

Arsenic speciation in Hungarian wheat by HPLC- ICP- MS

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The arsenic (As) is the most toxic semi-metal element, which is dangerous for the human body and other organism. Although these days the arsenic poisonings are reduced, it occurs sometimes in the world. The individual sensitivity for toxic effect of arsenic can be very different. High tolerance level of arsenic can increase continuously in human body, which can exceed the toxic level several times.

Natural high concentration of arsenic occurs in deeper levels of groundwater. Arsenic contamination of ground water is found in many countries throughout the world, including some geography areas of Hungary as well. Arsenic and its compounds are used as pesticides, herbicides, insecticides in the agriculture cultivation.

The toxicity of arsenic compounds is different therefore necessary to determinate total arsenic and its species. Actually there is bigger calm to determination of arsenic species separately all over the world, therefore more and more laboratories, as Central Agricultural Office Food and Feed Safety Directorate, adopt the modern speciation techniques to their routine methods.

First step in our laboratory was developing the coupled HPLC-ICP-MS technique for arsenic speciation in fish, rice and wheat samples. Early results shown the total arsenic concentration is higher in the marine fish and rice than wheat. This higher arsenic concentration was in organic form which is a smaller risk than inorganic As (III) or As (V). Another part of this project to determinate any coherence between the different types of Hungarian wheat and different nitrogen treatment and up-taken arsenic levels including species too.

Experiments were carried out on a winter wheat stand grown on chernozem soil with brown forest residues in Martonvásár during 2007/2008. In the two-factor long-term experiment the effect of fertilisation and genotype was studied in a crop rotation where winter wheat was grown after pea. In the split-plot design the N treatments (0, 80, 160, 240 kg ha⁻¹) were in the main plot and the variety (Mv Toborzó – extra early, Mv Palotás – early, Mv Verbunkos – medium early) in the subplot.

Microwave (Milestone Ethos Plus) assisted digestion was used for total arsenic determination and water and enzymatic (*α-amylase*) extractions were used for speciation as sample preparation. Surveyor HPLC system was coupled to the quadrupole ICP-MS (Thermo Elemental X Series). Hamilton PRP 100 anion exchange column was used for the separation of the arsenic species (As III, As V, AB, MMA, DMA) with 20 and 200 mM ammonium carbonate solution.