

Preface

Nanotechnology has revolutionized many fields, including agriculture, by providing unique tools for addressing challenges such as climate change, environmental degradation, and food security. Engineered nanoparticles, in particular, have emerged as promising candidates for improving crop production and mitigating the negative impacts of abiotic and biotic stresses on plant growth and yield.

The book *Engineered Nanoparticles in Agriculture: From Laboratory to Field* aims to provide a comprehensive overview of the current state of the art in the use of nanoparticles in agriculture, with a focus on their practical applications from laboratory to field. The book covers a range of topics, including the synthesis and characterization of nanoparticles, their mechanisms of action in plant growth and stress responses, and their potential applications in crop production and soil management.

The book is divided into 10 chapters. Chapter 1 covers the synthesis and characterization of nanoparticles, including various methods for their synthesis, properties, and characterization techniques. Chapters 2 to 6 cover the practical applications of nanoparticles in agriculture, including their use in plant protection, seed priming, soil amendments, and nanofertilizers. The chapters in this section also discuss the potential risks associated with the use of nanoparticles in agriculture and the need for responsible nanotechnology. Chapters 7 to 10 focus on the mechanisms of action of nanoparticles in plant growth and horticultural plant production and application of new engineered nanoparticles to improve the postharvest quality of horticultural crops. The chapters in this section cover topics such as nanoparticle uptake and translocation, their effects on plant physiology, and their potential to mitigate the negative impacts of abiotic and biotic stresses.

This book is intended for researchers, students, and professionals in the fields of agriculture, nanotechnology, and environmental science, as well as policymakers and stakeholders interested in the future of sustainable agriculture. We hope that this book will serve as a valuable resource for those interested in exploring the potential of engineered nanoparticles in agriculture and their practical applications in the field.

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