

Valorization of rare earth processing byproducts for agriculture usage

ABSTRACT

Sandy texture soil, a major problem for agriculture requires structure and capacity improvements. However, utilization of soil conditioner may arrest this problem. This research was carried out to investigate the accumulated levels of metal ions and radionuclides in water, soil and plants following phosphogypsum organic (PG organic) added to a sandy soil for 23-month in 3 cropping seasons. The condition in the field was simulated in the laboratory using an open leaching column for 30-day under constant but different pH of leachant. More ions were released at $\text{pH} < 4.6$ and decreases greatly at $\text{pH} > 5.6$. The metal ions measured in the surface and borehole water, and soils were below the target values for respective standard raw drinking water. The metal ions did not accumulate in soil, plant and grain, and water as indicated by biological accumulation coefficients, contamination factors, I-geo index and pollution load index in a sandy soil that received the PG organic. Naturally occurring radionuclide concentrations, such as ^{226}Ra , ^{228}Ra , and ^{40}K , in soil and plant tissue were found to be lower than the average value reported by several earlier studies. Under field condition the pH of water (i.e., rainfall) was greater than pH 5.6, thus renders PG organic became less soluble. There was no leaching of natural occurring radionuclides to the groundwater. Therefore, the application of PG organic to the studied soil had no impact on the soil, plants, and water and suitable as a soil conditioner in sandy texture soils.