

2002 Upland Cotton Variety Evaluation in Graham County

E.R. Norton and L.J. Clark

Abstract

A field trial was established during the 2002 growing season as part of the statewide Upland Cotton Variety Testing Program. This trial was located in Thatcher with Dennis Layton Farms as the cooperator. The location was one of eleven around the state. Nine varieties from 5 different participating seed companies were evaluated in this study. Several varieties performed well including Deltapine DP555BR, a new variety from Deltapine, DP655BR, Fiber Max 989BR and 991R. Results indicate that DP655BR, which has traditionally been grown in this valley, continues to be an excellent choice. However, there are several other varieties that have recently come onto the market that provide very strong alternatives for cotton production in the Upper Gila Valley.

Introduction

Variety selection is one of the most important decisions that a producer can make that will directly affect the outcome of the year's crop. With the development of transgenic technologies, the overall number of varieties available has dramatically increased over the recent years making the decision of which variety to plant more difficult.

There are several sources available to help the producer determine which variety best suits a particular farm including seed company variety trials conducted around the state. In an effort to contribute in an unbiased manner the University of Arizona conducts a statewide Upland Cotton Variety Testing Program that involves locations around the state to which seed companies may submit varieties for evaluation.

Most tests are located on grower-cooperator fields under normal production practices for that region. These regional tests are conducted by individual county extension agents with cooperators selected from local growers.

Materials and Methods

Nine varieties were selected by the cooperating seed companies in 2002 and planted in a randomized complete block design with four replications. Plots were four - 38" rows wide and extended the full length of the irrigation run of 1250 feet. Plots were planted on 15 April 2002 with 525 heat units (86^o/55^oF thresholds) accumulated since January 1. Table 1 provides agronomic information for this study. Stand counts were collected shortly after emergence to evaluate the percent emergence and seedling vigor of each variety. Plant measurements were taken on approximately fourteen-day intervals throughout the growing season including plant height, number of mainstem nodes, and number of aborted or missing sites. Yield estimates were made by harvesting the entire four-row plot, for each replication, at the end of the season. Sub-samples were taken from each plot for fiber quality and percent lint estimates. Premiums or discounts were calculated based upon fiber quality for each variety from data developed for the CCC loan schedule. The overall value of the crop was also determined by multiplying lint yield by the adjusted price determined from fiber quality discounts or premiums.

Results

Stand count information collected shortly after emergence reveals significant differences among varieties. Table 2 shows the number of seeds per pound, number of seeds planted per acre, number of seeds that actually germinated and produced viable seedlings, and the resultant percent emergence. Small differences among varieties in percent germination were observed with the exception of Deltapine DP555BR. Significant differences were observed with the DP555BR having lower germination and less seedling vigor. This particular variety ultimately yielded higher than any other variety indicating its ability to compensate for the lower level of seedling vigor. Planting conditions for this trial were optimum. Care should be taken when planting this variety ensuring that soil temperatures are in the optimum range and the five-day forecast is clear of inclement weather.

Plant measurement data collected throughout the season also revealed some interesting differences among varieties. Mainstem node development was significantly different for several of the varieties entered in this trial. DP555BR produced a higher number of mainstem nodes during the 2002 growing season. This increase in node development also resulted in a greater number of fruiting sites and potential yield. Figure 1 shows development of mainstem nodes over the course of the season. Node development remained fairly equal until approximately 1400 HUAP at which time DP555BR began to produce mainstem nodes at an accelerated rate. In the higher elevations of Graham County the number of mainstem nodes developed is often less than in the central region of the state due to lower HU accumulations. However, it appears that DP555BR has the capability to produce higher mainstem node numbers resulting in a greater number of fruiting sites and thus enhancing yield potential.

Height to node ratio (HNR) is calculated by dividing the total plant height by the number of mainstem nodes. This index provides a measurement of crop vigor. Figure 2 plots HNR as a function of HU accumulated after planting (HUAP) for all nine varieties. All nine varieties tracked close to the normal curve for Upland cotton in Arizona. Vigor dropped off slightly after 2000 HUAP for all varieties due to the high level of retained fruit as indicated in Figure 3. Fruit retention (FR) levels were above normal for most of the year until late in the season. Late season FR levels still remained above 50% for nearly all nine varieties.

Seed cotton yields were considerably different than the final lint yields (Table 3 and Figure 4). DP655BR produced the highest seed cotton yields with the two Fiber Max varieties placing second and third. Due to the high lint percent values (Table 3 and Figure 4) for DP555BR, it produced the highest lint yield of all nine varieties.

A premium or discount (Table 3 and Figure 4) was calculated for each of the nine varieties based on fiber quality results from high volume instrument (HVI) analysis. Fiber quality for the new Arizona Cotton Growers Association variety, AG3601, along with the two Fiber Max varieties produced high price premiums. The NMSU variety, 1517-99, produced an exceptionally high fiber quality but was discounted due to high leaf grade results.

Results from this test demonstrate the range of quality varieties from which to choose for growers in the Upper Gila River Valley. It is important to remember that performance in one year is not necessarily an indication of how that variety will perform in other years. It is always a good idea to experiment with an unfamiliar variety in small acreages at first in an effort to become familiar with it prior to planting a large number of acres to a new variety.

Table 1. Agronomic information for the Graham County Upland Cotton Variety Test, 2002.

Planting Date	15 April
Final Irrigation Date	10 September
Harvest Date	22 October
Total Number of Irrigation	6
Total N Applied	77 lbs. N
General Soil Texture	Grabe Clay loam

Table 2. Seed size, total seed planted, and percent emergence for each of the nine varieties entered into the Graham County Upland Variety Test, 2002.

Variety	Seeds per Pound	Total Seeds Planted per Acre	Seedlings per Acre	Percent Emergence
1517-99	5,150	164,800	116,500	70.7
AG3601	4,600	147,200	118,000	80.2
DP555BR	6,100	195,200	95,500	48.9
DP655BR	4,951	158,432	124,000	78.3
FM991R	4,800	153,600	115,500	75.2
FM989BR	4,200	134,400	112,500	83.7
SG215BR	4,719	151,008	105,500	69.9
ST4793R	4,900	156,800	113,500	72.4
ST4892BR	4,800	153,600	114,500	74.5

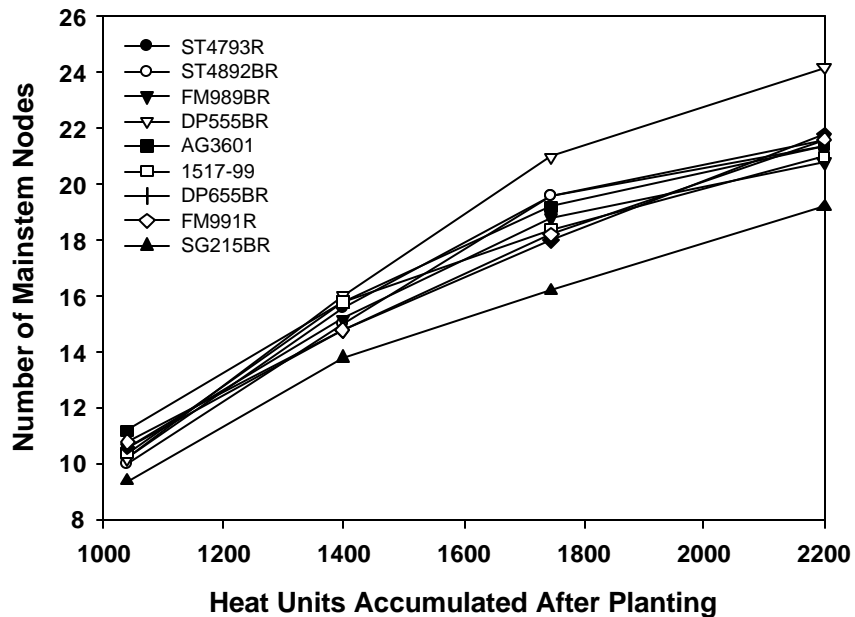


Figure 1. Total number of mainstem nodes developed over the course of the season for each of the nine varieties entered into the Graham County Upland Variety Test, 2002.

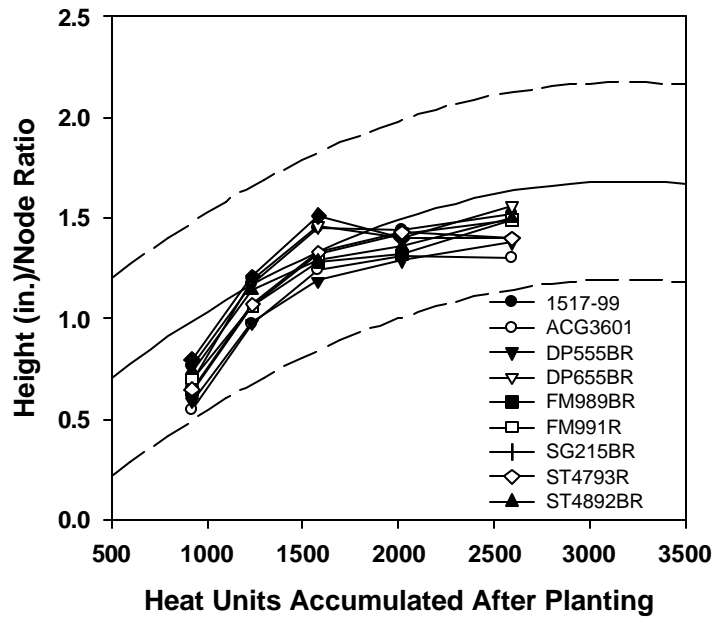


Figure 2. Height (in.) to node ratio trends for each of the nine varieties planted in the Graham County Upland Variety Test, 2002.

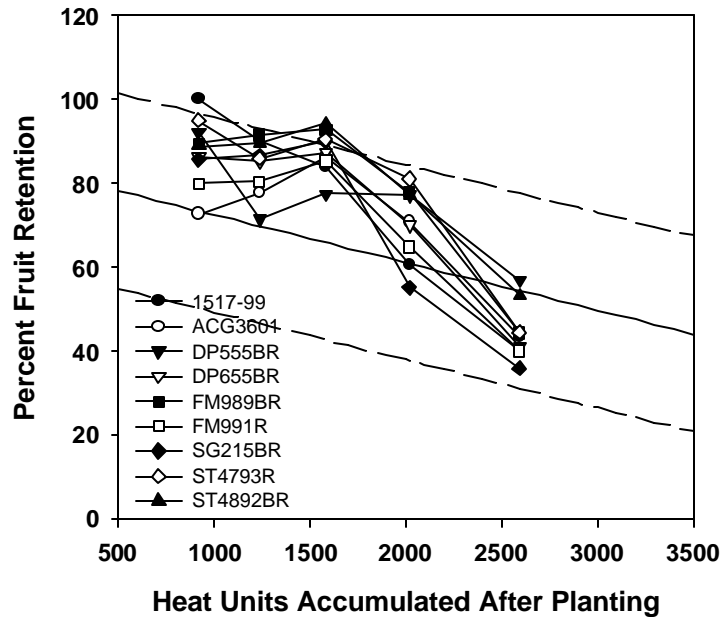


Figure 3. Fruit retention levels for each of the nine varieties planted in the Graham County Upland Cotton Variety Test, 2002.

Table 3. Lint yield and fiber quality characteristics for each of the nine varieties planted in 2002.

Cooperator: Layton Farms				Fiber Quality						
Company	Variety	Lint Yield (lbs/Acre)	Percent Lint	Micronaire	Fiber Length (100ths)	Staple Length (32nds)	Fiber Strength (g/tex)	Uniformity Index	Premium/ Discount ⁵ (points)	Value ⁶ (\$/acre)
Deltapine	DP555BR	1628.6 a ¹	38.3 a	4.2 bc	1.09 d	34.8 d	29.3 d	79.8 d	270	891
Deltapine	DP655BR	1585.6 ab	35.0 c	4.2 bc	1.13 bc	36.3 bc	31.1 c	81.8 bc	373	884
Fiber Max	FM991R	1532.9 b	35.6 bc	4.4 b	1.12 bc	36.0 bc	31.3 bc	81.8 bc	411	860
Fiber Max	FM989BR	1531.2 b	34.8 c	4.2 bc	1.10 cd	35.5 cd	31.4 bc	81.0 bcd	364	852
Stoneville	ST4793R	1459.8 c	36.2 b	4.7 a	1.08 d	34.8 d	28.2 d	82.0 b	-194	731
Stoneville	ST4892BR	1426.0 cd	36.1 b	4.4 b	1.10 cd	35.3 cd	29.5 d	81.8 bc	-95	728
Deltapine	SG215BR	1383.1 d	34.9 c	4.2 bc	1.04 e	33.7 e	25.9 e	80.7 cd	1.7	719
ACGA	AG3601	1318.4 e	32.7 d	4.3 b	1.14 b	36.8 b	32.6 ab	81.5 bc	361	733
NMSU	1517-99	1289.4 e	32.4 d	4.0 c	1.20 a	38.3 a	33.5 a	83.5 a	-209	644
LSD _{0.05} ²		59.2	0.76	0.3	0.03	1.1	1.4	1.2631	--	--
OSL ³		2.8	1.5	4.7	2.0	2.0	3.1	1.0	--	--
CV (%) ⁴		0.0001	0.0001	0.0066	0.0001	0.0001	0.0001	0.0006	--	--

¹Means followed by the same letter are not significantly different according to a Fisher's LSD means separation test.

²LSD: Least Significant Difference.

³OSL: Observed Significance Level.

⁴CV: Coefficient of Variation.

⁵Average premium or discount applied to the lint based on CCC loan schedule.

⁶Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 52.00 cents per pound.

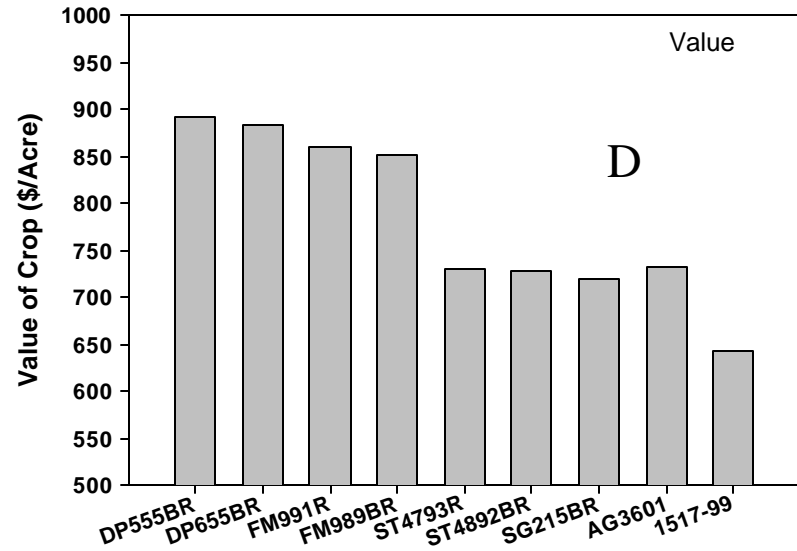
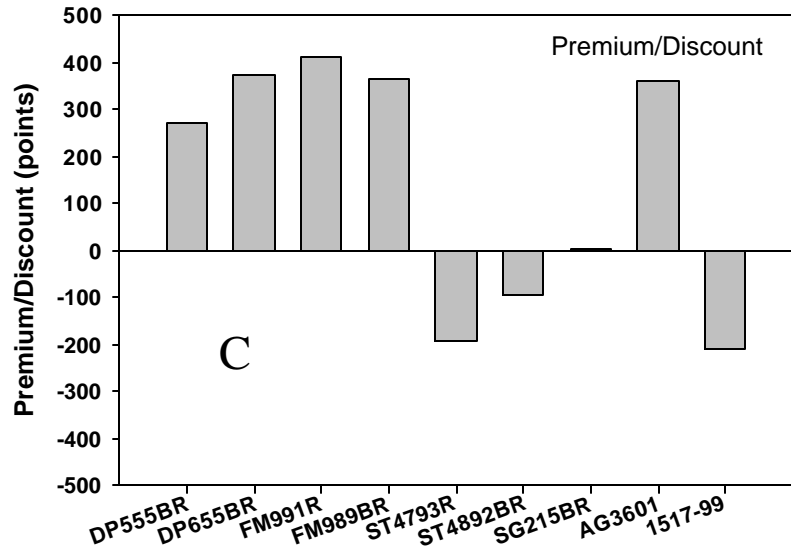
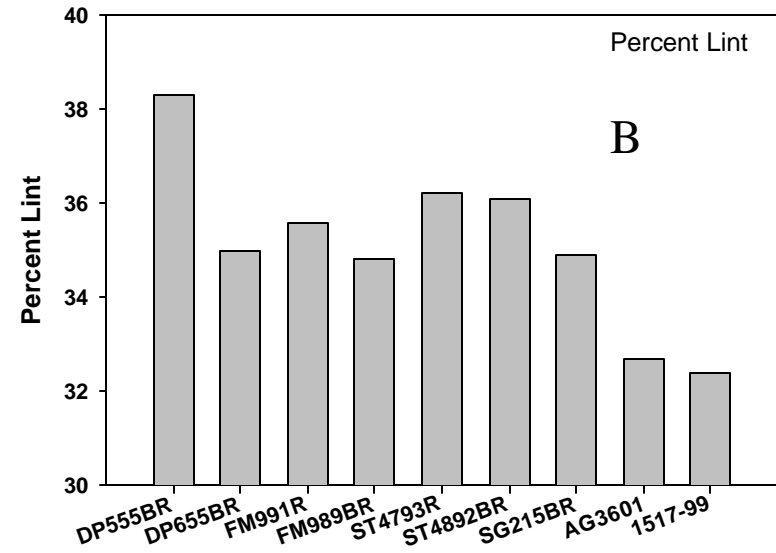
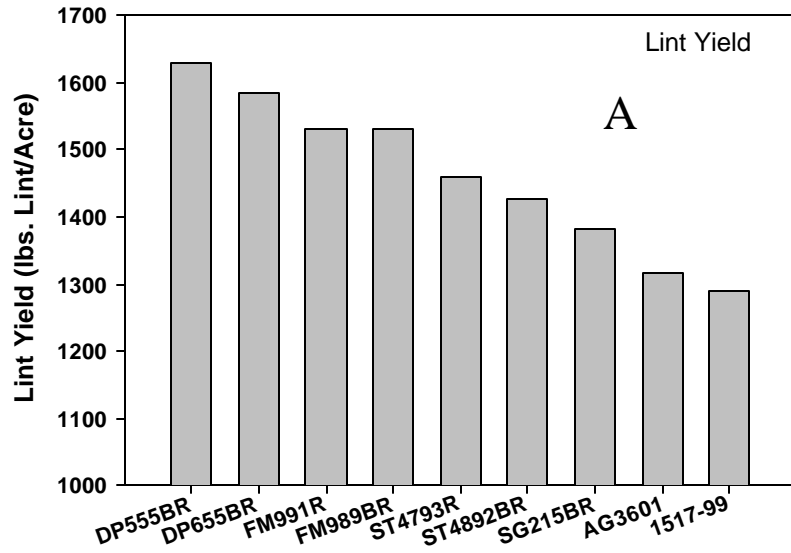


Figure 4. Graphical representation of lint yield (A), percent lint (B), premium/discount (C), and crop value (D) for each of the nine varieties entered in the Graham County Upland Cotton Variety Test, 2002.