

Smart Nanomaterials Technology

Azamal Husen *Editor*

# Enhanced Crop Production Setup Under Various Micro and Nano Contaminants

Sustainable Use, Production and Future  
Prospects

 Springer


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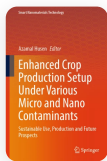
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# Biological Tools for Improving Crop Plant Growth Under Contaminants

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[Bhoomika Varshney](#), [Reena Vishvakarma](#) & [Archana Vimal](#)

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## Abstract

Crop production and development under micro and nanocontamination have become a very considerate subject for farmers and researchers. These contaminants can negatively affect plant growth, soil health inclusive agricultural productivity. For the production of crops, scientists use several chemical and biological methods. The biological approach has proven more successful as compared to chemical means. Biological systems are more effective, useful, and eco-friendly. There are several biological methods or tools such as phytoremediation, plant growth-promoting bacteria, genetic engineering, and nanobiotechnology which are significant tools for crop improvement under these critical contaminants. Crop development and their productivity are affected by both environmental and genetic factors. Numerous microbes such as *Acetobacter*, *Bacillus*, *Burkholderia*, and *Pseudomonas* genera are naturally helpful for the growth and development of plants under unfavorable conditions. Additionally, there are many genetic transformations, nanochemicals, and nanoparticles that have arrived as a promising agent for the growth and development of crops. Recently, nanomaterials have been considered the best alternative to insecticides and pesticides. Biological tools are very beneficial to obtain a newly cultivated crop of desired traits such as high quality and quantity and easily grow in biotic and abiotic stress conditions.