

# **Arbuscular Mycorrhizae of Goa - A Manual of Identification Protocols**

**Editors**

**B. F. Rodrigues  
T. Muthukumar**



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# **Arbuscular Mycorrhizae of Goa - A Manual of Identification Protocols**

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*In vitro* germination of *Gigaspora* spore showing germ tubes.

## **FOREWORD**

Arbuscular mycorrhizal fungi are obligate symbionts and form natural partners with Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. They are found in nutrient deficient soils, phosphorus being the critical component in evaluating their efficacy. Around 80% of plants are colonized by AM fungi which belong to Glomeromycota. Arbuscular Mycorrhizal (AM) fungi help in plant growth and in offering resistance to drought, temperature and salinity besides helping in seedling establishment and control of plant pathogens. Mycorrhizae are employed both in agriculture and forestry. Efforts are on to produce bulk inoculum of AM fungi so as to employ them as biofertilizers. Morphotaxonomic criteria have been used to identify these AM fungi. From time to time a number of AM fungi are reported from India and identification is the key factor. In recent times molecular tools have played an important role in reclassifying these fungi.

Therefore this publication entitled "Arbuscular Mycorrhizae of Goa - A Manual of Identification Protocols" is a welcome feature. The publication includes basic protocols, recent developments in taxonomy and taxonomic identification of AM fungal species collected from Goa. The manual will be of immense utility in the identification of AM fungi. These kinds of manuals are essential in basic and applied sciences.

Prof. B. F. Rodrigues, Department of Botany, University of Goa, Goa and Dr. T. Muthukumar, Department of Botany, Bharathiar University, Coimbatore are known to me for many years. I consider them as dedicated, committed, innovative and knowledgeable scientists in the field of AM fungal research. I congratulate and compliment Prof. B. F. Rodrigues and Dr. T. Muthukumar on this academic venture. I am sure that this manual will find a suitable place not only in libraries but will be highly useful to P. G. students, researchers, the teaching community, scientists of different R & D organizations, agriculturists and industry.

**C. Manoharachary**  
Prof. Emeritus (CSIR)  
Osmania University

## **PREFACE**

Of the several types of symbiotic associations, the mycorrhizal symbiosis involving plant root and soil fungi is immensely beneficial to plants. Although in arbuscular mycorrhizal (AM) symbiosis there is no host specificity, there is host preference and hence mycorrhizal research assumes great significance.

Mycorrhizal plants have many advantages over non-mycorrhizal, including better nutrient uptake especially Phosphorus (P), faster rehabilitation of degraded sites, greater tolerance to diseases and soil toxins, and greater survivability under stress conditions. Mycorrhizal research carried out over the years has confirmed their importance. It's time to take mycorrhizal technology into farmers fields and nurseries and to prove the benefits of mycorrhiza in enhancing plant growth, thereby effectively reducing the costs incurred in the use of expensive phosphate fertilizers.

This book entitled "Arbuscular Mycorrhizae of Goa – A Manual of Identification Protocols" is a modest effort to compile the protocols widely used in AM fungal research. There are also topics relating to the importance of PCR, root organ culture technique and the significance of molecular biological tools in AM fungal research. Finally the recent developments in taxonomy research have been highlighted and taxonomic descriptions of AM fungal species (based on spore morphology) have been given. There are a total of 13 plates accounting for 78 photographs of AM fungal structures and spores. We are sure that the book will serve as a useful guide for, and confident that it will receive a wide acceptability among mycorrhizal researchers, teachers and the student community.

We place on record our sincere thanks to Prof. C. Manoharachary, Professor Emeritus, Osmania University for obliging us with the foreword for the publication. We gratefully acknowledge the financial assistance received from National Bank for Agriculture and Rural Development (NABARD), Mumbai and University Grants Commission (UGC), New Delhi. Thanks to Prof. Stéphane Declerck, Université Catholique de Louvain for editing the topic on *in vitro* culture technique. We also thank GINCO, Belgium for providing photographs of *in vitro* culture of AM fungi. We thank the research scholars Mr. Andy Willis, Ms. Radhika K. P., Ms. Jyoti Vaingankar, Ms. Seema Dessai and Mr. James D'Souza for their help.

**B. F. Rodrigues  
T. Muthukumar**

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