## AN EVALUATION OF WITHIN – PLANT FIBER LENGTH DISTRIBUTIONS OF COMMERCIAL COTTON VARIETIES GROWN IN MULTIPLE ENVIRONMENTS AND UNDER DIFFERENT IRRIGATION SYSTEMS

## Scott Baker A. Ayele E. Hequet B. Kelly Texas Tech University Lubbock, TX

## <u>Abstract</u>

Environmental conditions play an important role in the growth and development of cotton plants and can influence variety performance. Many cotton varieties are developed for specific environmental conditions and when grown outside of these environments, unexpected differences in plant structure, maturity, fiber quality and yield may be observed. In 2012 and 2013, small plot experiments were conducted in the Mid-South and High Plains regions of the U.S. with eight genetically diverse commercial cotton varieties to evaluate within-plant variability in fiber length. Several agronomic observations were made during the growing season to evaluate varietal differences. Lint samples were collected at maturity from individual fruiting positions and analyzed by AFIS to characterize within-plant variability in fiber length distribution. Overall, average plant densities were higher and more uniform in 2013 than 2012. Plant heights and first fruiting nodes were taken prior to harvest with no interaction across years. Location effects were observed with Mid-South trials having significantly taller plants and lower first fruiting node than the High Plains location. These differences were expected and due to environmental conditions. Similarly, plant heights and first fruiting node were consistent within variety as expected. Percent open bolls were taken prior to defoliation to determine relative crop maturity. Varieties were categorized as early, mid, or late maturing relative to each other. Varietal interactions were observed between 2012 and 2013 in both trial regions. Differences in rankings are likely due to different growing conditions at these locations across years. Boll samples were taken and identified from each fruiting position at crop maturity. However, only 2 varieties (Variety A and Variety B) and first fruiting position are presented here due to time constraints. Variety A exhibited lower within-plant length variability in both 2012 and 2013 at all locations compared to Variety B. The highest variability for Variety A occurred in the upper fruiting positions, while Variety B had greater overall variability among nodes. Fiber length distributions were grouped by the 40 standard AFIS length categories (0.0625-2.4375 in.) and combined across nodes. Coefficients of variance (CV's) were calculated on arcsine transformed data for 0.0625-1.8125 in. range and used to determine overall fiber variability. Similar to individual node comparison, Variety A had lower CV's than Variety B in all trials. These results indicate that while environmental conditions can influence variability in length distributions, genetic background also significantly affects within-plant variability of fiber length and therefore can potentially be manipulated in a conventional breeding program.