YIELD ADJUSTMENT FOR SMALL PLOT TRIALS ON THE HIGH PLAINS OF TEXAS Valerie M. Morgan Jane K. Dever Carol M. Kelly Texas A&M AgriLife Research Lubbock, TX

<u>Abstract</u>

In small plot, replicated yield studies a perfect stand is rare, either because of poor germination or uneven emergence. The researcher is often faced with making adjustments to small plots to analyze data from field trials. The current standard used by the Texas A&M AgriLife Research Cotton Improvement Program in Lubbock, a plant can compensate for 18 in skip, or 3 ft. or less between plants, (Pope, 1947) has been questioned in regard to validity in modern production systems. Accurate relative yield performance of cotton lines in given environments is critical to decision points in a breeding program as well as to generating objective data comparing finished cultivars. Objective of this research is to evaluate effect of stand skips in small plots on total plot yield, and determine what is the minimum skip length before yield adjustment is required? A multi-year study was conducted in irrigated and dryland environments near Lubbock, TX to help address this problem.

A pre-test was conducted during 2010 at the Texas A&M AgriLife Research and Extension Center in Lubbock using one variety, FM 9180B2F, and 7 treatments, 0, 3 ft., 6 ft., 2- 6 ft., 9 ft., 12 ft. and 24 ft. skips in 4-row, 24 ft. plots where the center two rows were treated. The design was a RCB with 3 replications. Plots were planted with a 4-row cone planter, and skips added by hand at the 5th true leaf stage. If natural stand variation was present, it was incorporated into the treatment. In 2011 and 2012 the test consisted of 2 varieties, FM 9160B2F and DP 104B2RF, with 9 treatments, 0, 3 ft., 2- 3ft, 3- 3ft, 6 ft., 2- 6 ft., 9 ft., and 12 ft., each in an irrigated environment near Lubbock. Plots were 32 ft., split-plot design with 3 replications. The same design was conducted in an irrigated as well as a dryland environment in 2013.

In 2010 only very large skips significantly impacted yield compared to control plots. In 2011 and 2012, variety alone was a significant factor on yield, even on skips as large as 12 feet. In 2013 dryland environment, variety was again the only significant factor; however, the irrigated location produced a treatment difference. The large skip, 2 9ft skips, was significant.

Additional research will be conducted, but data herein show only large skips such as 12ft. and 2-9 ft., are significantly different from the control in total plots of 48-64 ft. and are the only skips impacting relative yield estimates. Large skips, estimated by these treatments more than 12 ft. between plants or more than one skip longer than 9 ft., should be treated as missing plots on the Texas High Plains and not mathematically corrected. Conversely, skips in stand between 3 ft. and 9 ft., plus multiple skips less than 9 ft. do not appear to negatively impact relative yield estimation in small-plot replicated trials on the Texas High Plains.