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PELTOVUORI, TOMMI,
Phosphorus extractability in surface soil samples as affected by mixing with subsoil

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Abstract

Samples taken from the plow layer (Ap horizon) and subsoil (B horizon) of six cultivated soil profiles were analyzed as original mixtures containing 25% or 50% material from the B horizon. Acid ammonium acetate extractable phosphorus, degree of phosphorus (DPS), and a phosphorus Q/I-plot were determined for each sample and mixture to evaluate the effect of bulking of dissimilar materials and to assess the possibilities of reducing P solubility in P-enriched surface soils. The results obtained for the mixtures were compared with mass-weighted average results of the original samples. Measured values of DPS corresponded well and those of acetate-extractable P reasonably well to the estimated values, and the results were linearly correlated with the mass fraction of horizon B material in the samples ($r^2 > 0.85$). Water-extractable P behaved dissimilarly; the equilibrium P concentration (EPC) estimated from the Q/I-plots decreased dramatically when the fraction of highly sorptive horizon B material increased in the mixture. The marked effect of subsoil material on EPC values may provide a technique to reduce potential losses of soluble P by deep tillage.

Contact tommi.peltovuori@helsinki.fi

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