Gamma radionuclides in tobacco plant processing

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Tobacco constitutes a spring, annual plant cultivated in diverse soils with suitable agricultural methodologies. This plant encompasses numerous types and varieties. The most prevalent types of tobacco include Virginia, Burley, Maryland, Oriental, Latakie, Perique, and Rustica. The Virginia variant is esteemed for its meticulous selection and drying process, as well as its elevated sugar content. Conversely, Burley contains a minimal sugar amount and is noted for its significant height and broad leaves. Maryland is characterized by a low nicotine level and a neutral taste. The remaining types, Oriental, Latakie, Perique, and Rustica, are distinguished by their pronounced aroma. The conducted research incorporated two major tobacco types: Virginia and Burley, derived from different levels of the plant. Besides the tobacco itself, tobacco dust and tobacco vein, regarded as by-products in the processing procedure, were also examined. Tobacco vein may be utilized in producing tobacco plugs, whereas tobacco dust is gathered and disposed of. This study aimed to ascertain the concentration of selected gamma radionuclides in Virginia tobacco, Burley tobacco, tobacco vein, and tobacco dust. The samples were analyzed for the presence of the following gamma radionuclides: ^{137}Cs, ^{40}K, ^{228}Th, ^{228}Ra, ^{226}Ra, ^{210}Pb, ^{238}U, ^{235}U, and ^{241}Am. A gamma spectrometer (model BE3830) was employed for identification. The gamma radionuclide concentrations displayed variability. In tobacco, the average levels of ^{137}Cs and ^{238}U were observed at the MDA (Minimum Detectable Activity) threshold. Concerning the by-products, the average level of ^{137}Cs was 2.07 ± 0.39 Bq·kg^{-1}. The concentration of the radioisotope ^{210}Pb was determined to be 164 ± 10 Bq·kg^{-1}. Due to its morphology, tobacco is capable of absorbing substantial quantities of radionuclides from the atmosphere. It is the primary plant from which most tobacco products currently in use are manufactured. Additionally, by-products from tobacco processing, including tobacco itself, significantly impact the environment and human populations, who are inherently intertwined with it. The radionuclide concentration within individual products is influenced by an array of factors, such as the tobacco type, the processing procedure, and the plant's development stage during cultivation.

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