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Gamma radionuclides in tobacco plant processing

Sylwia Wójcik, Katarzyna Szarłowicz

AGH University of Krakow, Faculty of Energy and Fuels, Department of Nuclear Energy and Radiochemistry

1. INTRODUCTION

- Tobacco as a plant tends to absorb radionuclides from the environment.
- Tobacco absorbs radionuclides from fertilizers.
- The most prevalent types of tobacco include Virginia, Burley, Maryland, Oriental, Latakie, Perique, and Rustica.
- By-products of tobacco cultivation are tobacco vein and tobacco dust.
- Tobacco cultivation is mainly for the production of various tobacco products.

2. AIM

- This study aimed to ascertain the concentration of selected gamma radionuclides in Virginia tobacco, Burley tobacco, tobacco vein, and tobacco dust.

Fig.1. Samples for analysis

- A gamma spectrometer (BE3830) was used to identify gamma radionuclides such as: ^{137}Cs, ^{40}K, ^{228}Th, ^{228}Ra, ^{226}Ra, ^{210}Pb, ^{238}U, ^{235}U and ^{241}Am.

Fig.2. Tobacco field

3. RESULTS

Tab.1. The concentration of chosen radionuclides

Products/ Radionuclides [Bq·kg^{-1}]	**Tobacco Virginia**	**Tobacco Burley**	**Tobacco vein**	**Tobacco dust**
^{40}K	614 ± 14	592 ± 12	1766 ± 21	545.0 ± 9.8
^{137}Cs	MDA	MDA	MDA	4.15 ± 0.39
^{228}Th	MDA	MDA	MDA	9.0 ± 1.7
^{226}Ra	MDA	MDA	MDA	12.4 ± 1.8
^{210}Pb	MDA	MDA	MDA	317 ± 18
^{238}U	MDA	MDA	MDA	MDA

4. SUMMARY

- Within the desiccated tobacco samples, concentrations of the naturally occurring radionuclide ^{40}K were recorded, while the remaining radioactive isotopes exhibited concentrations at the Minimum Detectable Activity (MDA) threshold.
- As a by-product, tobacco dust contains significantly more gamma radionuclides than tobacco vein. Tobacco dust is a by-product that is not further processed.
- ^{40}K present in each product in varying amounts.
- The concentration of radionuclides in tobacco is also influenced by the environment in which the plant develops. The type of soil and the fertilizers used to grow tobacco.
- The content of gamma radionuclides in products during tobacco cultivation and processing is significant for environmental protection and human safety. The level of radiological exposure should be controlled, especially due to the increased risk of ionizing radiation exposure.

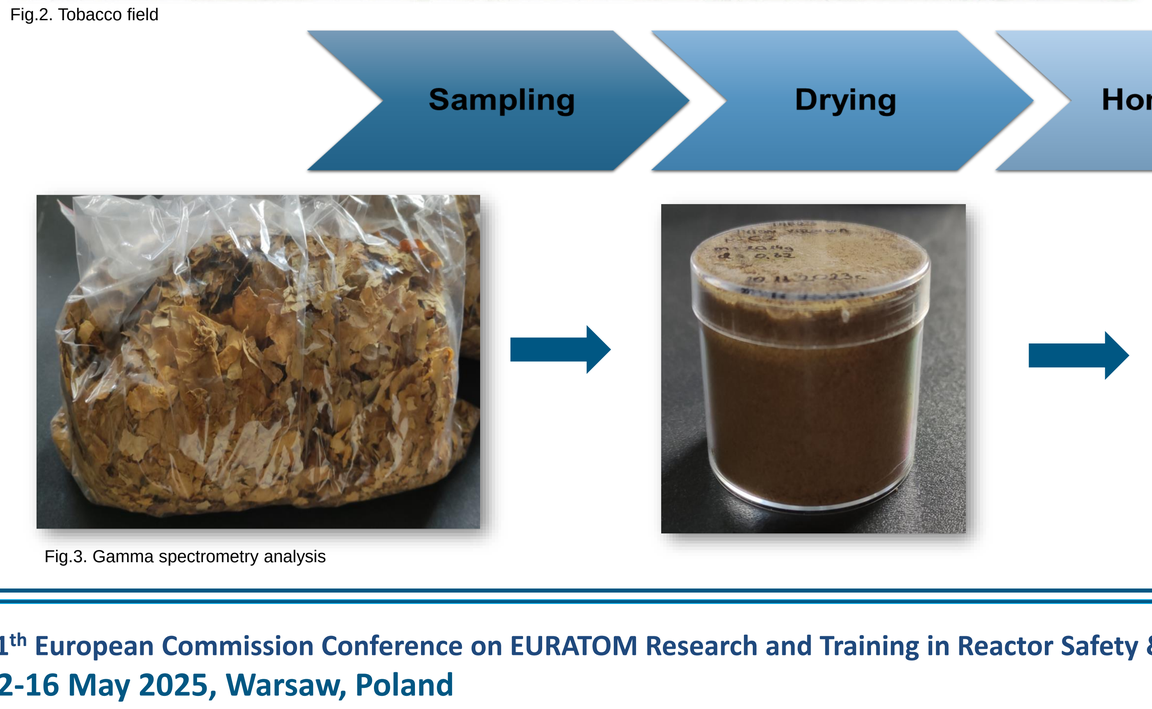

Fig.3. Gamma spectrometry analysis

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