

Monitoring results for surface water and groundwater

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European Glyphosate Environmental Information Source

Important Notes to users:

This document is part of a toolbox which provides independent information on the sustainable use of glyphosate. It cannot however be definitive and users must ensure that they assess local factors and particularly take account of any national or regional legislative requirements. At the end of the document reference sources used in its preparation and links to other relevant documents are provided.

Summary

This note summarises available information on detection of glyphosate and its main metabolite AMPA in surface waters and groundwater from across Europe based on a survey in 2009 (29 countries reviewed; data obtained from 16 countries, 2 started monitoring in 2009 and data were not yet available, 6 confirmed that glyphosate and AMPA were not monitored; and no information was obtained for the remaining 5). Based on this survey it was noted that Glyphosate and AMPA have been regularly reported in surface water monitoring studies conducted by several European countries although there was little evidence of any persistent and confirmed groundwater contamination. However, both for surface waters and groundwaters there was not always adequate information to fully assess the reliability of the results.

Detailed information

Survey of groundwater and surface water monitoring:

In 2009 the UK Water Research Centre (WRC) conducted a detailed survey of glyphosate and AMPA monitoring and occurrence in surface waters and groundwater across Europe (all 27 Member States plus Switzerland and Norway), including an investigation into where analyses have been carried out, an attempt to obtain any available data, and an evaluation of the reliability of the data, where possible.

In contrast to many other pesticides, glyphosate is highly water soluble and polar. Consequently it is more difficult to analyse glyphosate in water, particularly at the low concentrations of interest in the context of the EU limit for pesticides in drinking water. Nevertheless, reports of reliable analyses are increasingly appearing.

The European Drinking Water Directive 98/83/EC prescribes maximum admissible concentrations (MAC) of $0.1 \mu\text{g l}^{-1}$ for individual pesticides, and $0.5 \mu\text{g l}^{-1}$ for total pesticides, although these limits are not based on toxicological considerations, but represent a precautionary surrogate for 'zero' pesticides in drinking water. Consequently, in monitoring programmes of environmental (or source) waters, a concentration value of $0.1 \mu\text{g l}^{-1}$ is often used as a reference value for pesticide contamination, although such low levels do not usually reflect concentrations of concern in terms of either ecological or human toxicity.

It is worth noting that pesticide concentrations are much more variable in surface waters, compared with groundwater, which tends to exhibit relatively constant levels over a considerable period of time (often many years) except where aquifers are highly fractured and allow rapid surface water inflow through fissures. In surface waters, short-term peaks are likely to occur, for example due to run-off after application of pesticides followed by rainfall, thereby producing seasonal patterns linked to pesticide application. Hence, a higher sampling frequency is required to provide a conclusive picture of pesticide concentrations in river waters. However, groundwater usually requires a much longer period for recovery, once affected. Both for surface waters and groundwaters there was not always adequate information to fully assess the reliability of the results.

Occurrence in surface water

Data for surface water was obtained for 13 countries. Glyphosate and AMPA are frequently detected in surface waters, often well above the $0.1 \mu\text{g l}^{-1}$ drinking water standard, and AMPA usually at higher concentrations and in a larger proportion of samples, though it was analysed less frequently than glyphosate (see table below). Where data allows an interpretation, glyphosate detection is often linked to application periods and run-off events and does not seem to persist. The more persistent presence of AMPA in surface waters may in part be due to other sources, e.g. inputs from wastewater discharges from the degradation of aminopolyphosphonates in detergents and cooling waters, in addition to the more short-term occurrence from the degradation of glyphosate. Concentrations of glyphosate and AMPA were generally below the threshold for ecotoxicological effects.

Occurrence in groundwater

Data for glyphosate was obtained for 13 countries, AMPA for 11 countries. Glyphosate and AMPA findings in groundwater are rare and in several cases investigations have been conducted to assess the validity of the detections. When found, they occur mainly in relatively shallow groundwater, sometimes associated with isolated contamination incidents, where the information was available (see also WRC report UC 7729.04). To date, there is no evidence of any persistent and confirmed contamination of groundwater.

Glyphosate and AMPA in surface water and groundwater across Europe (1993-2009)

Water type	Year	Number of sites / samples	Samples where glyphosate detected		Samples where glyphosate $\geq 0.1 \mu\text{g l}^{-1}$	
			Number	%	Number	%
Surface water						
Glyphosate	1993-2009	$\geq 3\ 716 / \geq 50\ 805$	$\geq 14\ 704$	~29	$\geq 11\ 700$	~23
AMPA	1997-2009	$\geq 2\ 728 / \geq 33\ 612$	$\geq 17\ 119$	~50	$\geq 15\ 172$	~45
Groundwater						
Glyphosate	1993-2009	$\geq 8\ 925 / \geq 36\ 298$	≥ 482	~1.3	≥ 270	~0.7
AMPA	1993-2008	$\geq 7\ 678 / \geq 28\ 254$	≥ 478	~1.7	≥ 252	~0.9

See also:

- Environmental fate and behaviour of glyphosate and its main metabolite
- Sampling, analysis and reporting of glyphosate and AMPA in environmental samples
- Impact of glyphosate on water supply abstractions
- Aquatic ecotoxicity of glyphosate and AMPA

Reference for further detailed information:

- WRC report UC 8073.02 dated November 2009 ([Click here](#))
- WRC report UC 7729.04 dated September 2008 ([Click here](#))

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