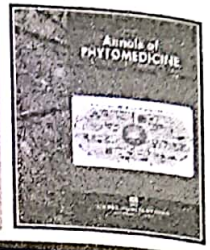
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A complete systematic review on biostimulant in fruit crops and their industrial applications

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Abstract

Fruit crops are vital to global agriculture, offering significant nutritional, health, and economic benefits. However, achieving high quality produce and scaling productivity are hindered by biotic and abiotic stresses, excessive reliance on agrochemicals, and shifting environmental conditions. Plant biostimulants have consequently gained considerable attention as a sustainable strategy to enhance fruit crop growth, yield, quality, and stress resilience. This review provides a comprehensive analysis of the functions of both microbial and non-microbial biostimulants in fruit production. It further explores their classification and modes of action, detailing how they influence on nutrient use efficiency, root architecture, hormonal balance, metabolic processes, and defense mechanisms. Finally, the review emphasizes the critical need to optimize application rates and timing, and to develop targeted, crop-specific strategies for effective implementation.

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