

Title: Radionuclides transfer from soil-to-tea leaves and concomitant doses to the Malaysian populace

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Abstract: One of the most well-liked energizing drinks is now tea, which is primarily used in Malaysia. The [natural radioactivity](#) in the associated soils where [tea plants](#) are cultivated plays a major role in determining the presence of [radionuclides](#) in tea leaves. The present study assesses the transfer of [radionuclides](#) from soil-to-tea leaves and then estimates the committed effective doses through tea consumption. Tea leaves and the associated soils were obtained from the largest tea plantation area, which is located in the Cameron Highlands, Malaysia. The marketed tea leaves in powdered form were obtained from the supermarkets in Kuala Lumpur. HPGe gamma-ray spectrometry was used to determine the prevailing concentrations of long-lived radioactive materials in tea leaves. Activity concentrations of ^{226}Ra , ^{232}Th , and ^{40}K in tea soils ranged from 49 to 101.7 Bq kg⁻¹, 74.5–124.1 Bq kg⁻¹ and 79.6–423.2 Bq kg⁻¹, respectively, while the respective values in tea leaves are 14.4–23.8 Bq kg⁻¹, 12.9–29.5 Bq kg⁻¹ and 297–387.5 Bq kg⁻¹. Transfer factors of radionuclides showed typical values (<1.0) except for the ^{40}K . The threshold tea consumption rates suggest that one should not consume more than 67 g of tea leaves per day (around 4 g of tea leaves are needed for making 1 cup of tea, so 17 cups per day) to avoid negative health effects. Committed effective doses due to tea consumption are found to be lower (5.18–6.08 μSv y⁻¹) than the United Nations Scientific Committee on the Effects of Atomic Radiation (2000) reference dose guidance limit of 290 μSv y⁻¹ for foodstuffs; however, it should be noted that the guidance limit is recommended for all foodstuffs collectively. Providing data on [natural radioactivity](#) in tea leaves grown in Malaysia, this study may help people manage a healthy lifestyle.

Key words: Cameron Highlands, Malaysia Committed effective dose Transfer factor Food safety assessment Environmental radioactivity

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