## NG 3306 B2RF, A NEW NEXGEN VARIETY FOR THE HIGH AND ROLLING PLAINS Ken E. Legé Tom Brooks Americot, Inc. Lubbock, Texas

# Abstract

NG 3306 B2RF is a new early-mid maturing variety with Bollgard II<sup>®</sup> and Roundup Ready Flex<sup>®</sup> transgenic traits. The initial cross for NG 3306 B2RF was made by Dr. David Bush in Seminole, Texas, in 2005. The variety was tested as NGX3306B2RF in selected university official variety trials in 2013, and will be available for commercial sale in limited quantities in 2014. NG 3306 B2RF is well-adapted to limited to highly irrigated production in the high and rolling plains of Texas, Oklahoma, New Mexico and Kansas. Plants of NG 3306 B2RF are medium to tall in stature, leaves are semi-smooth, bolls have very good storm tolerance, and the variety has very good *Verticillium* tolerance. The variety has superior fiber quality compared to NG 1511 B2RF, and numerically yielded higher than NG 1511 B2RF in the northern high plains region. NG 3306 B2RF yielded comparably to NG 1511 B2RF in the southern high plains, but the improved fiber quality and associated loan value for NG 3306 B2RF resulted in a numerical increase of crop value (\$/acre) over NG 1511 B2RF in the southern high plains.

## **Introduction**

Americot, Inc. is the only privately-owned cotton planting seed company in the United States, and develops and markets cotton varieties from Arizona to Virginia. The main breeding station, directed by Dr. Tom Brooks, is in Seminole, Texas, with additional nurseries in Lubbock, Texas, and the north delta region. Americot's headquarters is in Lubbock, Texas, and the company has field representatives across Texas and the Mid-South/southeast regions.

#### **Materials and Methods**

The initial cross for NG 3306 B2RF was made by Dr. David Bush in Seminole, Texas, in 2005, between AMX0511302B2RF and AMX2225RF. In 2006, an individual plant selection was made in the north delta region and was designated 6204332. In 2007, another individual plant selection was made in Seminole, Texas, and was designated 7111436. In 2008, the line was determined to have very good *Verticillium* tolerance and designated as 813306. 813306 was tested in replicated trials across the high and rolling plains in 2009 and 2010, then tested in replicated trials in 2011 and 2012 across the cotton belt as NGX3306B2RF. In 2013, NGX3306B2RF was tested in internal replicated trials and in university official variety trials across the high and rolling plains regions. NGX3306B2RF was advanced to a commercial variety and named NG 3306 B2RF in December, 2013.

Data within this manuscript were generated via small-plot Americot internal breeder trials and university official variety trials in 2011 through 2013, as of December 23, 2013. Relative maturity was determined using nodes above cracked boll method (Speed et al., 2004). Plots were machine-harvested using either a stripper with burr extractor or spindle picker. Lint yield, turnout, and fiber quality data are presented. Loan values were calculated from year-specific premiums and discounts. Crop values are presented as plot-level calculations of lint yield X loan value.

### **Results and Discussion**

### **Relative Maturity**

NG 3306 B2RF was slightly later in maturity to NG 3348 B2RF, but numerically earlier than NG 4012 B2RF and NG 1511 B2RF across eight locations in the high plains region in 2013 (Table 1). When compared to a six other competitor varieties across twelve locations in the high plains region in 2013, NG 3306 B2RF was slightly later than DP 1321 B2RF, but earlier than FM 2011GT, FM 2484B2F, PHY 499 WRF, and an estimated eleven days earlier than FM 1944GLB2 and DP 1219 B2RF (Table 2).

Table 1. Relative maturity of four NexGen varieties from eight high plains locations in 2013. Difference in degreedays, base 60°F (DD60s) assumes 50 DD60s to develop one node. Estimated day difference based on 30-year average from September 16 to October 15 at Lubbock, Texas, (source: www.weather.com) of 6.4 DD60s per day.

Variety	Nodes Above Cracked Boll	DD60s later than NG 3348 B2RF	Estimated days later than NG 3348 B2RF
NG 3348 B2RF	2.73	-	-
NG 3306 B2RF	2.99	13.0	2.0
NG 4012 B2RF	3.58	42.5	6.6
NG 1511 B2RF	3.84	55.5	8.7
LSD	NS	NS	NS

Table 2. Relative maturity of seven varieties from twelve high plains locations in 2013. Difference in degree-days, base 60°F (DD60s) assumes 50 DD60s to develop one node. Estimated day difference based on 30-year average from September 16 to October 15 at Lubbock, Texas, (source: www.weather.com) of 6.4 DD60s per day.

Variety	Nodes Above	DD60s later than	Estimated days later than
	Cracked Boll	DP 1321 B2RF	DP 1321 B2RF
DP 1321 B2RF	4.40	-	-
NG 3306 B2RF	4.70	15.0	2.3
FM 2011GT	4.71	15.5	2.4
FM 2484B2F	5.13	36.5	5.7
PHY 499 WRF	5.36	48.0	7.5
FM 1944GLB2	5.81	70.5	11.0
DP 1219 B2RF	5.82	71.0	11.1
LSD	NS	NS	NS

#### **<u>Plant Growth and Development</u>**

Plant height and total nodes were not different between NG 3306 B2RF and NG 1511 B2RF, but NG 3306 B2RF had a significantly higher node of the first fruiting branch. Boll size was similar between the two varieties. (Table 3).

Table 3. Plant growth and development characteristics of NG 3306 B2RF and NG 1511 B2RF at three locations in Dawson Co., Texas, in 2013.

Variety	Plant Height (in)	Total Nodes	Node of 1st Fruiting Branch	Boll Size (g seedcotton/boll)
NG 3306 B2RF	22.9	15.9	5.7	4.64
NG 1511 B2RF	22.8	15.7	5.4	4.89
t test	0.9218	0.7668	0.0793	0.7145
n	4	13	4	3

### Lint Yield, Turnout, and Fiber Quality

Lint yield, turnout, strength, and micronaire were numerically less for NG 3306 B2RF compared to NG 1511 B2RF from trials across the cotton belt. However, staple length, uniformity index, and loan value for NG 3306 B2RF were numerically improved over NG 1511 B2RF, making the overall crop value numerically better than NG 1511 B2RF (Table 4).

Since NG 1511 B2RF is widely adapted across the cotton belt (Brooks, 2012), lint yield comparisons were made by region between NG 3306 B2RF and NG 1511 B2RF to determine overall area of adaptation for NG 3306 B2RF. NG 3306 B2RF numerically yielded more than NG 1511 B2RF in the northern high plains, and slightly less than NG 1511 B2RF in the southern high plains and rolling plains regions. Although not statistically significant, dramatic differences in yield were seen in other regions from central Texas eastward to the lower southeast region, with NG 3306 B2RF yielding less than NG 1511 B2RF. Therefore, the potential primary area of adaptation for NG 3306 B2RF is the high and rolling plains of Texas, Oklahoma, Kansas, and New Mexico (Table 5).

	lbs		Staple	Strength			Loan	Crop Value
Variety	lint/A	Turnout	(1/32 in)	(g/tex)	Mic	Uniformity	(\$/lb)	(\$/A)
NG 3306 B2RF	1395	38.5%	36.4	30.7	4.27	82.9%	0.5349	696
NG 1511 B2RF	1417	40.3%	34.8	30.9	4.42	82.1%	0.5194	689
t test	0.8730	0.3408	0.0268	0.7854	0.4154	0.1561	0.1065	0.9491
n	33	21	15	15	15	15	15	15

Table 4. Lint yield, turnout, HVI fiber quality, loan value, and crop value of NG 3306 B2RF and NG 1511 B2RF across the cotton belt in 2011-2013.

Table 5.	Lint	yield b	y gro	wing	region	for	NG	3306	B2RF	and NC	3 1511	B2RF	in 2	2011	-201	3.
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	lbs. l			
Region	NG 3306 B2RF	NG 1511 B2RF	t test	n
Northern high plains	1815	1672	0.4610	3
Southern high plains	1501	1516	0.9243	19
Rolling plains	1108	1135	0.9234	3
Central/South Texas	952	1031	0.6882	3
South delta	784	926	n/a	1
North delta	1108	1183	0.7598	3
Lower southeast	1791	1960	n/a	1

In the northern high plains (Table 6), lint yield, staple length, strength, uniformity, loan value, and crop value were numerically improved over NG 1511 B2RF across three locations in 2013. In 19 trials from 2011 to 2013 in the southern high plains, yield was very similar between the two varieties, and fiber quality differences were similar to that observed in the northern high plains. Regardless of region, turnout was numerically and consistently higher for NG 1511 B2RF.

Table 6. Lint yield, turnout, HVI fiber quality, loan value, and crop value for NG 3306 B2RF and NG 1511 B2RF in the northern and southern high plains regions.

			Staple	Strength			Loan	Crop Value
Variety	lbs lint/A	Turnout	(1/32 in)	(g/tex)	Mic	Uniformity	(\$/lb)	(\$/A)
Northern high plains (	(2013)							
NG 3306 B2RF	1815	33.4%	38.0	32.0	3.77	83.4%	0.5558	1008
NG 1511 B2RF	1672	34.4%	36.3	31.9	3.93	82.4%	0.5487	915
t test	0.4610	0.8753	0.1027	0.8035	0.4785	0.2730	0.6024	0.3479
n	3	3	3	3	3	3	3	3
<b>a</b>	2011 2012							
Southern high plains (	2011-2013)							
NG 3306 B2RF	1501	37.1%	36.4	31.0	4.45	83.1%	0.5398	689
NG 1511 B2RF	1516	39.7%	34.8	30.9	4.55	81.9%	0.5183	698
t test	0.9243	0.4327	0.1197	0.9179	0.6432	0.2283	0.0483	0.9548
n	19	9	8	8	8	8	8	8

NG 3306 B2RF had numerically higher lint yield, turnout, staple length, strength, micronaire, uniformity, loan value and crop value compared to NG 4012 B2RF across ten trials in the high plains region in 2011 to 2013 (Table 7). Similarly, NG 3306 B2RF had numerically improved lint yield and turnout compared to NG 3348 B2RF in eight

trials in the high plains region in 2011 to 2013, but strength was significantly improved for NG 3306 B2RF in that comparison (Table 8). NG 3306 B2RF yielded less than NG 4111 RF across eight trials in the high and rolling plains regions in 2011 to 2013, but had similar turnout; fiber quality for NG 4111 RF was superior to that of NG 3306 B2RF (Table 9).

Table 7. Lint yield, turnout, HVI fiber quality, loan value, and crop value for NG 3306 B2RF and NG 4012 B2RF in the high plains region, 2011-2013.

								Crop
	lbs		Staple	Strength			Loan	Value
Variety	lint/A	Turnout	(1/32 in)	(g/tex)	Mic	Uniformity	(\$/lb)	(\$/A)
NG 3306 B2RF	1263	37.0%	36.3	31.2	4.39	83.0%	0.5403	657
NG 4012 B2RF	1186	36.8%	35.7	31.1	4.29	81.8%	0.5324	614
t test	0.5937	0.9478	0.4451	0.9945	0.6466	0.2595	0.3209	0.6449
n	10	9	8	8	8	8	8	8

Table 8. Lint yield, turnout, HVI fiber quality, loan value, and crop value for NG 3306 B2RF and NG 3348 B2RF in the high plains region, 2011-2013.

	lbs		Staple	Strength			Loan	Crop Value
Variety	lint/A	Turnout	(1/32 in)	(g/tex)	Mic	Uniformity	(\$/lb)	(\$/A)
NG 3306 B2RF	1386	33.2%	36.6	33.0	3.89	82.2%	0.5530	710
NG 3348 B2RF	1250	31.4%	35.1	30.6	3.70	81.2%	0.5162	606
t test	0.5719	0.6599	0.3015	0.0011	0.3548	0.3214	0.0354	0.5795
n	7	7	5	5	5	5	5	5

Table 9. Lint yield, turnout, HVI fiber quality, loan value, and crop value for NG 3306 B2RF and NG 4111 RF in the high and rolling plains regions, 2011-2013.

	lbs		Staple	Strength			Loan	Crop Value
Variety	lint/A	Turnout	(1/32 in)	(g/tex)	Mic	Uniformity	(\$/lb)	(\$/A)
NG 3306 B2RF	1571	38.3%	37.2	30.7	4.02	83.0%	0.5447	872
NG 4111 RF	1659	38.4%	36.7	33.1	3.92	82.9%	0.5479	943
t test	0.5218	0.9707	0.6737	0.1482	0.7325	0.8797	0.8119	0.5797
n	8	7	5	5	5	5	5	5

When compared to six varieties in the high and rolling plains regions in 2013, NG 3306 B2RF had the numerically highest lint yield, strength, uniformity index, and loan value, and was not significantly different in staple length from the longest fiber variety in the comparison. Crop value for NG 3306 B2RF was not statistically different from the top ranked variety for that parameter as well (Table 10).

Table 10. Lint yield, turnout, HVI fiber quality, loan value, and crop value for seven varieties in the high and rolling plains regions, 2013.

								Crop
			Staple	Strength			Loan	Value
Variety	lbs lint/A	Turnout	(1/32 in)	(g/tex)	Mic	Uniformity	(\$/lb)	(\$/A)
NG 3306 B2RF	1688	29.3%	38.6 ab	32.5	3.60	83.1%	0.5634	1012 ab
NG 1511 B2RF	1657	29.8%	36.8 c	31.5	3.85	81.7%	0.5562	897 b
FM 2011GT	1607	30.5%	37.3 bc	30.6	3.55	82.1%	0.5612	1070 a
FM 1944GLB2	1469	27.2%	38.2 bc	30.7	3.55	81.2%	0.5438	923 b

FM 2484B2F	1469	29.3%	39.9 a	31.6	3.55	82.2%	0.5545	1133 a
DP 0912 B2RF	1460	29.0%	35.8 c	31.3	3.75	81.8%	0.5476	858 b
DP 1219 B2RF	1449	31.3%	37.5 bc	31.8	3.60	80.4%	0.5398	945 b
LSD	NS	NS	1.6	NS	NS	NS	NS	134
n	7	7	5	5	5	5	5	5

Four varieties were grown under three different irrigation regimes by Dr. Wayne Keeling at the Texas A&M University AG-CARES farm in Lamesa, Texas, in 2013. Figure 1 shows the total water received, including preplant irrigation, in-season irrigation, and 10.55 inches of rainfall in-season. Crop value was numerically highest in all three irrigation regimes for NG 3306 B2RF, and the variety was significantly higher than NG 3348 B2RF for crop value in the lowest (19.65 inches of total water) and base (21.65 inches of total water) regimes. At the highest regime (23.65 inches of total water), NG 3306 B2RF had significantly higher crop value than NG 4012 B2RF. This study also suggested that NG 3306 B2RF and NG 1511 B2RF were more water-use efficient than NG 4012 B2RF and NG 3348 B2RF (Figure 1).



Figure 1. Crop value for four varieties grown under three irrigation regimes at Texas A&M University AG-CARES, Lamesa, Texas, in 2013. Data courtesy of Dr. Wayne Keeling, Texas A&M University.

### **Summary**

NG 3306 B2RF is a new early to mid-maturing variety with Bollgard II<sup>®</sup> and Roundup Ready Flex<sup>®</sup> transgenic traits. Relative maturity for NG 3306 B2RF is similar to that of NG 3348 B2RF and FM 2011GT. With semismooth leaves, very good storm tolerance, very good *Verticillium* tolerance and equivalent or improved lint yield and fiber quality performance compared to leading varieties in high and rolling plains, NG 3306 B2RF is potentially well-adapted to the high and rolling plains. The best and most consistent performance for this variety has been observed in the northern high plains.

#### **References**

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