Role of AI and Biotechnology in Controlling Disaster of Food Adulteration Agriculture and Climate Resilience: Challenges and Future Prospects

Editors

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Chapter 3

Advances in Phytoremediation: Using Plants to Clean UP Environmental Pollutants

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Advances in phytoremediation, a green and sustainable method using plants to clean up environmental pollutants, include genetic engineering to enhance pollutant uptake and tolerance, the use of nanoparticles to increase pollutant bioavailability, the application of chelating agents to improve metal extraction, the integration of beneficial microorganisms to boost plant performance, and the deeper understanding of plant-microbial interactions through omics technologies. The term is an amalgam of the Greek *phyto* (Plant) and Latin *remedium* (restoring balance). Although attractive for its cost, phytoremediation has not been demonstrated to redress any significant environmental challenge to the extent that contaminated space has been reclaimed. Phytoremediation is proposed as a cost-effective plant-based approach of environmental remediation that takes advantages of the ability of plants to concentrate elements and compounds from the environment and to detoxify various compounds without causing additional pollution. The concentrating effects results from the ability of certain plants called hyperaccumulators to bioaccumulate chemicals. The remediation effect is quite different. The degraded, but organic pollutants can be and are

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