

Committed Effective Dose by Ingestion Food Grown in Pedra Branca State Park

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Introduction

Pedra Branca State Park (PEPB) is a conservation unit located in the municipality of Rio de Janeiro. Its geological formation is made up of a group of rocks with different lithologies, that presuppose higher concentrations of natural radionuclides [1]. This work aimed to calculate the concentrations activity of ⁴⁰K, ²²⁶Ra, ²²⁸Ra and ²²⁸Th present in some organic foods grown in this location and the effective dose due to their ingestion.

Methodology

Six organic foods from PEPB were homogenized and, *in natura*, stored in a 500 mL polypropylene container in the freezer. The Figure shows two samples prepared for analysis.



Figure: Organic pineapple and khaki samples

The radiation spectra were obtained using a vertical HPGe detector. The Genie 2000 software was used to simulate the efficiencies as well as the values of the corrections due to self-attenuation. Activity concentrations were determined considering the simulated detection efficiencies. The effective dose was calculated based on the annual food consumption published by the IBGE [2] and the dose coefficient from the ICRP [3].

Results

The following table displays the values for

the activity concentration of ⁴⁰K and the effective dose due to the ingestion of organic foods.

Table: Activity concentration of ⁴⁰K and effective dose

Sample	Activity Concentration (Bq.kg ⁻¹)	Effective dose (μSv.year ⁻¹)
Avocado	74 ± 12	1.480
Cabbage	81 ± 13	0.221
Carrot	102 ± 15	0.207
Khaki	33 ± 06	0.659
Pineapple	26 ± 05	0.0636
Red onion	65 ± 10	0.293

The avocado exhibited the highest effective dose. The activity concentrations of ²²⁶Ra, ²²⁸Ra and ²²⁸Th showed values below the minimum detectable activity in all samples.

Conclusions

The estimated values for doses due to ingestion are within the limits established by the ICRP. Thus, the consumption of these organic foods grown in the PEPB is safe from a radiological point of view.

Acknowledgments

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References

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