The distribution and availability of phosphorus fractions in restored cut slopes soil aggregates along altitude gradient

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January 11, 2022

Abstract

The distribution and availability of phosphorus (P) fractions in restored cut slope soil aggregates along altitude gradients were studied. We examined soil aggregates total phosphorus (TP), available phosphorus (AP) and phosphorus activation coefficient (PAC), and discovered that there was no significant difference in TP at four altitudes ($p > 0.05$), but there was a significant difference in AP at 3009 m, 3347 m and 3980 m ($p < 0.05$). At 3009 m, 3347 m and 3654 m, the AP accumulation in small size aggregates were more advantageous. Overall, PAC dropped steadily as aggregate size increased, as shown by $PAC(3654\text{ m}) > PAC(3347\text{ m}) > PAC(3009\text{ m}) > PAC(3980\text{ m})$ in altitudes. In all particle size soil aggregates, total inorganic phosphorus (TPi) > total organic phosphorus (TPo) > residual phosphorus (R-P) at 3009 m, 3347 m and 3654 m; $TPo > TPi > R-P$ at 3980 m. Through correlation and multiple stepwise regression analysis, we concluded that active $NaHCO_3\text{-Pi}$ was the main AP source. It was suggested that more attention should be paid to the ratio of small particle size aggregates, so as to increase soil AP storage. At low (3009 m) and high altitude (3980 m), inorganic P fertilizer and P activator were added into soil to improve the activation ability of soil P and the AP supply, so as to promote the healthy development of slope soils ecosystem.

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