

# **AN ASSESSMENT OF VARIATION IN MAJOR SOIL PROPERTIES FOR EFFICIENT SOIL MANAGEMENT AND CROP PRODUCTIVITY IN POKHARE KHOLA SUB-WATERSHED, DHADING**

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## **SUMMARY**

The study herein was intended to assess the variation of major soil properties with respect to factors like landuse, aspect and elevation and to explore the existing fertility management options for better soil fertility management and crop production in Pokhare Khola watershed, Dhading district of Nepal. Two types of data were collected, one on the soil properties and the other on socioeconomic information of the local people. Factorial experimental design was adopted to analyze the soil properties, considering three types of landuse, two aspect classes and two elevation classes. A total of thirty-six soil samples were taken from the top soil (0-15 cm), three from each of twelve different strata of land, which were selected using GIS and GPS. Socioeconomic data was collected through semi-structured interviews from fifty HHs and few group discussions to assess existing practices and farmers' perception on different aspects of soil fertility and its management.

Soils in the watershed are acidic in nature with pH value ranging from 4.43 to 6.87. Organic matter content and total Nitrogen percent in the soil are at very low level with very little variation among the strata. Average OM content is 1.53 percent and average total N is 0.085 percent. Available phosphorus and available potassium show a high degree of variation among the strata. Range of the former is between 4.33 ppm to 22.84 ppm while that of later is between 10.67 ppm to 158 ppm. Regarding soil texture, a relative consistency is observed with most of the cases of sandy loam.

Analysis of variance shows significant variations at  $p \leq 0.05$  in pH, OM and total N with respect to the landuse types. Forest soil has lowest pH of 4.98 on an average compared to other landuse types. *Bari* and *Kbet* show slightly higher pH of 5.8 and 5.86 respectively. OM content is highest in forest land with 1.89 percent. *Bari* and *Kbet* lands follow with 1.49 and

1.19 percent respectively. Total N percent is highest in *Bari* land with 0.10 percent than in *Khet* and forest lands. Effect of aspect is significant only over total N at  $p \leq 0.05$ . Northern aspect has higher total N percent of 0.10 compared to 0.07 in southern aspect. Elevation is found to affect only pH significantly at  $p \leq 0.05$ . Upper elevation class has higher pH of 5.76 than lower elevation class having 5.33 pH. Available phosphorus is affected significantly by the interaction effect of aspect and elevation at  $p \leq 0.05$ . Similarly, interaction effect of landuse and elevation cause variation in total N at  $p \leq 0.05$ . Three-way interaction effect of all the factors shows variation over pH at  $p \leq 0.05$  and available P at  $p \leq 0.10$ .

Farmers show a clear-cut distinction between *khet* and *bari* lands for chemical fertilizer and FYM application rate. FYM application is higher in *Bari* with 22083.40 kg/ha/yr compared to 16666.60 kg/ha/yr in the *Khet*. Chemical fertilizer application rate is higher in *Khet* with 400 kg/ha/yr than in *Bari* with 123.40 kg/ha/yr. Land degradation problem varied in types and extent with respect to the landuse types. In *Bari* land sheet erosion, rill erosion and gully erosion are more severe than others. Sedimentation and flooding problems are mostly associated with the *Khet* land. Crop types and crop combinations are also different with respect to the landuse types. Paddy is the major crop raised in *Khet* land and maize is the one in *Bari* land. 86% of the households are involved in either summer or winter vegetables farming. 84% of HHs are engaged in tree plantation, mostly fodder and fruit trees. 100% HHs studied showed demand of fodder and fuelwood. Annual demand for fodder is 26.06 tons per HH while that for fuelwood is 4.66 tons. 58.36% of total forest product requirements is met from the forest and the remaining is fulfilled from the farmlands.

People are known to have a good knowledge of ranking soil fertility based on landuse types and soil colour. Forest land is ranked at the first place among different landuses. Black soil is ranked first followed by red and yellow soils. They are aware about the impact of chemical fertilizer and organic manure on soil fertility. They are relatively unaware about the effects of crop rotation, crop diversification and fallow periods to the soil fertility. Farmers' have positive perception about the importance of forest resource in soil conservation.

The study recommends for the soil fertility amelioration through the proper addition of nutrients complemented by the preventative and restorative measures for soil erosion. Regeneration of the degraded forest and side by side providing alternatives for fuelwood energy is crucial for the conservation of forest resources. Further interventions in vegetable farming and follow-ups in private tree plantation will benefit the local people.