

UK FLOUR MILLERS BRIEFING DOCUMENT

Glyphosate residues in wheat and flour

Updated January 2023

Summary

Flour customers and consumers are increasingly aware of the potential for agrochemical (pesticide) residues to enter the food chain. Each year flour millers submit milling wheat samples for agrochemical residue analyses and Defra's Expert Committee on pesticide residues in food (PRiF) also conducts a survey of residues in food. This briefing focuses on the agrochemical 'glyphosate' which repeatedly attracts media and political attention. Another briefing document 'Pesticide Residues in Wheat and Flour' covers residues from other agrochemicals.

Data from the AHDB Contaminants Monitoring Project and the PRiF survey show that in the majority of cases, glyphosate residues were absent or below the limit of detection in UK milling wheat, flour and bread samples. Where residues were present, they were always significantly below the Maximum Residue Limit (MRL).

Background

Glyphosate is a herbicide used to control a broad range of weeds in agriculture. It has been commercially available for 40 years with the formulation from Monsanto being named 'Roundup'. Glyphosate is used for non-selective weed control either applied to fallows or to stale seedbeds prior to drilling a crop. It may also be used as a desiccant to hasten the drying of cereal straw especially when the crop is slow to dry in wet harvest years. In Canada (and some other countries) glyphosate is applied pre-harvest but mainly for weed control. Glyphosate is used on farms across the world, including in the UK.

A number of genetically-modified (GM) crops are tolerant of glyphosate and are grown widely in the Americas and Asia where the herbicide may be applied several times to the growing crop. Questions have been asked about glyphosate residues for a number of years. Not only have there been suggestions of negative impacts on biodiversity and the soil fauna, but worries have also been expressed that exposure may cause health problems. These include potential carcinogenic effects relating to operator exposure rather than residues in food.

Glyphosate studies and approval

As an agrochemical, glyphosate must meet safety criteria and be registered and approved for specific uses. As one of the world's most widely used herbicides, it has attracted significant attention from activists and politicians concerned about potential impacts to the environment and consumer health. Some of the concern stems from a study in 2015 by the International Agency for Research on Cancer (IARC) which stated the agrochemical is "probably carcinogenic in humans" – Category 2A in its system, although said this was based on "limited evidence". Follow-up studies by the German Federal Institute for Risk Assessment and the European Food Safety Authority (EFSA) did not find the link between glyphosate and cancer. A 2017 study by the European Chemicals Agency (ECHA) concluded that glyphosate should not be classified as a carcinogen.

Despite conclusions by EFSA and ECHA that the use of glyphosate in agriculture was safe, the approval and renewal process in the European Union was affected and in 2017, the European Commission voted to renew its license for a shortened period of five years instead of the standard fifteen years for agrochemical active substances.

In 2018 and 2019 a number of American court cases resulted in damages paid to individuals who claimed their use of Roundup, a herbicide containing glyphosate, caused them to develop cancer. These rulings received significant media attention and there are ongoing additional court cases and appeals taking place in the US. Crucially, these cases are related to operator exposure to glyphosate, rather than exposure through consumption of residues in food. In May 2022 the ECHA concluded again that glyphosate is not carcinogenic.

In the EU, glyphosate was approved until 15 December 2022, but a one-year temporary extension to its license (until 15 December 2023) was granted to cover the period during which it remains under assessment. Following the UK's departure from the EU, the regulation of agrochemicals used in Great Britain is now a UK competency. All active substance approvals originally due to expire before December 2023, including glyphosate, were extended for three years to allow the GB regulatory process to be established. As such, in GB the approval of glyphosate has been extended until at least December 2025. Approval in Northern Ireland is subject to the EU regulatory process.

Limits for residues

There is an established EU and GB maximum residue limit (MRL) for glyphosate in grain of 10mg/kg, and the acceptable daily intake level (ADI) is 0.3mg/kg bodyweight per day. As is normal, the ADI incorporates a safety factor of 100 compared with the experimental evidence base. The WHO and US EPA currently have higher ADIs of 1.0 and 1.75mg/kg bodyweight per day.

The ADI for glyphosate established in the EU translates into 6mg per day for a 20kg child. Using the highest value of glyphosate residue found in white bread (0.5mg/kg), if this child ate 100g of bread per day (the average for an adult male) their intake would be 0.05mg – more than 100 times lower than the ADI.

Monitoring glyphosate residues in wheat

Samples of grain used by UK millers are regularly analysed for glyphosate as part of the AHDB Contaminants Monitoring Project, which assesses levels of contaminants in cereal samples destined for food and animal feed markets. The majority contain no detectable residues. The apparent increase in 2014 is associated with a reduction in the limit of detection (LOD) to 0.01mg/kg, which was subsequently revised back to 0.05mg/kg in 2015 and 0.1mg/kg in 2016. All samples were significantly below the MRL of 10mg/kg, and the majority of samples were below the LOD.

Harvest year	Samples (n)	% samples containing residue	% below MRL	Min level (mg/kg)	Max level (mg/kg)
2022	50	18%	100%	0.12	0.55
2021	51	41%	100%	0.13	1.18
2020	51	37%	100%	0.14	1.20
2019	50	18%	100%	0.11	2.21
2018	50	14%	100%	0.14	1.30
2017	50	28%	100%	0.15	0.91
2016	51	37%	100%	0.10	1.40
2015	75	30%	100%	0.05	0.92
2014	75	95%	100%	0.01	1.40
2013	76	40%	100%	0.06	2.20

Glyphosate residues in bread and flour

The UK government annually monitors the levels of agrochemical residues in bread and flour, through the Defra Expert Committee on Pesticide Residue in Food (PRiF). The large collection of data show glyphosate residues are not present in the majority of flour and bread samples, and where present, are well below the established MRL.

Bread					
Year	Samples (n)	% samples containing residue	% below MRL	Range in values for white bread (MRL 1.05 mg/kg)	Range in values for wholemeal bread (MRL 3.60 mg/kg)
2021	264	35%	100%	0.05 - 0.1	0.06 - 0.5
2020	162	20%	100%	0.05 - 0.2	0.1 - 0.2
2019	180	27%	100%	0.05 - 0.2	0.05 - 1.1
2018	144	8%	100%	0.1	0.1 - 0.7
2017	216	20%	100%	0.1	0.1 - 0.5
2016	216	13%	100%	0.1 - 0.2	0.1 - 0.5
2015	140	21%	100%	0.06 - 0.1	0.06 - 0.3
2014	204	15%	100%	0.1 - 0.2	0.1 - 0.5
2013	216	25%	100%	0.1 - 0.5	0.1 - 0.9
2012	216	31%	100%	0.1 - 0.3	0.1 - 1.3
2011	216	15%	100%	0.1 - 0.2	0.1 - 0.9
2010	216	11%	100%	0.2	0.4 - 0.9

Flour					
Year	Samples (n)	% samples containing residue	% below MRL	Range in values for white flour (MRL 1.05 mg/kg)	Range in values for wholemeal flour (MRL 4.60 mg/kg)
2021	72	18%	100%	0.05 - 0.1	0.05 - 0.5
2018	72	4%	100%	0.1	0.1
2014	67	10%	100%	0.0	0.1 - 0.5
2011	72	3%	100%	0.0	0.1 - 1.1

UK Flour Millers position

UK millers would prefer that residues of agrochemicals are kept to a minimum but recognise that their use is necessary in the production of sufficient quantity and quality of milling wheat required by UK millers. UK Flour Millers works as an active member of Red Tractor Assurance to ensure that all agrochemicals are applied properly according to the manufacturer's instructions and their use is kept to a minimum whilst providing appropriate control measures to crops.

Although residue levels are well below the MRLs, millers and their customers would prefer them to be even lower. UK Flour Millers supports the AHDB glyphosate stewardship programme, which brings together user and producer interests by providing guidance to maximise the efficacy of glyphosate whilst minimising the risk of residues in wheat.

Future actions

UK Flour Millers will continue to monitor agrochemical residues, including glyphosate, by participating in AHDB Contaminants Monitoring Project and by examining the results of the PRiF reports and engaging with Defra where needed in order to ensure the ongoing safety and confidence of consumers.