

Phosphorus Forms Distribution in Various Composts

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Abstract

Unidirectional flow of phosphorus (P) from limited phosphate rock is unsustainable in the long term. Recovery of alternative P-rich resources for agricultural use is highly demanded. Composting is a widely used method for treatment of large variety of organic wastes. One of less utilised organic feedstocks for composting is fish waste - by-catch fish, low quality fish and fish residues from the fishing sites and fishing processing industries. Since fish waste has high nutrient content, including P, it has great potential to be processed into nutrient-rich fertiliser and/or soil improver to promote plant growth. Nutrient concentration in compost depends on the original organic material, different composts contain different amount of P and different relative distribution of P compounds. This affects how readily plants can absorb P from the compost-amended soil. The aim of this study was to investigate P content and P forms in the fish waste compost and compare the results to different composts, which were made from sewage sludge, green waste and horse manure. Six forms of P (labile; bound to reducible metals (iron, manganese); bound to non-reducible metals (aluminium); bound to easily degradable organic material; and bound to calcium) were determined using sequential method of Rydin (2000). Results indicated that fish waste compost had relatively high proportion of labile P, suggesting good biological availability of fish compost P. Considering that labile P has a potential to be leached into the water stream, it is important to monitor that fish waste compost is not overdosed and plants are able to absorb the nutrients added to the soil. For comparison, sewage sludge compost contained the highest concentration of total P per dry weight unit, but it was predominantly in iron- or aluminium-bound forms, that is not as bioavailable as labile P. Our study suggests that evaluation of composts as alternative P sources in agriculture should rely not only on total P concentration but, additionally, on relative distribution of P forms in the compost.

Keywords: Sequential fractionation, fish waste, sewage sludge, manure, green waste

References

Rydin, E. (2000). Potentially mobile phosphorus in Lake Erken sediment. *Water Research*, 34(7), 2037-2042.

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