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Editors: Dr. Aruna Kumari Nakkella, Dr. Surendra Kumar Yadav

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4819/24, 3rd Floor, Mathur Lane

Ansari Road, Darya Ganj, New Delhi-110002

Phone: 011-23247537, Mobile: +91-989-989-7381

E-mail: bhartipublications@gmail.com

info@bharatipublications.com

Website: www.bhartipublications.com

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Preface

Earth's resources, while vast, are finite. Increasingly, humans have come to realize that we must be better stewards of those resources and that economic activity must be carried out in ways that do not compromise the ability of future generations to prosper. The sustainability challenge is to develop innovations and policies that allow humanity to meet current and future environmental, human health, economic, and societal needs.

As governments strive to tackle inter-related challenges such as energy and materials security, climate change and pollution, the chemical sciences will have a vital role to play in the development of the new technologies required to help tackle global energy and sustainability issues for future generations.

We, the citizens of our nation and of the Earth, are endowed with certain rights, powers, and obligations, which demand we act to preserve and protect the future of humanity as well as Earth's other animal and biological life.

Based on abundant scientific evidence or our own current experiences, we recognize that the global climate is rapidly warming and becoming increasingly *unstable* due to *human-caused* atmospheric carbon pollution primarily from the burning of fossil fuels.

We also recognize that in spite of 35 years of credible scientific warnings, global warming is still rising and has now reached dangerous levels!

We have already seen or experienced global warming-aggravated weather, like record-breaking floods, hurricanes, and wildfires. We have witnessed the "worst in centuries" droughts and dust storms. We have experienced alternating unseasonably cold then warm winters, extreme storms, bomb cyclones, and rain bombs where weeks or months' worth of rain falls in a few hours or a few days.

Chapter

25 Arbuscular Mycorrhizal Symbiosis, Agriculture and Environmental Sustainability

Pampi Ghosh

Assistant Professor & Head, Department of Botany, Seva Bharati Mahavidyalaya, Kapgari, Jhargram, W.B.

Abstract

In this communication Arbuscular mycorrhizal association on forest plants in Southwest Bengal has been presented. Am mycorrhizae are ubiquitous in distribution and show better growth on host plants as they provide support and nutirients uptake from neighbouring environment. Activities of native AM strains are more effective on growth and development of many valuable plants in experimental conditions. Therefore the present study recommends using local Am strains for incocula production and application in large scale. This would help farmers to grow better yield in a time specific period and helps to manage more active soil without hampering the local soil health after chemical fertilizer and pesticide applications. Hope that experts and farmers will take the opportunity to develop local Am biofertilizer in a short span in their areas without spending any money. This research article reflects yield of experimental plants in connection with some parameters choosen for study.

Keywords: *Am Fungi, Root Colonization, Spore Density, Forest Plants, Experimental Plant and Yield, Management*

Introduction

The coexistence of fungi and symbiotic relathionship with the highe plant rootls is known as Mycorrhizae as coined by the earlier worker Frank, 1885. Mycorrhizal association as symbiotic

one is a universal phenomenon throughout the plant kingdom which is versatile for the life and growth of higher plants. The role of mycorrhizae is in the improvement of plant nutrition, drought tolerance, suppression of soil-borne pathogens and reclamation of degraded lands, change of soil structure is well recognized. From arctic to coastal area wherever plants grow mycorrhizal association are most common but the intensity and mod of infection is different even change du to seasonal impact is diffr from one season to another seeasons. The vesicular arbuscular mycorrhizal fungi (VAM) not only promote the growth of plants but also improve the productivity of active components in lavs, fruits and in seeds. Hence, there is a need for research in improving the quality and quantity of yild produced from plants in relatively shorter period and at lower expense by using VAM fungi as fungal biofertilizer. Recent research revealed that potential of Am fungi in carbon sequestration paving the way towards a better understanding of possible AMF mechanism by which C balance between biosphere and atmosphere can be moved forward in more positive direction (Parihar, et al. 2020).

Southwest Bengal has the tropical dry deciduous forests that record many valuable plants. However no attempt has been taken to study the mycorrhizal status and their effect on the growth and survival of the medicinal plants of southwest Bengal to mitigate the problems. It is bcause local strain of Am fungi is better to activeat the yield quickly in vivo condition. Therefore, the present research work has been taken into consideration in West Bengal.

Objectives of the Study

(1) To survey the Vesicular Arbuscular (VA) mycorrhizal status of Medicinal plants growing in the forests of southwest (SW) Bengal, (2) To study the VA mycorrhizal status of cultivated medicinal plants, (3) To correlate the soil nutrient status with mycorrhizal status of medicinal plants, (4) To study seasonal variation of soil nutrients and mycorrhizal status of selected medicinal plants, (5) To conduct growth studies of *Catharanthus roseus* and *Kalanchoe pinnata* as selected medicinal plants inoculated with *Glomus mosseae*, *Gigaspora margarita* and *Acaulospra laevis*.

Study Area and Climate

The study site, the plateau tract in the southwestern side of the West Bengal lies within 21° 36′ to 24° 35′ N latitude and 85° 49′