New Mutant Cotton Seed Increases Production and Fiber Quality

Mutant Seed Improves Gossypium Hirsutum Upland Cotton Production

This Upland Cotton naked-tufted mutant seed significantly enhances cotton production of Gossypium hirsutum L., the most widely planted species of cotton in the U.S.

The naked-tufted cotton seed mutant line of Gossypium hirsutum L., produced by chemical mutagenesis, improves crop quality and lowers cotton processing costs by reducing the formation of linters (fuzz) on the surface of the cotton seed.

The lines carrying this naked seed mutation have reduced seed coat neps (waste), reduced short fiber content (which improves cotton cloth quality), improved yarn quality, and increased cotton seed oil content.

This trait will also reduce the energy and time required for cotton ginning and oil extraction, and it will limit the need to acid-delint cotton seed prior to planting.

Upland Cotton Line through Chemical Mutagenesis

The objective of our research was to develop ‘naked-tufted’ seed mutants and to incorporate this genetic trait into cotton to enhance crop quality and reduce processing costs. During the testing process, we identified plants that had partially naked seed coats. The trait was stabilized through individual plant selections, and the homozygous naked-tufted mutant lines were evaluated for lint yield, lint percent, fibers/seed, fiber quality, seed oil content, ginning efficiency and yarn spinning performance.

Fiber analyses have been conducted at the Fiber and Biopolymer Research Institute, and Texas Tech University has built an extensive database of field test data.

The naked-tufted seed mutants had lower lint yield, lower fibers per seed, and lower lint per seed when compared with their original fuzzy parents. The lint turnout from the mutants was similar to the fuzzy parents and the commercial cultivars. The naked-tufted seed mutants had higher seed oil percent, 6–17 percent lower short fiber contents, significantly reduced seed coat neps (37–42 percent), higher elongation and yarn tenacity than their fuzzy counterparts and, therefore, required less energy to gin.
Cotton Fiber Quality and Benefits of the Upland Cotton Naked Tufted Mutant Seed

We believe the “naked and tufted” seed mutant may be critical to the development of ELS (Extra Long Staple) stripper cotton varieties in Texas. It also appears this mutation could significantly reduce both the time and the energy required for ginning, oil extraction, and delinting of cottonseed.

The superior fiber quality and improved energy efficiency obtained with the naked and tufted mutant will drive its rapid incorporation into new varieties.

This innovation is beneficial for cotton breeders and growers because it:

- Reduces the cost of production
- Increases cotton seed oil content
- Improves fiber quality of cotton grown
- Reduces the energy and time required for cotton ginning and oil extraction
- Occurs as incorporated into several, modern cultivars of cotton: cultivars that have higher yield potential and better fiber quality cotton for improved cotton cloth and yarn quality
- Reduces the need to acid delint cotton seed prior to planting

Reducing the need for acid delinting in upland cotton has widespread commercial potential in cotton crop management. Acid delinting will become outdated as the use of the naked-tufted mutant will increase, causing more affordable and effective crop production techniques to be widely available.