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Special Issue Reprint

Exploring Abiotic Stress in Plants

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This Reprint presents a focused collection of recent advances in the understanding of plant responses to abiotic stress and their implications for sustainable agriculture and ecosystem resilience. The contributions explore how plants perceive and integrate environmental signals, such as drought, heat, salinity, heavy metals, nutrient imbalance, and chemical exposure, and how these signals trigger coordinated physiological, biochemical, and molecular responses. Across diverse plant systems, the studies highlight the central roles of redox regulation, transcriptional control, metabolic plasticity, and signaling networks in shaping adaptive responses. Particular attention is given to emerging insights from metabolomics, phosphoproteomics, and integrative systems biology approaches that help explain how stress tolerance is established and maintained under complex environmental conditions. This Reprint also emphasizes translational strategies, including genetic improvement, optimized nutrient management, exogenous protectants, and innovative technological interventions that support crop performance under stress. By linking mechanistic discoveries with applied perspectives, this Reprint provides a coherent overview of current progress in plant abiotic stress research and identifies promising directions for developing resilient crops capable of maintaining productivity under ongoing environmental change.

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