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EC Interlaboratory Comparison on Radionuclides in Dried Bilberries

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The Euratom Treaty obliges Member States of the European Union to perform measurements of the radioactivity on their territories and to report the results to the European Commission. Therefore, regular European comparisons are conducted in order to verify the performance of the monitoring laboratories. In 2011, the Institute for Reference Materials and Measurements (IRMM) organised an interlaboratory comparison (ILC) for the activity concentrations of three radionuclides (40K, 90Sr, 137Cs) in dried bilberry powder. The Fukushima accident underlined the importance of radioactivity monitoring in food, and the need for comparisons and proficiency tests as a tool to provide reliable measurement results.

The candidate reference material IRMM-426 Wild Berries was used as a testing material. The berries were collected in the region affected by the Chernobyl accident. Due to the natural uptake from elevated levels in the environment, the radionuclides 137Cs and 90Sr were metabolised by the plants, hence no spiking was required. The material was processed at IRMM and the reference values traceable to SI units and SIR were established in the CCRI(II) supplementary comparison in which nine National Metrology Institutes participated [1].

In total, 88 monitoring laboratories participated in this ILC. They were free to use methods of their own choice, preferably the routine procedures used in their laboratories. The measurement procedures used by the participants are discussed in this paper in an overview of methods. The results of the participating laboratories were evaluated versus the reference values. A robust evaluation of the performance of individual laboratories was performed using relative deviations and En numbers [2].

The activity concentrations of 137Cs and 40K were determined almost exclusively by gamma-ray spectrometry with 9 % and 18 % of results deviating more than 20 % from the reference values of (772 +/- 32) Bq•kg-1 and (250 +/- 17) Bq•kg-1, respectively. These results are worse in comparison to previous ILCs. This may be due to the food matrix and inappropriate use of corrections for differences in density and/or geometry between sample and standard sources of activity. In the case of 90Sr, about 77 % of results lie within 20 % from the reference value of (153 +/- 8) Bq•kg-1 and 69 % of results are En compatible. This is much more favourable than observed in previous exercises.

This comparison demonstrates that several laboratories have difficulties to determine activity concentrations of 137Cs and 40K in food samples. The relative success in the 90Sr determination might be attributed to the easier separation of strontium from the dried fruit matrix compared to milk powder or soil in earlier comparisons.

[1] U. Wätjen et al. Appl. Radiat. Isot. In press.
[2] ISO/FDIS 13528:2005(E), Statistical methods for use in proficiency testing by interlaboratory comparisons, ISO, Geneva (2005).

Primary author: Dr MEREŠOVÁ, Jana (Institute for Reference Materials and Measurements, Belgium)

Co-authors: Dr WÄTJEN, Uwe (JRC-IRMM); Dr JOBBÁGY, Viktor (JRC-IRMM)

Presenter: Dr MEREŠOVÁ, Jana (Institute for Reference Materials and Measurements, Belgium)

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