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Assessment of Inorganic Phosphorus Fractions of Fruits and Vegetable Dumpsite Soils as a Strategy for Mitigating Eutrophication Hazard

[*1]Solomon, Rejoice Ibrahim; [2]Binamem, Simon; [3]Musa, Aishatu Mala, [4]Shehu, Yusuf

[*1,2,3]Modibbo Adama University, Yola, Nigeria
[4]Ahmadu Bello University, Zaria, Nigeria

Abstract

Phosphorus is essential for plant growth, but mishandling phosphorus-rich waste can harm the environment. This study assessed inorganic phosphorus in fruit and vegetable dumpsite soils and its relation to soil properties. Soil samples were collected from the study site using simple random sampling at depths of 0-15cm, 15-30cm, and 30-60cm and were analyzed for calcium-bound phosphorus (Ca-P), reductant soluble phosphorus (RS-P), Fe-bound Phosphorus (Fe-P), aluminium-bound phosphorus (Al-P), and Soluble/loosely bound P. The data obtained was analyzed using the student's t-test to compare the different fractions in fruit and vegetable dumpsite soils. The results showed no significant differences between fruit and vegetable dumpsite soils in all the inorganic P fractions. However, vegetable dumpsite soils recorded higher soluble P, Al-P, Fe-P, RS-P, and Ca-P levels of 11.65, 36.29, 41.95, 40.75, and 41.35 mg/kg, respectively. These values were not significantly different from 9.75, 34.01, 39.28, 37.11 and 41.03 mg/kg recorded by fruit dumpsite soil for soluble P, Al-P, Fe-P, RS-P and Ca-P respectively. Also, the concentration of the inorganic P fractions for vegetable dumpsite soil is in the order; Fe-P> Ca-P>RS-P>Al-P>soluble P, while that of fruit dumpsite soil is in the order; Ca-P>Fe-P> RS-P>Al-P>soluble P. Soluble phosphorus significantly impacts eutrophication due to its rapid release into water. However, low levels of soluble P in fruit and vegetable dumpsite soils are not a major concern. In vegetable dumpsite soil, Fe-P would pose a greater threat during anoxic events while, in fruit dumpsite soil, Ca-P would contribute more to eutrophication due to its high concentration in this soil, especially in alkaline conditions.

Keywords: *Fruit and Vegetable; Dumpsite soils; Inorganic phosphorus fractions; Eutrophication; Nigeria*