

# GENETIC AMELIORATION OF *GOSSYPIMUM ARBOREUM* THROUGH INTROGRESSION OF GENES FROM *G. HIRSUTUM*

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## Abstract

*G. arboreum* cultivated in India is known for short staple, weak and coarse fibre. However, it has been considered as resistant to sucking pests and abiotic stress compared to *G. hirsutum*. The paucity of genetic resources to improve fibre properties in *G. arboreum* has prompted to resort for introgression of genes from *G. hirsutum*. The *G. arboreum* ( $2n=2x=26$  AA) was colchiploidised ( $2n=4x=52$  AAAA) and crossed with *G. hirsutum* ( $2n=4x=56$  AADD). The resultant  $F_1$  was backcrossed to *G. arboreum* ( $2n=4x=52$  AAAA). The  $BC_1F_7$  lines resulted from such cross were evaluated in three cotton growing situation in India to assess the genetic gain over the diploid parent and controls. The introgression has resulted into improved boll features of *G. arboreum* with boll weight more than 3.0 g and more than 35 per cent four loculed bolls as compared to 2.4 and 16.7 per cent respectively of its *G. arboreum* parent PA 140. There was significant genetic gain for seed index with genotypes having as high as 10.5 g. On the contrary, PA 140 and local *G. arboreum* checks possessed only 6.2 g of seed index. Transgressive  $BC_1F_7$  intraspecific derivatives were noticed for Ginning out turn with more than 40% GOT where as, GOT around 35 per cent was evident in PA 140 and other local *G. arboreum* checks. There were significant genetic gains in fibre properties of introgressed *G. arboreum* derivatives with fibre length as high as 28.4 mm. Fibre micronaire as low as (4.2), strength greater than 25 g/tex as 3.2 mm gauge (ICC mode) and elongation up to 7.0 per cent. The improvement of fibre properties of *G. arboreum* were quite significant because the *G. arboreum* parent and control possessed fibre length, around 22.0 mm, micronaire around 5.5, tenacity around 18.0 g/tex at 3.2 mm gauge and elongation between 5 to 6 percentage. The genetic diversity analysis based on 14 economic characters exhibited formation of one big cluster of introgressed derivatives, which was separate from either of the two parents and checks. However, few introgressed derivatives found more near to *G. hirsutum* parent than *G. arboreum*. The results of the experiments confirmed the introgression of genes for different economic characters like boll features and fibre properties. Further, the data indicated the possibility of greater 'D' genome involvement in long and fine fibre properties of *G. hirsutum* than 'A' genome. The results are first of its kind in diploid cotton breeding.