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Studies on Biotic and Abiotic Stress Responses of Horticultural Plants

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Plants face constant challenges from biotic and abiotic stresses, which trigger complex defense mechanisms. This Reprint focuses on research related to biotic and abiotic stresses. Under biotic stress, plants employ pattern-triggered immunity and effector-triggered immunity to recognize and counteract invaders. Key responses include the production of reactive oxygen species, phytohormone signaling, and the synthesis of antimicrobial compounds. Under abiotic stress, the following are involved: ROS mitigation by antioxidants; protein and membrane stabilization by heat shock proteins (HSPs) and cold-responsive genes (COR), and osmoprotectants; and the upregulation of aquaporins. Hormonal pathways, particularly abscisic acid (ABA), play central roles in coordinating stress responses and regulating stomatal closure and gene expression. Understanding these mechanisms is critical for developing stress-resistant crops through genetic engineering or breeding, ensuring food security under changing environmental pressures.

