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BREEDING NEW FIBERMAX VARIETIES WITH IMPROVED LINT YIELD AND PREMIUM FIBER FOR THE SOUTHEASTERN USA

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Abstract

There is increased demand for US cotton fiber to be of higher quality for world market competition. Cotton grown in the Southeastern US needs to improve its level of cotton fiber quality to meet and potentially exceed minimum international cotton fiber standards. Bayer Cotton Seed International's southeast cotton breeding and development program's goals include developing improved FiberMax® (FM) cotton varieties having both increased yield and fiber quality for the Southeast (SE) and Mid-Atlantic (MA) regions of the US cotton belt. Variety stability across regions and superior fitness within regions is necessary for variety success. The process of developing a final, significantly better, cotton seed product for a specific region or to fit over several regions requires: 1. germplasm development, 2. introgression of gene technology, and 3. successful transgenic conversion of the superior germplasm to a completed variety. During advancement breeding lines are evaluated using genotype/phenotype x environmental interaction performance data. Preliminary results in the development process are best observed in fiber yield and quality among advanced conventional lines and transgenic lines. Four 2004 breeding and selection trials were presented to demonstrate breeding and transgenic conversion progress for the new gene technology and germplasm advancement targeted for the Southeast. The tests included: 1. BollgardII®-LibertyLink® line comparison trial, 2. BollgardII®-RoundUpFlex® line comparison trial, 3. Early to mid season conventional cotton line comparison trial, and 4. mid to full season advanced conventional line trial. All four tests were analyzed over multiple locations throughout the SE and MA. Results identified several advanced transgenic and conventional lines that were significantly higher in yield and fiber quality across locations when compared to leading competitor and FM varieties. Yield trends among lines were indicated by stability across regions and can be correlated to various agronomic characters described that affected yield stability. Mid to full season lines performed at a more stable rate in yield across all locations than early to mid season types. A few early to mid lines of both transgenic and conventional versions had highly significantly better yields than competing varieties and parental genotypes in the MA region. Data indicated that 50% of the new breeding lines performing in the top 20% yield group of all four trials were stable across locations for yield. New advanced FM lines now in transgenic conversion indicated superior fitness to SE and MA regions when compared to all leading commercial/conventional varieties and pedigree types. More variation in fiber quality was found among the conventional line testing, mostly due to pedigree differences across lines within the conventional tests. Fiber quality was not reduced among transgenic lines when compared to conventional parents. Location x fiber-trait-interactions were not significant for the FM lines indicating excellent fiber stability within the germplasm for conventional and transgenic lines. Although there was phenotypic segregation for yield and fiber quality, there was no significant correlation within both FM conventional and transgenic lines for lint yield and fiber quality performance levels. The two transgenic trials indicated upside variation occurred among sister lines and that several lines were significantly better in both yield and fiber quality when compared to mid parent values. The various lines evaluated have excellent potential for commercial variety development as well as future recombination work in the BCSI-FiberMax breeding program.