2007 Arizona Upland Cotton Advanced Strain Testing Program

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Abstract

A series of experiments were conducted across three locations in Arizona to evaluate over 40 commercial cotton strains during the 2007 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 four row plots extending 38 feet in a randomized complete block design with a minimum of four replications. Each location had three commercial cotton varieties included as control treatments for comparison. Data collected on these trials included a series of plant measurements at three growth stages over the course of the season, yield, and fiber quality data. All data was subjected to statistical analysis to test for differences among strains for yield and fiber quality. Yields were good at all locations with Maricopa producing excellent yields with the highest being nearly 2,200 lb/acre. Limited heat stress experienced across the state contributed to the high yields observed at Maricopa. Fiber quality was good with the exception of a few lines at the Safford location that experienced high leaf grades resulting in price discounts. Several new lines produced better than average yield and fiber quality at all three locations. Several new lines also performed significantly better than the commercial control entries at each location. This is a good indication that new varieties are being developed, and will soon be released, that will continue to excel and outperform current varieties in use today. This is particularly important in light of the fact that all varieties that contain the Bollgard gene will not be available after the 2009 season. All Bt varieties after 2009 will have to contain the Bollgard II gene for insect resistance. This program continues to provide an excellent method of evaluating new cotton lines in a variety of environments prior to their release to Arizona cotton producers.

Introduction

One of the most critical decisions a cotton producer will make during the course of the season is which variety is best suited to the region and growing style of a particular operation. With the advent of transgenic technologies and the introduction of new varieties that decision can be very difficult. 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 the advanced strains across environments. This is one of the last opportunities for a seed company to evaluate a particular strain before release to the public and is critical for the development of varieties that are well-suited for the cotton producing regions of the United States. Arizona cotton growing conditions provide an excellent environment for seed production so it is in the best interest of the seed company to develop varieties that are well-suited to the hot, dry growing conditions of the desert southwest.

The Arizona Upland Cotton Advanced Strains Testing Program provides critical, unbiased information to the seed company on the performance of varieties that will likely be grown in Arizona for seed production in the subsequent years. It also provides the Arizona cotton industry with an unbiased view of plant materials that are being considered for release into the public market before they are actually released. This situation provides an opportunity to influence the decisions as to which varieties will be advanced for release, helping to ensure high yielding and high fiber quality varieties for the Arizona cotton growing industry.

One of the unique aspects of this program is the range in 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). This provides an opportunity to examine the stability of the varieties across varying yield potential conditions.

Materials and Methods

Three separate field trials were conducted in 2007 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). Plots consisted of four rows wide and extended 38 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 at a rate of 25 lbs of seed per acre. Upon post seedling emergence, all plots were thinned to a consistent stand of 3 to 4 plants per foot. Further details of each experiment are contained in Table 1.

A series of plant growth measurements were collected across all strains at each location three times over the course of the season. Data collected included plant height, number of mainstem nodes, position of first fruiting branch, number of aborted or missing fruiting positions, and number of nodes above the top first position fresh bloom. This data allows for evaluation of plant growth and development, fruiting distribution, plant vigor, and progression toward maturity, and is also critical in evaluating how a variety responds under a particular set of growing conditions.

Data collected at harvest included plot yield by harvesting the center two rows of each experimental unit. A 50 boll hand sample was collected from each experimental unit in a random fashion. This sample was used to determine seedcotton weight per boll which gives an indication of boll size. A large grab sample (approximately 8 lbs) was also collected from each experimental unit from which percent lint and fiber quality was determined by the USDA classing office in Phoenix, AZ. A premium or discount for each strain was determined 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/lb and a final crop value was calculated by multiplying the base price plus the premium/discount by the total lint yield of the strain.

All data collected was summarized and analyzed according to statistical procedures as outlined by the SAS Institute.

Results and Conclusions

Yuma

The crop in Yuma was planted on 12 February but due to inclement weather in the subsequent two weeks the plots were not irrigated to initiate germination until 2 March. The delay in irrigation provided optimal conditions for germination resulting in a vigorous stand and strong seedling emergences. Plots were thinned in mid march and the crop experienced excellent vigor throughout the season. Measurements taken to evaluate crop vigor are plotted in Figure 1. Height to node ratio (HNR) levels are plotted for each of the lines entered into the evaluation. Nearly all lines tracked well above established ‘normal’ baselines throughout the majority of the season. This was despite the significant fruit load experienced by the crop. Fruit load levels were evaluated for each line entered and are plotted in Figure 2. Percent fruit retention (FR) levels are plotted against established baselines and illustrate an excellent fruit load over the course of the season with FR levels at the end of the season near 50%. Heat induced fruit shed was not a significant factor for the 2007 crop which allowed for generally excellent yield in this evaluation. Table 2 lists all yield, percent lint, and fiber quality data for each of the lines entered into the Yuma evaluation. Lint yield ranged from just over 1,000 lbs/acre to just over 1,500 lbs/acre. Statistical results are presented at the bottom of the Table for each of the parameters measured. Significant differences among lines were observed for each of these parameters. Fiber quality differed among the lines entered, however none of them experienced any price discounts as a result of poor fiber quality. The premiums ranged from just over one penny per pound to as high as 7.5 cents (Table 2). Each of the parameters listed in Table 2 are graphically presented in Figures 3-5. The black colored bars in each of the figures are control varieties that were entered in each of the trials for comparison. Several new varieties performed better than the commonly planted DP 449BR variety in terms of lint yield (Figure 3a). Several of the new varieties also

performed well with respect to fiber quality when compared to the control varieties. Figure 6 plots the final plant height, total mainstem node numbers, and average position of the first fruiting branch for each entry. The main purpose of these trials is to identify new lines that will perform well in terms of yield and fiber quality. Figure 7 is a plot of lint yield on the vertical axis and the premium/discount associated with fiber quality along the horizontal axis. The vertical line represents the mean for premium/discount and the horizontal line represents the mean for lint yield. Points that fall in the upper right quadrant of the graph have higher than average lint yield and higher than average fiber quality.

Maricopa

Plots at Maricopa were planted on 19 April under optimum conditions that resulted in excellent seedling emergence and stand establishment. Plots were thinned to 3 to 4 plants per foot. The crop experienced excellent early season vigor which carried on into mid-season. Height to node ratios are plotted against normal baselines in Figure 8 for each of the lines entered at Maricopa. All lines remained above the 'normal' baseline for plant vigor the entire season. Fruit retention levels began lower than the normal baseline but improved in fruit load through mid- to late-season (Figure 9). Final fruit retention levels were above 50% for nearly every line. Maricopa typically experiences heat stress induced fruit shed. However, in 2007 this was not the case as more moderate temperatures produced lower levels of heat stress allowing the crop to set and hold fruit during the peak season. This lack of heat stress in reflected in the yield obtained in 2007. Yield data along with fiber quality data is summarized in Table 3. Lint yield ranged from a low of 1400 lbs./acre to over 2100 lbs./acre. Several new lines entered into the trial at Maricopa performed significantly better than the commercial control varieties in this evaluation in terms of both yield and fiber quality. Figures 10-12 graphically display the yield and fiber quality data with the black bars indicating the commercial control varieties. All lines in the Maricopa location produced fiber that qualified for a price premium and ranged from just under 3 cents/lb to nearly 8 cents/lb (Figure 12a). Figure 13 displays final plant measurement data associated with each entry including final plant height (Figure 13a), total mainstem nodes (Figure 13b), and position of first fruiting branch (Figure 13c). Figure 14 displays the yield and premium data for each line entered. Unlike the Yuma location the Maricopa data is fairly tightly clustered around the mean for both yield and premium. Several new lines performed better than average and also better than the commercial control varieties with respect to these two parameters (Figure 14).

Safford

Plots at the Safford location were planted on 26 April under good conditions. Seedling emergence was adequate and plots were thinned to 3-4 plants per foot. Early season vigor was lower than 'normal' as illustrated by the HNR data plotted against the 'normal' baselines in Figure 15. An excellent early season fruit load was experienced by the crop (Figure 16) which in part explains the lower level of vigor experienced by the crop. Heat induced fruit shed at the higher elevation in Safford is typically not a problem, as was the case in 2007. The high level of fruit retention carried throughout the entire season with final fruit retention levels near 60% for the majority of lines. This high FR level is reflected by the yield observed at this location. Table 4 lists all yield and fiber quality data collected at this location. Yield ranged from just over 1,000 lbs/acre to just over 1,600 lbs/acre. Fiber quality was excellent for nearly every line, however, a few lines did experience a discount associated with fiber quality (Table 4) due to excessively high leaf grade (4, 5, and 6). The control variety FiberMax FM989B2R produced the highest yield with the next highest yield line an experimental from Deltapine. Graphical representation of yield and fiber quality data can be found in Figures 17-19. A new line from Phytogen produced extremely high fiber quality with an average staple length of over 40.5 (Figure 17c). This line also produced the fourth highest yield (Figure 17a). Figure 20 displays the data for final plant height (Figure 20a), total mainstem nodes (Figur 20b), and average first fruiting branch (Figure 20c). Figure 21 shows Lint yield plotted vs. fiber premium/discount for each line entered at Safford with vertical and horizontal lines indicating mean values for yield and premium respectively. The data from Safford has a much larger distribution than that found at Maricopa. Several new lines performed better than average in terms of both yield and fiber quality.

Table 1. Significant crop management dates for each advanced strain evaluation location conducted during the 2007 growing season.

Location:	Yuma	Maricopa	Safford
Planting Date:	2 March	13 April	20 April
Plant Measurement Sample Dates	6 June 2 July 9 August	5 June 3 July 7 August	14 June 20 July 1 October
Final Irrigation	26 July	10 September	6 September
Defoliation	10 August	10 October	30 October
Harvest Date:	20-21 August	12-13 November	19-20 November

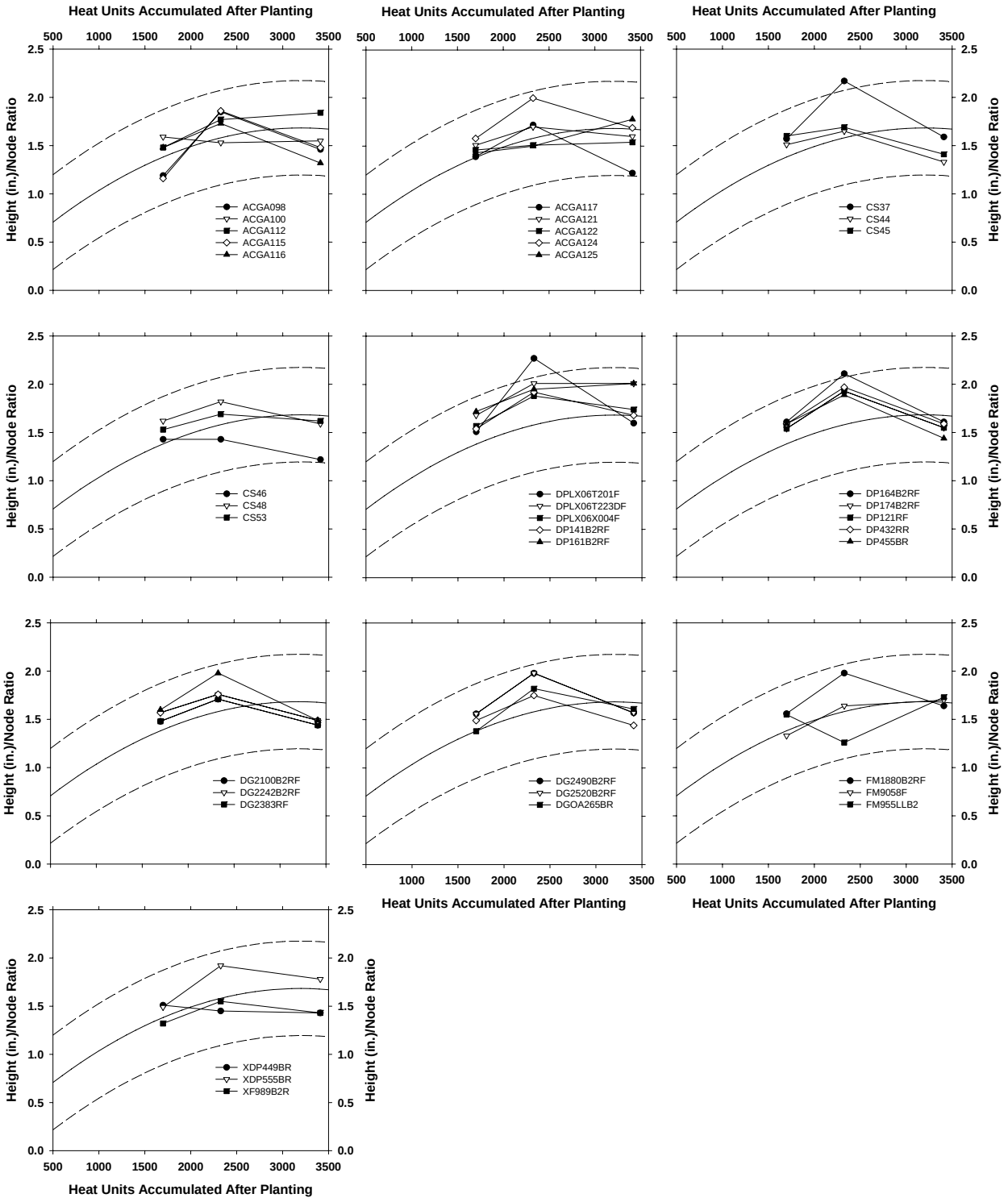

Figure 1. Height (in) to node ratio trends as a function of heat units accumulated after planting (HUAP) for each of the advanced strain lines entered at Yuma, AZ, 2007. Control varieties are plotted in the lower left graph.

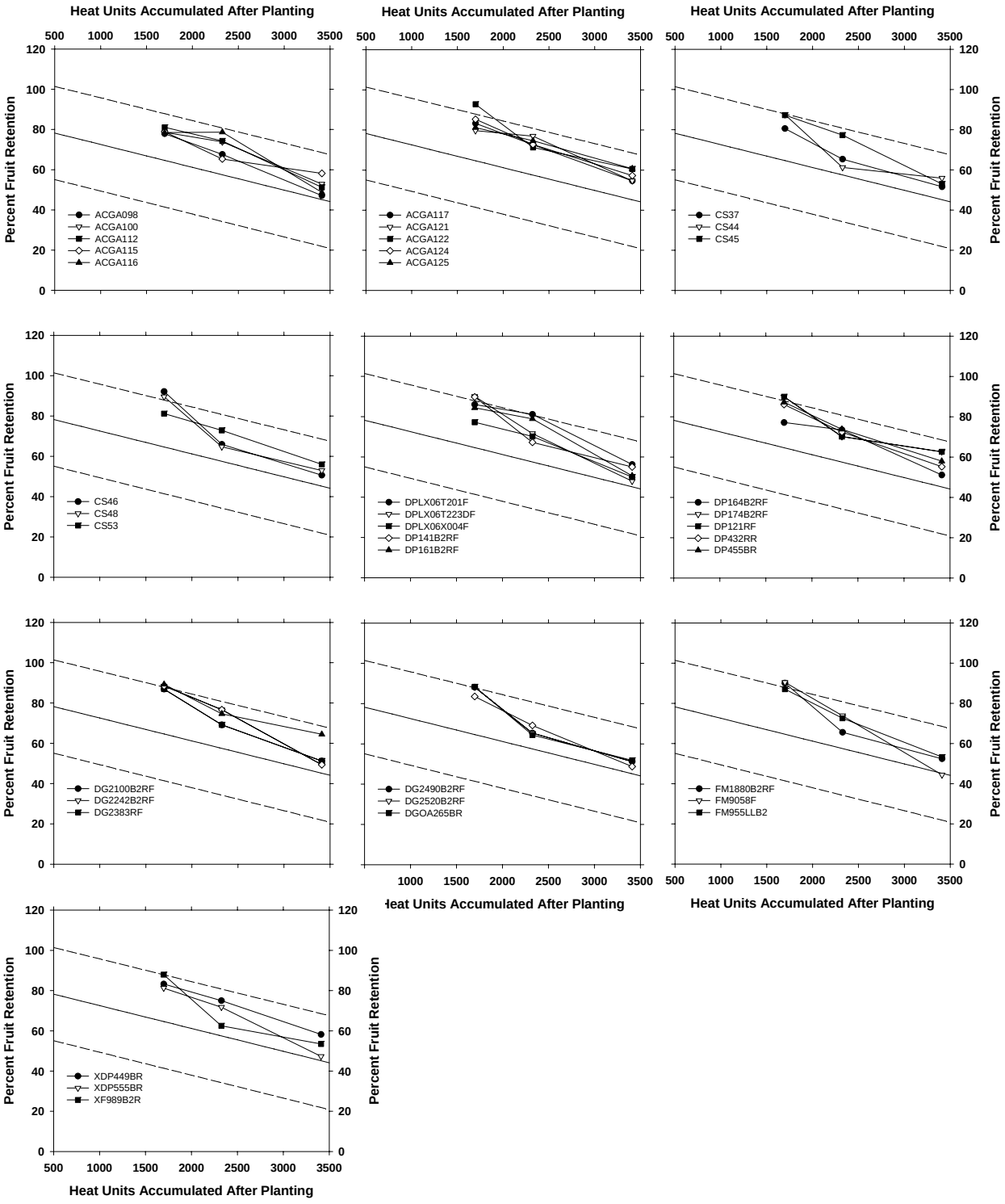

Figure 2. Percent fruit retention trends as a function of heat units accumulated after planting (HUAP) for each of the advanced strain lines entered at Yuma, AZ, 2007. Control varieties are plotted in the lower left graph.

Table 2. Lint yield and fiber quality results for the advanced strain trial conducted in Yuma, AZ, 2007.

Seed Company	Strain	Lint Yield	Means Separation*	Lint Turnout	HVI Color	Staple	Length	Strength	Uniformity	Micronaire	Leaf Grade	Premium	Value
		lbs/acre		Percent		32nds	Inches	g/tex	Percent			cent/lb	$/acre
Deltapine	DP 445 BR	1513.2	a	35.1	21	35.8	1.11	28.6	82.1	4.55	2	6.50	904.80
Deltapine	DP 174 B2RF	1501.3	a b	37.6	21	36.8	1.14	26.1	81.2	4.48	3	5.76	824.46
Deltapine	DPLX 06T201F	1478.8	a b c	35.6	11	36.8	1.14	28.3	80.8	4.08	3	6.93	860.71
Deltapine	DP 121 RF	1446.0	a b c d	34.6	21	35.0	1.09	27.5	81.7	4.58	3	5.34	799.58
CPCSD	CS 48	1440.9	a b c d e	33.0	21	37.5	1.18	28.7	81.0	4.40	3	6.65	832.95
CPCSD	CS 37	1433.1	a b c d e f	33.2	21	36.5	1.14	30.9	81.5	4.25	2	7.05	801.18
ACGA	0122-2033-307	1395.2	a b c d e f g	34.2	11	36.0	1.12	28.5	81.2	4.48	2	6.55	814.91
ACGA	0101-2165-303	1342.9	a b c d e f g h	33.8	21	36.5	1.14	30.2	81.1	3.75	2	7.30	808.64
Dyna-Gro	DG 2520 B2RF	1338.7	a b c d e f g h	33.2	11	36.0	1.12	26.6	81.4	4.33	3	6.63	789.55
Control	**DP 449 BR**	**1335.8**	**a b c d e f g h**	**33.9**	**11**	**36.3**	**1.13**	**30.2**	**82.0**	**4.53**	**2**	**7.30**	**785.91**
Dyna-Gro	DG 2490 B2RF	1330.0	a b c d e f g h i	31.5	21	34.5	1.08	26.8	80.5	3.60	4	1.89	674.41
ACGA	0122-2039-303	1324.3	a b c d e f g h i	32.8	11	35.3	1.11	29.9	82.7	4.58	2	5.66	722.02
CPCSD	CS 44	1318.4	b c d e f g h i	34.2	11	35.5	1.11	27.2	80.9	4.63	2	6.30	784.24
CPCSD	CS 45	1314.0	b c d e f g h i	32.5	21	36.3	1.13	30.2	81.1	4.50	2	6.88	795.75
ACGA	0122-2033-303	1307.4	c d e f g h i	34.8	11	35.3	1.10	29.9	81.4	4.40	3	6.01	782.60
ACGA	0157-303-B	1295.4	c d e f g h i	32.8	21	37.3	1.16	29.0	82.5	4.50	3	6.96	727.51
CPCSD	CS 46	1272.1	d e f g h i j	34.0	21	35.3	1.10	30.8	81.3	4.68	3	4.56	740.31
Dyna-Gro	DG 2100 B2RF	1268.1	d e f g h i j	31.4	21	34.8	1.08	25.7	81.5	4.15	3	4.85	713.45
Control	**DP 555 BR**	**1263.4**	**d e f g h i j**	**35.4**	**11**	**35.5**	**1.10**	**28.3**	**80.5**	**4.28**	**3**	**5.98**	**712.95**
Control	**FM 989 B2R**	**1261.1**	**d e f g h i j**	**32.8**	**21**	**36.8**	**1.15**	**31.2**	**81.8**	**4.15**	**3**	**7.20**	**735.72**
Deltapine	DP 164 B2RF	1255.1	d e f g h i j	32.9	21	37.5	1.18	29.0	81.8	4.15	2	7.34	748.90
CPCSD	CS 53	1252.1	e f g h i j	30.3	21	36.0	1.12	27.0	81.9	4.48	2	6.76	749.21
FiberMax	FM 9058 F	1248.2	f g h i j	32.7	21	36.8	1.15	28.7	80.2	4.18	3	6.60	711.16
Deltapine	DP 432 RR	1244.0	f g h i j k	32.4	21	35.0	1.09	29.1	82.5	4.73	3	4.28	697.14
ACGA	0144-2086-4B	1243.9	f g h i j k	32.7	21	36.0	1.13	30.5	81.9	4.53	3	6.03	766.36
FiberMax	FM 1880 B2RF	1225.9	g h i j k	32.0	21	36.5	1.14	30.1	81.0	4.08	3	7.11	741.21
Deltapine	DP 141 B2RF	1213.9	g h i j k	32.7	21	36.5	1.13	28.5	80.2	4.25	3	5.93	722.88
Dyna-Gro	DG 2383 RF	1201.7	h i j k	32.6	21	36.3	1.13	29.1	82.3	4.18	4	4.94	697.93
Deltapine	DP 161 B2RF	1188.4	h i j k l	31.6	21	37.5	1.18	30.4	81.7	4.35	4	5.14	644.52
Deltapine	DPLX 06T223DF	1167.1	h i j k l	32.8	11	37.0	1.16	30.1	81.2	4.08	2	7.41	717.66
ACGA	0106-3004-B	1160.4	h i j k l	33.3	11	36.7	1.14	30.7	81.2	4.57	2	7.28	688.33
FiberMax	FM 955 LLB2	1160.4	h i j k l	31.1	21	36.8	1.15	27.8	81.1	4.43	2	6.91	735.91
ACGA	0116-2B-326	1141.0	i j k l	30.8	11	35.3	1.10	32.2	82.3	4.28	3	5.59	640.39
ACGA	0116-2016-301	1101.2	j k l	31.6	21	36.8	1.14	31.9	82.6	4.50	3	6.54	636.78
Deltapine	DPLX 06X004F	1093.0	j k l	32.7	21	35.3	1.10	28.0	80.5	3.95	3	4.88	645.94
Dyna-Gro	DG 2242 B2RF	1084.9	j k l	31.5	21	36.0	1.11	25.7	81.5	4.40	3	5.21	655.27
ACGA	0144-2036-304	1053.3	k l	29.6	21	37.0	1.16	32.6	82.2	4.38	3	6.53	660.94
Dyna-Gro	DG OA265 BR	1001.0	l	31.9	11	36.5	1.14	33.6	82.0	4.40	3	7.10	616.19
LSD§		191.9		2.0	---	0.8	0.02	1.2	0.9	0.30	1	1.28	78.88
OSL†		0.0002		0.0001	---	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
CV‡		7.4		3.4	---	1.6	1.5	2.8	0.8	4.9	20.3	14.8	7.6

*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

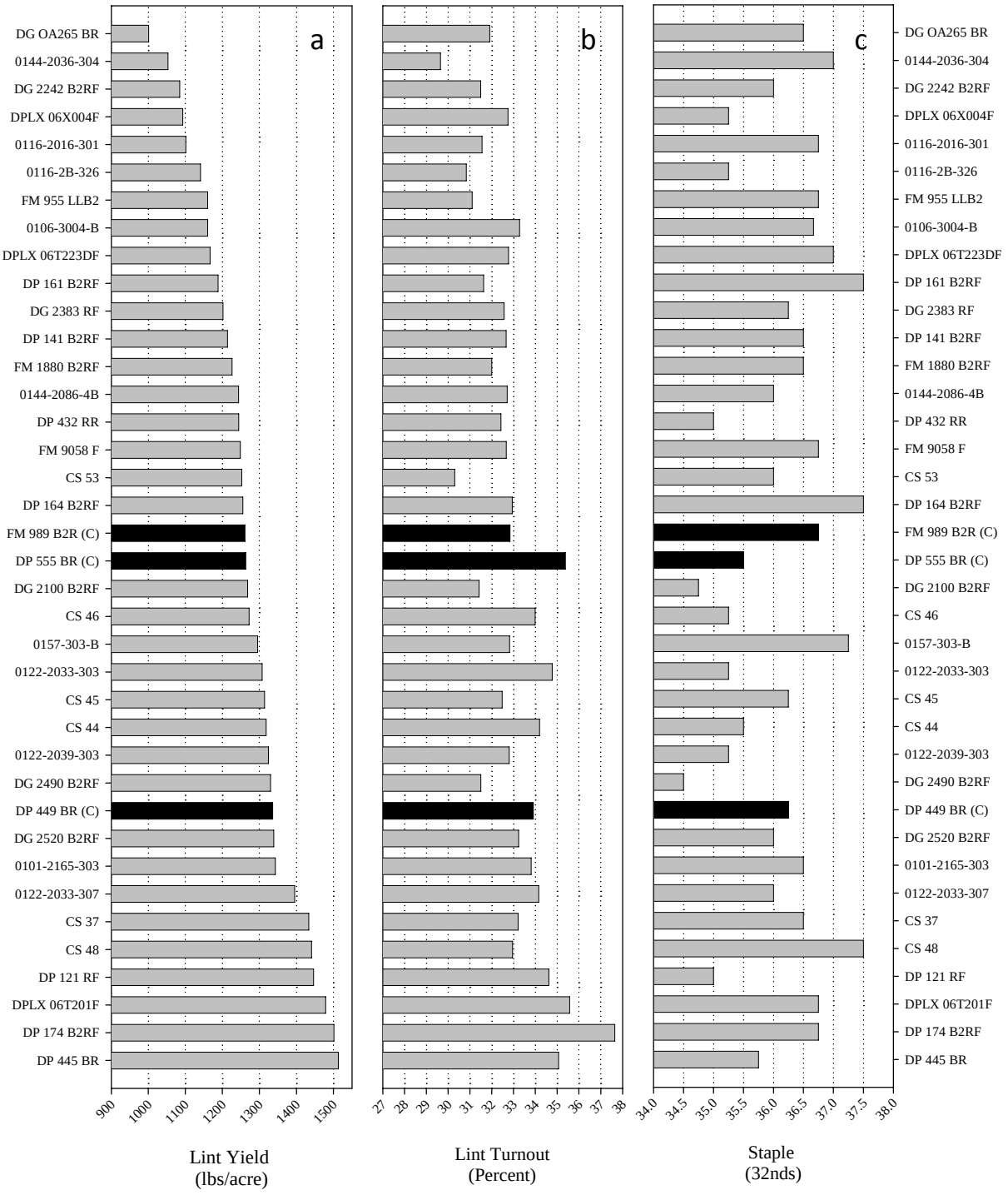

Figure 3. Lint yield (a), lint turnout (b), and fiber staple (c), for each of the advanced strain lines entered at Yuma, AZ, 2007. Black bars represent control varieties.

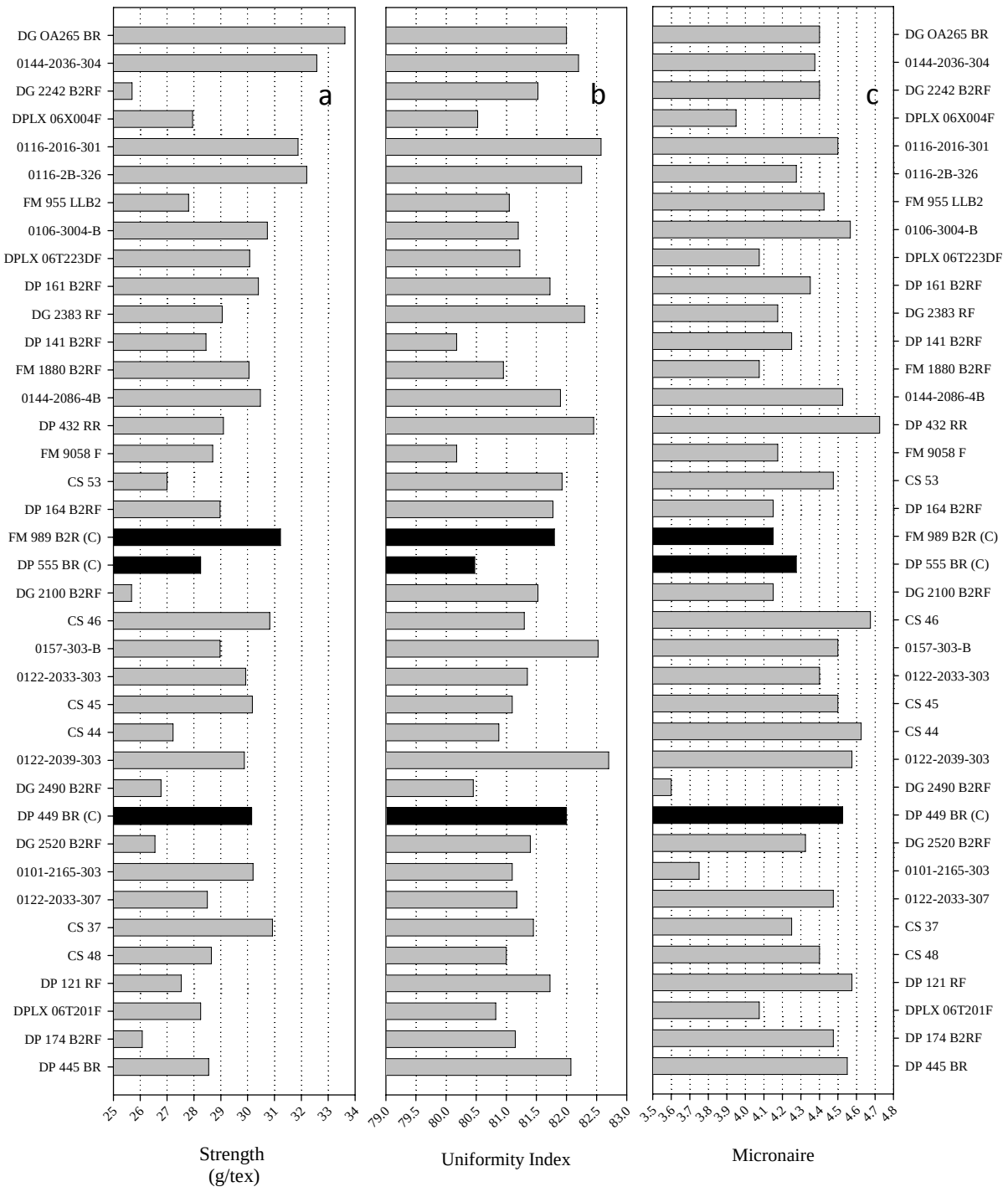

Figure 4. Fiber strength (a), fiber uniformity (b), and fiber micronaire (c), for each of the advanced strain lines entered at Yuma, AZ, 2007. Black bars represent control varieties.

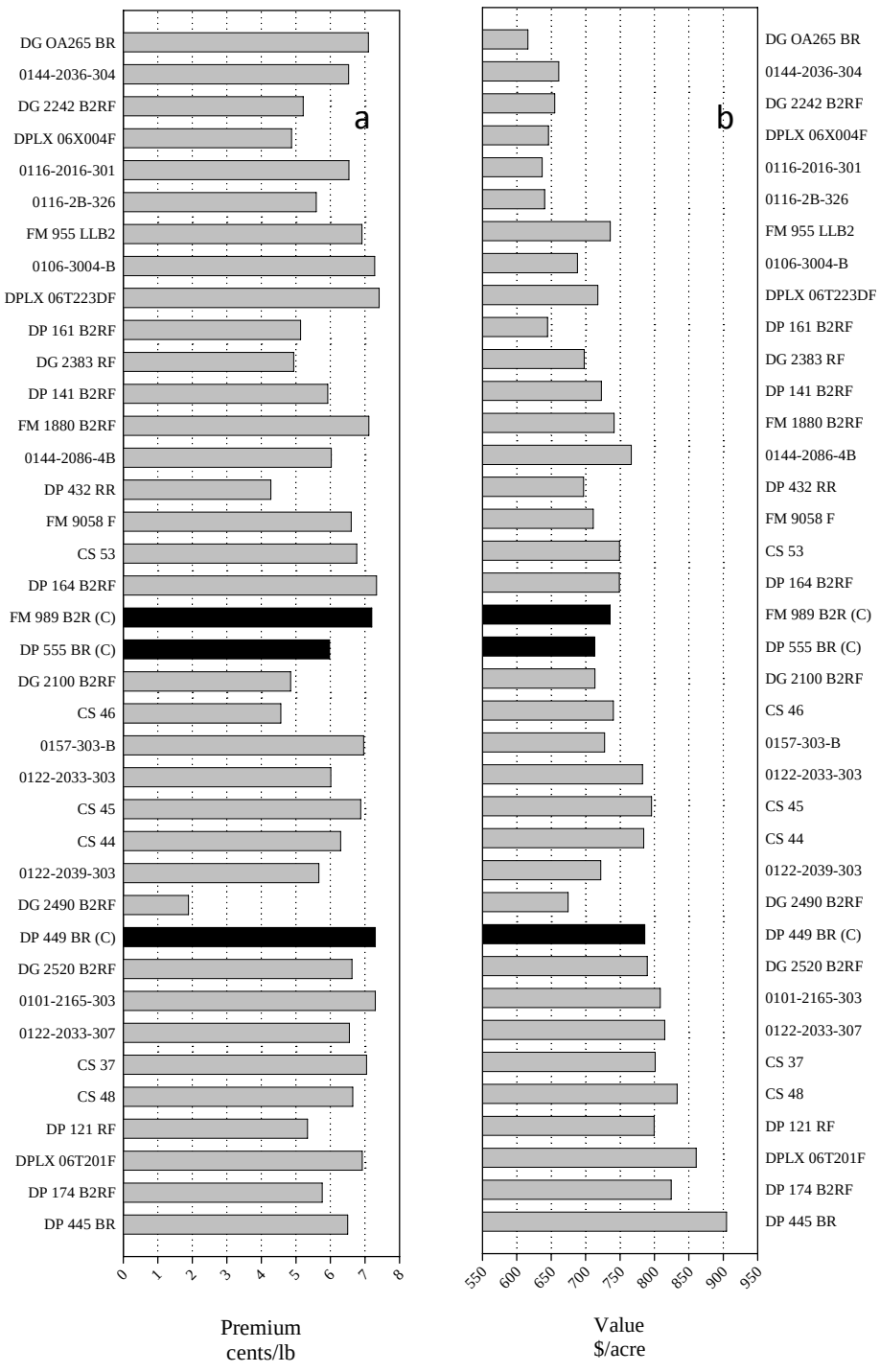

Figure 5. Fiber quality premium (a), and value of crop (b), for each of the advanced strain lines entered at Yuma, AZ, 2007. Black bars represent control varieties.

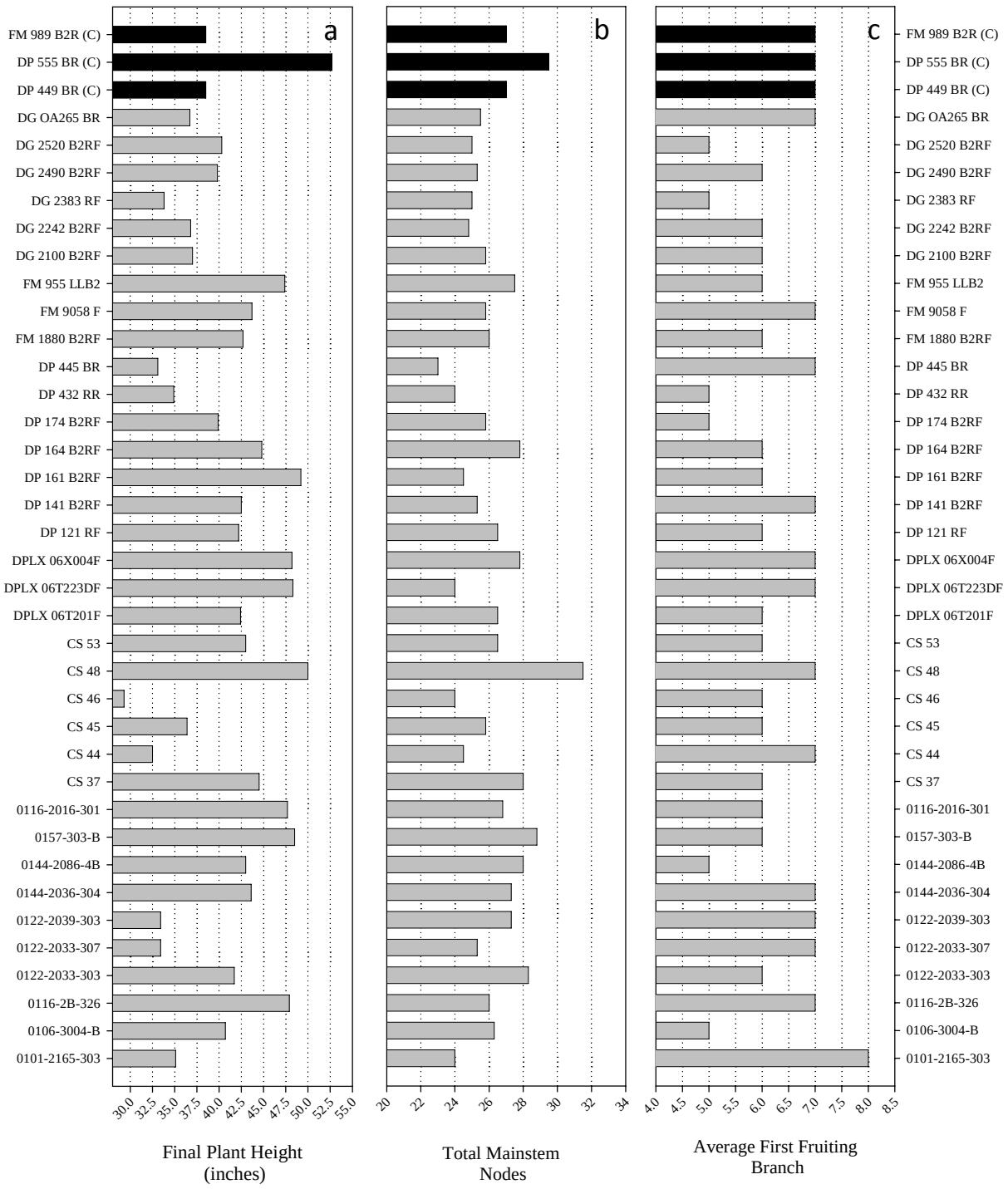

Figure 6. Final plant height (a), total mainstem nodes (b), and average position of first fruiting branch (c), for each of the advanced strain lines entered at Yuma, AZ, 2007. Black bars represent control varieties.

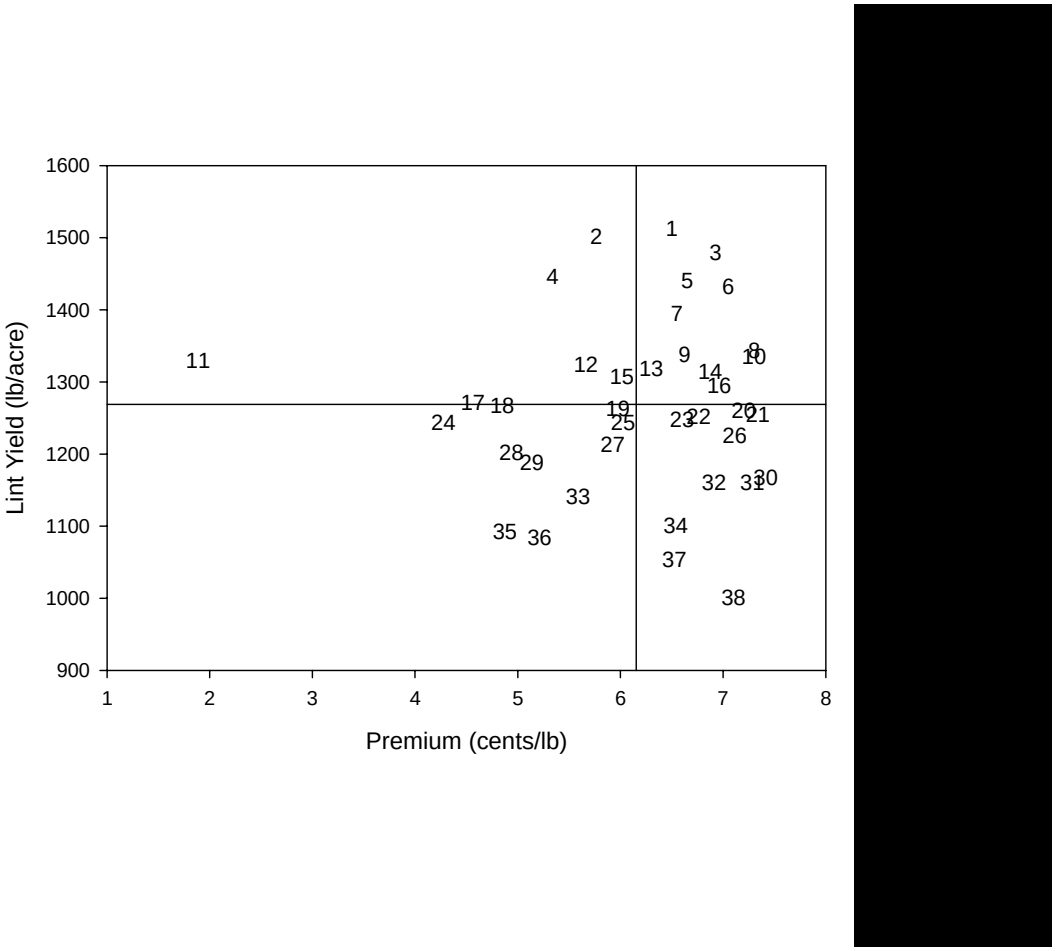

Figure 7. Lint yield (lbs/acre) plotted as a function of fiber quality premium/discount (cents/lb). Vertical and horizontal lines represent the mean value for the two parameters. Varieties that fall in the upper right quadrant formed by the mean lines produced higher than average lint yield and fiber quality. Each of the advanced strain entries are plotted for the Yuma, AZ location in 2007.

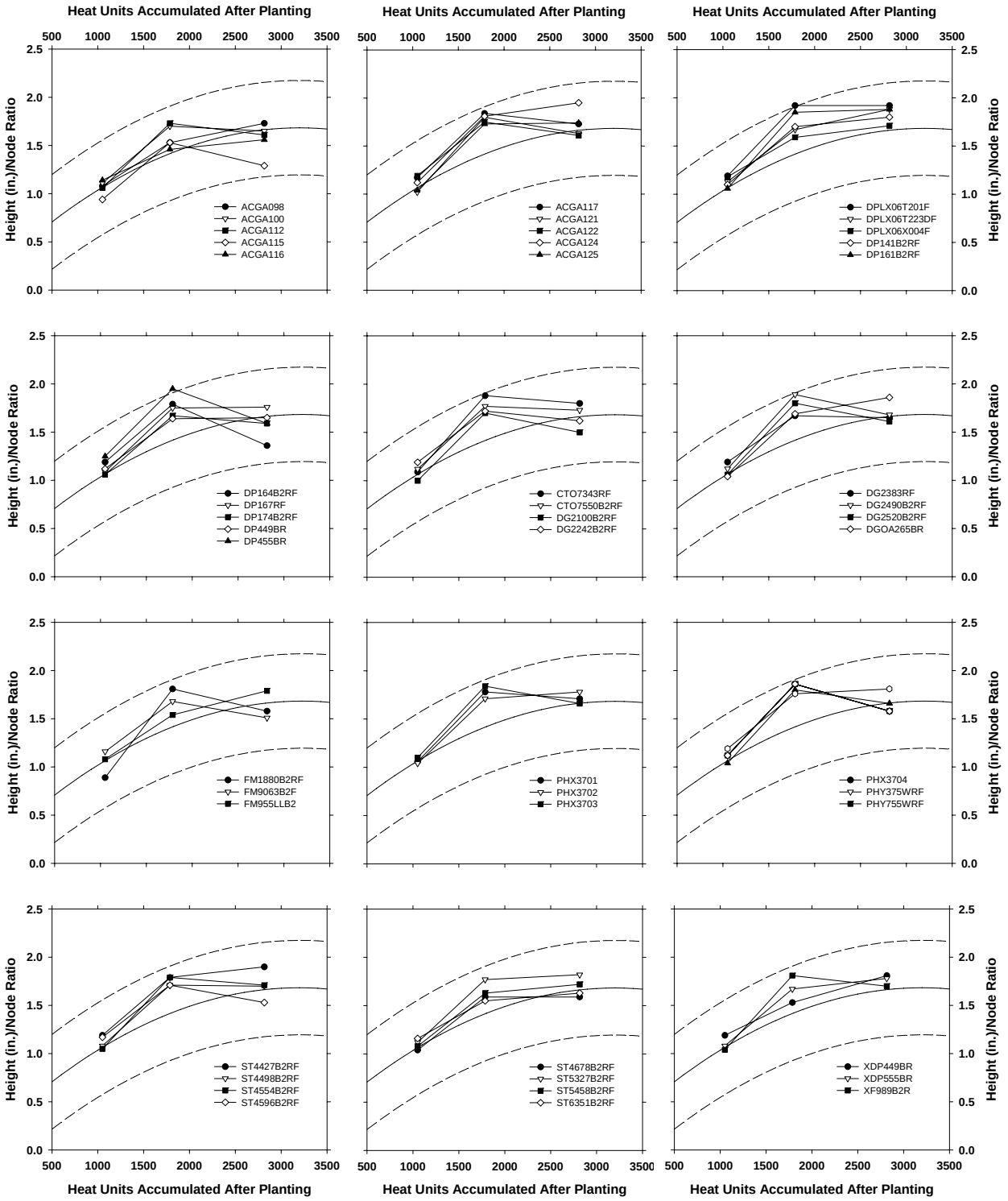

Figure 8. Height (in) to node ratio trends as a function of heat units accumulated after planting (HUAP) for each of the advanced strain lines entered at Maricopa, AZ, 2007. Control varieties are plotted in the lower right graph.

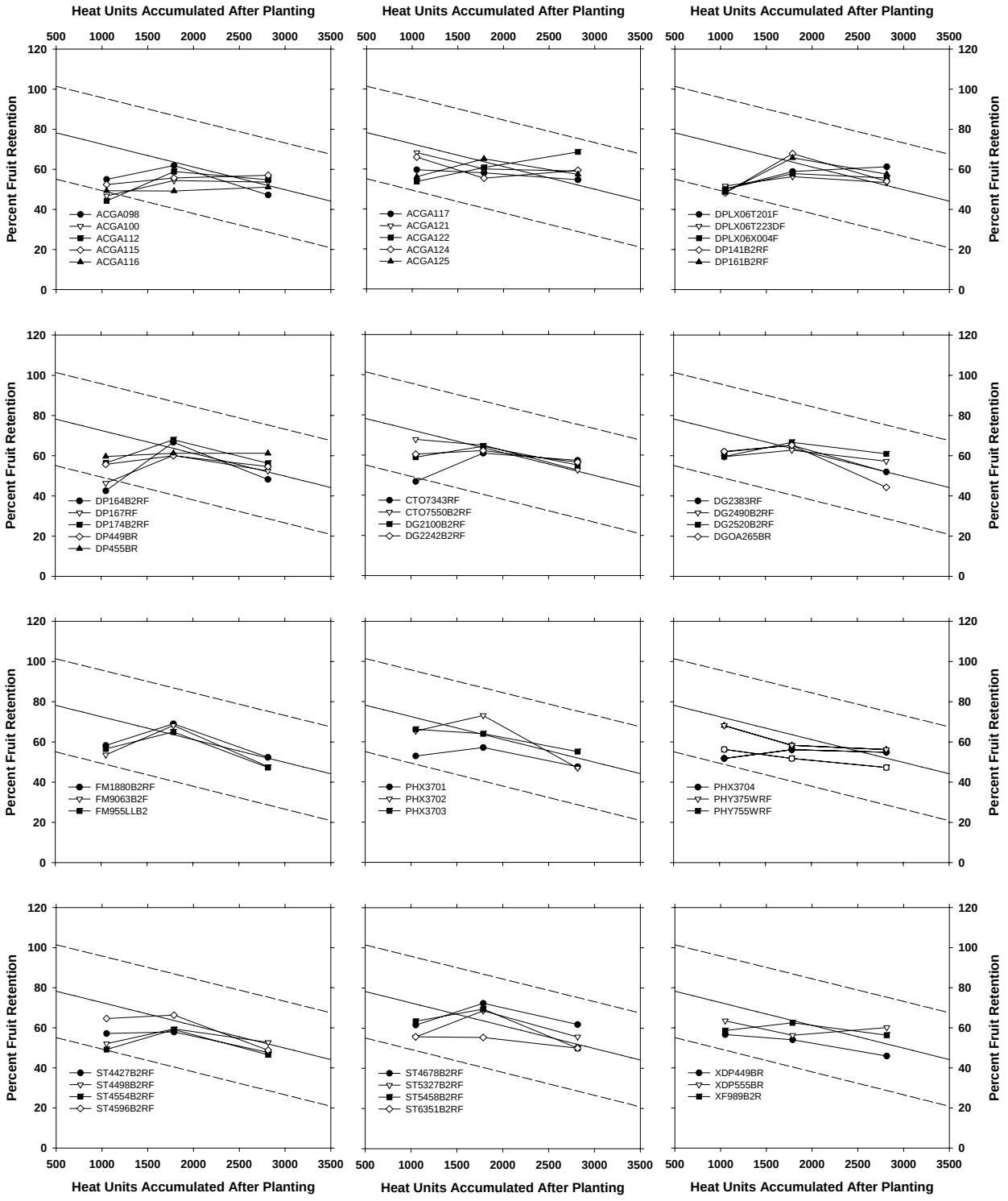

Figure 9. Percent fruit retention trends as a function of heat units accumulated after planting (HUAP) for each of the advanced strain lines entered at Maricopa, AZ, 2007. Control varieties are plotted in the lower right graph.

Table 3. Lint yield and fiber quality results for the advanced strain trial conducted in Maricopa, AZ, 2007.

Seed Company	Strain	Lint Yield	Means Separation*	Lint Turnout	HVI Color	Staple	Strength	Length	Uniformity	Micronaire	Leaf Grade	Seedcotton Weight/boll	Premium	Value
		lbs/acre		Percent		32nds	g/tex	Inches	Percent			grams	cent/lb	$/acre
Stoneville	ST 6351 B2RF	2199.9	a	35.5	21	38.0	30.6	1.2	83.1	4.43	3	6.4	7.25	1279.78
Deltapine	DP 174 B2RF	2147.4	a b	36.9	21	36.7	29.9	1.1	81.4	4.50	3	5.7	6.57	1236.02
Deltapine	DP 164 B2RF	2138.2	a b c	34.8	21	37.7	30.5	1.2	82.2	4.50	2	5.0	7.62	1222.99
ACGA	0122-2033-307	2100.7	a b c d	34.7	21	37.0	30.6	1.1	81.6	4.83	2	6.1	6.35	1161.15
Stoneville	ST 5458 B2RF	2080.9	a b c d e	33.0	21	36.3	30.4	1.1	82.0	4.97	3	5.7	4.13	1122.00
Dyna-Gro	CTO 7550 B2RF	2023.7	a b c d e f	34.5	21	36.0	29.7	1.1	82.4	4.93	2	5.6	5.55	1087.75
Control	**DP 449 BR**	**2006.3**	**a b c d e f**	**33.6**	**21**	**36.7**	**31.6**	**1.1**	**82.8**	**4.80**	**2**	**5.0**	**7.32**	**1162.92**
Phytogen	PHX3704	2001.3	a b c d e f	34.5	11	35.3	29.2	1.1	82.3	4.73	2	5.1	6.03	1123.95
Dyna-Gro	DG 2242 B2RF	1998.9	a b c d e f	35.1	21	37.0	29.1	1.2	82.9	4.57	3	4.9	5.73	1134.40
ACGA	0122-2033-303	1955.0	a b c d e f g	33.0	21	37.0	32.0	1.2	82.9	4.73	2	5.9	7.85	1133.95
ACGA	0122-2039-303	1953.1	a b c d e f g	34.4	21	37.0	32.5	1.2	83.2	4.93	2	6.0	6.18	1160.40
Deltapine	DP 449 BR	1942.9	a b c d e f g	34.7	21	37.0	32.0	1.2	83.2	4.77	2	5.4	7.90	1186.02
Dyna-Gro	DG 2100 B2RF	1931.9	b c d e f g h	32.8	21	36.0	28.7	1.1	82.1	4.50	2	4.8	7.03	1103.34
Stoneville	ST 4554 B2RF	1927.4	b c d e f g h i	34.9	11	36.7	31.0	1.1	82.3	4.87	3	5.5	5.32	1155.93
Stoneville	ST 4498 B2RF	1914.6	b c d e f g h i j	35.6	11	37.0	31.0	1.2	83.1	4.77	3	5.4	6.37	1143.11
Stoneville	ST 4596 B2RF	1912.8	b c d e f g h i j k	33.2	21	38.0	31.0	1.2	83.4	4.97	4	5.8	3.67	1062.49
Deltapine	DP 161 B2RF	1906.4	b c d e f g h i j k	33.7	31	39.7	32.1	1.2	83.5	4.47	3	4.6	6.67	1139.11
Deltapine	DP 455 BR	1903.0	b c d e f g h i j k	36.3	21	36.3	31.5	1.1	81.1	4.73	2	4.5	7.22	1169.20
Dyna-Gro	DG 2490 B2RF	1898.6	b c d e f g h i j k	33.4	31	36.0	28.2	1.1	82.8	3.87	4	4.9	2.87	1084.22
Dyna-Gro	DG 2520 B2RF	1886.3	b c d e f g h i j k l	34.5	21	37.3	29.8	1.2	82.6	4.37	3	5.7	6.80	1134.27
Stoneville	ST 5327 B2RF	1883.5	c d e f g h i j k l	35.1	21	37.0	31.0	1.2	83.2	4.70	3	5.1	6.78	1166.71
Control	**FM 989 B2R**	**1865.0**	**d e f g h i j k l m**	**34.2**	**21**	**37.3**	**33.2**	**1.2**	**83.0**	**4.53**	**3**	**7.0**	**7.40**	**1062.28**
ACGA	0144-2086-4B	1856.9	d e f g h i j k l m	34.4	31	36.7	33.6	1.1	83.1	4.80	3	5.1	5.77	1096.82
Phytogen	PHY 375 WRF	1837.0	e f g h i j k l m n	33.0	21	36.0	30.0	1.1	82.6	4.57	3	6.2	6.87	1151.23
Stoneville	ST 4427 B2RF	1835.8	e f g h i j k l m n	33.6	31	37.3	30.7	1.2	82.5	4.50	4	5.9	3.47	1026.29
Deltapine	DP 141 B2RF	1827.9	e f g h i j k l m n	30.9	21	37.7	30.6	1.2	81.2	4.23	3	5.1	6.83	1038.60
Deltapine	DP 167 RF	1821.8	e f g h i j k l m n	33.4	21	38.0	31.6	1.2	82.8	4.37	2	5.3	7.27	1057.48
Stoneville	ST 4678 B2RF	1818.6	e f g h i j k l m n	32.5	31	37.0	30.3	1.2	83.5	4.77	3	4.6	5.75	1062.07
ACGA	0157-303-B	1802.0	f g h i j k l m n	33.8	21	37.3	31.6	1.2	84.0	4.73	3	4.7	7.13	1085.78
Phytogen	PHX3701	1801.9	f g h i j k l m n	35.7	21	35.3	28.4	1.1	81.2	4.57	2	5.9	5.40	1089.45
Phytogen	PHX3702	1800.9	f g h i j k l m n	33.3	21	36.7	29.2	1.1	81.9	4.30	3	5.2	6.55	1078.05
Control	**DP 555 BR**	**1791.7**	**f g h i j k l m n**	**34.7**	**21**	**36.0**	**29.9**	**1.1**	**80.8**	**4.57**	**2**	**4.5**	**6.95**	**1122.60**
ACGA	0106-3004-B	1786.8	f g h i j k l m n	33.4	21	36.3	31.7	1.1	81.5	4.90	2	4.6	5.00	1064.66
Dyna-Gro	DG 2383 RF	1784.8	f g h i j k l m n	32.0	31	37.3	30.8	1.2	82.7	4.47	5	4.8	2.82	923.27
Deltapine	DPLX 06T223DF	1775.8	f g h i j k l m n	33.7	11	37.0	28.1	1.2	81.1	4.30	2	5.4	6.80	1051.23
ACGA	0144-2036-304	1697.0	g h i j k l m n	33.2	31	38.7	32.7	1.2	83.2	4.80	2	4.8	6.10	1029.59
ACGA	0116-2016-301	1675.8	h i j k l m n	34.5	21	38.0	31.9	1.2	83.2	4.63	3	5.8	7.08	1028.83
Dyna-Gro	DG OA265 BR	1669.3	h i j k l m n	34.0	21	38.3	33.7	1.2	83.0	4.30	4	6.4	5.53	986.69
Phytogen	PHX3703	1667.6	i j k l m n o	34.5	21	36.3	29.9	1.1	82.1	4.53	3	5.1	6.83	975.36
ACGA	0116-2B-326	1661.0	j k l m n o	34.7	31	36.7	34.0	1.1	83.3	4.77	3	4.8	6.87	1025.63
ACGA	0101-2165-303	1659.5	j k l m n o	34.2	21	36.7	29.9	1.2	82.1	3.97	3	5.4	5.93	984.57
FiberMax	FM 9063 B2F	1652.1	j k l m n o	33.6	21	37.3	31.9	1.2	82.6	4.27	3	5.8	7.33	991.43
Dyna-Gro	CTO 7343 RF	1650.2	k l m n o	33.4	11	36.0	29.3	1.1	82.8	4.83	2	5.5	7.35	1013.98
FiberMax	FM 955 LLB2	1633.5	l m n o	32.9	21	38.0	30.8	1.2	82.8	4.60	2	6.5	7.45	984.15
Deltapine	DPLX 06X004F	1610.8	m n o	32.7	21	37.3	31.1	1.2	81.2	3.97	3	3.9	7.05	991.72
FiberMax	FM 1880 B2RF	1605.0	m n o	32.8	31	37.7	31.4	1.2	82.8	4.37	3	5.1	6.43	960.98
Deltapine	DPLX 06T201F	1582.7	n o	34.8	21	36.7	29.9	1.1	80.6	4.37	2	4.9	7.20	978.47
Phytogen	PHY 755 WRF	1406.1	o	34.1	21	40.0	32.6	1.2	83.8	4.33	3	5.0	7.05	861.95
LSD§		262.9		1.9	---	1.2	1.8	0.0	1.1	0.2	0.8	3.9	1.8	163.39
OSL†		<.0001		0.0001	---	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	0.0001	0.0011
CV‡		10.2		3.9	---	2.0	3.6	2.0	0.9	2.7	18.6	15.4	17.7	9.32

*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

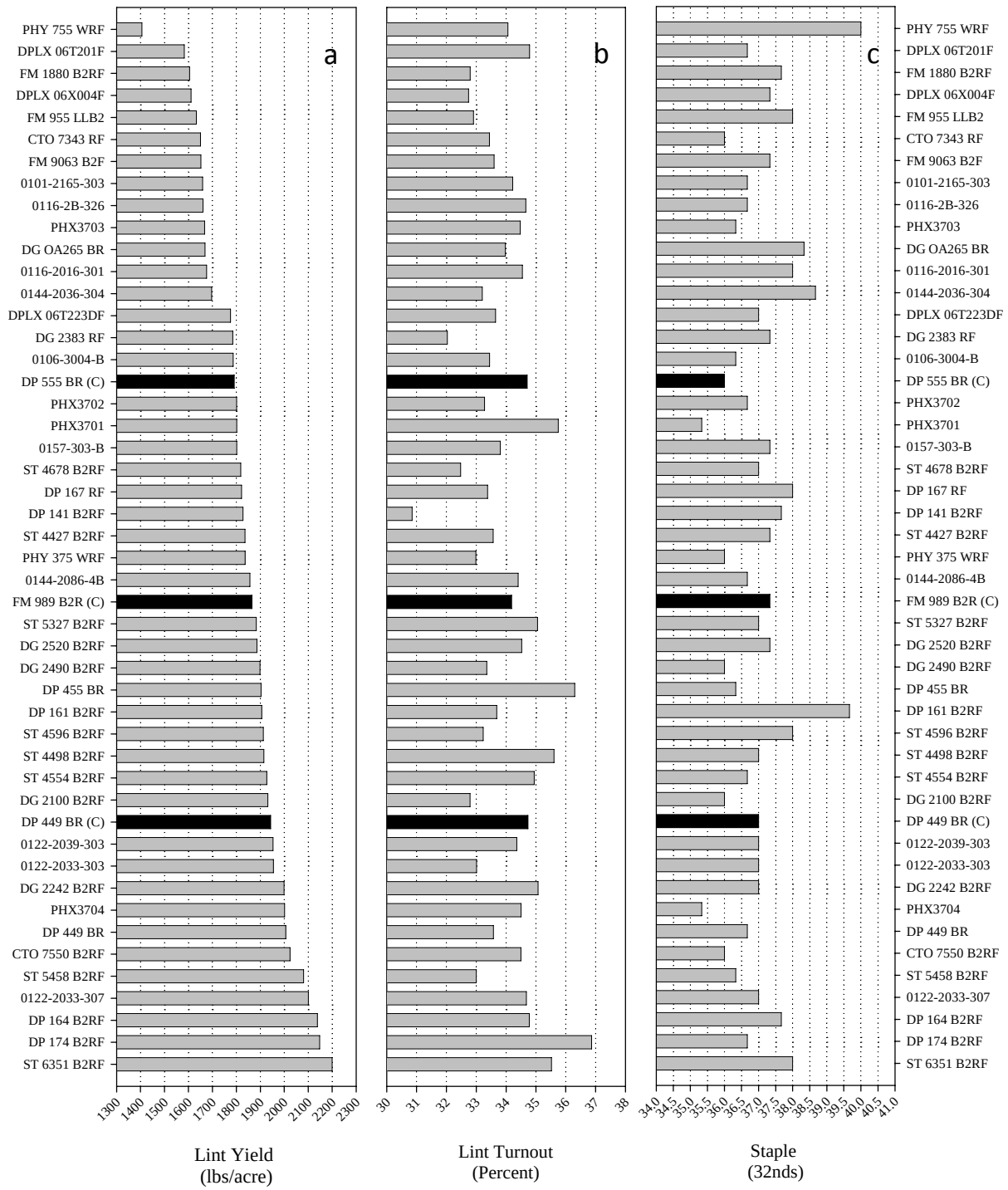

Figure 10. Lint yield (a), lint turnout (b), and fiber staple (c), for each of the advanced strain lines entered at Maricopa, AZ, 2007. Black bars represent control varieties.

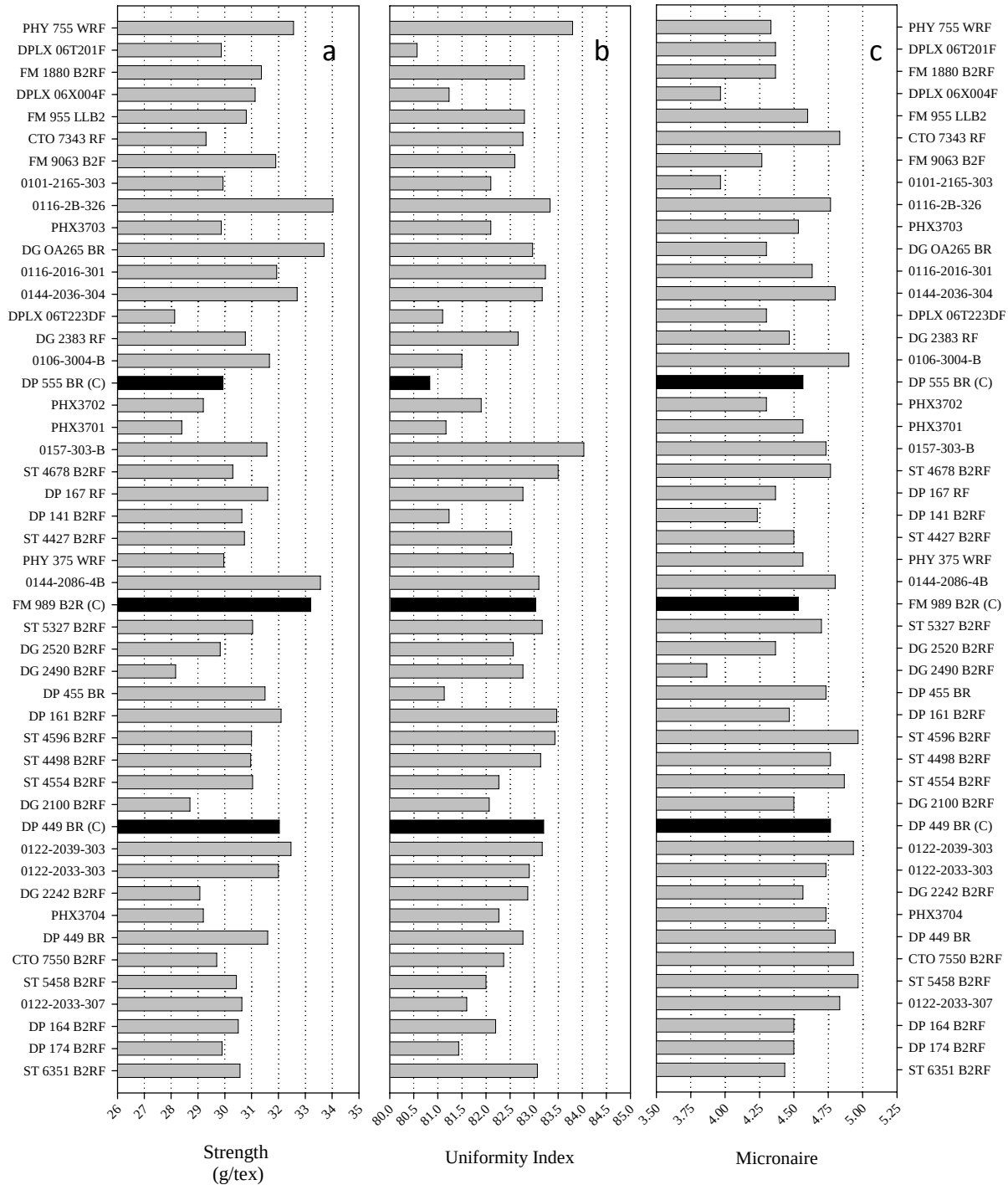

Figure 11. Fiber strength (a), fiber uniformity (b), and fiber micronaire (c), for each of the advanced strain lines entered at Maricopa, AZ, 2007. Black bars represent control varieties.

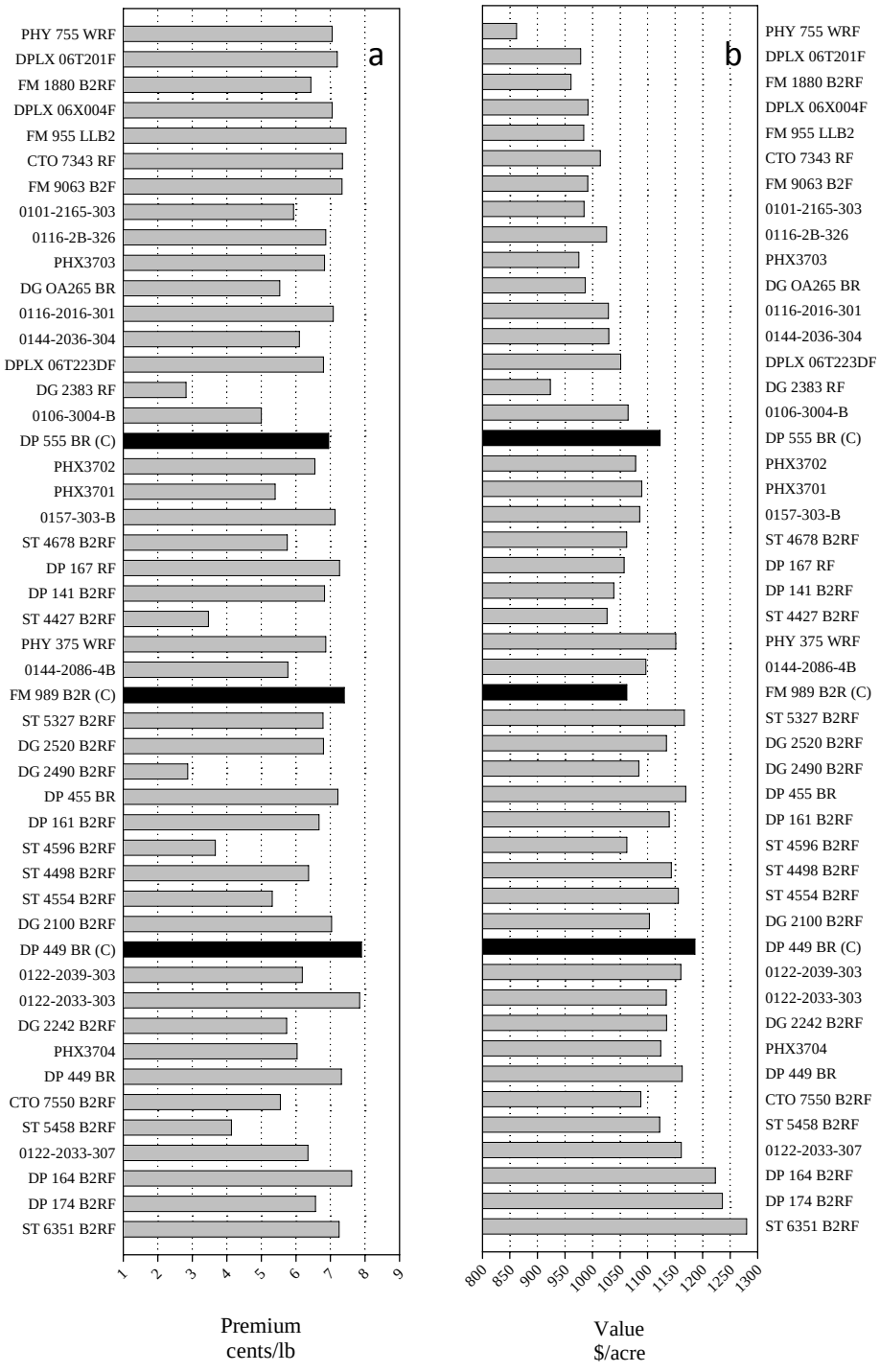

Figure 12. Fiber quality premium (a), and value of crop (b), for each of the advanced strain lines entered at Maricopa, AZ, 2007. Black bars represent control varieties.

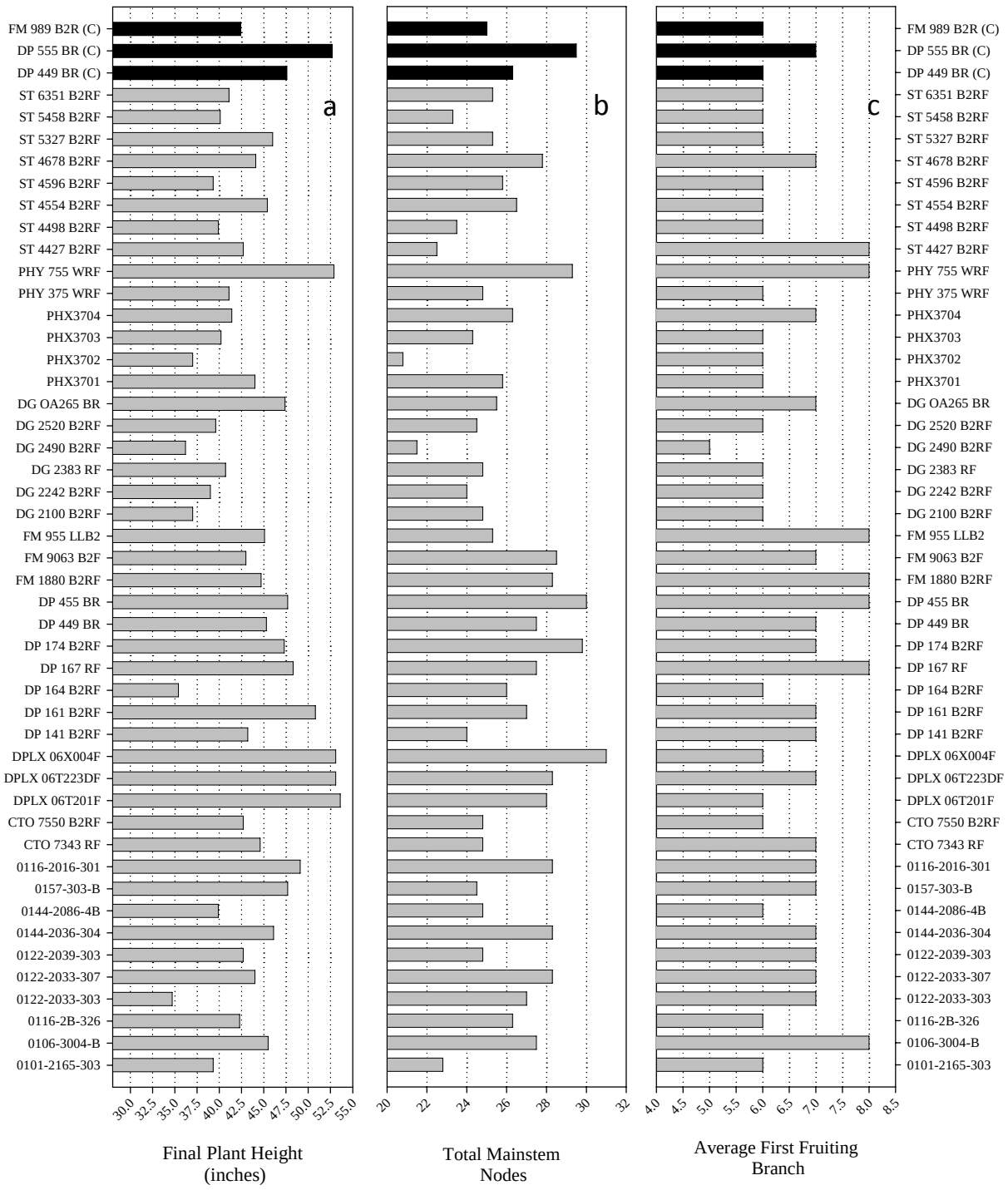

Figure 13. Final plant height (a), total mainstem nodes (b), and average position of first fruiting branch (c), for each of the advanced strain lines entered at Maricopa, AZ, 2007. Black bars represent control varieties.

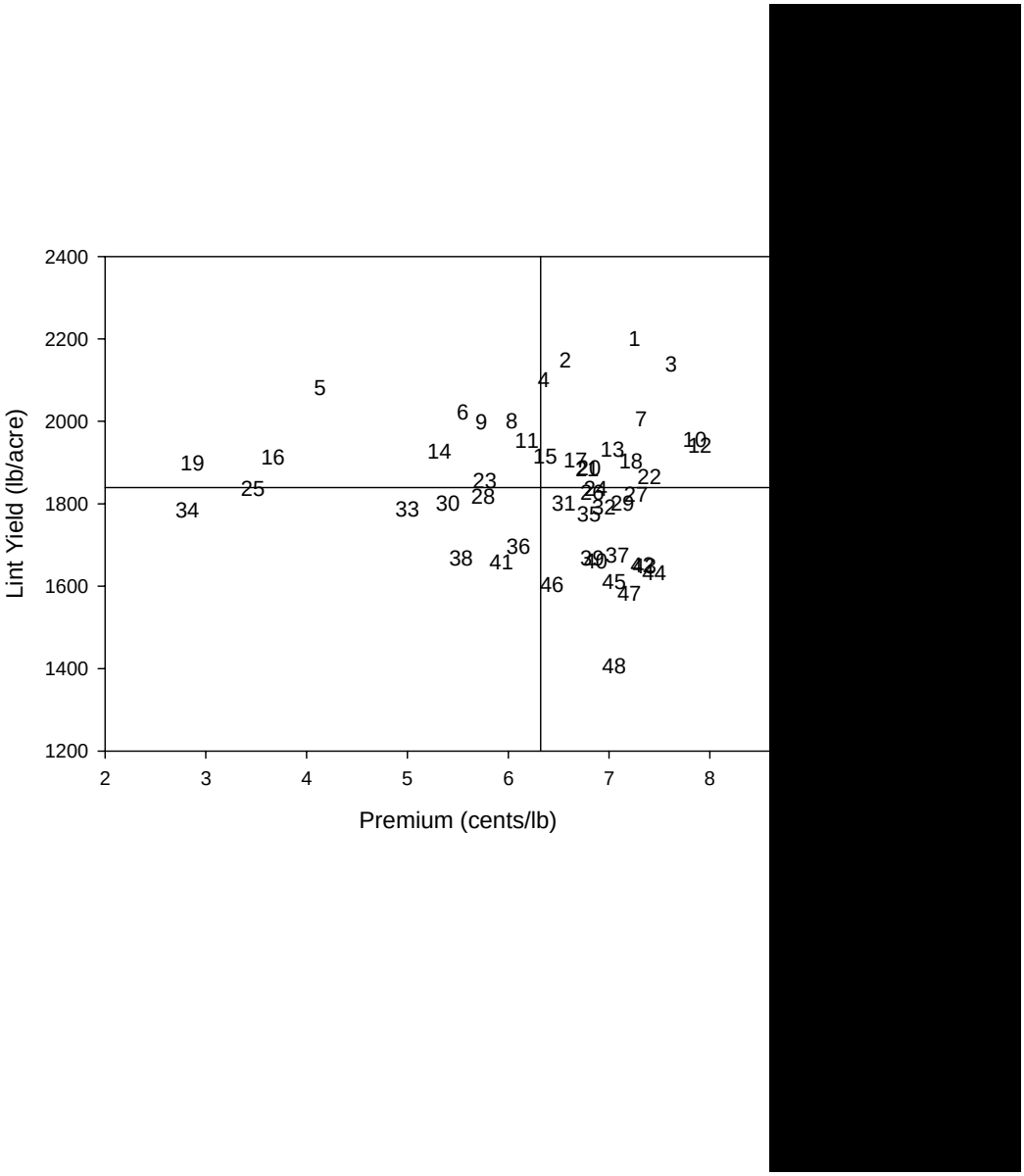

Figure 14. Lint yield (lbs/acre) plotted as a function of fiber quality premium/discount (cents/lb). Vertical and horizontal lines represent the mean value for the two parameters. Varieties that fall in the upper right quadrant formed by the mean lines produced higher than average lint yield and fiber quality. Each of the advanced strain entries are plotted for the Maricopa, AZ location in 2007.

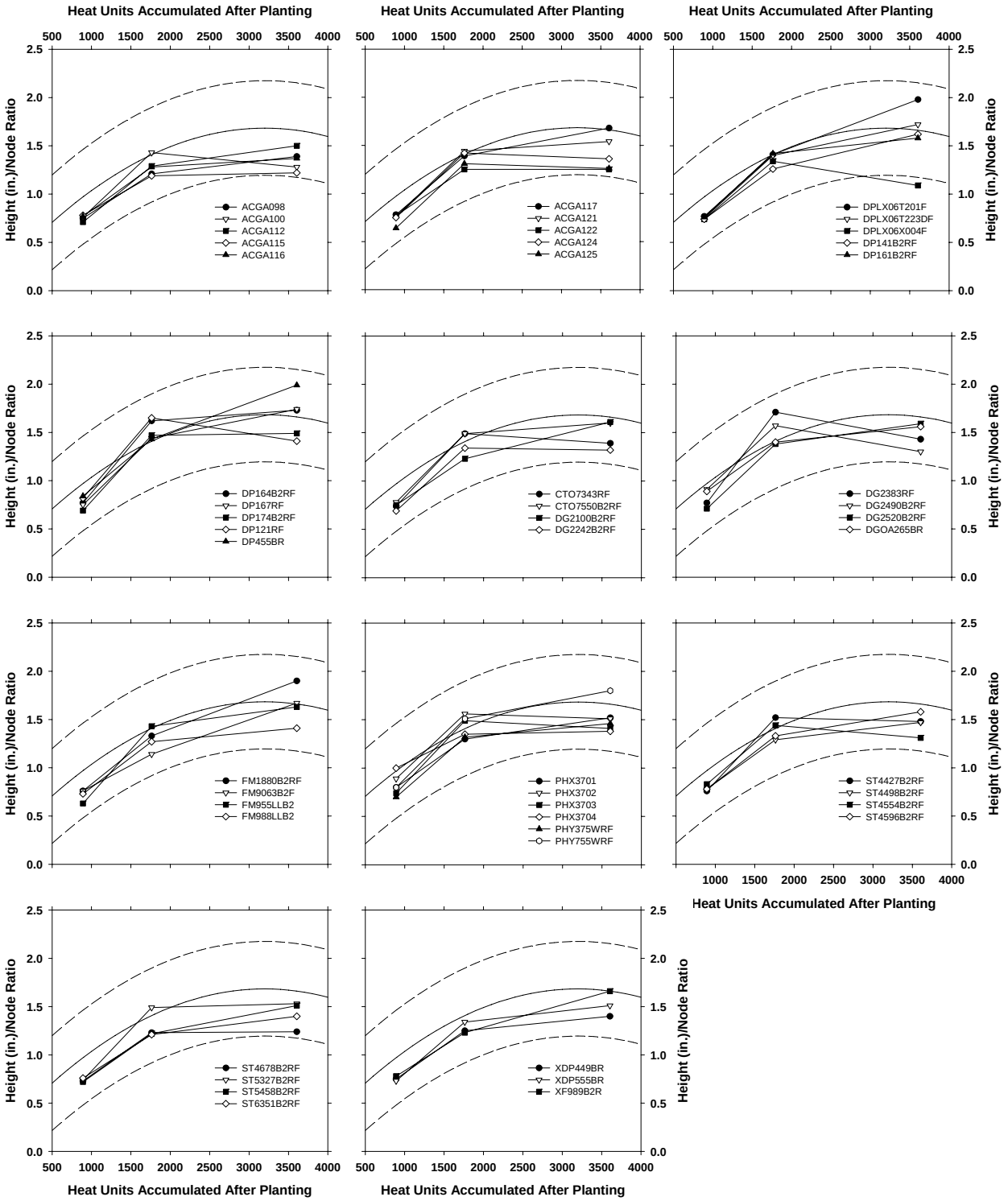

Figure 15. Height (in) to node ratio trends as a function of heat units accumulated after planting (HUAP) for each of the advanced strain lines entered at Safford, AZ, 2007. Control varieties are plotted in the lower middle graph.

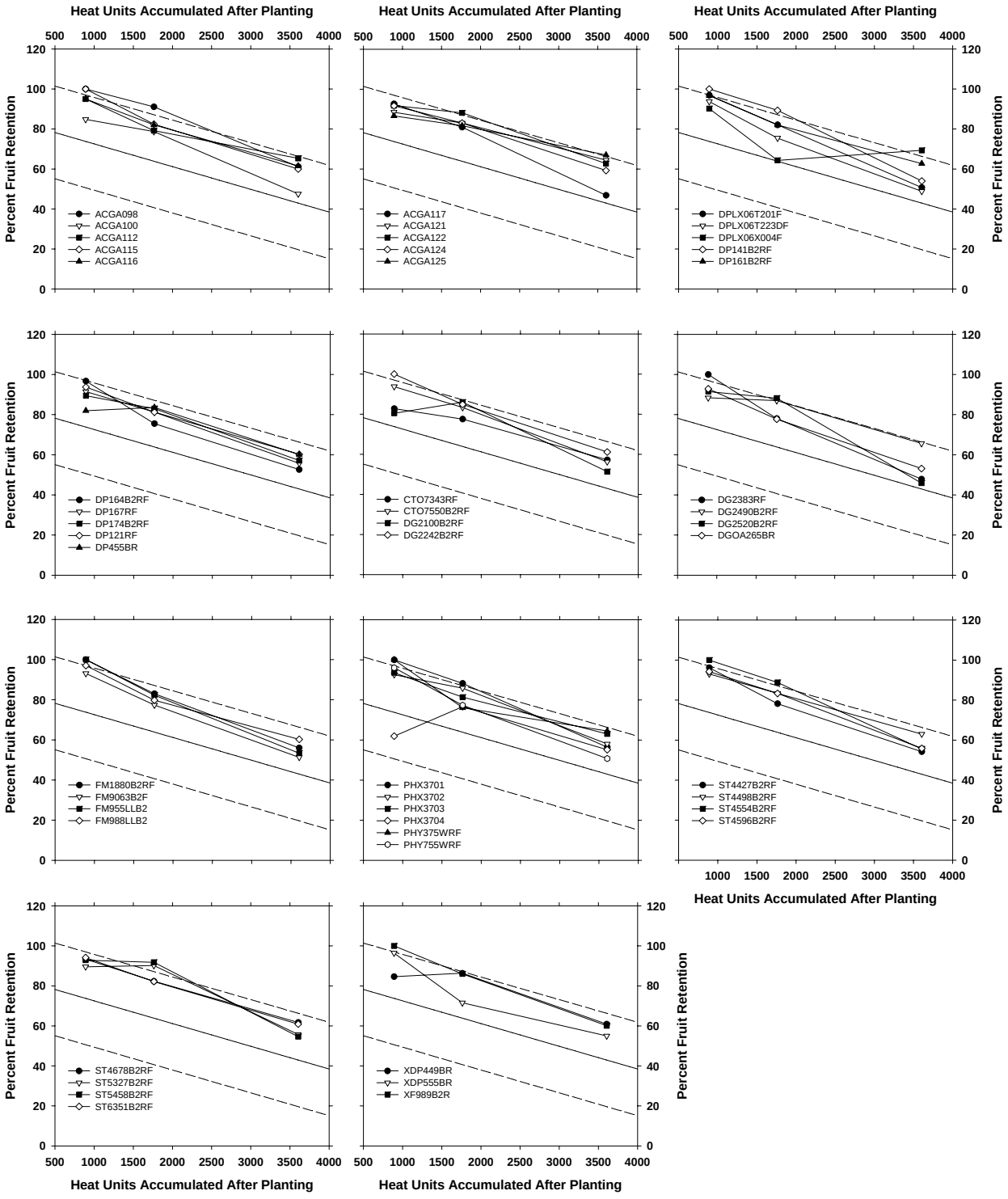

Figure 16. Percent fruit retention trends as a function of heat units accumulated after planting (HUAP) for each of the advanced strain lines entered at Safford, AZ, 2007. Control varieties are plotted in the lower middle graph.

Table 4. Lint yield and fiber quality results for the advanced strain trial conducted in Safford, AZ, 2007.

Seed Company	Strain	Lint Yield	Means Separation*	Lint Turnout	HVI Color	Staple	Strength	Uniformity	Length	Micronaire	Leaf Grade	Seedcotton Weight/boll	Premium	Value
		lbs/acre		Percent		32nds	g/tex	Percent	Inches			grams	cent/lb	$/acre
Control	**FM 989 B2R**	**1634.3**	**a**	**35.4**	**21**	**37.7**	**31.7**	**82.7**	**1.18**	**4.13**	**3**	**5.53**	**6.57**	**900.09**
FiberMax	FM 988 LLB2	1593.9	a b	34.5	11	37.0	29.9	80.7	1.17	4.07	3	5.57	6.25	854.70
Deltapine	DPLX 06T223DF	1591.9	a b c	35.1	21	37.0	29.5	81.4	1.16	4.03	3	4.5	5.38	908.42
Stoneville	ST 4498 B2RF	1577.5	a b c d	36.0	31	37.0	28.6	82.9	1.16	4.17	6	5.39	-1.22	803.77
ACGA	0122-2033-303	1562.6	a b c d e	35.2	21	36.7	29.9	83.1	1.15	4.20	3	4.9	5.68	828.68
ACGA	0144-2036-304	1515.4	a b c d e f	33.4	21	38.7	31.0	81.6	1.21	4.07	4	5.8	5.30	837.55
Phytogen	PHY 755 WRF	1514.6	a b c d e f	32.8	21	40.7	32.2	82.8	1.28	3.90	3	4.85	7.30	872.35
Dyna-Gro	DG 2100 B2RF	1491.4	a b c d e f g	34.6	21	37.0	27.2	82.4	1.15	3.87	4	5.1	3.35	826.94
Deltapine	DPLX 06T201F	1476.2	a b c d e f g h	33.8	21	37.3	30.2	81.2	1.17	3.80	3	4.73	6.13	844.26
Deltapine	DP 161 B2RF	1473.4	a b c d e f g h i	31.8	31	39.3	30.6	82.5	1.23	3.73	4	4.6	2.58	730.04
Stoneville	ST 4678 B2RF	1471.1	a b c d e f g h i	34.7	31	38.0	29.5	82.3	1.19	4.20	6	4.8	-1.17	747.00
Deltapine	DP 164 B2RF	1460.8	a b c d e f g h i	33.8	21	38.0	30.6	81.1	1.19	3.63	3	5.18	5.88	717.32
FiberMax	FM 9063 B2F	1443.6	b c d e f g h i j	32.8	21	38.7	32.0	81.7	1.22	4.07	4	5.7	3.82	801.98
Stoneville	ST 4596 B2RF	1439.3	b c d e f g h i j	33.2	21	37.7	28.8	82.5	1.18	4.33	5	5.37	0.15	696.99
Deltapine	DP 121 RF	1426.2	b c d e f g h i j	34.4	21	35.7	29.1	82.2	1.12	4.03	4	5.2	2.93	783.05
Deltapine	DP 455 BR	1418.9	b c d e f g h i j	31.3	21	37.0	30.6	81.0	1.15	4.07	3	5.01	6.40	827.84
Phytogen	PHX3704	1417.0	c d e f g h i j k	34.4	21	35.3	26.3	81.3	1.10	4.17	4	5.18	3.85	772.72
Deltapine	DP 141 B2RF	1411.1	d e f g h i j k l	33.8	21	37.7	30.4	80.9	1.19	3.80	5	4.7	2.63	684.68
Stoneville	ST 6351 B2RF	1404.2	d e f g h i j k l m	33.2	21	37.0	28.7	81.4	1.15	3.97	4	5.55	4.37	759.85
ACGA	0106-3004-B	1403.5	d e f g h i j k l m	35.4	21	37.0	30.5	81.3	1.17	4.10	3	4.4	6.00	813.71
Dyna-Gro	CTO 7550 B2RF	1402.7	d e f g h i j k l m	35.2	21	37.3	28.5	82.5	1.16	3.97	3	5.1	7.02	827.89
FiberMax	FM 955 LLB2	1398.8	e f g h i j k l m	31.3	21	39.0	30.4	82.3	1.23	3.93	3	5.71	6.15	778.36
ACGA	0116-2016-301	1396.2	e f g h i j k l m	35.0	21	38.0	30.7	82.3	1.18	4.17	3	5.24	7.08	789.88
FiberMax	FM 1880 B2RF	1389.0	e f g h i j k l m n	33.3	31	37.7	31.1	81.2	1.18	3.60	4	5.31	3.23	701.09
ACGA	0122-2033-307	1368.9	f g h i j k l m n o	32.7	21	36.7	28.0	82.1	1.14	4.27	3	5.8	6.65	775.00
Phytogen	PHX3703	1353.7	f g h i j k l m n o p	33.9	21	36.3	28.9	80.4	1.13	3.43	5	4.9	0.95	658.32
Stoneville	ST 4554 B2RF	1350.5	f g h i j k l m n o p	33.4	31	36.7	28.5	81.7	1.15	3.90	5	5.27	0.42	620.01
Stoneville	ST 5327 B2RF	1346.1	f g h i j k l m n o p q	33.3	21	37.7	30.2	82.2	1.18	4.13	4	4.6	4.43	691.09
Control	**DP 449 BR**	**1334.8**	**g h i j k l m n o p q**	**33.5**	**21**	**37.0**	**31.8**	**81.9**	**1.14**	**3.87**	**3**	**4.65**	**6.07**	**754.46**
Stoneville	ST 5458 B2RF	1332.2	g h i j k l m n o p q	34.6	31	37.3	30.3	81.3	1.17	4.10	6	4.87	-2.53	606.38
Deltapine	DP 167 RF	1329.1	g h i j k l m n o p q	33.6	21	37.7	29.5	81.0	1.18	3.77	3	4.95	5.28	762.17
Dyna-Gro	DG OA265 BR	1324.9	g h i j k l m n o p q	34.2	31	38.0	34.7	82.4	1.18	4.00	5	6.4	1.82	711.40
ACGA	0101-2165-303	1318.2	g h i j k l m n o p q	32.6	21	37.3	29.8	81.0	1.17	3.63	3	4.45	6.72	710.38
Phytogen	PHX3701	1306.4	h i j k l m n o p q	34.2	31	36.0	28.7	79.9	1.11	3.40	4	4.78	0.67	679.97
Stoneville	ST 4427 B2RF	1303.2	h i j k l m n o p q	31.9	31	36.7	28.8	81.4	1.14	3.83	6	4.73	-2.00	616.73
Phytogen	PHY 375 WRF	1302.2	h i j k l m n o p q	32.2	21	36.7	28.8	81.6	1.14	3.77	4	5.04	3.47	581.00
Dyna-Gro	DG 2490 B2RF	1298.2	i j k l m n o p q	35.0	31	35.7	26.2	81.5	1.11	3.37	6	4.65	-2.67	590.82
ACGA	0144-2086-4B	1280.1	j k l m n o p q r	32.0	21	37.0	31.3	82.2	1.15	4.13	4	5.0	4.25	661.13
Dyna-Gro	DG 2242 B2RF	1274.7	j k l m n o p q r	32.9	31	37.0	26.5	81.8	1.16	4.03	5	5.1	0.18	667.98
ACGA	0116-2B-326	1242.4	k l m n o p q r	32.0	21	36.7	31.0	83.0	1.13	4.10	4	4.65	5.58	626.81
Dyna-Gro	DG 2383 RF	1238.3	l m n o p q r	31.5	31	37.0	28.4	81.6	1.15	3.87	6	4.70	-2.55	612.63
Control	**DP 555 BR**	**1234.3**	**m n o p q r**	**32.5**	**31**	**35.7**	**27.2**	**79.5**	**1.11**	**3.77**	**3**	**4.35**	**5.02**	**703.47**
Dyna-Gro	DG 2520 B2RF	1214.3	n o p q r	34.9	21	37.0	26.4	80.3	1.16	3.73	5	4.7	1.38	520.58
Phytogen	PHX3702	1197.3	o p q r s	33.2	31	36.7	28.3	80.8	1.14	3.37	5	5.08	-0.83	599.93
Deltapine	DPLX 06X004F	1186.0	p q r s	34.0	21	37.0	29.6	80.2	1.15	3.50	4	4.5	4.12	661.33
ACGA	0157-303-B	1172.7	q r s	32.5	21	37.7	30.8	81.8	1.18	3.70	4	4.7	5.28	552.36
Deltapine	DP 174 B2RF	1120.5	r s	32.3	21	37.7	27.0	82.1	1.17	4.10	5	6.11	1.57	478.15
Dyna-Gro	CTO 7343 RF	1112.3	r s	33.3	21	36.0	27.9	80.5	1.12	3.70	2	5.3	5.35	634.60
ACGA	0122-2039-303	1036.3	s	32.5	31	37.0	32.0	81.9	1.15	3.17	3	5.0	2.10	522.14
LSD§		175.3		2.0	---	1.1	2.1	1.1	0.04	0.47	1	0.8	3.31	190.83
OSL†		0.0001		0.0001	---	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
CV‡		9.2		4.2	---	1.8	4.3	0.8	1.9	7.4	19.8	9.7	60.2	16.4

*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

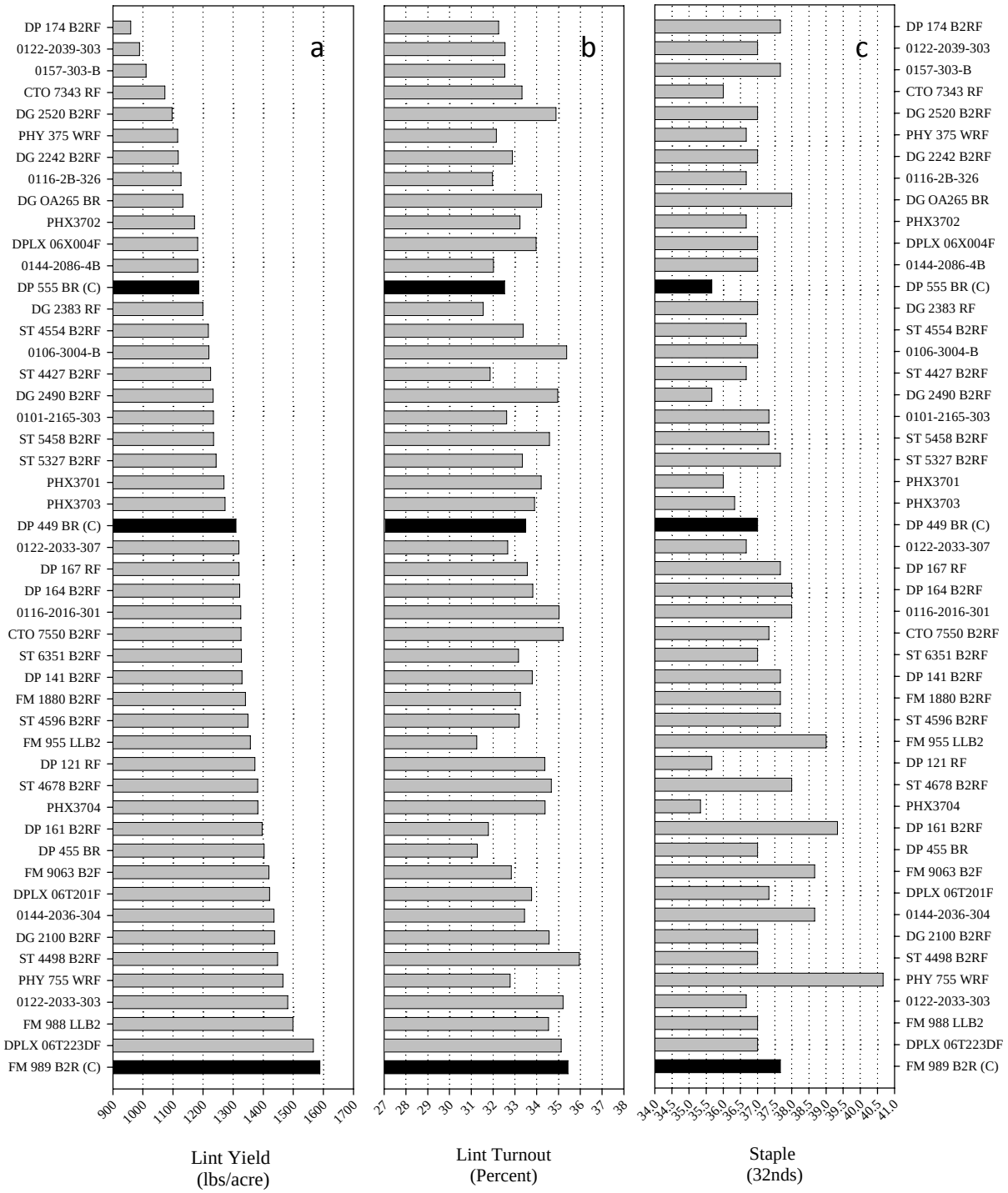

Figure 17. Lint yield (a), lint turnout (b), and fiber staple (c), for each of the advanced strain lines entered at Safford, AZ, 2007. Black bars represent control varieties.

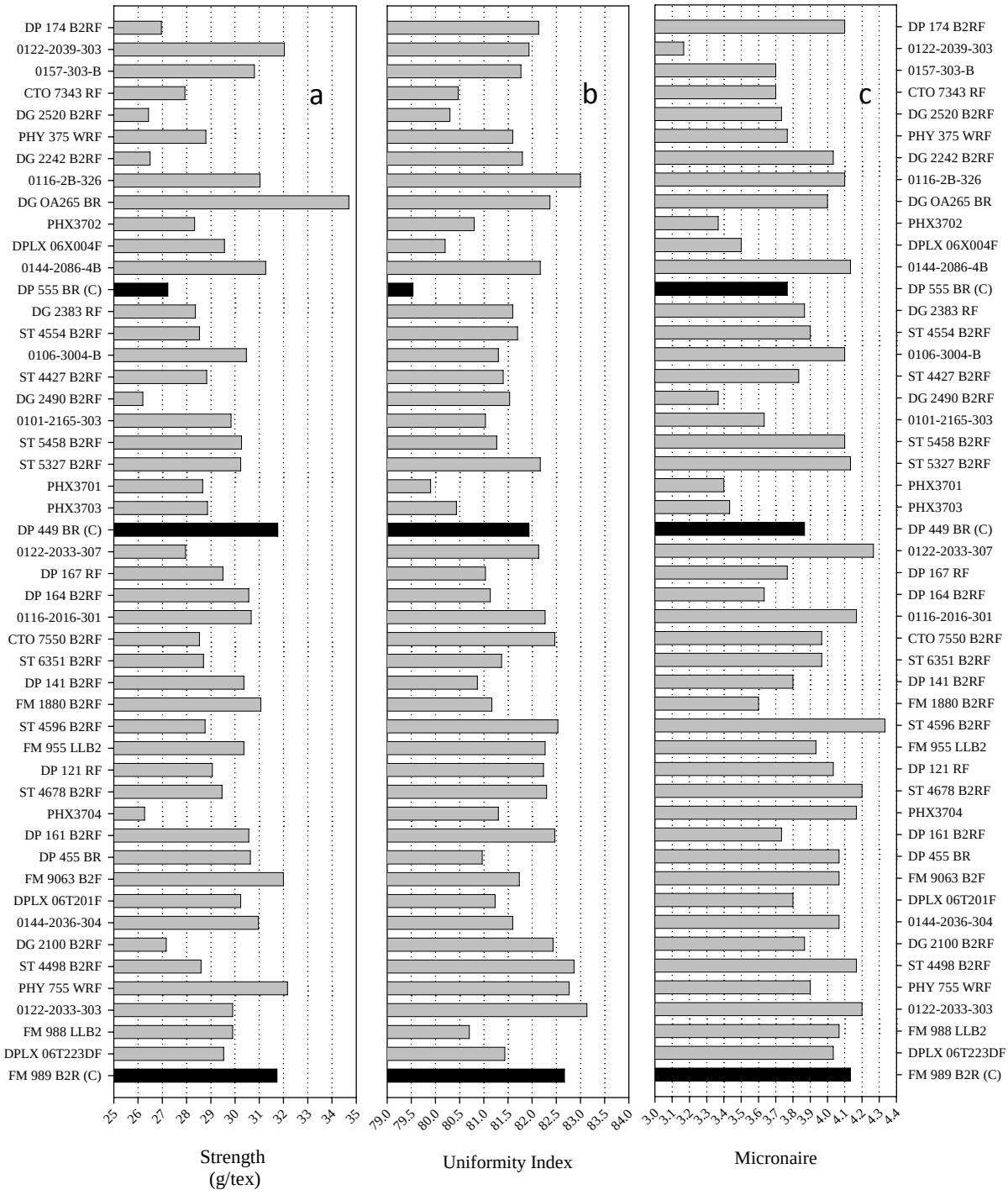

Figure 18. Fiber strength (a), fiber uniformity (b), and fiber micronaire (c), for each of the advanced strain lines entered at Safford, AZ, 2007. Black bars represent control varieties.

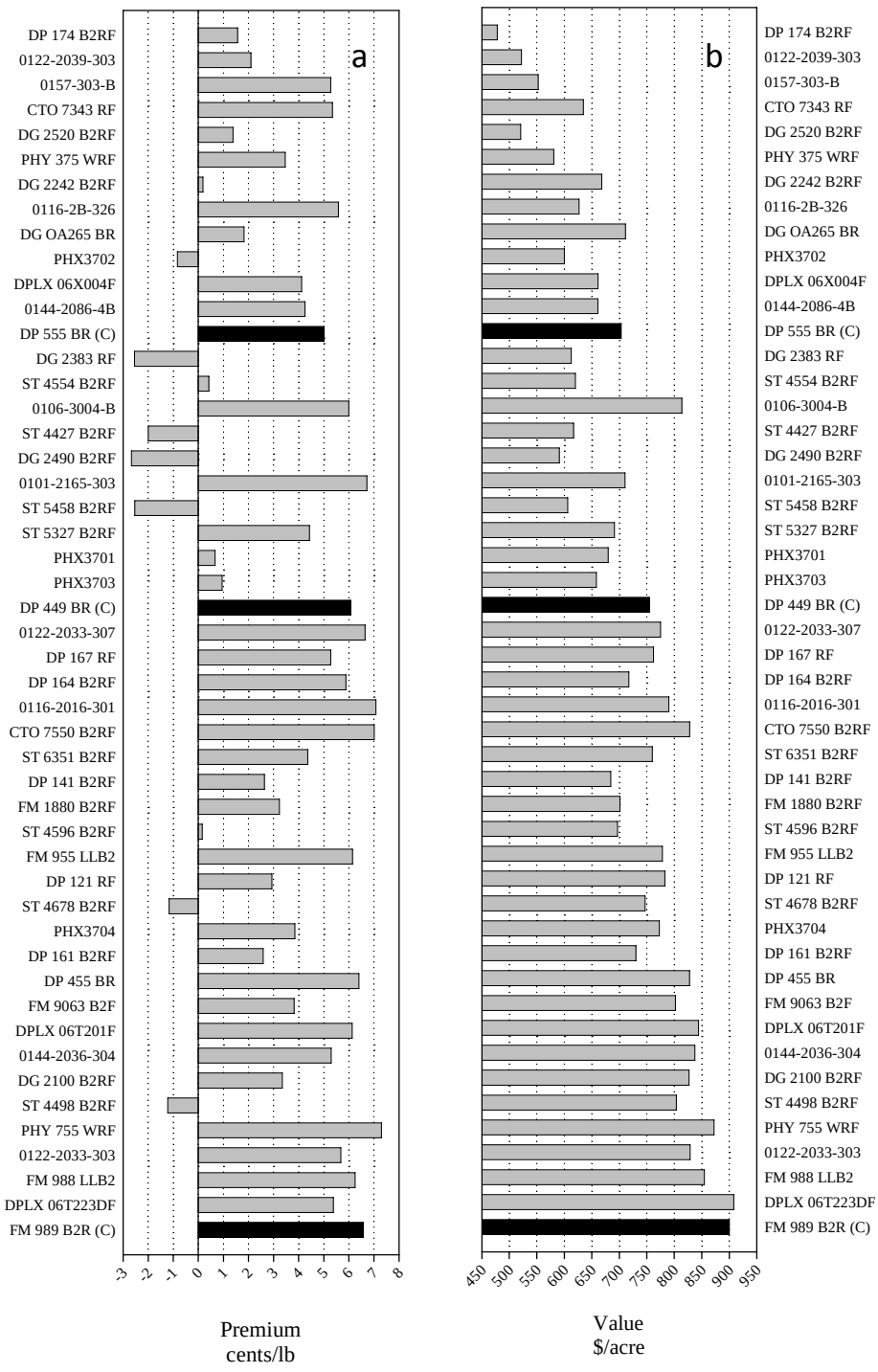

Figure 19. Fiber quality premium (a), and value of crop (b), for each of the advanced strain lines entered at Safford, AZ, 2007. Black bars represent control varieties.

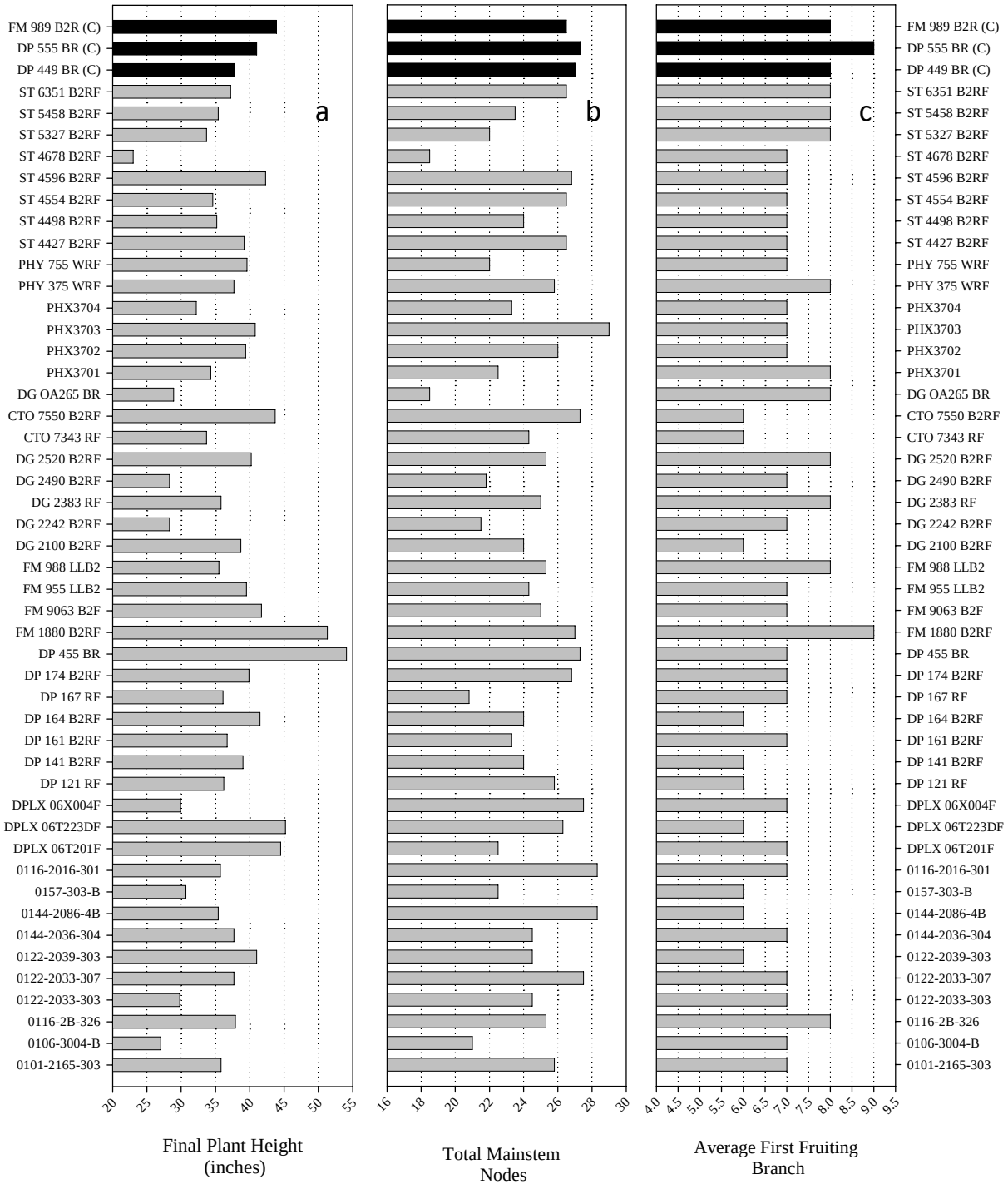

Figure 20. Final plant height (a), total mainstem nodes (b), and average position of first fruiting branch (c), for each of the advanced strain lines entered at Safford, AZ, 2007. Black bars represent control varieties.

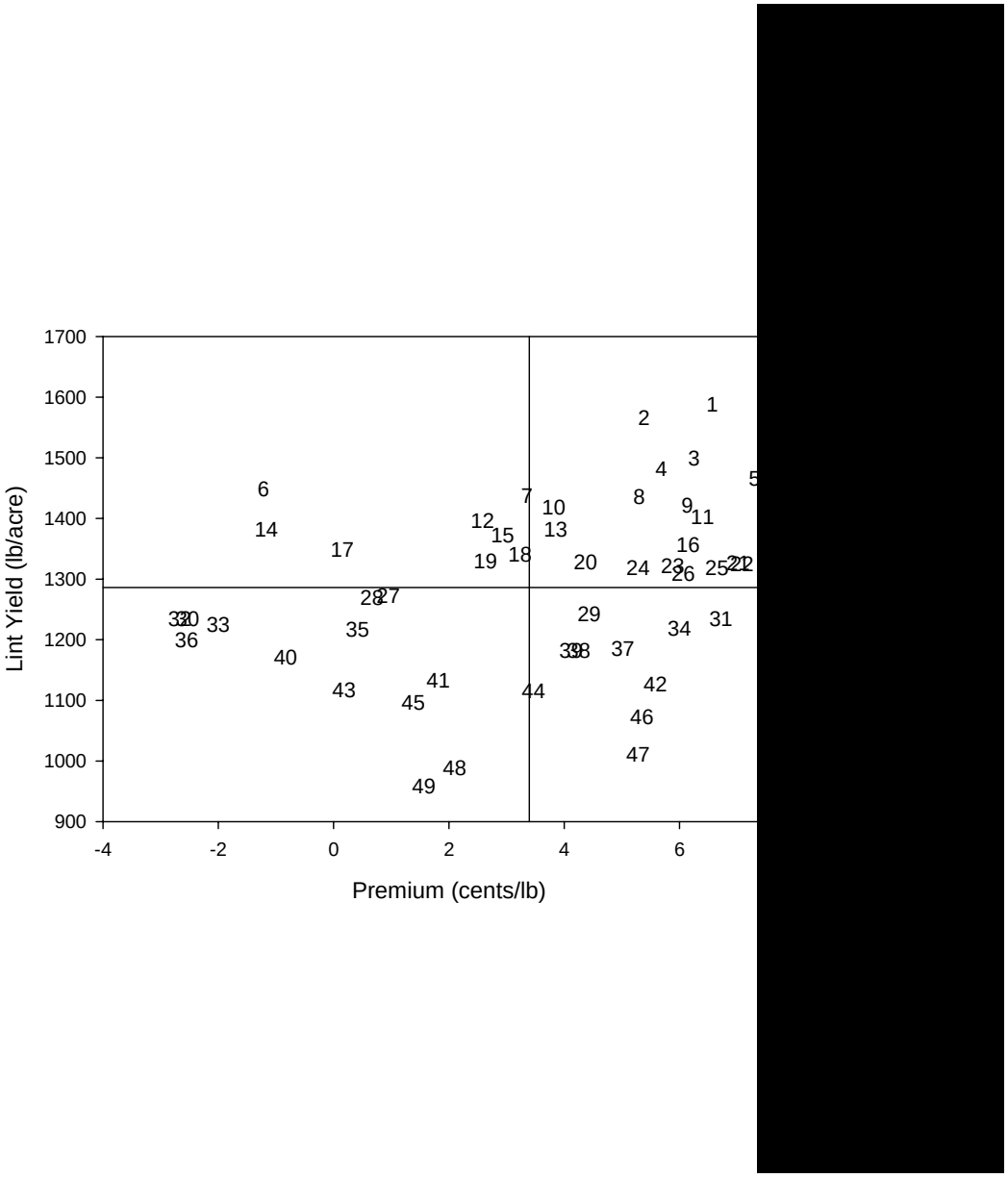

Figure 21. Lint yield (lbs/acre) plotted as a function of fiber quality premium/discount (cents/lb). Vertical and horizontal lines represent the mean value for the two parameters. Varieties that fall in the upper right quadrant formed by the mean lines produced higher than average lint yield and fiber quality. Each of the advanced strain entries are plotted for the Safford, AZ location in 2007.