



## **Comparative analysis of enzyme activities in bulk and physically fractionated soil samples from horticultural fields across the altitudinal gradient of Kumaun Himalaya**

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Horticulture contributes significantly to food, nutritional security and economic upliftment of any nation. In addition, horticulture also have an immense capacity for carbon sequestration and greenhouse gases reduction. However, less work has been done regarding the contribution of horticulture systems to carbon sequestration. Therefore, this study was performed in horticultural fields of Kumaun Himalaya at three different altitudes (1370m, 1782m, and 2170m). Soil samples were collected at three soil depths (0-10 cm, 10-20 cm, 20-30 cm) pre and post monsoon season as it is known that soil respiration increases post moisture additions. Particle size fractionation was carried for different sieve sizes (2000 $\mu$ m, 500 $\mu$ m, 250 $\mu$ m and 53 $\mu$ m). Soil enzyme activities viz.,  $\beta$  glucosidase, urease, acid phosphatase and dehydrogenases were estimated in both bulk and fractionated soil samples at all the three depths. Bulk soil samples of all the sites, showed decreased enzyme activities with increasing soil depths. However, the activities of the enzymes in fractionated macro aggregates was relatively less than the bulk samples, although, in a way similar to the bulk samples the enzyme activities decreased with increasing depths. Interestingly, acid phosphatase activity at 10-20 and 20-30cm soil depths did not show any significant decline in both bulk and fractionated soil samples. Soil enzyme activities are indicators of soil health as well as carbon turnover. The present study revealed declined enzyme activities in fractionated soil samples and suggest landowners and farmers to moderate the disturbance of soil at the time of cultivation/plantation (a common practice in horticultural fields) to maintain soil health and carbon stocks.