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Title: Estimation of the concurrent radiological dosage to humans due to the transfer of ^{226}Ra , ^{228}Ra , and ^{40}K from soil-to-Malaysian traditional medicinal plants

Abstract:

Medicinal plants have been incorporated into various traditional medicine systems worldwide to reduce disease risk, treat illnesses, and provide medicinal remedies. Today, the pharmaceutical industry uses the most active plant compounds in drug synthesis. Possible high levels of naturally occurring radionuclides in medicinal plants have raised public concern about the consequent radiological impact on the consumption of medicinal plants and herbs. This paper reports the first study of soil-to-plant mobilities of natural radionuclides in native medicinal plants in Malaysia. Representative samples of soils and organically grown traditional medicinal plants from western Malaysia were collected and studied using HPGe gamma-ray spectrometry. Average activity concentrations for ^{226}Ra , ^{228}Ra , and ^{40}K in the soils are respectively 57, 84, and 520 Bq/kg, and the respective values in the medicinal plants are 10, 4, and 498 Bq/kg. The respective transfer factors (TFs) for the medicinal leaves are 0.18, 0.05, and 1.18. The TFs of ^{40}K were higher than others due to higher uptake and its essentiality in plant growth. These findings indicate that plant growth habits greatly influenced the radionuclides' uptake. The radioactivities in soils and their corresponding mobilities are in accordance with literature data. To discard any radiological hazards to human health, the estimated threshold consumption rate is found to be approximately 46 kg/y. Annual effective doses and excess lifetime cancer risk for adult members of the public due to the consumption of medicinal plants are found to be negligible. It is suggested that the use of traditional medicinal plants may provide a risk-free and safe means of maintaining public health.

Keywords: Medicinal Plants, Natural Radionuclides, Radiological Impact, Soil-to-Plant Mobility, Health Risk Assessment, Traditional Medicine

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