

Soil microbial population numbers and enzyme activities in relation to altitude and forest degradation

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Abstract

Microbial population numbers and their enzyme activities in terms of different enzymes, namely dehydrogenase, urease and phosphatase, were estimated in four forest stands (two at low and two at higher altitudes). The two forest stands at each altitude were at different stages of regeneration. At both altitudes, fungal and bacterial population numbers were higher in the less degraded forests than in the more degraded ones. Consequently, the different enzyme activities were also greater in the less degraded forest soils. A correlation coefficient was calculated between fungal population numbers, bacterial population numbers, soil moisture, organic C and the various enzymes activities. Dehydrogenase activity showed a positive correlation with fungal population numbers in all of the forest stands. However, the bacterial population numbers only showed a significant correlation ($r = 0.639$, $P < 0.05$) with dehydrogenase enzyme in the less degraded forest at the lower altitude. A significant positive correlation was established between urease activity and fungal and bacterial population numbers at the lower altitude, but only with the fungal population numbers at the higher altitude. At the higher altitude no significant correlation could be established with phosphatase and any of these traits. At the lower altitude, however, phosphatase showed a positive correlation with organic C and fungal population numbers. These enzymes showed a marked seasonality. The results of the investigation indicated that disturbance of soil and vegetation has an adverse effect on microbial population numbers and microbial enzyme activities.