PLANTING DATE AND FERTILIZER RATE EFFECTS ON SELECTED COTTON CULTIVARS IN NEW MEXICO

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Abstract

Field trials were conducted near Las Cruces and Artesia, NM to test the response of two transgenic cotton cultivars (PHY 375 WRF and PHY 499 WRF) and two traditional cotton cultivars (Acala 1517-08 and Acala-GLS) to planting date and N fertilization. Fertilizer rates of 100 Ibs N/acre (Low) and 200 Ibs N/acre (High) were applied to respective treatments before bloom. Three planting dates were established at the Las Cruces site (April 13, April 27, and May 16) and two planting dates in Artesia (May 3 and May 21) in 2012. Measurements that were taken included lint turnout, boll weight, seedcotton, lint and seed yields. Results show that the cultivar effect was significant for all the measured parameter, while the planting date and the fertilizer rate did not show and significant difference for many of the measurements. The lint yields were significantly different between cultivars at both sites. PHY 499 and Acala 1517-08 yields were not significantly different in Las Cruces, while PHY 375 and Acala-GLS had significantly lower yields than Acala 1517-08. In Artesia, the yield of PHY 499 was the highest and significantly more than the Acala-GLS. However, lint yields of PHY 375 and Acala 1517 were not significantly different from PHY 499 in Artesia. Cotton seed yields were not significantly different in Artesia, but in Las Cruces, Acala 1517 had significant higher seed yield compared to the other cultivars tested. There was also a significant interaction between cultivar and planting date for the lint yield in Las Cruces.

Introduction

Optimizing agronomics for cotton production continues to be an important activity, especially with the release of new cotton cultivars and specialty cultivars without gossypol. Two important issues that need to be addressed include the nitrogen fertilization and appropriate planting dates. Most NM farmers typically plant cotton when the 4” soil temperature reaches 65F. However, seeds of some newly released cotton cultivars may be able to withstand slightly lower soil temperatures at the beginning of the season without necessarily experiencing yield reductions. In such a case, farmers can enjoy greater flexibility with their planting operation.

Additionally, nitrogen requirements for these new cultivars may be different from the previously released cultivars. Therefore, agronomic studies are needed to fine-tune cultural practices suitable for these new cultivars in different cotton production zones of NM, thus optimizing yields and profitability.

Objectives

To evaluate and test the response of two transgenic cotton cultivars (PHY 375 WRF and PHY 499 WRF) and two traditional cotton cultivars (Acala 1517-08 and Acala-GLS) to: i) different planting dates and ii) different nitrogen application rates.

Materials and Methods

This trial involved four cotton cultivars PHY 375 WRF, PHY 499 WRF, Acala 1517-08, and Acala-GLS.
Sites chosen for testing included NMSU Leyendecker Plant Science Center in Las Cruces and NMSU Agricultural Science Center in Artesia. Planting took place on 40 inches spaced beds. The trial was furrow irrigated at Las Cruces site and combined furrow and sprinkler irrigated in Artesia. Nitrogen fertilizer rates applied were 100 lb N/acre or 200 lb N/acre depending on treatments. Las Cruces site had three planting dates (April 13, April 27 and

May 16, 2012), while Artesia had only two planting dates (May 3, and May 21, 2012.) Harvest took place in Las Cruces from November 12-13, 2012 and in Artesia from November 8-9, 2012. Experimental design was a split-split plot with planting date as the main plot, cultivar as the subplot and fertilizer rate as the sub-subplot. The experimental units were replicated four times. Data collection included 25 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.

Results and Discussion

There was significant effect of cultivar on the lint turnout at both trial sites. The lint turnouts of the Phytogen cultivars were generally higher than the traditional cultivars (Figure 1a-b).

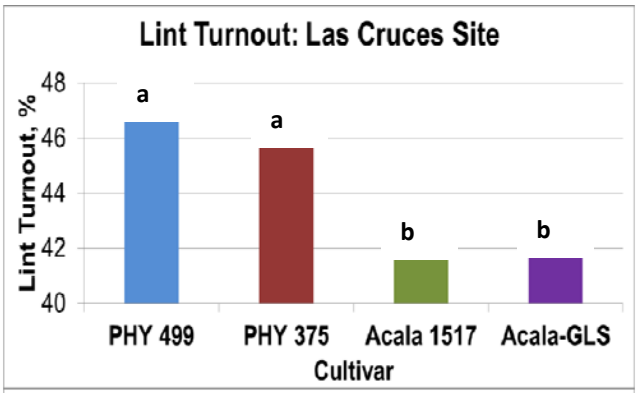

Figure 1a&b. Lint turnout at Las Cruces and Artesia sites

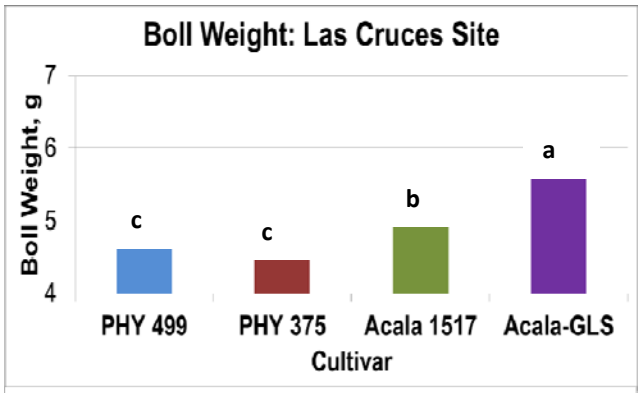

Figure 2a&b. Boll weight at Las Cruces and Artesia sites

Boll weights of the traditional cultivars (Acala-GLS & Acala 1517) were more than those of the Phytogen varieties tested at both sites (Figure 2a-b). Seedcotton yields were not significantly different between the cultivars in Artesia, but in Las Cruces, the seedcotton yield of the Acala 1517 was significantly higher than PHY 375 and Acala-GLS, but not significantly different from PHY 499 (Figure 3a-b). The lint yields were significantly different between cultivars at both sites. In Las Cruces, PHY 499 and Acala 1517 yields were not significantly different, while PHY 375 and Acala-GLS had significantly lower yields than Acala 1517. In Artesia, the yield of PHY 499 was the highest and significantly more than the Acala-GLS. However, lint yields of PHY 375 and Acala 1517 were not significantly different from PHY 499 in Artesia (Figure 4a-b). Cotton seed yields were not significantly different in Artesia, but in Las Cruces, Acala 1517 had significant higher seed yield compared to the other cultivars tested (Figure 5a-b) The effect of planting date was generally not significant for most of the measurements.

In Artesia, only the boll weight was significant, with the second planting date having heavier bolls that the first planting date. In Las Cruces, the lint turnout was higher for the second planting date than the third planting date.

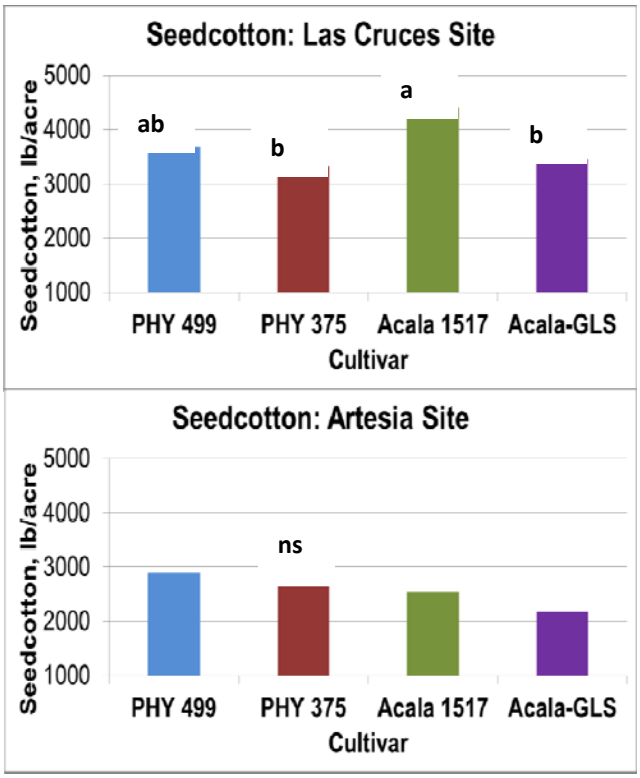

Figure 3a&b. Seedcotton yield at Las Cruces and Artesia sites

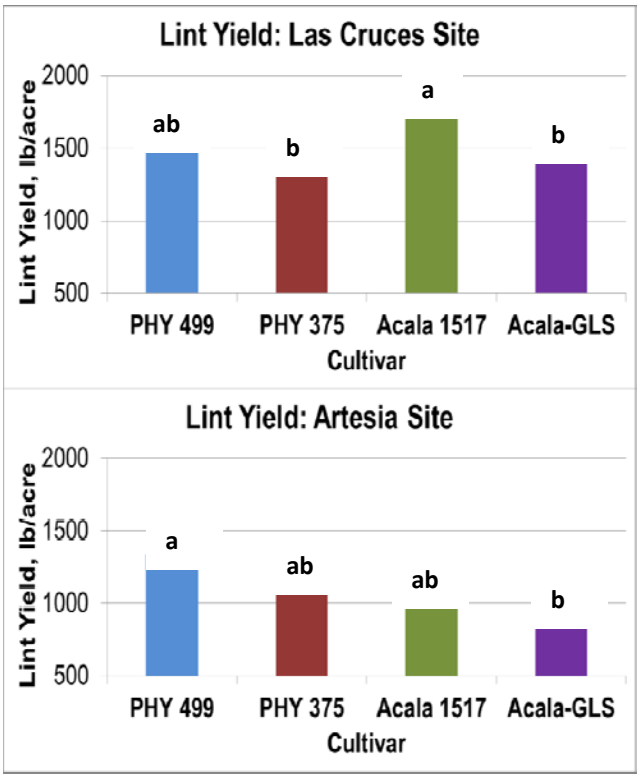

Figure 4a&b. Lint yield at Las Cruces and Artesia sites

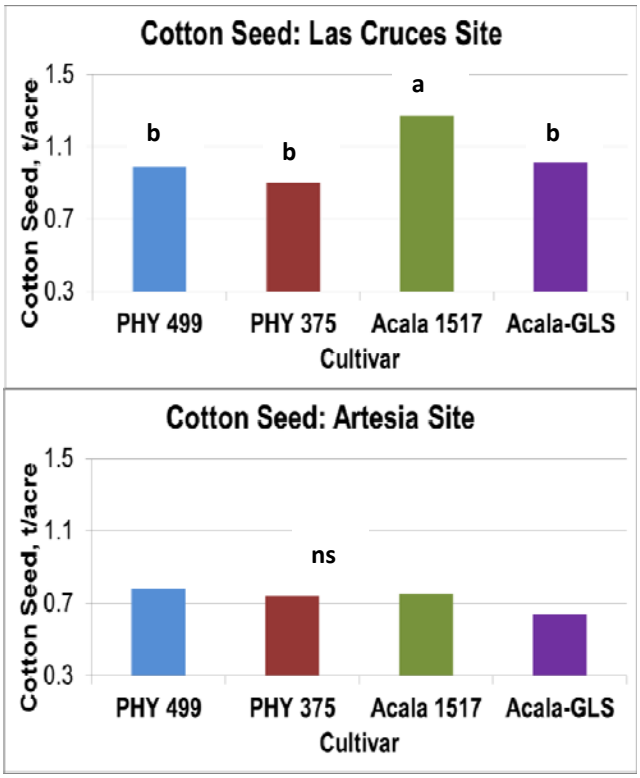

Figure 5a&b. Lint yield at Las Cruces and Artesia sites

The fertilizer rate effect was not significant for all the measurements in Artesia and it was significant only for lint turnout in Las Cruses, with the 200 lb N/acre having higher lint turnout than 100 lb N/acre, but this had no significant effect on yields.

In Las Cruces, there was a significant interaction between planting date and cultivars for lint yields (Figure 6).

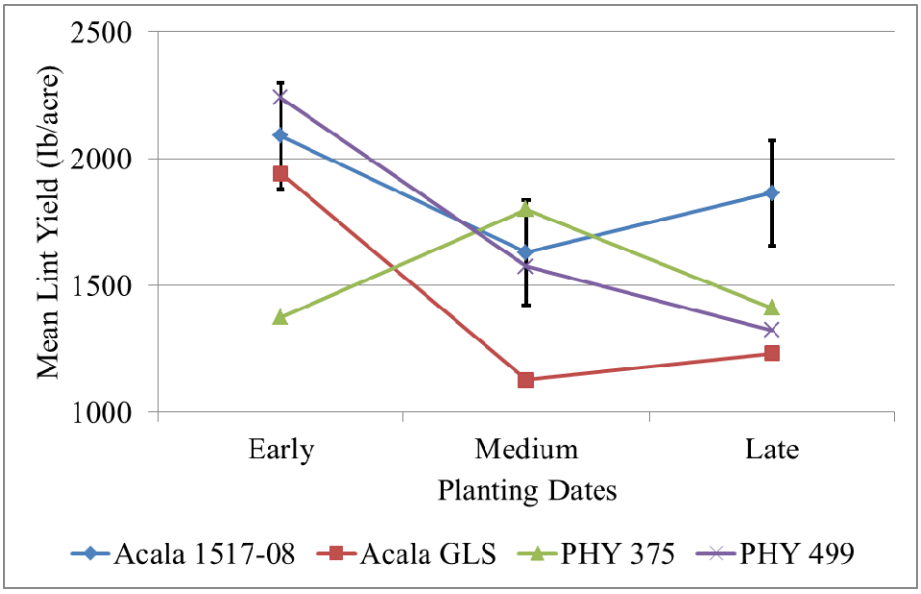

Figure 6. Lint yields showing interaction between planting date and cultivar in Las Cruces

From figure 6, the lint yields of the cultivars tested showed different trends with planting dates. PHY 499, Acala 1517-08, and Acala GLS had their maximum yields at the early planting date, while PHY 375 had the maximum yield at the medium planting date (Figure 6). Acala GLS experienced a significant reduction in lint yield between early planting date and the later planting dates. The yield difference of Acala GLS between the medium and late planting dates was not significantly different (Figure 6). This result indicates that planting Acala-GLS early may lead to a higher lint yield.

Conclusions

A preliminary study investigating the effects of planting dates and nitrogen rates on four cotton cultivar (PHY 375 WRF, PHY 499 WRF, Acala 1517-08 and Acala-GLS) in NM indicate a strong cultivar effect on growth and yield at two study sites (Artesia and Las Cruces, NM). The effect of planting date and fertilizer rate were not significant for many of the yield parameters measured at both sites. Also, the yield parameters of the cultivars tested were generally higher in Las Cruces than in Artesia. There was a significant interaction between cultivars and planting date for lint yields with the Acala-GLS in Las Cruces showing significantly higher lint yield at the first plant date compared to the later dates. The trial will be repeated next year to evaluate the treatment effects.