## EVALUATION OF GLANDLESS COTTON CULTIVARS IN NEW MEXICO O.J. Idowu J.B. Pierce C.S. Bundy J. Zhang R.P. Flynn T. Carrillo

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## <u>Abstract</u>

Glandless cotton (cotton plants without gossypol) can potentially widen cottonseed use beyond ruminant animal feed and increase the value of cotton seeds due to absence of gossypol. However, since gossypol is a natural defense mechanism against pests, glandless cotton is subject to a higher pest pressure, which may affect lint and seed yields. Previous research efforts have shown that glandless cotton has high susceptibility to chewing, piercing and sucking insect pests such as lygus and boll weevil, and vertebrate pests (Benedict et al., 1977; Jenkins et al., 1966), and this led to severe yield losses. New Mexico has lower insect pressure than most other areas of the cotton belt and might be an area where glandless cotton is a viable crop.

## **Objectives**

- 1. Evaluate and compare yield and fiber quality of an Acala glandless cotton with conventional Acala cultivars grown in New Mexico.
- 2. Evaluate the pest pressure on an Acala glandless cotton and a locally adapted Acala cultivar.

#### **Methods**

## Agronomic Evaluation

The trials involved two glandless cultivars (Acala-GLS & STV-Glandless) and two conventional cultivars (Acala 1517-08 & Acala 1517-99). Sites for testing included the NMSU Leyendecker Plant Science Center in Las Cruces, NMSU Agricultural Science Center in Artesia, the NMSU Agricultural Science Center in Clovis, and 3 commercial farm sites in La Union, Anthony, and Hagerman, NM. The row spacing was 40 inches. The fields were furrow-irrigated at the Anthony, La Union, and Leyendecker sites, and sprinkler irrigated in Clovis, and combined furrow and sprinkler irrigation in Artesia. The cultural practices were based on New Mexico State University recommendations.

The cotton was planted in April, 2011, and harvested in November, 2011. The experimental design was a randomized complete block design or paired comparison with four replicates in strip plots. Data collection consisted of collecting 50 matured bolls from each plot (2 bolls/plant) for seed/lint ratio and fiber quality determination. Quantitative field yield was assessed on each plot by harvesting 2 rows, 20 feet long.

#### **Pest Monitoring**

Field plots of the glandless Acala GLS and Acala 1517-99 were established at the NMSU Leyendecker Plant Science Center in Las Cruces and the NMSU Agricultural Science Center at Artesia. The experimental design was a randomized complete block design with four replicates Plots were sampled weekly for insect pests. Early season sampling included sampling for thrips. When squares were available, they were sampled and examined for insect damage weekly. Sweep net samples also were collected weekly to determine both the beneficial and pest species. In the Artesia Science Center trial, field plots were also evaluated for beet armyworm damage to foliage weekly, with whole plant evaluations for eggs to determine infestation rates and ratings (1-5) for damage.

# **Results**

# Artesia Pest Pressure:

Field ratings of *S. exigua* damage were significantly higher in glandless compared to glanded cotton (Figure 1). There was no difference in the number of *S. exigua* infested plants and virtually all plants were infested with beet armyworm.



Figure 1. Field ratings of the beet army worm in glandless and glanded cotton in Artesia.

There was no significant difference in squares infested by the cotton bollworm with 5.8% and 5.4% infested squares in glanded and glandless cotton (Figure 2).



Figure 2. Square infestation with cotton bollworm in glandless and glanded cotton in Artesia.

Surprisingly, there were significantly more western flower thrips on the glanded cotton compared to glandless in Artesia (Figure 3). The reason for this is not yet clear.



Figure 3. Thrips incidence in glandless and glanded cotton in Artesia.

#### Las Cruces Pest Pressure:

There was no significant difference in thrip populations between the glandless and glanded cotton (Figure 4). Cotton bollworm injury was significantly higher in the glandless cotton (20% overall damage on glandless compared to 12% damage on glanded) (Figure 4). Meanwhile, beet army worm damage to squares was higher in glandless than glanded cotton, but this difference was not statistically significant (Figure 4).



Figure 4. Cotton bollworm and beet army worm infestation in glandless and glanded cotton in Las Cruces.

### Yield results:

- Across all sites, seed cotton yields of the Acala-GLS varied from 1495-3440 lbs/ac; lint yields varied from 610-1437 lbs/ac, and the cottonseed yields varied from 0.44 -1.1 t/ac (Figures 5-7).
- Variations of yield parameters for the Acala-GLS across sites may have been due to management differences, soil types and weather conditions.



Figure 5. Seed cotton yields of glandless and glanded cotton at different trial sites in New Mexico.



Figure 6. Lint yields of glandless and glanded cotton at different trial sites in New Mexico.



Figure 7. Cottonseed yields of glandless and glanded cotton at different trial sites in New Mexico.

At Las Cruces, Artesia and La Union sites, Acala-GLS yielded less than the conventional Acala cultivars, with yield differences being statistically significant at Artesia and Las Cruces sites (Figures 5-7). At Clovis, seed cotton and lint yields were slight lower for the STV-Glandless compared to the Acala-GLS cultivar but the differences were not statistically significant (Figures 5-6). At the Artesia site, the yields of STV-Glandless were not statistically different from the conventional Acala 1517-08 cultivar (Figures 5-7).

## **Conclusions**

Pest pressure was site dependent. In Artesia, beet armyworm damage on the glandless cultivar was significantly higher but not in Las Cruces, while cotton bollworm damage on the glandless was significantly higher in Las Cruces but not in Artesia. Unexpected higher thrip pressure on the glanded cultivar was observed at the Artesia site. We will monitor thrips next season to verify this observation. Seed cotton, lint and cottonseed yields of the Acala-GLS were significantly lower than the conventional cultivars in Artesia and Las Cruces. The yield of the STV-Glandless was not significantly different from the conventional Acala cultivar at the Artesia site. Also, STV-Glandless and Acala-GLS yielded similarly at the Clovis site. The yields of the two glandless cultivars appear promising in New Mexico. More cultivar evaluations will continue in New Mexico to assess the economic viability and adaptability of the glandless cotton.

# **References**

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