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Nota di contenuto	Part I: Mutation Induction -- Chapter 1. Physical mutagenesis and population development in Musa spp -- Chapter 2. Gamma irradiation of embryogenic cell suspension cultures from Cavendish banana (Musa spp. AAA group) and in vitro selection for resistance to Fusarium wilt -- Part II: Fusarium TR4 Screening Technologies -- Chapter 3. Pre-screening of banana genotypes for Fusarium wilt resistance by using an in vitro bioassay -- Chapter 4. In vitro based mass-screening techniques for early selection of banana mutants resistant to Fusarium wilt -- Chapter 5. An optimised greenhouse protocol for screening banana plants for Fusarium wilt resistance -- Chapter 6. Lab-based screening using hydroponic system for the rapid detection of Fusarium wilt TR4 tolerance/resistance of banana -- Chapter 7. Field screening of gamma-irradiated Cavendish bananas -- Part III: Mutation Detection using Genomics Tools -- Chapter 8. Mutation detection using Low Coverage Copy Number Variation -- Chapter 9. A protocol for detection of large chromosome variations in banana using Next Generation Sequencing -- Part IV: Low-cost in vitro Methods for Banana Micropropagation -- Chapter 10. Low-cost in vitro methods for generation advancement in banana mutation breeding -- Chapter 11. A

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protocol for mass propagation of plants using a low-cost bioreactor.

## Sommario/riassunto

Bananas are a staple food for over 500 million people and are also an important cash crop. Fusarium wilt, caused by the fungus *Fusarium oxysporum* f.sp. *cubense*, is one of the most destructive diseases of banana globally. Since the 1990s, an aggressive variant of this fungus, called Tropical Race 4 (TR4), severely affected banana plantations in Southeast Asia from where it spread to other continents, including Latin America, where the global banana export market is primarily centred. TR4 is a soil borne pathogen making the disease difficult to contain. The Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture implemented a Coordinated Research Project (CRP) ‘Efficient Screening Techniques to Identify Mutants with Disease Resistance for Coffee and Banana’ (2015-2020). This CRP brought together experts from Asia, Europe and Africa in addition to experts of the Joint FAO/IAEA Centre to develop resistance against TR4 through mutation-assisted breeding. Induced mutagenesis is particularly attractive in case of banana since most cultivated bananas are seedless, thus hampering conventional cross breeding. This Open Access book is a compilation of the protocols developed under the CRP specifically for TR4. The first part covers methods for mutation induction, including the integrated use of innovative single-cell culture with mutagenesis techniques. The book also describes up-to-date phenotypic screening methods for TR4 resistance in banana under field-, greenhouse- and laboratory conditions. Finally, molecular and bioinformatics tools for genome-wide mutation discovery following Next Generation Sequencing are also described. Given the imminent threat of Fusarium Wilt TR4 on banana production globally, it is our hope and intention that the book will serve as a timely reference and guide for banana breeders and pathologists worldwide who are committed to the genetic improvement of banana for Fusarium wilt resistance.

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