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Special Issue Reprint

Research on Pomegranate Germplasm, Breeding, Genetics and Multiomics

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This Special Issue of *Horticulturae* presents ten studies on pomegranate, covering genetics, physiology, disease resistance, postharvest treatment, and cultivar phenotyping. These studies provide insights to advance breeding, quality enhancement, and cultivation practices, addressing the rising interest in this fruit. Genetics is a key focus, with research being conducted on the anthocyanidin synthase (ANS) gene family for pigmentation, R2R3-MYB transcription factors affecting flavonoid biosynthesis, and expansin genes influencing fruit texture. Together, these findings support breeding for improved nutritional and esthetic traits. Additionally, studies on the UDP-glycosyltransferase (UGT) and laccase gene families highlight their roles in bioactive compound production and structural resilience, respectively, aiding efforts to enhance pomegranate's health benefits and durability. Postharvest research includes the use of 1-methylcyclopropene (1-MCP) to prolong shelf life and resistance to anthracnose rot, promoting disease-resistant cultivars. Studies on reproductive development, such as miRNA involvement in pistil growth and phenotypic diversity across cultivars, contribute to selective breeding based on morphological and chemical traits. A review summarizes progress in pomegranate genetics and breeding, discussing challenges and future directions. Collectively, these studies enhance our understanding of pomegranate, guiding breeding, cultivation, and postharvest strategies to support industry needs.



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