DIGITAL IMAGING FOR DEFOLIATION MEASUREMENTS A.M. Stewart, K.L. Edmisten, and R. Wells Dept. of Crop Science, NCSU Raleigh, NC

<u>Abstract</u>

Measurements made in defoliation trials are currently made with a visual rating. While this method seems to work well, it is subject to human subjectivity. In this study, we attempted to consistently quantify defoliation without a visual rating by means of digital images. A Kodak DC-50 digital camera was mounted to a camera stand modified for plot use. The camera was set up to shoot an image perpendicular into the center row middle of a four row test plot. The camera lens was approximately 7 feet high. Digital images were taken at 0, 7, and 14 days after treatment on plots defoliated with Finish 1.5 qt/acre+Folex/Def 0.5 pt/acre, Folex/Def 1.5 pt/acre, and an untreated control. Images were analyzed for percent defoliation, percent desiccation, and percent open bolls. Analysis was conducted with Image Tool for Windows 95 and Image Pro Plus software. Visual ratings were also taken. With the Image Tool software, the images were converted to a gray scale. Color separation was set to separate green leaf colors by manually setting a desirable threshold level, and thus producing a mask of the original image with the green leaf colors represented by black pixels and all other colors represented by white pixels. The software then counted the number of black and white pixels in the image, in order to obtain a relative leaf area for the image. With the Image Pro Plus software, an area of the original image that contained desired leaf colors was selected, and these colors were separated from the rest of the image. A black and white mask was then obtained and pixels were counted with the Image Tool software.

After analysis, results showed that color separation for defoliation and percent open bolls was successful. For defoliation, a comparison of methods showed that the digital imaging methods were comparable to the visual ratings. However, differences between treatments were not as evident as with visual ratings, due to greater least significant differences. The inability to separate treatments was probably due to the fact that the plot area analyzed was relatively small compared to visually rating the entire plot. Measurements for percent desiccation did not exhibit the same trends as visual ratings, due to the fact that the foliage at 0 days after treatment contained some desiccated leaf colors, thus giving no point of reference for the subsequent measurements. Future investigations in this area will need to focus on refining the procedure to measure larger areas

Reprinted from the Proceedings of the Beltwide Cotton Conference Volume 2:1362-1363 (1997) National Cotton Council, Memphis TN that will give more accurate measurements and separate differences between treatments.