DETERMINATION OF THE CONTENT OF HEAVY METALS IN SAMPLES OF STERILIZED VEGETABLES: PEAS AND GREEN BEANS ON THE MARKET OF THE REPUBLIC OF SRPSKA

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Abstract

Heavy metals are natural components of the Earth's crust. They are highly persistent, so the total amount of their emissions from both natural and human technological activities accumulates in the soil and water. Due to their persistence, high toxicity, and tendency to accumulate in ecosystems, heavy metals pose a threat to living organisms. The aim of this paper is to determine contents of heavy metals-arsenic, cadmium, chromium, copper, iron, nickel, manganese, lead, tin, and zinc—in samples of sterilized vegetables: peas and green beans, packaged in white tin cans from different manufacturers on the market of the Republic of Srpska. The samples were mechanically homogenized and then dissolved using microwave digestion with the addition of HNO_3 and H_2O_2 (9:1) in a Milestone ETHOS device. Heavy metal content was determined by optical emission spectroscopy with inductively coupled plasma (ICP-OES Shimadzu 9820). In the tested samples (1-3 sterilized peas; 4-6 sterilized green beans), the arsenic content was 0.1066-0.2713 mg/kg for sterilized peas, 0.1532-0.1997 mg/kg for sterilized green beans, cadmium 0.0291-0.0371mg/kg for sterilized peas, 0.0252-0.0322 mg/kg for sterilized green beans and zinc 15.6214-17.1989 mg/kg for sterilized peas, 12.5842-14.3345mg/kg for sterilized green beans. The content of copper was 3.4183-4.4987 mg/kg for sterilized peas, 3.9921-4.5641mg/kg for sterilized beans, iron 16,3141-26.1358 mg/kg for sterilized peas, 31.3026-38,8898mg/kg for sterilized green beans, and nickel 0.2035-0.2083 mg/kg for sterilized peas, 0.0850-0.1850 mg/kg for sterilized geen beans. The content of manganese was 6.1358-10.0002 mg/kg for sterilized peas, 8.8898-11.4111 mg/kg for sterilized green beans and lead 0.1271-0.1515 mg/kg for sterilized peas and 0.1213-01841 mg/kg for sterilized green beans. In all samples concentrations was within the permissible limits prescribed by domestic and European Union regulations. White tin is the most used material for packaging food products. In the tested samples, the content of tin 113.1459-124.8616 for sterilized peas, 124.2135-145.0031mg/kg for sterilized green beans and chromium 0.0081-0.0095 mg/kg for sterilized peas, 0.0085-0.0105 mg/kg for sterilized green beans was very low, confirming that there is no interaction between the contents of the can and the passivation film, that is, that the packaging - cans in perfect condition. The obtained results indicate that the content of heavy metals is lower than the maximum prescribed by national regulations, namely the Rulebook on Maximum Amounts of Certain Contaminants ("Official Gazette of BA", No. 68/14, 79/16, 84/18).

Keywords: *peas, green beans, sterilization, white tin, microwave digestion, ICP-OES.*