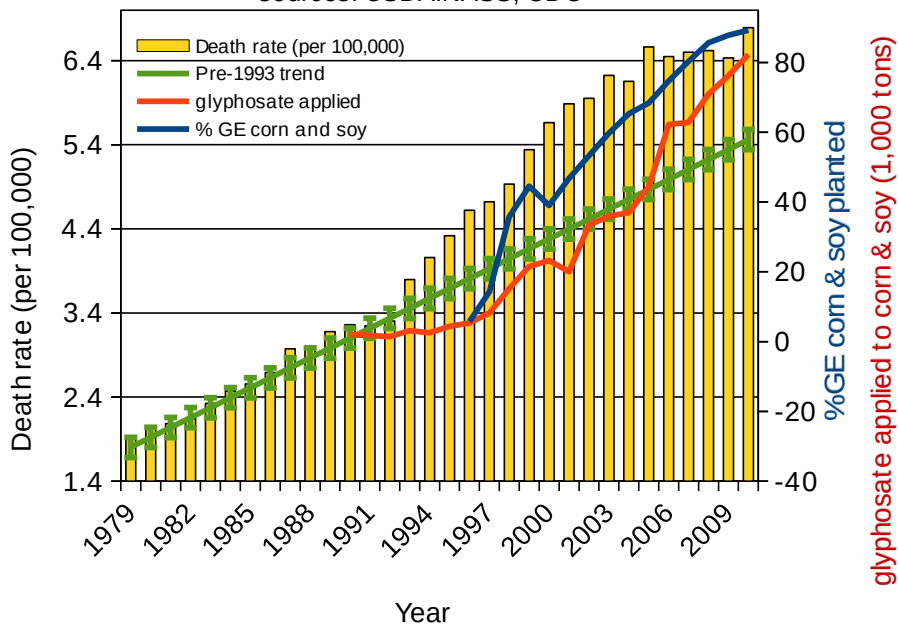


## 2 Roundup and Neurodegenerative Disorders

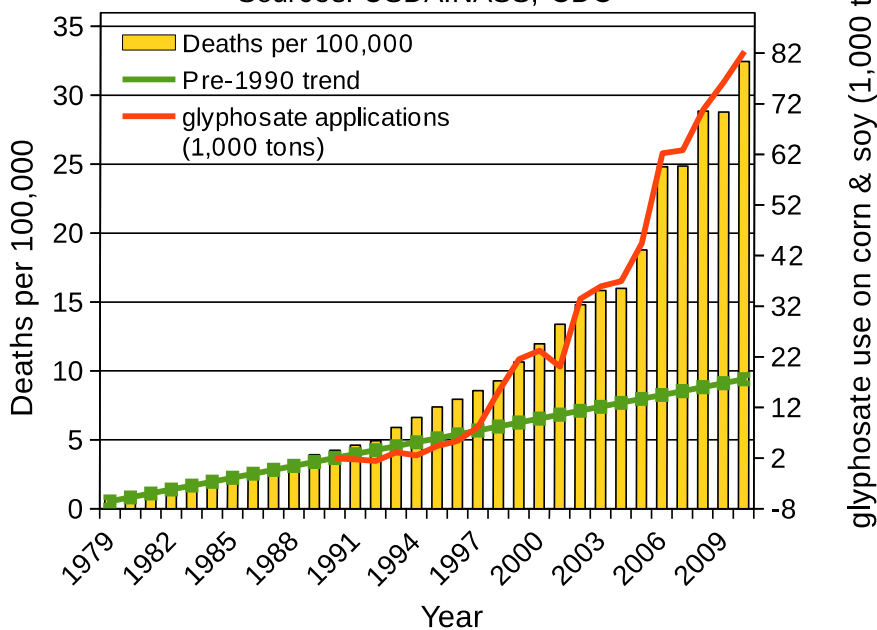
### Age Adjusted Deaths from Parkinson's disease (ICD G20 & 332.0)

plotted against glyphosate use on corn & soy ( $R = 0.8754$ ,  $p \leq 1.631e-06$ )  
and percent GE corn & soy planted ( $R = 0.9516$ ,  $p \leq 5.398e-06$ )  
sources: USDA:NASS; CDC



### Age Adjusted Deaths from Senile Dementia (ICD F01, F03 & 290)

Plotted against glyphosate use on corn & soy  
( $R = 0.9942$ ,  $p \leq 1.822e-09$ )  
Sources: USDA:NASS; CDC



## **Genetically-engineered crops, glyphosate and the deterioration of health in the United States of America. Swanson *et al.* <sup>1</sup>**

*Abstract: A huge increase in the incidence and prevalence of chronic diseases has been reported in the United States (US) over the last 20 years. Similar increases have been seen globally. The herbicide glyphosate was introduced in 1974 and its use is accelerating with the advent of herbicide-tolerant genetically engineered (GE) crops. Evidence is mounting that glyphosate interferes with many metabolic processes in plants and animals and glyphosate residues have been detected in both. Glyphosate disrupts the endocrine system and the balance of gut bacteria, it damages DNA and is a driver of mutations that lead to cancer.*

*In the present study, US government databases were searched for GE crop data, glyphosate application data and disease epidemiological data. Correlation analyses were then performed on a total of 22 diseases in these time-series data sets. The Pearson correlation coefficients are highly significant ( $< 10^{-5}$ ) between glyphosate applications and **hypertension** ( $R = 0.923$ ), **stroke** ( $R = 0.925$ ), **diabetes prevalence** ( $R = 0.971$ ), **diabetes incidence** ( $R = 0.935$ ), **obesity** ( $R = 0.962$ ), **lipoprotein metabolism disorder** ( $R = 0.973$ ), **Alzheimer's** ( $R = 0.917$ ), **senile dementia** ( $R = 0.994$ ), **Parkinson's** ( $R = 0.875$ ), **multiple sclerosis** ( $R = 0.828$ ), **autism** ( $R = 0.989$ ), **inflammatory bowel disease** ( $R = 0.938$ ), **intestinal infections** ( $R = 0.974$ ), **end stage renal disease** ( $R = 0.975$ ), **acute kidney failure** ( $R = 0.978$ ) cancers of the **thyroid** ( $R = 0.988$ ), **liver** ( $R = 0.960$ ), **bladder** ( $R = 0.981$ ), **pancreas** ( $R = 0.918$ ), **kidney** ( $R = 0.973$ ) and **myeloid leukaemia** ( $R = 0.878$ ).*

*The Pearson correlation coefficients are highly significant ( $< 10^{-4}$ ) between the percentage of GE corn and soy planted in the US and **hypertension** ( $R = 0.961$ ), **stroke** ( $R = 0.983$ ), **diabetes prevalence** ( $R = 0.983$ ), **diabetes incidence** ( $R = 0.955$ ), **obesity** ( $R = 0.962$ ), **lipoprotein metabolism disorder** ( $R = 0.955$ ), **Alzheimer's** ( $R = 0.937$ ), **Parkinson's** ( $R = 0.952$ ), **multiple sclerosis** ( $R = 0.876$ ), **hepatitis C** ( $R = 0.946$ ), **end stage renal disease** ( $R = 0.958$ ), **acute kidney failure** ( $R = 0.967$ ), cancers of the **thyroid** ( $R = 0.938$ ), **liver** ( $R = 0.911$ ), **bladder** ( $R = 0.945$ ), **pancreas** ( $R = 0.841$ ), **kidney** ( $R = 0.940$ ) and **myeloid leukaemia** ( $R = 0.889$ ). The significance and strength of the correlations show that the effects of glyphosate and GE crops on human health should be further investigated.*

## **UK Parliament Meeting Brings 'Dangers' of Roundup® into Public Focus. This meeting of world experts on glyphosate held on June 18 2014<sup>2</sup> was not reported by the UK mainstream Media**

The All-Party Parliamentary Group (APPG) on Agro-ecology, chaired by the [Countess of Mar](#), met in the Houses of Parliament in London on June 18, 2014 to discuss the possible harm caused by the world's most popular herbicide – Roundup®.

*In what was one of the most comprehensive meetings ever held in Europe on Glyphosate and Roundup, experts from around the World gathered in London to share their expertise with the media, members of a number of UK political parties, NGO representatives and members of the public. Committee Room 10 of the Houses of Parliament was full to the rafters, with experts having travelled from as far away as Russia, China and the U.S., to listen to the four speakers give detailed presentations on how the unanswered questions surrounding the possible harm caused by Glyphosate and Roundup should be approached.*

<sup>1</sup> [http://www.organic-systems.org/journal/92/JOS\\_Volume-9\\_Number-2\\_Nov\\_2014-Swanson-et-al.pdf](http://www.organic-systems.org/journal/92/JOS_Volume-9_Number-2_Nov_2014-Swanson-et-al.pdf)

<sup>2</sup> [http://sustainablepulse.com/2014/07/02/uk-parliamentary-meeting-brings-dangers-roundup-public-focus/#.U7TvD-j\\_hzl](http://sustainablepulse.com/2014/07/02/uk-parliamentary-meeting-brings-dangers-roundup-public-focus/#.U7TvD-j_hzl)

The full presentations from the APPG Agro-ecology meeting in London are on the following links: Dr Don Huber, <sup>3</sup> Professor Malcolm Hooper, <sup>4</sup> Dr John Peterson Myers, <sup>5</sup> Dr Michael Antoniou <sup>6</sup>

**The following two slides from the meeting in Parliament are shown by kind permission of Don Huber – Professor Emeritus of Plant Pathology at Purdue University**

Four different patents have been filed and granted for glyphosate. As a chelator of heavy metals and a wetting agent in 1961;<sup>7</sup> as an herbicide in 1968;<sup>8</sup> as an antibiotic in 2002;<sup>9</sup> and as an anti-protozoal agent in 2003.<sup>10</sup>

In addition, Dr Huber shows that glyphosate is an organic phosphonate, a growth regulator, a toxicant, a virulence enhancer and is persistent in the soil. It chelates (captures) and washes out the following minerals: boron, calcium, cobalt, copper, iron, potassium, magnesium, manganese, nickel and zinc.



Antibiotic-resistant diseases are an apocalyptic threat to humans; but when Monsanto is to blame UK public health doctors, the UK Science Media Centre, the Wellcome Trust, BBSRC and the Media Corporations are unaccountably silent

<sup>3</sup> [Dr. Don M. Huber – Professor Emeritus of Plant Pathology at Purdue University](#)

<sup>4</sup> [Professor Malcolm Hooper – Professor of Medicinal Chemistry at the University of Sunderland](#)

<sup>5</sup> [Dr. John Peterson “Pete” Myers – Founder, CEO and Chief Scientist of Environmental Health Sciences](#)

<sup>6</sup> [Dr. Michael Antoniou – Reader in Molecular Genetics and Head of the Gene Expression and Therapy Group, Department of Medical and Molecular Genetics, King’s College London School of Medicine, UK.](#)

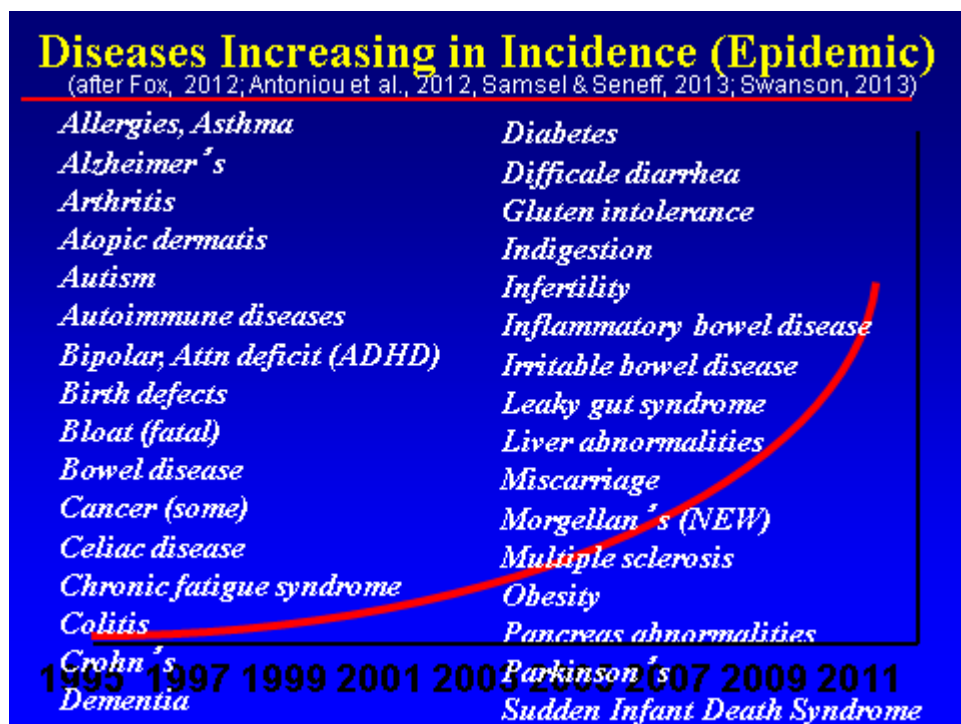
<sup>7</sup> <http://www.google.com/patents/US3160632>

<sup>8</sup> <http://www.google.com/patents/US3455675>

<sup>9</sup> <http://www.google.com/patents/US7771736>

<sup>10</sup> <http://patft.uspto.gov/netacgi/nph->

[Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetacgi%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7771736.PN.&OS=PN/7771736&RS=PN/7771736](#)



Dr Huber's second slide shows diseases which have increased in incidence since 1995, correlated with the red line, which represents the increasing use of glyphosate in the US

### Glyphosate, pathways to modern diseases III: Manganese, neurological diseases, and associated pathologies<sup>11</sup>

**Abstract:** Manganese (Mn) is an often overlooked but important nutrient, required in small amounts for multiple essential functions in the body. A recent study on cows fed genetically modified Roundup®-Ready feed revealed a severe depletion of serum Mn. Glyphosate, the active ingredient in Roundup®, has also been shown to severely deplete Mn levels in plants. Here, we investigate the impact of Mn on physiology, and its association with gut dysbiosis as well as neuropathologies such as autism, Alzheimer's disease (AD), depression, anxiety syndrome, Parkinson's disease (PD), and prion diseases. Glutamate overexpression in the brain in association with autism, AD, and other neurological diseases can be explained by Mn deficiency. Mn superoxide dismutase protects mitochondria from oxidative damage, and mitochondrial dysfunction is a key feature of autism and Alzheimer's. Chondroitin sulfate synthesis depends on Mn, and its deficiency leads to osteoporosis and osteomalacia. Lactobacillus, depleted in autism, depends critically on Mn for antioxidant protection. Lactobacillus probiotics can treat anxiety, which is a comorbidity of autism and chronic fatigue syndrome. Reduced gut Lactobacillus leads to overgrowth of the pathogen, Salmonella, which is resistant to glyphosate toxicity, and Mn plays a role here as well. Sperm motility depends on Mn, and this may partially explain increased rates of infertility and birth defects. We further reason that, under conditions of adequate Mn in the diet, glyphosate, through its disruption of bile acid homeostasis, ironically promotes toxic accumulation of Mn in the brainstem, leading to conditions such as **Parkinson's Disease** and prion diseases.

### Associations with neurodegenerative disorders in humans

Ya-xing Gui et al. [Glyphosate induced cell death through apoptotic and autophagic mechanisms](#). *Neurotoxicology and Teratology* 2012, **34** (3): 344–349<sup>12</sup>  
Herbicides have been recognized as the main environmental factor associated with human

<sup>11</sup> [http://www.surgicalneurologyint.com/temp/SurgNeuroInt6145-4381109\\_121011.pdf](http://www.surgicalneurologyint.com/temp/SurgNeuroInt6145-4381109_121011.pdf)

<sup>12</sup> <http://www.sciencedirect.com/science/journal/08920362>

<http://www.activistpost.com/2012/04/roundup-herbicide-linked-to-parkinsons.htm>

neurodegenerative disorders such as Parkinson's disease (PD). Previous studies indicated that the exposure to glyphosate, a widely used herbicide, is possibly linked to Parkinsonism, however the underlying mechanism remains unclear. We investigated the neurotoxic effects of glyphosate in differentiated PC12 cells and discovered that it inhibited viability of differentiated PC12 cells in dose-and time-dependent manners. Furthermore, the results showed that glyphosate induced cell death via autophagy pathways in addition to activating apoptotic pathways. Interestingly, deactivation of Beclin-1 gene attenuated both apoptosis and autophagy in glyphosate treated differentiated PC12 cells, suggesting that Beclin-1 gene is involved in the crosstalk between the two mechanisms.

**Neurotransmitter changes in the brain from exposure to Glyphosate-based herbicides: many papers come from Latin American countries where they grow almost exclusively GM Roundup Ready Crops that Monsanto forced on them in 1996: here are three papers: the Glyphosate Task Force excluded papers from South America**  
Behavioral impairments following repeated intranasal glyphosate-based herbicide administration in mice.<sup>13</sup>

*Taken together, our findings demonstrate that intranasal (IN) exposure to commercial Gly-BH produces alterations in locomotor activity, anxiety and memory in adult mice. These observations could be a consequence of alterations in neurotransmission systems comprising the GABAergic, dopaminergic, serotonergic and/or cholinergic systems.*” In this research paper there are references to many papers from around the world that confirm the glyphosate-based herbicides are damaging to the development of the foetal brain and that repeated exposure is toxic to the adult human brain and may result in alterations in locomotor activity, feelings of anxiety and memory impairment.

**This is why there are so many mental health and psychiatric disorders, depression, suicides, anxiety and violence among children and adults.**

Martínez, M. A., Ares, I., Rodríguez, J. L., Martínez, M., Martínez-Larrañaga, M. R., & Anadón, A. (2018). Neurotransmitter changes in rat brain regions following glyphosate exposure. *Environmental Research*, 161, 212-219.<sup>14</sup>

Highlights:

- Glyphosate oral exposure caused neurotoxicity in rats.
- Brain regions were susceptible to changes in CNS monoamine levels.
- Glyphosate reduced 5-HT, DA, NE levels in a brain regional- and dose-related manner.
- Glyphosate altered the serotonergic, dopaminergic and noradrenergic systems.

Mechanisms underlying the neurotoxicity induced by glyphosate-based herbicide in immature rat hippocampus: Involvement of glutamate excitotoxicity.<sup>15</sup>

### **Substantial increase in neurological deaths 1979-2010**

Ten major developed Western countries and 10 smaller Western countries were studied.<sup>16</sup> There was a major reduction in general mortality in all 20 countries, but total neurological deaths rose substantially between 1980 and 2010 in both sexes in 16 out of 20 western countries. The mortality was significantly higher in females. “Moreover, looking back 30 or more years the concept of early dementia or the need for the creation of a Young Parkinson’s Disease Society in Britain would have seemed a tautology.

*Furthermore, increasing deaths from Parkinson’s Disease and Motor Neurone Disease cannot be attributable to longevity, bearing in mind the relatively short-time period, and cannot explain the 55-64-year old mortality rises up to 2006. Clearly other influences must be operating, though in no*

<sup>13</sup> <https://www.sciencedirect.com/science/article/pii/S0892036217301526>

<sup>14</sup> <https://www.sciencedirect.com/science/article/pii/S0013935117316730>

<sup>15</sup> <https://www.sciencedirect.com/science/article/pii/S0300483X14000493>

<sup>16</sup> <http://dx.doi.org/10.1016/j.phe.2012.12.018> Pritchard, C. *et al.* Changing patterns in mortality from neurological deaths in the 10 major developed countries 1979-2010 *Public Health* (2013)

*way does this deny the importance of hereditary factors but rather strongly points towards an epigenetic explanation..."*

Pritchard suggests some possible environmental factors, but doesn't mention pesticides.

Neurological deaths of American adults (55–74) and the over 75's by sex compared with 20 Western countries 1989–2010: Cause for concern 23-Jul-2015 Colin Pritchard Emily Rosenorn-Lanng

Comments below: *"The findings of this study — namely that tremendous increases in Total Neurological Deaths (TND) over a 20-year period in twenty countries, particularly the United States — are quite disturbing. What this study suggests is that the two most likely possibilities for the increase in TND may be related to unknown environmental factors, or even more likely, epigenetics phenomena, as yet to be discovered. The authors, Drs Colin Pritchard and Emily Rosenorn-Lanng have done an outstanding epidemiological investigation and have my congratulations for bringing to our attention this disturbing phenomenon and presenting these observations in a convincing and elegant manner, and in a succinct scientific methodology."*

Miguel A Faria MD.

### **Young-onset Parkinson's disease (YOPD)**

*"Young-onset Parkinson's disease (YOPD) occurs in people younger than 50 years of age. Most people with idiopathic, or typical, PD develop symptoms at 50 years of age or older.*

*YOPD affects about two to 10 percent of the one million people with PD in the United States. Symptoms are similar to late onset PD but it is important to understand the challenges YOPD individuals often face at a financial, family and employment levels."*

### **Numbers of cases of Parkinson's Disease in the US**

According to the National Parkinson's Foundation, in the United States alone, there are 50,000-60,000 new cases of PD diagnosed each year, joining one million people who currently have the disease.

### **Numbers of cases of Parkinson's Disease in the UK: estimated incidence for 2018**

As Table 2 shows, the estimated incidence of Parkinson's for people aged 45 or over 2018 is 18,461. (Due to small numbers, it was not possible to properly estimate incidence for people under 45.) As shown in our more detailed report, for the UK in 2015, the lifetime risk of being diagnosed with Parkinson's was 2.7%. This is equivalent to 1 in every 37 people being diagnosed with Parkinson's at some point in their life.

### **Glyphosate in human urine<sup>17</sup>**

A study conducted by the Heinrich Böll Foundation discovered that 99.6% of German people has glyphosate residues in urine. Most of them are those who eat meat, because of animal feed containing GM soy and corn. Studies demonstrate that glyphosate entered the humans' food chain. According to the Italian Organic Agriculture Association (AIAB), in order to prove the presence of the controversial weed killer in our daily life bread was analysed in the United Kingdom, water in France and breast milk as well as tampons in the United States. Germany chose to analyse glyphosate residues in 2,009 German people's urine. The study reveals that 75% of the target group displayed levels that were five times higher than the legal limit of drinking water. One third of the people contaminated with glyphosate even showed levels that were between 10 and 42 times higher than what is generally admissible. Only 0.4% of the 2,009 samples was completely free from glyphosate residues, so almost all Germans (99.6%) have residues of the weed killer in their body. The most significant levels were found in children aged 0 to 9, teenagers aged 10 to 19, and farmers. *"The investigation confirmed the findings of the Federal Environment Agency, in regards to the majority of the population having glyphosate residue in their urine. The investigation was the largest of its kind ever carried out and volunteers*

<sup>17</sup> <https://www.lifegate.com/people/lifestyle/glyphosate-almost-all-germans-intoxicated>

from all over Germany participated in it. The findings exemplify that further research must be conducted in order to grasp the link between glyphosate exposure through food, drinking water or air and serious diseases", said veterinarian Monika Krüger, author of the study.

Those who eat meat showed higher levels of glyphosate than vegetarians and vegans. Also, those who consume organic products are less intoxicated than people who eat non-organic food.

### **Glyphosate in animals: The first study to measure glyphosate residues in Danish dairy cattle and its impact on blood parameters. Field Investigations of Glyphosate in Urine of Danish Dairy Cows<sup>18</sup>**

**Abstract:** *In the present study, thirty dairy cows from each of eight Danish dairy farms were investigated for excretion of glyphosate in urine. Blood serum parameters indicative of cytotoxicity as alkaline phosphatase (AP), glutamate dehydrogenase (GLDH), glutamate oxaloacetate transaminase (GOT), creatinine kinase (CK), nephrotoxicity, (urea, creatine), cholesterol and the trace elements as manganese (Mn), cobalt (Co), selenium (Se), copper (Cu) and zinc (Zn) were investigated. All cows excreted glyphosate in their urine but in varying concentrations. Increased levels of GLDH, GOT and CK in cows from all farms demonstrate a possible effect of glyphosate on liver and muscle cells. High urea levels in some farms could be due to nephrotoxicity of glyphosate. Also the unexpected very low levels of Mn and Co were observed in all animals which could be explained due to a strong mineral chelating effect of glyphosate. In contrast the mean levels of Cu, Zn and Se were within the normal reference range. In conclusion, this study gives the first documentation to which extent Danish dairy cattle are exposed to Glyphosate and its impact on blood parameters.*

### **Glyphosate is everywhere**

Séralini found glyphosate in rodent diets for testing chemicals used in every continent. Samsel has found glyphosate present in the keratin proteins of humans and animals, in **vaccines**, baby milk formulations, pet foods and rat feeds for experimental purposes. It has been found in sanitary products made from GM cotton. All processed foods including orange juice; beers, breakfast cereals, bread, wine; all non-organic vegetables including potatoes.<sup>19</sup> In March 2016 a survey of more than 2009 German citizens tested showed that more than 99% had glyphosate in their urine and the highest levels were in children and young adults and those that were meat eaters.<sup>20</sup> Glyphosate was found to be persistent in seawater off the Great Barrier Reef.<sup>21</sup> It was also found in the islands of Hawai'i where the agrochemical industry undertakes testing of GM crops, which the people of Hawai'i don't want.<sup>22</sup> *"The most commonly tested GE "trait" is herbicide-resistance (82% of field releases over the past two years), which permits heavier and more frequent spraying of herbicides than is otherwise possible (3.2 & 3.4). Hawai'i's incredible biodiversity and many threatened and endangered species are at risk from intensive pesticide use on the Islands. "*

### **Report presented to UN Human Rights Council about the Right to Food**

Global Agricultural Corporations are severely criticised by Hilal Elver the UN Special Rapporteur on the right to food.<sup>23</sup> The Report presented to the UN human rights council on 08/03/2017 is severely critical of the global corporations that manufacture pesticides, accusing them of the *"systematic denial of harms"*, *"aggressive, unethical marketing tactics"* and heavy lobbying of governments which has *"obstructed reforms and paralysed global pesticide restrictions"*.

The report authored by Hilal Elver the UN Special Rapporteur on the right to food and co-authored by Baskut Tuncak, the UN's special rapporteur on toxics, says pesticides have *"catastrophic impacts on the environment, human health and society as a whole"*, including an

<sup>18</sup> <http://dx.doi.org/10.4172/2161-0525.1000186>

<sup>19</sup> <http://www.pesticides.gov.uk/guidance/industries/pesticides/advisory-groups/PRiF/about-PRiF>

<sup>20</sup> <http://www.lifegate.com/people/lifestyle/glyphosate-almost-all-germans-intoxicated>

<sup>21</sup> <http://www.sciencedirect.com/science/article/pii/S0025326X14000228>

<sup>22</sup> [http://www.centerforfoodsafety.org/files/pesticidereportfull\\_86476.pdf](http://www.centerforfoodsafety.org/files/pesticidereportfull_86476.pdf)

<sup>23</sup> <http://www.pan-uk.org/site/wp-content/uploads/United-Nations-Report-of-the-Special-Rapporteur-on-the-right-to-food.pdf>

estimated 200,000 deaths a year from acute poisoning. Its authors said: *“It is time to create a global process to transition toward safer and healthier food and agricultural production.”* *“It is a myth,”* said Hilal Elver. *“Using more pesticides is nothing to do with getting rid of hunger.”*<sup>24</sup> *According to the UN Food and Agriculture Organisation (FAO), we are able to feed 9 billion people today. Production is definitely increasing, but the problem is poverty, inequality and distribution.”* Elver said many of the pesticides are used on commodity crops, such as palm oil and soy, not the food needed by the world’s hungry people: *“The corporations are not dealing with world hunger, they are dealing with more agricultural activity on large scales.”*

The Report says: *“excessive use of pesticides is very dangerous to human health, to the environment and it is misleading to claim they are vital to ensuring food security.”* Chronic exposure to pesticides has been linked to **cancer, Alzheimer’s and Parkinson’s diseases, hormone disruption, developmental disorders and sterility.** Farmers and agricultural workers, communities living near plantations, indigenous communities and pregnant women and children are particularly vulnerable to pesticide exposure and require special protections. The experts warn that certain pesticides can persist in the environment for decades and pose a threat to the entire ecological system on which food production depends. The excessive use of pesticides contaminates soil and water sources, causing loss of biodiversity, destroying the natural enemies of pests, and reducing the nutritional value of food. The impact of such overuse also imposes staggering costs on national economies around the world.

Rosemary Mason

Compiled 08/03/2018

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<sup>24</sup> <https://www.theguardian.com/environment/2017/mar/07/un-experts-denounce-myth-pesticides-are-necessary-to-feed-the-world>