



Glyphosate residues in Swiss market foods: monitoring and risk evaluation

Otmar Zoller, Peter Rhyh, Heinz Rupp, Jürg A. Zarn, Christoph Geiser

Federal Food Safety and Veterinary Office, Risk Assessment Division, Laboratories Sector, CH-3097 Liebefeld

Key words

Glyphosate; AMPA; food monitoring; risk assessment

Aim of the study

This study was conducted to:

- identify food commodities significantly contributing to the glyphosate exposure of Swiss consumers;
- perform a dietary risk assessment on the measured residues on assessed food commodities.

Material and methods

In total, 243 samples of diverse foodstuffs were purchased from retail stores, in the Berne area, Switzerland. Samples were chosen to represent a wide range of food products, but food categories like pulses and durum wheat suspected to reveal more glyphosate positive results were more frequently sampled. Samples were analyzed for glyphosate and aminomethylphosphonic acid (AMPA) using a liquid chromatography triple quadrupole mass spectrometry (LC/MS/MS) method. Data were subjected to exposure estimates and risk assessment.

Results and significance

Main contributors for dietary glyphosate intake were cereals and pulses. The results suggested that pasta is a very important foodstuff for dietary glyphosate residue intake in Switzerland. Interestingly all samples of wine, fruit juice and nearly all samples of honey tested positive for glyphosate although at very low levels:

Food category (number of samples)	proportion of samples >LOQ	mean	maximum
Baby food (11)	0 %	< 0.001	< 0.001
Meat and fish (13)	23 %	0.0008	0.0049
Eggs (1)	0 %	< 0.001	< 0.001
Flour and baking mixtures (28)	29 %	0.0106	0.133
Bread (10)	70 %	0.0069	0.0458
Pastry and snacks (11)	36 %	0.0037	0.0179
Durum wheat (18)	89 %	0.1349	0.421
Breakfast cereals (10)	80 %	0.0508	0.291
Other cereal products (13)	15 %	0.0012	0.0124
Pseudo cereals (3)	0 %	< 0.001	< 0.001
Potatoes and vegetables (10)	30 %	0.0013	0.0077
Pulses (41)	51 %	0.1733	2.948
Oil seeds and vegetable oil (6)	0 %	< 0.001	< 0.001
Honey (16)	94 %	0.0046	0.0159
Milk (3)	0 %	< 0.0005	< 0.0005
Fruit juice (11)	100 %	0.0019	0.0035
Mineral water (2)	0 %	< 0.0005	< 0.0005
Beer (15)	13 %	0.0006	0.0068
Wine (21)	100 %	0.0048	0.0189

LOQ (limit of quantification) was 0.0005 mg kg⁻¹ for milk, fruit juice, mineral water, beer and wine and 0.001 mg/kg⁻¹ for all other food categories. Values for arithmetic mean and maximum are in mg kg⁻¹

Based on the measured residues, a dietary risk assessment was conducted. Simple exposure estimates were derived and compared to the acute reference dose (ARfD) and the acceptable daily intake (ADI) as established by the European Food Safety Authority (EFSA). Estimated human exposure was below the ARfD and the ADI as well. Although rather food products were selected for the study for which high levels of glyphosate residues were expected, maximum residue levels (MRL) were never exceeded. Consequently, glyphosate residues found in the sampled foodstuffs from the Swiss market were of no concern for human health.

Data were published in a peer reviewed scientific journal, integrated in a report of the Swiss Federal Council ("Survey on the impact of glyphosate in Switzerland") and were summarized on the websites of the Federal Food Safety and Veterinary Office.

Publications, posters and presentations

Zoller O.; Rhyn P.; Rupp H.; Zarn J.A.; Geiser C. (2018) Glyphosate residues in Swiss market foods: monitoring and risk evaluation. Food Additives & Contaminants: Part B Surveillance, 2018 Jan 23:1-9.

<https://www.tandfonline.com/doi/pdf/10.1080/19393210.2017.1419509?needAccess=true>

Federal Council of the Swiss Confederation (2018) Studie über die Auswirkungen von Glyphosat in der Schweiz (Survey on the impact of glyphosate in Switzerland). Bericht des Bundesrates in Erfüllung des Postulats der nationalrätlichen Kommission für Wissenschaft, Bildung und Kultur vom 6. November 2015 (15.4084). Adopted 09.05.2018.

<https://www.news.admin.ch/news/message/attachments/52319.pdf>

Federal Food Safety and Veterinary Office (2018) Stoffe im Fokus – Glyphosat.

<https://www.blv.admin.ch/blv/de/home/lebensmittel-und-ernaehrung/lebensmittelsicherheit/stoffe-im-fokus/glyphosat.html>

Project 16GLYP

Project duration July 2016 – May 2018