

# 2006 Upland Cotton Variety Evaluations in Southeastern Arizona

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## Abstract

*Two separate Upland cotton variety evaluations were conducted in southeastern Arizona during the 2006 cotton growing season. One location was in Graham County (Thatcher), while the second location was in Cochise County (Kansas Settlement). Sixteen varieties were planted at the Thatcher and ten varieties were selected and planted at the Kansas Settlement location. Varieties ranged in maturity from early to full at each of the locations. All plots were arranged in a randomized complete block design with four replications. Both locations were planted on grower-cooperator fields and were managed in accordance to the individual grower styles. Plant measurements were collected over the course of the season at only the Thatcher location. Lint yield was determined by harvesting the entire plot at each location and weighing the resultant seedcotton. Sub-samples were collected also at the time of harvest for percent lint estimates and fiber quality analysis. Crop value was calculated multiplying the lint yield by a lint price determined by a base value of \$0.52/lb plus any discounts or premiums based upon fiber quality. Lint yield levels at both locations were high ranging from 1200 to just over 1900 lbs. lint/acre with a new Acala variety from Phytogen (PHY745WRF) producing the highest yield and also the highest crop value at the Thatcher location. In Kansas Settlement lint yields ranged from 1000 to over 1500 lbs. lint/acre with the highest lint yield and total crop value being produced again by the new Acala variety from Phytogen (PHY745WRF).*

## Introduction

One of the most important decisions that a cotton producer makes ever year, that has a tremendous effect on the rest of the season, is variety selection. Selection of a properly adapted variety and appropriately timed planting is critical to achieving optimum returns in a cotton production system. The rising cost of seed and technology fees that accompany many of the commonly planted varieties places an ever increasing level of importance on making the right decision for a particular farm. There are many choices available to a grower today which make the task of variety selection that much more difficult.

Several sources may provide information on variety evaluations but it is critical to have regionally based information and, whenever possible, to base a decision on multiple years of evaluation for a particular variety. That is not always possible but should be done to the extent possible. The University of Arizona conducts a thorough evaluation of commercially available cotton varieties in several regions around the state. One of those regions is southeastern Arizona which includes Graham and Cochise counties. The tests provide an unbiased evaluation of available varieties. These tests are almost exclusively conducted in grower-cooperator fields which provide for an added dimension of applicability to the local producers.

## Materials and Methods

### Thatcher Location

The evaluation conducted at the Thatcher location included 16 varieties with a variety of transgenic traits. Table 1 lists the varieties along with their associated transgenic traits. These varieties were planted on 28 April 2006 in four, 38" row plots that extended the full length of the irrigation run of approximately 1,260 feet. Each variety was replicated four times in a randomized complete block design. Plant measurements

were collected over the course of the growing season to evaluate crop growth and development. These measurements included: plant height, number of mainstem nodes, position of the first fruiting branch, number of retained fruiting structures on the first two positions of each fruiting branch, and number of nodes above the top, first position, fresh bloom.

### **Kansas Settlement Location**

A total of 10 varieties were included in the Cochise County evaluation (Table 2). Varieties were planted on 18 April 2006 in four, 30" row plots that extended the full length of the irrigation run (1130 feet). The irrigation system at the Kansas Settlement location was a sub-surface drip irrigation system. Plots were arranged in a randomized complete block design with four replications. Due to lack of labor and distance, plant measurements were not collected.

At both locations yield estimates were made by harvesting the entire experimental plot and weighing the resultant seedcotton with a cotton weigh wagon equipped with load cells. Sub samples were collected from each experimental unit that was subsequently cleaned and ginned at the University of Arizona Maricopa Agricultural Center ginning facility. Lint samples were then submitted to the USDA Phoenix Classing Office for HVI analysis to obtain fiber quality estimates. All yield and fiber quality data were analyzed according to procedures outlined by the SAS Institute including analysis of variance and means separation using a Fisher's least significant difference test.

The value for each of the varieties was calculated by calculating a premium or discount using the USDA CCC loan schedule. This premium/discount is based upon fiber quality characteristics and is added to the base USDA loan rate of \$0.52 per pound. This price is multiplied by the lint yield to calculate a total value for that variety.

## **Results**

### **Thatcher**

Plant growth and development data revealed height to node ratios that trended slightly lower than average throughout the season (Figure 1). The Stoneville varieties ST5242BR and ST6565B2RF had slightly taller plant structure resulting in higher height to node ratios (Figure 1). This slightly lower than average vigor was due in part to the exceptionally high fruit retention (FR) levels for all varieties in this trial across the course of the season (Figure 2). Lint yield levels ranged from 1200 to just over 1900 lbs. lint/acre (Table 3). A new variety introduced by Phytogen containing the Widestrike™ gene and RoundupReady Flex™ technology produced both the highest lint and the greatest crop value (Table 3). Two varieties from Deltapine (DP455BR and DP164B2RF) and one variety from Stoneville (ST5242BR) also produced high lint yields and crop values in this evaluation. Figures 3-5 provide a graphical depiction of the yield and fiber quality data for this location. Figure 6 is a scatter plot of lint yield versus fiber premium. Vertical and horizontal lines denote the mean of the evaluation for premium and lint yield respectively. These two lines form four quadrants on the graph. Varieties that place in the upper right quadrant demonstrated higher than average lint yield and fiber quality in this evaluation.

### **Kansas Settlement**

Lint yields among the ten varieties ranged from 1000 lbs/acre to over 1500 lbs/acre. A clear response among the varieties was observed in relation to variety maturity and lint yield (Table 4). Shorter season, more determinate type varieties performed significantly better than the more indeterminate type varieties. The highest lint yield and crop value was again produced by the new Phytogen variety (PHY745WRF) just as in the Graham County trial. Figures 7-9 provide a graphical depiction of the yield and fiber quality data for this location. Figure 10 is a scatter plot of lint yield versus fiber premium. Vertical and horizontal lines denote the mean of the evaluation for premium and lint yield respectively. These two lines form four

quadrants on the graph. Varieties that place in the upper right quadrant demonstrated higher than average lint yield and fiber quality in this evaluation.

Table 1. Listing of varieties with corresponding transgenic traits included in the Graham County Upland cotton variety evaluation in Thatcher, AZ, 2006.

<b>Variety</b>	<b>Company</b>	<b>Genetic Traits</b>
APEXB2RF	AllTex	Boll Gard II + Roundup Ready Flex
SUMMITB2RF	AllTex	Boll Gard II + Roundup Ready Flex
DP143B2RF	Delta and Pine Land	Boll Gard II + Roundup Ready Flex
DP164B2RF	Delta and Pine Land	Boll Gard II + Roundup Ready Flex
DP455BR	Delta and Pine Land	Boll Gard + Roundup Ready
DP655BR	Delta and Pine Land	Boll Gard + Roundup Ready
FM9063B2RF	FiberMax	Boll Gard II + Roundup Ready Flex
FM991BR	FiberMax	Boll Gard + Roundup Ready
PSC370WR	Phytogen	Wide Strike + Roundup Ready
PSC485WRF	Phytogen	Wide Strike + Roundup Ready Flex
PSC745WRF	Phytogen	Wide Strike + Roundup Ready Flex
ST4357B2RF	Monsanto/Stoneville	Boll Gard II + Roundup Ready Flex
ST4554B2RF	Monsanto/Stoneville	Boll Gard II + Roundup Ready Flex
ST5242BR	Monsanto/Stoneville	Boll Gard + Roundup Ready
ST6565B2RF	Monsanto/Stoneville	Boll Gard II + Roundup Ready Flex
ST6611BR	Monsanto/Stoneville	Boll Gard + Roundup Ready

Table 2. Listing of varieties with corresponding transgenic traits included in the Cochise County Upland cotton variety evaluation in Kansas Settlement, AZ, 2006

<b>Variety</b>	<b>Company</b>	<b>Genetic Traits</b>
DP164B2RF	Delta and Pine Land	Boll Gard II + Roundup Ready Flex
DP455BR	Delta and Pine Land	Boll Gard + Roundup Ready
DP655BR	Delta and Pine Land	Boll Gard + Roundup Ready
FM9063RF	FiberMax	Roundup Ready Flex
PSC370WR	Phytogen	Wide Strike + Roundup Ready
PSC485WRF	Phytogen	Wide Strike + Roundup Ready Flex
PSC745WRF	Phytogen	Wide Strike + Roundup Ready Flex
ST4357B2RF	Monsanto/Stoneville	Boll Gard II + Roundup Ready Flex
ST4554B2RF	Monsanto/Stoneville	Boll Gard II + Roundup Ready Flex
ST6565B2RF	Monsanto/Stoneville	Boll Gard II + Roundup Ready Flex

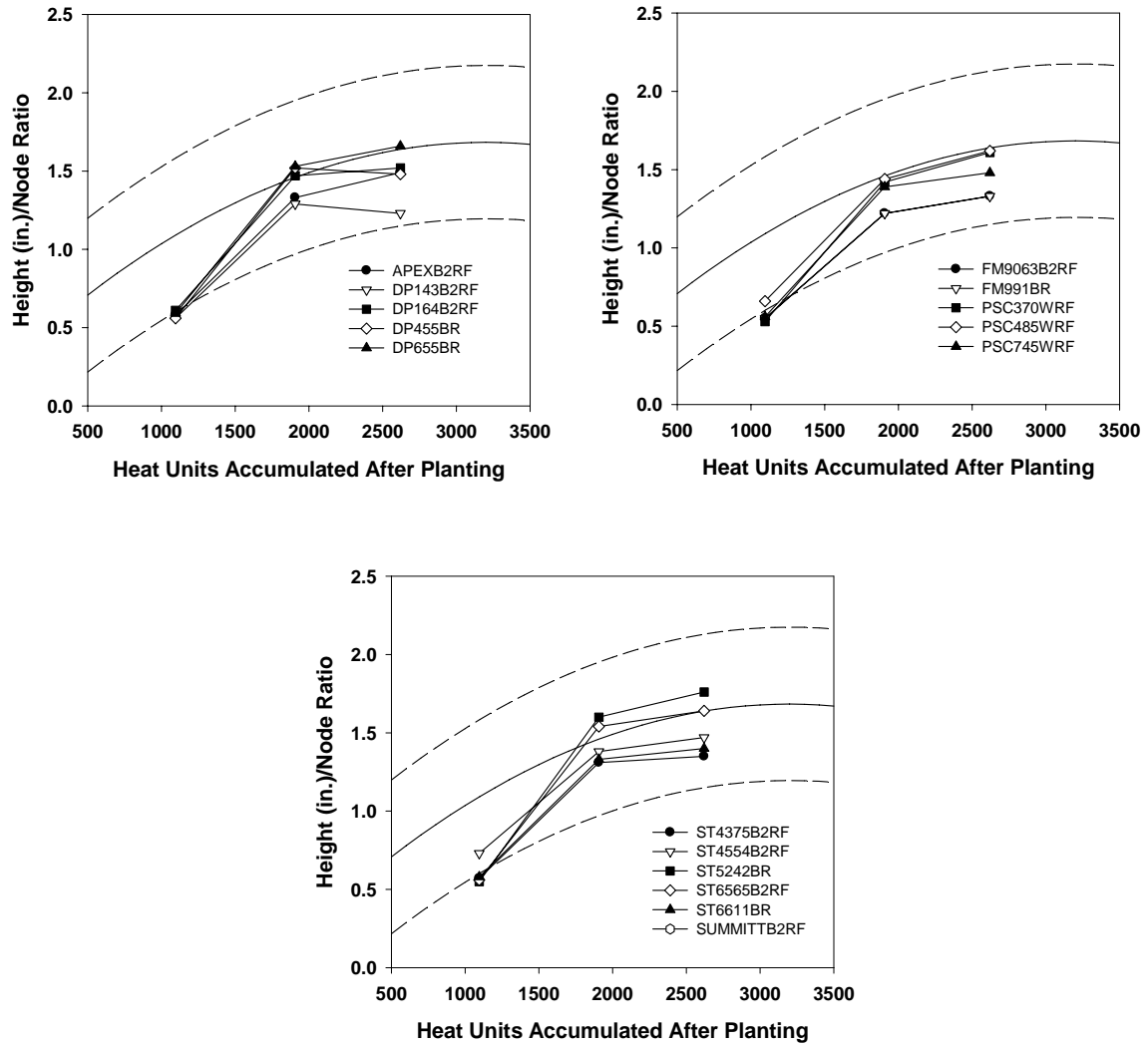


Figure 1. Height to node ratio levels for each of the 16 varieties entered into the Graham County Upland cotton variety test, Thatcher, AZ, 2006.

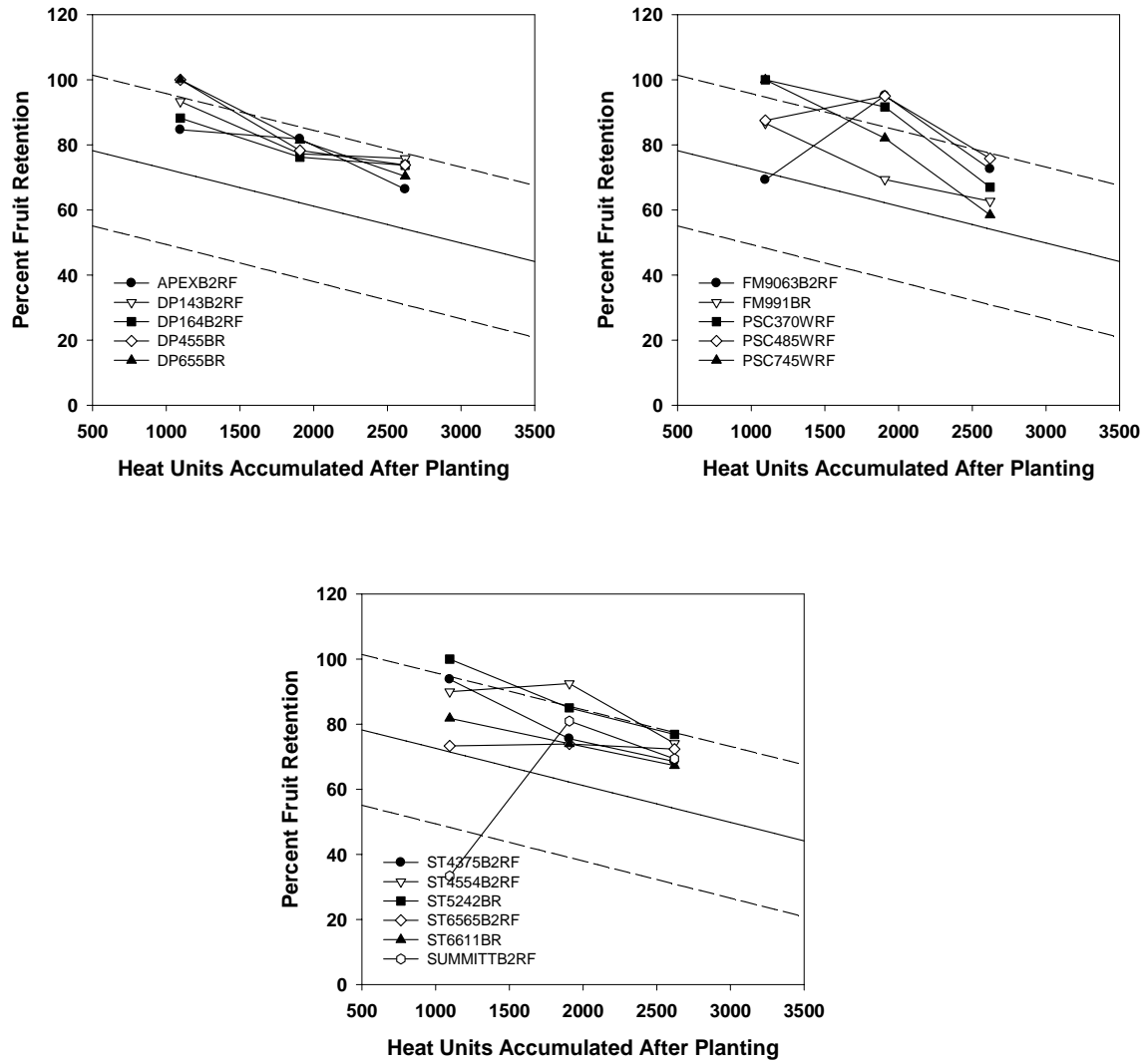


Figure 2. Percent fruit retention levels for each of the 16 varieties entered into the Graham County Upland cotton variety test, Thatcher, AZ, 2006.

Table 3. Lint yield and fiber quality results for the advanced strain trial conducted in Thatcher, AZ, 2006.

Seed Company	Variety	Lint Yield lbs/acre	Means Separation*	Lint Turnout Percent	HVI Color	Staple 32nds	Strength g/tex	Uniformity Percent	Micronaire	Leaf Grade	Premium cent/lb	Value \$/acre
Phytogen	PSC745WRF	1859.9	a	36.5	31	37.7	29.6	81.9	3.6	4	2.85	1020.47
Delta and Pine	DP455BR	1701.2	b	41.7	21	36.7	28.6	80.0	3.7	2	6.95	1002.74
Delta and Pine	DP164B2RF	1645.7	b c	37.3	21	37.3	28.8	80.0	3.4	3	4.27	925.05
Stoneville	ST5242BR	1606.4	c	39.7	21	35.7	26.1	80.6	3.7	3	5.80	928.44
FiberMax	FM9063B2RF	1494.6	d	37.3	21	39.7	30.3	80.8	3.7	2	6.93	880.72
Delta and Pine	DP655BR	1487.7	d	37.2	21	37.3	29.1	81.5	3.4	3	5.00	847.43
FiberMax	FM991BR	1487.0	d	36.8	21	38.0	29.9	81.2	3.7	2	7.12	878.83
Stoneville	ST4554B2RF	1474.0	d e	38.0	21	36.3	26.8	80.0	3.9	4	3.63	820.09
Delta and Pine	DP143B2RF	1389.3	e f	36.6	31	39.0	28.2	80.1	3.3	5	-2.57	686.31
Phytogen	PSC485WRF	1378.2	f	36.0	31	37.0	27.1	81.6	3.9	6	-3.18	673.06
AllTex	APEXB2RF	1336.9	f g	36.3	31	38.7	26.4	80.2	3.4	3	3.78	745.93
AllTex	SUMMITB2RF	1333.5	f g	36.2	31	36.7	25.4	79.9	3.3	3	2.32	724.01
Stoneville	ST4357B2RF	1325.3	f g h	36.1	31	37.3	26.5	80.2	3.0	4	-1.50	671.24
Stoneville	ST6611BR	1278.7	g h	34.9	21	37.7	28.6	80.4	3.4	3	3.55	711.49
Stoneville	ST6565B2RF	1242.8	h	34.6	31	38.3	28.8	81.0	3.5	3	4.72	704.41
Phytogen	PSC370WR	1239.3	h	39.1	31	36.7	27.1	80.9	3.4	4	1.33	660.66
LSD§		87.4		1.1	---	0.8	1.4	NS	0.3	1	3.49	70.69
OSL†		0.0001		0.0001	---	0.0001	0.0001	0.1188	0.0004	0.0001	0.0001	0.0001
CV‡		3.6		1.7	---	1.3	2.9	1.1	5.6	18.6	65.7	5.3

\*Means followed by the same letter are not statistically different according to a Fisher's least significant difference means separation test.

§ Least Significant Difference

† Observed Significance Level

‡ Coefficient of Variation

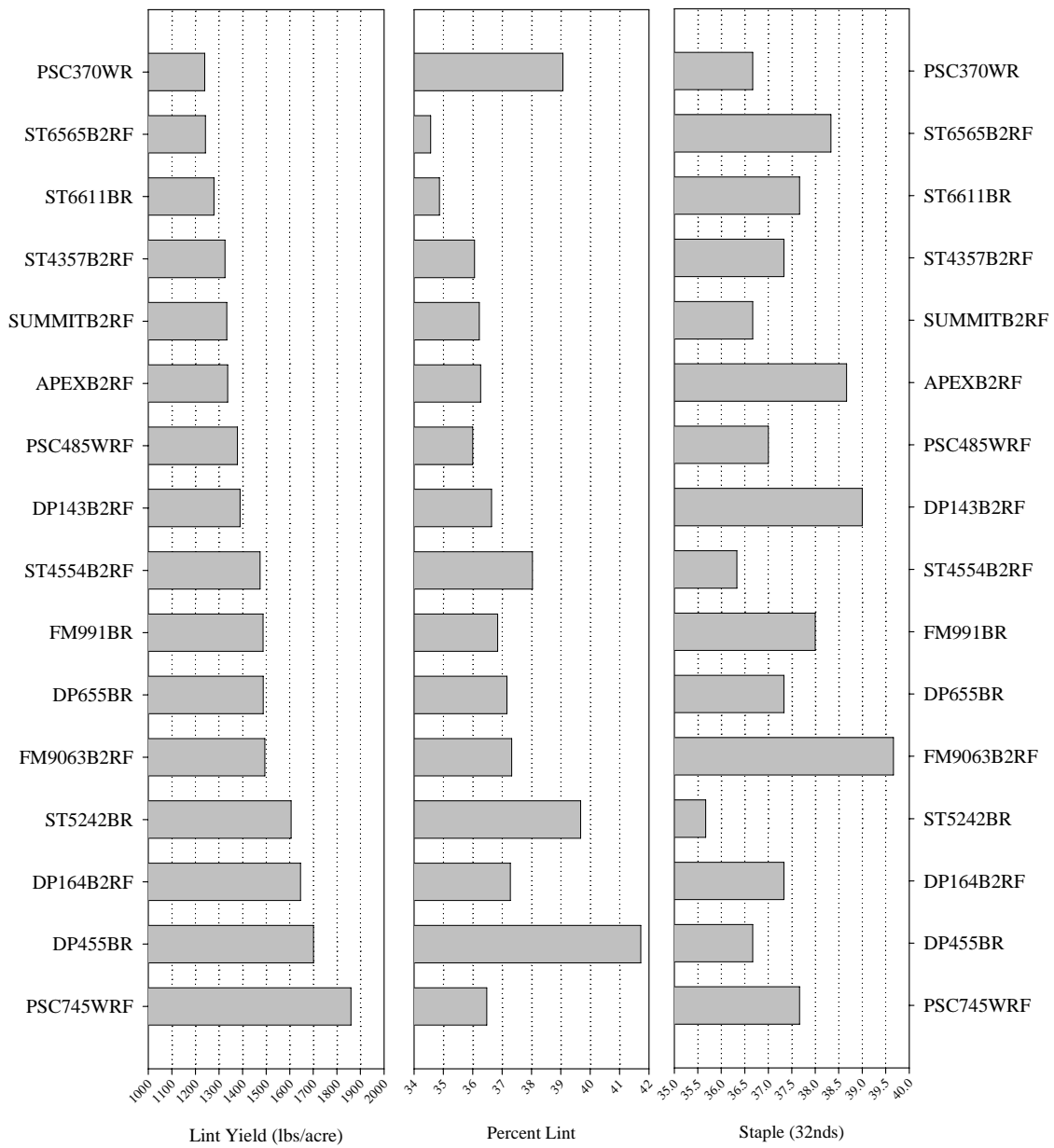


Figure 3. Lint yield, percent lint, and staple length for each of the 16 varieties entered into the Graham County Upland cotton variety test, Thatcher, AZ, 2006.



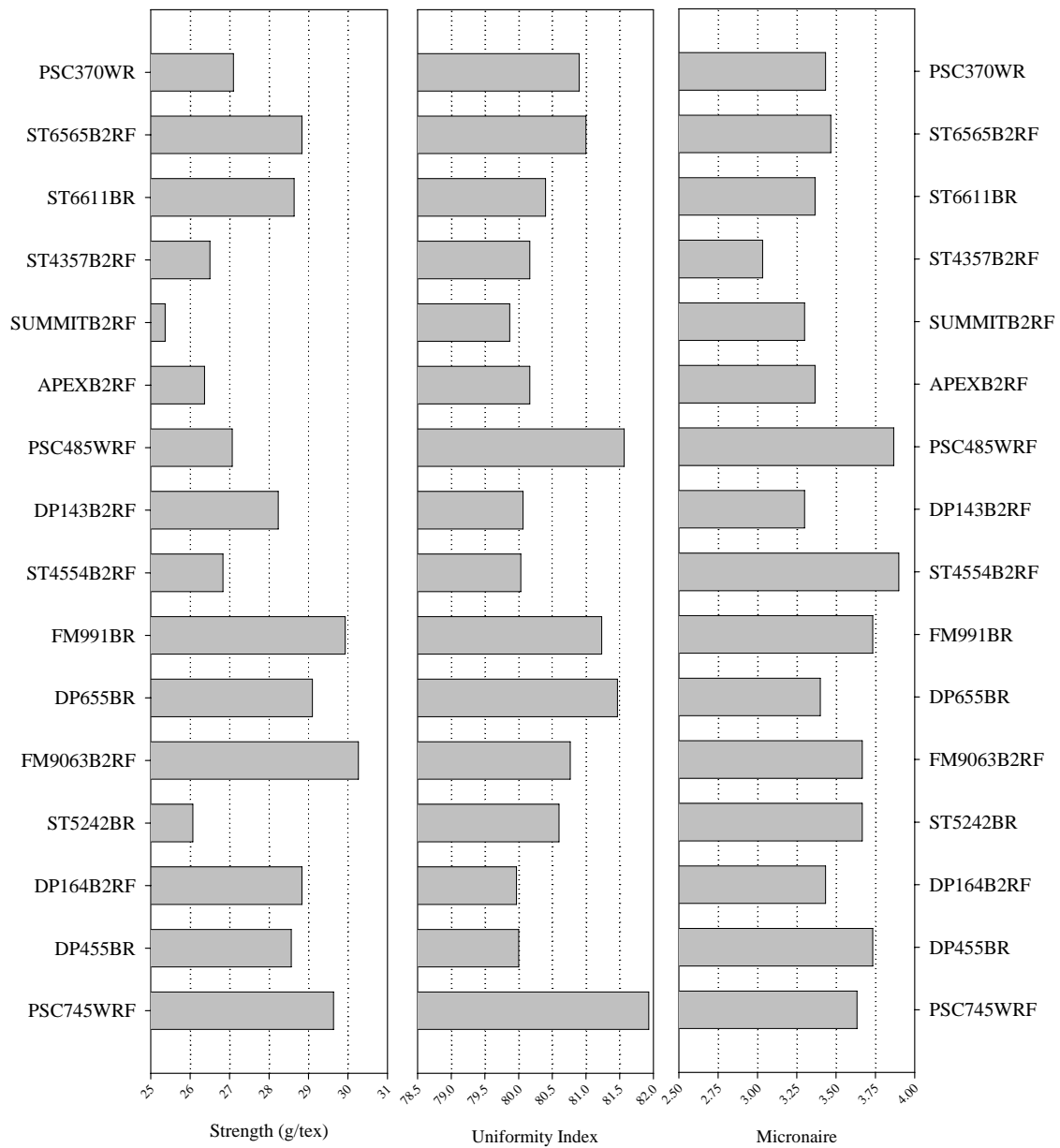


Figure 4. Fiber strength, fiber length uniformity index, and fiber micronaire for each of the 16 varieties entered into the Graham County Upland cotton variety test, Thatcher, AZ, 2006.

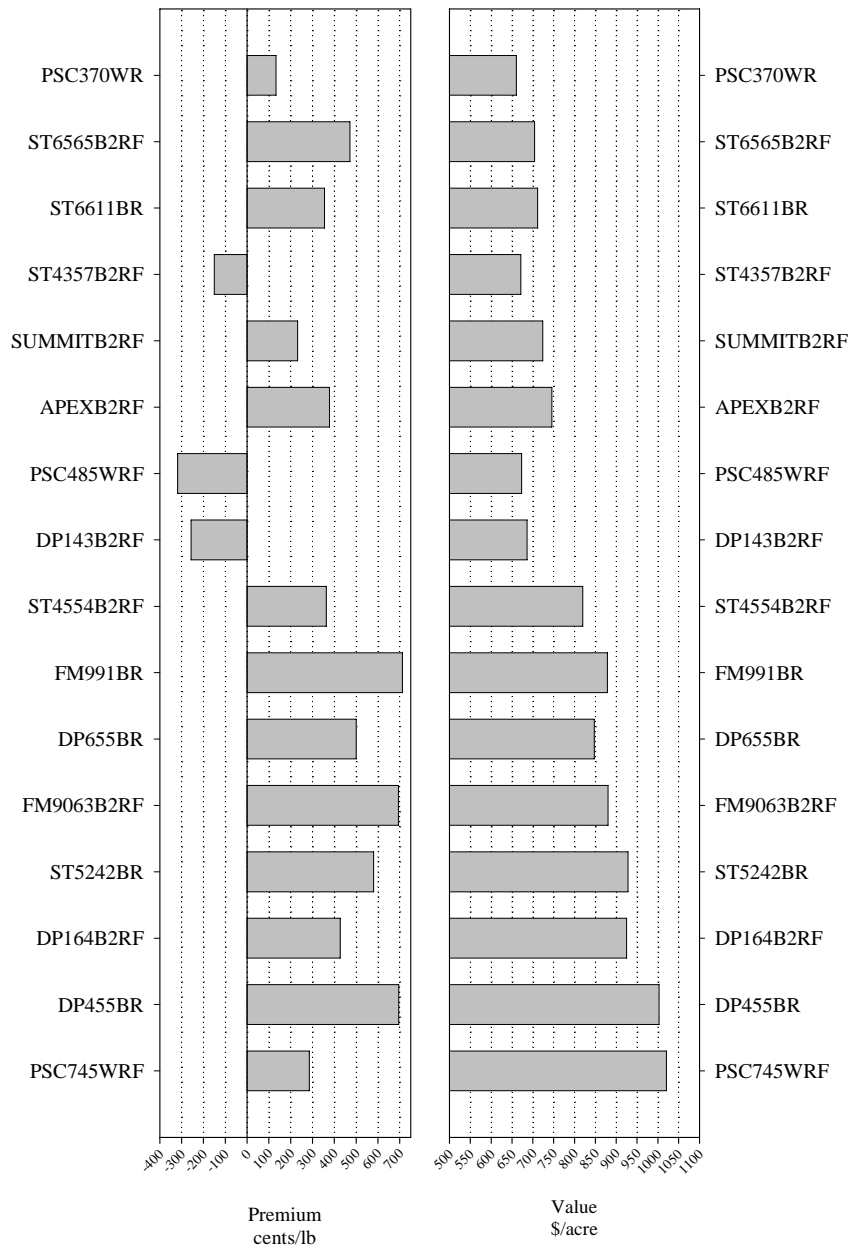


Figure 5. Premium associated with fiber quality, and total crop value for each of the 16 varieties entered into the Graham County Upland cotton variety test, Thatcher, AZ, 2006.

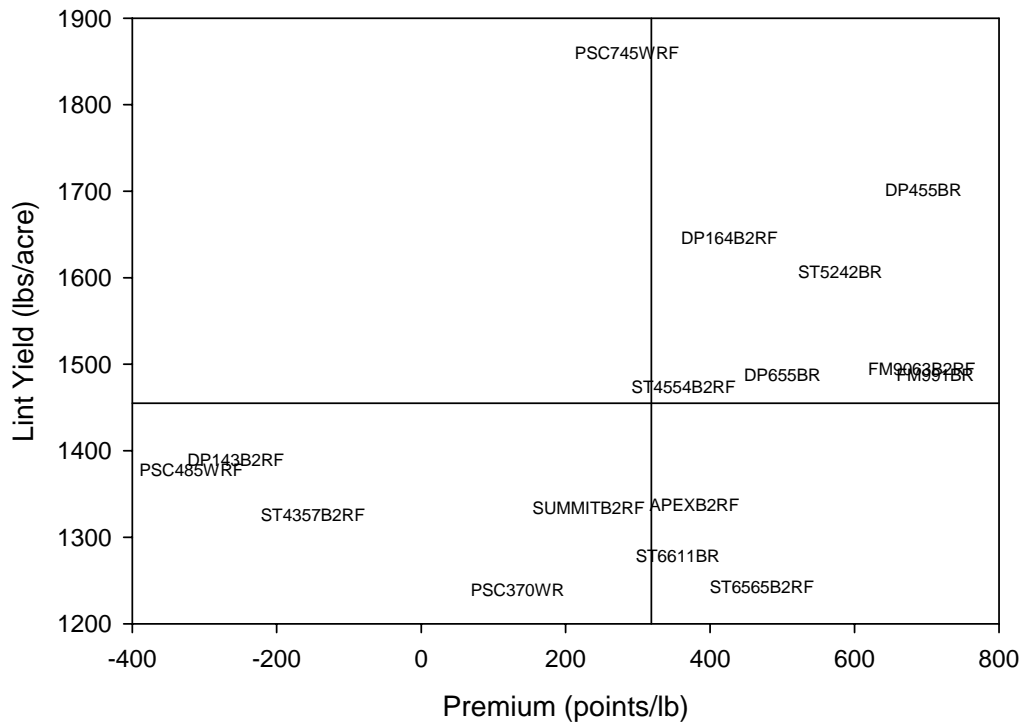


Figure 6. Lint yield plotted as a function of premium associated with fiber quality. Vertical and horizontal lines represent mean of premium and lint yield respectively. Varieties located in the upper right quadrant formed by the vertical and horizontal mean lines indicate better than average lint yield and fiber quality performance for the Graham County Upland variety test, Thatcher, AZ, 2006.

Table 4. Lint yield and fiber quality results for the advanced strain trial conducted in Cochise County, AZ, 2006.

Seed Company	Variety	Lint Yield	Means Separation*		Lint Turnout	HVI Color	Staple	Strength	Uniformity	Micronaire	Leaf Grade	Premium	Value
		lbs/acre			Percent		32nds	g/tex	Percent			cent/lb	\$/acre
Phytogen	PSC745WRF	1551.3	a		35.8	21	38.0	27.2	82.5	3.3	4	2.45	844.61
Stoneville	ST4554B2RF	1519.5	a		35.2	21	37.3	25.2	80.4	3.5	3	4.86	864.81
Phytogen	PSC370WR	1507.0	a		36.8	21	36.3	24.6	81.1	3.6	2	5.43	865.25
Stoneville	ST4357B2RF	1436.2	a	b	34.2	21	38.3	24.6	80.3	3.1	3	1.23	766.53
FiberMax	FM9063RF	1324.3		b c	35.2	21	39.5	28.1	80.5	3.1	3	2.71	726.28
Phytogen	PSC485WRF	1307.3		b c	32.8	21	38.0	25.5	81.6	3.4	5	0.29	686.79
Delta and Pine	DP164B2RF	1188.5		c d	33.2	21	38.0	25.9	79.3	3.1	3	2.05	643.55
Delta and Pine	DP655BR	1156.0		c d e	34.0	21	37.0	29.0	80.4	3.3	2	4.20	648.01
Delta and Pine	DP455BR	1130.0		d e	35.8	21	36.5	26.9	79.5	2.9	2	0.65	591.99
Stoneville	ST6565B2RF	1004.2		e	30.9	21	39.8	26.0	81.4	3.5	2	6.13	585.23
LSD§		176.5			2.7	---	1.0	0.8	1.2	0.2	1	3.09	114.68
OSL†		0.0001			0.0048	---	0.0001	0.0001	0.0005	0.0001	0.0001	0.0038	0.0001
CV‡		9.3			5.4	---	1.8	2.2	1.1	4.8	19.3	71.0	10.9

\*Means followed by the same letter are not statistically different according to a Fisher's least significant difference means separation test.

§ Least Significant Difference

† Observed Significance Level

‡ Coefficient of Variation

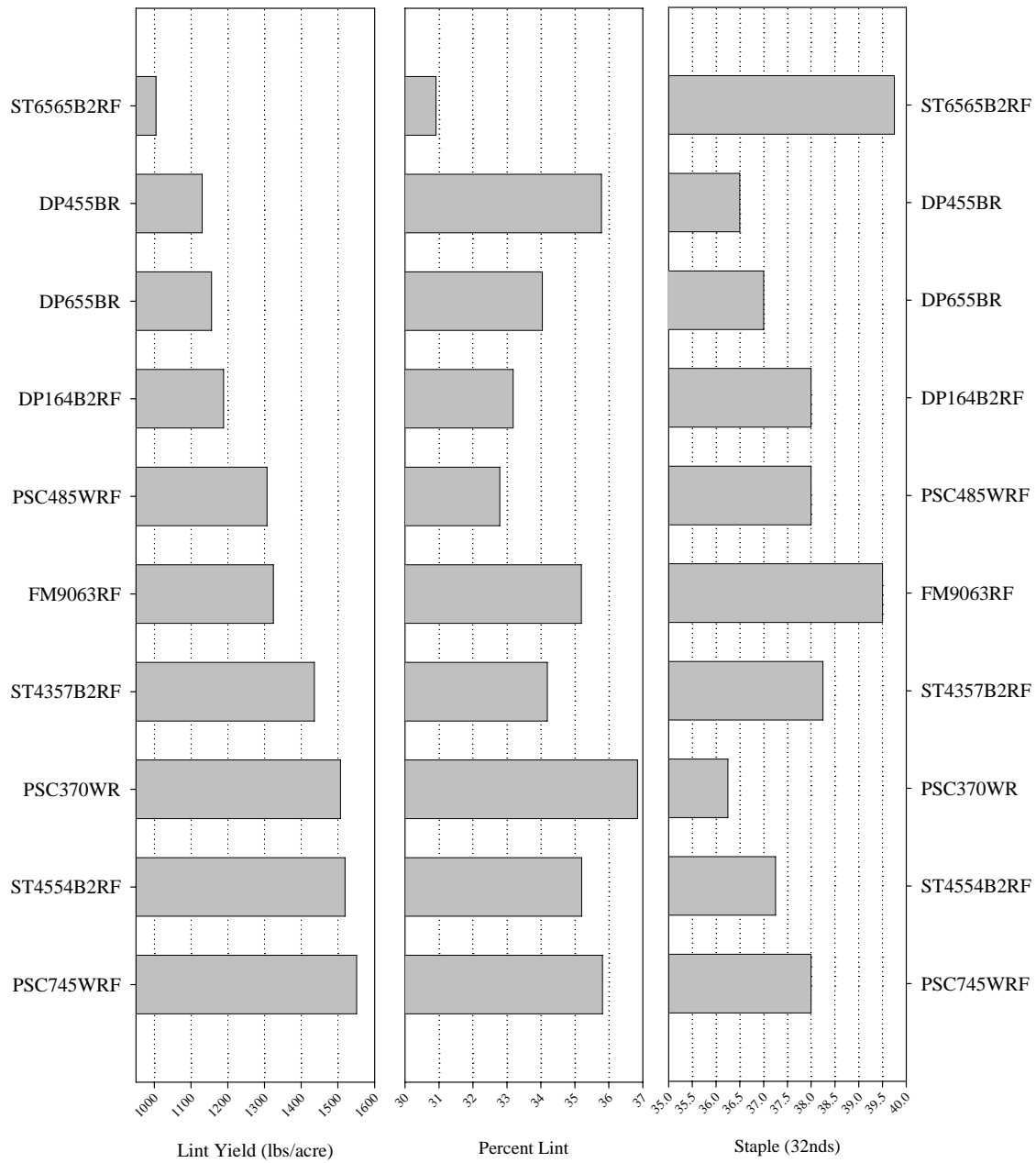


Figure 7. Lint yield, percent lint, and staple length for each of the 10 varieties entered into the Cochise County Upland cotton variety test, Kansas Settlement, AZ, 2006.

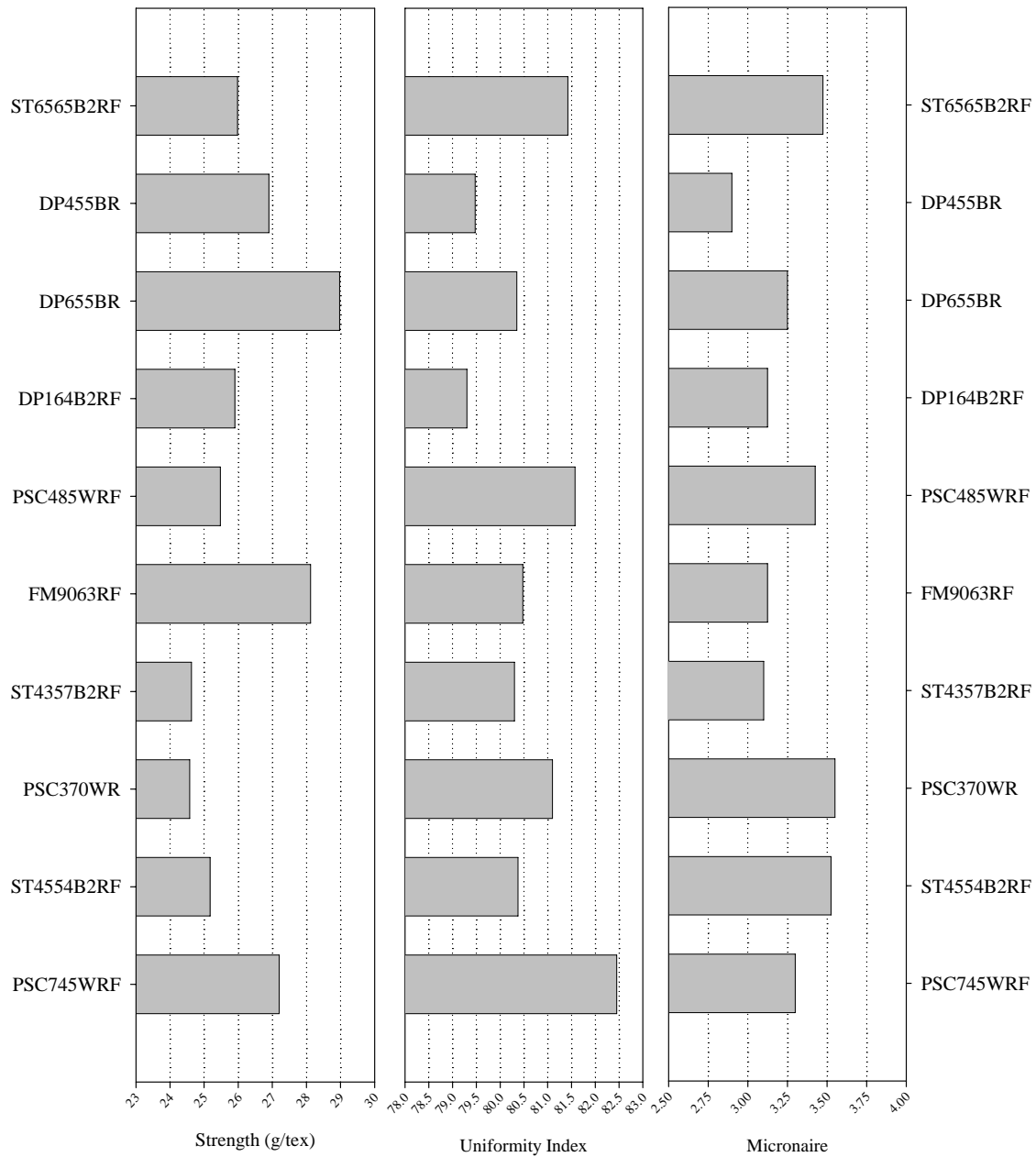


Figure 8. Fiber strength, fiber length uniformity index, and fiber micronaire for each of the 10 varieties entered into the Cochise County Upland cotton variety test, Kansas Settlement, AZ, 2006.

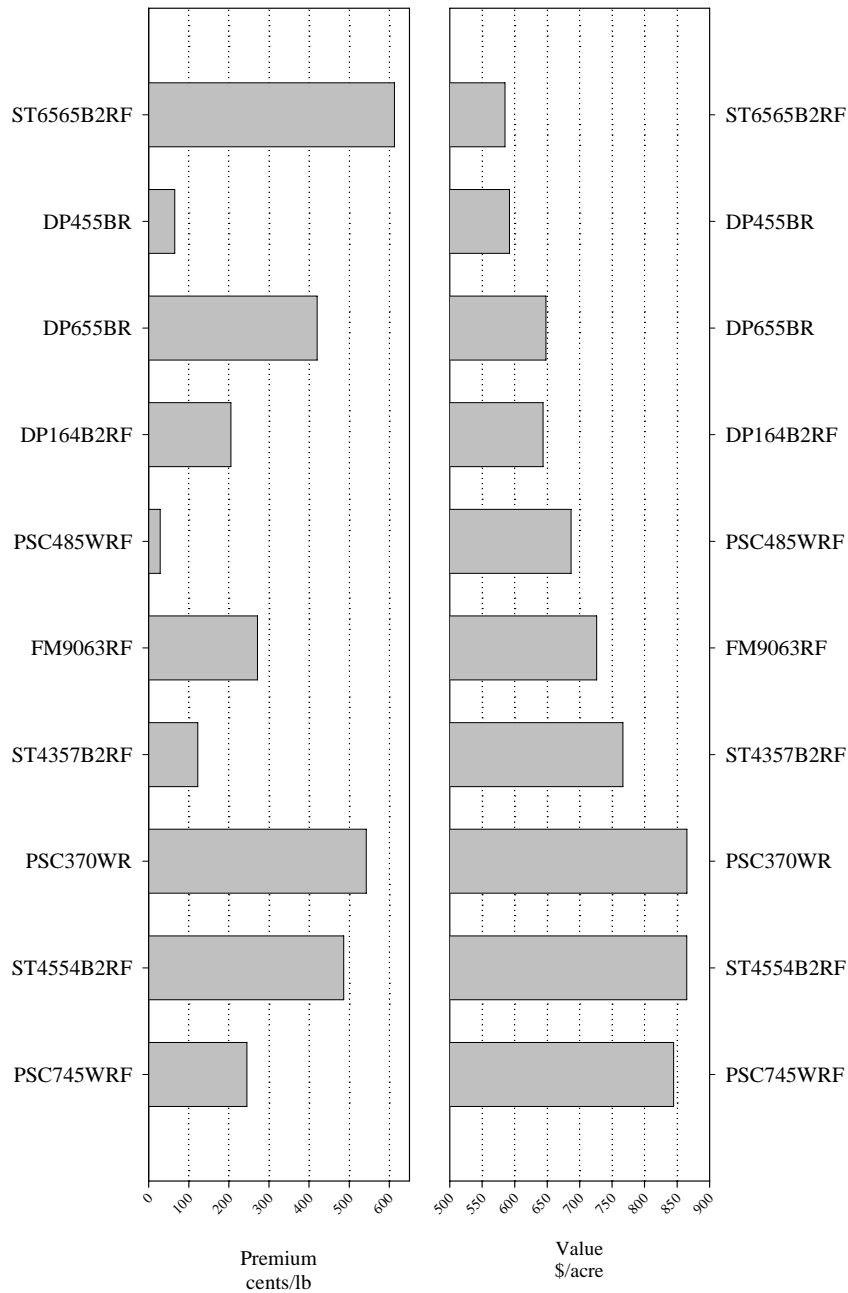


Figure 9. Premium associated with fiber quality, and total crop value for each of the 10 varieties entered into the Cochise County Upland cotton variety test, Kansas Settlement, AZ, 2006.

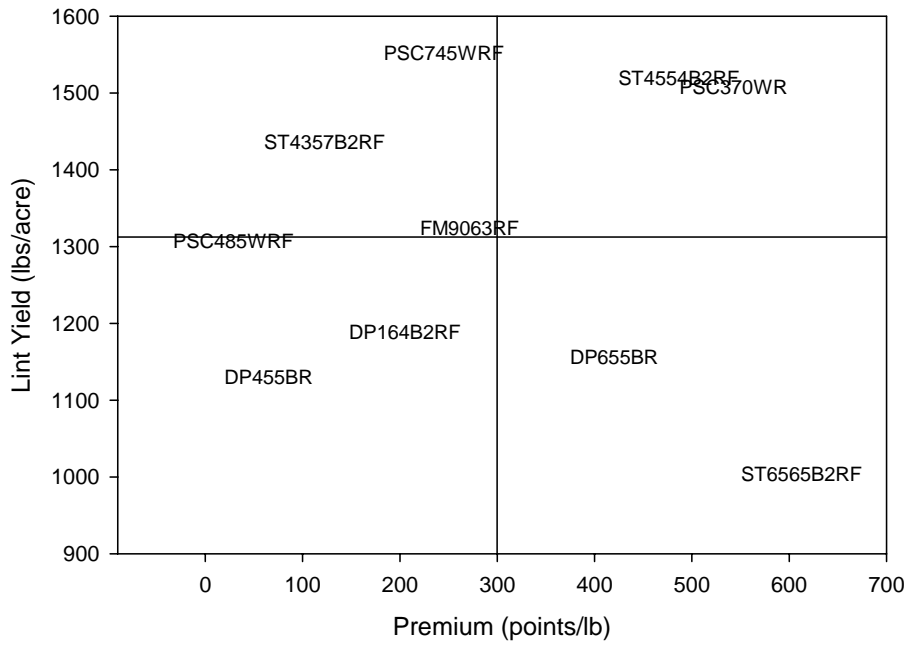


Figure 10. Lint yield plotted as a function of premium associated with fiber quality. Vertical and horizontal lines represent mean of premium and lint yield respectively. Varieties located in the upper right quadrant formed by the vertical and horizontal mean lines indicate better than average lint yield and fiber quality performance for the Cochise County Upland variety test, Kansas Settlement, AZ, 2006.