

Application of CRISPR/Cas-based Gene-Editing for Developing Better Banana

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Abstract

Banana (*Musa* spp.) is one of the major staple food crops grown in over 136 countries in the subtropics and tropics, with around 153 million tons annual global production, feeding about 400 million people. It is valuable food security and cash crop as it can be cultivated in diverse environments and produces fruits in favorable weather conditions throughout the year. Its production is severely constrained by many pathogens and pests, particularly where a number of them are co-existing. There is a need to develop banana varieties with multiple and durable resistance to combat biotic stresses. The advances in gene-editing have the potential to develop disease-resistant varieties of banana, which will contribute to food security, particularly in Africa. CRISPR/Cas9 based genome editing has emerged as the most powerful tool for crop improvement due to its capability of creating precise alterations in plant genome and trait stacking through multiplexing. The availability of a well-annotated, whole-genome sequence of banana coupled with established genetic transformation regeneration protocols makes the banana a strong candidate for gene editing. CRISPR/Cas9-based gene editing has been recently established for the banana, paving the way for functional genomics allowing identification of genes associated with disease-resistant traits, which could be used to improve banana. However, the commercialization of gene-edited products has some challenges due to the regulation of gene-edited products in various countries. The use of gene editing in crop improvement programs of banana will be boosted by developing science-based guidelines, which will treat the gene-edited varieties similar to those generated through conventional breeding, particularly where no foreign gene is inserted. A synopsis of recent advancements in the application of gene-editing of banana will be presented during this conference. It will also briefly describe the current status of regulatory requirements for the release of gene-edited crop varieties among different countries.

Key words: Banana, gene-editing, disease resistance, regulatory guidelines