What's On Your Plate?

Rounding up the evidence of health effects

of toxic chemicals in food.

Betsan Martin, March 2018

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Introduction

Responsible food production includes taking account of the way weeds and pests are controlled in growing crops, and knowing about the toxic effects of herbicide sprays on food crops. The herbicide Roundup, which is the trade name for Glyphosate, is widely used for weed control in industrial agriculture but research gives evidence of the toxic the effects of this herbicide and the detrimental effects on nutritional value of food. It asks questions about links between toxic chemicals in food systems and soils and cancer, obesity, autism, diabetes, reduced sperm counts and male infertility.

The debate around Glyphosate

The debate – or rather the deep discord the surrounds the issue of the toxic effects of chemical sprays is world-wide. It reached a crisis point in Europe at the end of 2017, and surfaces in other food growing countries alongside the vexed matter of Genetic Modification.

Glyphosate was relicensed for sale in Europe in November 2017 after a bitterly fought battle to stop its use by scientists and food safety advocates, including Greenpeace. The renewal for 5 years is a reprieve from the 15 year license sought through the EU Food Safety Authority, EFsa. Generally the industrial farming interests lobby for the use of glyphosate , most notably associated with Monsanto. Farmers associations in Europe threatened legal action on the basis they would have to change farming methods. French farmers are opposed to the relicensing of glyphosate, whereas farmers in Germany and UK insist on using it.

There are strong links between Genetic Modification and Roundup. Its use is permitted on the premise that it is deemed to have minimal toxicity and is widely used for weed control in food production. Roundup kills plants when applied to foliage, and also is absorbed into the plant and reacts with enzymes which are vital for protein synthesis, plant growth and development. Glyphosate also adsorbs (binds) to soil and can contaminate water.

Researchers, such as Seralini have shown glyphosateto be carcinogenic, and this has been acknowledged by the World Health Oganization. Glyohosate is toxic in plant cells because it interferes with plant metabolism, known technically as aromatic amino acid synthesis. Roundup kills plants when applied to foliage, and also is absorbed into the plant and reacts with enzymes which are vital for protein synthesis, plant growth and development. Glyphosate also adsorbs (binds) to soil and can contaminate water.

Roundup is composed of Glyphosate + adjuvents. Adjuvents act like glue, they are the chemicals which enable the glyphosate to penetrate the plant. These, until now have not been tested as they were regarded as 'inactive' or inert. Until now adjuvents not been tested as they were regarded as 'inactive' or inert.

Physicians and Scientists for Global Responsibility say:

'Glyphosate may be one of the most biologically disruptive chemicals in the human and physical environment' because of the effects at the cellular level and the extra-ordinary extent of its use, insertion into our daily diet and constant exposure from so many sources. They say 'virtually every bodily system can be adversely affected'. The medical journal *Lancet* published similar findings in 2015.

Physicians and Scientists for Global Responsibility, in New Zealand state that exposure to glyphosate may result in hormonal problems, miscarraiges, pre-term births and birth defects. In Argentina 95% of their crop of 47 million tones is Roundup Ready GM soybeans. Two years after plantings birth malformations were reported and this is verified by studies in UK, US and Brazil on animals in much lower doses than agricultural applications.

Studies on Genetic Modification and Roundup

French scientist and professor in molecular biology at the University of Caen, Gilles-Éric Seralini's studied GM and Roundup as part of his cancer research. Because of correlations of cancer and other diseases with GM food he moved from testing GM food to more detailed studies of the Roundup components of GM; and carried out extensive tests on glyphosate and adjuvents separately.

In contrast to Monsanto's trials for 90 days, Séralini tested rats for 2 years. The rats were fed with GM corn with and without Roundup, in quantities of 1 ppb in drinking water. Tumors showed up in the 4th month, and kidney and liver toxicity were marked effects. Mortality was 2 to 3 times higher in females, with breast tumors and pituitry disablement. Males had four times the rate of tumors than the rats fed with non GM corn. The animals in the control group showed no signs of tumors up to fourteen months old, while up to 30% females fed GM corn had tumors. By 24 months 50% to 80% females had tumors, while 30% control rats had tumors. The groups receiving Roundup showed the highest tumor incidence with 80% animals affected. (Seralini. Long Term Toxicity p. 6-7)

It is important to see that these dramatic effects of tumors, liver and kidney degeneration and higher mortality, emerged after the fourth month – showing that 90 days is an insufficient testing period, and hides the longer term effects of the herbicide.

Food Technology and Responsibility?

Many scientists see the technology of GM as progressive; this has to be weighed against the aggressive corporate interests behind GM food production. An example of the aggressive approach can be seen during the Trans Pacific Partnership negotiations and the US response to New Zealand's GM Free policy. In the annual US report on New Zealand's 'trade barriers' confirmed that they will "continue to raise trade-related concerns with mandatory biotechnology labelling regimes". The Biotech Industry Organisation, representing the world's GMO companies like Monsanto and Cargill —also said that they want GM labelling restricted under the proposed Trans Pacific Partnership Trade Agreement

Corporate profit is closely tied to the patenting system for the commercial ownership of knowledge. This means that large corporates can use repeated patenting to maintain their monopolies and control prices as well as the marketing of products.

The following sketches some of the emerging science on roundup and a history of patenting associated with it to show the commercial interests and also the health impacts.

These are some of the attributes of Glyphosateand why it is used

Glyphosate is a **Descaler: it** combines with minerals such as iron, sodium, copper, magnesium, potassium and thus has descaling effect, like the scales that form in our electric kettles. **Glyphosate** was patented in 1964 for this use in industry to clean pipes.

The demineralizing effect of glyphosate has severe effects on food. When the weight of 47 tons of non-GM corn was compared to the weight of GM corn it was found to be 2 kilograms lighter – accounted for by the loss of mineral content. This is an example of where the idea of nutrient depletion of food. Fruit today has an average of 20% less minerals than in 1940, and vegetables about 50% less minerals.

When the scaled compound is deposited in nature, plants are killed. So Monsanto patented glyphosate as a **herbicide** in 1969. In gardens it kills weeds and plants. In the GM industry, seeds are treated with Roundup (which is glyphosate plus adjuvents), to make them herbicide resistant.

Roundup Ready crops were patented in 1996. This means a farmer can spray weeds and not kill the plants which led to a massive increase in the repeated sprayings of Roundup as a herbicide, because of the resistance of the GM engineered crops. Nearly 100% corn, soy, cotton and sugar beet in the US and Canada which is GM engineered.

Then glysphosate was patented as **dessicant in 2005** This is an extension of the weedkilling properties to include killing all the green foliage on a crop, such as corn, to make harvesting easier – as only the corn is left for harvesters to reap.

Most recently **(**2010) Glyphosate was patented as an **antibiotic** because it destroys bacteria. Glyphosate combines with Iron – and the removal of iron inhibits the oxidation and detoxification effects of iron in the body. Traces of glyphosate in food have the effect of killing bacteria in the human microbiome, intestinal flora bacterial – an organ as important as the heart or brain. The 100 trillion bacteria in the microbiome provide the symbiotic processes of the body. The microbiome does the work of digestion and is in charge of the circulatory and immune systems; the neurostransmission pathways in the brain and the production of serotonin come from the microbiome. Lack of serotonin is linked to depression and to mental illness. Asthma and allergies are signs of a damaged microbiome.

Now Seralini's researchers are studying adjuvents in herbicides – which were previously declared inert. Adjuvents are residues of Glyphosate based Herbicides, and thus are the first contaminants on ground and surface waters and feed because they have been designed to tolerate Roundup and so are present for at least 15 years.

Results of testing on liver, kidney and placental cells show that adjuvants are also active principles that are toxic to human cells. They act as cell membrane disruptors and then induce sever mitochondrial alterations (Masnage et al 2013. P.125). One of the outcomes of this testing is that when Roundup is being assessed for its use, all parts of the formulation should be assessed. Adjuvents are additional active principles of pesticides.

Because the toxic effects of glyphosate take time to manifest, illnesses that are thought to be associated with western food, it is easy to misinterpret the effects. It could be that digestive issues, autism, obesity, Alzheimers, depression, liver diseases, Parkinsons disease, cancer are associated with biological disruptions of glyphosate and adjuvents.

An antidote: Organic food is not toxic, and organic growing is healthiest for soils.

Reference

Mesnage, R. Bernayc, B. Séralini G.-E. (2013) Ethoxylated adjuvants of glyphosate-based herbicides are active principles of human cell toxicity. Toxicology 313 (2013) 122–128