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Nota di contenuto	Preface -- Global Importance and Cycling of Nanoparticles -- Environmental Emissions of Nanoparticles -- Bio- and Geo-Transformation and Bioavailability of Nanoparticles -- Interaction of Nanoparticles to Soil Pollutants -- Impact of Nanoparticles to Soil Systems -- Too Much or Too Little? A Review of the Connundrum of Nanoparticles -- Application and Use of Nanoelements in Combating Plant Nutrition -- Role of Nanoparticles in Remediation of Contaminated Soils -- Biochemical, Molecular and Ultrastructural Aspects in Phytoremediation of Nanoparticles Subjected to Unfertilized Soil -- Nanomaterials: A New Approach in Biofortification -- Applications and Implications of Nano-Fertilizers in Food Industries -- Nanobiosensors Based on Agri-Biomass -- Nanoparticles Uptake and Translocation in Plants -- Risks and Concerns of Use of Nanoparticles in Agriculture -- Mechanism of Nanoparticles Mediated Alleviating

Biotic and Abiotic Stresses in Agricultural Crops -- Role of Nanoparticles in Environment, Human, and Animals Under Contaminated Soil -- Cytotoxic and Genotoxic Aspects of nanoparticles Interactions with Plant Systems -- Nanoparticles and its Effects on Growth, Yield, and Crop Quality Cultivated Under Polluted Soil -- Impact of nanoparticles of Modulations of Genes and Secondary Metabolites in Plants -- Interaction of Nanoparticles with Plant Growth Promoting Rhizobacteria in Polluted Soil -- Interaction of Nanomaterials with Plant Metabolism -- Bibliography -- Index.

Sommario/riassunto

NNanotechnology has shown great potential in all spheres of life. With the increasing pressure to meet the food demands of rapidly increasing population, thus, novel innovation and research are required in agriculture. The principles of nanotechnology can be implemented to meet the challenges faced by agricultural demands. Major challenges include the loss of nutrients in the soil and nutrient-deficient plants, which result in a lower crop yield and quality. Subsequently, consumption of such crops leads to malnourishment in humans, especially in underprivileged and rural populations. One convenient approach to tackle nutrient deficiency in plants is via the use of fertilizers; however, this method suffers from lower uptake efficiency in plants. Another approach to combat nutrient deficiency in humans is via the use of supplements and diet modifications; however, these approaches are less affordably viable in economically challenged communities and in rural areas. Therefore, the use of nano-fertilizers to combat this problem holds the greatest potential. Additionally, nanotechnology can be used to meet other challenges in agriculture including enhancing crop yield, protection from insect pests and animals, and by use of nano-pesticides and nano-biosensors to carry out the remediation of polluted soils. The future use of nanomaterials in soil ecosystems will be influenced by their capability to interact with soil constituents and the route of nanoparticles into the environment includes both natural and anthropogenic sources. The last decade has provided increasing research on the impact and use of nanoparticles in plants, animals, microbes, and soils, and yet these studies often lacked data involving the impact of nanoparticles on biotic and abiotic stress factors. This book provides significant recent research on the use of nano-fertilizers, which can have a major impact on components of an ecosystem. This work should provide a basis to further study these potential key areas in order to achieve sustainable and safe application of nanoparticles in agriculture.