

Analyzing the Contamination of Some Food Crops Due to Mineral Deposits in Ondo State, Nigeria

Authors : Alexander Chinyere Nwankpa, Nneka Ngozi Nwankpa

Abstract : In Nigeria, the Federal government is trying to make sure that everyone has access to enough food that is nutritiously adequate and safe. But in the southwest of Nigeria, notably in Ondo State, the most valuable minerals such as oil and gas, bitumen, kaolin, limestone talc, columbite, tin, gold, coal, and phosphate are abundant. Therefore, some regions of Ondo State are now linked to large quantities of natural radioactivity as a result of the mineral presence. In this work, the baseline radioactivity levels in some of the most important food crops in Ondo State were analyzed, allowing for the prediction of probable radiological health impacts. To this effect, maize (*Zea mays*), yam (*Dioscorea alata*) and cassava (*Manihot esculenta*) tubers were collected from the farmlands in the State because they make up the majority of food's nutritional needs. Ondo State was divided into eight zones in order to provide comprehensive coverage of the research region. At room temperature, the maize (*Zea mays*), yam (*Dioscorea alata*), and cassava (*Manihot esculenta*) samples were dried until they reached a consistent weight. They were pulverized, homogenized, and 250 g packed in a 1-liter Marinelli beaker and kept for 28 days to achieve secular equilibrium. The activity concentrations of Radium-226 (Ra-226), Thorium-232 (Th-232), and Potassium-40 (K-40) were determined in the food samples using Gamma-ray spectrometry. Firstly, the Hyper Pure Germanium detector was calibrated using standard radioactive sources. The gamma counting, which lasted for 36000s for each sample, was carried out in the Centre for Energy Research and Development, Obafemi Awolowo University, Ile-Ife, Nigeria. The mean activity concentration of Ra-226, Th-232 and K-40 for yam were 1.91 ± 0.10 Bq/kg, 2.34 ± 0.21 Bq/kg and 48.84 ± 3.14 Bq/kg, respectively. The content of the radionuclides in maize gave a mean value of 2.83 ± 0.21 Bq/kg for Ra-226, 2.19 ± 0.07 Bq/kg for Th-232 and 41.11 ± 2.16 Bq/kg for K-40. The mean activity concentrations in cassava were 2.52 ± 0.31 Bq/kg for Ra-226, 1.94 ± 0.21 Bq/kg for Th-232 and 45.12 ± 3.31 Bq/kg for K-40. The average committed effective doses in zones 6-8 were $0.55 \mu\text{Sv/y}$ for the consumption of yam, $0.39 \mu\text{Sv/y}$ for maize, and $0.49 \mu\text{Sv/y}$ for cassava. These values are higher than the annual dose guideline of $0.35 \mu\text{Sv/y}$ for the general public. Therefore, the values obtained in this work show that there is radiological contamination of some foodstuffs consumed in some parts of Ondo State. However, we recommend that systematic and appropriate methods also need to be established for the measurement of gamma-emitting radionuclides since these constitute important contributors to the internal exposure of man through ingestion, inhalation, or wound on the body.

Keywords : contamination, environment, radioactivity, radionuclides

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