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Dr. Usman Sayeed is an academician, researcher, and educator specializing in Agricultural Informatics (Agriinformatics), with expertise in integrating information and communication technologies (ICT), artificial intelligence (AI), bioinformatics, geospatial technologies, and data analytics into modern agricultural systems. His work focuses on harnessing digital technologies to enhance agricultural productivity, sustainability and evidence-based decision-making. His research interests encompass Artificial Intelligence and Machine Learning in Agriculture, Precision Agriculture, Bioinformatics, Remote Sensing and GIS, Internet of Things (IoT), Decision Support Systems (DSS), Agricultural Databases, Climate-Smart Agriculture, Crop Modeling, and Digital Agriculture. He is particularly interested in developing data-driven approaches for crop monitoring, resource optimization, disease prediction, and sustainable farm management.



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Sustainable Agriculture: An Update



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Prof. Saba Siddiqui

Dr. Deepti Srivastava

SUSTAINABLE AGRICULTURE: AN UPDATE

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CHAPTER -3

Role of Biofertilizer in Sustainable Agriculture

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The growing demand for safe, environmentally friendly food has initiated the rise of organic farming worldwide. This approach prioritizes the health of agro-ecosystems by promoting biodiversity, natural cycles, and soil health. Organic farming is based on the development of the bio fertilizers instead of chemical inputs. The use of chemical fertilizers in large quantities has boosted crop productivity, but their overuse not only harms soil quality but also contaminates groundwater and depletes nutrients, which ultimately leads to yield losses. This problem could be overcome by using various biofertilizers, which provide all the essential nutrients to plants. Biofertilizers obtained from microorganisms are more environmentally friendly, cost-effective, and can replace chemical fertilizers.

Biofertilizers, often referred to as "microbial inoculants," are different from traditional fertilizers as they do not directly supply nutrients to crops. Instead, they are organic formulations containing beneficial soil microorganisms that, when applied to seeds, plant surfaces, or soil, start forming microbial colonies in the rhizosphere and enhance plant growth by improving the availability of essential nutrients. Inoculation with these microorganisms is a promising strategy for enhancing soil fertility, as it enhances plant access to key elements like nitrogen, phosphorus, and potassium.

Biofertilizers: Biofertilizers are carrier-based microbial inoculants that, when applied to seed, plant surface, or soil, colonise the