SEED SIZE CONSIDERATIONS IN COTTON VARIETY DEVELOPMENT

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Abstract

Cotton seed dimension, weight, density, and composition are naturally influenced by growing conditions, year, and location. Seed size, measured by seed index as weight in grams of 100 fuzzy seed, is a highly heritable trait. Seed index averaged 9.3, and ranged from 7.8 to 11.6 in a replicated, small plot variety trial with 48 entries conducted under drip irrigation at Lamesa, Texas in 2017. Data sets with large and diverse complement of commercial varieties indicate a wide range of seed index and may suggest limited trend to smaller seed. Relative seed index from the same variety test location-year combined with variety market share data from that year indicate seed size of varieties grown on majority of acres in the United States has shifted to smaller seed from 2008 to 2018. Seed size alone is not a predominant factor in producer variety selection decisions. Variety brand market share shifts over the last 10 years indicate transgenic insect resistance and herbicide tolerance traits are a priority factor followed by yield potential, disease or nematode resistance and fiber quality. Breeders create large segregating populations with priority characteristics to select and stabilize new varieties with the optimum combination of biotechnology traits, yield potential, disease resistance, and fiber quality for a target seed market. Large numbers of genotypes must be evaluated and narrowed to few candidate varieties. First selection priority is lines homozygous for desired transgenic traits, leaving a small percentage of genotypes from which to select high-yielding, high quality varieties. Lint percent is one easily measured characteristic to reduce the number of genotypes prior to multiple location performance testing. It is used as in indication of lint yield potential. In the 48-entry drip irrigated commercial variety test at Lamesa in 2017, higher lint percent is significantly correlated with lower seed index (-0.3580). However, lint percent is not significantly correlated with yield (0.2722). Literature review of cotton yield components indicates it is possible to breed high performance cotton varieties desirable to growers without sacrificing seed size. The most impactful yield component in cotton is number of seeds per acre (averaging 84% over studies evaluated), independent of the size of those seed. Over the last several years, breeders have been successful deciphering the negative association reported between yield and fiber quality, maintaining U. S.-grown cotton competitiveness in the global fiber market. Seed size, and all its related seed properties, should also be a breeding objective in order to maintain competitive value of the overall cotton crop for the cotton grower and allied industries throughout the cotton market.