

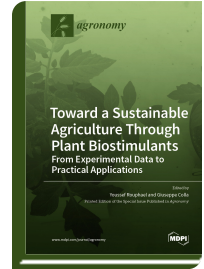


*Special Issue Reprint*

## **Toward a Sustainable Agriculture Through Plant Biostimulants**

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Over the past decade, interest in plant biostimulants has been on the rise, compelled by the growing interest of researchers, extension specialists, private industries, and farmers in integrating these products in the array of environmentally friendly tools to secure improved crop performance, nutrient efficiency, product quality, and yield stability. Plant biostimulants include diverse organic and inorganic substances, natural compounds, and/or beneficial microorganisms such as humic acids, protein hydrolysates, seaweed and plant extracts, silicon, endophytic fungi like mycorrhizal fungi, and plant growth-promoting rhizobacteria belonging to the genera *Azospirillum*, *Azotobacter*, and *Rhizobium*. Other substances (e.g., chitosan and other biopolymers and inorganic compounds) can have biostimulant properties, but their classification within the group of biostimulants is still under consideration. Plant biostimulants are usually applied to high-value crops, mainly greenhouse crops, fruit trees and vines, open-field crops, flowers, and ornamentals to sustainably increase yield and product quality. The global biostimulant market is currently estimated at about \$2.0 billion and is expected to reach \$3.0 billion by 2021 at an annual growth rate of 13%. A growing interest in plant biostimulants from industries and scientists was demonstrated by the high number of published peer-reviewed articles, conferences, workshops, and symposia in the past ten years. This book compiles several original research articles, technology reports, methods, opinions, perspectives, and invited reviews and mini reviews dissecting the biostimulatory action of these natural compounds and substances and beneficial microorganisms on crops grown under optimal and suboptimal growing conditions (e.g., salinity, drought, nutrient deficiency and toxicity, heavy metals, waterlogging, and adverse soil pH conditions). Also included are chapters dealing with the effect as well as the molecular and physiological mechanisms of plant biostimulants on nutrient efficiency, product quality, and modulation of the microbial population both quantitatively and qualitatively. In addition, identification and



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