MYCORRHIZA

The compendium is a compilation of research papers, covering various aspects of mycorrhiza, presented at the National Conference on Mycorrhiza held at Barkatullah University, Bhopal. There, the contributors come from different field of research have discussed — in recent future it will be possible the application of mycorrhizal inoculum in large-scale by developing cost-effective technology. Also demonstrations of the use of mycorrhizal-technology have to be carried out in farmer's field and forest nurseries to show the benefits of mycorrhiza in enhancing plant growth and reducing chemical fertilizer use in cultivation practices.

The departments, companies and NGOs involved in afforestation and agricultural activities are advised to include eco-friendly mycorrhizal-technology in their programmes, thus, helping in reducing the use of chemicals.

The book will serve as a useful guide for conducting further research studies on the interactions between plant and mycorrhiza.

The Editors

Dr. Anil Prakash was born in 1958. He obtained his B.Sc., M.Sc and Ph.D. from Barkatullah University, Bhopal in 1985, he joined Barkatullah University as Lecturer and was elevated to the position of Reader in 1993. He is currently Head, Department of Biotechnology in the University. Dr. Prakash has several outstanding contributions to his credit, which include research paper and articles on Thermophilic Fungi, Microsomes and Mycorrhiza in national and international journals. During 17 years of research career, he has guided 7 M.Sc. students and 10 Ph.D. students. He has completed 4 research projects sponsored by ICAR, DST and UGC. Dr. Prakash is member of several scientific bodies including Indian Science Congress Association, Association of Microbiologists of India, Japan Society of Bioscience, Biotechnology and Agrochemistry. He has participated in several conferences/workshops/seminars held in India and abroad including Japan, Canada and USA. He visited Japan and Hungary under Indo-foreign cultural Exchange Programme. Dr. Prakash also coordinator of Bioinformatics Centre of Barkatullah University, Bhopal (M.P.).

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MYCORRHIZA

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and
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FOREWORD

In recent years, the negative environmental and edaphic impacts of modern agriculture (with high inputs of fertilizers and pesticides) have been realised and steps are being taken all over the globe to adopt new approaches to sustainable agriculture, such as combining chemical fertilizers with biofertilizers. Several measures, such as use of biopesticides are being adopted to reduce the negative effects of chemicals and to gradually switch over to organic farming. Integrated nutrient management will pave way for organically grown foods and to enhance the quality of environment and human life.

Mycorrhizas, which have co-evolved with plants as symbiotic partners are now well-known to be beneficial for the growth of plants and for increasing yields. They are working with plants for so many years in maintaining the ecological balance and enriching the soil. They are also helpful in binding soil particles together, connecting them into larger aggregates for a stable, porous and physical structure. Also, elements toxic to plant life can be absorbed and neutralized to certain level by mycorrhizas.

This volume on 'Applications of Mycorrhiza', which include research papers on a wide array of aspects related to mycorrhizas will certainly serve as a useful material for promoting mycorrhizal research.

The daunting task before the researchers today is to motivate farmers to design comparable experimental units on their farm, convince them through observable mycorrhizal phenomenon and make them adapt the technology according to the conditions and resources. I hope that the papers included in the volume would inspire young scientists to come out with new ideas for research in the fascinating field of mycorrhiza.

D.J. Bagyaraj

PREFACE

Mycorrhiza, which refers to the several types of symbiotic associations between plant root and soil fungi, has been studied extensively as biological and physiological phenomenon that could provide immense benefits to the plants. The magnitude of mycorrhizal activity depends not only on the partners (plant and soil microorganisms) but also, the environmental (climatic and edaphic) conditions. The beneficial effect of arbuscular mycorrhizal fungi on plant growth has been well documented. Plants with AM association have many advantages over non-mycorrhizal plants, such as: better uptake of nutrients, faster rehabilitation in adverse sites, greater tolerance to diseases and soil toxins, and greater survivability under drought and saline conditions. The association of mycorrhizal fungi have been shown to have tremendous growth effects on several plants, which include onion, tomato, maize, soybean, sunflower, strawberry, banana, coffee, coconut, mangoes, palms, papaya, teak, etc. Experimental comparisons of mycorrhizal and non-mycorrhizal plants have shown that improved uptake of macro- and micro-nutrients in mycorrhizal plants positively influence the establishment and survivability of mycorrhizal plants, especially under adverse conditions. Thus, decades of experimental work all around the globe have proved the basic importance of mycorrhizal symbiosis. Now the need is to develop cost effective application of mycorrhizal technology in agriculture and forestry, which would mainly depend on the availability of bulk inoculum from a reliable source. Application of mycorrhizal inoculum would be possible by developing cost effective technology for large-scale application of mycorrhiza inoculum. Also, large-scale field demonstrations of the use of mycorrhizal technology have to be carried out in farmer's field and forest nurseries to show the benefits of mycorrhiza in enhancing plant growth and reducing fertilizer use. The Agriculture Department, Forest Department, Mining Companies and Non-Government Organizations involved in afforestation and agricultural activities can include the ecofriendly mycorrhizal technology in their programmes, thus, helping in reducing use of chemicals in cultivation practices.

The compendium entitled is a compilation of 53 papers, covering various aspects of mycorrhiza presented at the National Conference on Mycorrhiza, jointly organized by Barkatullah Uni versity, Bhopal and Tata Energy Research Institute (TERI), New Delhi at Barkatullah University, Bhopal from 5-7 March 1999. The contributors are from different field of research including plant nutrition, soil science, horticulture, forestry, soil microbiology, soil ecology, plant physiology, agronomy, plant pathology etc. In order to avoid repetition of certain references, all the references are given at the end in the reference section. We hope that the book will serve as a useful guide for conducting further research studies on the interactions between plant and mycorrhiza.

We are grateful to Dr. R.K. Pachauri, Director, TERI for his support and encouragement in organizing the Conference. The financial support extended by M.P. Council for Science and Technology, Ministry of Environment and Forest, Council for Scientific and Industrial Research, Barkatullah University and Department of Science and Technology is gratefully acknowledged. The technical support and co-operation provided by the Faculty, Staff and Students of the Institute of Microbiology and Biotechnology, Barkatullah University during the conference is thankfully acknowledged.

We sincerely apologise for the inordinate delay in publishing the compendium, due to certain unavoidable circumstances.

Anil Prakash
V. S. Mehrotra

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