



Prof. Saba Siddiqui, is a Professor and Head of the Department of Agriculture at the Integral Institute of Agricultural Science & Technology (IIAST), Integral University, Lucknow. She obtained her M.Sc. in Agricultural Microbiology from Aligarh Muslim University, Aligarh, and her Ph.D. in Botany from Dr. Ram Manohar Lohia Avadh University, Ayodhya. Her research interests encompass agricultural microbiology, nanotechnology, plant-microbe interactions, biofertilizers, bioremediation etc. She has successfully guided more than 10 postgraduate students and is currently handling various government-funded research projects. Dr. Siddiqui has published over 35 research articles and reviews in national and international reputed journals and has authored more than 20 book chapters. She has received several academic honors and continues to contribute actively to interdisciplinary research, postgraduate education, academic leadership, and scientific collaborations aimed at advancing sustainable and climate-resilient agriculture.



Dr. Deepti Srivastava completed her M.Sc. and Ph.D. in Agricultural Biotechnology from Acharya Narendra Deva University of Agriculture and Technology (ANDUAT), Ayodhya, India. She worked as a researcher at CSIR-National Botanical Research Institute (CSIR-NBRI), Lucknow, before joining the Department of Agriculture, Integral Institute of Agricultural Science & Technology (IIAST), Integral University, Lucknow, where she currently serves as an Associate Professor. Her research interests include plant biotechnology, molecular breeding, functional genomics, climate-resilient agriculture, crop improvement, and abiotic stress tolerance. Dr. Srivastava has successfully guided 7 M.Sc. and 1 Ph.D. scholars and has published over 30 research articles, 31 book chapters, and 2 books, has successfully guided 7 M.Sc. and 1 Ph.D. scholars, and has received numerous awards and recognitions from reputed national scientific and academic organizations for her outstanding contributions to research, teaching, and academic excellence.



Dr. Md. Abu Nayyer completed his Ph.D. in Horticulture from Bihar Agricultural University, Sabour. He currently serves as an Assistant Professor-cum-Junior Scientist specializing in Horticulture with a focus on fruits. His expertise encompasses Integrated Nutrient Management, Post-harvest Physiology of Horticultural Crops, Precision Farming and Artificial Intelligence. Dr. Nayyer has successfully guided more than 10 M.Sc. students and has made significant contributions to academic research, with over 20 research papers published in national and international peer-reviewed journals, along with several book chapters.



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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An Update



Prof. Saba Siddiqui

Dr. Deepti Srivastava

SUSTAINABLE AGRICULTURE: AN UPDATE

Prof. Saba Siddiqui

Department of Agriculture, Integral Institute of
Agricultural Science and Technology, Integral
University, Lucknow

Dr Deepti Srivastava

Department of Agriculture, Integral Institute of
Agricultural Science and Technology, Integral
University, Lucknow

Dr Md Abu Nayyer

Department of Horticulture, Bihar Agricultural
University, Sabour, Bihar

Dr Usman Sayeed

Department of Agriculture, Integral Institute of
Agricultural Science and Technology, Integral
University, Lucknow



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CHAPTER -11

Sustainable Agriculture and Microbial Diversity: A Symbiotic Relationship

**Faria Fatima, Saba Siddiqui*

Department of Agriculture, Integral Institute of Agricultural Science and Technology, Integral University

Email: ffatima@iul.ac.in

Abstract

Sustainable agriculture today relies extensively on the soil microbiome, which is an assembly of microbes in the soil. Despite being the most varied collection of creatures found in soil, our understanding of microbes is still quite restricted. Microbes support plant growth by numerous process like nitrogen fixation, mineralization, solubilization, and nutrient mobilization. In addition, they generate antibiotics, siderophores, antagonistic chemicals, and hormones [gibberellin and auxin] that stimulate plant growth. Numerous plant species collaborate with microorganisms to obtain mineral nutrients while using the least amount of energy possible. Moreover, it is possible to separate, combine, and create biofertilizers—a novel class of biological product—from microorganisms that are essential to the soil microbiome. The future of sustainable agriculture is being shaped by innovations pertaining to microbiomes. Improved knowledge regarding ecology of soil microbes can improve land management techniques. The goal of low-input agriculture is to reduce the use of artificial fertilizers and pesticides while increasing long-term yield. Thus by using the potential of the soil microbiome promotes sustainable agriculture and safer environments, both of which are beneficial to human health.