

YIELD PROGRESS IN DELTAPINE CONVENTIONAL VARIETIES GROWN IN THE MIDSOUTH

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Abstract

Lint yield comparisons of Deltapine varieties and new lines were made from data summarized from several tests grown across several locations and years. Yield of the varieties and lines were compared on a basis of year of release (or expected release). Yield with early season varieties increased from 0.2% to 0.8% per year with new varieties over a period of 20 years. Yield of full season varieties increased from 0.2% to 1.1% per year over a period of 12 years. Fiber quality was maintained or improved as yield improvements were made.

Introduction

Recent advances and adoption of transgenic cotton have been dramatic and profitable to growers. However, these single gene traits have primarily been protection mechanisms and have enhanced productivity indirectly. Direct enhancements in lint yield have, and in the foreseeable future, will come from conventional plant breeding. It is a critical link in developing improved germplasm in which transgenic traits will reside. Genetic advances in fiber yield are critical to a healthy and competitive cotton industry.

Recent presentations have suggested that genetic advances in cotton yields have become somewhat stagnant. Reasons presented have included the reaching of a genetic yield plateau; lack of genetic diversity, or to breeders concentrating on transgenic traits. Certainly, genetic yield advance has been delayed, but not stopped, simply by the time it takes for backcrossing of transgenic traits into current varieties.

Materials and Methods

As part of an ongoing conventional breeding program, varieties and experimental lines were evaluated at up to six locations in the Midsouth from 1996 through 1999. These sites included Scott, MS; Tunica, MS; Sikeston, MO; Courtland, AL; Brownsville, TN; and Panther Burn, MS. Lint yields were summarized for four early season varieties and one experimental line.

Mid to full seasons varieties and lines were evaluated in full season environments across the Midsouth and Southeast from

1995 through 1999. Locations included Wisner, LA, Panther Burn, MS, Atmore, AL; Bainbridge, GA; Unadilla, GA, Moultrie, GA and Hartsville, SC. Lint yields for two varieties and two experimentals were summarized and compared.

Results and Discussion

Early season varieties graphed by lint yield and year of release (or expected release) are presented in Figure 1. Yield progress information is presented in Table 1. Four-year test means indicated that a yield gain of 97 lb/A occurred between Deltapine 50, 20 and DP 388. Based on year of release that would indicate a 0.7% or 6.5 lb/A gain per year.

Comparison of a new experimental line, K5304, with 1999 data summarized across 5 locations, indicated that yield gains are continuing. Gains of up to 0.8% (7.3 lb/A) per year are indicated with this limited data.

Information on full season varieties and lines are presented in Figures 2 and 3, and Table 2. Gains between varieties varied from 2.7 to 10.7 lb/A per year. The gains between DP 5415 and DP 675 was 0.2% per year based on five years of testing. With a more limited data set, the newer lines DPX 8C09 and 99X02 showed gains of 5.8 lb/A(0.6%) and 10.7 lb/A (1.1%) , respectively, based on their expected year of release.

This group of varieties and their corresponding yield gains indicate that genetic yield progress through conventional breeding is continuing and probably at a higher rate than in the past.

The next question to ask is at what penalty to fiber quality do the yield improvements require. Some newer varieties with enhanced yield do, in fact, have higher micronaire and in some cases, lower fiber length. Data presented in Table 3 indicate that fiber quality can be maintained and enhanced, along with genetic yield increases. The line K5304 has indicated a much lower micronaire than that of Stv 474. The line, 99X02, has shown dramatic increases in fiber length and strength, and also a lower micronaire than Stv 474.

In conclusion, genetic increases in lint yields are continuing. Recent improvements appear to be at a higher level. Lint yield improvements can also be made without penalizing fiber quality.

In the private seed industry today, conventional breeding efforts are greater than ever in the history of cotton improvement. These increased efforts are likely related to the increased economic incentives brought on with advent of transgenic cotton. Genetic yield improvements will certainly be forthcoming indirectly, as a result of the impact that transgenic cotton has on the cotton planting seed industry.

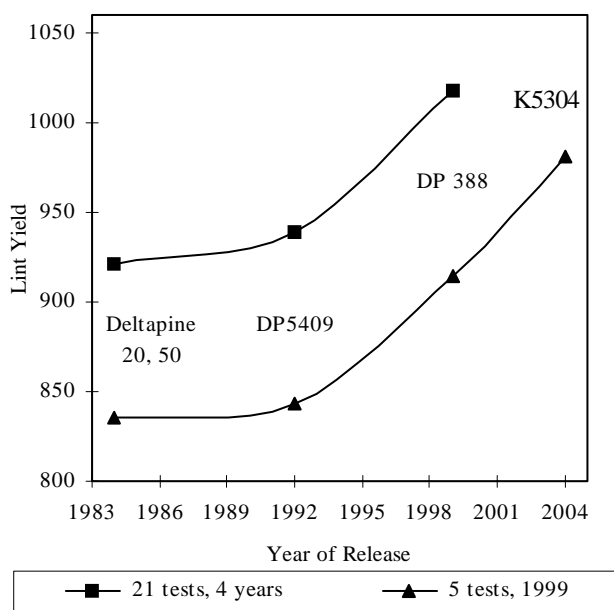


Figure 1. Genetic Progress in Lint Yield with Early Season Deltapine Varieties Grown in the Midsouth.

Table 1. Genetic Progress in Lint Yield with Early Season Deltapine Varieties Grown in the Midsouth.

Variety	DP 20, 50	DP 5409	DP 388	K5304
Year of Release	1984	1992	1999	2004
21 tests, 4 years	921	939	1018	
5 tests, 1999	835	843	914	981
Gain		18	79	67
Cum. Gain		18	97	146
Gain/year		2.3	6.5	7.3
% gain/year		0.2%	0.7%	0.8%

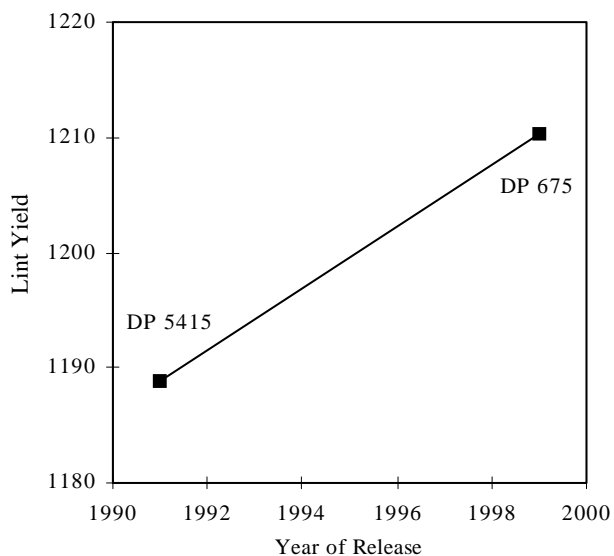


Figure 2. Lint Yield from 20 Full Season Tests, 1995-1999, across the Midsouth and Southeast.

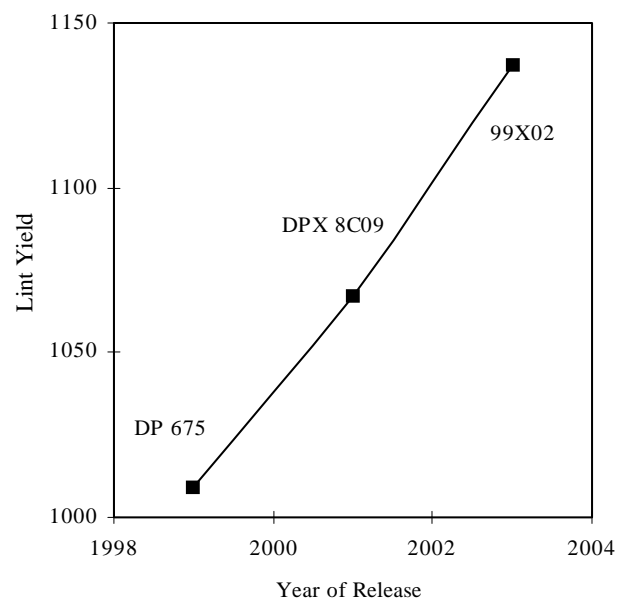


Figure 3. Lint Yield from 10 Full Season Tests, 1998-1999 across the Midsouth and Southeast.

Table 2. Genetic Progress in Lint Yield with Mid to Full Season Deltapine Varieties Grown in the Midsouth and Southeast.

Variety	DP	DP 675	DPX 8C09	99X02
Year of Release	1991	1999	2001	2003
20 tests, 1995-99	1189	1210		
10 tests, 1998-99		1009	1067	1137
Gain		21	58	70
Cum. Gain		21	58	128
Gain/year		2.7	5.8	10.7
% gain/year		0.2%	0.6%	1.1%

Table 3. Lint Yield and Fiber Quality Comparisons in Midsouth and Southeast Tests.

Name	Lint Yield	Lint %	Mic	Len	Ur	T1	E1
12 Tests, 1997 - 1999							
K5304	1050	38.0	4.1	1.10	83	29.5	9.7
STV 474	1044	39.0	4.6	1.10	83	28.8	9.4
13 Tests, 1997 - 1999							
99X02	1180	41.0	4.5	1.18	84	31.48	8.6
STV 474	1124	40.0	4.8	1.10	83	28.8	9.7