DP 161 B2RF – A NEW MID-FULL MATURITY, HIGH QUALITY VARIETY

David Albers
Delta and Pine Land Business of Monsanto Co.
Memphis, TN
Doug Shoemaker
Delta and Pine Land Business of Monsanto Co.
Scott, MS
Larry Burdett
Delta and Pine Land Business of Monsanto Co.
Maricopa, AZ

Abstract

DP 161 B2RF is a mid-full maturity variety with high fiber quality that will be released for commercial sales in the 2008 growing season. The variety has smooth leaf pubescence, medium to tall plant height and a columnar / cluster fruiting habit. The average fiber properties of DP 161 B2RF are 37.5 staple, 4.4 micronaire, and 30.3 g/tex fiber strength. The node of the first fruiting branch averages 6.2 nodes. DP 161 B2RF was developed from the same germplasm as DP 164 B2RF, and has similar fruiting pattern, maturity, and yield performance. The staple length, micronaire, and uniformity index are all improved in DP 161 B2RF compared to DP 164 B2RF. The yield performance of DP 161 B2RF is similar to ST 4554 B2RF in the southern Cotton Belt, and similar to PHY 485 WRF in a Beltwide comparison. The staple length of DP 161 B2RF was longer than all three comparison varieties: DP 164 B2RF, PHY 485 WRF, and ST 4554 B2RF. The crop value of DP 161 B2RF is greater than PHY 485 WRF, and similar to DP 164 B2RF and ST 4554 B2RF. The regional performance of DP 161 B2RF showed the best performance in Arizona, and the southeast U.S., with strong performance in other full-season markets (S. Delta, South Texas, Trans Pecos region of Texas).

Introduction

Delta and Pine Land is releasing for commercial introduction in 2008, a new mid-full maturity variety that contains both the Bollgard II and Roundup Ready Flex traits: DP 161 B2RF. The characteristics describing DP 161 B2RF are summarized in Table 1. DP 161 B2RF was developed from the same germplasm background as DP 164 B2RF (Lege, et al. 2006) by Doug Shoemaker at the D&PL Transgenic Breeding program in Scott, MS and Larry Burdett at the D&PL Western breeding program in Maricopa, AZ. The highlights of DP 161 B2RF characteristics are improved fiber quality compared to DP 164 B2RF and competitive check varieties, smooth leaf pubescence. In addition DP 161 B2RF characteristics include Verticillium and Fusarium tolerance both rated as very good.

Table 1. DP 161 B2RF Characteristics and Fiber quality

Trait	Description
Maturity	Mid – Full
Leaf Pubescence	Smooth
Plant Height	Med – Tall
Seed Size	5100 – 5600 seed / lb
Verticillium Tolerance	Good to Very Good
Fusarium Tolerance	Very Good
Fruiting Habit	Columnar / Cluster
Micronaire	4.4
Staple	37.5
Strength	30.3 g/tex
Node First Fruiting Branch	6.2

Materials and Methods

The data describing DP 161 B2RF (along with internal and competitive check varieties) was obtained from the following sources: Delta and Pine Land breeder trials (2006), D&PL on-farm trials (2007), and University trials typically referred to as Official Variety Tests and County Agent Tests (2007). Plant growth, fruiting, and maturity comparisons were made by plant mapping a subset of the D&PL on-farm trials when approximately 50% of the bolls were open. All available yield, fiber quality and plant mapping data were queried on the dates noted in each data table for these analyses. Analysis of variance was completed using JMP 5.0 statistical software (SAS Institute).

Results and Discussion

Plant Mapping Comparisons

The growth and fruiting characteristics of DP 161 B2RF, as measured by end-of-season plant mapping, are summarized in Tables 2 to 4. Maturity comparisons of DD60's to 100% open used the method of Speed, et al. (2004). The growth and fruiting variables of DP 161 B2RF are similar to DP 164 B2RF, with the exception of total nodes, where DP 161 B2RF is 0.4 nodes greater than DP 164 B2RF (Table 2). DP 161 B2RF is characterized as a mid-full maturity variety, with medium to tall plant height due, in part, to the similarity of its fruiting and plant development characteristics compared to DP 164 B2RF.

Table 2. Plant mapping comparison of DP 161 B2RF and DP 164 B2RF in D&PL on-farm variety trials, 2007.

	DP 161 B2RF	DP 164 B2RF	Prob>F
Plant Ht.	38.7	37.9	NS
Total Nodes	**20.8**	20.4	0.006
Fruiting Nodes	10.4	10.3	NS
HNR	1.86	1.86	NS
NFFB	6.2	6.3	NS
NUCB	11.6	11.8	NS
NUHB	15.7	15.6	NS
DD60's to 100% open	203.1	189.3	NS

n= 61 locations, 2007
HNR = Height to Node Ratio (inches / node); NFFB = Node of First Fruiting Branch; NUCB = Node uppermost cracked boll (1st position); NUHB = Node Uppermost Harvestable Boll (1st position).

DP 161 B2RF is compared to ST 4554 B2RF in Table 3. In this comparison, DP 161 B2RF was found to be taller, with more total nodes, more fruiting nodes, greater HNR, slightly higher NFFB, and NUCB. These growth and fruiting parameters result in DP 161 B2RF having later maturity (measured in DD60's to 100% open) by 35.6 DD60's. DP 161 B2RF's taller plant size will provide growers the opportunity to position this variety on soils that they typically have trouble attaining good stalk height. Under vigorous growing conditions on strong soils, growers should follow local recommendations for growth regulator management of DP 161 B2RF.

Table 3. Plant mapping comparisons of DP 161 B2RF and ST 4554 B2RF in **D&PL on-farm variety trials, 2007.**

	DP161B2RF	ST4554B2RF	Prob>F
Plant Ht.	**42.4**	37.2	<.0001
Total Nodes	**21.3**	20.0	<.0001
Fruiting Nodes	**10.4**	9.9	0.047
HNR	**2.00**	1.88	<.0001
NFFB	**6.2**	6.0	0.04
NUCB	11.8	11.7	NS
NUHB	**15.7**	14.8	0.0005
DD60's to 100% open	**195.4**	159.8	0.003
DD60 Difference	**35.6**		

n=49 locations, 2007
HNR = Height to Node Ratio (inches / node); NFFB = Node of First Fruiting Branch; NUCB = Node uppermost cracked boll (1st position); NUHB = Node Uppermost Harvestable Boll (1st position).

The growth parameters of plant height, total nodes, fruiting nodes, HNR, NFFB, and NUHB were not different in the DP 161 B2RF and PHY 485 WRF comparisons (Table 3). The NUCB of DP 161 B2RF was lower than DP 485 WRF, which translated to 46.4 DD60's later maturity for DP 161 B2RF. This data would indicate that the growth and fruiting pattern of DP 161 B2RF and PHY 485 WRF are similar, with the exception of later maturity for DP 161 B2RF.

Table 4. Plant mapping comparisons of DP 161 B2RF and PHY 485WRF in D&PL on-farm variety trials, 2007.

	DP161B2RF	PHY485WRF	Prob>F
Plant Ht.	42.6	42.6	NS
Total Nodes	21.3	20.8	NS
Fruiting Nodes	9.7	9.8	NS
HNR	2.00	2.06	NS
NFFB	6.5	6.3	NS
NUCB	**11.2**	12.1	0.0005
NUHB	15.2	15.1	NS
DD60's to 100% open	**199.7**	153.3	0.016
DD60 Difference	**46.4**		

n=26 locations, 2007
HNR = Height to Node Ratio (inches / node); NFFB = Node of First Fruiting Branch; NUCB = Node uppermost cracked boll (1st position); NUHB = Node Uppermost Harvestable Boll (1st position).

Yield, Fiber Quality, and Value Comparisons

DP 161 B2RF had similar yield and gin turnout compared to DP 164 B2RF, in 220 locations of testing in 2006 and 2007 (Table 5). The fiber properties that showed improvement in DP 161 B2RF were staple (0.5 staple longer), fiber strength (0.9 g/tex stronger), and uniformity index (0.7 higher). DP 164 B2RF is a very good fiber quality variety, so no differences were found in loan value. The improved fiber quality of DP 161 B2RF gives growers a higher quality option for several markets that fit the mid to full maturity of this variety.

Table 5. Lint Yield, Fiber Quality, and Value comparisons of DP 161 B2RF and DP 164 B2RF in 2006 and 2007 testing.

Variety	Crop Value ($/acre)	Lint Yield (lb/acre)	% Gin Turnout	Staple (32nd's inch)	Micronaire	Fiber Strength (g/tex)	Uniformity Index	Loan Value (cents/lb)
DP161B2RF	601	1089	35.4	37.0	4.31	29.1	82.1	54.69
DP 164 B2RF	602	1089	35.4	36.5	4.28	28.0	81.4	54.49
N	198	220	220	199	199	198	199	198
Prob>F	NS	NS	NS	<.0001	NS	<.0001	<.0001	NS

Notes: Beltwide Data, 2006 and 2007 testing, all locations; Head to Head (balanced) data in AIS as of 12.17.07
NS = Statistically Non-significant
Loan Value = $0.52/lb +/- premiums or discounts according to 2007 USDA Loan Chart

DP 161 B2RF also had similar yield and gin turnout to PHY 485 WRF in the 100 comparisons for the 2007 testing (Table 6), but significant improvements in staple, micronaire, and uniformity index. In this case, the improvements in fiber quality resulted in greater loan value (cents / lb), and crop value ($ / acre). The fiber strength of the two varieties was also similar in this comparison.

Table 6. Lint Yield, Fiber Quality, and Value comparisons of DP 161 B2RF and PHY 485 WRF in 2007 testing.

Variety	Crop Value ($/acre)	Lint Yield (lb/acre)	% Gin Turnout	Staple (32nd's inch)	Micronaire	Fiber Strength (g/tex)	Uniformity Index	Loan Value (cents/lb)
DP161B2RF	570	1062	36.5	36.8	4.40	28.9	82.0	53.99
PHY485WRF	549	1052	36.8	35.6	4.53	28.8	82.6	52.64
n	83	100	100	84	84	83	84	83
Prob>F	0.03	ns	ns	<.0001	0.0002	ns	<.0001	<.0001

Notes: Beltwide Data, 2007 testing, all locations; Head to Head (balanced) data in AIS as of 12.17.07
NS = Statistically Non-significant
Loan Value = $0.52/lb +/- premiums or discounts according to 2007 USDA Loan Chart

DP 161 B2RF was also found to have similar crop value, lint yield, and gin turnout, when compared to ST 4554 B2RF in the southern Cotton Belt (Table 7). The fiber qualities that show improvement are staple length (1.5 staple units longer), and lower micronaire. Fiber strength and uniformity index for DP 161 B2RF were not different than ST 4554 B2RF. Loan value for DP 161 B2RF was significantly higher than ST 4554 B2RF.

Table 7. Lint Yield, Fiber Quality, and Value comparisons of DP 161 B2RF and ST 4554 B2RF in Southern Cotton Belt 2006 and 2007 testing.

Variety	Crop Value ($/acre)	Lint Yield (lb/acre)	% Gin Turnout	Staple (32nd's inch)	Micronaire	Fiber Strength (g/tex)	Uniformity Index	Loan Value (cents/lb)
DP 161 B2RF	635	1161	35.3	37.1	4.47	29.7	82.6	54.54
ST 4554 B2RF	629	1165	35.6	35.5	4.54	29.4	82.4	53.82
N	90	100	100	90	90	90	90	90
Prob>F	NS	NS	NS	<.0001	0.03	NS	NS	0.002

Notes: Southern Cotton Belt (S. Southeast, S. Delta, Texas Blacklands, Trans Pecos) data, 2006 and 2007 testing, all locations; Head to Head (balanced) data in AIS as of 12.17.07
NS = Statistically Non-significant
Loan Value = $0.52/lb +/- premiums or discounts according to 2007 USDA Loan Chart

Regional Yield and Crop Value Performance

The regional yield (lb lint/acre) and crop value ($/acre) were compared to the location mean to calculate yield and value as % of mean within each data region listed below (Figure 1). In Arizona, southern Southeast, and northern Southeast both the lint yield and crop value were greater than 100% of the location means. The germplasm

background for DP 161 B2RF was developed in Arizona, so that regional fit is similar to the regional fit of DP 164 B2RF (Lege, et al., 2006). The southeast portion of the Cotton Belt has a history of good performance with mid to full maturity varieties. The 2007 season in the southeast experienced significant drought that resulted in relatively better yields in varieties in the mid to full maturity range, including DP 161 B2RF.

Several regions had both yield and crop value greater than 97.5% of the mean of the tests in that region: SJV (CA), Trans Pecos, TX, Southern High Plain, TX, Central Texas Blacklands, South Texas, and South Delta. All of these regions typically experience enough heat units to permit strong performance of mid to full maturity varieties like DP 161 B2RF. In the north Delta region, the crop value was greater than 97.5% of the means, while the yield was slightly below 97.5%. The north Delta region can be limited on heat units in some seasons, so growers need to place mid to full maturity varieties like DP 161 B2RF on soils that give them challenges attaining sufficient plant height, and to manage them according to local recommendations for growth regulators.

In only 2 data regions, Northern High Plains and Rolling Plains, DP 161 B2RF did not reach 95% of the yield or crop value means. These regions are both relatively short season, so the maturity of DP 161 B2RF may not have been the best fit. Further testing will be carried out to assess the performance of DP 161 B2RF in these regions.

In 10 of the 12 data regions the crop value performance was relatively higher than the lint yield performance, indicative of the high fiber quality, relative to the varieties being tested in each region. In the SJV, CA region the value was not greater than the yield, as a result of the high quality varieties that DP 161 B2RF was tested against in that market.

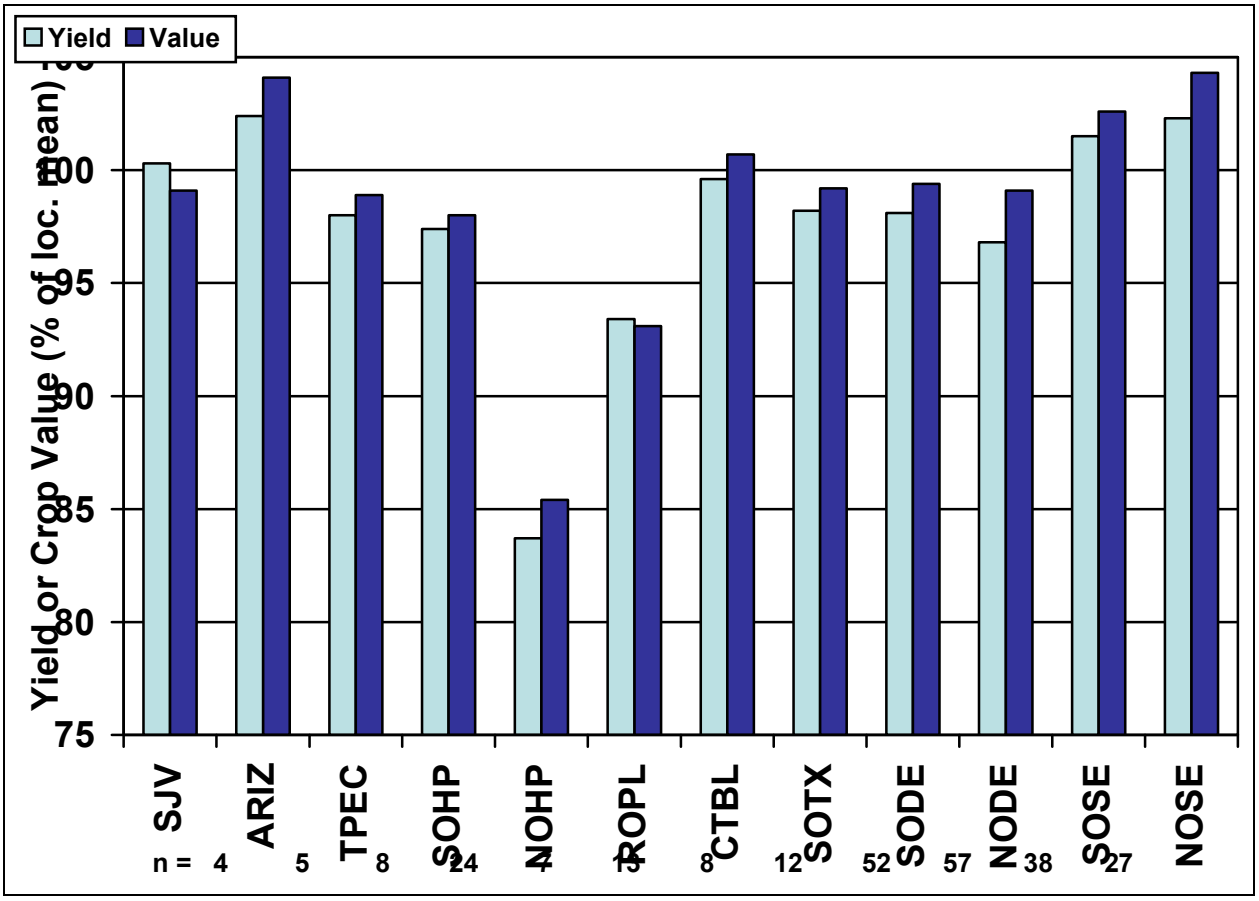

Figure 1. DP 161 B2RF regional lint yield and crop value performance expressed as % of location mean based on 2006 and 2007 testing. Regions: SJV (CA), ARIZ (AZ), TPEC (Trans Pecos, TX), SOHP (S. High Plains), NOHP (N. High Plains), ROPL (Rolling Plains), CTBL (Central Texas Blacklands), SOTX (S. Texas), SODE (S. Delta), NODE (N. Delta), SOSE (S. Southeast), NOSE (N. Southeast).

Summary

DP 161 B2RF was found to have similar yield performance to DP 164 B2RF, PHY 485 WRF, and ST 4554 B2RF (southern Cotton Belt). The fiber quality of DP 161 B2RF was improved for staple length compared to all three check varieties discussed. The loan value of DP 161 B2RF was greater than ST 4554 B2RF and PHY 485 WRF. The crop value of DP 161 B2RF was greater than PHY 485 WRF. The regional performance of DP 161 B2RF was best in Arizona and southeast U.S. regions. Strong performance (>97.5% of location means) was also noted for other full season regions: SJV (CA), Trans Pecos, TX, Southern High Plains, TX, Central Texas Blacklands, S. Texas, and South Delta. The regional crop value performance was greater than the lint yield for 10 of the 12 data regions, indicating that DP 161 B2RF had superior fiber quality and loan value compared to the varieties being testing in those regions.

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