

Opportunities for gene editing in cotton for economic development

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Cotton crop is an important fiber and cash crop in tropical and sub-tropical regions of the world and it provides raw material to several industries. However, it is subjected to several biological and non-biological stresses due to adverse effects of climate change. These natural calamities not only effect the yield of seed cotton but also quality of fibre. Although traditional methods of breeding have been exploited for development of accessions of upland cotton but it takes more time to fix the desirable traits in one genotype due to complex nature and diverse genetic background. Besides, genetic background is going to narrow due to use of same resources in breeding that need to be exploited for identification of potential genes of interest controlling resistance to biotic and abiotic stress, and other necessary traits. These complications warn the plant researcher to explore non-traditional assays. So, more genetic advances are required in traditional plant breeding in order to accelerate the breeding process. Success stories are available in literature in several field crops for rapid increases in crop improvement through the use of state-of-the-art gene editing technologies. A genetic study has revealed a unique natural defensive mechanism in prokaryotic cells, which was effectively exploited as gene editing tool in model plants using a system termed clustered regularly interspaced short palindromic repeats-Cas9 (CRISPR-Cas9). Besides, this and other available systems namely epigenetic factors as well as insect/pest gene drive technology, RNA targeting and more recently, single base and prime editing, are used for induction of genetic modification for crop improvement. However, gene editing in agriculture is most effective when it is used to achieve transmissible changes through targeted mutations in genes associated with yield or other quality traits. Gene editing technologies could be used efficiently for numerous traits like induction of genetic defense umbrella, nectorless, phosphorus use efficient, cultivation of cotton and opening of bolls in humid environment, determinate growth pattern, improvement in oil profile, modifications in boll shape, fiber quality parameters and many more for efficient cotton farming.