



## Determination of Pesticide Residues in Food of Plant Origin by "Multiresidue" Methods

**Ewa Szpyrka\***

*Laboratory of Pesticide Residue Analysis, Regional Experimental Station in Rzeszow, Institute of Plant Protection - National Research Institute, ul. Langiewicza 28, Poland*

**\*Corresponding Author:** Ewa Szpyrka, Laboratory of Pesticide Residue Analysis, Regional Experimental Station in Rzeszow, Institute of Plant Protection - National Research Institute, ul. Langiewicza 28, Rzeszow, Poland.

**Received:** May 25, 2017; **Published:** July 01, 2017

Crops yields are constantly affected by harmful organisms. It is essential to protect plants and plant products against such organisms in order to prevent a reduction in yield or damage to them and to ensure both the quality of the harvested products and high agricultural productivity. One of the most common methods of protecting plants and plant products from harmful organisms is the use of active substances in plant protection products. However, a possible consequence of their use may be the presence of residues in the treated products [1].

Plant protection products shall be used properly. Proper use shall include the application of the principles of good plant protection practice and compliance with the conditions specified on the labels, inter alia.: (a) the maximum dose per hectare in each application; (b) the period between the last application and harvest; (c) the maximum number of applications per year [2].

Although the protection of plants brings many benefits, pesticides are toxic to the environment and for humans [3,4].

Monitoring of pesticide residues in food and the environment is carried out all over the world [5-7].

According to the EU Pesticide Database, there are over 1300 pesticides. 488 of them are approved for use in EU countries, while over 800 are not permitted [8]. Pesticide residues are mainly determined by the "multiresidue" method, which allows the determination of a large number of compounds in one analytical procedure, while maintaining low limits of determination, usually at the level of 0.01 mg/kg.

The most commonly used approach in multiresidue pesticide analysis is:

- ◆ Using of acetonitrile as extraction solvent;
- ◆ Purifying of the extracts by dispersive solid phase extraction d-SPE;
- ◆ Determination of pesticide residues by chromatography coupled to tandem mass spectrometry;
- ◆ Calibration of detectors at multiple concentration levels

using standard solutions in the blank sample matrix;

- ◆ Reporting of results without taking into account the correction factors [9,10].

### Bibliography

1. "Regulation (EC) of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC". Off. J. L 70, with later amendments 396 (2005).
2. Regulation EC. "Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC". Off J. L 309, with later amendments, (2009): 50.
3. Rodney SI., *et al.* "Estimating the Toxicity of Pesticide Mixtures to Aquatic Organisms: A Review". *Human and Ecological Risk Assessment* 19.6 (2013): 1557-1575.
4. Karami-Mohajeri S and Abdollahi M. "Toxic influence of organophosphate, carbamate, and organochlorine pesticides on cellular metabolism of lipids, proteins, and carbohydrates: A systematic review". *Human and Experimental Toxicology* 30.9 (2010): 1119-1140.
5. Yehouenou A Pazou E., *et al.* "Health risks associated with pesticide residues in sediments, fish, and plants from the Oueme valley in the republic of Benin". *Archives of Environmental Contamination and Toxicology* 65.2 (2013): 260-265.
6. Lu JL. "Insecticide residues in eggplant fruits, soil, and water in the largest eggplant-producing area in the Philippines". *Water Air and Soil Pollution* 220.1 (2011): 413-422.
7. Lozowicka B., *et al.* "Pesticide residues in grain from Kazakhstan and potential health risks associated with exposure to detected pesticides". *Food and Chemical Toxicology* 64 (2014): 238-248.
8. EU Pesticide Database <http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=homepage&language=EN>. Accessed April 2017.

9. Final Report EURL-PROFICIENCY TEST-FV-15, 2013, Pesticide Residues in Potato Homogenate. 29.11.2013. University of Almeria, Almeria, Hiszpania.
10. Ewa Szpyrka, Izabela Kopeć. Oznaczanie pozostałości pestycydów w żywności pochodzenia roślinnego metodami „multiresidue”. XI SEMINARIUM NAUKOWE „Aktualne Problemy Chemii Analitycznej”, 12 maja 2017, Katowice, (2017): 12. <http://www.zcha.us.edu.pl/download/program%20APCh%202017.pdf>

**Volume 1 Issue 3 July 2017**

**© All rights are reserved by Ewa Szpyrka.**