

Gage W. DeVries

Mrs. Morris

EN 101

11-25-18

Trade Secret

Active Ingredients: chemicals in a pesticide formulation that act on pests and are required to be identified on the label. Inert Ingredients: chemicals deemed “confidential” or “trade secrets” that are not required to be on the label of a pesticide. Federal law allows the identity of inert ingredients to be hidden. An example of the two: glyphosate is the active ingredient in Roundup (a popular weedkiller). Polyethoxylated tallow amine (POEA) is an inert ingredient in Roundup and is the only inert ingredient known to the public (but POEA refers to a list of surfactants); therefore, any tests regarding the safety of Roundup can only examine the active ingredient (“Basic Information...”). In other words, scientists can only analyze glyphosate toxicity and if they analyze Roundup as a whole, they will not be able to determine the chemical responsible for harmful effects. The unknown inerts in Roundup work synergistically to make glyphosate, and the entire formulation, toxic. Glyphosate-based herbicides, specifically Roundup, are dangerous and should be banned.

In 1973, Monsanto Company developed its newest creation: a formulation of the chemical glyphosate under the trade name of Roundup. Designed to specifically harm plants by inhibiting crucial enzymes required for growth, glyphosate became the most widely used herbicide in the United States (US) in 2007, according to the Environmental Protection Agency (EPA). Worldwide usage skyrocketed after Monsanto released Roundup Ready crops in 1996, allowing Roundup to become one of the most popular herbicides in the world. In 2015, World

Health Organization's International Agency for Research on Cancer (IARC) found that glyphosate was “probably carcinogenic in humans”. Later that year, the European Food Safety Authority found that glyphosate was “unlikely” to cause cancer. Conflicting debates would continue over the glyphosate-based formulation Roundup, such as a jury ruling in favor of a groundskeeper accusing Roundup of causing his cancer in 2018. Later in the year, high levels of glyphosate were found in General Mills cereals causing more heated debates.

Studies found that glyphosate and Roundup are toxic to the human endocrine system and placental cells. Researches from, *Environmental Health Perspectives; Research Triangle Park*, found that glyphosate and Roundup disrupted the endocrine system by inhibiting the enzyme aromatase. Aromatase is an enzyme needed for the creation of estrogen (the most important sex hormone for female development), and glyphosate inhibits aromatase by blocking its active sites. It was found that Roundup, with its inert ingredients, aids glyphosate in disrupting aromatase and speeds up the toxic effects (Richard). This synthetic chemical has been shown to have the capability of damaging an entire system of the body. Scientists from, *Alternative Therapies in Health and Medicine; Aliso Viejo*, studied the effects of glyphosate on human placental cells. They looked at placenta cells, specifically JEG3 cells, and found that glyphosate was able to infiltrate cell membranes and become cytotoxic. The Roundup formulation was found to double glyphosate’s ability to infiltrate and kill cells (Campbell). Both studies concluded that this poison has detrimental effects on the human body.

The glyphosate Roundup formulation poses a great risk to non-target species. A study by scientists from the University of Texas found that glyphosate exposure to bees can be deadly. Glyphosate’s chemical properties allow it to be able to kill bacteria and the gut bacteria in bees are susceptible. Once the gut bacteria are killed, bees cannot fight off diseases and other

pathogens as easily. During the study, only a tenth of the bees afflicted by glyphosate were able to survive and they believe this chemical is contributing to “colony collapse disorder” (Romo).

This poison is sprayed all over flowering plants where bees cannot avoid encountering it.

Researchers from the University of Pittsburgh conducted a study on the effects of Roundup on tadpoles and amphibian larvae. The study has alarming data concerning amphibian populations:

The elimination of 96–100% of tadpoles in the water, combined with the elimination of 68–86% of juvenile frogs and toads on land, could have a major negative impact on amphibian populations... applying Roundup formulations containing the POEA surfactant [Polyethoxylated tallow amine] to amphibian habitats has the potential to cause substantial mortality in many amphibian species. (Relyea)

Roundup is very deadly at these stages in the amphibian life cycle because tadpoles and larvae have gills. The glyphosate formulation is toxic to the epithelial cells lining their gills during this period (Relyea). For something that is supposedly “only harmful to plants” there are a lot of non-target organisms that are harmed by it.

Glyphosate-based herbicides are not foolproof and pose a risk to the agricultural industry. According to the book, *Glyphosate Resistance in Crops and Weeds*, multiple species of weeds have developed a resistance to glyphosate. For example, in the Valle del Cauca Department in Colombia, glyphosate-resistant strains have appeared in areas where cultivation has occurred. In response to the newfound resistance, farmers applied larger doses to their crops; which in turn, created larger populations of weeds more resistant to the herbicide. Farmers now must rely on another poison or physically destroy the weeds with machines (Valverde). Intended targets of this poison are becoming immune to it, resulting in this harmful chemical having to be applied more often. Glyphosate use on crops has adverse effects on symbiotic nitrogen fixation (SNF).

SNF is a natural process by which certain bacteria living in plant root nodules can convert nitrogen in the soil to ammonia. This allows plants to convert the ammonia into usable compounds for food sources. SNF helps immensely to keep costs down for farmers by eliminating the need of nitrogen fertilizers. The chemical glyphosate has been shown to be toxic to nodule formation, thus crippling SNF in plants. Furthermore, glyphosate also reduces nickel content which is needed by the bacteria for SNF resulting in lesser root formation (Zobiole). This synthetic poison does the opposite of its intended purpose and it adversely affects crops by inhibiting natural beneficial processes.

Supporters of glyphosate, namely Monsanto Company (recently purchased by Bayer AG), claim that their chemical formulations are essential for sustainable agriculture. They go on to claim that without their poisons, pests and weeds would wreak havoc upon the world's crops. Monsanto argues that all evidence regarding toxicity of their chemical and humans/animals is inconclusive and false; saying that many studies prove their poison is safe ("Get the Facts..."). Spokespeople for Monsanto repeatedly say that glyphosate (not the formulation as a whole) is safe when used as directed.

Monsanto is incorrect; there are safer and better alternatives to volatile chemical use. Stephen L. Tvedten has crusaded against the use of pesticides/herbicides for 40 years and has written a manual, *The Best Control 2*, which details how to successfully achieve organic agriculture. Tvedten has developed and patented an enzymatic solution that eliminates: pests, mold, and mildew; while still maintaining an all-natural organic crop (Tvedten). Tvedten has revolutionized agriculture by creating safe and efficient ways to combat pests. Monsanto is careful to make claims about Roundup being toxic, and only claim that the active ingredient (glyphosate) is safe. In leaked company emails employees admit the toxicity of Roundup,

“Glyphosate is OK but the formulated product (and thus the surfactant) does the damage” (Gillam). Employees admit that the entire herbicide formulation can be harmful.

Glyphosate-based herbicides need to be banned by the EPA. The US should ban these volatile chemicals like many other countries already have, such as: El Salvador, Bermuda, and Belgium. Emmanuel Macron, the president of France, has announced that France will be taking steps to ban the chemical glyphosate, and leaders from Italy expressed similar concerns; following a court case in the US regarding a groundskeeper with non-Hodgkin’s lymphoma (Marks and Giulia). The US should take similar steps in banning this poison as other nations have done. California has introduced a new proposal that would combat the use of this herbicide. The new proposal, Proposition 65, lists glyphosate as a carcinogen and requires products containing it to have a warning label. Many cities throughout the US (much of them from California) have banned the use of glyphosate-based herbicides altogether (“Proposition 65”). Rather than idly sitting by for the federal government to create a ban, state governments can pass legislation to ban/restrict the use of these harmful poisons.

Synthetic formulations containing glyphosate, like Roundup, cannot be used safely. Active and inert chemicals work together to harm plants and animals. The EPA should err on the side of caution and ban herbicides containing it. There are safer and more effective alternatives to these poisons. Volatile toxins such as these have no place in everyday use or the shared environment.

Works Cited

- “Basic Information about Pesticide Ingredients.” *EPA*, Environmental Protection Agency, 2 Apr. 2018, www.epa.gov/ingredients-used-pesticide-products/basic-information-about-pesticide-ingredients.
- Campbell, Andrew W. “Glyphosate: Its Effects on Humans.” *ProQuest Central*, May 2014, 0-search-proquest-com.lib.grcc.edu/central/docview/1552462937/83E1D9300F1448BFPQ/1?accountid=11183.
- “Get the Facts: Glyphosate and Roundup Brand Herbicides.” *Monsanto*, monsanto.com/products/glyphosate-roundup-facts/.
- Gillam, Carey. “Weedkiller Products More Toxic than Their Active Ingredient, Tests Show.” *The Guardian*, Guardian News and Media, 8 May 2018, www.theguardian.com/us-news/2018/may/08/weedkiller-tests-monsanto-health-dangers-active-ingredient.
- Marks, Simon, and Giulia Paravicini. “French and Italians Sense Golden Opportunity in Glyphosate Ban.” *POLITICO*, POLITICO, 16 Jan. 2018, www.politico.eu/article/french-and-italians-sense-golden-opportunity-in-glyphosate-ban/.
- “Proposition 65.” *Oehha.ca.gov*, 7 July 2017, oehha.ca.gov/proposition-65/chemicals/glyphosate.
- Relyea, Rick A. *THE LETHAL IMPACT OF ROUNDUP ON AQUATIC AND TERRESTRIAL AMPHIBIANS*. Ecological Society of America, 2005, pp. 1118–1124, *THE LETHAL IMPACT OF ROUNDUP ON AQUATIC AND TERRESTRIAL AMPHIBIANS*.
- Richard, Sophie, et al. “Differential Effects of Glyphosate and Roundup on Human Placental Cells and Aromatase.” *ProQuest Central*, June 2005, 0-search-proquest-

com.lib.grcc.edu/central/docview/222634629/108C66534F8F4268PQ/1?accountid=1118

3.

Romo, Vanessa. "Study: Roundup Weed Killer Could Be Linked To Widespread Bee Deaths."

NPR, NPR, 26 Sept. 2018, www.npr.org/2018/09/25/651618685/study-roundup-weed-killer-could-be-linked-to-widespread-bee-deaths.

Tvedten, Stephen. "Chapter 44." *Www.stephentvedten.com*,

www.stephentvedten.com/44_Organic_Agriculture.pdf.

Valverde, Bernal E. "Glyphosate Resistance in Latin America." *Glyphosate Resistance in Crops*

and Weeds: History, Development, and Management, by Vijay K. Nandula, Wiley-Blackwell, 2010, pp. 254–255.

Zobiolo, L.H.S., et al. "Effect of Glyphosate on Symbiotic N₂ Fixation and Nickel Concentration

in Glyphosate-Resistant Soybeans." *Www.ars.usda.gov*, 3 Apr. 2009, www.ars.usda.gov/ARUserFiles/50701000/cswq-0427-zobiolo.pdf.