

Title: Assessment of radioactivity level and associated radiological hazard in fertilizer from Dhaka

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Abstract: Miners, factory workers, traders, end-users, and foodstuff consumers all run the risk of encountering health hazards derived from the presence of elevated levels of radiation in fertilizers, as these groups often come into direct or indirect contact with fertilizers as well as raw materials throughout various linked processes such as mineral extractions, fertilizer production, agricultural practices. A total of 30 samples of various kinds of fertilizer produced in different factories in Dhaka megacity were analyzed to quantify the concentrations of primordial radionuclides using HPGe detector. Among the analyzed samples, average (range) concentration of ^{40}K was found to be 9920 ± 1091 (8700 ± 957 – $11,500 \pm 1265$), 9100 ± 1001 (8600 ± 946 – 9600 ± 1056), 2565 ± 282 (2540 ± 279 – 2590 ± 285), and 3560 ± 392 (2620 ± 288 – 4500 ± 495) Bq/kg in the samples of Muriate of Potash Fertilizer, Sulphate of Potash Fertilizer, Humic Acid Fertilizer, and NPKS Fertilizer, respectively. Elevated concentration of ^{226}Ra was found in Triple Super Phosphate Fertilizer with a mean (range) of 335 ± 37 (290 ± 32 – 380 ± 42) Bq/kg. The higher activity of ^{40}K can be linked to the greater levels of elemental potassium in phosphate fertilizer. Elevated concentrations of radionuclides may also result from variations in chemical processes as well as the local geology of the mining areas where the raw materials were extracted for fertilizer production. Numerous fertilizer brands surpass prescribed limits for various hazardous parameters, presenting significant health risks to factory workers, farmers, and consumers of agricultural products. This study provides baseline information on the radioactivity of fertilizers, which could be used to develop mitigation methods, establish national fertilizer usage limits, justify regulatory frameworks, and raise public awareness of fertilizer overuse. The findings of the study could potentially help to explore the impact of fertilizer on the food chain.

Keywords: Chemical Safety, Nuclear Waste, Radiation Dosimetry and Protection.

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