

# Letter of Thierry Vrain to Canada's Health Minister

I sent Kids Right to Know and the Minister of Health Canada a briefing paper, ahead of the meeting between Rona Ambrose and Rachel Parent to discuss GMO labelling on October 27, 2014. The meeting was cancelled at the last minute because of the shooting incident on the Hill.

To the Honorable Rona Ambrose, Minister of Health

Re: Herbicide pollution and GMO labeling

Minister,

The confusion about the safety of GMOs is quite simple to address. The only GMOs in our agriculture are Glyphosate Modified Organisms also known as RoundUp Ready crops and the only GMOs in our food supply are from those crops. RoundUp Ready crops are engineered to be sprayed with the herbicide RoundUp and this technology has become so successful that RoundUp has become a major pollutant (1). This chemical pollution is antibiotic, it impacts the microbiome, impairs CYP enzymes, and depletes food of essential mineral micronutrients. As a background paper for the impact of this pollution I offer my speaking notes to the American College of Nutrition conference last week in San Antonio (Texas). Most of the studies I cite were published in the last five years.

Glyphosate is the active ingredient of the herbicide RoundUp, a new molecule created in 1960 by Stauffer Chemicals - a US company with a business of cleaning industrial pipes and boilers of mineral scales. The mineral deposits (same as in electric kettles) are called scales, and the pipe cleaning chemicals are called descaling agents. Glyphosate was patented in 1964 in the US as a powerful and very broad spectrum descaling agent (2). Meaning, it binds to metals indiscriminately and does a great job at “dissolving and preventing minerals from being reactive or bioavailable in solution”. When the descaling solution was disposed of in nature, it was obvious that it killed plants. The chemical company Monsanto promptly bought the molecule, patented it as a herbicide in 1969, and got it commercialized in 1974 (3). This molecule is making history because glyphosate has become the most successful agricultural chemical in North and South America wherever RR seeds are used. The farmers using this technology get simpler and cheaper weed management and despite higher

input bills and sometimes disappointing yields, and with weed resistance spreading fast, they adopted it in troves (4).

The herbicide RoundUp had a completely novel chemistry for a herbicide in 1969. It was deemed to kill plants by bonding to only one protein enzyme in the chloroplasts. Enzymes are metalloproteins with a metal atom as a cofactor at the active site of the molecule. Bacteria and plants and fungi share a metalloprotein called EPSPS for short and 5-Enol Pyruvyl Shikimate-3 Phosphate Synthase if you want to know what it does. It works with other metalloproteins to “make” building blocks of proteins, the aromatic amino acids. These molecules are also building blocks for a large number of aromatic molecules we call secondary compounds. Glyphosate binds tightly to the manganese atom at the centre of the EPSPS metalloprotein, so tightly that the protein cannot move and do its work making aromatic amino acids. No protein synthesis means there is no metabolic work possible, a quick death for the plant, or the fungi or the bacteria.

Because animals lack the shikimate pathway and because of its presumed mode of killing plants, glyphosate was pronounced innocuous to humans and registered as such in 1974 in the USA. Glyphosate has no acute toxicity, and at the time of registration in the US and Canada, nobody bothered to check for chronic effects. Considering the chemical properties of this pollution, one would expect long term chronic effects, equivalent to rickets, scurvy, or beriberi, for progressive lack of micronutrients. The animal feeding studies proving the safety of GMOs do not include testing for the safety of glyphosate. None of them mentions the residue levels of glyphosate in the feed. Meanwhile, a fast growing series of independent studies in various countries published in the last 5 years have ascertained the impact of glyphosate on various cellular enzymes and organs of animals and of human cells.

The first RoundUp Ready crops to be commercialized were soy and corn, released in 1996. Since then, a handful of RR crops have been adopted enthusiastically by farmers, particularly in North and South America. Today close to 500 million acres of soya and corn, and cotton, canola, and sugar beet, are engineered to be sprayed with RoundUp. About 40% of all RR crops are grown in the USA, most of the rest are grown in Brazil, Argentina, Canada, and a few other countries. RR crops are now sprayed with close to two billion lbs of glyphosate every year, and so much of that finds its way into

animal feed and processed food, that the EPA had to raise the legal residue limits last year to accommodate a new reality (5).

Glyphosate is antibiotic, a powerful and broad spectrum antibiotic (6). The mode of kill is again alleged to be very selective. The glyphosate molecule impairs the functioning of the shikimate pathway in bacteria in the same manner that it does in plants. Only one enzyme is affected in a pathway that animals do not possess. The antibiotic patent describes its effectiveness to kill bacteria at 1 ppm and this was confirmed last year in Germany (7). At this point I usually spend a minute or two explaining why a low level antibiotic diet is not a good idea. I describe the recent interest of the medical field in a large joint research project involving many Universities to decipher the huge community of thousands of species of bacteria that call us home. The Human Microbiome project is the equivalent of the Human Genome project in its scope. We are vastly outnumbered, roughly ten to one – one hundred trillion bacterial cells call our lower intestine home. They are forever sending signalling molecules to each other and to all human organs, particularly the brain. All animals depend on their symbiosis with these bacteria, and humans are no exception. They are the teachers of our immune system, they make the neurotransmitters for our brain, and have a strong connection to the heart and the whole digestive tract. They literally feed us all kinds of molecules that we require - we call them essential, like vitamins and such. They digest and recycle most of our food. Human organs rely on molecular signals from the microbiome for normal functioning, and as goes the microbiome so does its human shell. A recent review of the medical literature on celiac and other diseases shows the link to imbalances of the microbiome that are fully explained by the antibiotic properties of glyphosate (8).

We lack official data on residues of glyphosate in food or in water in Canada – no epidemiological studies of any kind have ever been done. All we have are the legal maximum residue limits now allowed by the EPA in RoundUp Ready foods, cereals 30 ppm, animal feed 100 ppm, soybean 120 ppm, and everything else in between (5). Here an inquisitive mind will ask why such a high residue limit for cereals when none of them are engineered to be sprayed with RoundUp. This is when you learn that RoundUp is sprayed on many non-engineered crops with the intent to kill them right before harvest. This is done to mature and dry the crops quickly to make them easier and cheaper to harvest. The RoundUp herbicide has been used as a desiccant for the last 10 years.

There is direct toxicity to animal cells because glyphosate binds to metals indiscriminately, and not just in plant cells. It binds to metals in solution and to metal co-factors at the centre of metalloproteins anywhere. For example glyphosate binds to the iron atom at the centre of a large family of protein enzymes called CYP. There are 57 different CYP enzymes in the human body, and approximately 20,000 in animals, plants, bacteria and fungi. The CYP enzymes are oxidizers, the first line of digestion and detoxification of most substrates. David Nelson writes in a review of the CYP enzymes: “The CYP enzymes of humans are essential for our normal physiology and failure of some of these enzymes results in serious illnesses (9). Samsel and Seneff have published a review of the impact of glyphosate on the CYP enzymes and the microbiome. They suggest that glyphosate’s suppression of CYP enzymes and its antibiotic effect on the human microbiome are involved in the etiology of the many chronic degenerative and inflammatory diseases that have grown to epidemic levels since the advent of the RoundUp Ready technology (10).

Dr Nancy Swanson has made public her statistical analyses of the US Centre for Disease Control’s statistics about the health status of America when placed next to the statistics of the US Department of Agriculture about the spread of RoundUp Ready soy and corn. Her correlation analyses show very high coefficient values suggesting strong links between glyphosate residues in RoundUp Ready food and chronic illnesses (11).

Medical and chemical reviews and peer reviewed studies have explained the mode of action of glyphosate and its impact on many metalloproteins. Human cell studies have shown acute toxicity (12-15) and animal studies have shown chronic toxicity (16-21). Glyphosate bio-accumulates in the plants and in animals that eat the plants. It accumulates in the lungs, the heart, kidneys, intestine, liver, spleen, muscles, and bones ... and chronically ill people have higher residues in their urine than healthy people.”(22)

To conclude this presentation of the nutritional status of GMOs, I would say that crops sprayed with RoundUp, whether they are RoundUp Ready or not, contain residues of glyphosate, and that foods made from these crops are depleted of the minerals that are bound to the glyphosate molecules, and chronically toxic (23).

Minister, your reassuring words have been quoted widely. “Currently, there is no scientific evidence, that says genetically modified foods are unhealthy. It is impossible for us to mandate a label, because our labels have to be based on

evidence that it is an unhealthy product for Canadians.” I hope you have found here the scientific evidence you require to act and that you join over 60 governments in the world who have found this evidence compelling enough in the past few years, to legislate some form of labelling or ban RoundUp Ready crops and the herbicide RoundUp.

Respectfully,

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2 U.S. Patent 3,160,632 Stauffer Chemicals 1964

3 US Patent 3,455,675 Monsanto Chemicals 1969

4 Fernandez-Cornejo J., Wechsler S.J., Livingston M. and Mitchell L. 2014. Genetically Engineered crops in the United States. USDA Economic Research Report No. (ERR-162) 60 pp. <http://www.ers.usda.gov/media/1282246/err162.pdf>

5 EPA 2013 MCL (US Environment Protection Agency legal Maximum Contaminant Levels). <http://www.epa.gov/ogwdw/pdfs/factsheets/soc/glyphosa.pdf>

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Video :

[Engineered food and your health: the nutritional status of GMOs](#)

Version française de la vidéo :

<https://www.youtube.com/watch?v=iGOu7kwaAVQ>

Acide phosphonic (article en français) :

[http://fr.wikipedia.org/wiki/Acide\\_phosphonique](http://fr.wikipedia.org/wiki/Acide_phosphonique)

Glyphosate, la molécule de base du Round-Up (article en français) :

<http://fr.wikipedia.org/wiki/Glyphosate>