PROSPECTS FOR MAXIMIZING THE GENETIC POTENTIAL WITHIN THE PEE DEE GERMPLASM RESOURCES

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Abstract

Over the last fifty years, the Pee Dee Cotton Genetics program has developed a large amount of valuable, genetic resources. These genetic resources consist of over 90 officially released germplasm lines and varieties. These germplasm lines and varieties are known as key sources of enhanced fiber quality genes used by the industry to develop higher quality commercial cultivars. The objectives of this study were to: 1) characterize the yield and quality potential of a representative subset of the Pee Dee germplasm resources and 2) develop strategies to better exploit the Pee Dee germplasm resources in cotton breeding programs. Eighty-two Pee Dee germplasm lines and varieties and six commercial cultivars were evaluated over three years in replicated, multi-location field trials across North Carolina, South Carolina, Georgia, and Mississippi. Results indicate significant variability exists among the Pee Dee germplasm resources for yield and fiber quality traits. Compared to modern commercial cultivars, on average, Pee Dee lines displayed higher seed index, length, strength, uniformity, and elongation, while displaying lower lint percent, lint yield, bolls per square meter, and micronaire. Several Pee Dee lines (PD5256, PD94042, and PD5529) representing favorable yield and fiber quality were identified and represent historic recombination events overcoming the negative relationship between yield and fiber quality. However, a significant relationship was identified between lint percent and lint yield that contributes to lower Pee Dee line yield potential compared to commercial cultivars. Based on these evaluations, we recommend future breeding efforts involving the Pee Dee germplasm focus on improving lint percent, while maintaining or increasing fiber quality potential. Ultimately, this study provides information to the cotton breeding community to enhance the selection of specific Pee Dee lines for specific breeding objectives.