

May 21, 2015

Regulatory Information Officer / Agent d'information sur la réglementation
Pest Management Regulatory Agency/Agence de réglementation de la lutte antiparasitaire
2720 Riverside Drive
Ottawa, ON, K1A 0K9

Dear Mr. Martin

I have reviewed the proposed re-evaluation decision by Health Canada for the chemical glyphosate published in April 13, 2015. I am a concerned Canadian citizen and a Certified Wildlife Biologist with over 25 years of experience in the fields of wildlife and forestry.

I am confounded by some of the content of your document, the lack of relevant research and thus what I consider an unwise position to continue with the registration of the product glyphosate. However, if, as your title page header purports, your priority is the "health and safety" of Canadians, you must seriously consider the following shortcomings of this process, and the appended research that directly contradicts your assessment.

To begin, I find it not only ironic, but immensely biased to include the economic and social benefits of glyphosate. While such factors would no doubt be considered by political entities, your document states that you use "a science-based approach". I would strongly argue that economics and social benefits have little relevance when considering the science behind the impacts and safety of a compound to human health. Politics should not enter a debate on the toxicity of a compound. I also believe with this formulating part of your document may explain the lack of recent research that shows numerous hazards associated with glyphosate and its formulations that should change the outcome of your review.

The basic overarching tenants of my position are as follows:

1. **Your current review of glyphosate appears to have been done apart from the adjuvants and emulsifiers that make it the effective product it is** – If glyphosate was used by itself for the benefits purported in both agriculture and forest based applications, then a review considering the impacts of glyphosate alone may be appropriate. However, we both know that the effectiveness of this compound is only possible in formulation. It is therefore the FORMULATION that must be considered in the review of glyphosate because indeed, this is what is sprayed across the country, not glyphosate alone.
2. **Your review lacks or ignores volumes of recent world-wide literature that reveals huge issues with glyphosate in formulation.** In any scientific review, literature review or published paper, the strength of the paper is only as relevant as the research upon which it is based. In other words, using outdated and short-term studies on a compound that has been continually modified and that has long term consequences is either knowingly biasing the process and

results, or worse, pleading ignorance to the advancement of science and emerging research. Neither is appropriate in this re-evaluation and I am appalled that your process relies on outdated, short-term research when long term and relevant research is readily available that shows markedly different results than you report.

For example, 78% of all industry-supplied research is between 10 and 40 years outdated. Further, the majority of these (a full 80%) are more than 15 years removed from currently published material. I have appended over 30 papers published within the past 10 years on glyphosate and glyphosate formulations that suggest markedly different results and reveal glyphosate and its formulations are the cause of many modern human diseases, are carcinogenic and are the cause of cell malformations in numerous types of human and animal cells, but most problematic are its problems associated with gastrointestinal systems and reproductive cells specifically. And this review doesn't even begin to address all the relevant research on GMO's and their problems.

Discouragingly, but likely explanatory to your proposed conclusion is that a mere 9% of the papers you review are recent publications. I do not understand on such a controversial topic as glyphosate use and it's proven health concerns why more effort was not expended to find current research from around the globe to give a much better review of this chemical. It would definitely impact your assessment. This very biased approach is clearly covered in Antoniou et. Al. 2012.

I would also like to comment on several specific concerns I have with your statements, science and assertions:

- a) You expressly state on page 3 that "pesticides are registered for use in Canada only if the level of exposure does not cause any harmful effects". **Therefore, if there is current research that DOES show harmful effects, particularly of a chemical in the state it is sprayed in throughout the country, by your own admission you MUST NOT recommend it for use. I contend that the attached research is clear evidence you must reverse your position.**
- b) Glyphosate formulations pose negligible risk to freshwater fish and amphibians. This conclusion has been proven incorrect by modern research (Annett et. Al. 2014, Vera et. Al. 2010). It shows harmful effects and would invoke a nation-wide ban on the use of glyphosate.
- c) Under 3.1 you state (as you do in most places in the document) that studies were available to satisfy data requirements, yet to not specify what these requirements are, nor what studies, when they were done, etc. to justify your statement. This is poor science and format for a review document with the intent of public review, unless of course the intent is to limit the amount of intelligent and scientific comment.
- d) You mention cardiovascular malformations on page 14 as serious side effects in one study (again, no specifics) but regardless, how can you then conclude glyphosate is safe? Once again, these results disagree with your statement that it "does not cause harmful effects"

and would rather corroborate modern research linking glyphosate and its formulations to a huge list of environmental, human and wildlife ill-effects.

- e) Dietary exposure can be mitigated by changes in use patterns. This begs two questions – if there are no harmful effects, why suggest mitigation? Next, because you suggest mitigation, this implies harmful effects. How do you propose such changes in use be enforced to ensure compliance? NOTHING is proposed or exists that I am aware of...therefore, this is an empty suggestion for change.
- f) On page 29 you discuss “major incidents of human exposure”. What exactly is “major”? Further, you attribute these exposures to “Highly toxic ingredients”. Could this be the adjuvants and emulsifiers I suggest **MUST** be considered? **Because the research you review also shows, along with most modern research, that glyphosate in formulation is indeed highly toxic.** Back to point 1 – how then can you suggest it does not cause harmful effects unless on the grounds of semantics by separating glyphosate from its formulations, a formulation that is rarely used commercially??
- g) Further, on page 30 you reference common incidents in wild animals where these formulations cause death in wildlife. Once again, totally contradicting statements and research that suggests your assessment is incorrect and will jeopardize human, wildlife and environmental health and safety. And these incidents you suggest resulted in NO changes to labelling? You can’t be serious. This in itself proves this entire process is biased, foolhardy or monopolized. How else could a toxic substance causing death NOT warrant changes in labels at the least, or more responsibly a ban on the product?
- h) Your statement “Glyphosate is rarely detected in drinking water” proves the weakness and ignorance of your process and data. I have included papers that show glyphosate, even at residual levels shows up in soil, water, human urine & other cells, cattle tissue, etc. Therefore, based on modern research your conclusions must once again be reconsidered in light of science.
- i) You assume “risk to mammals is low”. Again, research from Montana, Australia, Denmark, Germany and Egypt directly linked malformations in ungulates to the mineral chelating effect it has and the resulting mineral deficiencies in their food and systems from the use of glyphosate. More erroneous data, more erroneous conclusions.
- j) You state there is no reproductive risk to glyphosate. Current research again proves this point outdated and erroneous.
- k) You mention it has no effect on fish. The appended research proves that herbicides are endocrine disruptors (which glyphosate is) and federal research scientists have proven they cause many problems in fish including high at-sea mortality.
- l) Quite disturbing is your assertion on page 42 that one of the benefits of glyphosate is its ability to be more effective when combined with other chemicals. It is hypocritical to in one breath dismiss the impacts of glyphosate in formation because you are only reviewing the compound glyphosate, yet when it suits your purpose to then use this very argument to weigh the scales in favour of the compound.
- m) Your wordsmithing in the section referencing OECD countries not prohibiting ALL used of glyphosate is correct only grammatically. For the record, there are municipalities within

Canada, Provinces within Canada and many countries that have prohibited the use of glyphosate (Columbia and Holland in the past few weeks) due to the health hazards and risks you purport are not present. Interesting play on words, but in no way reflects reality and concerns around this compound. Statements like these drip with bias, and ignorance – whether purposeful or not – to current research.

- n) Maximum levels in foods – this raises another point that MUST be considered by Health Canada. In light of emerging research and glyphosates link to modern disease, it is Health Canada's responsibility to request labels on all foods that have been sprayed at one point or another in the growth process by glyphosate so the public can protect themselves from ingestion of this substance. If you do not revoke the use of this harmful chemical, at the very least you must allow a means by which the public can make informed decisions on the purchase of contaminated foods.
- o) If the only change from Health Canada's former review of glyphosate is several labelling changes, how do you ensure these label instructions are followed? What are the penalties for failure to heed them? Once again, this is a broken system and in NO WAY protects the health and welfare of humans, wildlife or the environment. These are serious deficiencies in your review and you cannot expect the Canadian public to take this re-evaluation seriously.

In closing, I am very disappointed with your re-assessment. This appears another bureaucratic process that only provides lip service and opportunity for input just to say it was done. I truly hope and expect that the scientists behind this review will take these comments seriously and amend this re-evaluation in light of applicable and relevant literature of glyphosate's great risk to public health, wildlife health and the environment when used in formulation across the country. We cannot let the politics of this chemical and the monopoly and pressure this creates to jeopardize health and safety. Otherwise, you are knowingly ignoring current literature, making you liable and creating another "agent Orange" situation all over again.

In all sincerity;

Rod E. Cumberland, CWB

Annett, et. Al. 2014. Impact of glyphosate and glyphosate-based herbicides on the freshwater environment. *J. Appl. Toxicology* 34:458-479.

Antoniou, et. Al. 2012. Teratogenic effects of glyphosate-based herbicides: Divergence of regulatory decisions from scientific evidence. *Envir. And Analyt. Toxic.* 13 pages.

Antoniou, M. 2011. Roundup and birth defects: Is the public being kept in the dark? 52 pages.

Benachour and Seralini 2009. Glyphosate formulations induce apoptosis and necrosis in human umbilical, embryonic and placental cells. *Chem. Res. Toxicol.* 22:97-105.

Benachour, et. Al. 2007. Time and dose dependant effects of Roundup on human embryonic and placental cells. *Arch. Environ. Contam. Toxicol.* 53:126-133.

Bohn, et. Al. Compositional differences in soybeans on the market: glyphosate accumulates in Roundup Ready GM Soybeans. *Food Chemistry.* 153:207-215.

Cattani, et. Al. 2014. Mechanisms underlying the neurotoxicity induced by glyphosate-based herbicide in immature rat hippocampus: involvement of glutamate excitotoxicity. *Toxic. Clair, et. Al.* 2012. Effects of Roundup and glyphosate on three food microorganisms. *Curr. Microbiol.* 64:486-491.

Cox. 1995. Glyphosate's toxicology. *Jour. Pesticide reform* 15(3): (complete review of 50 research papers back in 1995 that prove glyphosate is toxic to animals and humans)

Druille, et. Al. 2013. Arbuscular mycorrhizal fungi are directly and indirectly affected by glyphosate application. *Applied Soil Ecology* 72:143-149.

Fairchild, et. Al. 2002. Effects of freshwater contaminants on marine survival in Atlantic salmon. NPAFC Tech Report No. 4

Fernandez, et. Al. 2009. Glyphosate associations with cereal diseases caused by *Fusarium* spp. In the Canadian Prairies. *Europ. Jour. Of Agrol.* 31:133-143.

Gasnier, et. Al. 2009 Glyphosate-based herbicides are toxic and endocrine disruptors in human cell lines. *Toxic.* 262:184-191.

Gasnier, et al. 2010. Dig 1 protects against cell death provoked by glyphosate-based herbicides in human liver cell lines. *Jour. Occup. Medicine & Toxic.* 5:29.

Jayasumana, et. Al. 2014. Glyphosate, hard water and nephrotoxic metals: are they the culprits behind the epidemic of chronic kidney disease of unknown etiology in Sri Lanka? *Int. Jour. Res. Public Health.* 11: 2125-2147.

Kruger, et. Al. 2013 Field investigations of Glyphosate in urine of Danish dairy cows. *Envir. And Analyt. Toxic.* 5:1-7 pp.

Kruger, et. Al. 2014. Detection of glyphosate residues in animals and humans. *Environ. And Analyt. Toxicology* 4(2):1-5.

Marc, et. Al. 2004. Glyphosate-based pesticides affect cell cycle regulation. *Biology of the cell* 96:245-249.

Mesnage, et.al. 2012. Ethoxylated adjuvants of glyphosate-based herbicides are active principles of human cell toxicity. *Toxicology*

Mesnage, et. Al. 2014 Major pesticides are more toxic to human cells than their declared active principles. *Biomed. Res. Int.*

Newton, I. 2004. The recent declines of farmland bird populations in Britain: An appraisal of causal factors and conservation Action. *Ibis* 146:579-600.

Paganelli, et. Al. 2010. Glyphosate-based herbicides produce teratogenic effects on vertebrates by impairing retinoic acid signaling. *Chem. Res. Toxicol.* 23:1586-1595.

Richard, et. Al. 2005. Differential effects of glyphosate and Roundup on Human placental cells and aromatase. *Environ. Health* 113(6):716-720. Vera, et. Al. 2010 – Glyphosate negatively affected the structure and function of freshwater ecosystems

Samsel and Seneff 2013. Glyphosates suppression of cytochrome P450 enzymes and amino acid biosynthesis by the gut microbe: pathways to modern diseases. *Entropy* 15:1416-1463.

Samsel and Seneff. 2014. Glyphosate – pathways to modern disease II: Celiac sprue and gluten intolerance. *Interdisc. Toxic.* 6(4):159-184.

Schinasi and Leon. 2014. Non-Hodgkin lymphoma and occupational exposure to agricultural pesticide chemical groups and active ingredients: a systematic review and meta-analysis. *Int. Jour. Res. Public Health* 11: 4449-4527.

Seralini, et. Al. 2012. Long term toxicity of a roundup herbicide and a roundup tolerant genetically modified maize. *Food and Chemical Toxicology* 50:4221-4231.

Seralini et. Al. 2013. Answers to critics: why there is a long-term toxicity due to a roundup-tolerant genetically modified maize and to a Roundup herbicide. *Food and Chem. Toxicology.* 53:461-468.

Seralini, et. Al. 2014. Conclusiveness of toxicity and double standards. *Food and Chem. Tox.*

Shitmae, et. Al. 2013. Etotoxicological effects of different glyphosate formulations. *Applied Soil Ecology* 72:215-224.

Talbot, et al. 1991. Acute poisoning with a glyphosate-surfactant herbicide: A review of 93 cases. *Human and Experimental Toxicology* 10:1-8.

Thongprakaisang, et. Al. 2013. Glyphosate induces human breast cancer cells growth via estrogen receptors. Food and Chem. Toxic.

Valenzuela, H. 2011 – Review of many research results showing glyphosate is toxic and causes a host of problems in humans and wildlife.

Vera et. Al. 2010. New evidences of Roundup impact on the periphyton community and the quality of freshwater ecosystems. Eotoxicology 19:710-721.