ON-FARM AGRONOMIC AND ECONOMICE EVALUATION OF STACKED-GENE COTTON CULTIVARS IN THE UPPER COASTAL BEND REGION OF TEXAS

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Abstract

Cotton variety selection is one of the most important decisions a producers will make each season. The cotton variety and associated technology will dictate the management decisions for the entire season and can significantly impact the profitability of a farm. To gather unbiased information on cotton varieties, Texas AgriLife Extension Service conducts about 20 large-plot replicated cotton variety trials across the southern, eastern and central portions of Texas each year. The objective of these variety trials are to compare yield and lint quality of stacked-gene Bollgard II and WideStrike Roundup Ready Flex cultivars grown in large plot replicated trials on producer-cooperator fields across this region. Because of the various environmental conditions and site locations that these trials are conducted annually, these trials produce a wealth of data on variety performance. These variety results are made available to local producers throughout these regions of the state. Due to limited space, a summary of 5 county cotton variety trials conducted in 2010 across the Coastal Bend Region of Texas is summarized below. All trial sites have three replicates and plot sizes range from 0.3 to 1.5 acres and are managed according to the farmer cooperator standard practices.

Introduction

Cultivar selection is the most important decision made by the cotton (Gossypium hirsutum L.) grower; however, with the proliferation of transgenic technology, new seed treatments for both early season insects and disease management, and new genetics, cultivar selection has become even more critical, and one of the most expensive inputs of the production enterprise. Unlike herbicide or insecticide decisions that can be changed during the season to address specific conditions and pests, cultivar selection is made only once and that selection dictates field management for the entire season.

Because of the rapid introduction of new cultivars/technologies into the marketplace today, growers and practitioners are forced to make cultivar selection decisions with less information than in the past. In most cases, decisions are based upon single-year information from academic/public sources, and sometimes the only information available is derived from seed company reports. Due to the rapid turnover of cultivars (three to four year life-cycle), multiple-year testing has virtually become a “thing-of-the-past.”

Traditional small-plot cultivar testing programs are inadequate in scale and design to investigate the economic impact of new cultivars/technologies. Generally, small-plot testing programs are not managed under field-scale, grower conditions. Agronomic management of weed, insect and plant growth regulator use and harvest operations will not be reflective of the commercial system. Consequently, an on-farm, large-plot cultivar testing program was developed by Texas AgriLife Extension cotton agronomists with the goal of providing growers and practitioners

with information necessary in making cultivar decisions. These Extension led, grower managed, replicated, large-plot variety trials are referred to as RACE (Replicated Agronomic Cotton Evaluation) trials.

Texas producers planted 5.7 million acres in 2010 which was about 800,000 acres more than 2009. In the Coastal Bend Region, 584,000 acres were planted in 2010, compared to 480,000 acres that were planted in 2009. Transgenic varieties accounted for over 94% of the state acreage in 2010. According to the USDA-Agricultural Marketing Service "Cotton Varieties Planted 2010 Crop" survey for the Corpus Christi Classing Office, the most popular varieties for the region that they track were: Phytogen 375 WRF – 5.2 %, FM 1740 B2F – 4.3%, Fiber Max 9160 – 3.6%, Delta Pine 555 BGRR – 2.4%, and Delta Pine 0935 B2RF – 2.2%.

The first objective of this project was to compare yield and lint quality of Stacked-Gene Bollgard II and WideStrike Roundup Ready Flex cultivars grown in large plot replicated trials on producer-cooperator fields in the Coastal Bend Region of Texas. The second objective is to disseminate these results to cotton producers through key educational meetings and publication distribution.

Materials and Methods

Up to twelve cultivars were planted at each location and cultivar selections were determined with input from grower cooperators/committees, Extension faculty, and seed industry representatives. Only the seven varieties that were consistent at each of the five locations were used for the analysis of this paper. Variety entries consisted of Bollgard II and WideStrike Roundup Ready Flex cultivars. All of the trials in this paper were grown without supplemental irrigation.

Plot dimensions ranged from 0.3 to 1.5 acres in size, depending upon the location (Table 1). Studies were arranged in a randomized complete block design with three replications. All trials were machine harvested with grower picker or stripper harvesters. Plot weights were determined at harvest using a weighing boll buggy equipped with integral electronic scales. All samples were ginned on a Continental 10 saw gin with no lint cleaner (which produces a higher lint turnout percent than a commercial gin would), except for the Wharton Co location which was ginned on a mini-research gin that included lint cleaners, thus leading to lower, more realistic, lint turnouts. Consequently, higher turnouts equate to lint yields higher than area-wide commercial yields. Lint samples were obtained from each plot for turnout. All lint samples were then sent to the Texas Biopolymer Research Center for classing, however only the loan value calculated from the classing data is shown here. . Additionally, all data were standardized to a color grade and leaf of 41 – 4. Per pound loan value was calculated using Cotton Incorporated's 2010 Cotton Loan Calculator. Data was analyzed with ARM 8 using LSD P=0.05.

Table 1. Summary of trial location, cooperator and planting information for the 5cotton variety trials in the Texas Coastal Bend Region of Texas, 2010.

County	Cooperator	Planting Date	Harvest Date	Row Spacing (inches)	Plot Dimensions	Irrigated or Dryland	Area harvested /plot
Victoria	Justin Leita	Mar 31	Aug 28	38	6 rows x 600'	Dry	0.26 Ac
Calhoun	David Hahn	Apr 9	Oct 8	38	6 rows x 1105'	Dry	0.48 Ac
Jackson	David Sappington	Apr 5	Sept 15	38	6 rows x 1300'	Dry	0.57 Ac
Matagorda	Hansen Farms	Apr 9	Sept 14	40	8 rows x 1230'	Dry	0.75 Ac
Wharton	Kresta Farms	Apr 10	Oct 6	40	6 rows x 1390'	Dry	0.64 Ac

For HVI analysis, fiber samples were sent to the Fiber and Biopolymer Research Institute at Texas Tech University in Lubbock, Texas. Statistical analysis for comparison among cultivars was conducted using Agricultural Research Manager 8, using LSD (P=0.05).

Results and Discussion

The 2010 season was characterized by a very wet winter, in which rainfall was plentiful from September of 2009 through Feb 2010, then it became relatively dry from that point on, through planting, till the crop reached late

bloom, with various weather systems bringing lots of rainfall. The Jackson Co site received more rainfall than any of the other locations, where it received over 15 in of rain the date the trial was initially scheduled to be harvested.

The Jackson Co site had the highest mean yield, 1319 lbs/ac, while the Calhoun Co site had the lowest mean yield, 702 lbs/ac and the overall mean for all five locations combined was 1046 lbs/ac (Tables 2-7). As it was for mean yield, the Jackson Co and Calhoun Co sites had the highest and lowest mean loan value of 53.8¢/lb and 51.3¢/lb, respectively. The mean loan value for all locations combined was 52.8¢/lb. Phytogen 375 WRF had the highest mean yield, 1159 lbs/ac among all sites. It was first at 3 locations and second in another. DP 0920 B2F had the second highest mean yield, 1127 lbs/ac.

Table 2. Summary of five county (Victoria, Calhoun, Jackson, Matagorda, and Wharton counties) yield, turnout, loan value and lint value, 2010

Variety	Yield (lbs/acre)	Turnout %	Loan Value (¢/lb)	Lint Value ($/acre)
PHY 375 WRF	1159	43.38	53.34	619
DP 0920 B2F	1127	43.96	51.97	586
ST 5458 B2F	1101	42.76	51.66	570
CG 3220 B2F	1039	41.74	52.81	550
FM 1740 B2F	1032	43.18	52.93	548
ST 4288 B2F	966	40.06	52.92	512
FM 9170 B2F	897	41.20	53.98	484
Mean	1046	42.33	52.80	553

Table 3. Lint yield, turnout, loan value and lint value for Victoria Co RACE trial, 2010 (LSD P=0.05).

Variety	Lint (lbs/acre)	Turnout %	Loan Value (¢/lb)	Lint Value ($/acre)
ST 5458 B2RF	1378 a	41.5 ab	50.70 d	698 a
PHY 375 WRF	1292 ab	42.1 a	53.48 ab	691 ab
DP 0920B2RF	1291 ab	42.6 a	51.73 cd	668 abc
CG 3220 B2RF	1269 b	40.7 bc	52.65 bc	668 abc
FM 1740 B2RF	1221 bc	42.6 a	51.98 c	635 bcd
ST 4288B2RF	1193 bcd	39.5 c	52.65 bc	628 cde
DG 2520 B2RF	1116 cde	39.9 c	54.00 a	602 de
PHY 565 WRF	1111 de	42.1 a	54.22 a	602 de
DP 1048 B2RF	1079 e	42.5 a	54.15 a	584 de
FM 9170 B2RF	1050 e	40.4 bc	54.18 a	569 e
Mean	1200	41.4	52.98	635
P>F	0.0001	0.0002	0.0001	0.0016
LSD (P=.05)	105.6	1.31	1.1441	59.55
STD DEV	61.6	0.764	0.6669	34.71
CV%	5.1	1.85	1.26	5.47

In 2010, as opposed to the drought year of 2009, the cotton crop was generally better than average, with some locations producing high yields, although rainfall during the growing season was below average. A nearly full moisture profile at planting and some timely, moderate rainfall events provided conditions favorable for a productive cotton crop. Heavy fleahopper pressure delayed the crop early in the season and stinkbugs and worm pests to a minor extent, caused late season boll damage and/or loss.

However, many varieties performed exceptionally well across the Upper Gulf Coast and will provide growers better yielding choices for 2011.

Table 4. Lint yield, turnout, loan value and lint value for Calhoun Co RACE trial, 2010 (LSD P=0.05).

Variety	Yield (lbs/acre)	Turnout %	Loan Value (¢/lbs)	Lint Value ($/Ac)
PHY 375 WRF	808	45.3 b	51.93	419.73
DP 0920 B2RF	784	46.6 a	50.55	396.42
CL 3220 B2RF	780	43.9 c	50.78	396.21
ST 5458 B2RF	755	43.8 c	50.55	382.22
CL 3520 B2RF	717	42.6 d	51.23	367.61
FM 1740 B2F	692	45 b	50.98	352.81
ST 4288 B2RF	690	42.2 d	50.73	349.9
PHY 565 WRF	621	45.4 b	51.48	319.85
DP 1048 B2RF	595	45.7 b	51.25	307.77
FM 9170 B2F	572 a	43.9 c	53.8	305.46
Mean	701.8	44.4	51.33	359.8
P>F	0.0591	0.0001	0.1027	0.0925
LSD (P=.05)	NS	0.77	NS	NS
STD DEV	67.94	0.34	0.8851	35.42
CV%	9.68	0.77	1.72	9.85

Table 5. Lint yield, turnout, loan value and lint value for Jackson Co RACE trial, 2010 (LSD P=0.05).

Variety	Yield (lbs/acre)	Turnout %	Loan Value (¢/lbs)	Lint Value ($/acre)
PHY 375 WRF	1654 a	44.3 a	53.90 a	891 a
FM 1740 B2RF	1395 bc	42.3 c	54.15 a	756 b
DP 0920 B2RF	1464 ab	44.8 a	51.55 b	755 b
ST 5458 B2RF	1361 bc	42.2 c	53.88 a	733 b
PHY 565 WRF	1277 bc	41.3 cd	54.18 a	692 b
FM 9170 B2RF	1272 bc	42.7 bc	54.12 a	689 b
CG 3220 B2RF	1261 bc	42.2 c	53.87 a	679 b
DP 1048 B2RF	1209 cd	41.8 cd	53.83 a	650 bc
ST 4288 B2RF	1031 d	40.4 d	53.95 a	555 c
Mean	1319	42.6	53.76	709
P>(F)	0.002	0.000	0.0001	0.003
LSD (P=.05)	222.89	1.510	0.367	119.95
STD DEV	129.93	0.88	0.21	69.92
CV %	9.85	2.06	0.40	9.87

Table 6. Lint yield, turnout, loan value and lint value for Matagorda Co RACE trial, 2010 (LSD P=0.05).

Variety	Yield (lbs/acre)	Turnout %	Loan Value (¢/lbs)	Lint Value ($/Ac)
DP 0935 B2F	1263 a	46.1 abc	53.93 a	681 a
PHY 565 WRF	1144 bc	45.5 bc	54.15 a	620 b
DP 0920 B2F	1165 b	47.2 a	53.08 b	618 b
ST 4288 B2F	1083 cd	42.7 d	54.12 a	586 bc
PHY 375 WRF	1082 cd	45.1 c	54.12 a	585 bc
ST 5458 B2F	1111 bcd	46.5 ab	51.63 c	574 cd
DG 3220 B2F	1046 de	45.1 c	53.82 ab	563 cd
FM 1740 B2F	988 e	46.5 ab	54.12 a	535 d
FM 9170 B2F	830 f	43.6 d	54.28 a	451 e
Mean	1079	45.4	53.69	579
P>(F)	0.0001	0.0001	0.0001	0.0001
LSD (P=.05)	72.065	1.38	0.8435	43.8
STD DEV	41.633	0.8	0.4873	25.3
CV %	3.86	1.75	0.91	4.37

Table 7. Lint yield, turnout, loan value and lint value for Wharton Co RACE trial, 2010 (LSD P=0.05).

Variety	Yield	Turnout	Loan Value	Lint Value
PHY 375 WRF	956.8 a	40.1 a	53.25 ab	510 a
DP 0920 B2F	933 ab	38.6 ab	52.95 b	494 ab
PHY 565 WRF	913 abc	37.6 abc	53.85 a	492 ab
ST 5458 B2F	899 a-d	39.8 ab	51.56 c	463 bc
FM 1740 B2F	862 bcd	39.5 ab	53.44 ab	461bc
CG 3220 B2F	840 cde	36.8 bc	52.95 b	445 cd
ST 4288 B2F	831 de	35.5 c	53.13 ab	441 cd
FM 9170 B2F	761 e	35.4 c	53.51 ab	407 d
Mean	874	37.9	53.08	464
P>(F)	0.0011	0.0	0.0003	0.0013
LSD (P=.05)	80.4	3.15	0.7735	42.75
STD DEV	54.66	2.14	0.5259	29.07
CV %	6.25	5.65	0.99	6.27

Summary

The information in this article represents only 5 of the 19 different Replicated Agronomic Cotton Evaluations (RACE) trials that were conducted in South and East-Central Texas in 2010.

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More information on these and other variety trials can be found at **http://varietytesting.tamu.edu**.