



ROLE OF PLANT-MYCORRHIZA SYMBIOSIS IN REVEGETATION OF DISTURBED MINING SITES IN INDIA (NORTH TELANGANA)

Dayakar GOVINDU^{1,2}, Sheak Rehana BEGUM¹, Srinivas PODETI¹, Borbala BIRO²

¹Kakatiya University, Warangal, India

²Szent Istvan University, Budapest, Hungary

Abstract

Extensive mining activities develops with energy requirements of globalizing World. Both underground- and open cast mining are resulting disturbed soil surfaces, which need to revegetate for environmental safety. Coal mining sites at North Telangana region of India was investigated. Soils there are poor habitats for any plant establishment, the growth and survival of revegetated plants are possible only with arbuscular mycorrhiza (AM) fungal inoculation. Two leguminous agroforestry tree species were selected (*Acacia nilotica*, A.n. and *Albizia lebbeck*, A.l.). AM fungal spores were isolated and based on their morphological structures, 5 different types of AM species, the *Glomus/Rhizophagus*-, *Gigaspora*-, *Acaulospora*-, *Scutellospora*- and *Sclerocystis* sp. were identified. We have investigated the AM colonization rates, efficiency of selected strains in greenhouses and also at coal mine dumps by inoculation experiments on two test plants. AM fungal strains was found to be effective for the selected leguminous tree species both in their natural forests and at disturbed soils. *Glomus* sp. was the most dominant among the five different AM fungal species, more particularly *G. aggregatum*, *G. fasciculatum* showed the best colonization and biomass production with the test plants. The AMF isolates from natural forests are supporting the revegetation of the disturbed mining sites. Preselection is needed for considering the environmental protection and the best soil functioning.

Keywords: mining sites, revegetation, AM fungi, isolation, inoculation.

1. INTRODUCTION

Coal is extracted from the earth by opencast and underground mining. Opencast mining is considered one of the most dramatic disturbances in terrestrial ecosystems. The disturbance of green vegetation due to mining it has been reported that there is a difficulty with restoration [1], because of three major macronutrients, namely nitrogen, phosphorus and potassium are generally found to be deficient in overburden dumps [2, 3], heavy metals on the other hand can be accumulating very frequently in mining sites [27].

The AM fungi and other potential microsymbionts helps the plants to grow in disturbed sites for improvement of environment [4]. By using indigenous AMF from forest systems is essential for reclamation of these mine spoils and overburdens include re-establishment of sustainable plant community [5, 28]. Mycorrhizal symbiosis are very important for survival and growth of plants and plant uptake of nutrient such as phosphorus and nitrogen, especially P deficient soils [6, 27]. In the colonization of arbuscular mycorrhizal (AM) fungi, several species of arbuscular mycorrhizae fungi



OKTATÁSI IGAZGATÓSÁG
EGYETEMI TANULMÁNYI HIVATAL
BUDAI CAMPUS TANULMÁNYI OSZTÁLY
Cím: 1118 Budapest, Villányi út 29-43.
Tel.: +36-1-305-7298
E-mail: geosel.andras@kerk.szie.hu

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Certificate

To whom it may concern,

hereby I certify that **Dayakar Govindu** (date and place of birth: 05.02.1992., Kothapally, India) participated on a particular PhD course in English within Stipendium Hungaricum Scholarship program at the Faculty of Horticultural Science, **Szent István University, Hungary**. The length of programme was two semester and he achieved 46 ECTS credits.

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Sincerely yours,

Dr. András Geösel
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