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Soil Nutrient Storage Under Major Ecosystems of Cold Deserts of Himachal Pradesh

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ABSTRACT: The present investigation was carried out at village Goshal of Lahaul and Spiti cold desert district of Himachal Pradesh during the year 2010 to 2013 to compare soil physical and chemical properties by demarcating the study area into three main ecosystems viz; forest ecosystem, alpine pasture ecosystem and agro ecosystem. The soil physical properties of all the three ecosystems revealed that the soils were found nearly neutral in reaction, having no salt problem and were medium in physical status. Bulk density was more in alpine and forest ecosystem due to grazing and soil was more compact as compared to agro ecosystem. The average soil moisture was maximum in agro ecosystem. Average soil nutrient status for all the three ecosystems depicted that the fields where peas and pulses were planted were found to be possessing higher nitrogen contents than other areas due to the fixation of atmospheric nitrogen.

KEY WORDS :: Cold Desert, Soil Physical Properties, Soil Nutrient Status, Forest Ecosystem, Alpine Pasture Ecosystem and Agro Ecosystem, Himachal Pradesh.

INTRODUCTION

The cold desert of India is located mainly in two states, viz., Himachal Pradesh and Jammu and Kashmir. In Himachal Pradesh, the cold deserts are restricted to the districts of Lahaul and Spiti, parts of Kinnaur (Sumdo side) and Pir Panjal in Chamba district. Lahaul and Spiti a tribal district of Himachal Pradesh falls under the cold desert region. The district is situated in the west of greater Himalayan ranges between 31°44'57" and 32°59'57" N latitudes and 76°45' 29" and 78°41' 34"E longitudes. The topography of Lahaul and Spiti district is entirely hilly. The region is characterized by low precipitation, a short growing season, low primary productivity and high stocking density (Mishra, 2000). Temperatures generally do not exceed 30°C with July and August as the hottest months. January and February are the coldest months, with a mean temperature of -20.00°C (Sinha and Samant, 2006). The growing season in cold deserts is restricted to less than six months in a year. The economy of the district is predominantly agriculture based. More than 80 per cent of the population is engaged in agriculture and its allied activities. Potato, Peas and Hops fetch good price to the inhabitants in the district. Beside agriculture, animal husbandry also plays an important role in the life of the people in Lahaul and Spiti. The key to settlement is through the intelligent use of glacial melts. Snow and glaciers are the only sources of water. At first glance, one would think that human survival is impossible in this harsh climate. Yet, the local people have learnt to make judicious and optimal use of their limited resources and have built a glorious civilization in the process. During the past few decades with the upcoming of the developmental activities such as education and communication facilities, the area experienced drastic change in the land use pattern resulting in alteration of soil physical and chemical properties which are the soil quality indicators of a site (Doran and Parkin, 1994). It is imperative to compare the soil physical and chemical properties of the site which have been altered due to recent land use changes. (Abbasi *et al.*, 2010).Therefore we demarcated the study area into three main ecosystems for conducting soil studies viz; Forest Ecosystem, Alpine Pasture Ecosystem and Agro Ecosystem, to support the hypothesis that land use changes affects soil properties. Thus the objective of our study was to compare soil physical and chemical properties of these three major ecosystems.

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MATERIALS AND METHODS

The present investigation was carried out at Goshal village of Lahaul and Spiti District of Himachal Pradesh. The climate of Goshal (Lahaul) valley is extremely dry and cold with high diurnal temperature variations. During different months, the mean atmospheric temperature ranges between -11.30°C to 26.03°C. Similarly, the minimum range of relative humidity ranges between 33.67 per cent in December to 59.33 per cent in August.

Ecosystem classification: The residents of the village Goshal follow agropastoral livelihood and with the age old experience had developed their own land use pattern depending upon availability and quality of land, availability of water for irrigation plus their requirements for growing of crops, grazing areas for their husbandry and forest areas for other uses. The