



horticulturae



Special Issue Reprint

Genetics and Molecular Breeding of Fruit Tree Species

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The global demand for horticultural crops with improved agricultural traits—such as enhanced fruit quality, higher yields, and increased resistance to biotic and abiotic stresses—is steadily rising. In this context, gaining a comprehensive understanding of the genetic basis underlying key agronomic traits is essential. However, genetic research and traditional breeding in fruit trees face significant challenges, including long juvenile phases, large plant sizes, and high levels of heterozygosity. Recent advancements in biotechnology and the emergence of genomics have opened up new avenues to overcome these limitations in conventional fruit tree breeding. The development of high-throughput genetic platforms, the availability of whole genome sequences, and the application of multi-omics approaches, along with genome-wide association studies (GWAS), have substantially advanced our understanding of the genetic architecture of traits of agronomic importance. In recent decades, biotechnological tools—such as molecular-based characterization, marker-assisted selection, and innovative breeding techniques including cisgenesis and genome editing—associated with the availability of efficient plant regeneration protocols are accelerating both the functional characterization of traits and the overall breeding process in fruit trees. This Reprint is part of the Special Issue "Genetics and Molecular Breeding of Fruit Tree Species", which aims to showcase the latest research and developments in the genetic and molecular breeding of fruit trees, focusing on the selection and creation of new genotypes with enhanced traits.



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