EFFECT OF HARVEST TIMING AND LEAF HAIRINESS ON FIBER QUALITY

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Abstract

High humidity is a constant concern during cotton harvest as relative humidity is directly linked with the moisture content of harvested seed cotton (Hughs et al., 1994; Riley, 1961). Increases in both relative humidity (Gordon et al., 2009) and seed cotton moisture content (Byler, 2006) have an impact on fiber quality parameters. Humidity and moisture levels are even more of a concern in stripper-harvested cotton as this harvest method brings more plant material in with the seed cotton, which can impact moisture levels even when seed cotton is harvested at appropriate moisture content. Variety hairness, or density of trichomes on leaves and bracts, can have an impact on the amount of trash or plant material present in seed cotton. Varieties with high levels of leaf or bract hairs tend to result in reduced efficacy of lint cleaning and greater trash levels in ginned lint (Novick et al., 1991; Ramey, 1962; Smith, 1964; Wanjura et al., 1976). To determine the relationship between seed cotton moisture and humidity levels at harvest, and the impact of varying leaf hairiness or trichome density levels of the plants on fiber quality, four commercial varieties were harvested at optimal and elevated humidity levels. The optimal and elevated humidity harvests took place on the same day, and were done consecutively to avoid an impending precipitation event. The four varieties included were Deltapine 1522 B2XF (DP 1522), FiberMax 1830 GLT (FM 1830), NexGen 3405 B2XF (NG 3405), and PhytoGen 333 WRF (PHY 333). Recent, unpublished research has determined that FM 1830 and NG 3405 have smooth (fairly hairless) leaves and bracts, while DP 1522 and PHY 333 have hairy leaves and bract, compared to a large amount of commercial varieties. Seed cotton moisture content was collected at harvest and fractionation data was collected after ginning at the USDA Cotton Production and Processing Research Unit in Lubbock, TX. Fiber samples were classed by the Texas Tech University Fiber and Biopolymer Research Institute in Lubbock, TX.

Trichome density was determined using the methods outlined by Hornbeck and Bourland (2007). Differences were observed in leaf trichome density between all varieties, with PHY 333 having the greatest, followed by DP 1522, NG 3405, and FM 1830. Fewer differences between varieties were present for bract trichome density, with FM 1830 having less than the other three varieties. Even though harvest of both conditions took place consecutively to avoid precipitation, a 4% difference in average relative humidity existed between the two harvest periods (39 compared to 43%). Similar to previous findings, this translated into a difference in seed cotton moisture content between optimal (7.3%) and elevated (7.9%) harvest conditions. The only fiber quality parameters impacted by the harvest conditions were fiber uniformity and fiber strength which were decreased by 0.29% and 0.44 g/tex, respectively, under elevated humidity. There were a greater amount of differences present due to variety. However, this is to be expected in many of the fiber parameters as differences due to variety are commonplace. There were also differences present in fractionation measurements, including burrs, leaf trash, and total trash, although differences didn't follow the differences observed in trichome density.

While there were a few cases of significance due to either harvest conditions or variety, none of these appeared to be significant in regards to potential discounts due to the harvest conditions investigated in this study. It is likely that the differences present in humidity were not enough for the conditions to be questionable for harvest in most cases. Selecting a period of higher humidity levels than those present in the elevated treatment in this study may result in a greater impact of harvest conditions, as well as the potential interaction with varieties with varying levels of trichome density.

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