

**Jamaluddin
Anuj Kumar Singh**

Microbes and Sustainable Plant Productivity



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Editors

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&

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PREFACE

The global concern about the chemical and chemical residues causing problems and degradation of environment has stimulated increased interest in bio-inoculants as bio-control agents and bio-fertilizers. Many exciting new frontiers exist for use of bio-fertilizers. The investigations in this field have already brought out a list of microbes particularly arbuscular mycorrhizal fungi and certain group of bacteria as bio-fertilizers and also a large group of fungi as bio-control agents for number of diseases, insect pest and nematodes. However, there is a need to develop the effective strains having broad spectrum nutrient absorption efficiency. Genetic manipulation of beneficial microbes is an effective possibility for developing host specific microbial inoculants for field application.

A large number of microbial inoculants and parasites and predators have been tested to control the diseases and also enhancing the growth of forest tree species. The arbuscular mycorrhizal fungi and bacterial bio-fertilizers not only enhance the growth of forest tree species but also increase the tolerance for different stresses and resistance against pathogens. Certain microorganisms like bacteria and blue green algae and *Frankia* have the ability to use nitrogen and provide this nutrient to the tree. Arbuscular mycorrhizal fungi and phosphate solubilizing organisms and plant growth promoting rhizobacteria (PGPRs) are extensively used in forestry for increased growth and production.

In India, fairly good quantity of bio-fertilizers and bio-pesticides are produced and consumed. This indicates the potential for organized production of these bio-agents. There is a demand of bacterial inoculants for leguminous tree species. This indicates the commercial benefit of this technology besides accruing benefit towards conservation of chemical nitrogen. There is a need for closer involvement of researchers, forest managers and other forest development agencies so that an integrated and comprehensive strategy can be formulated to raise the bio-fertilizers to a level of fulfill the demand for application in forest nurseries and plantations. There is a need for development of effective techniques of retaining applied nutrients and to make it available to the root zone since not more than 30-40% of applied nutrients are taken up by the plants.

There is also a need for development of effective strains of bio-inoculants so as to break down the epidemics of the pest in the field and also to develop the culture of effective bio-fertilizers which can proliferate effectively in the soil and may help the growth of the plant. No doubt, there are the effective microbes which have been developed in the laboratory but need exploitation in the field through effective and easy technology to be easily practiced by the users.

This volume on microbial inoculants includes important techniques and practices effective for application in forest nurseries and plantation as well as also discusses future prospects of application of microbes in green technology. The microbes are effective in acquisition of phosphorus and nitrogen in the field and techniques are environmentally safe. The due care has been taken to include the articles of the researchers well conversant with the subject. We hope this book may be an useful tool for the researchers and field users.

We are highly thankful to all the worthy contributors of this volume.

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Contents

1.	ARBUSCULAR MYCORRHIZAL FUNGI HAVE A POTENTIAL ROLE IN TROPICAL FORESTRY	D.J. Bagyaraj	1
2.	AM FUNGAL TAXONOMY AND GERMPLASM DEVELOPMENT: SOME ASPECTS	C. Manoharachary and B. Bhadraiah	17
3.	STUDIES ON ECTOMYCORRHIZAL (ECM) FUNGI AND THEIR ROLE AS BIOFERTILIZERS IN FORESTRY	V. Mohan	22
4.	STUDIES ON THE VAM FUNGI OF ARID TREE SPECIES AND ITS SIGNIFICANCE IN AFFORESTATION	K.K. Srivastava, V. Mohan and Neelam Verma	39
5.	MYCORRHIZAE: A PROMISING STEP TOWARDS GREEN TECHNOLOGY	Richa Raghuwanshi and R. S. Upadhyay	48
6.	ROLE OF BIOFERTILIZER ON GROWTH OF SANDAL PLANTS	Nagaveni, H. C.	65
7.	DIVERSITY OF AM FUNGI IN FOREST NURSERY AND PLANTATION IN JABALPUR	Pratiksha Chaturvedi and Jamaluddin	71
8.	SYMBIOTIC ASSOCIATION OF ARBUSCULAR MYCORRHIZAL FUNGI (AMF) IN SELECTED ARID ZONE TREE SPECIES AND THEIR IMPACT ON GROWTH OF SEEDLINGS	Lokendra Singh, K.K. Srivastava and Neelam Verma	87
9.	APPLICATION OF MYCORRHIZAL FUNGI IN NURSERY	Jamaluddin	100
10.	ARBUSCULAR MYCORRHIZAL FUNGI PLAY A MAJOR ROLE IN AGRICULTURE AND NATURAL ECOSYSTEMS TO IMPROVE PRODUCTION IN SUSTAINABLE MANNER	Kamal Prasad	113

11.	DIVERSITY OF ARBUSCULAR MYCORRHIZAL (AM) FUNGI ASSOCIATED WITH COMMERCIALY IMPORTANT PLANTATION SPECIES IN THE NILGIRI BIOSPHERE RESERVE AREAS IN TAMIL NADU	V. Mohan and A. Keerthi	139
12.	EFFICACY OF AM FUNGI AGAINST <i>RHIZOCTONIA SOLANI</i> – A DAMPING -OFF CAUSING PATHOGEN OF <i>TECOMELLA UNDULATA</i>	K.K. Srivastava, Neelam Verma and Sunil Kumar	151
13.	APPLICATION OF BIOCONTROL AGENTS IN FORESTRY	V.S. Dadwal and Savitri Bhartiya	156
14.	ARBUSCULAR MYCORRHIZAL FUNGI ASSOCIATED WITH OIL YIELDING PLANTS	Ajay Kumar Gond and A.K. Pandey	165
15.	MICROBES IN GREEN TECHNOLOGY AND CARBON SEQUESTRATION IN MINE DEGRADED LAND	Anuj Kumar Singh and Rahul Bhadouriya	170
16.	INTERESTING LICHENS FROM GARHWAL HIMALAYA WITH PARTICULAR REFERENCE TO CYANOBACTERIAL PHYCOBIONT	Amit Jakhal and M. P. Sharma	179