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IMPROVED PUBLIC ACALAS FOR NEW MEXICO

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Abstract

A series of selections were made to determine better acala varieties that could be used in New Mexico. Seed from the breeder program were planted in a farmer's field trial in order to determine variety characteristics, yield and quality for further selection toward commercialization. Within this study, a comparison of the okra-leaf characteristic to regular-leaf acalas was made to further discriminate between yield and cotton quality as well as variety adaptation. Use of both high volume instrument (HVI) as well as the advanced fiber information system (AFIS) will be used to help determine cotton quality and how environmental conditions in New Mexico would influence the various varieties. Advances in variety characteristics were confirmed when these new selections were compared to the existing benchmark Acala 1517-99 from New Mexico. Future testing will continue to include AFIS, HVI as well as yield testing to collect further information on the potential varieties over locations and years.

Introduction

A series of breeder tests narrowed the field of possible new releases within the New Mexico breeding program to five new acalas to be used in comparison with the existing Acala 1517-99 public variety from New Mexico State University. The six lines in consideration include the current public variety, 1517-99 as a check; a 1517-03 okra leaf variety; a genetically modified variety called 1517-99W with a Bt gene event; NM03N1155 that is a genetically altered acala with the Roundup-Ready (RR) gene that will be considered a 1517-99RR; 1517-99WR that includes both the Bt (Widestrike) and the RR gene modification; and, NM03012 which is a potentially high-yielding new acala line. Using a series of breeder trials, farmer trials, quality testing using both the standard HVI as well as AFIS testing and continuing to observe possible management, pest tolerance and stability characteristics of the varieties should lead to a better determination of variety fit and improvement in the acala lineup through New Mexico State University. In particular, the future use of the AFIS testing procedure should refine information on reduced short fiber content, reduced neps and seed coat fragments, reduced or eliminated fabric barre as well as nay reduced maintenance on the textiles made from the cotton (Thibodeaux, 2004). Further testing is being pursued to not only collect samples for these tests but to also work cooperatively with USDA-ARS Gin Lab there at Las Cruces, New Mexico to gin out the trial cotton collected in trailers to spin for final fabric quality. With both the AFIS tests as well as with the final spin testing, better measurement of staple length by weight and number, length coefficient of variance percentage by weight and number, upper quartile length, short fiber content by weight and number, nep count and size including seed coat neps, trash and dust count and size, visible foreign matter, fineness, and maturity will be further evaluated. This will provide a broader picture of the true quality of the cotton staple and provide additional information on these quality characteristics to cotton buyers. More information on staple strength, length and length uniformity as well as stability will provide a profile of each variety to further test fit and improvement as well as marketable trait confirmation (Bell, 2004). In particular, a larger scaled trial was wanted to confirm breeder early results and to further test if such characteristics as okra-leaf traits can confirm better quality and/or quantity to a breeding program.

Materials and Methods

A trial was run in 2005 across the six proposed cotton varieties in order to ascertain differences in Acala cotton in quantity and quality. The trial had each variety replicated in strips four times in a randomized, replicated plan. Planted on May 2, 2005 at a seeding rate of about six seed per foot at a depth of 1 to 1.5 inches, the trial was planted with a hill planter. Stand counts and vigor ratings were taken on May 20, 2005 with good establishment accomplished. Each strip of each variety was four, 40-inch rows, replicated four times in a randomized pattern. The planting equipment was an eight-row planter with half of the boxes containing one variety and the other four boxes on the other side of the planter containing a second variety. The plots were flagged to each randomized, replicated strip for the varieties with the only constraint the

preset randomization based on the two-at-a-time planting manner. The soil type of the field was a clay loam that was furrow irrigated as needed through the season. The trial was located just north of Las Cruces, New Mexico near Dona Ana and the farmer's residence in North Valley. Soil temperatures in 2005 remained relatively warm through germination and emergence. The field was checked every week for differences within and among the strips as well as for pest problems and later for growth regulator use. A few timely rains supplemented irrigation supplied but did not greatly add to the moisture additions. During harvest, two subsamples were taken in paper bags for use in ginning and HVI as well as future AFIS testing, while whole trailer samples were taken from each strip, dumped from the cotton picker into the boll buggy and weight in pounds and collected in a trailer with strips separated by roof tarping and tagged with the variety and replication number. These trailer samples were later ginned, turnout again measured as it was with the small subsamples and the cotton collected sent to be spun for further variety quality testing. Using this process to thoroughly test the six varieties against one another will allow a better variety profile to be developed on the quality and quantity achieved in 2005. This testing will continue in 2006 in order to test the stability of the profile over time.

Results and Discussion

Differences between varieties was immediately seen in yield and confirmed once the turnout was determined from the subsamples run from each variety and each replicate. Table 1 below describes the bales per acre picked from this trial across the different varieties.

Table 1. Yield determination on the Acala variety trial to test six breeder cottons on quantity in 2005.

Yield Rank	Variety	Bales/A	Non-Significance Ranges*
1	1517-99W (Bt)	3.19	a
2	1517-99WR (Bt and RR)	3.07	ab
3	NM03N1155 (1517-99RR)	2.96	bc
4	NM03012 (new, high-yielding)	2.81	cd
5	1517-03 (okra-leaf)	2.70	d
6	1517-99 (check)	2.66	d

The variety yields were highly significant at F 0.0006; mean at 2.90; CV of 5.02%; and LSD 0.05 of 0.2193.

Several quality characteristics also provided an insight into the cotton varieties as compared to each other and to the check as shown in Table 2.

Table 2. Quality characteristics tested across the six Acala varieties in 2005.

Variety	Lint turnout (%)	2.5% Span (inch)	5.0% Span (inch)	Fiber Elong. (%)	Fiber Strength (g/tex)	Micron -aire (unit)	Short Fiber (%)
1 1517-99W (Bt)	41.45	1.20	0.56	7.00	23.37	4.45	4.54
2 1517-99WR (Bt and RR)	41.91	1.24	0.57	7.13	26.51	4.41	3.75
3 NM03N1155 (1517-99RR)	40.39	1.23	0.54	6.56	27.27	3.91	4.76
4 NM03012 (new, high-yielding)	41.91	1.23	0.56	6.81	25.23	4.77	4.06
5 1517-03 (okra-leaf)	42.54	1.25	0.53	7.56	25.80	4.23	4.21
6 1517-99 (check)	40.42	1.25	0.56	6.88	25.38	4.48	4.01
F value	0.0204	0.2756	0.2303	0.1128	0.0219	0.0312	0.4442
Mean	41.32	1.23	0.55	6.99	25.59	4.38	4.22
CV	2.09%	2.71%	4.60%	6.58%	5.39	7.19%	17.41
LSD 0.05	1.30	0.05	0.04	0.69	2.08	0.47	1.11

With the quality and quantity characteristics evaluated, two varieties appear to be a better fit in 2005. These varieties are the 1517-99WR and the 1517-99W new breeder varieties. The okra-leaf variety, 1517-03, did not improve yield or quality characteristics to an extent to rival the other two top-yielding Acalas. In fact, yield loss with the okra-leaf variety was not significantly different than the earlier commercial Acala 1517-99 developed in 1999.

Further tests using the AFIS test as well as the final results from spinning the cotton collected on-site and ginned for testing these larger quantities of cotton obtained from the strips will further confirm the quality aspects of each variety. These two sets of further testing should be finished in early 2006.

Conclusions

The variety testing method for forming a complete profile on each new acquisition obtained for potential commercialization through subsampling, collecting large field samples for spinning, running the HVI quality tests and finally submitting the ginned samples through the AFIS testing procedure will provide a fuller spectrum of information that can be tweaked for reliability and stability over time if multiple years of data is obtained through field trials. This information can then be used to promote the more reliable, stable quality cottons that continue to obtain higher yields. Providing this complete information will also allow a better profile to be developed on the cotton for marketing purposes that can then be used to develop better prices and demand on specific cotton varieties grown within the areas of best fit (Estur, 2004). This in turn will again provide the farmer with more reliable data on each cotton variety and possible insight into management and variety selection that may enhance yield, staple length, and strength while limiting reduced fiber content, neps and seed coat fragments, poor fabric barre as well as maintenance needs when spinning the cotton at textile factories. By providing more reliable, stable cotton quality and quantity, the product will better meet the needs and desires in the world market.

References

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