

Genome Editing in Sorghum: Advancements and Future Possibilities: A Review

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Abstract : The advancement of target-specific genome editing tools, including clustered regularly interspaced short palindromic repeats (CRISPR)/CRISPR-associated protein9 (Cas9), mega-nucleases, base editing (BE), prime editing (PE), transcription activator-like endonucleases (TALENs), and zinc-finger nucleases (ZFNs), have paved the way for a modern era of gene editing. CRISPR/Cas9, as a versatile, simple, cost-effective and robust system for genome editing, has dominated the genome manipulation field over the last few years. The application of CRISPR/Cas9 in sorghum improvement is particularly vital in the context of ecological, environmental and agricultural challenges, as well as global climate change. In this context, gene editing using CRISPR/Cas9 can improve nutritional value, yield, resistance to pests and disease and tolerance to different abiotic stress. Moreover, CRISPR/Cas9 can potentially perform complex editing to reshape already available elite varieties and new genetic variations. However, existing research is targeted at improving even further the effectiveness of the CRISPR/Cas9 genome editing techniques to fruitfully edit endogenous sorghum genes. These findings suggest that genome editing is a feasible and successful venture in sorghum. Newer improvements and developments of CRISPR/Cas9 techniques have further qualified researchers to modify extra genes in sorghum with improved efficiency. The fruitful application and development of CRISPR techniques for genome editing in sorghum will not only help in gene discovery, creating new, improved traits in sorghum regulating gene expression sorghum functional genomics, but also in making site-specific integration events.

Keywords : CRISPR/Cas9, genome editing, quality, sorghum, stress, yield

Conference Title : ICABR 2024 : International Conference on Agricultural Biotechnology Research

Conference Location : Melbourne, Australia

Conference Dates : February 01-02, 2024