

DP 424 BGII/RR: A NEW BOLLGARD II VARIETY STACKED WITH ROUNDUP READY

David W. Albers

**Delta and Pine Land Company
Lubbock, TX**

Doug Shoemaker

**Delta and Pine Land Company
Scott, MS**

Abstract

During the 2004 growing season, Delta and Pine Land Company will introduce a new, early maturing, picker Bollgard II and Roundup Ready variety, DP 424 BGII/RR. DP 424 BGII/RR is a medium plant height variety with smooth leaf trait, and good storm resistance. DP 424 BGII/RR was developed from the SG 215 BG/RR germplasm pool, using the backcross method. The yield and the crop value of DP 424 BGII/RR was not different than any of the 4 comparison stacked varieties (SG 215 BG/RR, DP 451 B/RR, FM 989BR, and ST 4646B2R). The staple, micronaire and fiber strength of DP 424 BGII/RR were improved compared to SG 215 BG/RR and the loan value of DP 424 BGII/RR was significantly increased by 1.5 cents per pound compared to SG 215 BG/RR. The performance of DP 424 BGII/RR on a regional basis was not different than DP 451 B/RR. Seed supply is expected to be good for commercial introduction in 2004.

Introduction

DP 424 BGII/RR will be released as an early maturing Bollgard II with Roundup Ready variety for the 2004 growing season. DP 424 BGII/RR was tested as DPLX 01W97DR, prior to being given the commercial name DP 424 BGII/RR. DP 424 BGII/RR was developed by using the backcross method with a Bollgard II donor variety using the SG 215 BG/RR germplasm pool as the recurrent parent. Testing in University Official Variety Trials (OVTs) was initiated in 2003 and Delta and Pine Land Company Agronomic Service Trials (ASTs) was initiated in 2001.

Materials and Methods

The data describing DP 424 BGII/RR here were extracted from the Delta and Pine Land Company Agronomic Information System database December 23, 2003. This database contains both public data from university OVTs and Delta and Pine Land Company (D&PL) tests from the Research and Technical Services departments. The data extracted from the database included yield and HVI fiber quality data to calculate "loan value" based on the 2003 USDA loan chart, using a base value of \$0.52 / lb. Comparisons for yield and fiber quality were made with SG 215 BG/RR, DP 451 B/RR, FM 989BR, and ST 4646 B2R and were all balanced head to head comparisons for all locations included. Crop value per acre was calculated by multiplying the lint yield for each plot by the USDA loan value calculated for that plot. Plant mapping data for maturity comparisons was collected at selected D&PL Technical Service plot sites. The data was collected near maturity when the plants had from 30 percent to 70 percent open bolls. Balanced, head to head comparisons of the plant mapping data were made against SG 215 BG/RR.

Results and Discussion

General Characteristics and Plant Growth

DP 424 BGII/RR is an early maturing, smooth leaf variety that has growth characteristics very similar to SG 215 BG/RR (Tables 1 & 2). The seed size of DP 424 BGII/RR ranges from 4500 to 4800 seed per pound and the variety has exhibited good seedling vigor. Storm resistance is rated as good. Preliminary disease tolerance ratings have indicated that DP 424 BGII/RR has very good tolerance to Fusarium wilt and good tolerance to Verticillium wilt, similar to the recurrent background of SG 215 BG/RR.

The plant mapping comparison of DP 424 BGII/RR and SG 215 BG/RR (Table 2) showed no differences for several parameters including total nodes, fruiting nodes, and the maturity/boll opening measures (NUCB, NUHB, and DD60's to 100% open). DP 424 BGII/RR had significantly shorter plant height, height to node ratio (HNR), and lower node or first fruiting branch (NFFB). The maturity and plant mapping comparison would indicate that these two varieties are candidates for similar management and similar production environments (i.e. DP 424 BGII/RR should not require a different season length than SG 215 BG/RR).

Yield, Fiber Quality, and Crop Value

The yield and HVI fiber quality of DP 424 BGII/RR was compared to 3 commercial stacked BG/RR varieties (SG 215 BG/RR, DP 451 B/RR, FM989BR) and 1 new competitor BGII/RR variety (ST 4646B2R) (Table 3). The yield performance of DP 424 BGII/RR was not significantly different than any of the 4 comparison varieties. The crop value of DP 424 BGII/RR was also the same as all 4 of the comparison varieties. The gin turnout of DP 424 BGII/RR was not different than

DP 451 B/RR, but less than the other three comparison varieties. The staple length of DP 424 BGII/RR was found to be longer than SG 215 BG/RR and shorter than DP 451B/RR, while not different than FM 989BR or ST 4646B2R (Table 3). The micronaire of DP 424 BGII/RR was less than SG 215 BG/RR and greater than FM 989BR, but not different than DP 451B/RR or ST 4646 B2R. The fiber strength of DP 424 BGII/RR was greater than SG 215 BG/RR and DP 451 BG/RR, but less than FM 989BR, and not different than ST4646B2R. The loan value of DP 424 BGII/RR was greater than SG 215 BG/RR and not different than the other 3 comparison varieties. The combination of yield potential and fiber quality potential in DP 424 BGII/RR produced a crop value similar to the 3 popular stacked gene varieties compared in this analysis and the competitor Bollgard II and Roundup Ready stacked variety.

Regional Performance

The lint yield and crop value of DP 424 BGII/RR is very similar to DP 451 B/RR across the regions from the Texas Plains eastward (Table 4). The data regions west of the Texas Plains did not have sufficient locations to complete the regional analysis. Lint yield differences between DP 424 BGII/RR and DP 451 B/RR ranged from -4.3% to 5.0% across that regions, but none of these differences were statistically significant. The crop value differences ranged from -4.4% to 5.5%, but again none of the differences were statistically significant. The region that DP 424 BGII/RR had a trend (non-significant) to stronger yield and crop value performance was Central Texas Blacklands. The overall performance of DP 424 BGII/RR would indicate a similar performance potential compared to DP 451 B/RR, regardless of region.

Summary

DP 424 BGII/RR is a new early maturing Bollgard II / Roundup Ready variety from Delta and Pine Land Company. The growth and fruiting pattern of DP 424 BGII/RR is similar to SG 215 BG/RR, with the primary difference noted in a shorter plant height to DP 424 BGII/RR. The yield and crop value of DP 424 BGII/RR was found to be similar to the 4 comparison varieties (SG 215BG/RR, DP 451B/RR, FM 989BR, and ST 4646B2R). The HVI fiber quality of DP 424 BGII/RR was within the range of the comparison varieties for staple, micronaire, and fiber strength. The fiber quality of DP 424 BGII/RR was improved compared to SG 215 BG/RR to result in a significantly higher loan value. The regional performance of DP 424 BGII/RR was found to be not significantly different than DP 451 B/RR. Seed supply is expected to be good for commercial introduction 2004.

Table 1. Characteristics of DP 424 BGII/RR.

| Former Design | DPLX 01W97DR |
|------------------------|----------------------------------|
| Germplasm pool | SG 215 BG/RR |
| Breeder | Doug Shoemaker |
| Maturity | Early |
| Plant Height | Medium |
| Leaf Hair | Smooth |
| Seedling Vigor | Good |
| Seed Size (#/lb) | 4500-4800 |
| Storm Resist. | Good |
| Fusarium tolerance | Prelim. - Very Good ¹ |
| Verticillium tolerance | Prelim. - Good ¹ |
| Bronze wilt | Not Observed |

¹ Limited observations for wilt tolerance determination.

Table 2. Plant Mapping parameters for DP 424 BGII/RR and SG 215 BG/RR averaged over 61 locations of Delta and Pine Land Company trials across the Cotton Belt in 2003.

| | DP 424 BGII/RR | SG 215 BG/RR | t-Test |
|---------------------|-----------------------|---------------------|---------------|
| Plant Height | 34.6 | 36.4 | <.0001 |
| Total Nodes | 20.0 | 20.0 | NS |
| Fruiting Nodes | 10.6 | 10.7 | NS |
| HNR* | 1.74 | 1.83 | 0.0001 |
| NFFB | 5.99 | 6.14 | 0.01 |
| NUCB | 12.2 | 12.4 | NS |
| NUHB | 15.6 | 15.8 | NS |
| DD60's to 100% open | 171 | 170 | NS |

*HNR – Height to node ratio (inches per node)

NFFB – Node of First Fruiting Branch

NUCB – Node Uppermost Cracked Boll

NUHB – Node Uppermost Harvestable Boll

Table 3. Head to Head Yield and HVI Performance of DP 424 BGII/RR compared to Delta and Pine Land Company and competitor BG/RR varieties. Data includes both DPL AST data and University OVT data from DPL AIS database as of 12.23.03.

| Variety | Crop Value (\$/Acre) | Yield (lb/acre) | % Gin Turn Out | Staple (32 nd inch) | Micronaire | Strength (g/tex) | Uniformity Index (%) | Loan Value (cents/lb) |
|----------------|----------------------|-----------------|----------------|--------------------------------|------------|------------------|----------------------|-----------------------|
| DP 424 BGII/RR | 579 | 1065 | 34.0 | 35.4 | 4.23 | 29.9 | 82.5 | 54.07 |
| SG 215 BG/RR | 589 | 1115 | 35.8 | 34.4 | 4.39 | 28.8 | 82.1 | 52.60 |
| n | 157 | 157 | 157 | 148 | 148 | 148 | 148 | 121 |
| t-Test | NS | NS | <.0001 | <.0001 | 0.005 | <.0001 | 0.016 | <.0001 |
| % Difference | -1.8 | -4.4 | -5.1 | 2.8 | -3.7 | 3.7 | 0.5 | 2.8 |
| DP 424 BGII/RR | 552 | 1018 | 34.2 | 35.2 | 4.19 | 29.5 | 82.5 | 53.95 |
| DP 451 B/RR | 559 | 1032 | 34.4 | 35.8 | 4.21 | 29.0 | 82.6 | 53.88 |
| n | 124 | 124 | 124 | 117 | 117 | 117 | 115 | 110 |
| t-Test | NS | NS | NS | <.0001 | NS | 0.04 | NS | NS |
| % Difference | -1.3 | -1.3 | -0.4 | -1.7 | -0.4 | 1.7 | -0.1 | 0.1 |
| DP 424 BGII/RR | 575 | 1054 | 33.9 | 35.3 | 4.22 | 29.6 | 82.3 | 54.17 |
| FM989 BR | 563 | 1031 | 35.2 | 35.6 | 4.09 | 30.7 | 81.8 | 54.21 |
| n | 95 | 95 | 95 | 92 | 92 | 92 | 89 | 90 |
| t-Test | NS | NS | <.0001 | NS | 0.033 | 0.0004 | 0.006 | NS |
| % Difference | 2.2 | 2.3 | -3.6 | -0.8 | 3.3 | -3.6 | 0.7 | -0.1 |
| DP 424 BGII/RR | 623 | 1170 | 37.1 | 35.5 | 4.35 | 28.3 | 83.4 | 53.39 |
| ST 4646BIIR | 613 | 1155 | 38.6 | 35.6 | 4.33 | 28.9 | 82.8 | 53.14 |
| n | 32 | 32 | 32 | 22 | 22 | 22 | 20 | 22 |
| t-Test | NS | NS | <.0001 | NS | NS | NS | 0.03 | NS |
| % Difference | 1.7 | 1.3 | -4.0 | -0.3 | 0.5 | -1.9 | 0.7 | 0.5 |

Table 4. Regional Head to Head Yield and Crop Value comparisons of DP 424 BGII/RR vs. DP 451 B/RR. Data includes both DPL AST data and University OVT data from DPL AIS database as of 12.23.03.

| | PLAINS | S. Texas | Cen. TX | S. Delta | N. Delta | S. Southeast | N. Southeast |
|-------------------|--------|----------|---------|----------|----------|--------------|--------------|
| Value | | | | | | | |
| DP 424 BGII/RR | 584 | 546 | 462 | 550 | 567 | 614 | 492 |
| DP 451 B/RR | 607 | 538 | 437 | 551 | 582 | 613 | 515 |
| n | 7 | 9 | 10 | 22 | 36 | 14 | 23 |
| t-Test | NS | NS | NS | NS | NS | NS | NS |
| % Difference | -3.7 | 1.6 | 5.5 | -0.3 | -2.5 | 0.3 | -4.4 |
| Lint Yield | | | | | | | |
| DP 424 BGII/RR | 1102 | 1039 | 859 | 1024 | 1023 | 1140 | 908 |
| DP 451 B/RR | 1111 | 1043 | 819 | 1030 | 1049 | 1141 | 949 |
| n | 7 | 9 | 10 | 22 | 36 | 14 | 23 |
| t-Test | NS | NS | NS | NS | NS | NS | NS |
| % Difference | -0.8 | -0.3 | 5.0 | -0.7 | -2.4 | -0.1 | -4.3 |