- For late maturing cotton (defined as cotton still needing maturity, but the long-term average heat units have gone to zero) high rates of ethephon can be used as a conditioning treatment to assist with boll opening. ***Low micronaire should be expected from this treatment.***
- An unfortunate but necessary judgment call will have to be made concerning harvest aid application about 7 days before a freeze, not the day before a freeze is forecast.
- Ethephon must have at least 70 degree daytime temperatures for several days in order to provide maximum benefits with respect to boll opening and potential reduction of lint staining of unopened immature bolls which typically occurs after a hard freeze.
- Ethephon application is ineffective AFTER ***a hard freeze*** based on the destruction of the required ***active physiological processes*** needed for benefit. ***Ethephon requires a functional plant. If a hard freeze is encountered, the plant is dead.***

Upcoming Meetings

Windstar Affiliated Gins Meetings and Dates:

Edcot Gin – Mixed Technology Trial, Bobby Byrd Farm, Plainview, September 24

Top of Texas Gin – PhytoGen Enlist Trial, Braden Gruhlkey Farm, Wildorado, September 25

Lonestar Gin – Open House, Pampa, 5:00 pm to 8:00 pm, September 25

Upcoming Field Days:

NexGen Field Day, Texas Tech Quaker Farm, Lubbock, 10:30 am, September 18

BASF/FiberMax/Stoneville Field Day, Lubbock, September 26

PhytoGen Field Day, Lubbock area, October 2; Plainview area, October 3

Table 1. Estimating Cotton Yield Using Boll Counting

38% Picked Lint Yield Estimation Matrix	Average boll weight (grams of seed cotton per boll)*					
(All calculations in this table are based on 38% picked lint)	2.0	3.0	4.0	5.0	6.0	7.0
Boll size category ==>	extremely small	very small	small	medium	large	very large
grams of lint per boll* ==>	0.76	1.14	1.52	1.90	2.28	2.66
bolls per lb of lint ==>	597	398	298	239	199	171
bolls in one bale (480 lb) of lint ==>	286,479	190,986	143,240	114,592	95,493	81,851
bolls per linear row-ft required for 1 bale (480 lb) per acre						
40-inch rows (13,068 row-ft per acre) ==>	21.9	14.6	11.0	8.8	7.3	6.3
36-inch rows (14,520 row-ft per acre) ==>	19.7	13.2	9.9	7.9	6.6	5.6
30-inch rows (17, 424 row-ft per acre) ==>	16.4	11.0	8.2	6.6	5.5	4.7

Note: 453.5924 grams = 1 lb.

*Disclaimer: Varieties genetically differ in boll size (g seedcotton/boll). Environment plays a significant role and may allow or not allow boll size to reach the genetic potential.
Boll size also varies by fruiting site location (mainstem node of fruiting branch and position of fruit on the fruiting branch).
Based on Texas A&M AgriLife Research Variety Testing Reports for the past several years, the following might be expected:
Normal irrigated - might expect 5 to 7 g seedcotton/boll.
Stressed irrigated - might expect around 5 g/seedcotton boll
Normal dryland - might expect 4 to 6 g seedcotton/boll.
Stressed dryland might expect 3 to 4 g seedcotton/boll.
Severely stressed dryland - might expect 2 to 3 g seedcotton/boll.
For variety specific boll sizes in various small plot replicated trial environments, go to: lubbock.tamu.edu and download "Cotton Books."

Table provided by Dr. Randy Boman
Windstar Inc. Cotton Agronomics Manager