

**Research Article****Identification of Isogenic ‘Naked-Tufted’ Seed Coat Mutants in Cotton**

S. Manickam, A.H. Prakash and N. Gopalakrishnan

**Abstract:**

A stable isogenic line with ‘naked-tufted’ seed has been identified in the restorer line AKH 98-81 through mass selection process. The original genotype was fuzzy with the dense white fuzz throughout the seed surface. The isogenic line is naked and has a small tuft of hair only at the micropylar region. Such genotypes with naked seeds will help in avoiding acid delinting of seeds, which is done at the time of sowing, for easier separation of seeds. This character will also help in reducing seed coat neps and reducing short fibre content.

**Keywords:**

Cotton, isogenic line, naked-tufted seed

**Introduction**

Cotton, the white gold, represents nearly half of the world’s natural fibre consumption. Only in India, all the four cultivated species of cotton viz., *Gossypium hirsutum*, *G. barbadense*, *G. arboreum* and *G. herbaceum* are grown in commercial scale in different agro-climatic zones till recent past. However, due to higher adoption of Bt cotton hybrids by Indian farmers, especially intra-hirsutum hybrids, in as much as 85 % of the total cultivated area of cotton, the area under other species have dwindled during the recent years.

The commonly cultivated American cotton, *G. hirsutum* is characterized by dense fuzzy seed coat. Such fuzzy seed cause problem during ginning and cause damage to fibre. Further, at the time of sowing, acid delinting is required to remove fuzz for easy handling of seeds. However, naked cotton seeds can be ginned easily with less damage or tearing of the lint during ginning (Manickam *et al.*, 2009). The less fuzz on the seed coat, the more efficient the ginning process because the fuzz creates resistance to the roller gin during ginning.

Also, naked seeds generally require lower force to remove the fibres than fuzzy seeds. Greater resistance to ginning can lead not only to torn fibres, but also to broken seed coat fragments during removal of the lint. The seed coat fragmentation is also minimal in naked seeds (Triplett 1990).

Relatively low levels of genetic variability are currently available in cotton for various morphological characters and this is a greater concern for DUS testing also. Naked seed serve as an useful marker character for variety protection. Keeping in view, the importance of naked seeded cotton, an attempt was made to isolate ‘naked-tufted’ seed from introgressed population.

**Material and Methods**

The investigation under report was undertaken at Central Institute for Cotton Research, Regional Station, Coimbatore over a period of the past five years. The base material for selection was the introgressed restorer line AKH 98-81, developed at Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. When the introgressed restorer line was evaluated for various morphological characters and stability for restoration of CMS lines, some plants with ‘naked-tufted’ seed was noticed. Such plants were selected, selfed and bulked following mass selection procedure.

## Results and Discussion

Fuzziness in cotton is a complex trait and several genes are known to control the presence or absence and quantity of fuzz (Endrizzi *et al.* 1984; Kohel 1973). The best characterized of these are the naked seed loci, N1N1 and n2n2. These mutants lack most of the lint fibers. The fuzz (short) fibers develop but eventually fall off the seeds to produce black or 'naked seeds'. The recessive gene n2n2 is characteristic of many of the commercial cotton varieties of the species *Gossypium barbadense*. Generally, there is substantial lint, i.e., lint percentage above 30%, in these strains. The seeds are not totally naked, but retain fuzz at least at the tip. Phenotypically, N1N1 is slightly more extreme, much less common and consistent than n2n2, which is more subject to changes in genotypes and environmental conditions. Historically, genes that induce linters have been strongly associated with both low lint yield and low lint percent.

A stable isogenic line with 'naked-tufted' seed has been identified in the restorer line AKH 98-81 through mass selection process. The original genotype was fuzzy with the dense white fuzz throughout the seed surface. The isogenic line is naked and has a small tuft of hair only at the micropylar region (Plate 1). It was found to have similar characteristics for all the other characters as that of AKH 98-81. These lines appear to be phenotypically similar to the "naked-tufted" mutant initially described by Endrizzi and Ray (1991) and Bechere *et al.* (2009).

Such genotypes with naked seeds will help in avoiding acid delinting of seeds, which is done at the time of sowing, for easier separation of seeds. This character will also help in reducing seed coat neps and for reducing short fibre content.

Plate 1. 'Naked-Tufted' isogenic line (left) and original restorer line AKH 98-81 with fuzzy seed (right)

## References:

- Bechere, E., Auld, D. L. and Hequet, E. 2009. Development of 'naked-tufted' seed coat mutants for potential use in cotton production. *Euphytica*, **167**:333–339.
- Endrizzi, J.E., Ray, D.T. 1991. Monosomic and monotelodisomic analysis of 34 mutant loci in cotton. *J. Hered.*, **82**:53–57.
- Endrizzi, J. E., Turcotte, E.C., Kohel, R.J. 1984. Qualitative genetics, cytology and cytogenetics. In: Kohel, R.J. and Lewis, D.F. (eds.) *Agronomy: Cotton*. American Society of Agronomy Inc., Madison WI, pp 59–80.
- Kohel, R.J. 1973. Genetic nomenclature in cotton. *J. Hered.*, **64**:291–295.
- Manickam, S., Prakash, A. H. and Gopalakrishnan, N. 2009. Isolation of 'naked-tufted' seed coat mutants for potential use in cotton production. *CICR Newsletter*, **25**: 4.
- Triplett, A.B. 1990. Evaluation of fiber and yarn from three cotton fiber mutant lines. *Text. Res. J.*, **60**:143–148.

**Plate 1. ‘Naked-Tufted’ isogenic line (left) and original restorer line AKH 98-81 with fuzzy seed (right)**

