Glyphosate Toxicity: Part of our Burgeoning Health Problems

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Feel Fab Nutrition
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Introduction

This is a sad story of many unintended consequences. It’s a story we cannot keep denying or ignoring.

It’s in everything from bread, to berries, to breast milk and is becoming increasingly ubiquitous. It’s glyphosate. Glyphosate is a poison.

To say ‘glyphosate does not cause cancer, so it is all right to use’ is disingenuous on two counts:

1. Most studies are done on glyphosate itself and not with its common adjuvants.\(^1\)
2. The consensus is that it may be implicated; while not proven beyond all doubt, there is enough doubt that we should be removing the chemical from Jersey.
3. Glyphosate causes many other health issues, ones that cannot be ignored.

Toxic effects from glyphosate can show up quickly (especially in areas where users cannot read accompanying safety instructions) or over time, almost insidiously. This is because, even at ‘safe’ levels, glyphosate enhances the damaging effects of other food-borne chemical residues and water- and air-borne environmental toxins.

There are many things to discuss in relation to introducing glyphosate-free practices, including some of the very good initiatives from individual farmers in the UK.

However, due to a) time constraints and b) to the case studies being presented by other individuals in Jersey, this short report will concentrate on the biochemical effects of glyphosate and its adjuvants.

**NOTE:** One problem is that glyphosate is part of a much bigger toxic load. If it were the only pollutant around, it would still be a worry, but we may be able to cope with it at ‘normal’ exposures.

Add in, however, poor diets, ‘good’ diets lacking in essential nutrients (because of depleted soils and pesticides), numerous environmental toxins (such as xeno-oestrogens), medications, social isolation and stress, and we have a burgeoning health problem.

In September 2017 I wrote an article in the JEP about the alarming effects of glyphosate on mitochondria (the organelles in our cells which produce energy). Subsequently I talked about it on Radio Jersey and was dismissed (not by the presenters) as a scaremonger.

A full discussion of the economics and politics behind glyphosate use is beyond the remit of this short report, but I will add some references in the Appendix. Suffice it to say, this is mainly about money – and involves a story of what, essentially, has been entrapment in a self-perpetuating system. I believe, however, this cycle can be broken.

This short report is merely an overview to give you some facts and further reading. When time allows, I shall write this up more fully; in the meantime, please feel free to contact me if you have any questions.

Jacqui Carrel

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\(^1\) The adjuvants are there to make the glyphosate much more targeted and potent in its effects; there are too many to discuss here, but a link in the Appendix gives more detail.
What glyphosate is and does

Glyphosate was introduced into the US food chain in 1974 and came out of patent in 2000, meaning even more glyphosate-based products came on the market.

Glyphosate\(^2\), a phosphonate\(^3\), is a broad-spectrum systemic herbicide and crop desiccant used to kill weeds, especially annual broadleaf weeds and grasses that compete with crops. It acts by inhibiting a key enzyme that is involved in the synthesis of three aromatic amino acids\(^4\).

The chemical is essentially the amino acid glycine with a bit extra attached; it works by replacing glycine, causing corruption and breakdown of proteins and pathways, so causes even more damage than it is marketed for.

It is absorbed through foliage, and minimally through roots; it is transported to growing points where the enzyme inhibition takes place. It is therefore effective only on actively growing plants and is not used as a pre-emergence herbicide.

Glyphosate works by inhibiting a key enzyme in the shikimate pathway; this pathway is only found in plants, which means it can be, and is, touted as ‘safe’ to humans. It’s not safe, for the reasons we will explore below.

Glyphosate is the active ingredient in the well-known herbicide Roundup\(^\circ\) (which is made by Monsanto) and many others like it. It is used on crops in general as a desiccant in order to time harvests/planting and on glyphosate-resistant crops to kill surrounding ‘weeds’.

Nonetheless, look at the emergence of ‘super weeds’ in the US (those that have become glyphosate-resistant themselves) and we see that the cunning plan was nothing of the sort; instead farmers are forced to use increasing quantities of the herbicide in order to control the weeds.

Crops affected where glyphosate is used as a desiccant include barley, beans, chick peas, flax, lentils, oats, peas, pulses, rye, sugar cane, sunflowers and wheat. Glyphosate resistant crops (ie, they have been genetically modified) include alfalfa, canola, corn, cotton, sugar beets, soya and tobacco.

If you’re thinking, ‘Well these are mostly American so we don’t need to worry’, then think again: products from the USA are on our shelves – and, depending on trading outcomes post-Brexit, we may get far more of these polluted frankenfoods appearing in our stores.

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\(^2\) Its IUPAC name is N-(phosphonomethyl)glycine.

\(^3\) Phosphonates are easily taken up and translocated inside plants.

\(^4\) Specifically, the plant enzyme 5-enolpyruvylshikimate-3-phosphate synthase. The shikimate pathway is a 7-step metabolic route used by bacteria, archaea, fungi, algae, some protozoans, and plants for the biosynthesis of folates and aromatic amino acids (phenylalanine, tyrosine, and tryptophan). This pathway is not found in animals, including humans, which require these amino acids. This means the products of this pathway constitute an essential part of our diet; it also means if the plants cannot make them, then we become deficient in them.
Why glyphosate is used

On the face of it, glyphosate was introduced as a safer alternative to chemicals like DDT and 2-4D but of course it also lined Monsanto’s pockets to a huge degree, especially as they introduced crop seeds that were resistant to Roundup.

The chemical is also used as a desiccant to time and speed up crop ripening: on the surface this seems like a good idea, but of course we have found many unintended consequences.

Glyphosate is meant to kill plants and then magically disappear from the environment. But glyphosate is not quickly metabolised and can still be found a year later, especially in poor and cold soil conditions. The manufacturers also reply on safe practice and calm weather conditions: real life is not like that in so many instances.

From the late 1970s to 2016, there was a 100-fold increase in the frequency and volume of application of glyphosate-based herbicides (GBHs) worldwide; the trend, so far, appears to be continuing in countries where the use of GBH has not been banned.

Part of the increase is in response to the global emergence and spread of glyphosate-resistant weeds. This is a big problem.

What glyphosate is mixed with

Glyphosate is an acid molecule, so it is formulated as a salt for packaging and handling; water is added at the point of use by farmers or beforehand where it is sold in garden centres.

By itself it is not as effective, so other chemicals – adjuvants – must be added:

Adjuvants are chemicals which make the main component (such as glyphosate) more effective; we use a similar principle in vaccinations when mercury (the adjuvant in this case) is added to the dose (a particular virus, for example).

Herbicide sprays are mostly water. Surfactants (‘surface-acting agents’) are adjuvants that reduce the surface tension of this water, meaning the spray stays more where it is targeted rather than all rolling off onto the surrounding soil.

Note that while this targeting is better than no targeting, glyphosate mixes still do reach the soil. Roundup’s main adjuvant is the surfactant polyethoxylated tallowamine, which also helps glyphosate penetrate plant cells.

Salts should not be left out in fields (they are, with pollution occurring), nor handled without safety gloves (they are, with dire epigenetic effects), and solutions must be sprayed when conditions will not cause drift or leaching (they are, polluting water courses, air, and neighbouring fields).
What glyphosate does to the environment

Glyphosate adsorbs strongly to soil; that is, it forms a thin film around soil particles. The half-life of glyphosate in soil ranges between 2 and 197 days; this variation is due to soil conditions and temperature. Because it is readily degraded by soil microbes it is not seen to be a problem in terms of pollution. However:

- Glyphosate can contaminate surface water as it adsorbs to soil particles suspended in runoff; if it reaches surface water, it is not broken down readily by water or sunlight
- The presence of phosphate fertilisers can reduce glyphosate sorption because they compete for the same surfaces

Glyphosate adversely affects earthworms and arbuscular mycorrhizal fungi (ARB), both of which are essential parts of a healthy ecosystem. In one study\(^5\) the authors conclude:

> Altogether, our data indicate that GBH toxic effects on soil filamentous fungi, and thus potential impairment of soil ecosystems, may occur at doses far below recommended agricultural application rate.

Earthworms benefit spoil health by fertilising it and aerating soil, allowing easy passage of water, dissolved nutrients and air. Fungi are needed for soil and plant health.

ARBs have a mutualistic relationship with plants. Very simply put, they, along with certain bacteria, provide a plant with mineral nutrients such as phosphorus, zinc and copper\(^6\) in return for sugar from the plant. They can also help plants mitigate water stress-induced deleterious changes.

A decrease in earthworms and ARBs from ploughing, compacting, the use of NPK fertilisers and pesticides, insecticides and herbicides such as glyphosate mean plant health suffers.

In turn, animals (including humans) do not get all the nutrients they need from their food.

In addition, glyphosate causes ‘leaky gut’ in animals, causing many of them to suffer from impaired guts, which cause health problems and which can rupture. Those farmers paying out lots of money to treat diseased and distressed animals who have turned to more sustainable methods of husbandry have seen huge health increases in their charges.

Glyphosate also has indirect effects on birds and other animals because of the destruction of habitats and food supplies. It even affects the aquatic food chain; amphibians appear to be particularly vulnerable.

Because soil fertility decreases and because the delicate balance of soil organisms is upset when glyphosate applications are used, the world is also seeing upsurge in some crop diseases even in no-till agricultural areas\(^8\) because the growth of fungal pathogens is stimulated.

Glyphosate has also been found to have adverse effects on beneficial insects and bees.

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\(^5\) Glyphosate degrades to aminomethylphosphonic acid (AMPA, which like glyphosate strongly adsorbs to soil solids and is thus unlikely to leach to groundwater).


\(^7\) Under certain conditions they can also supply more mobile ions such as bromine, calcium, chlorine, iron, magnesium, manganese, nitrogen, potassium, sodium, sulphur.

\(^8\) No-till practices are important in sustainable farming.
And what of crops? I quote here from the Soil Association⁹:

**Increase in micro-organisms causing disease in crops**

It has been reported that using glyphosate as a weed control in agricultural systems has led to the increased severity or re-emergence of crop diseases.

There is concern over how the use of glyphosate increases the potential for the development of pathogen levels that affect crop health, altering the communities of rhizosphere microbes involved in nutrient transformation, and shifting the balance between micro-organisms that are beneficial and detrimental to plant health.

For example, one study found that the disease severity and frequency of the soil borne fungus Fusarium solani f. sp. Glycines, the cause of Sudden Death Syndrome, in glyphosate-tolerant soya beans was higher after application of glyphosate compared to no herbicide application.

There is now evidence to suggest that it is not just the direct disruption of the shikimic acid metabolic pathway which is responsible for the herbicidal properties of glyphosate. It is now believed by some scientists that the herbicidal efficacy of glyphosate is largely due to colonization of roots of affected plants by soil-borne pathogens and that glyphosate somehow compromises the ability of plants to defend against pathogens that inhabit the rhizosphere.

Many of plants defences are reliant on the shikimic acid pathway, and as glyphosate blocks this pathway, it is conceivable that glyphosate would render plants more susceptible to pathogens.

Research on glyphosate-resistant soybeans found that glyphosate altered particular rhizosphere micro-organisms.

In one study, the colonisation of roots by Fusarium fungi increased steadily as soybean growth progressed and as the rate of glyphosate increased. This suggests that glyphosate affects the ability of plants to suppress potential pathogen colonisation and root infection. Further, by suppressing Fluorescent pseudomonads bacteria and Mn-reducing rhizobacteria, glyphosate lowers two plant defence mechanisms for warding off pathogens.

A different laboratory study found no effect of glyphosate (Roundup) on Trichoderma or Gliocladium genera of fungi. However, both Fusarium and Pythium fungi genera populations increased proportionally to the increase in glyphosate concentrations, a concern given that both genera contain plant pathogens.

Conversely, one study has looked at the impact of glyphosate, active ingredient and glyphosate commercial formulations, in laboratory tests, at field concentrations, on four types of entomopathogenic fungi – fungi that are understood to play a positive role in controlling pest insects in agricultural systems. They found that glyphosate active ingredient had no impact on the fungi, but that the glyphosate formulations (different brands of Roundup) did have a negative impact. The authors say that it is important that the impact of the supposedly inert ingredients in these formulations is further studied.

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What happens with repeated applications of glyphosate

Studies show that:

- Single exposure of soils to glyphosate may only cause minor changes to microbial community function and structure
- Nonetheless, in soils with no previous application, microbial respiration increases in response to glyphosate exposure, probably reflecting stress responses to species sensitive to the herbicide and/or its adjuvants
- In addition, repeated applications can impact on these communities. For example, we do not see the microbial responses mentioned above; this may be due to the gradual elimination of glyphosate-sensitive species

What glyphosate does to humans

Known as the main ingredient in Monsanto’s Roundup weed killers, glyphosate was in the spotlight two years ago when the World Health Organization defined it as a ‘probable human carcinogen’. Since then, the WHO has revised its position and downplayed the potential risk. However, many scientists, and certainly many members of the public, view it as a pervasive poison in our food system that increases the risk of physical and mental ill health.

Let’s go back to the shikimate pathway – remember, this is the chemical sequence in plants responsible for the production of folate, vitamin K and the aromatic amino acids phenylalanine, tryptophan and tyrosine. These amino acids are needed by humans to make the neurotransmitters serotonin, melatonin, dopamine and adrenalin and to help with the production of the thyroid hormone.

Humans can’t make these substances: we need them from our diet or from our gut bacteria. As glyphosate stops plant production of these nutrients and kills off our gut bacteria, we end up with deficiencies.

Massachusetts Institute of Technology researcher and glyphosate expert Professor Seneff is sure the herbicide’s deleterious impacts on human health can be traced to its adverse effects on sulphate synthesis, production, transport, delivery and retention.

As in animals, glyphosate can also disrupt intestinal bacteria, triggering gut dysbiosis and increased intestinal permeability (‘leaky gut syndrome’), which in turn have adverse impacts on physical and mental health.

This screen shot shows just one of the hundreds of papers showing very strong correlations between glyphosate and chronic disease. I know correlation is not causation, but sometimes the link is so strong it would be stupid to brush aside the findings.
In another study in Ontario, Canada, exposure of male farmers to glyphosate-based herbicides was associated with an increase in miscarriage and premature birth in farm families.

We also see strong correlations between glyphosate use and thyroid cancer, diabetes, end-stage renal disease and urinary/bladder cancer.

Remember, glyphosate chelates minerals, meaning we don’t get them into our body systems? Consider this: in 2012, the area treated by glyphosate in the UK was 1,750,000 ha, and by 2014 it had increased to 2,250,000 ha. So, we have an increasing interrupted supply of vital nutrients... and a big chemical industry predicated on the resultant problems. For example, glyphosate can cause:

- Hypercholesterolaemia – which is now treated by statins
- Activation of the enzyme aromatase – we now use aromatase inhibitors to treat breast and prostate cancer

Campaigner Dr Rosemary Mason reports spikes in incidences of cancer in areas of Wales where glyphosate is prevalent. She also points out how many drugs to combat the toxic effects of pesticides are developed in the UK and sold to other countries; these practices are seen as something to be proud of by the UK government.

A search on PubMed and Google Scholar will keep you reading for days, so here, in alphabetical order, are some of the problems that can occur with glyphosate.

**ADHD, Alzheimer’s, autism and Parkinson’s Disease rate increases**

Rates of ADHD, Alzheimer’s, autism and Parkinson’s Disease are increasing. There are many causes cited, all of which are backed up by research; one of these is glyphosate.

In brief, glyphosate exposure can cause an imbalance in the minerals iron and manganese. Too much iron in relation to manganese is associated with increased levels of autism and Alzheimer’s. Too little iron in relation to manganese is associated with an increase in ADHD and Parkinson’s.

In addition, once the gut is leaky (which can be caused by glyphosate), glyphosate can enter the body proper. It can travel to the brain and is associated with an increase in autism, Parkinson’s and Alzheimer’s. We also see more seizures in autistic infants fed on genetically modified soya (on which glyphosate has been used).

**ALS/MND**

Glyphosate is implicated in ALS (also known as motor neurone disease) because it replaces glycine in proteins; glycine is particularly important in muscles.

**Breast milk**

Disturbingly, glyphosate is showing up in breast milk across the world. Do we want our babies to ingest this?

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10 Boron, calcium, cobalt, copper, iron, potassium, magnesium, manganese, nickel and zinc.
11 These include treatments for Alzheimer’s, cancer, infertility and immunity.
Cancer

There is a lot of debate about this in both camps. The many farmers in the USA who have developed non-Hodgkin’s lymphoma have their own thoughts on this. There is evidence of Monsanto (the makers of Roundup) covering up important data that show a correlation between glyphosate and cancer and by conducting studies looking at effect on rats over three months (when rats are still OK) and not longer periods (when they do develop cancers).

MIT research scientist Dr Stephanie Seneff has new evidence linking glyphosate to cancer as well as autism and leaky gut. It is worth exploring her website and watching her videos.

Glyphosate causes oxidative stress in the liver and ‘double-strand breaks’ in the DNA, both of which leave someone open to cancer.

Detoxification problems

Cytochrome P450 (CYP) enzymes in the liver are used for many crucial processes, one of which is to detoxify xenobiotics\(^\text{12}\). Glyphosate interferes with these CYP enzymes meaning the xenobiotics are detoxified inefficiently or not at all.

CYP enzymes are also needed to activate vitamin D and make bile acids; lack of these enzymes thus has an adverse knock-on effect with health.

Fat gain

There is also an association between the disrupted gut biome and weight gain, partly because toxins in the body, if not dealt with by the liver, are stored in fat deposits, effectively neutralising them\(^\text{13}\).

Gluten intolerance

In the paper *Glyphosate, pathways to modern diseases II: Celiac sprue and gluten intolerance* by Anthony Samsell and Stephanie Seneff\(^\text{14}\), we see the problem with gluten isn’t the gluten itself\(^\text{15}\). In their paper, they show how the increasing number suffering from celiac disease and gluten intolerance is due to glyphosate.

They conclude:

> We have systematically shown how all of the features of celiac disease can be explained by glyphosate’s known properties.

> These include (1) disrupting the shikimate pathway, (2) altering the balance between pathogens and beneficial biota in the gut, (3) chelating transition metals, as well as sulfur and selenium, and (4) inhibiting cytochrome P450 enzymes.

> We argue that a key system-wide pathology in celiac disease is impaired sulfate supply to the tissues, and that this is also a key component of glyphosate’s toxicity to humans.

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\(^{12}\) Xenobiotics are chemical substance found within an organism that is not naturally produced or expected to be present within the organism. Xenobiotics may be grouped as carcinogens, drugs, environmental pollutants, food additives, hydrocarbons, and pesticides.

\(^{13}\) This is one of the reasons people can feel a bit under the weather when they start losing weight, as the toxins are released into the blood stream.


\(^{15}\) I believe it is a bit of both, but that is a debate for another time.
Gut biome

We’ll start by noting that glyphosate has been patented as an antibiotic. This means it can adversely affect our gut bacteria leading, for example to a die-off in beneficial gut bacteria and a growth in pathogenic gut bacteria. In turn, health suffers and anxiety levels increase.

This is a problem because we need a balanced biome for many things including gut health (providing short chain fatty acids and keeping down pathogen levels), synthesising vitamins B and K, metabolising bile acids, sterols and xenobiotics, producing neurotransmitter serotonin and communicating with the brain.

Kidney disease

Where people are also exposed to arsenic, glyphosate is strongly associated with kidney disease.

Leaky gut

Villi are the millions of finger-like projections in the small intestine that absorb digested food, enabling the nutrients to pass into the lymphatic system (most fats) and blood stream (the rest). Glyphosate acts on the gut, shrivelling villi, effectively shrinking them.

It also directly causes openings in the gut membrane (through inflammation) and indirectly (by causing an overproduction of zonulin, the gut membrane’s gate keeper).

Genetically modified crops bred to be resistant to glyphosate do this too. Pigs fed these crops in US in feedlots end up with intestine membranes too thin to use as sausage casings. The suffering animals have to be slaughtered before their intestines pack up and they bleed out. People eating meats from inflamed animals also suffer from inflammation.

Manganese deficiency

Manganese aids in the formation of connective tissue, bones, blood-clotting factors, and sex hormones; it also plays a role in fat and carbohydrate metabolism, calcium absorption, and blood sugar regulation. It is necessary for normal brain and nerve function.

Glyphosate has been seen to cause manganese accumulation in the brain stem (via the vagus nerve), meaning not enough is available in the body.

Mineral chelation

Glyphosate chelates (binds) minerals such as iron, cobalt, manganese and zinc; these minerals play vital roles in our bodies. The binding can affect plants (so they don’t grow as healthily) and us (indirectly through eating glyphosate-contaminated plants and animals, and directly through contact).

Mitochondrial function

See my letter after this list.

Nitric oxide and sulphate production interruption

Glyphosate can cause nitric oxide synthase 3 (eNOS) to malfunction, interrupting production of both sulphate and nitric oxide, leading to anaemia, vascular constriction and hypertension16.

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Neurotransmitter problems

Glyphosate interferes with the synthesis of the aromatic amino acids\(^\text{17}\) and the hydrophobic amino acid methionine\(^\text{18}\). The aromatic amino acids (tryptophan, tyrosine, phenylalanine) are the biosynthetic precursors for the neurotransmitters serotonin, dopamine, and norepinephrine and methionine.

Methionine is needed to make SAMe\(^\text{19}\); if we don’t have enough, SAMe and neurotransmitter levels decrease in the cerebrospinal fluid, contributing to the process of depression.

Nutrient deficiencies

Due to farming practices that effectively pillage our soils, plants don’t get enough nutrients themselves. We eat plants or eat the animals which eat the plants and we, in turn, do not get the number and concentration of nutrients we need. This is also a problem with foods made from GMO crops.

We saw above that glyphosate also interferes with the manufacture of the essential amino acids tryptophan, tyrosine, phenylalanine.

Steroid synthesis problems

Glyphosate also disrupts synthesis of steroids\(^\text{20}\) in our bodies; these steroids include the sex hormones and cortisol.

Sulphur synthesis disruption

Glyphosate disrupts sulphur metabolism, causing glutathione deficiencies (our bodies’ potent antioxidant) through impaired methylation pathways; these impaired pathways can also affect processes such as stress response, inflammation and immune response, detoxification of hormones, chemicals and heavy metals in the liver, genetic expression and the repair of DNA, and more.

**NOTE:** Severe glyphosate poisoning does occur. Read this list and then consider how ‘lucky’ an Islander was a couple of weeks ago when she got away with chest pains, muscle aches, rhinitis and severe headaches after inadvertently touching a contaminated patch when picking up dog faeces from the edge of a field that had easy access. Also consider how, at the time of writing, neither Environment or Health are taking responsibility for following up the incident after it was reported.

Severe glyphosate poisoning\(^\text{21}\):

- Acidosis
- Altered consciousness and shock
- Dysrhythmia
- High white blood cell count
- Low serum oxygen
- Renal failure
- Pulmonary oedema
- Respiratory distress

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\(^{17}\) Animals obtain aromatic amino acids from their diet, but all plants and micro-organisms must synthesise via the shikimate pathway in order to make them. Herbicides and antibiotics work by inhibiting these enzymes rendering them toxic to plants, and not enough in the diet for humans. Aromatic amino acids have a number of other roles, including absorption of UV light.

\(^{18}\) Methionine plays numerous other critical roles, including blood vessel formation.

\(^{19}\) SAMe is short for S-adenosylmethionine.

\(^{20}\) Natural steroids are biologically active organic compounds made in the body; they are used in cell membranes (altering cell fluidity) and as signalling molecules.

\(^{21}\) HL Lee et al, Academic Emergency Medicine 2000; 7(8):906-910
Here is part of my article published in the JEP on 11 September 2017.

Feeling tired? Maybe your mitochondria are suffering. “What’s that?” I hear you say. Since you ask, mitochondria are cigar-shaped organelles found in your cells; they make the energy you run on. Your mitochondria also play an important role in inflammation, the death of damaged cells (helping prevent cancer) and more. Given mitochondria supply you with your energy and help protect your health, it makes sense to nurture them, eh?

Sadly, in our modern world of processed foods and environmental toxins, we don’t always do that. For example, glyphosate is the main active ingredient in Roundup, a herbicide that’s sanctioned for use in Jersey and in many countries over the world.

Roundup damages your mitochondria in two main ways: the glyphosate component binds minerals such as manganese both in plants and our bodies, so less is absorbed from the gut. Manganese is needed for bones, immune function and to neutralise free radicals (those pesky things made as a by-product of metabolism or when we are hit with pollutants). Secondly, the added ‘inert solvents’ wreck mitochondrial membranes, allowing glyphosate into the mitochondria; as a result, your cells work much less optimally than they should.

That’s really quite worrying, yet our Environment Minister said in answer to a question from Deputy Tadier about glyphosate use, “...if he looked at the evidence he would find [glyphosate] is in the same class as red meat and red wine when it comes to the likelihood of giving you cancer, so I am extremely disappointed that he links again that particular chemical with cancer.” Was the Minister being disingenuous or just disappointingly ill-informed?

He added, “… it is education that is the secret here, working with the industry and getting the people who work on the land to follow the codes of conduct.” Yes, quite. But it does depend on what information you’re disseminating, and currently there is no evidence that our farmers are being officially encouraged to adopt soil regeneration practices whereby soils are given back their health and the need for manmade fertilisers and pesticides disappears.

The article was written some time ago, but nothing seems to have changed since then.

**Glyphosates in Jersey**

I wrote a letter to the JEP, which was printed on 26 October 2017. This was picked up by Radio Jersey and I was interviewed there. On both occasions, States members refuted/played down my claims.

We appear to have no buffer zones in Jersey. For example:

- We have regular stories of dogs and people becoming ill after contact with glyphosate-treated areas while out on walks

- I have spoken with a couple of organic farmers who complain that while they work their own soils in traditional, sustainable ways, they are downwind from areas being sprayed with glyphosate and contamination occurs when the spray drifts on the wind

It is really quite shocking how little overview there appears to be on Island use of glyphosate.
Glyphosate in foods

We are told there is no glyphosate-contaminated foods in Jersey; I have not seen the data so cannot comment in an informed manner. However, data for the UK and US are much more easily available and they do not make good reading.

The Soil Association says:

Government figures show its use in UK farming has increased by a shocking 400% in the last 20 years. Between 2014 - 2016 area treated with glyphosate increased 24%, and amount applied by 26%.

In addition to its use as a normal weedkiller, its manufacturers advise farmers to spray their wheat with glyphosate to kill and dry the crop, making it easier to harvest.

But glyphosate can follow the grain into our food. Tests by the Defra Committee on Pesticide Residues in Food (PRiF) found that almost two thirds of wholemeal bread sampled contained glyphosate.

We see it in packaged cereals too.

If we set up more links with the USA, we need to be worried: their processed foods come from glyphosate-treated GMO crops.

What Islanders can do: Insist on buying produce that hasn’t been sprayed with glyphosate, stop using it at home, and petition your deputies, Connétables and other States members to ban its use in Jersey. At the same time, ask that the debate is opened up to how we can transition to a healthier, sustainable farming community.

What we must do about glyphosate

First, we need to step back and explore why we even use the stuff: it’s because of modern farming practices, which came about through post-war political initiatives on using chemicals developed in the War for other uses and now forced upon the unsuspecting populace to ‘make yields’ better.

What we ended up with is a system that fights nature rather than working with it and many poor soils that lack in structure, biodiversity and nutrients; are compacted; cannot retain water in dry periods, nor keep cool in hot spells; allow swift runoff of chemicals and particles.

Living soils become dirt, weeds grow too fast and food plants need more fertilisers and pesticides to grow.

Plants that are grown in such conditions do not contain the nutrients they should and this impacts on the health of animals and people.

Political will

Decisions in the EU on glyphosate use are based on data from studies. On the face of it, this is what we would require; however, many scientists claim the decisions to be flawed because more weight has been placed on a) studies looking at glyphosate by itself and not as part of a chemical cocktail, and b) the results of industry unpublished studies (usually unpublished and not peer-reviewed) and too little on the peer-reviewed studies.
I am in agreement with the Soil Association who say:

...we are calling on the EU to ban the use of glyphosate on crops immediately before harvest and to ban all use in public spaces and gardens.

Sri Lanka and other countries made the brave decision to ban glyphosate. Why can’t we?

I would like politicians to take this call one or more steps further and see this poison being phased out to be replaced with regenerative, sustainable practices – not just more toxins.

More and more farmers are (re)adopting organic, sustainable horticultural methods – and with great success on many levels, including soil health and increased biodiversity, crop yields and plant and animal nutrient values. Quoting of these case studies is beyond the remit of this short report, but they are easy to find online and through listening to Radio 4’s Farming Today (which is also available on replay).

The methods are the sort of things I learned when I did my PGCE in Rural & Environmental Sciences. The knowledge is there: political will needs to be too.

We need a period of education, consultation and a new system whereby farmers are rewarded for environmentally-based farming practices. At the same time, we need a ban on glyphosate products sold in garden centres and ways to educate gardeners cide-free practices.

In closing, I make the request that our politicians speak to representatives from farming, science and health communities and concerned Islanders. I request they review glyphosate use in Jersey and work out the means by which is can be phased out and replaced with a healthier-for-all system.

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Appendix: Further reading and viewing

Letter:

My letter to the JEP from 31st October 2017.

Glyphosate is a herbicide; ‘cide’ means ‘killer’. As far as I can find, the word ‘safe’ has not been used in conjunction with glyphosate-based herbicide (GBH) use, but let’s accept for now it isn’t, as claimed by Environment, associated with cancer, and turn instead to other proven reasons we should not be using it.

GBH prevents proper uptake of several vital minerals; interferes with the liver’s detoxification systems and the synthesis of some neurotransmitters and steroids; harms mitochondria, which are needed for energy; is associated with Alzheimer’s, ADHD and autism; and kills beneficial gut bacteria, thus contributing to anxiety, obesity and antibiotic resistance.

Current methods to determine toxic load are based on extrapolation, so there is an assumption that toxicity decreases with concentration. Indeed, this is true – until we get to very low levels: at that stage glyphosate becomes a hormone and DNA disruptor, and effects are especially noticeable in foetuses and infants. The resultant damage to organs and brain development can even pass to subsequent generations.

Each ingredient in GBH is tested separately; there are no requirements to test the added ‘inert’ ingredients collectively. However, we must think about why they are added: it’s not for bulk (as in some vitamin pills), but to enhance the action of the glyphosate. That is, the ingredients, once mixed, act synergistically.

[Former Environment Minister] Deputy Luce has rightly stressed that chemicals such as GBH preparations must be used legally, responsibly and according to the instructions on product labels. While we hope this is indeed what happens in Jersey, there are many documented cases elsewhere where it is not, with disastrous health and development effects on communities.

Glyphosate is just one of the poisons used in Jersey, all of which add to the toxic load on our environment and bodies. When traces of these chemicals are found worldwide in water, breast milk, and organs, the Environment department should be very worried and not trying to persuade Islanders that the use of poisons is acceptable, especially as there are good alternatives, such as using regenerative farming practices.

Will this regeneration of Jersey’s environment happen overnight? Of course not, though it can be quicker than many think. Ministers need consider the low-cost, environmentally sound alternatives that are being proven to work across the world and must act now before it is too late.

Online:


Google Scholar: https://scholar.google.com/

Why IARC (from the WHO) said glyphosate is a probable carcinogen: https://www.iarc.fr/featured-news/media-centre-iarc-news-glyphosate/ and explanations for changes to the drafts and final paper: https://www.reuters.com/investigates/special-report/who-iarc-glyphosate/
Dr Mason and cancer in Wales:  
https://www.academia.edu/22173000/Glyphosate-causes-cancer_and_birth_defects and  
https://gmandchemicalindustry9.wordpress.com/tag/dr-rosemary-mason/ (also speaks of species decline)

Friends of the Earth:  

Mechanism of action: http://www.glyphosate.eu/glyphosate-mechanism-action

How glyphosate adversely affects the P450 enzymes:  
https://www.researchgate.net/publication/236211603_Glyphosate's_Suppression_of_Cytochrome_P450_Enzymes_and_Amino_Acid_Biosynthesis_by_the_Gut_Microbiome_Pathways_to_Modern_Diseases


Why we use adjuvants: https://www.roundupreadyplus.com/resourcecenter/understanding-herbicide-adjuvants

Explanation of adjuvants: https://extension.psu.edu/adjuvants-for-enhancing-herbicide-performance

More about cytochrome P450: https://en.wikipedia.org/wiki/Cytochrome_P450


Glyphosate action on earthworms and soil fungi:  
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4087917/

Design of glyphosate molecule by Yikrazuul.

More about AM fungi: https://en.wikipedia.org/wiki/Arbuscular_mycorrhiza#Symbiosis and  
https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/arbuscular-mycorrhizal-fungi

The Soil Association: https://www.soilassociation.org


Effects of glyphosate on fungi even at low concentrations:  

Countries where glyphosate is banned or at least restricted: [https://www.baumhedlundlaw.com/toxic-tort-law/monsanto-roundup-lawsuit/where-is glyphosate-banned/](https://www.baumhedlundlaw.com/toxic-tort-law/monsanto-roundup-lawsuit/where-is glyphosate-banned/)


Glyphosate in cereals: [https://www.ewg.org/childrenshealth/glyphosateincereal/](https://www.ewg.org/childrenshealth/glyphosateincereal/)

Dr Seneff’s website: [http://people.csail.mit.edu/seneff/](http://people.csail.mit.edu/seneff/)

Glyphosate overview: [https://gmofreeusa.org/research/glyphosate/glyphosate-overview/](https://gmofreeusa.org/research/glyphosate/glyphosate-overview/)


Glyphosate pretending to be glycine: [https://people.csail.mit.edu/seneff/2016/Seneff_Stephanie_052516.pdf](https://people.csail.mit.edu/seneff/2016/Seneff_Stephanie_052516.pdf)

Study showing how glyphosate adjuvants may increase toxicity: [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257636/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1257636/)

Glyphosate herbicide affects belowground interactions between earthworms and symbiotic mycorrhizal fungi in a model ecosystem: [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4087917/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4087917/)

Many, many more studies here: [https://www.ncbi.nlm.nih.gov/pmc/?term=glyphosate](https://www.ncbi.nlm.nih.gov/pmc/?term=glyphosate)

Other sites: Food Democracy Now, Moms Across America, The Weston A Price Foundation

**Books:**


**Videos:**

Does glyphosate cause cancer? (Short video): [https://www.youtube.com/watch?v=IXIF4ahPjrU](https://www.youtube.com/watch?v=IXIF4ahPjrU)

The dangers of glyphosate: [https://www.youtube.com/watch?v=8QqR68BY6F4](https://www.youtube.com/watch?v=8QqR68BY6F4)

The latest on the effects of glyphosate: [https://www.youtube.com/watch?v=kxSjt722iSw](https://www.youtube.com/watch?v=kxSjt722iSw)

Glyphosate and how to detox from it: [https://www.youtube.com/watch?v=CmAsTrsUjBc](https://www.youtube.com/watch?v=CmAsTrsUjBc)

The Monsanto Papers: [https://www.youtube.com/watch?v=JszHrM27dx4](https://www.youtube.com/watch?v=JszHrM27dx4)