PERFORMANCE OF BG/RR AND RR VARIETIES IN SYSTEMS TRIALS ACROSS THE MID-SOUTH AND SOUTHEAST Ken E. Lege' Delta and Pine Land Company Centre, AL David W. Albers Delta and Pine Land Company Lubbock, TX Tom A. Kerby Delta and Pine Land Company Scott, MS

Abstract

Following several years of light to moderate *Lepidopteran* insect pressure in cotton in the Mid-South and Southeast, the value of Bollgard[®] technology is being questioned by many growers. Since the demand for Roundup Ready[®] varieties remains very high across these regions, most growers need information regarding the value of planting Bollgard[®]/Roundup Ready[®] (BR) varieties over Roundup Ready[®] (RR) varieties. Systems trials were established that directly compared BR varieties and RR varieties planted in the same field, but managed for their respective transgenic technology across the two regions. Average yield and crop value performance of BR varieties were significantly greater than that for RR varieties, regardless of sub-region (Lower Southeast, Upper Southeast, Lower Mid-South, Upper Mid-South) or maturity classification (early maturity of full season). After considering estimated total insect control costs, including insecticide costs, application costs, and Bollgard[®] technology fees, BR varieties provided an additional \$20.34 to \$63.75 per acre relative to the RR varieties. The highest difference between technology types was found in the Lower Mid-South sub-region. The lowest difference, though still positive, was found in the Upper Mid-South sub-region. Differences in net value per acre between BR and RR varieties in the Southeast ranged from \$30 to nearly \$40.

Introduction

Bollgard[®]/Roundup Ready[®] (BR) varieties were planted on 37% of the total acreage planted to cotton in the United States in 2001 (USDA-AMS, 2001). Roundup Ready[®] (RR) varieties were planted on 28% of the total US acreage in 2001. Although an overwhelming demand for RR varieties exists in the Mid-South and Southeast regions of the US, many growers are questioning whether to invest in Bollgard[®] technology in combination with the RR technology. The question arises following several years of light to moderate pressure from *Lepidopteran* insect pests, such as tobacco budworm (*Heliothis viresence* L.) and cotton bollworm (*Helicoverpa zea* L.), in those regions.

Oppenhuizen et al. (2001) evaluated the net return generated from the use of Bollgard[®] throughout the cotton Belt over a five-year period. Data from independent sources for their study indicated that Bollgard[®] provided a net return of \$49.80 per acre; internal data from Monsanto indicated a similar value for Bollgard[®] net return, at \$44.70 per acre.

Each season, Delta and Pine Land Company (D&PL) Technical Services conducts many 'systems' trials throughout the cotton belt, in which the management of each trial corresponds to the transgenic traits for the varieties in the trial. We also conduct 'non-systems' trials in which varieties are tested under conventional insect and weed control practices regardless of transgenic traits. The state official variety trials (OVTs) conducted by the land-grant universities across the cotton belt are also predominantly 'non-systems' trials. The University of Georgia Extension Service in Decatur Co., GA, has been conducting an extensive systems trial since 1998. Their data showed a yield advantage of BR varieties of 85 lbs/acre compared to the RR varieties in the trial over a four-year period. Additionally, BR varieties showed a net return \$43.95 higher relative to the RR varieties (McGriff, 2001).

Previous data from D&PL systems trials combined with state OVT data has shown a 48 lb/acre yield advantage of BR varieties over RR varieties; however, those data were primarily indirect comparisons over many locations (Lege' et al., 2001). Those same data also suggested that there were no consistent differences in staple length, fiber strength, or micronaire values for comparisons between BR and RR varieties. Kerby et al. (2000) reported that, although some differences do exist between transgenic and conventional varieties, those differences are minor in magnitude and not consistent across variety families.

The objectives of this study were to: 1) determine if any lint yield and/or crop value differences exist between BR and RR varieties that are tested in the same systems trials across the Mid-South and Southeast regions; and 2) evaluate the net return of each technology type in those regions.

Materials and Methods

Large plot, on-farm cotton variety trials were established across the Mid-South and Southeast regions by Delta and Pine Land Company Technical Services Agronomists in 2000 and 2001. In all trials for which data is reported within, the management decisions were made by the grower-cooperator and corresponded with the transgenic traits possesses by the varieties within the trials (i.e., 'systems' trials). All data reported within are from locations in which Roundup Ready[®] (RR) varieties and Bollgard[®]/Roundup Ready[®] (BR) varieties were planted in the same trial and managed according to the respective technologies. Therefore, all varieties were managed within the RR system; conventional insect control methods were used on RR varieties, but BR varieties were managed within the Bollgard[®] system with regard to insect control.

Seedcotton yield was determined using boll buggies equipped with load cells. Seedcotton was ginned either at Scott, MS, or Hartsville, SC, on 20-saw gins which include seedcotton cleaners and lint cleaners. High Volume Instrument measurements were made at the Delta and Pine Land Company HVI lab at Scott, MS. Crop values were calculated using the 2001 USDA loan chart using a base of \$0.50/lb. of lint. Crop value data are expressed in \$/acre, +/- premiums and/or discounts. Net returns were calculated by subtracting the 'total insect control costs' from Oppenhuizen et al., 2001, from the crop value. The assumed total insect control costs were from the same approximate geographic areas included in this study.

Analyses of variance were used to compare means (SAS, 1990). Data were categorized by sub-region and variety maturity classification. The Lower Southeast region (south AL, FL, GA) and Lower Mid-South region (south AR, LA, south MS) data were grouped into full season varieties (DP 451 B/RR, DP 458 B/RR, DP 655 B/RR, DP 5415 RR, DP 5690 RR, and DP 436 RR) and early-maturing varieties (SG 215 BG/RR, Sure-Grow 501 BR, DP 451 B/RR, ST4892BR, Sure-Grow 521R, DP 436 RR, and ST4793R). The Upper Southeast region (SC, NC, VA) data and Upper Mid-South region (north AL, north AR, MO, north MS, TN) data included only early-maturing varieties (SG 215 BG/RR, DP 451 B/RR, DP 451 B/RR, PM 1218 BG/RR, Sure-Grow 501 BR, ST4892BR, DP 436 RR, Sure-Grow 521 R, PM 1199 RR, and ST4793R). All data reported are from all trials that had all of the varieties listed in the regions listed available in Delta and Pine Land Company's Agronomic Information System as of 2 January, 2002.

Results and Discussion

Lower Southeast

Significant differences among full season varieties were found across 15 trials in the Lower Southeast region (south AL, FL, GA) for lint yield, turnout, micronaire, and strength (Table 1). DP 451 B/RR had significantly yielded higher than DP 655 B/RR, DP 5415 RR, and DP 5690 RR; no differences in crop value were detected for this data set. BR varieties significantly outyielded the RR varieties; crop value for BR varieties were also significantly higher than for RR varieties in this data set (Table 1). The only fiber characteristic that showed differences between BR and RR technology types was fiber strength.

Early-maturing varieties in 7 trials across the Lower Southeast differed in lint yield, turnout, staple length, micronaire, strength, and crop value, with SG 215 BG/RR having the highest yield and crop value (Table 2). BR varieties within this data set had significantly higher yield and crop value than the RR varieties. None of the fiber characteristics differed between technology types in this data set.

Upper Southeast

Early-maturing varieties in 12 trials across the Upper Southeast (north SC, NC, VA) significantly differed in lint yield, turnout, staple length, micronaire, strength, uniformity, and crop value (Table 3). SG 215 BG/RR had the highest yield, but DP 451 B/RR had the highest crop value. BR varieties in this data set significantly outyielded the RR varieties; similar differences in crop value were found between technology types as well (Table 3). RR varieties had longer staple values and higher strength values compared to the BR varieties. No other fiber characteristic differences were found.

Lower Mid-South

Significant differences were found among full season varieties across 14 trials in the Lower Mid-South region (south AR, LA, south MS) for lint yield, turnout, micronaire, strength, and crop value (Table 4). DP 451 B/RR had the highest yield and crop value in this data set. BR varieties had higher yield and crop value than the RR varieties in this data set (Table 4). The only fiber characteristic that showed a significant difference between the technology types was fiber strength, with RR varieties having stronger fiber in this data set.

Early-maturing varieties planted in 18 trials across the Lower Mid-South showed significant differences in lint yield, all fiber characteristics, and crop value (Table 5). PM 1218 BG/RR had the highest yield and crop value in this data set. Significant differences between technology types were also shown for all parameters in this data set, with BR varieties having higher lint yield, turnout, micronaire, leaf grade, and crop value relative to RR varieties (Table 5).

Upper Mid-South

Significant differences among early-maturing varieties planted in 30 trials across the Upper Mid-South (north AL, north AR, MO, north MS, TN) region were found for lint yield, all fiber characteristics, and crop value (Table 6). PM 1218 BG/RR had the highest yield in this data set; SG 215 BG/RR had the highest crop value. Lint yield, staple length, uniformity, and crop value significantly differed between technology types for this data set (Table 6). BR varieties had higher yield and crop value relative to RR varieties.

<u>Net Returns</u>

Net returns for each technology type are presented for each data set (i.e., sub-region and maturity classification) in Table 7. Net value was obtained by subtracting the estimated total insect control cost, which was assumed from Oppenhuizen et al., 2001 by specific geography that closely matched the sub-regional groupings used in this study, from the crop value, which was based on the 2001 USDA loan chart. The difference between the net value for each technology type in each data set appears in the column labeled 'Net BR Advantage'.

In every sub-region and for each maturity classification within the sub-region, BR varieties showed a positive net BR advantage, indicating that the performance of the BR varieties generated crop values in excess of any insect control costs as compared to the RR varieties in those same trials (Table 7). In the Lower Southeast, full season BR varieties showed an advantage of \$33.12/acre over the full season RR varieties. In that same sub-region, early-maturing BR varieties generated \$29.44 more per acre than RR varieties. In the Upper Southeast, the early-maturing BR varieties generated \$39.48 more per acre than the RR varieties. In the Lower Mid-South, full season BR varieties showed a \$63.75 advantage over the RR varieties, and the early-maturing BR varieties in this sub-region generated \$59.22 more per acre than the RR varieties. In the Upper Mid-South, early-maturing BR varieties.

Summary

Over all sub-regions and maturity classifications, BR varieties outyielded RR varieties by an average of 45 to 98 lbs/acre. PM 1218 BG/RR and SG 215 BG/RR were the top-performing varieties in both Mid-South sub-regions in terms of lint yield and crop value. In the Upper Southeast, SG 215 BG/RR and DP 451 B/RR had the highest lint yields and crop value. In the Lower Southeast, SG 215 BG/RR, DP 451 B/RR, and DP 458 B/RR had the highest yields and crop values. Positive differences in net value between BR and RR varieties were shown in all sub-regions and maturity classifications, with those differences being greatest in the Lower Mid-South at nearly \$60/acre. The BR advantage was lowest in the Upper Mid-South, but nonetheless, BR varieties returned \$20.34 more than the RR varieties in that sub-region. The BR advantage in the Lower Southeast was nearly \$30/acre, regardless of maturity classification. The BR advantage in the Upper Southeast was nearly \$40/acre.

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Variety/								Crop
Technology	Lbs.	%	Staple	Micro-	Leaf	Strength	% Uni-	Value
Type [†]	lint/acre	Turn-out	(1/32 in)	naire	Grade	(g/tex)	formity	(\$/acre) [‡]
DP 451 B/RR	1041.8	36.0	35.3	4.43	1.6	26.8	81.4	520.10
DP 458 B/RR	992.2	37.2	34.6	4.52	1.5	28.2	80.6	494.00
DP 655 B/RR	955.4	36.1	35.2	4.27	1.4	29.6	80.8	485.17
DP 5415 RR	912.5	37.5	35.4	4.52	1.6	29.0	81.4	461.45
DP 5690 RR	898.6	36.6	35.2	4.42	1.7	30.4	80.8	454.41
\mathbf{R}^2	0.88	0.72	0.79	0.71	0.46	0.88	0.67	0.88
CV (%)	9.29	3.01	1.93	5.84	39.14	3.46	1.11	10.17
Prob>F								
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Variety	0.0063	0.1965	0.1965	0.0219	0.6973	< 0.0001	0.0988	0.0781
Variety LSD _(0.05)	60.2	0.7	NS [§]	0.17	NS	0.7	NS	NS
BR	996.3	36.5	35.1	4.41	1.5	28.2	80.9	499.46
RR	905.6	37.1	35.3	4.47	1.7	29.7	81.1	457.93
R^2	0.86	0.64	0.77	0.66	0.45	0.74	0.64	0.87
CV (%)	9.65	3.30	1.97	6.19	38.68	5.12	1.15	10.29
Prob>F	2.00	0100	1177	0117	20100	0112		10.22
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Technology	0.0132	0.0837	0.6357	0.6998	0.3360	0.0003	0.6780	0.0496
Technology								
LSD _(0.05)	40.9	NS	NS	NS	NS	0.6	NS	21.95

Table 1. Mean lint yield and fiber characteristics of full season varieties and means for technology type in 15 Delta and Pine Land Bollgard[®]/Roundup Ready[®] systems trials in the Lower Southeast region (south AL, FL, GA) in 2000 – 2001.

[†] BR = all Bollgard[®]/Roundup Ready[®] varieties; RR = all Roundup Ready[®] varieties.

Based on 2001 USDA loan chart at \$0.50/lb., +/- premiums and/or discounts.

<u>2000 – 2001.</u>								Crear
variety/	The	07	Stanla	Miono	Loof	Stuonath	07 Umi	Crop
Termo		70 T	(1/22 + m)	MICTO-	Creal	Strength	% UIII-	$(f)(a arra)^{\ddagger}$
Туре	int/acre	Turn-out	(1/32 III)	naire	Grade	(g/tex)	Tormity	(\$/acre)
SG 215 BG/RR	1105.7	37.5	33.5	4.50	1.7	25.4	80.2	543.91
SG 501 BR	1032.6	37.6	33.6	4.76	2.0	27.4	80.8	497.75
ST4892BR	1007.0	39.1	33.9	4.90	2.0	27.0	81.4	467.33
DP 451 B/RR	991.1	35.6	34.8	4.29	1.4	26.2	80.7	497.50
SG 521 R	950.0	37.0	33.5	4.40	2.1	26.4	80.3	462.39
DP 436 RR	937.6	35.6	34.9	4.27	1.9	26.3	80.8	473.94
ST4793R	923.5	38.5	33.7	4.68	2.3	27.6	81.1	453.50
\mathbf{R}^2	0.95	0.76	0.80	0.57	0.51	0.75	0.66	0.92
CV (%)	5.88	2.66	1.84	5.72	40.81	3.75	0.94	8.34
Prob>F								
Replicate	< 0.0001	0.0002	< 0.0001	0.1932	0.0006	< 0.0001	< 0.0001	< 0.0001
Variety	< 0.0001	< 0.0001	< 0.0001	0.0002	0.5516	0.0039	0.0557	0.0087
Variety LSD _(0.05)	64.2	1.1	0.7	0.29	NS [§]	1.1	NS	44.51
BR	1034.1	37.4	34.0	4.61	1.8	26.5	80.8	501.62
RR	937.7	36.9	34.0	4.44	2.1	26.8	80.7	463.77
\mathbb{R}^2	0.92	0.25	0.57	0.17	0.46	0.59	0.53	0.90
CV (%)	6.65	4.42	2.52	7.46	40.01	4.52	1.04	9.14
Prob>F								
Replicate	< 0.0001	0.0853	< 0.0001	0.5352	0.0003	< 0.0001	< 0.0001	< 0.0001
Technology	< 0.0001	0.3389	0.7484	0.1110	0.2096	0.4463	0.9077	0.0155
Technology								
LSD _(0.05)	39.1	NS	NS	NS	NS	NS	NS	26.29

Table 2. Mean lint yield and fiber characteristics of early-maturing varieties and means for technology type in 7 Delta and Pine Land Bollgard[®]/Roundup Ready[®] systems trials in the Lower Southeast region (south AL, FL, GA) in 2000 - 2001

 \dagger BR = all Bollgard[®]/Roundup Ready[®] varieties; RR = all Roundup Ready[®] varieties.

Based on 2001 USDA loan chart at \$0.50/lb., +/- premiums and/or discounts.
§ not significant.

Variety/	*							Crop
Technology	Lbs.	%	Staple	Micro-	Leaf	Strength	% Uni-	Value
Type [†]	lint/acre	Turn-out	(1/32 in)	naire	Grade	(g/tex)	formity	(\$/acre) [‡]
SG 215 BG/RR	1209.5	39.5	33.9	4.74	1.7	26.9	81.1	593.51
DP 451 B/RR	1194.3	38.4	35.6	4.64	1.7	27.8	82.1	601.68
PM 1218 BG/RR	1193.9	40.3	34.0	5.14	1.2	27.5	81.5	563.80
SG 501 BR	1171.2	39.3	34.5	4.88	1.4	28.9	82.1	577.01
DP 436 RR	1113.2	37.3	35.7	4.60	1.2	28.0	82.1	566.73
SG 521 R	1098.7	39.3	34.7	4.45	1.3	27.8	81.5	544.09
ST4892BR	1096.5	40.3	34.5	4.75	1.9	29.3	81.7	545.20
ST4793R	1057.2	40.3	34.6	4.87	1.8	29.1	81.3	518.43
PM 1199 RR	1032.5	40.3	35.6	4.80	1.6	29.8	83.1	517.39
\mathbf{R}^2	0.91	0.79	0.73	0.85	0.32	0.82	0.63	0.90
CV (%)	6.96	2.97	1.96	4.69	43.33	3.47	0.90	8.42
Prob>F								
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0089	< 0.0001	< 0.0001	< 0.0001
Variety	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0850	< 0.0001	< 0.0001	< 0.0001
Variety LSD _(0.05)	64.6	1.0	0.6	0.18	NS [§]	0.8	0.6	38.60
BR	1173.1	39.6	34.5	4.83	1.6	28.1	81.7	576.24
RR	1075.3	39.3	35.2	4.68	1.5	28.7	82.0	536.90
\mathbf{R}^2	0.89	0.62	0.49	0.76	0.21	0.65	0.38	0.87
CV (%)	7.55	3.88	2.60	5.69	44.96	4.63	1.12	9.07
Prob>F								
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0201	< 0.0001	< 0.0001	< 0.0001
Technology	< 0.0001	0.3087	0.0010	0.0091	0.5298	0.0406	0.1176	< 0.0001
Technology								
LSD _(0.05)	33.2	NS	0.4	0.11	NS	0.5	NS	19.73

Table 3. Mean lint yield and fiber characteristics of early-maturing varieties and means for technology type in 12 Delta and Pine Land Bollgard[®]/Roundup Ready[®] systems trials in the Upper Southeast region (north SC, NC, VA) in 2000 – 2001.

 $\frac{1}{1000}$ BR = all Bollgard[®]/Roundup Ready[®] varieties; RR = all Roundup Ready[®] varieties.

Based on 2001 USDA loan chart at \$0.50/lb., +/- premiums and/or discounts.

Table 4. Mean lint yield and fiber characteristics of full season varieties and means for technology type in 14 Delta and Pine Land Bollgard[®]/Roundup Ready[®] systems trials in the Lower Mid-South region (south AR, LA, south MS) in 2000 – 2001.

Variety/								Crop
Technology	Lbs.	%	Staple	Micro-	Leaf	Strengt	% Uni-	Value
Type [†]	lint/acre	Turn-out	(1/32 in)	naire	Grade	h (g/tex)	formity	(\$/acre) [‡]
DP 451 B/RR	798.8	32.6	35.2	4.50	1.8	27.1	81.4	402.06
DP 458 B/RR	752.9	34.5	34.9	4.60	2.1	28.5	81.4	373.53
DP 655 B/RR	743.9	33.2	35.0	4.31	2.2	30.0	81.0	383.68
DP 5415 RR	717.6	34.5	34.9	4.53	2.1	29.0	81.3	362.75
DP 5690 RR	682.0	33.0	35.0	4.43	2.1	29.7	81.2	348.37
2								
\mathbf{R}^2	0.81	0.50	0.52	0.68	0.32	0.59	0.29	0.80
CV (%)	15.57	5.43	2.09	4.64	44.72	4.74	1.19	16.17
Prob>F								
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Variety	< 0.0001	< 0.0001	0.3704	< 0.0001	0.6246	< 0.0001	0.4897	0.0006
Variety LSD _(0.05)	53.6	0.8	NS [§]	0.10	NS	0.6	NS	28.11
BR	764.6	33.5	35.0	4.49	2.1	28.5	81.3	385.24
RR	699.8	33.7	35.0	4.48	2.1	29.4	81.2	355.56
\mathbf{P}^2	0.80	0.20	0.51	0.60	0.21	0.40	0.28	0.70
\mathbf{K}	15.61	0.39	0.51	0.00	0.51	5.40	0.20	0.79
CV(%)	13.01	5.95	2.10	5.15	44.00	5.08	1.19	10.18
PTOD>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Replicate	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.0001	<0.0001	<0.0001
Technology	< 0.0001	0.8530	0.7140	0.4128	0.7931	< 0.0001	0.7997	< 0.0001
Technology								
LSD(0.05)	34.7	NS	NS	NS	NS	0.49	NS	18.16

† BR = all Bollgard[®]/Roundup Ready[®] varieties; RR = all Roundup Ready[®] varieties.
‡ Based on 2001 USDA loan chart at \$0.50/lb., +/- premiums and/or discounts.

Variety/		%						Crop
Technology	Lbs.	Turn-	Staple	Micro-	Leaf	Strength	% Uni-	Value
Type [†]	lint/acre	out	(1/32 in)	naire	Grade	(g/tex)	formity	(\$/acre) [‡]
PM 1218 BG/RR	861.8	36.7	33.9	4.88	2.6	26.6	81.6	394.13
SG 215 BG/RR	817.2	34.7	33.4	4.64	2.7	26.1	81.1	373.01
DP 451 B/RR	780.0	33.0	34.9	4.53	2.2	27.1	81.2	384.80
ST4892BR	775.2	35.6	34.6	4.83	2.5	28.4	81.9	368.44
ST4793R	750.7	35.9	34.5	4.76	2.2	28.2	81.6	355.80
SG 501 BR	732.4	34.1	34.1	4.76	2.6	28.5	81.9	348.38
DP 436 RR	720.4	32.8	35.4	4.49	2.0	27.8	82.2	359.32
PM 1199 RR	708.3	34.9	35.1	4.80	2.2	29.0	83.0	345.91
SG 521 R	683.9	34.2	34.0	4.54	2.6	27.4	81.5	331.52
\mathbf{R}^2	0.83	0.57	0.62	0.56	0.20	0.57	0.48	0.79
CV (%)	13.52	5.06	2.23	5.54	43.25	4.64	1.09	15.17
Prob>F								
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Variety	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0051	< 0.0001	< 0.0001	< 0.0001
Variety LSD _(0.05)	43.6	0.7	0.3	0.11	0.4	0.5	0.4	23.54
BR	791.9	34.8	34.2	4.73	2.5	27.4	81.6	373.05
RR	714.9	34.4	34.8	4.64	2.2	28.1	82.1	347.90
\mathbf{R}^2	0.82	0.36	0.42	0.45	0.17	0.37	0.33	0.78
CV (%)	14.09	6.14	2.72	6.13	43.71	5.53	1.22	15.44
Prob>F								
Replicate	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Technology	< 0.0001	0.0423	< 0.0001	0.0026	0.0067	< 0.0001	< 0.0001	< 0.0001
Technology								
LSD _(0.05)	21.6	0.4	0.2	0.06	0.2	0.3	0.2	11.39

Table 5. Mean lint yield and fiber characteristics of early-maturing varieties and means for technology type in 18 Delta and Pine Land Bollgard[®]/Roundup Ready[®] systems trials in the Lower Mid-South region (south AR, LA, south MS) in 2000 – 2001. _

 $\frac{1000}{1000} = \frac{1000}{1000} = \frac{1000}{1000$

Table 6. Mean lint yield and fiber characteristics of early-maturing varieties and means for technology type in 30 Delta and Pine Land Bollgard[®]/Roundup Ready[®] systems trials in the Upper Mid-South region (north AL, north AR, MO, north MS, TN) in 2000 – 2001.

	%						Crop
Lbs.	Turn-	Staple	Micro-	Leaf	Strength	% Uni-	Value
lint/acre	out	(1/32 in)	naire	Grade	(g/tex)	formity	(\$/acre) [‡]
1038.8	37.2	34.8	4.43	2.2	28.1	82.2	521.82
1037.8	35.8	34.6	4.12	1.8	27.9	82.0	522.35
1022.1	35.9	35.0	4.37	2.0	29.5	82.4	520.31
1012.0	36.8	35.2	4.25	2.5	29.4	82.7	520.71
1002.1	34.5	36.0	3.98	1.7	28.3	82.2	513.09
995.4	37.6	34.9	4.27	2.2	29.0	82.4	505.08
985.6	35.8	35.1	4.09	2.2	28.3	82.2	501.34
979.9	36.9	35.6	4.39	1.7	29.7	83.2	502.19
949.1	33.8	35.6	4.14	1.4	28.5	82.3	489.44
0.88	0.83	0.77	0.85	0.35	0.72	0.63	0.87
9.38	3.60	1.98	5.48	43.92	3.63	1.01	10.19
< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0375
44.4	0.6	0.3	0.11	0.4	0.5	0.4	24.55
1022.3	36.0	35.1	4.23	2.0	28.6	82.3	519.61
977.1	36.0	35.3	4.22	1.9	28.9	82.5	499.14
0.87	0.69	0.67	0.79	0.26	0.59	0.57	0.87
9.43	4.85	2.34	6.45	46.41	4.29	1.07	10.14
< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
< 0.0001	0.6144	0.0204	0.5899	0.1030	0.0516	0.0320	0.0004
21.2	NS§	0.2	NS	NS	NS	0.20	11.59
	Lbs. lint/acre 1038.8 1037.8 1022.1 1012.0 1002.1 995.4 985.6 979.9 949.1 0.88 9.38 <0.0001 0.0005 44.4 1022.3 977.1 0.87 9.43 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001	$%$ Lbs.Turn- out1038.8 37.2 1037.8 35.8 102.1 35.9 1012.0 36.8 1002.1 34.5 995.4 37.6 985.6 35.8 979.9 36.9 949.1 33.8 0.88 0.83 9.38 3.60 <0.0001	$\frac{\%}{101/acre}$ Turn- outStaple $(1/32 in)$ 1038.837.234.81037.835.834.61022.135.935.01012.036.835.21002.134.536.0995.437.634.9985.635.835.1979.936.935.6949.133.835.60.880.830.779.383.601.98<0.0001	$\frac{\%}{lint/acre}$ Turn- outStaple $(1/32 in)$ Micro- naire1038.837.234.84.431037.835.834.64.121022.135.935.04.371012.036.835.24.251002.134.536.03.98995.437.634.94.27985.635.835.14.09979.936.935.64.39949.133.835.64.140.880.830.770.859.383.601.985.48<0.0001	$\frac{\%}{101}$ Staple outMicro- naireLeaf Grade1038.837.234.84.432.21037.835.834.64.121.81022.135.935.04.372.01012.036.835.24.252.51002.134.536.03.981.7995.437.634.94.272.2985.635.835.14.092.2979.936.935.64.391.7949.133.835.64.141.40.880.830.770.850.359.383.601.985.4843.92<0.0001	$\frac{\%}{lint/acre}$ Staple outMicro- (1/32 in)Leaf naireStrength (gread)1038.837.234.84.432.228.11037.835.834.64.121.827.91022.135.935.04.372.029.51012.036.835.24.252.529.41002.134.536.03.981.728.3995.437.634.94.272.229.0985.635.835.14.092.228.3979.936.935.64.391.729.7949.133.80.770.850.350.729.383.601.985.4843.923.63<0.0001	$\frac{\%}{101/2 \text{ cm}}$ Staple (1/32 in)Micro- naireLeaf GradeStrength (g/tex) $\%$ Uni- formity1038.837.234.84.432.228.182.21037.835.834.64.121.827.982.01022.135.935.04.372.029.582.41012.036.835.24.252.529.482.71002.134.536.03.981.728.382.2995.437.634.94.272.229.082.4985.635.835.14.092.228.382.2979.936.935.64.391.729.783.2949.133.835.64.141.428.582.30.880.830.770.850.350.720.639.383.601.985.4843.923.631.01<0.0001

[†] BR = all Bollgard[®]/Roundup Ready[®] varieties; RR = all Roundup Ready[®] varieties.

Based on 2001 USDA loan chart at \$0.50/lb., +/- premiums and/or discounts.

			Estimated Total		Net BR
Sub-region/	No.	Crop Value	Insect Control	Net Value	Advantage
Technology Type [†]	Trials	(\$/acre) [‡]	Cost (\$/acre) [§]	(\$/acre) [¶]	(\$/acre) ^{††}
Lower Southeast					
Full Season	15				
BR		499.46	58.97	440.49	33.12
RR		457.93	50.56	407.37	
Early Maturity	7				
BR		501.62	58.97	442.65	29.44
RR		463.77	50.56	413.21	
Upper Southeast					
Early Maturity	12				
BR		576.24	38.28	537.96	39.48
RR		536.90	38.42	498.48	
Lower Mid-South					
Full Season	14				
BR		385.24	86.96	298.28	63.75
RR		355.56	121.03	234.53	
Early Maturity	18				
BR		373.05	86.96	286.09	59.22
RR		347.90	121.03	226.87	
Upper Mid-South					
Early Maturity	30				
BR		519.61	38.28	481.33	20.34
RR		499.41	38.42	460.99	

Table 7. Net economic return differences between Bollgard[®]/Roundup Ready[®] and Roundup Ready[®] varieties for each sub-region and maturity classification in Delta and Pine Land systems trials in 2000 - 2001.

[†] BR = Bollgard[®]/Roundup Ready[®] varieties; RR = Roundup Ready[®] varieties.

‡ Based on 2001 USDA loan chart at \$0.50/lb. +/- premiums and/or discounts.

§ From Oppenhuizen et al., 2001; includes insecticide costs, application costs, and Bollgard[®] technology fees for approximately the same geography for each sub-region.

¶ Crop value – Estimated total insect control cost.

⁺⁺ Difference between net value for Bollgard[®]/Roundup Ready[®] and Roundup Ready[®] varieties; all other crop management inputs were considered equal across all varieties in the study.