

A CASE STUDY:

Mycorrhizal spore density in relation to land use and soil depth in a village landscape of Garhwal Himalaya, India

■ J. S. CHANDRASHEKAR AND M.A. KHAN

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SUMMARY

The present study was aimed to investigate the effect of land use and soil depth on mycorrhizal spores in village landscape of Garhwal Himalaya, India. The study showed that total spore abundance decreased with depth in all land use types and showed interaction of land use and soil depth. Since majority of AM fungi produce soil-borne spores and spore count is advantageous for evaluating the effect of land use and soil depth. The effect of depth was more marked in more intensively ploughed homegardens and irrigated agricultural land use compared to less intensively tilled rainfed agriculture. The differences between land uses were more marked in spore abundance in relation to soil depth. Spore density was correlated with root biomass. Further studies are needed to understand the effect of season and management of the respective land uses.

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Key Words :

Mycorrhizal spores, Land use, Soil depth, Soil organic carbon, Root biomass

Mycorrhizal association between plants and AM fungal communities are influenced by land use (Oehl *et al.*, 2003; Sturmer and Siqueira, 2011), soil depth (Cardoson *et al.*, 2003; Choudhary *et al.*, 2010) and by plant species composition, soil properties, climatic conditions and management practices such as fire, tillage, crop rotation and fallowing (Rashid *et al.*, 1997; Muthukumar and Udaiyan, 2002; Lovelock *et al.*, 2003; Martinez and Johnson, 2010). Natural ecosystems dominated by perennial trees and shrubs, spores had fewer compared to the adjacent agricultural soils, but some virgin grasslands showed higher spore numbers than the adjacent wheat crop field. In some environments, cultivation (tillage and fertilizer application) reduces VAM diversity, while in others it enhances the VAM diversity (Abbott and Robson, 1991). Vertebrates and invertebrates act as potential vectors of VAM. Earthworms concentrate VAM propagules in their casts. Thus, agricultural soil management can greatly influence the population size and activity of both VAM fungi and earthworms (Lee *et al.*, 1996).

The diversity of organisms involved in

nutrient cycling may be substantially reduced under agricultural intensification. Land use distribution is unique in Garhwal Himalaya with heterogeneity in the landscape occupying three dimensional space in contrast to two dimensional spatiality on low lands. The variation exists in the distribution of biological diversity between the land uses which are primarily imparting soil fertility of the land uses. The objective of this paper is to see the effect of land use and soil depth on mycorrhizal spores in a village landscape of Garhwal Himalaya.

EXPERIMENTAL METHODOLOGY

Study area:

The Garhwal Himalaya, spread over a geographical area of 29698 km² comprises five districts of Uttarakhand state of India viz., Uttarkashi, Chamoli, Pauri, Tehri and Dehradun. The study was carried out in and around the Chamoli village landscape in Chamoli district (30° 27' N latitude and 79° 5' E longitude). The landscape covers an elevation range of 800-1400 m above mean

Author for
Correspondence -

**J. S.
CHANDRASHEKAR**

Department of
Environmental Science,
Bangalore University,
BANGALORE
(KARNATAKA)
INDIA
Email: jnuchand
@gmail.com

See end of the paper
for **Copied authors**