



**Friends of
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Europe**

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Introducing Glyphosate, the world's biggest selling herbicide

Friends of the Earth Europe, June, 2013

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Prepared by Friends of the Earth Europe | June 2013

This briefing has been produced with the financial assistance of the European Commission funded Development Fields project. The contents of this briefing are the sole responsibility of Friends of the Earth Europe and can under no circumstances be regarded as reflecting the position of the European Commission.

Introducing Glyphosate, the world's biggest selling herbicide

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Introduction

Glyphosate is the world's best-selling chemical herbicide. Glyphosate-containing herbicides, such as Monsanto's Roundup, are the most widely used herbicides in Europe and are applied in farming, forestry, parks, public spaces and gardens. Glyphosate-containing herbicides are also crucial to the production of genetically modified herbicide resistant crops. In recent years a number of scientific studies have raised concerns about glyphosate's safety and there have been calls for glyphosate-containing herbicides to be banned. New research by Friends of the Earth has detected glyphosate residues in the urine of 44 percent of people tested, from 18 different European countries.

What is glyphosate?

Glyphosate is a systemic, broad-spectrum herbicide. This means it moves throughout the plant, and it kills any plant not genetically modified to resist it. Glyphosate's chemical name is N-(phosphonomethyl)glycine and its main effect is to block an enzyme that plants need to make amino acids and proteins [1]. When the enzyme is blocked, plants die within a few days. The same metabolic pathway is also found in some bacteria and fungi, but not in animals [2].

Glyphosate was originally developed by a pharmaceutical company, but its weed-killing properties were patented by the US company Monsanto in the 1970s [3]. Monsanto's patent expired outside the USA in 1991, and in the US in 2000. Since then, other pesticide companies have marketed their own glyphosate products, and many hundreds of different glyphosate-containing herbicides are now sold around the world [4]. Despite this competition, Monsanto has used a range of strategies to keep its hold on the market and still accounts for around half of global production [5]. Its strategy for the last two decades has centred on genetically modified (GM) glyphosate resistant crops.

What is in glyphosate-containing herbicides?

Glyphosate is not used in its pure form in herbicide formulations. Firstly, it is combined with an alkali, creating a salt. Commonly used alkalis include ammonium, trimethylsulphonium (trimesium) and isopropyl-ammonium (IPA), a chemical used in dye manufacture. Other substances are also added to the glyphosate-containing herbicide. For example, chemicals known as surfactants are used to increase glyphosate's ability to penetrate into plant cells. The exact combination of chemicals used in any herbicide is a commercial secret. In fact, only glyphosate, which is called the 'active ingredient', has to be listed on the product label. This means it is difficult to find out exactly what is in any of the glyphosate-containing herbicides being sold around the world.

What is glyphosate used for?

Glyphosate cannot be used to control weeds in a growing crop, unless the crop has been genetically modified to resist glyphosate. This is because the herbicide would kill the crop plants as well as the weeds. But glyphosate is still heavily used in the production of non-GM crops, and it has approval in Europe for a wide range of uses.

For example, glyphosate may be used to kill weeds in a field before a crop is sown, before it germinates, or after it has been harvested. Glyphosate is also sprayed onto crops 1 to 2 weeks they are harvested to make them dry out, or to make them easier to harvest. This practice is called desiccation. Glyphosate is used as a desiccant on cereals, oilseed rape, maize and sunflowers [6].

Other approved uses for glyphosate-containing herbicides in the European Union include weed control in vineyards, olive groves and fruit orchards [7]. Glyphosate is approved for use on grass pastures and in forestry. It is approved for clearing railway lines and in some countries it is even approved for use in rivers and lakes. Glyphosate is also widely approved for use in parks, public spaces, streets and gardens. In short, glyphosate may be used almost anywhere, whether in the countryside or in towns and cities.

How much glyphosate is used?

The European Union does not publish data on the use of individual pesticides, making it difficult to find out how much glyphosate is being used by farmers. However, surveys in individual countries give some indication. Glyphosate is the top ranked herbicide in UK arable crop production [8]. In Denmark, glyphosate accounts for 35% of all pesticides used in agricultural production [9]. In Germany, it has been estimated that glyphosate is used on 4.3 million hectares (39%) of agricultural land each year, with nearly two thirds applied to just 3 crops - oilseed rape, winter wheat and winter barley [10]. It is estimated that 50% to 60% of sunflower crops in France, Romania and Hungary are treated before harvest with glyphosate [11]. It is the most commonly used herbicide in commercial fruit orchards in the UK [12].

Worldwide, around 650,000 tonnes of glyphosate products were used in 2011 [13], and sales were worth around US\$6.5 billion in 2010 [14], more than the value of all other herbicides combined. And its use keeps increasing, in large part because of the production of GM crops - one industry analyst is predicting global glyphosate use could double by 2017 [15].

Glyphosate and genetically modified crops.

Genetic modification is a technology that uses various techniques to alter the DNA of plants and animals. In the 1990s, Monsanto developed crop plants that were genetically modified to resist the effects of glyphosate. Up to this point, glyphosate could not be directly applied to growing crops, but GM crops opened a new market for the herbicide. Today, 85% of the GM crops grown globally are herbicide resistant [16], and almost half (65 million hectares) of US cultivated crop land was planted with Monsanto's 'Roundup Ready' crops in 2012 [17].

No GM herbicide resistant crops have yet been authorised for commercial production in the European Union, but there are 14 applications for approval of GM glyphosate resistant crops being considered by the European Commission. Most of them are for GM maize, as well as GM cotton, GM soybean, and GM sugar beet. Monsanto claims that if these GM crops are approved, there will be a reduction in pesticide use [18]. But evidence from countries where GM glyphosate-resistant crops are already grown shows the opposite.

A 2009 study examined pesticide use in the United States for thirteen years after the introduction of GM crops [19]. It found GM soybeans were treated with 26% more herbicide than non-GM soybeans, and the use of glyphosate had increased over time. In the same period, there was a decline in the amount of herbicide used on non-GM soybeans. Increasing use of glyphosate and other herbicides has also been reported from GM soybean growing areas in Argentina [20] and Brazil [21]. One reason is that GM herbicide resistant crops encourage farmers to make continuous use of glyphosate, so weeds rapidly evolve resistance to it. There are now 13 species of weed resistant to glyphosate in the United States [22], and GM crop farmers have to use more and more glyphosate, or even different herbicides, to control them [23].

If GM glyphosate resistant crops are approved in the EU, glyphosate use will inevitably go up. Based on evidence from the US, it has been predicted that the introduction of GM glyphosate resistant sugar beet, maize and soybean could lead to an 800% increase in glyphosate use by 2025, with overall herbicide use going up 72% compared to current levels [24]. Even if the EU imposed a strict regime to try and prevent the rapid evolution of weed resistance, glyphosate use would still go up by 400%, and there would be a 25% increase in herbicide use.

Conclusions and demands

New research from Friends of the Earth has shown that people from all over Europe – in EU and non-EU countries – have glyphosate residues in their urine. The evidence suggests that a significant proportion of the population could have glyphosate in their bodies – and it is not clear where it is coming from. Despite the fact that glyphosate is the world's best-selling chemical herbicide and glyphosate-containing herbicides are the most widely-used herbicides in Europe, very little testing is done for glyphosate residues in food, feed, or water. Tests for glyphosate in the body do not take place at all.

Friends of the Earth wants to know:

- Why do people have glyphosate in their urine? Where does it come from?
- Why haven't public authorities done any testing on glyphosate residues in humans?
- Why is food, animal feeds (such as imported soy) and drinking water so rarely tested for glyphosate?

- What are the health impacts of glyphosate in our bodies? Is it guaranteed that glyphosate residues are completely excreted? If not, what happens to the remaining residues?
- Why haven't there been any long-term health studies on on-going glyphosate uptake in humans?
- Why have the maximum residue levels (MRLs) for glyphosate in food and feed been steadily increased?
- Who is profiting from increasing glyphosate use?
- Why are authorities considering applications to grow glyphosate-resistant genetically modified crops in Europe?

Given the uncertainty about how glyphosate is entering people and the need to minimise exposure to glyphosate, Friends of the Earth demands that:

- The EU and national governments must immediately start a monitoring programme for glyphosate in food and feed, including imported animal feed crops such as GM soy. Levels of glyphosate (and its breakdown product AMPA) in the environment should also be monitored, covering aquatic systems and soil. These monitoring programmes should be comprehensive and the results should be made available to the public without delay.
- National governments must introduce a glyphosate reduction programme and desiccation (spraying crops shortly before the harvest) should be banned without delay. All other uses for glyphosate should be evaluated by 2015, existing maximum residue limits (MRLs) should be re-evaluated, and there must be no further increases in the MRLs.
- No glyphosate resistant genetically modified crops should be authorized in the EU.
- All food processors and retailers should minimise their customer's exposure to glyphosate residues by specifying glyphosate-free products from their suppliers. They should extend their internal pesticides monitoring programme and include glyphosate in their regular testing.

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Friends of the Earth Europe campaigns for sustainable and just societies and for the protection of the environment, unites more than 30 national organisations with thousands of local groups and is part of the world's largest grassroots environmental network, Friends of the Earth International.