FIBER PROPERTIES AND LARGE SCALE PROCESSING EFFICIENCY OF TWO ACALA COTTONS

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Abstract

El Dorado Acala is a new cotton from J. G. Boswell Cottonseed Breeding. To examine the unique fiber and spinning properties of this variety, El Dorado was compared to Acala Maxxa (the San Joaquin Valley standard cotton variety). Samples of the two cottons were obtained from replicated trials conducted over a three year period in the San Joaquin Valley. El Dorado was found to exhibit significantly better fiber uniformity, strength, and elongation than Maxxa. Despite reduced fiber length (ITC test) and elevated micronaire, El Dorado produced superior yarns compared to Maxxa, with lower manufacturing waste. El Dorado yarns showed improved strength, tenacity, elongation, evenness, and had fewer neps than Maxxa yarns.

Introduction

J. G. Boswell Cottonseed Breeding continually strives to develop the world's finest cotton fibers in order to meet the ever changing demands of today's progressive spinning industry. As a result of this effort, El Dorado Acala was developed. This unique variety was approved for release in March, 1995 by the San Joaquin Valley Cotton Board. To demonstrate the superior fiber and spinning properties of El Dorado, a comparison was made with Acala Maxxa, the standard cotton of the San Joaquin Valley.

Materials and Methods

Between 1992 and 1994, El Dorado and Maxxa were compared at seventeen separate locations in the San Joaquin Valley, each in a randomized complete block design with four replications. Seed cotton samples from each plot were ginned on a complete small scale gin line that included a drying system, incline cleaner, impact cleaner, feeder, 40 saw gin stand, super jet cleaner, and two lint cleaners. Lint subsamples from each plot were evaluated on individual instruments at the J. G. Boswell Cottonseed Breeding Fiber Lab to determine length, uniformity, strength, elongation, and micronaire. The instruments used to perform these tests included the Spinlab Model 630 Fibrograph, the Spinlab Model 154M Stelometer, and the Spinlab Model 675 Micronaire. Final data were combined and analyzed across locations.

Two fifty pound bales of El Dorado and Maxxa from each of eight of these locations were also sent to the International Textile Center in Lubbock, Texas for additional fiber and spinning tests. The fiber properties examined included length, uniformity, adjusted stelometer strength, Pressley strength, elongation, micronaire, and short fiber content. In addition, carded 50's and combed 50's yarns were spun and tested. Data were combined and analyzed across locations.

Results and Discussion

Results of fiber tests performed by J. G. Boswell Cottonseed Breeding are shown in Table 1. El Dorado and Maxxa were found to have equal length, but El Dorado showed significantly better uniformity, strength, elongation, and a higher micronaire.

When tested at the International Textile Center (Table 2), El Dorado was significantly shorter than Maxxa by 0.01 inches. But it showed higher uniformity , higher adjusted stelometer strength, higher Pressley strength, and significantly higher elongation and micronaire than Maxxa. Short fiber content was also lower in El Dorado than in Maxxa.

Spinning properties are shown in Table 3. El Dorado showed a lower Shirley non-lint content and significantly lower manufacturing waste than Maxxa.

For carded 50's single yarns, El Dorado showed a higher tenacity and higher mean strength than Maxxa, El Dorado's coefficient of variation for strength was slightly higher than Maxxa's. This is not completely understood. El Dorado's elongation was significantly higher than Maxxa and its coefficient of variation for elongation was significantly lower.

For combed 50's single yarns, the same trend was observed. El Dorado showed higher tenacity, mean strength, and elongation than Maxxa, although the differences were not significant. Coefficients of variation for strength and elongation were lower for El Dorado than for Maxxa.

With respect to carded 50's skein properties, El Dorado exhibited a higher break factor, significantly better evenness, significantly fewer thins and thicks, fewer neps, and an improved appearance index compared to Maxxa.

The same trend was observed for combed 50's skein properties. El Dorado showed a higher break factor, better evenness, fewer thins and thicks, fewer neps, and an improved appearance index compared to Maxxa, although the differences were not significant.

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Summary

El Dorado exhibited significantly better fiber uniformity, strength, and elongation than Maxxa when measured on individual instruments. Despite reduced fiber length (as measured at ITC) and elevated micronaire, El Dorado produced superior yarns compared to Maxxa. Manufacturing waste was significantly lower for El Dorado than for Maxxa. El Dorado yarns showed improved strength, tenacity, elongation, evenness, appearance index, and had fewer neps than Maxxa yarns.

Table 1. Fiber Quality Traits, J. G. Boswell Cottonseed Breeding Lab, 17 Locations, 1992-94

	Maxxa	El Dorado
2.5% Span Length	1.14	1.14
Uniformity	46.9	49.0 *
Strength T1 (g/tex)	23.2	24.2 *
Elongation	6.4	6.9 *
Micronaire	3.89	4.14 *

* Indicates a significant LSD value at alpha = 0.05.

Table 2. Fiber Quality Traits, International Textile Center Lab, 8 Locations, 1992-94

	Maxxa	El Dorado
2.5% Span Length	1.12 *	1.11
Uniformity	46.7	49.0
Strength T1 [Adj. Stel. (g/tex)]	28.8	29.9
Strength Pressley	100.94	98.69
Elongation	5.9	6.3 *
Micronaire	4.0	4.3 *
Short Fiber Content	3.2	1.1

* Indicates a significant LSD value at alpha = 0.05.

Table 3. Spinning Properties, International Textile Center Lab, 8 Locations, 1992-94

	Maxxa	El Dorado
Shirley Non-Lint Content	1.2	1.0
Manufacturing Waste		
Picker and Card	4.6	4.4 *
Cormber	16.2	13.7 *
Total	20.0	17.5 *
Single Yarn - Carded 50's		
Tenacity	16.39	17.43
Mean Strength	195	207
% CV Strength	11.9	12.5
Elongation	4.51	5.05 *
% CV Elongation	10.5	9.5 *
Single Yarn - Combed 50's		
Tenacity	18.30	18.95
Mean Strength	218	226
% CV Strength	10.5	10.4
Elongation	4.68	5.17
% CV Elongation	9.0	8.6
Skein/Evenness - Carded 50's		
Break Factor	2362	2577
Evenness	23.52	21.98 *
Thins	903	579 *
Thicks	1781	1336 *
Neps	1588	1101
Appearance Index	80	87
Skein/Evenness - Combed 50's		
Break Factor	2679	2848
Evenness	17.93	17.31
Thins	196	130
Thicks	359	296
Neps	247	230
Appearance Index	113	116

* Indicates a significant LSD value at alpha = 0.05.