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2005 EVALUATION OF ROUNDUP READY FLEX VARIETIES

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Introduction

Roundup Ready Flex cotton exhibits excellent tolerance in both vegetative and reproductive tissues to glyphosate applied overtop. In contrast to currently available Roundup Ready varieties, glyphosate can be applied overtop Flex cotton at any growth stage without risk of boll abortion (May et al., 2004). This will allow greater flexibility in weed management programs (Culpepper and York, 2005; York and Culpepper, 2006).

Variety selection is an important component of a cotton production system and should be based on multiple years of data. Similar to the situation when Roundup Ready varieties first entered the marketplace (May et al., 2000), only limited public testing of Flex varieties will have occurred prior to commercialization in 2006. In an effort to get Roundup Ready varieties on the market quickly, companies released varieties with questionable fiber quality (Bourland and Johnson, 2003; Kerby et al., 2002; Lewis, 2001; Meredith, 2002). Flex varieties were first available for public testing in 2005, hence growers will be selecting Flex varieties in 2006 without the benefit of multiple years of testing. To supplement the information from Official Variety Trial (OVT) programs, we conducted trials in 2005 to evaluate the performance of Flex varieties.

Methods

Experiments were conducted in conventionally tilled fields at Belhaven, NC, Clayton, NC, Suffolk, VA, and Alexandria, LA. The experimental design was a randomized complete block with variety entrees replicated four times. Plots consisted of two 36- or 38-inch rows in North Carolina and Virginia or four 38-inch rows in Louisiana. Plots were 40 to 50 feet long, depending upon location. Seeding was accomplished with a cone planter dropping 3.5 seeds per foot of row. DP 451B/RR was included in North Carolina as a standard. FM 958LL was included in the Virginia trial.

The Virginia location received Prowl plus Cotoran applied preemergence; no preemergence herbicides were used in North Carolina or Louisiana. All plots in Louisiana received Roundup WEATHERMAX at 22 oz/acre applied overtop of cotyledonary, 4-leaf, and 14-leaf (pre-bloom) cotton followed by a directed application at the same rate during the second week of bloom. Flex varieties in North Carolina received WEATHERMAX at 22 oz/acre applied overtop of 1-, 6-, and 11-leaf cotton. The standard variety in North Carolina, DP 451B/RR, received the same rate of WEATHERMAX overtop of 1- and 4-leaf cotton and directed to 11-leaf cotton. Flex varieties in Virginia received WEATHERMAX at 22 oz/acre overtop of 1- and 8-leaf cotton followed by Caparol plus MSMA plus Envoke directed to 13-leaf cotton. The Liberty Link variety in Virginia received Ignite at 32 oz/acre applied to 1- and 8-leaf cotton followed by the previously mentioned directed herbicides. Except for herbicides, other production practices were standard for the respective states.

Cotton was harvested with spindle pickers modified for small-plot harvesting and ginned on small laboratory gins without lint cleaning. Fiber length, strength, uniformity, and micronaire were determined by HVI testing on fiber from each location, but Virginia fiber data were not available by the 2006 Beltwide Conferences. Data were subjected to analysis of variance with means separation by LSD 0.05.

Results

Good lint yields were obtained in all trials (trial averages of 1290, 1375, and 1625 lb/acre in LA, NC, and VA, respectively). Yield differences among varieties were relatively minor in Virginia (Table 1) and North Carolina (Table 2), while a greater spread among varieties was noted in Louisiana (Table 3).

Yields of all Flex varieties in Virginia were statistically similar to the yield of FM 958LL (Table 1). The highest yielding four varieties included PHY 415RF, DG 2520B2RF, ST 4357B2RF, and Vigoro CX 601B2RF. Lint yields of these varieties ranged from 1720 to 1740 lb/acre. The lowest yielding varieties in Virginia were PHY 475WRF and DP 117B2RF, which yielded 1455 and 1500 lb/acre, respectively.

Yields of most Flex varieties in North Carolina were statistically similar to the yield of DP 451B/RR (Table 2). Only BCG 9124B2RF and ST 4357B2RF yielded greater than DP 451B/RR while only DP 110RF yielded less. Excellent fiber length (UHM) was noted in North Carolina. The UHM ranged from 1.10 to 1.20 inches, and all varieties exceeded the base value of 1.06 inches. The UHM of 13 Flex varieties exceeded that of DP 451B/RR while shorter fiber was noted with nine Flex varieties. Only DP 451B/RR and two Flex varieties had a premium uniformity index (UI) ($\geq$82.5) but none were in the discount range ($\leq$79.4). Eleven Flex varieties had UI less than DP 451B/RR while none were greater. Micronaire ranged from 4.0 to 4.8, with no variety having a discounted micronaire ($\geq$5.0). Most Flex varieties had lower micronaire than DP 451B/RR, and 13 of the 34 Flex varieties were in the premium range of 3.7 to 4.2. Fiber strength was generally not impressive in the North Carolina trials. Only six Flex varieties had strength greater than DP 451B/RR while 21 Flex varieties had less strength than DP 451B/RR. Ten Flex varieties had strength in the discount range ($\leq$25.4 g/tex) while only one was in the premium range ($\geq$29.5 g/tex).

The greatest number of Flex varieties, 45, were evaluated in Louisiana. Yields were good with all varieties, although significant differences among varieties were noted (Table 3). Yield of the top 20% of the varieties averaged 1500 lb/acre while yield of the lowest 20% averaged 1040 lb/acre. The top five highest yielding varieties included DP 117B2RF, DP 113B2RF, BCG 1004B2RF, PHY 475WRF, and ST 4554B2RF. Only ST 5007B2RF and ST 6622B2RF yielded less than 1000 lb/acre.

Micronaire in Louisiana ranged from 3.9 to 4.7, with 19 of the 45 Flex varieties having micronaire in the premium range (3.7 to 4.2). Fiber length, ranging from 1.10 to 1.22 inches, was excellent. All varieties had UHM in the premium range ($\geq$1.09 inches). No variety had strength in the discount range ($\leq$25.4 g/tex) while 11 of the 45 varieties had a premium strength ($\geq$29.5 g/tex). Uniformity was good, with 21 varieties having a premium UI while none were in the discount range.

Variety selection should be based on multi-year data from within a given state or geographical region. In the absence of that data, the trials reported here should be useful to growers planning to plant a Flex variety in 2006. Our results suggest good fiber quality in the Flex varieties although fiber strength in the North Carolina trials was somewhat questionable. Excellent lint yields were obtained with Flex varieties. The results should not, however, be interpreted to mean yield of Flex varieties is comparable to yield of the better commercially available Roundup Ready and conventional varieties. These trials were not set up to specifically compare performance of Flex varieties to commercially available Roundup Ready and conventional varieties. The only comparison was in the North Carolina trials, where yields of most Flex varieties were similar to the yield of DP 451B/RR. DP 451B/RR has been included in North Carolina's OVT as a comparative variety for the past several years. The relative yield ranking of DP 451B/RR has dropped over the past three years as newer Roundup Ready varieties have been evaluated. In the 2005 North Carolina OVT, DP 451B/RR ranked in the lower half of Roundup Ready varieties evaluated (Bowman, 2005). Roundup Ready varieties, in general, substantially outyielded Flex varieties in the 2005 North Carolina OVT. Yields of Flex varieties in Virginia were similar to the yield of FM 958LL. FM 958LL, however, has generally not yielded nearly as well as the more productive Roundup Ready varieties in the Virginia/Carolina region (Bowman, 2005).

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Table 1. Roundup Ready Flex variety trial results. Virginia, 2005.

Variety	Lint yield (lb/acre)	Variety	Lint yield (lb/acre)
PHY 415RF	1740**	FM 958LL	1610*
DG 2520B2RF	1735*	PHY 485WRF	1610*
ST 4357B2RF	1725*	ST 4664RF	1610*
Vigoro CX 601B2RF	1720*	Vigoro CX 611B2RF	1585*
ST 4554B2RF	1665*	DP 108RF	1585*
DG 2100B2RF	1645*	BCG 3255B2RF	1565*
DP 110RF	1640*	DP 117B2RF	1500
Vigoro CX 612B2RF	1630*	PHY 475WRF	1455
LSD 0.05	190		

*Yield not different from highest yielding variety
**Highest yielder

Table 2. Roundup Ready Flex variety trial results. North Carolina, 2005. Data averaged over two locations.

Varieties	Lint yield lb/acre	Micronaire	UHM in.	Strength g/tex	UI %
BCG 9124B2RF	1485**	4.4	1.17	25.1	82.7
ST 4357B2RF	1440*	4.4	1.17	25.6	82.6
Vigoro CX621B2RF	1410*	4.3	1.17	25.7	82.7
ST 4664RF	1410*	4.8	1.10	26.7	82.4
Americot1664B2RF	1405*	4.4	1.14	25.3	82.5

DP 152RF	1400*	4.1	1.14	28.8	82.1
DP 164B2RF	1390*	4.4	1.17	28.0	82.1
DG 2520B2RF	1390*	4.3	1.17	25.4	83.0
BCG 4630B2RF	1390*	4.4	1.16	26.0	82.1
CG 4020B2RF	1385*	4.5	1.15	25.7	82.5
BCG 4575B2RF	1380*	4.2	1.11	25.2	82.6
DP 143B2RF	1365	4.2	1.19	27.1	81.5
BCG 1004B2RF	1365	4.3	1.16	25.4	82.6
Americot 1532B2RF	1360	4.4	1.18	26.0	83.0
ST 4554B2RF	1360	4.8	1.11	26.9	82.5
CG 3020B2RF	1355	4.4	1.11	25.0	82.6
Americot 1504B2RF	1340	4.3	1.11	25.6	83.1
Vigoro CX601B2RF	1330	4.2	1.11	25.3	82.4
DP 451B/RR	1325	4.6	1.14	26.9	83.1
Vigoro CX611B2RF	1325	4.2	1.14	25.2	82.0
BCG 8391B2RF	1320	4.1	1.19	25.9	83.8
BCG 3255B2RF	1315	4.2	1.11	25.1	82.6
ST 5007B2RF	1315	4.2	1.20	26.3	83.3
Vigoro CX612B2RF	1310	4.4	1.15	26.0	82.8
DG 2100B2RF	1305	4.2	1.11	25.6	82.8
DP 108RF	1295	4.2	1.10	27.0	82.0
DP 156B2RF	1285	4.3	1.17	27.2	82.3
BCG 4021B2RF	1285	4.3	1.13	25.3	81.9
Americot 1521B2RF	1285	4.1	1.14	25.9	82.2
DP 147RF	1285	4.1	1.18	28.0	81.9
CG 3520B2RF	1275	4.4	1.14	25.9	82.5
DP 117B2RF	1245	4.3	1.13	30.5	82.2
DP 113B2RF	1245	4.0	1.13	29.0	82.5
Americot 1622 B2RF	1230	4.3	1.17	26.6	83.4
DP 110 RF	1205	4.4	1.15	29.2	83.0
LSD 0.05	110	0.2	0.02	0.9	0.8

*Yield not different from highest yielding variety
**Highest yielder

Table 3. Roundup Ready Flex variety trial results. Louisiana, 2005.

Variety	Lint yield lb/acre	Micronaire	UHM in.	Strength g/tex	UI %
DP 117B2RF	1680**	4.7	1.17	31.7	83.4
DP 113B2RF	1675*	4.2	1.14	30.3	83.7
BCG 1004B2RF	1640*	4.2	1.15	27.4	82.9
PHY 475WRF	1470*	4.5	1.14	30.3	83.6
ST 4554B2RF	1470*	4.5	1.11	29.2	82.7
PHY 485WRF	1400	4.5	1.16	29.5	84.2
CG 3520B2RF	1395	4.4	1.16	27.6	82.9
DG 2100B2RF	1380	4.2	1.12	27.0	83.1
DG 2520B2RF	1375	4.2	1.17	28.6	83.6
DG 2242B2RF	1370	4.4	1.14	28.9	84.0
BCG 3255B2RF	1370	4.1	1.14	28.0	83.8
DP 156B2RF	1370	4.3	1.17	27.8	82.4
BCG 4021B2RF	1365	4.1	1.13	27.6	82.6
DP 108RF	1360	4.3	1.15	29.5	84.1
Vigoro CX612B2RF	1355	4.4	1.16	28.3	83.8
ST 4357B2RF	1350	4.2	1.14	27.5	83.4
Vigoro CX601B2RF	1345	4.0	1.12	26.5	83.0

DP 143B2RF	1345	4.2	1.22	28.2	82.2
CG 4020B2RF	1315	4.3	1.14	29.2	82.4
ST 4664B2RF	1315	4.3	1.12	28.1	83.4
Vigoro CX621B2RF	1310	4.1	1.18	28.4	83.3
BCG 4630B2RF	1270	4.2	1.18	28.0	83.7
Americot 1504B2RF	1270	3.9	1.17	28.4	83.8
Americot 1664B2RF	1270	4.4	1.13	27.9	83.2
BCG 9124B2RF	1265	4.2	1.14	27.2	83.3
PHY 425RF	1260	4.4	1.14	29.8	83.3
DP 152RF	1260	4.5	1.15	27.4	82.5
BCG 4575B2RF	1245	4.3	1.12	27.7	83.3
Americot 1521B2RF	1240	4.1	1.13	26.9	83.1
Americot 1532B2RF	1230	4.2	1.16	28.9	82.8
BCG 1505B2RF	1220	4.5	1.13	30.0	83.5
ST 5885B2RF	1210	4.7	1.14	30.6	83.2
Vigoro CX611B2RF	1200	3.9	1.11	26.0	82.3
CG 3020B2RF	1195	4.3	1.10	27.3	83.8
PHY 415RF	1190	4.4	1.14	28.3	83.8
DP 147RF	1190	4.2	1.18	28.6	83.6
ST 6611B2RF	1190	4.5	1.14	30.0	82.9
DP 164B2RF	1185	4.6	1.15	30.0	83.2
DG 2215B2RF	1165	4.2	1.14	28.6	83.9
BCG 9775B2RF	1150	4.3	1.14	29.0	83.7
DP 110RF	1115	4.5	1.15	33.3	83.4
Vigoro CX631B2RF	1090	4.1	1.19	28.2	84.1
Americot 1622B2RF	1055	4.3	1.18	28.4	84.4
ST 5007B2RF	970	4.3	1.18	27.8	83.5
ST 6622B2RF	955	4.3	1.10	27.9	83.0
LSD 0.05	220	0.4	0.04	2.2	NS

*Yield not different from highest yielding variety
**Highest yielder