ABSTRACT OF THE WORK

Indian Himalayas are well known for its biodiversity and has a special place in world mountain ecosystems. However, in recent years agricultural activities in this region has been increased rapidly causing potential threat of environmental degradation and so assessing soil health of this region is of paramount importance for our nation to develop potential strategies for improving agricultural sustainability. This Ph.D. thesis entitled “Impact of changing land use systems on soil microbial diversity and biological and biochemical indicators in the central Himalayan region of India” is an wide investigation to assess soil microbial diversity and related biological and biochemical indicators in different land use systems of the central Himalayas. The land use systems selected for this study varies in altitude, soil types, management practices etc to understand the factors associated with the soil microbial processes and function. This thesis evaluates and interprets the impact of changing land use, soil types, altitudes and management practices on soil microbial community and diversity in order to better understanding of the relation between microbial diversity and soil functions.

The thesis comprises of thirteen chapters. Chapter 1 deals with the introduction on Indian Himalayas, soil quality, soil enzymes, soil microbial community and diversity, soil carbon, nitrogen and phosphorus fractions and the objective of the present work. Chapter 2 deals with review of literature of work done on soil microbial community and diversity and related biochemical indicators in relation to soil health and productivity. Chapter 3 covers the description of the study area including sampling location, climatic features, sample collection and the research methodology for studying soil physio-chemical properties, microbial communities, microbial diversity, soil enzymes, soil carbon, and nitrogen and phosphorus fractions. Chapter 4 deals with the impact of different land use systems on soil microbial population, soil enzymes and microbial community composition with respect to different
management practices of the Kumaon region of Central Himalayas, Chapter 5 covers the microbial community composition and their relationship with soil enzymes of Garhwal region of Central Himalayas. Chapter 6 deals with the soil genetic fingerprint assessment of different land use systems. Chapter 7 covers the evaluation of microbial diversity of different land use systems by automated ribosomal intergenic spacer analysis (ARISA). Chapter 8 contains the research on the soil carbon fractions of the central Himalayas. Chapter 9 evaluates the relationship between soil carbon fractions and soil enzymes with respect to different seasons of different land use systems. Chapter 10 covers the nitrogen mineralization and nitrifier population studies in the central Himalayas. Chapter 11 deals with the phosphorus pools as affected by the management practices. Chapter 12 covers the isolation and enumeration of phosphate solubilizing microorganisms in the central Himalayas. Chapter 13 is a case study to understand the effect of canopy cover on the microbial systems.