2015 Arizona Upland Cotton Advanced Strain Testing Program

E.R. Norton

Abstract

A series of experiments were conducted at three locations in Arizona to evaluate approximately 35-40 commercial cotton strains and varieties during the 2015 cotton-growing season. These trials were conducted in Yuma, AZ (130 ft. above MSL); Maricopa, AZ (1170 ft. above MSL); and Safford, AZ (2900 ft. above MSL). Strains were planted in two row plots in Yuma and Maricopa and four row plots in Safford each extending 35 feet in length. Plots were arranged in a randomized complete block design with a minimum of four replications. Data collected included early season emergence and vigor data, limited plant growth and development data, yield and fiber quality data. Yield and fiber quality data was subjected to statistical analysis to test for differences among strains for these parameters. Overall yield levels for two of the three trials were very good with average yields of 1,475, 1,870, and 427 lbs lint/acre for Yuma, Maricopa, and Safford respectively. A significant hail storm passed through the Safford Valley on 11 August 2015 resulting in severe damage to the the plots at this location. Yield was reduced by around 1,200 lbs/acre. The data from this trial is still presented in this publication for documentation purposes but is not necessarily a fair evaluation of these entries. Fiber quality was lower at the Safford location in 2015 with average premium received for varieties tested of 1.4, 2.3, and -5.4 cents per pound for Yuma, Maricopa, and Safford respectively. Six of the varieties evaluated at the Yuma location produced fiber quality receiving a discount due primarily to high micronaire. All of the varieties at the Maricopa location produced fiber receiving a premium. Conversely, due to the hail damage, every entry at the Safford location produced fiber receiving a discount primarily due to low micronaire fiber color and leaf grade. Several new varieties released for the 2015 season along with some new varieties that will be available in 2016 performed very well in these trials, both in terms of lint yield and fiber quality. As of this writing, seven experimental varieties evaluated in 2015 will be advanced for commercial release in 2016. Of the seven new varieties, four are from Monsanto/Deltapine and three are from Bayer. These new offerings will provide additional options and choices for Arizona's cotton industry.

Introduction

One of the most critical decisions cotton producers make each year is which variety is best suited to their region and even more specifically, on their own farm. With the advent of transgenic technologies and the quick development and release of additional varieties each year, that decision can be very difficult. Variety trial information produced by both private industry and by the public sector, such as universities, can help provide the information needed to make an informed decision with respect to variety selection.

The decision of a seed company to bring a variety to market and release it for general consumption is made after several years of testing through a breeding program. One of the last steps of a breeding program prior to

commercial release is testing of advanced strains across environments. This is one of the last opportunities for a seed company to evaluate a particular strain prior to public release and is critical for the development of varieties that are well-suited for specific cotton producing regions of the United States.

The Arizona Upland Cotton Advanced Strains Testing Program conducted through the University of Arizona, with support from participating seed companies and Cotton Incorporated through the Arizona Cotton Growers Association State Support Committee, provides critical and unbiased information to the seed companies on the performance of varieties that will likely be grown in Arizona in the subsequent years. It also provides the Arizona cotton industry with an unbiased view of plant materials that are being considered for commercialization prior to their release into the public market place. This situation provides an opportunity to influence the decisions as to which varieties will be advanced for release, helping to ensure varieties with high yield potential and high fiber quality characteristics are available for the Arizona cotton growing industry. One of the unique aspects of this program is the range of conditions under which these strains are being evaluated. Three locations are selected for testing of these strains that range from slightly above sea level (100 ft, Yuma) to over 2800 ft. elevation (Safford), providing for a very diverse set of climatic conditions for variety performance evaluation. This program provides an opportunity to evaluate the same variety across these varied environments and to observe the effects of these conditions on plant growth and development, yield, and fiber quality.

Materials and Methods

Three separate field trials were conducted in 2015 across the cotton producing regions of Arizona. These locations included Yuma (130 ft above MSL), Maricopa (1170 ft. above MSL), and Safford (2900 ft above MSL). Plot dimensions were two rows wide and extended 35 feet in length at both the Yuma and Maricopa locations. In Safford, plots were four rows wide and extended 35 feet in length. Row spacing varied among locations with 38, 40, and 42 inch row spacing at Safford, Maricopa, and Yuma respectively. All plots were arranged in a randomized complete block design with four replications. Plots were planted with 180 seeds per 38 feet of row length to achieve a plant population of 2-4 plants per linear foot. Plots were planted to a length of 38 feet and then trimmed to a uniform overall plot length of 35 feet. If populations were found to be higher than this target, thinning crews were employed to achieve the desired population. In 2015 there was no need for plot thinning. Further details of each experiment, including planting dates, irrigation termination dates, defoliation, harvest dates, and soil classification are contained in Table 1.

Early season data, including stand counts and vigor rating, were collected within 2 weeks of planting or initial water-up irrigation. This data was used to calculate a population estimate, and to evaluate seedling vigor. Plant growth and development data was collected at early bloom to mid-bloom. Data collected included plant height and nodes above white flower (NAWF).

Yield was estimated by harvesting the center two rows of each experimental unit and weighed with a hanging basket equipped with load cells. A large grab sample (approximately 6-8 lbs.) was also collected from each experimental unit from which percent lint was determined by ginning the sample on a small research gin at the Maricopa Agricultural Center. Fiber quality was determined by the USDA-AMS cotton classing office in Visalia,

CA. A premium or discount for each entry was then calculated based upon fiber quality data and the USDA CCC (Commodity Credit Corporation) loan schedule. This premium/discount was then applied to a base price of 52 cents per pound and a final crop value was calculated by multiplying the base price plus the premium/discount by the total lint yield of the entry. All data collected was summarized and analyzed according to statistical procedures as outlined by the SAS Institute.

Results and Conclusions

Yuma

Plots in Yuma were established on 25 March with planting and irrigating on the same day. Average emergence was experienced with an Average plant spacing of 4.3 plants per foot with an average vigor rating of 6.5 on a scale of 1-9 with 9 being the highest vigor rating (Table 2). Data collected at late bloom (21 July) indicated an average plant height of 35.6 inches and a range from 31.2 to 41.0 inches (Table 2). An indication of crop maturity and progression toward cut-out can be obtained from the NAWF data collected at late bloom. Values for NAWF ranged from 3 to 5 with an average of 4.5 (Table 2).

Yield data was collected on 17 September by harvesting the center 2 rows of each plot and weighing the seedcotton. Fiber quality and gin turnout was determined by ginning a sample collected at the time of harvest. Average lint yield for this trial was 1,477 pounds lint per acre and ranged from a low of 1179 slightly over 1,850 pounds of lint (Table 3). Table 5 lists the results of lint yield and all fiber quality results for each variety. In the final column of Table 3 an overall crop value for each variety is presented. This final crop value represents both the yield and fiber quality performance of a particular variety. All the entries but evaluated in Yuma produced fiber with a premium with the exception of six which received a slight discount due to high micronaire. An evaluation of varieties as a function of lint yield and fiber quality is presented in Figure 1. Average lint yield (y-axis) for each variety is plotted as a function fiber quality or premium (x-axis). Average values for both lint yield and premium are represented on the figure by the horizontal and vertical lines respectively. The quadrants formed by the intersection of these two lines delineate the performance of a particular variety. Any variety that falls in the upper right-hand quadrant performed better than average in terms of both lint yield and fiber quality. Those falling in the lower left-hand quadrant performed lower than average for both lint yield and fiber quality. This provides a unique look at the performance of a variety in terms of both lint yield and fiber quality in relation to the average of that trial.

Maricopa

The Maricopa location was planted on 20 April and irrigated one days later and experienced excellent emergence and stand establishment. Average plant spacing was 3.6 plants per foot so no thinning was employed (Table 4). Early season vigor for all varieties averaged 6.0 with a very small range in vigor. Average plant height was 24.6 inches at early bloom and ranged from 21.9 to 28.2 inches. Values for NAWF ranged from 6 to 8 with an average of 7.1 (Table 4).

Plots were harvested on 13 November with an average lint yield of 1,870 pounds of lint per acres with a range of 1,435 to slightly over 2,100 pounds of lint (Table 5). Table 5 contains a summary of lint yield and fiber quality for all varieties along with a calculated final crop value in the last column of Table 5. All varieties evaluated at the Maricopa location produced fiber of a quality that no discounts were experienced. Fiber quality produced premiums and ranged from 0.4 cents per pound to over 3.5 cents with an average of 2.3 cents (Table 5). An evaluation of varieties as a function of lint yield and fiber quality is presented in Figure 2. This figure is constructed the same way as described above. Average lint yield (y-axis) for each variety is plotted as a function fiber quality or premium (x-axis). Average values for both lint yield and premium are represented on the Figure by the horizontal and vertical lines respectively. Evaluating a variety in this way shows that some varieties that produce a similar, and at times higher lint yield may not always have the same return due to a higher premium associated with the fiber quality.

Safford

The trial conducted in Safford was planted on 27 April into moisture. Excellent emergence and stand establishment was experienced with plant stands averaging 3.5 plants per foot. Early season vigor ratings averaged 5.7 and ranged from 4.3 to 6.8 (Table 6). Plant measurements taken at the mid-bloom stage revealed average plant height at 27.6 inches with a range of 24.1 to 30.7 inches. Values for NAWF at this mid-bloom stage average 6.2 with a range of 5 to 7 (Table 6).

A severe thunderstorm with associated hail passed over the Safford Ag Center on 11 August 2015 and caused severe damage to the plots. The trial was managed optimally for the remainder of the season and was harvested as normal to provide documentation of the damage. Plots were mechanically harvested on 5 November in Safford with an average yield of 427 pounds of lint per acre. It is estimated that lint yields were reduced by approximately 1,200 lbs/acre. The range in lint yield was a low of 312 to a high yield of 555 pounds. Yield and fiber quality data for the Safford location are summarized in Table 7. As a result of the severe hail damage and subsequent fall rains scattered throughout September and October all varieties experienced discounts associated with fiber quality. The majority of these discounts were due to high leaf grade, low micronaire, and poor color quality (Table 7). The average premium for this location was -0.5 cents per pound and ranged from -10.0 cents to -0.4 cents per pound. An evaluation of varieties as a function of lint yield and fiber quality is presented in Figure 3. This figure is constructed the same way as described above. Average lint yield (y-axis) for each variety is plotted as a function fiber quality or premium (x-axis). Average values for both lint yield and premium are represented on the Figure by the horizontal and vertical lines respectively

Conclusions

Several new varieties performed very well at all three locations in 2015 which is a good indication that we continue to move in the right direction in terms of variety development with respect to both lint yield and fiber quality. Several of the entries that performed well in Arizona in 2013 and 2014 as experimental varieties were advanced in 2015 or will be advanced by the seed companies in 2016 into commercial production. We will

continue with this evaluation of recently released and experimental varieties in Arizona in 2016 in an effort to find varieties that continue to raise the bar with respect to yield and fiber quality expectations for the Arizona cotton industry.

Table 1. Significant crop management dates and soil classification for each advanced strain evaluation location conducted during the 2015 production season.

Location:	**Yuma**	**Maricopa**	**Safford**
Planting Date:	25 March	20 April	27 April
Final Irrigation	10 August	9 September	1 September
Initial Defoliation	28 August	15 October	10 October
Harvest Date:	17 September	18 November	5 November
Soil Type	Gadsden clay	Casa Grande sandy clay loam	Grabe clay loam

Table 2. Early season emergence and vigor evaluations (0-9 scale with 9 being best) and early bloom plant height and nodes above white flower for each entry planted in the Advanced Strain evaluation in Yuma, AZ, 2015.

Seed Company	Variety	Plants per Foot	Seedling Vigor*	Plant Height	NAWF**
Monsanto/Deltapine	**15R511B2XF**	4.5	6.8	41.0	4.8
Americot/NexGen	**NG5007B2XF**	4.1	6.0	39.9	4.8
Monsanto/Deltapine	**DP1549B2XF**	3.6	6.0	39.9	5.3
Monsanto/Deltapine	**DP1646B2XF**	4.4	7.0	38.8	4.7
Bayer/Stoneville	**ST6182GLT**	3.8	6.0	38.7	4.6
Dow/Phytogen	**PHY499WRF**	4.4	6.3	38.2	4.6
Monsanto/Deltapine	**15R556B2XF**	4.1	6.5	37.3	4.9
Monsanto/Deltapine	**15R513B2XF**	4.6	6.5	37.0	4.9
Monsanto/Deltapine	**DP1639B2XF**	4.3	6.5	36.9	4.8
Dow/Phytogen	**PHY764WRF**	3.4	5.8	36.8	4.2
Dow/Phytogen	**PX5590-01WRF**	4.5	7.0	36.7	4.9
Bayer	**BX1638GLT**	4.0	7.0	36.2	4.4
Bayer/Stoneville	**ST4949GLT**	3.8	7.0	36.2	4.0
Bayer/Stoneville	**ST5115GLT**	4.7	7.0	35.7	4.3
Americot/NexGen	**NG3406B2XF**	4.1	6.5	35.6	4.9
Bayer/Stoneville	**ST4848GLT**	4.5	6.5	35.2	4.8
Monsanto/Deltapine	**DP1614B2XF**	4.2	6.0	34.8	4.4
Monsanto/Deltapine	**15R525B2XF**	4.1	6.5	34.7	4.6
Bayer	**BX1634GLT**	4.2	6.8	34.4	3.7
Monsanto/Deltapine	**DP1612B2XF**	4.8	7.3	34.3	4.3
Americot/NexGen	**NG3405B2XF**	4.0	5.8	34.0	4.8
Monsanto/Deltapine	**DP1044B2RF**	4.3	6.5	33.8	4.9
Monsanto/Deltapine	**15R519B2XF**	4.5	6.5	33.4	3.9
Bayer/Stoneville	**ST4946GLB2**	4.1	6.3	33.4	3.9
Bayer/FiberMax	**FM2334GLT**	4.6	6.5	33.2	4.3
Dow/Phytogen	**PX4533-18WRF**	5.0	7.5	33.0	3.8
Bayer/FiberMax	**FM1900GLT**	4.3	7.0	32.9	4.1
Monsanto/Deltapine	**15R535B2XF**	4.4	6.0	32.7	4.9
Bayer/FiberMax	**FM2007GLT**	4.6	6.5	31.6	4.3
Bayer/FiberMax	**FM1830B2RF**	4.3	6.8	31.2	3.8
Average		**4.3**	**6.5**	**35.6**	**4.5**

*Seedling vigor evaluated on a scale of 1-9 with 9 being the highest vigor.

**NAWF - Nodes Above White Flower. Total number of nodes above the uppermost, first position fresh bloom.

Table 3. Yield and fiber quality data along with statistical analysis for each of the varieties and advanced strains evaluated in Yuma, AZ, 2015

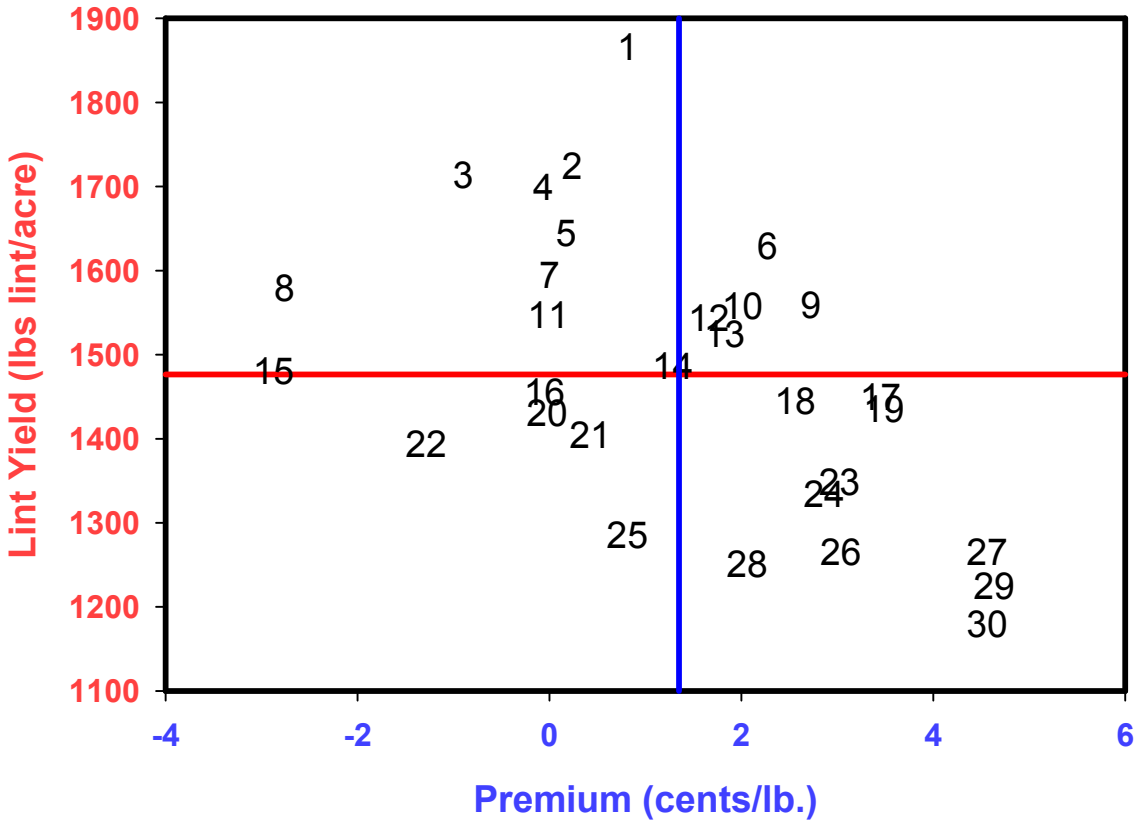
Seed Company	Variety	Lint Yield (lbs/acre)	Yield Means	Percent Lint	Color Grade	Staple (32nds)	Micronaire	Strength (g/tex)	Length (in.)	Leaf Grade	Uniformity Index (%)	Premium (cents/lb)	Value * ($/acre)
Bayer/Stoneville	**ST4946GLB2**	1,865.2	a	38.4	21	35	5.1	30.3	1.12	3	81.9	0.8	$985.26
Monsanto/Deltapine	**DP1044B2RF**	1,723.2	ab	35.8	21	35	5.2	29.7	1.12	3	82.4	0.2	$902.20
Dow/Phytogen	**PHY499WRF**	1,713.3	abc	38.3	31	35	5.1	31.2	1.15	2	82.4	-0.9	$876.03
Americot/NexGen	**NG3406B2XF**	1,698.2	abcd	38.3	21	35	5.1	29.6	1.16	2	82.3	-0.1	$883.25
Monsanto/Deltapine	**DP1614B2XF**	1,644.1	bcde	38.6	21	37	5.4	30.5	1.15	3	82.8	0.2	$858.25
Dow/Phytogen	**PX4533-18WRF**	1,628.5	bcde	37.6	21	36	5.1	30.1	1.08	3	82.7	2.3	$883.43
Monsanto/Deltapine	**DP1549B2XF**	1,594.4	bcdef	37.8	21	35	5.2	29.7	1.16	3	81.4	0.0	$829.09
Monsanto/Deltapine	**15R519B2XF**	1,578.8	bcdef	37.5	21	35	5.4	28.4	1.12	2	81.8	-2.8	$783.83
Bayer	**BX1638GLT**	1,558.9	bcdefg	37.5	21	37	5.1	30.6	1.13	3	82.5	2.7	$853.29
Americot/NexGen	**NG5007B2XF**	1,557.1	bcdefg	39.4	21	36	4.9	26.9	1.11	2	81.4	2.0	$844.51
Monsanto/Deltapine	**DP1646B2XF**	1,547.0	cdefg	37.6	21	36	5.4	29.2	1.09	3	82.5	0.0	$803.32
Dow/Phytogen	**PX5590-01WRF**	1,542.5	defg	37.4	21	36	5.0	30.7	1.13	3	82.3	1.7	$826.75
Bayer/Stoneville	**ST6182GLT**	1,523.5	efg	43.0	21	36	5.1	28.5	1.14	2	82.3	1.8	$818.13
Monsanto/Deltapine	**15R535B2XF**	1,485.6	efgh	41.0	21	36	5.1	29.0	1.15	2	81.9	1.3	$794.79
Americot/NexGen	**NG3405B2XF**	1,479.5	efgh	37.8	11	34	5.1	25.7	1.11	2	81.2	-2.9	$725.50
Monsanto/Deltapine	**DP1639B2XF**	1,454.9	fgh	39.2	21	36	5.4	31.0	1.10	2	82.5	-0.1	$756.63
Bayer/FiberMax	**FM1830B2RF**	1,449.2	fghi	39.1	21	37	5.0	30.7	1.16	2	82.1	3.5	$805.03
Bayer	**BX1634GLT**	1,443.7	fghi	37.5	21	36	5.1	29.7	1.16	3	83.0	2.6	$788.02
Monsanto/Deltapine	**DP1612B2XF**	1,435.0	fghi	36.5	21	36	4.9	30.6	1.12	2	82.2	3.5	$795.61
Bayer/Stoneville	**ST5115GLT**	1,429.8	fghij	37.2	21	35	5.0	30.2	1.15	2	81.4	0.0	$744.27
Bayer/Stoneville	**ST4848GLT**	1,403.2	ghijk	37.7	21	36	5.5	30.0	1.06	2	83.2	0.4	$735.42
Bayer/Stoneville	**ST4949GLT**	1,393.2	ghijk	39.0	21	35	5.2	29.3	1.10	3	82.2	-1.3	$707.11
Monsanto/Deltapine	**15R556B2XF**	1,347.8	hijkl	41.1	21	35	4.8	30.8	1.12	2	81.8	3.0	$741.53
Bayer/FiberMax	**FM2334GLT**	1,333.8	hijklm	38.1	21	37	5.1	30.4	1.09	3	82.8	2.9	$730.67
Monsanto/Deltapine	**15R525B2XF**	1,284.5	ijklm	35.9	31	37	5.2	29.9	1.15	3	82.3	0.8	$678.21
Bayer/FiberMax	**FM2007GLT**	1,264.6	jklm	35.6	21	36	4.9	29.8	1.14	2	81.6	3.0	$696.40
Monsanto/Deltapine	**15R513B2XF**	1,264.1	jklm	39.4	21	37	4.9	28.8	1.11	4	81.5	4.6	$716.20
Bayer/FiberMax	**FM1900GLT**	1,250.1	klm	36.0	31	37	5.1	30.7	1.11	3	82.3	2.1	$675.78
Monsanto/Deltapine	**15R511B2XF**	1,223.9	lm	35.7	21	37	4.7	29.0	1.08	2	81.7	4.6	$692.53
Dow/Phytogen	**PHY764WRF**	1,178.6	m	35.2	21	37	4.6	34.2	1.11	2	82.9	4.6	$666.85
Average		**1,476.5**		**38.0**	**---**	**36**	**5.1**	**29.8**	**2.43**	**1**	**82.2**	**1.4**	**$786.60**
LSD§		**167.3**		**1.7**	**---**	**1**	**0.2**	**1.2**	**0.03**	**1**	**0.9**	**2.60**	**$99.64**
OSL†		**<0.0001**		**<0.0001**	**---**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0002**	**<0.0001**	**<0.0001**
CV‡		**8.1**		**3.2**	**---**	**2.0**	**3.4**	**2.9**	**2.0**	**24.1**	**0.8**	**136.6**	**9.0**

* Value calculated from CCC loan schedule base price of $0.52/lb + premium/discount

§ Least Significant Difference

† Observed Significance Level

‡ Coefficient of Variation



1ST4946GLB2	11DP1646B2XF	21ST4848GLT
2DP1044B2RF	12PX5590-01WRF	22ST4949GLT
3PHY499WRF	13ST6182GLT	2315R556B2XF
4NG3406B2XF	1415R535B2XF	24FM2334GLT
5DP1614B2XF	15NG3405B2XF	2515R525B2XF
6PX4533-18WRF	16DP1639B2XF	26FM2007GLT
7DP1549B2XF	17FM1830B2RF	2715R513B2XF
815R519B2XF	18BX1634GLT	28FM1900GLT
9BX1638GLT	19DP1612B2XF	2915R511B2XF
10NG5007B2XF	20ST5115GLT	30PHY764WRF

Figure 1. Lint yield (lbs/acre) plotted as a function of fiber quality premium/discount (cents/lb). Vertical and horizontal lines represent the mean value for the two parameters. Varieties that fall in the upper right quadrant formed by the mean lines produced higher than average lint yield and fiber quality. Each of the varieties and advanced strain entries are plotted for the Yuma, AZ location in 2015.

Table 4. Early season emergence and vigor evaluations (0-9 scale with 9 being best) and early bloom plant height and nodes above white flower for each entry planted in the Advanced Strain evaluation in Maricopa, AZ, 2015.

Seed Company	Variety	Plants per Foot	Seedling Vigor*	Plant Height	NAWF**
Monsanto/Deltapine	**15R511B2XF**	3.5	6.4	28.2	8.2
Dow/Phytogen	**PHY499WRF**	4.0	6.5	27.5	7.5
Bayer	**BX1638GLT**	3.7	6.3	27.1	7.1
Monsanto/Deltapine	**DP1646B2XF**	3.1	4.4	27.0	7.8
Monsanto/Deltapine	**DP1549B2XF**	3.3	5.5	26.4	7.7
Premium Cotton Genetics	**713-88-92**	3.6	6.6	26.2	7.6
Monsanto/Deltapine	**15R513B2XF**	4.0	6.5	25.9	6.8
Monsanto/Deltapine	**15R556B2XF**	2.7	5.0	25.3	7.5
Bayer/FiberMax	**FM1900GLT**	3.4	6.1	25.2	6.8
NexGen/Americot	**NG3405B2XF**	3.6	5.6	25.2	7.6
Bayer	**BX1634GLT**	3.7	6.6	25.2	6.5
Bayer/Stoneville	**ST4946GLB2**	4.4	7.3	25.1	6.3
Premium Cotton Genetics	**713-85-95**	4.1	6.9	25.1	7.1
Monsanto/Deltapine	**DP1639B2XF**	3.0	5.3	25.0	7.0
Premium Cotton Genetics	**717-84-91**	3.5	6.2	25.0	6.5
Dow/Phytogen	**PX5590-01WRF**	3.9	6.6	24.7	7.2
Premium Cotton Genetics	**717-804-901**	3.4	6.8	24.5	6.7
Bayer/Stoneville	**ST6182GLT**	2.8	4.8	24.4	7.8
NexGen/Americot	**NG3406B2XF**	4.0	7.1	24.3	6.4
Dow/Phytogen	**PX4533-18WRF**	5.0	7.6	24.1	6.4
Bayer/Stoneville	**ST4949GLT**	4.1	6.7	24.0	6.7
NexGen/Americot	**NG5007B2XF**	2.8	5.7	24.0	6.7
Monsanto/Deltapine	**15R535B2XF**	3.0	4.9	23.8	6.7
Bayer/FiberMax	**FM2007GLT**	4.0	5.9	23.7	7.7
Bayer/FiberMax	**FM2334GLT**	3.2	5.6	23.5	7.8
Monsanto/Deltapine	**15R519B2XF**	4.0	6.2	23.4	7.1
Bayer/Stoneville	**ST4848GLT**	4.2	6.7	23.4	6.2
Monsanto/Deltapine	**DP1612B2XF**	3.8	6.3	23.4	6.6
Monsanto/Deltapine	**DP1614B2XF**	3.0	4.8	23.1	7.2
Monsanto/Deltapine	**15R525B2XF**	2.9	5.3	23.0	8.2
Bayer/FiberMax	**FM1830B2RF**	3.6	6.1	22.9	7.6
Dow/Phytogen	**PHY764WRF**	2.0	4.5	22.4	7.8
Bayer/Stoneville	**ST5115GLT**	3.9	6.3	22.4	7.2
Monsanto/Deltapine	**DP1044B2RF**	3.7	5.4	21.9	6.9
Average		**3.6**	**6.0**	**24.6**	**7.1**

*Seedling vigor evaluated on a scale of 1-9 with 9 being the highest vigor.

**NAWF - Nodes Above White Flower. Total number of nodes above the uppermost, first position fresh bloom.

Table 5. Yield and fiber quality data along with statistical analysis for each of the varieties and advanced strains evaluated in Maricopa, AZ, 2015.

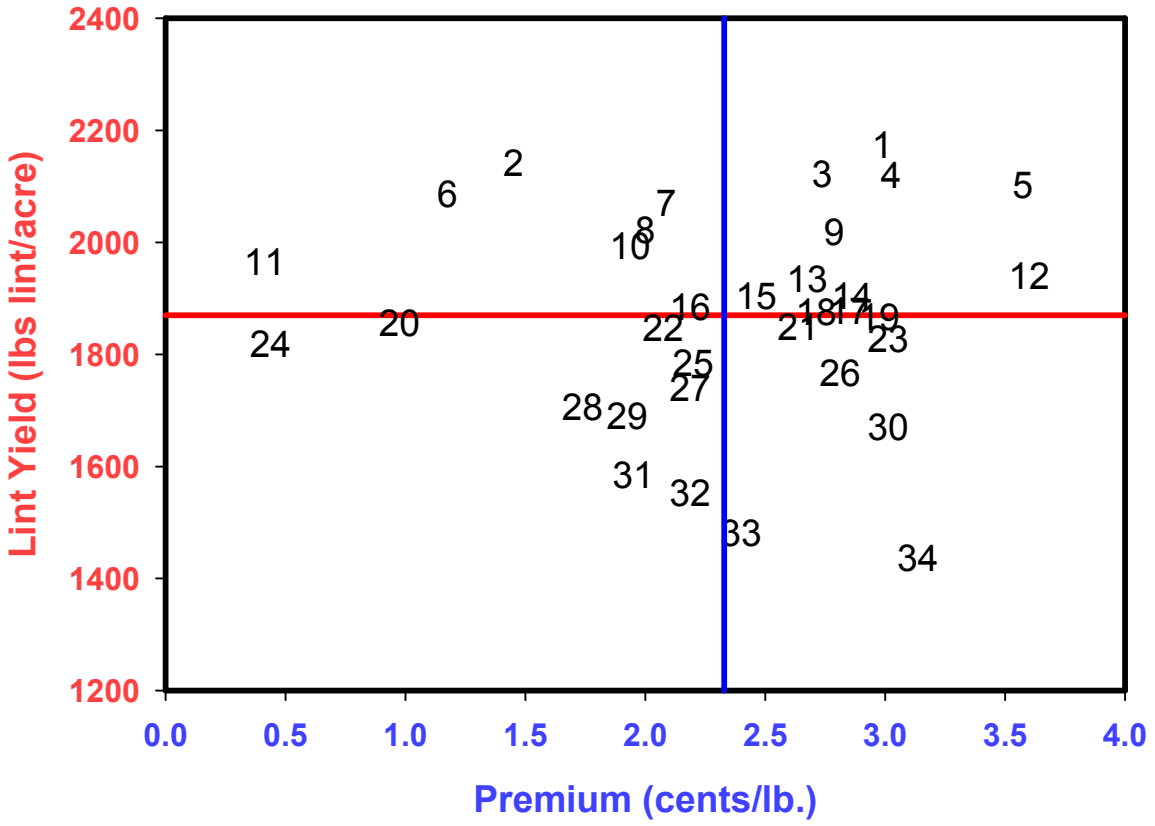
Seed Company	Variety	Lint Yield (lbs/acre)	Yield Means	Percent Lint	Color Grade	Staple (32nds)	Micronaire	Strength (g/tex)	Length (in.)	Leaf Grade	Uniformity Index (%)	Premium (cents/lb)	Value * ($/acre)
Monsanto/Deltapine	**DP1549B2XF**	2,172.7	a	37.1	41	36	4.6	32.1	1.13	3	81.3	3.0	$1,194.69
Bayer/Stoneville	**ST4949GLT**	2,140.1	a	39.0	41	36	4.7	30.3	1.13	4	82.3	1.5	$1,146.09
Dow/Phytogen	**PX4533-18WRF**	2,121.7	ab	38.4	41	37	4.6	30.9	1.15	3	82.5	2.7	$1,161.34
Bayer	**BX1638GLT**	2,119.0	ab	36.2	41	38	4.6	33.5	1.17	3	81.7	3.0	$1,165.98
Bayer/Stoneville	**ST6182GLT**	2,100.7	abc	40.7	41	36	4.8	29.4	1.13	3	81.4	3.6	$1,167.02
Monsanto/Deltapine	**DP1639B2XF**	2,086.2	abc	38.3	41	37	5.1	33.0	1.16	3	82.7	1.2	$1,109.37
Dow/Phytogen	**PX5590-01WRF**	2,068.8	abcd	37.8	41	37	4.5	32.7	1.14	4	82.2	2.1	$1,119.00
Monsanto/Deltapine	**15R535B2XF**	2,020.6	bcde	39.9	41	36	4.8	29.9	1.14	3	81.3	2.0	$1,090.37
Bayer/Stoneville	**ST4946GLB2**	2,017.5	bcdef	35.3	41	36	4.5	31.9	1.14	3	82.1	2.8	$1,105.29
NexGen/Americot	**NG3405B2XF**	1,993.2	cdefg	36.5	41	35	4.4	27.6	1.09	3	81.6	1.9	$1,075.02
Monsanto/Deltapine	**DP1614B2XF**	1,964.1	defgh	38.3	41	37	5.1	30.3	1.17	4	82.5	0.4	$1,030.19
NexGen/Americot	**NG5007B2XF**	1,939.2	efghi	38.4	41	37	4.5	29.3	1.15	3	81.4	3.6	$1,078.64
Monsanto/Deltapine	**15R556B2XF**	1,933.4	efghij	40.7	41	37	4.3	32.6	1.15	4	81.8	2.7	$1,057.08
Monsanto/Deltapine	**DP1646B2XF**	1,904.1	efghij	39.8	41	38	4.6	31.0	1.20	3	81.5	2.9	$1,044.68
NexGen/Americot	**NG3406B2XF**	1,902.2	fghij	36.7	41	36	4.5	30.1	1.12	3	81.9	2.5	$1,036.07
Bayer/FiberMax	**FM2334GLT**	1,883.6	ghijk	39.0	41	38	4.9	31.2	1.18	2	82.6	2.2	$1,019.95
Bayer/Stoneville	**ST4848GLT**	1,876.9	ghijkl	36.1	41	37	4.7	32.1	1.16	3	82.4	2.9	$1,029.46
Dow/Phytogen	**PHY499WRF**	1,874.8	hijkl	37.7	41	36	4.7	32.8	1.12	4	82.9	2.7	$1,025.52
Premium Cotton Genetics	**713-88-92**	1,865.9	hijkl	35.1	41	37	4.8	33.4	1.15	3	82.4	3.0	$1,025.80
Premium Cotton Genetics	**713-85-95**	1,855.8	hijklm	32.4	41	37	5.0	33.0	1.15	3	82.2	1.0	$982.89
Bayer/FiberMax	**FM1900GLT**	1,847.5	hijklm	34.7	41	37	4.6	33.6	1.17	4	81.8	2.6	$1,009.44
Monsanto/Deltapine	**DP1044B2RF**	1,846.0	ijklm	35.0	41	36	4.9	30.8	1.13	3	82.0	2.1	$998.47
Bayer/FiberMax	**FM1830B2RF**	1,826.5	ijklm	38.4	41	37	4.7	33.0	1.17	3	82.3	3.0	$1,004.78
Monsanto/Deltapine	**15R519B2XF**	1,817.2	jklmn	37.0	41	36	5.0	30.9	1.11	3	82.7	0.4	$952.89
Monsanto/Deltapine	**15R513B2XF**	1,783.1	klmno	36.8	41	36	4.8	29.8	1.14	4	82.1	2.2	$966.58
Bayer/Stoneville	**ST5115GLT**	1,766.4	lmno	34.9	41	36	4.6	31.7	1.13	3	81.5	2.8	$968.25
Bayer	**BX1634GLT**	1,739.6	mno	35.3	41	37	4.8	31.1	1.15	3	82.5	2.2	$942.85
Bayer/FiberMax	**FM2007GLT**	1,705.8	no	35.0	41	37	4.3	31.5	1.16	3	81.1	1.7	$916.99
Monsanto/Deltapine	**DP1612B2XF**	1,688.7	op	35.1	41	37	4.6	32.1	1.16	4	82.2	1.9	$910.77
Monsanto/Deltapine	**15R511B2XF**	1,668.8	op	34.6	41	37	4.2	31.3	1.16	3	80.8	3.0	$918.04
Monsanto/Deltapine	**15R525B2XF**	1,584.0	pq	35.5	41	38	4.9	32.0	1.18	4	81.7	2.0	$854.32
Premium Cotton Genetics	**717-84-91**	1,551.5	qr	30.2	41	35	4.7	30.9	1.10	3	81.6	2.2	$840.75
Premium Cotton Genetics	**717-804-901**	1,480.8	qr	30.7	41	36	4.6	31.2	1.10	3	81.9	2.4	$805.50
Dow/Phytogen	**PHY764WRF**	1,434.6	r	34.2	41	37	4.4	37.5	1.17	3	83.3	3.1	$790.98
Average		**1,870.0**		**36.5**	**----**	**37**	**4.7**	**31.6**	**1.15**	**3**	**82.0**	**2.3**	**$1,016.03**
LSD§		**117.2**		**1.4**	**---**	**1**	**0.2**	**1.3**	**0.02**	**1**	**0.7**	**1.40**	**$70.75**
OSL†		**<0.0001**		**<0.0001**	**---**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0006**	**<0.0001**
CV‡		**4.5**		**2.7**	**---**	**1.4**	**2.6**	**3.0**	**1.2**	**16.0**	**0.6**	**43.4**	**5.0**

* Value calculated from CCC loan schedule base price of $0.52/lb + premium/discount

§ Least Significant Difference

† Observed Significance Level

‡ Coefficient of Variation



1DP1549B2XF	1315R556B2XF	2515R513B2XF
2ST4949GLT	14DP1646B2XF	26ST5115GLT
3PX4533-18WRF	15NG3406B2XF	27BX1634GLT
4BX1638GLT	16FM2334GLT	28FM2007GLT
5ST6182GLT	17ST4848GLT	29DP1612B2XF
6DP1639B2XF	18PHY499WRF	3015R511B2XF
7PX5590-01WRF	19713-88-92	3115R525B2XF
815R535B2XF	20713-85-95	32717-84-91
9ST4946GLB2	21FM1900GLT	33717-804-901
10NG3405B2XF	22DP1044B2RF	34PHY764WRF
11DP1614B2XF	23FM1830B2RF	
12NG5007B2XF	2415R519B2XF	

Figure 2. Lint yield (lbs/acre) plotted as a function of fiber quality premium/discount (cents/lb). Vertical and horizontal lines represent the mean value for the two parameters. Varieties that fall in the upper right quadrant formed by the mean lines produced higher than average lint yield and fiber quality. Each of the varieties and advanced strain entries are plotted for the Maricopa, AZ location in 2015.

Table 6. Early season emergence and vigor evaluations (0-9 scale with 9 being best) and early bloom plant height and nodes above white flower for each entry planted in the Advanced Strain evaluation in Safford, AZ, 2015.

Seed Company	Variety	Plants per Foot	Seedling Vigor*	Plant Height	NAWF**
Premium Cotton Genetics	**713-88-91**	3.5	6.3	30.7	6.3
Premium Cotton Genetics	**727-86-93**	3.4	6.3	30.0	6.8
Monsanto/Deltapine	**15R513B2XF**	4.0	6.3	30.0	6.1
Premium Cotton Genetics	**713-87-95**	4.1	6.5	29.3	6.2
Dow/Phytogen	**PHY499WRF**	3.9	6.3	29.3	6.2
NexGen/Americot	**NG3405B2XF**	3.5	5.5	29.3	6.0
Monsanto/Deltapine	**15R511B2XF**	3.4	6.0	29.1	6.1
Monsanto/Deltapine	**DP1646B2XF**	3.1	4.3	29.0	6.5
Dow/Phytogen	**PX5590-01WRF**	3.8	6.3	28.9	7.0
Bayer/FiberMax	**FM1830B2RF**	3.5	5.8	28.3	6.9
NexGen/Americot	**NG3406B2XF**	4.0	6.8	28.2	5.8
Bayer/Stoneville	**ST6182GLT**	2.8	4.5	28.0	6.5
Bayer/Stoneville	**ST4946GLB2**	4.3	6.8	28.0	5.7
Monsanto/Deltapine	**DP1044B2RF**	3.6	5.3	28.0	6.4
Bayer/Stoneville	**ST5115GLT**	3.8	6.0	27.8	6.1
Bayer	**BX1638GLT**	3.6	6.0	27.7	6.1
Monsanto/Deltapine	**DP1639B2XF**	3.0	5.0	27.7	6.1
Premium Cotton Genetics	**727-87-94**	3.4	6.0	27.7	6.3
Monsanto/Deltapine	**DP1549B2XF**	3.3	5.3	27.5	7.3
Bayer/FiberMax	**FM1900GLT**	3.3	5.8	27.3	6.0
NexGen/Americot	**NG5007B2XF**	2.7	5.5	27.3	6.8
Bayer/FiberMax	**FM2007GLT**	3.9	5.5	27.2	6.6
Dow/Phytogen	**PX4533-18WRF**	4.9	7.3	27.2	6.0
Monsanto/Deltapine	**15R556B2XF**	2.7	4.8	27.1	6.5
Monsanto/Deltapine	**15R519B2XF**	4.0	6.0	26.9	5.8
Bayer/FiberMax	**FM2334GLT**	3.1	5.3	26.8	6.4
Monsanto/Deltapine	**15R525B2XF**	2.8	5.0	26.6	7.0
Dow/Phytogen	**PHY764WRF**	1.9	4.3	26.5	6.5
Monsanto/Deltapine	**DP1612B2XF**	3.7	6.0	26.4	5.8
Bayer	**BX1637GLT**	3.6	6.3	25.9	5.7
Monsanto/Deltapine	**DP1614B2XF**	3.0	4.5	25.7	6.2
Bayer	**BX1636GLT**	4.1	6.3	25.4	5.6
Monsanto/Deltapine	**15R535B2XF**	2.9	4.8	25.0	5.8
Bayer/FiberMax	**FM1911GLT**	4.0	6.5	24.1	5.7
Average		**3.5**	**5.7**	**27.6**	**6.2**

*Seedling vigor evaluated on a scale of 1-9 with 9 being the highest vigor.

**NAWF - Nodes Above White Flower. Total number of nodes above the uppermost, first position fresh bloom.

Table 7. Yield and fiber quality data along with statistical analysis for each of the varieties and advanced strains evaluated in Safford, AZ, 2015.

Seed Company	Variety	Lint Yield (lbs/acre)	Yield Means	Percent Lint	Color Grade	Staple (32nds)	Micronaire	Strength (g/tex)	Length (in.)	Leaf Grade	Uniformity Index (%)	Premium (cents/lb)	Value * ($/acre)
Dow/Phytogen	**PX5590-01WRF**	555.4	a	37.5	41	35	3.3	30.5	1.09	5	80.0	-3.2	$270.69
Bayer/FiberMax	**FM1911GLT**	522.5	ab	36.3	41	36	2.8	29.2	1.13	4	78.5	-6.2	$239.22
Bayer/Stoneville	**ST4946GLB2**	516.4	abc	35.6	41	36	2.7	28.5	1.12	4	78.9	-6.1	$236.72
Bayer	**BX1636GLT**	504.5	abcd	36.3	41	36	2.5	27.0	1.13	4	76.8	-9.4	$215.31
Premium Cotton Genetics	**727-87-94**	494.7	abcde	33.0	41	35	3.2	29.2	1.09	3	79.1	-1.9	$247.69
Monsanto/Deltapine	**DP1646B2XF**	493.1	abcde	38.1	41	36	3.3	28.3	1.12	4	78.0	-0.4	$254.25
Monsanto/Deltapine	**15R511B2XF**	487.4	bcde	35.4	51	37	2.9	28.8	1.14	4	79.2	-6.2	$223.16
NexGen/Americot	**NG3406B2XF**	483.8	bcde	36.7	41	35	2.9	27.9	1.10	4	79.2	-5.7	$223.97
Dow/Phytogen	**PX4533-18WRF**	480.7	bcdef	35.3	41	35	2.8	26.4	1.09	4	78.7	-6.4	$219.93
Monsanto/Deltapine	**15R513B2XF**	459.8	bcdefg	34.9	41	36	3.0	26.3	1.12	4	78.5	-5.9	$212.11
Bayer	**BX1637GLT**	454.4	cdefg	35.6	41	36	2.6	29.0	1.13	4	77.5	-8.5	$197.28
Bayer/FiberMax	**FM2334GLT**	453.6	cdefg	38.1	41	37	3.4	29.2	1.15	3	79.4	-0.4	$233.90
Bayer/FiberMax	**FM2007GLT**	449.9	defg	33.3	41	36	2.9	28.9	1.11	4	78.0	-4.8	$211.62
Premium Cotton Genetics	**727-86-93**	449.4	defgh	33.6	51	36	3.1	28.9	1.11	3	79.1	-4.2	$214.36
Bayer/FiberMax	**FM1900GLT**	447.4	defgh	35.0	41	36	2.7	28.8	1.13	5	78.5	-7.3	$199.84
Monsanto/Deltapine	**15R556B2XF**	442.2	defghi	39.3	41	35	3.3	28.8	1.08	5	78.9	-4.3	$210.86
Premium Cotton Genetics	**713-87-95**	435.2	efghij	30.7	51	36	2.8	27.2	1.14	4	77.5	-7.4	$194.31
Bayer/FiberMax	**FM1830B2RF**	435.0	efghij	36.3	51	37	3.1	29.3	1.15	4	79.1	-4.3	$208.94
Monsanto/Deltapine	**15R535B2XF**	418.1	fghijk	39.1	41	34	3.2	26.6	1.07	3	78.2	-3.5	$202.58
Monsanto/Deltapine	**DP1612B2XF**	413.8	ghijk	36.8	41	36	3.0	29.9	1.11	5	79.0	-6.1	$189.46
Premium Cotton Genetics	**713-88-91**	408.4	ghijkl	32.2	41	35	3.1	28.1	1.11	4	79.5	-4.4	$193.96
Bayer/Stoneville	**ST6182GLT**	399.0	ghijklm	40.8	41	35	3.1	25.8	1.07	3	77.7	-5.3	$186.03
Dow/Phytogen	**PHY499WRF**	397.7	ghijklm	35.3	41	35	2.8	29.0	1.09	5	79.4	-7.5	$176.52
Monsanto/Deltapine	**DP1549B2XF**	397.4	ghijklm	36.6	41	35	3.1	28.7	1.08	3	78.4	-3.7	$190.65
Monsanto/Deltapine	**15R519B2XF**	383.8	hijklm	37.3	41	34	3.3	26.4	1.05	4	79.8	-5.1	$180.35
Monsanto/Deltapine	**DP1044B2RF**	377.4	hijklmn	34.7	41	35	3.0	28.3	1.08	4	79.0	-7.1	$168.91
NexGen/Americot	**NG5007B2XF**	372.7	jklmn	36.3	41	34	3.2	25.2	1.07	3	78.5	-5.7	$172.48
NexGen/Americot	**NG3405B2XF**	368.6	klmn	35.3	41	34	2.7	25.3	1.06	3	77.8	-10.3	$154.91
Monsanto/Deltapine	**15R525B2XF**	366.0	klmn	36.6	51	36	3.4	27.5	1.12	5	78.6	-4.7	$173.47
Bayer/Stoneville	**ST5115GLT**	350.3	lmn	34.9	41	35	2.6	28.3	1.08	4	77.5	-9.1	$150.56
Dow/Phytogen	**PHY764WRF**	337.1	mn	35.1	51	36	2.9	31.2	1.12	4	79.3	-6.5	$153.81
Monsanto/Deltapine	**DP1614B2XF**	335.6	mn	36.6	41	36	3.4	27.6	1.11	4	78.9	-2.2	$167.58
Bayer	**BX1638GLT**	317.1	n	32.9	41	35	2.6	26.9	1.10	3	76.9	-7.4	$141.55
Monsanto/Deltapine	**DP1639B2XF**	312.1	n	36.3	41	35	3.3	29.2	1.09	4	80.3	-1.3	$158.90
Average		**427.1**		**35.8**	**---**	**35**	**3.0**	**28.1**	**1.10**	**4**	**78.6**	**-5.4**	**$199.29**
LSD§		**65.7**		**1.7**	**---**	**1**	**0.2**	**1.2**	**0.02**	**1**	**1.0**	**3.30**	**$33.11**
OSL†		**<0.0001**		**<0.0001**	**---**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
CV‡		**11**		**3.3**	**---**	**1.7**	**5.1**	**3.0**	**1.6**	**14.6**	**0.9**	**44.3**	**11.8**

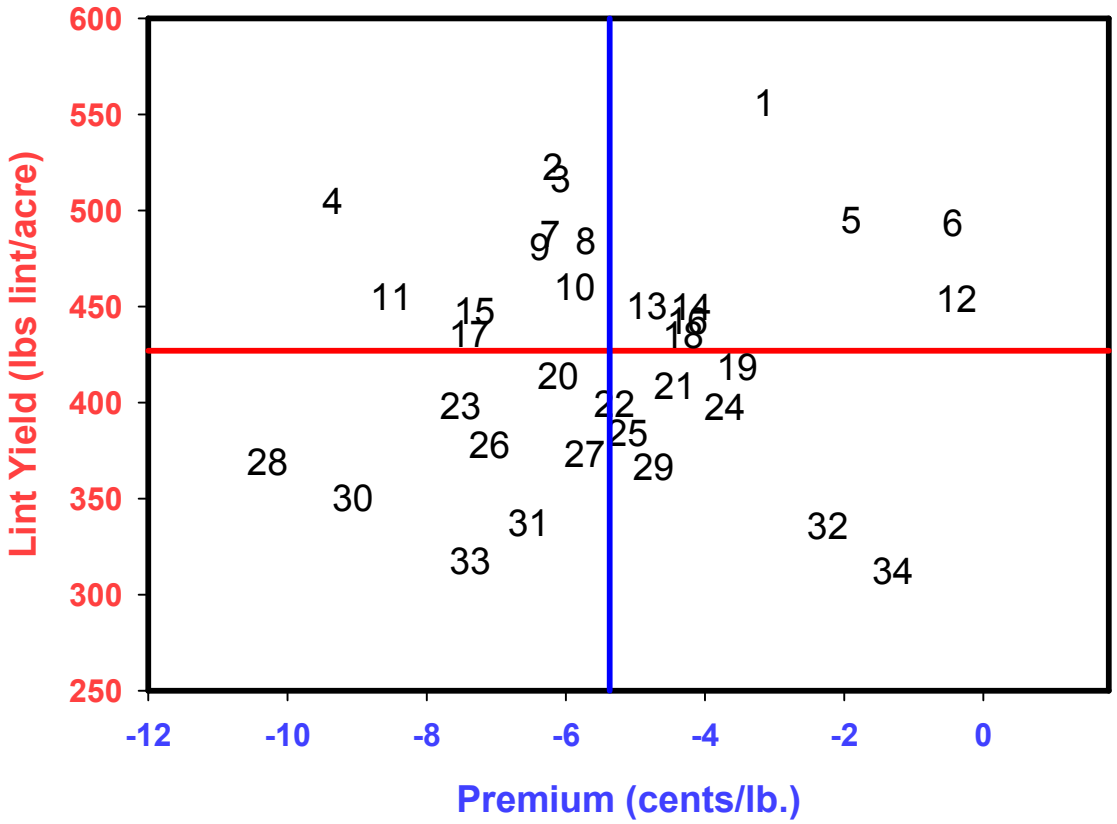
* Value calculated from CCC loan schedule base price of $0.52/lb + premium/discount

§ Least Significant Difference

† Observed Significance Level

‡ Coefficient of Variation

**This field was significantly impacted by a hail event on 11 August 2015



1PX5590-01WRF	13FM2007GLT	2515R519B2XF
2FM1911GLT	14727-86-93	26DP1044B2RF
3ST4946GLB2	15FM1900GLT	27NG5007B2XF
4BX1636GLT	1615R556B2XF	28NG3405B2XF
5727-87-94	17713-87-95	2915R525B2XF
6DP1646B2XF	18FM1830B2RF	30ST5115GLT
715R511B2XF	1915R535B2XF	31PHY764WRF
8NG3406B2XF	20DP1612B2XF	32DP1614B2XF
9PX4533-18WRF	21713-88-91	33BX1638GLT
1015R513B2XF	22ST6182GLT	34DP1639B2XF
11BX1637GLT	23PHY499WRF	
12FM2334GLT	24DP1549B2XF	

Figure 3. Lint yield (lbs/acre) plotted as a function of fiber quality premium/discount (cents/lb). Vertical and horizontal lines represent the mean value for the two parameters. Varieties that fall in the upper right quadrant formed by the mean lines produced higher than average lint yield and fiber quality. Each of the varieties and advanced strain entries are plotted for the Safford, AZ location in 2015.