THE PEE DEE GERMPLASM ENHANCEMENT PROGRAM: WHERE HAVE WE BEEN AND WHERE ARE WE GOING? B.T. Campbell USDA-ARS Florence, SC

<u>Abstract</u>

The USDA-ARS Pee Dee germplasm enhancement program was initiated in 1935. Although initially focused on developing Sea Island cultivars for the southeast US, the program's long-term objective has been to develop high yielding Upland germplasm with Sea Island fiber properties. The foundation of the Pee Dee program was developed using an array of unique breeding methods and diverse germplasm that included Sea Island, Upland, and triple hybrid strains. Since 1935, the Pee Dee program has released greater than 80 cultivars and germplasm lines. Beginning in 2004, a series of experiments were initiated to examine genetic properties of the Pee Dee germplasm collection. These experiments examined a number of genetic properties of the Pee Dee germplasm program including: 1) molecular and phenotypic trait variation, 2) genetic gain, 3) correlated traits, 4) genotype-by-environment interactions, and 5) breeding potential. Compared to similar studies in cotton, molecular variation suggests the Pee Dee germplasm program maintains a moderate level of genetic variation. Over eight cycles of contemporary cotton breeding, the Pee Dee program has increased yield while maintaining high fiber quality. Negative genetic correlations between yield and fiber quality persist in the Pee Dee program. However, efforts over eight breeding cycles to break the negative linkage between yield and quality have lessened the negative relationship. Specific germplasm lines were identified that overcome this negative relationship. Collectively, this knowledge and germplasm can be used to improve the productivity of cotton breeding programs.