The **Food Chemistry and Analytics Department** is part of the **Institute of Food Science and Technology** at the Hungarian University of Agricultural and Life Sciences. Our organisational unit conducts both educational (general and bioinorganic chemistry, organic and biochemistry, food analytics, separation techniques, spectroscopy, analytical quality assessment of food, pesticide chemistry) and research activities related to the quality and safety of food and environmental matrices.

The lead researcher participating in this project is Csilla Sörös, who specialises in the determination of hazardous substances, including pesticides, mycotoxins, PFAS, toxic alkaloids, and surfactants. She employs targeted instrumental analytical methods such as UHPLC-MS/MS, along with isotope-labelled calibration techniques. Analytical methods are validated according to international guidelines (e.g., SANTE, 2021). She also develops sample preparation techniques, including dilute-and-shoot, QuEChERS, QuPPe, and SPE. Matrices under investigation include environmental samples, food samples, surface water, and drinking water.

Principal Investigator:

Dr. Csilla Sörös graduated as a pharmacist from Semmelweis Medical University in Budapest and subsequently joined the analytical division of Richter Gedeon Pharmaceutical Factory. There, she performed instrumental analytical tasks related to cleaning validation. She then began her PhD studies at the Hungarian University of Agriculture and Life Sciences (MATE), earning her doctorate in arsenic speciation analysis in 2006. Since then, she has been employed at the University and currently works as an **associate professor**.

She is the responsible instructor for two subjects, namely Organic and Biochemistry (Food Engineer BSc and Bioengineer BSc programs) and Pesticide Chemistry (Plant Protection MSc program). Additionally, she provides practical training in other courses, such as HPLC laboratory for Separation Techniques and multi-pesticide and PFAS analysis for Analytical Classification of Foodstuffs (Food Quality and Safety Engineer MSc program).

Her research focuses on multicomponent analysis (e.g., pesticide residues and mycotoxins) in food and environmental matrices using coupled instrumental techniques, such as UHPLC-MS/MS or HPLC-UV/FLD. She also works on pesticide formulation, with particular emphasis on adhesion-enhancing adjuvants and efficacy-improving formulation research.

Scopus ID: 9744913800. Publications: https://www.researchgate.net/profile/Csilla-Soeroes

Main scientific tasks in the project:

Csilla Sörös's primary responsibility within Work Package 2 of the project is assessing mycotoxin contamination in sorghum. For this task, she will analyse sorghum samples collected from various climates for multi-mycotoxin profiles, thereby comparing whether sorghum mycotoxin profiles show characteristic differences relative to maize or other crops. The analytical group will determine, from a risk assessment perspective, whether sorghum cultivation offers opportunities for broader use in feed and food production relative to other crops. For these analyses, they will develop a targeted UHPLC-MS/MS analytical method capable of detecting >20 mycotoxins, including emerging toxins and their metabolites. For quantification, isotopically labelled toxin variants will be used. The developed method fully addresses all analytical questions arising in the project and will also be applied to other matrices and to any research tasks that emerge during the work.

"Through this collaboration, we are establishing a 'toxin competence centre' in Hungary and, even more widely, the Central European region. This involves developing laboratory expertise to map mycotoxin profiles in various agricultural samples (feed and food) using a validated multi-toxin analytical approach. It is important to emphasise that our method enables the quantitative determination not only of regulated toxins (those with established threshold limits) but also of newly detected or emerging toxins, such as MON, NIV, and BEA. The project specifically focuses on characterising the food and feed safety profile of sorghum, a crop that may replace maize in both feed and food applications in Central Europe due to climate change, thereby providing critical food safety data. Our analytical method can also detect specific toxin metabolites. This opens up future possibilities for research extensions, such as studying transformation processes during food processing or investigating the deconjugation of metabolites during digestion. These advanced capabilities are being established through this project."