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Nota di contenuto	Section - A - Plant-mediated synthesis and applications of nanomaterials -- 1. Nanomaterials and plant potential: An overview -- 2. Basic chemistry and biomedical significance of nanomaterials -- 3. Plant-mediated fabrication of gold nanoparticles and their applications -- 4. Green synthesis of gold nanoparticles by using natural gums -- 5. Plant-based fabrication of silver nanoparticles and their application -- 6. Plant protein-based nanoparticles and their biomedical applications -- 7. Natural product-based fabrication of zinc-oxide nanoparticles and their applications -- 8. Plant-mediated synthesis of copper oxide

nanoparticles and their biological applications -- 9. Green synthesis of iron-oxide nanoparticles: Cutting edge technology and multifaceted applications -- 10. Phytomediated synthesis of cerium-oxide nanoparticles and their applications -- 11. Plant-assisted fabrication of SnO<sub>2</sub> and SnO<sub>2</sub>-based nanostructures for various applications -- 12. Bio-nanoparticles in the treatment of glycation-induced secondary complications of diabetes -- 13. *Andrographis paniculata*: From traditional to nano drug for cancer therapy -- Section B - Interaction of plants and nanomaterials -- 14. Impact of nanomaterials on plant physiology and functions -- 15. Impacts of metal and metal-oxide nanoparticles on plant growth and productivity -- 16. Ecotoxicological effects of nanomaterials on growth, metabolism and toxicity of non-vascular plants -- 17. Oxidative-stress biomarkers and antioxidant defence in plants exposed to metallic nanoparticles -- 18. Role of nanomaterials in the mitigation of abiotic stress in plants -- 19. Nanofertilization to enhance nutrient use efficiency and productivity of crop plants -- 20. Weed control through herbicide-loaded nanoparticles -- 21. Impact of fabricated nanoparticles on the rhizospheric microorganisms and soil environment -- 22. Effect of carbon-based nanomaterials on rhizosphere and plant functioning -- 23. Progress in research on nanomaterial-plant interaction -- Index.

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## Sommario/riassunto

This book discusses the latest developments in plant-mediated fabrication of metal and metal-oxide nanoparticles, and their characterization by using a variety of modern techniques. It explores in detail the application of nanoparticles in drug delivery, cancer treatment, catalysis, and as antimicrobial agent, antioxidant and the promoter of plant production and protection. Application of these nanoparticles in plant systems has started only recently and information is still scanty about their possible effects on plant growth and development. Accumulation and translocation of nanoparticles in plants, and the consequent growth response and stress modulation are not well understood. Plants exposed to these particles exhibit both positive and negative effects, depending on the concentration, size, and shape of the nanoparticles. The impact on plant growth and yield is often positive at lower concentrations and negative at higher ones. Exposure to some nanoparticles may improve the free-radical scavenging potential and antioxidant enzymatic activities in plants and alter the micro-RNAs expression that regulate the different morphological, physiological and metabolic processes in plant system, leading to improved plant growth and yields. The nanoparticles also carry out genetic reforms by efficient transfer of DNA or complete plastid genome into the respective plant genome due to their miniscule size and improved site-specific penetration. Moreover, controlled application of nanomaterials in the form of nanofertilizer offers a more synchronized nutrient fluidity with the uptake by the plant exposed, ensuring an increased nutrient availability. This book addresses these issues and many more. It covers fabrication of different/specific nanomaterials and their wide-range application in agriculture sector, encompassing the controlled release of nutrients, nutrient-use efficiency, genetic exchange, production of secondary metabolites, defence mechanisms, and the growth and productivity of plants exposed to different manufactured nanomaterials. The role of nanofertilizers and nano-biosensors for improving plant production and protection and the possible toxicities caused by certain nanomaterials, the aspects that are little explored by now, have also been generously elucidated.

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