



## Accumulation and distribution of toxic and potentially toxic elements in potato on different types of soil

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Potato is currently the third most significant crop culture in the world, with the production of over 388 million tons in 2016. This crop is present on the tables of Serbian consumers throughout the year because of the tradition and its affordable price. Serbia has relatively good climatic conditions for potato production, which are defined by the temperature regime and the amount and frequency of precipitation. The nutritive value of the potato is mainly attributed to the chemical composition of the tuber. The element composition of tubers depends on many factors, such as: genotype, developmental phase of the plant, agroecological conditions, chemical properties of soil, fertilization and irrigation. On the other hand, geochemical origin of trace elements in the soil, the intensive agriculture production, use of contaminated soil and irrigation water may increase their toxic levels in tubers.

Potato tubers of five varieties were produced on commercial farms at two locations in Western Serbia (Guča and Sjenica), with favorable agroecological conditions for potato production. Tuber samples of studied varieties from each location were collected at the end of growing seasons at the stage of physiological maturity. Soil samples were collected from several sites at each production location at the depth of 0–30 cm. Basic agrochemical properties of the soil samples were determined. Content of toxic (As, Cd, Pb) and potentially toxic (Al, Ba, Ni, V) elements in fresh tubers (peel and core) and soil samples was established by inductively coupled plasma–optical emission spectrometry (ICP–OES). Bioaccumulation factor (BAF) of each studied element, as the ratio between its content in the peel and in the core of the tuber and the soil, was calculated.

According to pH values, 4.77 and 6.80, soils were classified as very acidic (Guča location) and slightly acidic (Sjenica location), respectively. Content of studied trace elements in soils, with the exception of Ni, was within the allowable limits. Tuber peel of all studied varieties grown on both soil types was characterized with the higher content of Cd, Al, Ba and Ni, compared to the relevant core. Consequently, the higher values of BAF were observed in the peel of tubers. Average values of BAF for the studied elements in the peel for both soil pH values 4.77 and 6.80 (Guča and Sjenica, respectively) were in the following order: Cd>Ba>Pb>As>Ni>Al=V. On the other hand, average BAF values for the core of the tuber samples were in a slightly different order, depending on the soil pH; Cd>Pb>As>Ba=Ni>Al=V (pH 4.77) and Cd>Pb>As>Ba=Ni>V (pH 6.80). The highest/lowest BAFs

were calculated for Cd (0.339) in the peel and Al (0.0002) in the core, respectively. Content of As and Cd did not exceed the maximum allowed concentrations set by the national and European Union regulations, but it should be pointed out that Cd content was close to the upper limit. Also, it was noticed that the content of Pb exceeded the safe limit set for these elements according to both regulations.

Keywords: potato tuber, soil, toxic elements, ICP

Acknowledgement: This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Research grant No. 46009).