Contested Safety:

Monsanto's "Roundup Ready" Agricultural Assemblage versus Counter Discourses of Roundup Risk

by

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A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

Approved April 2015 by the
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ARIZONA STATE UNIVERSITY

May 2015

ABSTRACT

Genetically Modified Organisms (GMOs) have a polarizing effect in the US. The first commercially viable GMO was Roundup Ready Soy, introduced by Monsanto in 1996, to be used in conjunction with Roundup herbicides. This thesis investigated and delineated the development and deployments of the discourse of Monsanto's agricultural assemblage of Roundup Ready seeds and Roundup herbicides and its resistant discourses. Monsanto builds its discourse around the safety and necessity of Roundup Ready seeds through federal regulation and toxicology studies. Resistant discourses deployed by Monsanto's critics problematize Roundup safety and reject Monsanto's contention that GMOs are necessary for meeting world's food demands. The discourse analysis pursued in this thesis explored interactions between the dominant discourse and counter discourses and charted their deployments in Colorado's and Oregon's 2014 ballot measures that would have required mandatory GMO labeling. Analysis suggested counter discourses were successful in mobilizing people to engage civically.

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CHAPTER 1

INTRODUCTION TO THE DISCOURSES

"At Monsanto, we believe agriculture should be improved for the same basic reasons that medicine, engineering, architecture and computers should be improved: because human innovation is at the center of human progress" ("Improving Agriculture," n.d.).

Roundup is a glyphosate-based herbicide made by Monsanto that was licensed in the US in 1974. Since then, it is said that is the most studied herbicide in the world. Roundup has enjoyed world-wide ubiquity, and in 1993, Roundup Ready seeds (GMOs) were licensed to be used in conjunction with the herbicide. Stories and articles surrounding the topic of GMOs are common, as illustrated by this headline: "Monsanto, Under Attack for GMOs, Has a New Defender" (Bunge, 2014) or "Can These GMO Foods Save the World?" (Myers, 2014) Monsanto and its agricultural technologies are highly visible in the debate about GMOs, so much so that often the counter discourses focus specifically on the company and its agricultural assemblage between Roundup and Roundup Ready seeds.

Monsanto's Roundup and Roundup Ready seeds enjoy ubiquity in the US. However, there is controversy about the necessity or safety of the technology. Competing risk frameworks concerning the safety of the Round-up assemblage of agricultural practices are constituted in competing discourses produced by Monsanto and its critics: there is a **dominant discourse deployed by Monsanto** and **counter discourses** developed by those opposed to their technology. Discourses critical of Monsanto and its products circulate widely across scientific journals and popular media painting a picture of polarized public opinion around GM—one is either for, or against, GM technology. GMOs represent a flashpoint where much of the public debate focuses on Monsanto's Roundup Ready seeds and agricultural assemblages—especially the use of Roundup. This thesis will not be directly investigating the safety of Roundup or the GMOs that are in use, but rather will analyze Monsanto's discourse pertaining to Roundup Ready seeds and Roundup, and the steadiness of its deployment in a context of growing controversy over safety fueled by counter discourses, both scientific and popular, that problematize Roundup safety:

RQ1: What are the dominant and counter discourses surrounding Monsanto's Roundup and Roundup Ready Seeds?

RQ2: How are these discourses deployed in regulatory policy and political activism around labeling?

These research questions are addressed by identifying and analyzing the discourse of genetically modified Roundup ready seeds produced primarily by the agricultural giant Monsanto, but also deployed by government agencies, such as the US FDA, USDA, EPA, and other authorities, such as the academics who are involved in the Genetic Literacy project. This thesis will also identify popular counter discourses that oppose Monsanto's formulations, as well as identify alternative discourses, especially alternative accounts of safety produced in scientific discourse about Round-Up safety.

Discourse analysis requires a historical context and framing, the next section will develop discourse analysis more fully. The following section will describe my methodology for gathering representative texts and analysis. Chapter One functions to introduce background information on Roundup and Roundup Ready seeds briefly and outline the method of analysis. Chapter Two will be an in-depth development of Monsanto's dominant discourse and deployment; Chapter Three will develop both counter discourses to the dominant discourse as well as alternative discourses and deployment of these discourses; and lastly Chapter Four will question the efficacy of counter discourses and alternative discourses.

Background Information

On March 28, 2013, President Obama signed HR-933 into law. HR-933 represents the Congressional budget bill for 2013, if it had not been approved and signed into law the US Government would have shut down. In HR-933, section 735 is known as the Farmer Assurance Provision, which is colloquially called "The Monsanto Protection Act." Section 735, penned by Senator Roy Blunt (R-Mo.) and Monsanto, allows for the USDA approval of GM crops despite any decision by a judiciary committee that GM crops are unsafe (Louv, 2013). Monsanto defended section 735 suggesting Section 735 is to prevent planting disruption to the farmer while a crop is being tested for safety, House Committee of

Appropriations chairman Harold Rogers wrote that section 735 is to protect farmers from “activist groups” (Rogers as quoted by Louv, 2013) disrupting the distribution of GM crops during litigation with the USDA.

The American multinational company, Monsanto, was founded in 1901 by Francis Queeny. Monsanto was primarily a chemical company, having amassed its fortune with PCBs (Robin, 2010). PCBs, Polychlorinated biphenyls, were used in electrics and machinery as a coolant. Marie-Monique Robin (2010) chronicles Monsanto’s PCB marketing, research, and distribution. The chemical has been banned in the US as of 1979 because of how toxic and persistent it is in the environment, but prior to that, many examples can be found of PCB affecting the communities around the plants manufacturing the chemical. Robin (2010) argues that Monsanto knew as early as 1937 that PCBs were highly toxic, and yet continued to carry on production and not warn anyone. Anniston, Alabama is a prime example of a community affected by Monsanto and PCBS. In 2006, the Community of Anniston, brought forth a class action lawsuit against Monsanto. Monsanto had knowingly been polluting the community with PCB waste in several ways: runoff in the river, air pollution, and dumping waste in a pit near the plant. The people of Anniston have record numbers of cancer because of the exposure to tens of millions of tons of PCB waste being released. Robin (2010) refers to Monsanto’s conduct as criminal, knowingly since 1937 polluting communities with PCB waste until the chemical was banned in 1979.

Critics of Monsanto such as Marie-Monique Robin (2010) and Jason Louv (2013) charge that Monsanto has produced many products with dubious, and sometimes devastating, effects: PCBs (outlined above), DDT, dioxin, Agent Orange, rBST (recombinant bovine somatotropin, a hormone that makes cattle lactate without being pregnant first) (Louv, 2013; Robin, 2010). Monsanto does not directly address these charges, in fact as of this writing, on the “Who We Are” page of Monsanto’s website, these events are not discussed and instead the company focuses on its current endeavors:

> Monsanto is a sustainable agriculture company. We deliver agricultural products that support farmers all around the world. We are focused on empowering farmers—large and small—to produce more from their land while conserving more of our world's natural resources such as water and energy. We do this with our leading seed brands in crops like corn, cotton, oilseeds

> and fruits and vegetables. We also produce leading in-the-seed trait technologies for farmers, which are aimed at protecting their yield, supporting their on-farm efficiency and reducing their on-farm costs.
>
> We strive to make our products available to farmers throughout the world by broadly licensing our seed and trait technologies to other companies. In addition to our seeds and traits business, we also manufacture Roundup® and other herbicides used by farmers, consumers and lawn-and-garden professionals.
>
> Monsanto could not exist without farmers. They are our customers--the lifeblood of our company. More important, they are the support system of the world's economy, working day in and day out to feed, clothe and provide energy for our world. (“Who We Are,” n.d.)

The history outlined here represents a contested history of Monsanto and its products forwarded by its many critics and, as such, it is important to the development of counter discourses.

As the “Who We Are” (n.d.) page suggests, Monsanto’s current feature product is Roundup, the glyphosate based herbicide. Roundup is touted as the safest herbicide on the market, glyphosate (the active product or AP in Roundup) does not persist in the environment and breaks down into an inert salt in the soil (“History of Monsanto’s Glyphosate Herbicides,” 2005). Roundup is one of the most commonly used herbicide in the US (second only to 2,4-D, the AP in Agent Orange). The EPA estimates 5-8 million pounds of Roundup are being used annually as of 2007 in homes and gardens ("2006-2007 Pesticide Market Estimates: Usage (Page 3) | Pesticides | US EPA,” 2013). Glyphosate was discovered by John Franz in 1970 while working for Monsanto. Roundup was licensed and commercialized shortly thereafter as a weed killer, and since then its use has expanded exponentially (Robin, 2010).

All pesticides have an active ingredient that must be licensed by the EPA; in Roundup’s case, Glyphosate In addition to the active ingredient, many other inert ingredients are used to intensify the chemical and biological effect of the pesticide such as solvents, carriers, emulsifiers, and surfactants. Generally speaking, because these additional ingredients are not pesticides themselves, the constitution of each iteration of Roundup is different depending on the application (Robin, 2010). The concoction for

each Roundup formulation is beyond the purview of the EPA and often kept secret (Mesnage, Defarge, Spiroux de Vendomois, & Séralini, 2014; Robin, 2010). Mesnage et al. (2014) charges that "the regulatory system assumes that the [active product] designed to specifically target plants, insects, or fungi is the most toxic compound of a formulation to nontarget species, The long term regulatory tests are performed on this substance alone" (p. 1). Additionally, Robin (2010) writes that the EPA relies on toxicology results provided by agro-chemical companies, in our case Monsanto, and does not run their own toxicology experiments nor does the EPA overview the experimental procedures. The way herbicides in the US are licensed will be particularly telling in the deployment of the dominant discourse provided by Monsanto.

Critics, such as Mesnage et al. (2014), suggest that Monsanto promotes reviews that favor their products, cherry-picking toxicology reports to submit to the EPA. "It is commonly believed that Roundup is among the safest pesticides. This idea is spread by manufacturers, mostly in the reviews they promote, which are often cited in toxicological evaluations of glyphosate-based herbicides" (Mesnage et al., 2014, p. 7). The Mesnage et al. (2014) study found Roundup to be up to 125 times more toxic than glyphosate, which is particularly interesting to this thesis as it stands in direct contention with Monsanto's and the EPA's claims of safety. Mesnage and colleagues' (2014) articles, and many others **represent a counter discourse of Roundup safety posed against the Monsanto discourse**.

Counter discourses of safety have been and continue to be contested by Monsanto. For example, one of the authors of the Mesnage et al. (2014) article, Gilles-Eric Séralini has faced considerable turmoil at the hands of the regulatory science community, including Monsanto directly. Séralini, a French molecular biologist and toxicologist at the University of Caen, studies genetically modified foods and has repeatedly found markers that contraindicate Roundup and Roundup Ready crops as safe. In September of 2012, Séralini published findings of a Roundup Ready crop NK603 corn study, he found the experimental groups of rats who were fed both Roundup treated and untreated NK603 over two years to have higher incidents of cancer and cases of abnormal organ (liver and kidney) tissues as well. Before the findings were published, Monsanto threatened the journal *Food and Chemical Toxicology* with legal action as the findings could be detrimental to their business. The article was published, which sparked

controversy and criticism in the scientific community, and was subsequently retracted (Fugh-Berman & Sherman, 2014; Smith, 2013). The Séralini affair is one germane event necessary to understand how the discourse developed by Monsanto interacts with those that publicly reject it.

More challenges to the dominant Monsanto safety discourse come from alternative news sources such as *Grist* (Upton, 2014) and even mainstream media sources like NPR citing evidence of harm produced by alternative discourses. For example, John Upton (2014) of *Grist* discusses a mysterious form of kidney failure is crippling entire communities of sugar-farm laborers in Central America and US Centers for Disease Control epidemiologists have connected it to Roundup. The article claims that the disease is killing young men, men as young as 20, and occurs only along the Pacific coast, from southern Mexico to Panama. Similar chronic kidney disease has shown up in rice laborers in Sri Lanka, all connected to Roundup. Certainly, there has been no definitive causal link between kidney failure and Roundup exposure, but there is a strong correlation (Upton, 2014).

In addition to popular media and news sources, several scientific studies have declared a link between Roundup exposure and Non-Hodgkin's Lymphoma in men (De Roos, Zahm, Cantor, Weisenburger, Holmes, Burmeister, & Blair, 2003: Hardell & Eriksson, 1999; Hardell, Eriksson, & Nordstrom, 2002; McDuffie, Pahwa, McLaughlin, Spinelli, Fincham, Dosman, Robson, Skinnider, & Choi, 2002). The link of Non-Hodgkin's Lymphoma and Roundup is one that is directly addressed by Monsanto in a press release titled "Glyphosate: Response to non-Hodgkin's Lymphoma Allegations" (2002). Monsanto's press release criticizes the 1999 Hardell & Eriksson study as not meeting criteria as valid epidemiological science, charges it fails to make a causal link, and reminds readers of Roundup's approval by the European Commission ("Glyphosate: Response to non-Hodgkin's Lymphoma Allegations," 2002). Time and time again, Monsanto claims, regulatory bodies have found Roundup and glyphosate to be perfectly safe ("History of Monsanto's Glyphosate Herbicides," 2005).

Roundup's patent expired in 2000, allowing for many copy-cat formulations marketed at bargain prices in order to compete for Monsanto's market share. Monsanto introduced Roundup Ready crops shortly thereafter to maintain their hold in the marketplace. Roundup Ready soy was the first crop

developed by Monsanto in 1996, and today there is Roundup Ready “alfalfa, corn, cotton, spring canola, sugar beets and winter canola, which contain in-plant tolerance to Roundup® agricultural herbicides. This means one can spray Roundup agricultural herbicides in-crop from emergence through flowering for unsurpassed weed control, proven crop safety and maximum yield potential” (“Roundup Ready System,” n.d.).

Monsanto makes many appeals for the desirability of its products by suggesting, and in some cases requiring (Robin, 2010), Roundup and Roundup Ready crop be used synergistically to reduce costs for farmers by lessening fuel costs, land tillage, and overall herbicides used: “Herbicides are key products used in conservation tillage (or no-till) farming, which leaves the soil undisturbed between cropping seasons – therefore being a major force in reducing soil lost to wind and water erosion” ("Monsanto | The History of Roundup,” n.d.). Echoing the Monsanto story, mainstream media cites authoritative voices; for example, according to a recent *Forbes* article citing a 20 year data review, research suggests there is no significant difference between livestock fed conventional food crops and Roundup Ready crops (Entine, 2014a). The data represented nearly 100 billion animals, fed conventional grain prior to 1996 (when Roundup Ready crops were approved) and then upwards of 90 percent Roundup Ready grain through the current year of the research (Entine, 2014a). According to *Forbes*, these researchers concluded that there is no significant difference between conventional crops and Roundup Ready crops; GM crops are safe (Entine, 2014a). In fact, the FDA requires no labeling of GM foods because they are “substantially equivalent” to their conventional counterparts (Bereano, 2014; O’Neil, 2014). According to O’Neil (2014), this means that unless there is material difference—differences that can be detected via taste, smell, or other human sense—the FDA sees no need to label.

Despite assertions of the safety of GMOs by Monsanto and regulatory bodies, Americans remain uncertain. According to polls, nearly 90 percent of Americans would like to know if they are in fact eating GMOs. Just like Americans would like to know their tuna is dolphin safe, their shoes are American Made, or their chicken is Kosher. The FDA suggests labeling of GMOs as unnecessary because there is substantial equivalence and people do not need to know the production inputs in their food; but that

suggests that all the aforementioned labels are frivolous and unnecessary (O'Neil, 2014). Colin O'Neil (2014) writes of the decision by the FDA "it was a political, not scientific, decision to apply nineteenth-century logic to a twentieth-century food technology, and in the process left all consumers in the dark to hidden changes to their food" (p. 71). Monsanto and the FDA maintain the safety and equivalence of Roundup Ready crops for food despite detractors (Entine, 2014a).

Critics also remain unconvinced by these assertions and challenge the safety of GMO products, some critics are suggesting links to neurological effects. Stephanie Seneff, a research scientist at the MIT Computer Science and Artificial Intelligence Laboratory, links Roundup Ready crops and a myriad of different ailments. Seneff says of Roundup and Monsanto: "since Monsanto first introduced Roundup into crops in 1974, there's been a rise in autism and other diseases […] I'm certain at this point that glyphosate is the most important factor in an alarming number of epidemic diseases" (Jackson, 2014). Her research links the use of glyphosate to diseases like Alzheimer's, diabetes, pancreatic cancer, thyroid cancer, Non-Hodgkin's lymphoma, and Parkinson's disease. Seneff's research also may have implications linking the herbicide to the ongoing brood failure in bee colonies (Jackson, 2014).

There seems to be a polarization within the scientific community regarding Roundup and Roundup Ready crops; begging the question of why is there so much difference in how data sets are interpreted? Dr. Don Huber, professor emeritus at Purdue University, suggests that "some of our scientists are the ones who are the most difficult—and the biggest impediment to better research—because their funding is dependent on the very same agrichemical companies like Monsanto that are producing Roundup. They're not about to go in a different direction from the people who've been funding them" (Jackson, 2014). Dr. Don Huber's stated concerns point to the importance of understanding how Monsanto's discourse was developed and deployed, appropriated and resisted, in agriculture, government, science, media and social activism.

Methodology

To answer the research questions proposed in the previous section a discourse analysis was performed by delineating discourses into the dominant discourse of Roundup and Roundup Ready seeds

deployed by Monsanto and the counter discourse deployed by critics of the herbicide and its synergistic seed system. More specific methods are outlined below.

Dominant Discourse

First, this thesis will investigate the dominant Monsanto discourse of GM safety while focusing on how safety is articulated and framed. To identify the dominant discourse a convenience and relevant sampling of the Roundup technology deployment through texts such as advertisements will be utilized, television advertising texts will be utilized. The toxicology report cited by Monsanto's website to declare the safety of the herbicide and seeds will also be examined. Other communications deployed by Monsanto on services such as their Facebook company page and company Twitter account will inform the discourse analysis as well. Press releases from federal agencies such as the USDA, FDA, and EPA will be utilized, as well. Mainstream news sources (e.g., *Wall Street Journal, New York Times)* and alternative news sources (e.g., *Mother Jones, Alternet*) will also be part the discovery, limited to the articles published within the last 18 months, with a focus on deployments of dominant discourse and oppositional discourses. Additionally, as other texts become part of the discovery that supports the dominant discourse they will also become part of the analysis. The aim in doing so is to identify common themes among the dominant discourses.

Counter Discourse

This thesis will identify the common rejected and contested issues of the dominant discourses to develop an understanding of the counter discourse by investigating a range of authoritative voices, from citizen activists to scientific authorities, exploring how their discourses are articulated, deployed and disseminated. To identify counter discourses, this thesis will be examining the studies that challenge both Monsanto's assertions of safety and the various toxicology reports that counter the one Monsanto cites for those assertions of safety. The counter discourse analysis will also examine alternative news sources (e.g., *Mother Jones, Alternet*) to understand and identify resistant authorities and discourses, as well as mainstream news sources (e.g., *Wall Street Journal, New York Times.*), activist groups such as Food Democracy Now and Organic Consumers Organization and activities like "March against Monsanto"

literature and events will also become part of the discovery. As with the dominant discourse, this thesis was open to other texts that support the counter discourses that may arise upon discovery.

A discourse analysis will be performed, or rather a genealogy of the dominant and counter discourses. Discourse analysis is a tool to uncover social constructions situated in both social and scientific areas. The investigation of Monsanto's dominant discourse, competing discourse, and alternative discourses require a historical contextualization and framing within society and science. Discourse analysis also includes analysis of outcomes of competing discourses. How each discourse represents its own contextualized history within the story Roundup Ready seeds and Roundup will be identified. This thesis will also identify the selective frames in which both the dominant discourse and counter discourse constitute problems and also the selective framing of solutions to those problems, for example Monsanto describes GM technologies as a solution to food scarcity and those discourses that counter the Monsanto discourse may see GM technology as the problem itself with abstinence as the solution. This thesis will be asking how authoritative voices are developed. It will be especially interested in how dominant and counter discourses are deployed, but even more so interesting is what will be revealed by what is missing in each discourse. Finally, this thesis will be looking at outcomes of each discourse and how each discourse defines success and efficacy.

Organization of Thesis

Chapter One introduced the background information needed to explore the dominant and counter discourses more fully in Chapters Two and Three. Chapter One has also outlined discourse analysis methods necessary to reconstruct the dominant and counter discourses in the US.

Chapter Two houses the analysis of the development and deployments of the dominant discourse of Roundup and its everyday normalization in weed-control, as well as Roundup Ready seeds in agriculture and the historical contextualization of GMOs. This chapter will also describe examples from the texts to fully develop the common concepts within each form of deployment (e.g., Monsanto's website, advertisements, press releases from federal agencies).

Chapter Three is a development of the supra counter discourse composed from scientific and populist counter discourses. This chapter will be focusing on the texts that question the dominant discourse employed by Monsanto and the Federal Government. Generally, these texts call into question the safety of the agricultural assemblage Roundup and Roundup Ready seeds, but there is more to their formulations than safety. As a collective, the counter discourses resist the dominant framing of Monsanto's agricultural assemblage to constitute a larger supra counter discourse. Chapter Three will also examine some the alternative visions of agricultural production available within the discourse, such as Polyface Farms in Virginia. Polyface is a closed-ended eco-system where there is very little input from outside the farm, such as corn, hay, and chicken feed. It is important to include alternative discourses because the modern food system, as we know it, is only 50 or so years old (Pollan, 2007).

Chapter Four is an analysis of social change through counter discourses. It will ask the question: have counter discourses been successful in calling into question the dominant discourse as well as mobilizing institutional change regarding Roundup? To answer this, Chapter four will be discussing mobilizations of people in the 2014 ballot initiatives to label GMO foods in Colorado and Oregon. It will be interesting to look at petitions of the Federal Government as well in relation to counter discourse deployments.

CHAPTER 2

MONSANTO'S DISCOURSE

Silent Spring by Rachel Carson is so frequently credited with galvanizing the Environmental movement in the U.S. that it is emblazoned on the front cover, “The Classic that Launched the Environmental Movement.” The introduction by Linda Lear (2002) is a poignant chronicling of the climate that greeted the book, “Carson’s thesis that we were subjecting ourselves to slow poisoning by the misuse of chemical pesticides that polluted the environment may seem like common currency now, but in 1962 *Silent Spring* contained the kernel of social revolution” (Lear, 2002, p. x). The chemical industry was in a post-WWII boon with pesticides in common use like DDT and many others. Carson challenged the vision of the companies so much so that she was repeatedly attacked as unscientific and an outsider (Fosberg, 1963), but her outsider status actually worked in her favor to see and explain how the toxic chemicals were harming us (Lear, 2002). Preeminent botanist F.R. Fosberg (1963) wrote a review of the book in the journal Ecology asserting that a review from the industry was necessary as there were threats of injunction of continued publication by the chemical industry. Regardless of the outcry, Rachel Carson’s book had gone on to become a bestseller, and no attempt to discredit the author or the expose has been capable of stopping its sales. *Silent Spring* was frequently attacked as a faux-science report by the chemical industry instead of what it was—an account of one woman’s interpretation of the state of the environment. Fosberg (1963) writes of the book,

> it is no more scientific than are the advertising of the pesticide salesmen, the mass application pest-control programs of the U.S. Department of Agriculture, and the propaganda to justify them. This book is strictly an effort to present the other side of this whole matter to those who are paying for, and whose health and enjoyment are being affected by, current procedures of pest control. (Fosberg, 1963)

He goes on to say the Carson simply took factual evidence available in the scientific literature and made it available and understandable by the general public (Fosberg, 1963). Fosberg’s (1963) assessment of *Silent Spring* is one that Linda Lear (2002), among others will agree with, but the chemical

industry, including Monsanto disagreed with vehemently. Monsanto even published a parody called *The Desolate Year* to combat Carson's account of the situation (Stauber & Rampton, 1995). The idea that Carson's writings gave rise to the modern environmental movement is not hyperbole, Rampton and Stauber, authors of *Toxic Sludge is Good for You* (1995) describe the book as interrupting "business as usual" for many Americans and even launched the first Earth Day on April 22, 1970. *Silent Spring* (1962) set the tone for the next 20 years of legislation in the U.S. as it made the public more aware of the fallout incurred by uses of DDT and other herbicides like 2,4-D (which is still in use today) and 2,4,5-T (Stauber & Rampton, 1995). Many argue that *Silent Spring* (1962) is the reason the public demanded regulation of harmful chemicals. In the face of DDT potentially being banned, agriculture needed acceptable and safe herbicides, safe herbicides like Monsanto's Roundup.

This chapter begins by understanding a popular press book, *Silent Spring*, and its effect on the discourse of toxic environments and pesticides. *Silent Spring* pre-empts a host of legislative measures such as the Toxic Substance Control Act and The Delaney Clause, which will be discussed in depth in the following section. This chapter will explore changes in accepted toxicology paradigms to understand the dismantling and re-articulation of legislation designed to protect the American public from hazards. Monsanto's star product, Roundup and its synergistic seed systems, emerged in this climate and found acceptance. Roundup's continued success is situated in the dominant discourse as safe and necessary, Roundup Ready crops are by extension of Roundup's discourse as safe and necessary. In addition to looking into the changes in the legislation and scientific thought, this chapter explores the dominant discourse of Monsanto's assemblage of Roundup, and Roundup Ready crops.

Historical Contextualization

Shortly before the 1940s were in full swing, the Food, Drug, and Cosmetic Act of 1938 was passed by the U.S. Food and Drug Administration (FDA). The more consumer-oriented Food, Drug and Cosmetic Act was a reaction to consumer pressures largely put forth by women's groups, the act was an effort "designed to protect the pocketbooks of consumers" ("About FDA | The Food, Drug, and Cosmetic Act of 1938," 2009) by creating food standards. "The law provided for three kinds of food standards: 1)

standards (definitions) of identity, 2) standards of quality, and 3) standards regulating the fill of container. Regulators had the discretionary authority to set standards 'whenever in the judgment of the Secretary such action will promote honesty and fair dealing in the interests of consumers'" ("About FDA | The Food, Drug, and Cosmetic Act of 1938," 2009). The Delaney amendment in 1958 updated section 401 of the Food, Drug, and Cosmetic act to include proscribing any food additives that have shown carcinogenic effects in laboratory animals. The Delaney Clause represented, and still does represent, the most risk averse piece of U.S. legislation to date.

The clause was proposed by Congressman James Delaney, "the chair of a special committee formed to investigate the pesticide contamination of food" (D. Vogel, 2012, p. 45). The public and legislative bodies were increasingly uncertain about rising cancer rates with unknown causes and the wide use of the chemical pesticide DDT, and the clause was passed swiftly. The clause states that "no additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal, or if it is found, after tests which are appropriate for the evaluation of food additives to induce cancer in man or animals" (Smart, 1998 as quoted by D. Vogel, 2012, p. 45). Essentially, the clause created a zero tolerance policy toward suspected carcinogenic additives and raised public salience of the issue of potentially hazardous food additives.

A few years later, carcinogens were singled out again with the passing of the Toxic Substance Control Act (TSCA) in 1976; in fact, during the 1970s in the U.S. more than twenty-one risk averse laws were adopted apropos of carcinogens (D. Vogel, 2012). The law allowed the EPA to regulate industry by requiring companies to provide data on production, use, health effects, and other matters concerning chemical substances (Harmison, 1978). The TSCA resulted from urging by the Council on Environmental Quality of Congress to close the regulatory gap that allowed for "hundreds of new chemicals to be marketed each year without adequate testing and provided no way for the federal government to test the safety of chemicals already in use" (D. Vogel, 2012, p. 155). Pesticides were regulated prior to the new TSCA and are not subject to the TSCA regulations (Harmison, 1978). In 1972, the U.S. Environmental Protection Agency (EPA) was given authority by the 1972 Federal Environmental Pesticide Control Act to

suspend use and distribution of pesticides based on a potential injury basis versus a demonstrable injury basis (D. Vogel, 2012). Demonstrable injury was based on risk assessments and toxicology profiles provided by the manufacturers themselves (J. Vogel, 2004; S. Vogel, 2008; D. Vogel, 2012), a caveat that made many chemical companies concerned over cost (Rattner, 1976).

The public was also increasingly concerned about water pollution and safe drinking water in the face of political debate over toxic substances. The 1972 Federal Water Pollution Act, commonly known as the Clean Water Act of 1972, gave the EPA authority to establish maximum thresholds of pollutants in drinking water and to maintain and restore the integrity of drinking water ("EPA | History of the Clean Water Act," 2014). The Clean Water Act set thresholds for pesticide runoff as well.

Monsanto's Roundup was registered in 1974 with the EPA and available for sale in 1976 according to Monsanto's "Company History" page (2013); its registration and sale began in a time of skepticism and risk aversion to chemicals deemed toxic. People were increasingly concerned about pesticide exposure and its impact on the environment. As Rachel Carson's (1962) account of harmful pesticides loomed over the chemical industry, Monsanto's newest herbicide Roundup gained ground as its active ingredient glyphosate was shown to be safe as it metabolizes into a form of salt after exposure to water and sunlight and does not pose unreasonable risks to either the environment or to humans when used as labeled (EPA R.E.D. Facts Glyphosate, 1993; "History of Monsanto's Glyphosate Herbicides," 2005; "What is glyphosate?," 2014). Glyphosate is a non-selective herbicide approved for use in both food and non-food crops in the U.S. by the EPA (EPA R.E.D. Facts Glyphosate, 1993). The herbicide works by inhibiting an enzyme, EPSP synthase, within the plant that it needs to grow. The plan will wither within 24 hours and will be yellowed within a few days and will subsequently die off. EPSP synthase is not a required enzyme by humans or animals and as such, the herbicide poses no risk to humans or animals ("What is glyphosate?," 2014). Additionally, the herbicide binds tightly with most soils and therefore is not available for reuptake in neighboring plants ("History of Monsanto's Glyphosate Herbicides," 2005).

According to the US Geological Survey, as of 2007, glyphosate is in use in almost all agricultural and urban areas in the US. Overall, agricultural use has increased from less than 11,000 tons in 1992 to

at least 88,000 tons in 2007 (Capel & Capelli, 2011). Monsanto's site boasts its star's ubiquity in that Roundup is one of the most used herbicides in the world, Monsanto's glyphosate products are registered in 130 countries and approved for weed control in more than 100 crops. "No other herbicide active ingredient compares in terms of number of approved uses" ("History of Monsanto's Glyphosate Herbicides," 2005).

Between the regulations of the TSCA and the Clean Water Act and the Delaney Clause, Monsanto's new star herbicide was registered. For all intents and purposes, by all accounts of measurement, Roundup was safe. The environmentalists were quieted as the TSCA ushered out problem chemicals like DDT, Dioxin, and PCBs. Companies began open discussion with consumers on how they were going to be more accountable for their products and pollution, but of course, everyone had a part to play in cleaning up the Earth (Stauber & Rampton, 1995).

In 1982, the Reagan Administration sought to simplify the Clean Water Act to mitigate some of the necessities of compliance for companies and states (Shabecoff, 1982). Journalist Philip Shabecoff's article discusses the fourteen proposed amendments of the time and the reactions of environmental groups. Included in the updated draft of the law would be a 4-year extension for companies to implement the "best available technology" to treat and contain their waste. The environmental groups called the proposal "a cynical attempt to undermine one the country's best environmental laws" (Shabecoff, 1982). Within the new proposal, the maximum term of discharge permits would increase from 5 to 10 years, companies would only have to update their technology to maintain waste every 10 years and more exemptions would be provided for Federal polluters for cleaning up toxic waste (Shabecoff, 1982). There were concerns of dismantling legislations like the Clean Water Act for economic reasons (Shabecoff, 1982).

The TSCA implementation fared no better than the Clean Water Act, critics point out that the TSCA exempts certain chemicals because they are either presumed safe from current use or because they are subject to other forms of legislation. The exempted chemicals include: "pesticides, radioactive materials, food and food additives, drugs and cosmetics, and firearms and munitions" (Draggan, 1978, p.

260), it is important to note at this point that Monsanto's Roundup is considered an exempted chemical. David Vogel (2012) points out that only five previously presumed safe chemicals have been restricted following the TSCA's implementation in 1976. Additionally, the chemical industry was concerned about their costs of testing, suggesting it will cost upwards of two billion dollars a year, and the General Accounting Office estimates it will be about 100 to 200 million annually. Dow Chemical Company, a vocal opponent of the bill, was concerned about the EPA having too much political power and the bill had too little to do with toxicity testing (Free, 1976; Rattner, 1976).

The EPA was criticized for its failure to implement the bill as written and had granted exemptions for 99% of all users of PCBs in America. Also, as of the writing of the 1979 article by Severo, the agency had failed to decide how to deal with the 40,000 chemicals already in use in industry (Severo, 1979). A year later, Severo (1980) pointed out another failure that in the three years post passing of the TSCA, the EPA had missed "almost every deadline established by the act on January 1, 1977." EPA officials complained that chemical companies are not forthcoming or compliant of the law, and environmentalists criticized the agency's lack of action. Also, Severo (1980) reports that PCBs were still widely in use despite the law because the EPA had granted hardship exemptions to 99.3% of companies that used PCBs. More recent as of 1996, the TSCA had over 75,000 chemicals in its inventory and only 263 chemicals with toxicology profiles provided by the companies that manufactured said chemicals (J. Vogel, 2004).

Risk Conceptualization. The school of thought regarding risk and exposure was archaic at best (Vogel, 2004) and with limited resources, it is no wonder that the EPA officials and the Administration declared they were overburdened by the sheer volume of chemicals to inventory and regulate; there needed to be regulatory change to the TSCA (Shabecoff, 1982). S. Vogel (2008) outlines the conceptualization of risk under the Reagan Administration which may account for the aforementioned proposed changes. "Risk is relative" (S. Vogel, 2008, p. 668) is a concept Vogel uses to describe how policy was interpreted and refers to the idea that chemical toxicity injury is relative to the amount of exposure. S. Vogel (2008) aligns the concept to an equation "risk = hazard x exposure" (p. 668). This idea

was expanded upon with “new methods and technologies for quantifying exposure” (p. 668) also known as biomonitoring. The equation was then updated to risk = hazard x presence. S. Vogel (2008) suggests this narrative of risk “was used to legitimize the proliferation of industrial chemicals throughout the twentieth century” (p. 668). Safety could be achieved by minimizing the exposure to the hazard (S. Vogel, 2008), which is the basis of the Delaney Clause of 1958, any hazard shown to be carcinogenic in animal trials was proscribed. Unfortunately, the Delaney Clause was undermined in 1962 by an amendment that allowed for the use of DES—a drug used in livestock to increase meat production—provided it was not detectable in the “edible flesh” (p. 669).

The FDA attempted to use the Delaney Clause to block the use of plastics that can leach carcinogens into food through packaging, but Monsanto and other industry lobbyists showed quantitative evidence of the amount of chemicals that leached from plastic was well below detectable limits (S. Vogel, 2008). In fact, this scientific paradigm of undetectable risk as risk mitigation found its way into many decisions regarding carcinogens, and eventually in 1996 the Delaney Clause was repealed and replaced with the Food Quality Protection Act which set a single standard for all pesticide residues in food, both processed and fresh (S. Vogel, 2008).

Generally, quantitative evidence of harm will refer to toxicology trials to determine maximum dose exposure limits before injury results. S. Vogel (2008) suggests the guiding principle of toxicology is “the dose makes the poison,” where animal research experiments are utilized to find “where toxic response begins and ends” (p. 670), which is similar to the aforementioned risk conceptualizations. The experiment designs typically include extremely high doses of chemicals given to adult animals to “determine the lowest level at which a toxic effect occurs or preferably the level at which no toxic effect is seen” (p. 670) which is referred to the “lowest observed adverse effect level” or LOAEL or “no observed adverse effect level” or NOAEL. These levels are then extrapolated to humans with an uncertainty factor of 100 to 1000 fold figured in to account for differences in individual responses to the chemical and the tested chemicals are generally considered safe at these levels. Regulatory bodies such as the FDA and EPA use the NOAEL or LOAEL thresholds to make assessments of risk, S. Vogel (2008) writes of the FDA: “over the

past fifteen years, however, studies measuring the effects of very low-dose exposures to pesticides, herbicides, and industrial chemicals—levels presumed to be safe—began filling in the black box of low-dose effects" (p. 670). Monsanto's Roundup would be included in this criticism.

Furthermore, troubling insights from researchers regarding chemicals and herbicides were coming to a proverbial head in the 1990s. In 1991, an interdisciplinary conference of wildlife biologists, experimental endocrinologists, and molecular biologists came to a consensus regarding endocrine disrupters called the Wingspread Statement. The Wingspread Statement, according to Vogel (2008), "declare[s] with certainty that 'a large number of man-made chemicals that have been released into the environment, as well as a few natural ones, have the potential to disrupt the endocrine systems of animals, including humans'" (p. 670). Chemicals referred to as endocrine disrupters have potentially adverse effects beyond cancer on the reproductive, immunological, behavioral, and neurological systems of animals. Endocrine disruption research challenges long held beliefs that minute exposures, NOAELS and LOAELS, are necessary but benign in the face of economic prosperity. Research on endocrine disrupters reframes the paradigm of "the dose makes the poison" to "timing makes the poison" as even minute exposures at critical development intervals are detrimental (S. Vogel, 2008). Industry has laid its best efforts to undermine endocrine research as junk science, but the topic has been persistent in political and scientific salience (S. Vogel, 2008), similar to the efforts against Herbert Needleman's research on minute exposures to lead and long term health outcomes.

Needleman and Timing Makes The Poison. Pediatrician and psychologist Herbert Needleman effectively took on the lead industry in 1979 when he and his colleagues published "Deficits in psychologic and classroom performance of children with elevated dentine lead levels" in The New England Journal of Medicine. The body mistakes lead for calcium and will deposit and store lead in bones, so Needleman collected deciduous teeth from teachers in low-, medium-, and high-income school districts to tract lead levels in children. Children were also given IQ tests and their teachers were asked to rate every student in their respective class on levels of attentiveness, hyperactivity, asocial tendencies, and several other "non-adaptive" behavior measures. Needleman (1979) concluded "frequency of non-

adaptive classroom behavior increased in a dose-related fashion to dentine lead level. Lead exposure, at doses below those producing symptoms severe enough to be diagnosed clinically, appears to be associated with neuropsychologic deficits that may interfere with classroom performance" (p. 689). Needleman hypothesized that no level of lead exposure was safe, a concept revolutionary in environmental toxicology at the time. According to a 2005 interview with Needleman, the lead industry was silent for about 6 months before beginning an assault on him, his data, and his conclusions (Rosner & Markowitz, 2005).

Needleman had made enemies within an industry that feared the implications of his research; in the 13 years following the 1979 publication became an inquiry of scientific research fraud, misconduct, falsification, and plagiarism through the university he worked for and the EPA essentially accused him of junk science. The U.S. Office of Research Integrity exonerated the doctor in 1992 (Markel, 2013; Rosner & Markowitz, 2005). The timeline of exoneration coincides with S. Vogel's (2008) suggestion that timing of low-dose hazard makes the poison scientific paradigm found its footing, but perhaps Needleman's work gave the foundation for its salience.

Needleman's work suggests that even at minimal exposure to hazards there are potentially insidious and subtle low-dose effects of presumed safe chemicals. Lead had been in use by humans for an extended time (Markel, 2013), presumably safe if one does not develop plumbism—acute lead poisoning. S. Vogel (2008) outlines the paradigm shift from "dose makes the poison" to "timing makes the poison," while Needleman's work embodies the shift. Yet another researcher (Vogel, 2004) suggests that the scientific paradigm to define risk is fraudulent in its conception.

Toxicology Paradigm Shifts. According to Jason Vogel (2004), science's role in chemical regulation is problematic because of several assumptions in the testing paradigm: "(1) scientific determination of harm must precede regulatory action, (2) science has the capacity to determine harm with sufficient certainty, and (3) chemical exposure affects humans according to the assumptions of classic toxicology" (p. 297). The first assumption forces regulation into "getting the science right" (p. 297), effectively changing the end-goal to be using science and distracting from protecting public health. J.

Vogel (2004) goes on to suggest that scientific determination also serves to exclude “non-testing regulatory alternatives [such as] subsidies for organic farming” (p. 297). Secondly, the idea that statistically significant certainty of cause and effect can be determined in endocrine disruption is doomed to fail because the science simply is not there yet. Finally, the assumption that exposure to endocrine disrupters can be proven beyond a doubt within exposure to other synergistic and environmental effects makes certain that legal and scientific proof will never be ascertained (J. Vogel, 2004).

In 1996 the Food Quality Protection Act effectively took the place of the Delaney Clause, came with a mandate to investigate the effects of synthetic chemicals on the human endocrine system. The EPA implemented the Endocrine Disrupter Screening Program (EDSP), which allows the EPA administrator to take action to protect public and determine if a chemical is an endocrine disrupter using “appropriate validated test systems and other scientifically relevant information” (J. Vogel, 2004, p. 283). Jason Vogel (2004) is cynical of the EDSP, he asserts that the scientific vigor of the EDSP favors industry, presuming a synthetic chemical is innocent until proven an endocrine disrupter and as such is likely in heavy use. He suggests it reverses the burden of proof of harm to the manufacturer and assumes scientific certainties of injury before regulation, and even then, the EPA must make an economic cost-benefit analysis to regulate or restrict any suspected endocrine disrupter.

The 1970s represented a time when risk aversion was publicly and politically salient (D. Vogel, 2012); this decade was the birth of many legislative attempts to make the environment in the U.S. safer and to limit human impact on it. As stated before, these are the auspices of which Monsanto’s glyphosate herbicide, Roundup, found itself. The literature suggests that glyphosate was and is safe by all appropriate testing measures that the EPA has put in place. Some environmental activist groups and journalists of the time seemed skeptical of implementation, but pleased that it was finally on the political agenda. More recently, however, scientists and cynics alike question the constructions of safety within the TSCA, Food Quality Protection Act, Clean Water Act, and many others. This contextualization of the adoption of Roundup is not exhaustive, and admittedly confusing (there is a lot of overlap in which acts

restrict which chemicals), but represents a fair cross-section of the discourse at the time and more recently.

Roundup and Roundup Ready Crops. Glyphosate was discovered in 1970 and subsequently Roundup was registered in the U.S. in 1976. Glyphosate was re-registered in 1993 ("EPA R.E.D. Facts Glyphosate," 1993), and the first commercial biotech seed was produced by Monsanto in 1996—the Roundup Ready soybean ("Agronomic Practices," 2015). The Roundup ready crop has been genetically engineered to be used synergistically with glyphosate based herbicides. Robb Fraley represents one of the trio of scientists who discovered the genes that allow a plant to be glyphosate resistant and successfully inserted the genes into the soybean (Robin, 2010). The science of gene insertion from one plant to another is necessary to the counter discourses and will be discussed in Chapter Three; however, it is germane to understanding the dominant discourse only in that the resulting crop has been deemed "substantially equivalent" to its conventional counterpart (Bereano, 2014; O'Neil, 2014) or "generally regarded as safe" (GRAS) (Acosta, 2014).

As it currently stands in the US, there are no specific federal laws or acts that govern Roundup Ready crops or other genetically modified foodstuffs (D. Vogel, 2012; Acosta, 2014). The Law Library of Congress states,

> the United States does not have any federal legislation that is specific to genetically modified organisms (GMOs). Rather, GMOs are regulated pursuant to health, safety, and environmental legislation governing conventional products. The US approach to regulating GMOs is premised on the assumption that regulation should focus on the nature of the products, rather than the process in which they were produced. (Acosta, 2014)

Genetically modified (GM) crops enjoy ubiquity in the U.S. and have become an integral part of the industrialized agricultural economy. The U.S. is the world's leading producer of GM crops and seed, as of 2012, the U.S. accounted for over 40%--roughly 69.5 million hectares of GM crops—of the world's GM crop production (Acosta, 2014). "In 2013, 93% of the soybeans, 90% of the cotton, and 90% of the corn grown in the US were genetically engineered for either herbicide tolerance or insect resistance"

(Acosta, 2014). GM food crops are GRAS presumptively by the FDA; the FDA only requires premarket approval as a food additive if the GM crop is substantially different from its conventional counterpart in structure, function, or composition. As of this writing, there is no federal mandate to label GM foodstuffs and any bill that has been introduced into Congress has fizzled quickly (Acosta, 2014). State attempts to regulate and label GM foodstuffs have also fizzled. GM crops and foods have been available on store shelves for nearly 20 years with no adverse effects being documented; perhaps there is no need for regulation and labeling of GM crops (Entine, 2014a).

There is a veil of safety in the U.S. regarding the safety of pesticides and the transgenic crops that are designed to withstand them. According to one of Monsanto's YouTube (i.e., Roundup Ready PLUS channel on YouTube) channels, the company is releasing new seeds that are resistant to more pesticides than just Roundup. For all intents and purposes, these practices are safe in the U.S., and the previous section outlined how the standards of safety, risk, and exposure have been understood. These points on the timeline of Monsanto's Roundup are key to understanding that conceptualization of safety within the dominant discourse.

Dominant Discourse

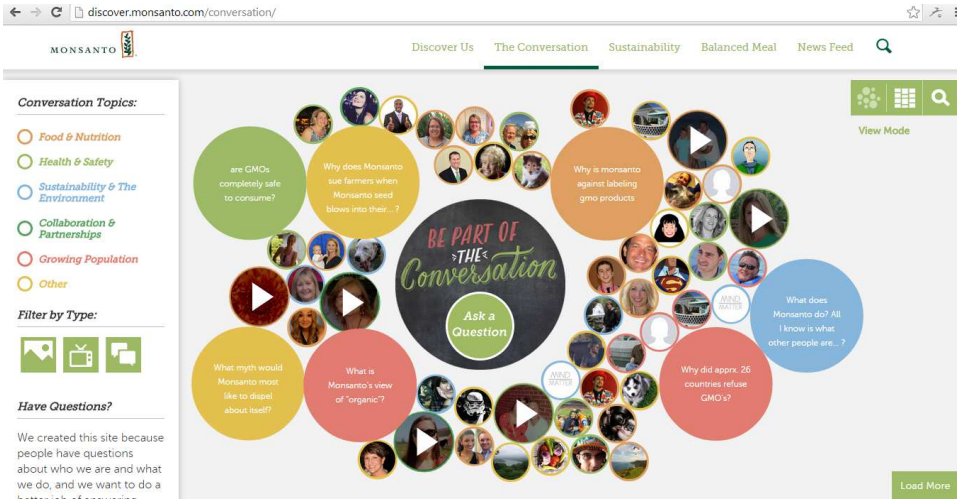

Figure 1 Screenshot of Monsanto's discover.monsanto.com landing page

In 2014, around the mid-term elections of 2014 based on the company's Facebook page, Monsanto launched a page designed to allow free exchange between the company and consumers called Discover Monsanto. The page is colorful, with a series of different colored circles that are arranged in a pattern that is reminiscent of a cornucopia full of produce. Recently, as seen in the above screen shot, Monsanto updated the page to include a menu to link the reader to different topics such as "Food & Nutrition," "Sustainability & The Environment," and "The Growing Population." There are a few other links that one can click on, but these three topics are relevant to the dominant discourse because Monsanto views itself to be in the nexus of food, nutrition, sustainability, the environment, and especially the growing population.

In October of 2013, Rob Fraley of Monsanto accepted the World Food Prize because of his work on Roundup Ready seeds. The Monsanto Company YouTube account uploaded a video of Robb Fraley discussing the World Food Prize, the need for more sustainable agricultural practices, and the need for more transparency between the consumer and the company. The Discover Monsanto site is likely part of this growing image of transparency. Rob Fraley says "at Monsanto, it probably took us a little longer than it should have to realize that people today expect full transparency about where their food comes from" (Monsanto Company, 2013). His sentiments and the inception of the Discover Monsanto site represent a slight shift in discourse deployment for Monsanto, but it fundamentally does not change their world view.

Monsanto views itself as a savior of sorts to the farmer. The company has dedicated a website and several YouTube videos to recognizing the hard work of the farmer. For example, there is a website titled America's Farmers that is owned and run by Monsanto that appears to serve as a reminder to everyone that farmers are integral to the American way. Farmers are the beginning of everything, from the food that one eats to the clothes that one wears.

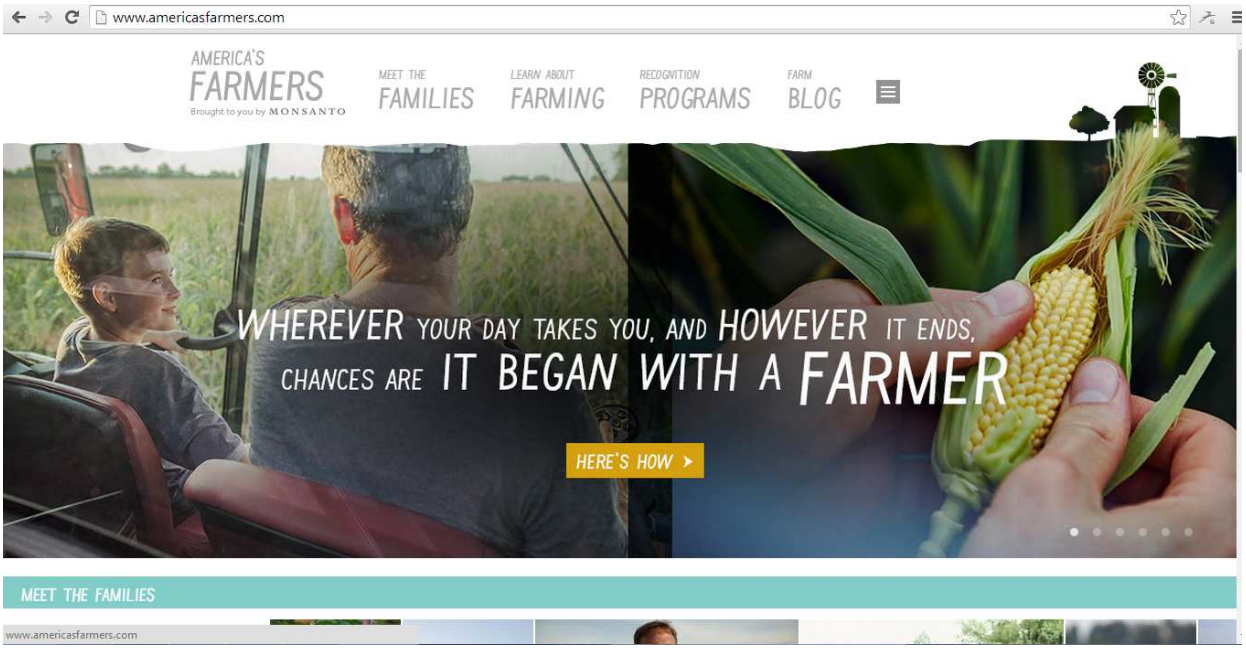

Figure 2 Screenshot of Monsanto's America's Farmers landing page

In addition to that, Monsanto has published several commercials to their Americas Farmers YouTube page (i.e., America's Farmers YouTube channel) that use instrumental music and a woman's voice to remind the viewer that American farmers are far removed from most people, but farmers are taking care of "us" (America's Farmers, 2013). The America's Farmers account has many videos introducing the viewer to an American farmer and his family. The imagery is bucolic, with long shots of the crops and close up framing of the livestock. Frequently, the children of the farmers are discussing how hard their parents work to feed America and what dedicated parents they are. These videos serve to humanize the American farmer, as though he had be vilified. Humanizing the American farmer is akin to humanizing Monsanto by extension. Rob Fraley's promise of transparency when paired with Discover Monsanto and American Farmer campaigns seems to be suited to soften the company in the public view. In recent years, Monsanto has been the subject of several documentaries (e.g., *Food Inc.* and *GMO*

OMG) and activist campaigns like March against Monsanto, these deployments serve two purposes: softening the company's public image and gaining the trust of the American people.

Necessity of GMOs. This sentiment is echoed throughout the company's main website and YouTube account both domestically and internationally. On their YouTube account, a video titled "The World We Share" reminds the viewer that the world is home to over seven billion people and sharing resources is the only way for the human race to survive. In fact, many of the 327 videos available on Monsanto's YouTube account are about the international farming community and Monsanto's efforts to improve lives in third world countries. These videos generally use faces of the country it is focused on to discuss the company's efforts and impacts, a tactic that offers credibility of the claims being made (e.g., Monsanto Company, 2014a). In this particular video, the focus is less on Monsanto's products and more on the community impact which serves to obfuscate rather than educate. These sorts of videos that focus more on projects and potential impacts on a presumably small community with no mention of the product in question suggest that it is less of an advertisement and more of a PR piece to convince Westerners that Monsanto and its products are altruistic and good indeed.

Some of the videos center on the technology of Monsanto specifically (i.e., Roundup Ready seeds and BT seeds) or focuses on community improvement efforts (e.g., agricultural schools, clean water efforts). These videos serve to extend Monsanto's worldview that the company is indeed saving the farmer, and by extension, the world. It is interesting that Monsanto is purporting a complex world view suggesting that humans and the environment are intertwined, and more interesting is that this world view also indicts everyone as a responsible party to sustainability. Stauber and Renton (1995) suggest this is a PR tactic to lessen the responsibility of a company to its externalities, but it seems that Monsanto is positing that every person has to make sustainable choices in how one chooses food and how one lives, without forgetting that Monsanto's products are part of a sustainable agricultural program.

Monsanto's discourse deployment is done primarily through its various websites (e.g., discover.monsanto.com and americanfarmers.com) and social media (e.g., YouTube and Facebook). The primary discussion Monsanto puts forth is sustainable agriculture for a growing population. According to a

video of Robb Fraley, there will be nine billion people on the earth come 2050 (Monsanto Company, 2014b), Monsanto sees itself as pivotal to feeding all those people. Currently, the discussion of feeding the world is conspicuously absent of an in-depth conversation surrounding the company's technology and products. Additionally, the star product, Roundup, is rarely discussed in Monsanto's campaigns, more than likely because of its long established safety. However, even in discussing GMOs, Monsanto rarely talks about the science of GMO seeds or Roundup Ready seeds specifically. The company strategically leaves out the science of biotechnology because the controversy in the public realm is not about the science and allows for Monsanto to establish its products as safe without begging the question from consumers about Roundup.

Safety of Roundup and GMOs. How does Monsanto articulate safety for its star herbicide? Monsanto provides a variety of press release-style documents on its website, frequently titled "Backgrounder," sometimes these are simply informative pieces or written specifically to defend products that have been indicted by independent research. Several of the Backgrounder releases form the basis of Monsanto's discourse of safety as they often establish and re-establish Roundup and glyphosate as safe according to current toxicology standards.

The culture of safety of Roundup centers on a seminal literature review performed by Williams, Kroes, and Munro (2000), the review is cited several times in Monsanto's Backgrounder series. The trio performed a peer-reviewed safety and risk assessment of glyphosate and Roundup herbicides. In doing so, the trio reviewed studies submitted by Monsanto to regulatory bodies worldwide, reports from regulatory and scientific organizational bodies, and a "wide array of studies conducted by independent researchers using information obtained from public literature." Williams et al (2000) reviewed 188 studies over two years to comprehensively evaluate glyphosate. In performing their risk assessment, the researchers reviewed literature,

The key findings of the study are as follows:

- Glyphosate is not carcinogenic

- Roundup herbicide, like glyphosate, has very low acute toxicity, which means very high exposure is required to cause an adverse effect
- Under present and expected conditions of use, Roundup herbicide does not pose a health risk to humans
- Glyphosate does not bioaccumulate

  Glyphosate does not adversely affect reproduction or development
- Children are not at greater risk unless they work or live on a farm
- There is no evidence of endocrine disruption, and
- There is no synergistic adverse effect. ("Summary of Human Risk Assessment and Safety Evaluation on Glyphosate and Roundup herbicide," 2005)

Furthermore, Monsanto has listed many more Backgrounders to quell any question of safety (see http://www.monsanto.com/products/pages/Roundup-safety-background-materials.aspx for review). The Backgrounder titled "Glyphosate and Standard Toxicology Studies" (2002) goes into the specifics of toxicology testing of the herbicide, demarcating exposures to acute, sub-chronic, and chronic. Within the discussion of standard toxicology, Monsanto also reminds us of the Food Quality Protection Act of 1996, which lowered acceptable human exposure to pesticides to levels that factor in exposure to infants and children. The U.S. EPA has concluded, based on standard toxicology reports, that glyphosate-based herbicides posed risk of increased sensitivity in children, and therefore adults ("Glyphosate and Standard Toxicology Studies," 2002). In Monsanto's discourse Williams, Kroes, and Munro (2000) serve as its authorities, these Toxicologists are cited in numerous places on Monsanto's website to remind the reader of Roundup's safety.

The culture of safety within Monsanto is a top priority, of course, and Monsanto is compliant with EPA and FDA guidelines for both their herbicide formulations and Roundup Ready System. The dominant safety discourse appears to be informed and built upon standards set up by federal agencies. It also appears to be limited to standards set up by the USDA, FDA, and EPA. There is limited discussion of

standards of safety in other countries, at least in the Backgrounder series. However, as stated previously, the Backgrounders also address independent research that may implicate Roundup in adverse health effects. Journal articles that suggest Roundup is linked to Hairy Cell Leukemia or non-Hodgkin's Lymphoma are addressed directly ("Glyphosate: Response to non-Hodgkin's Lymphoma Allegations," 2002; "Glyphosate: Response to Hairy Cell Leukemia Allegations," 2002) and dismissed outright because of junk science allegations, the epidemiological studies do not meet previously established criteria for cause-effect relationships.

Another study Monsanto addressed directly on their website is "Differential effects of glyphosate and Roundup on human placental cells and aromatase" (Richard et al., 2005) where researchers imply that Roundup is "an endocrine disrupter based on effects in human tumor cells originally derived from a cancer of the placenta. Aromatase activity, which is required for the production of certain steroid hormones, was decreased when these tumor cells were exposed to high concentrations of Roundup in a Petri dish for 18 hours." Monsanto writes that the study is "interesting" but has no relevance to living humans or animals. Extensive studies on live animals contradict the findings of Richard et al. (2005) and are more reflective of real world conditions. Monsanto contends that the study cannot be extrapolated to humans because a placental cancer cell in a Petri dish exposed to high concentrations of Roundup will behave "vastly different[ly]." The author goes on to say "the concentration of Roundup reported to have caused a reduction in aromatase activity was orders of magnitude granter than would results from the highest possible human exposure under real conditions. The direct exposure used in this study intentionally bypasses normal processes limiting absorption and cellular exposure and avoids normal metabolism, digestion, and excretion that would protect cells from the minute amounts of chemical." The author of the Backgrounder cites several more studies to expose Richard et al.'s (2005) work as bad science and concludes that Roundup will not disrupt steroid synthesis in vivo under biologically relevant conditions ("Glyphosate: Response to "differential effects of glyphosate and Roundup on human placental cells and aromatase," 2005).

Companies want to protect their investments, so it stands to reason that Monsanto would and will defend Roundup against supposed bad science. Interestingly, the Backgrounder series does not include topics on the Roundup Ready System, also known as Roundup Ready seeds in this writing. This may be because the FDA and EPA generally regard GM crops as safe and only the regulation of Roundup is at risk? Of course this is conjecture, but J. Vogel (2004) previously established and suggested that regulation prioritizes the science over public safety. The Backgrounder series produced by Monsanto seems to reiterate this regulatory priority of getting the science right and in the absence of certainty of harm, Roundup should be and is regarded as safe.

The TCSA approval by Congress came with specific restrictions on PCBs, a nearly indestructible chemical so persistent it bioaccumulates in humans and the food chain. As of 1973, one out of every two Americans had PCBs in their system (Mintz, 1975). Monsanto is the only manufacturer of PCBs in the US and had voluntarily stopped making and selling PCBs as of 1975 (Mintz, 1975). This move reminds readers that Monsanto has made safety of humans and the environment a priority in the past and will continue to do so. The PCB events in particular in Monsanto's history are a point of contention for its critics; this will be explored further in Chapter Three.

Monsanto seems to be painfully aware of its links to the past of unregulated toxic chemical use; the history of the company web page outlines its history from an agricultural point of view. Beginning in 1901, when the company was founded by John F. Queeny, the timeline is scant of information of the company until 1987. It's suggestive that Monsanto has only ever been an agricultural company. To reconcile this, there is a blurb at the top of the page that says "Monsanto is a relatively new company. While we share the name and history of a company that was funding in 1901, the Monsanto of today is focused on agriculture and supporting farmers around the world in their mission to produce more while conserving more. We're an agricultural company" ("Company History," 2013). Hugh Grant (2013), the current CEO of Monsanto, exalts the farmer and Monsanto's place as the farmer's advocate in the 2012 Sustainability Report while also discussing Monsanto's place in the future of sustainable agriculture. The report calls for people to continue to support the farmer, as the farmer is "a quiet, unwavering figure" in

the midst of a growing population and dwindling resources. Monsanto is committed to supporting the farmer to produce and conserve more and create safe, sustainable, healthy, and affordable foodstuffs. Sustainability is at the heart of Monsanto's vision of "produce more, conserve more, and improve lives," and as such, influences every action the company takes in both local and global agricultural networks. Over the last 5 years, Monsanto has managed to deliver sustainable yield goals to the world, and plans to do more. Hugh Grant (2013) is extremely proud of the work his employees and company have done.

Exploring Monsanto's website, social media accounts, and various PR campaigns makes one thing clear: Monsanto is creating products that they believe are beneficial to the world. The view of the world from Monsanto's is a grim one where people are already starving and more will starve without Monsanto's intervention. The intervention is biotechnology, and unfortunately, the worldview is absent of what that technology actually entails. There are no videos on YouTube or webpages on Monsanto's web pages discussing how these products will specifically end hunger in food insecure nations. It almost appears to be unimportant to Monsanto how their products fit into saving the world; perhaps people just need to trust that the amount of transparency the company offers is enough.

Journalists Confused for Scientists. Monsanto's deployment of the dominant discourse is powerful and persuasive, but underdeveloped if some of the other methods of deployment to propagate the dominant discourse were excluded. Much of this is done through popular press publishing such as *Forbes* and *The New Yorker*. One particular author that is prolific in his writing on the topics is John Entine. John Entine is especially interesting not because his writing is so scathing and skeptical of any counter-discourse regarding GMOs (and really any sort of counter-discourse regarding science in general), but because of his ties to the Genetic Literacy Project. The Genetic Literacy Project says of itself,

> The Genetic Literacy Project is a non-profit organization funded by grants from non-partisan foundations. We also accept donations from individuals. We have no ties to and accept no support money from corporations. The GLP is affiliated with the 5013c non-profit Sense About Science-US, which oversees STATS and supplies administrative support for the GLP. Executive

> Director Jon Entine is Senior Fellow at the World Food Center's Institute for Food and Agricultural Literacy at the University of California-Davis. ("Mission," 2014)

Jon Entine, while not directly connected to Monsanto and the deployment of its discourse, has a long history of being charged as a "corporate crony" ("Manufactured scientific debate, third-party experts, and Jon Entine," 2013).

Despite the charges against the author, Jon Entine publishes opinion-editorials in major new publications such as *Forbes* and *Huffington Post* regarding GMOs and many other science topics like Fracking and Bee Colony Collapse (generally favoring the industry's point-of-view). Conveniently, Entine was especially productive and vocal about GMO technology in the months leading up the 2014 election which include several state measures to require labeling of GMOs. Entine frequently cites scientific studies in his work, but one article in particular deserved special attention. The article titled "The debate about GMO safety is over, thanks to a new trillion-meal study" published in September of 2014 on *Forbes.com* cites a study that has yet be located for the interest of this thesis. The lack of access to the report Entine (2014a) cites is dubious at best, but it conflates Entine (2014a) with scientist in the dominant discourse deployment.

In addition to Jon Entine, other authors represent the proliferation of a dominant worldview of progress in the face of scientific uncertainty—the aforementioned notion that science must have quantifiable evidence of harm before limiting or prohibiting a practice. These authors include Michael Specter (2014), author of a severe account of Dr. Vandana Shiva, the golden child of the Anti-GMO movement published in the summer of 2014 for *The New Yorker*; Henry Miller and Drew Kershen (2014) also wrote a similar piece for *Forbes* shortly before Specter. These skeptics fill a gap in Monsanto's worldview; Monsanto has had a history of directly addressing science that interfered with their products like Roundup, as one can see on its Backgrounder series, but the Backgrounder series never addresses the safety of GMOs nor public opinion on either GMOs or Roundup. The short list of journalists represents the direct address of GMO counter-discourses. As long as there are journalists reproducing the dominant discourse regarding GMOs, Monsanto does not have to directly address the public's concerns or the anti-

GMO discourse at large. At the very least, this dominant worldview discourse as represented in popular press demonstrates the far reaching ability for a discourse to proliferate. Seemingly unconnected authors replicating the worldview of a seemingly unconnected multi-national agribusiness company serves to validate and solidify the dominant discourse.

Conclusion

This chapter reviewed pieces of legislation that established acceptable levels of safety and set the stage in understanding risk and exposure. It's important to recall the dismantling of the Delaney Clause because this was potentially the most powerful piece of legislation passed that protected the public. The Delaney Clause established a zero-tolerance policy for potential carcinogens and it was dismantled because it could hinder progress in the science community. This marks a sharp turn in understanding precautionary politics in the US and a change in the scientific establishment of harm—that the FDA should establish minimum exposure levels of demonstrable harm. The FDA is woefully understaffed and too underfunded to establish the minimums itself so it is up to companies to determine the thresholds of harm and report them to the FDA. This is a conflict of interest in public safety, but this is the umbrella of safety in the world as of this writing. It is also the environment in which Roundup Ready seeds have been deemed safe.

Monsanto has been a very successful agribusiness in this environment, with Roundup being approved for commercial and domestic use in 1974 ("History of Monsanto's Glyphosate Herbicide," 2005) shortly before the Toxic Substances Control Act of 1976. The TSCA was long awaited legislation to protect the public from harm—harm that Rachel Carson (1962) discussed in *Silent Spring*—and to establish a culture of safety before progress. In the 1970s, presumably because of Rachel Carson (1962) and subsequent fallout, public awareness of toxic substances was extremely high and thus many pieces of legislation were passed in regards to protecting the public. Roundup was established as safe, and there was no reason to question it when it was approved for use during a high tide of public and political awareness. No one questioned it; at least that is the way it appears in the archives of newspapers. At the time of the TSCA, PCBs were the hot topic and rightly so. Following the fallout from *Silent Spring*,

Roundup was approved and ushered into use because it was the answer to a toxic environment that people were becoming increasingly aware of.

Monsanto discusses Roundup as the most tested molecule in existence ("History of Monsanto's Glyphosate Herbicide," 2005), and as such it is safe. The discourse of science rhetoric (J. Vogel, 2004; S. Vogel, 2008) and Roundup are tightly intertwined as the focus of getting the science right is more important the potential implication of the results. Monsanto's readers, both supporters and critics, can see through its website that this culture of scientific rigor is important. If the science is right, then the chemical is harmless and it is reasonable to consider Roundup Ready crops as safe.

Monsanto's discourse is persuasive because it requires very little critical analysis from its subscribers, in other words, it is easier to believe the dominant discourse than to question the safety of food grown in the US and countries that the US imports food from. Weasel (2008) suggests that the cognitive miser is one who uses cognitive shortcuts (i.e., MO labels) to make decisions regarding safety; cognitive misers will go with what makes one's life easier. Embracing Monsanto's dominant world view of safety is easier than questioning every packaged food in the US, and this makes the dominant discourse extremely palatable.

CHAPTER 3

CRITICAL DISCOURSE

This chapter aims to discuss the counter discourses operating against the Monsanto agricultural assemblage of Roundup and Roundup Ready crops. With a particular focus on the contested history of the company itself, this chapter delves into the dominant counter discourses of safety arguing against the benefits and necessity of Monsanto's agricultural assemblage of Roundup and Roundup Ready seeds. There are several counter discourses of interest to this chapter, primarily the "scientific" counter discourse and the "populist" counter discourse. The populist discourse rises from popular media sites such as documentaries and social media. The scientific counter discourse articulates resistance indirectly through experiments and epidemiological studies that cast doubt on Monsanto's safety assurances. The populist counter discourse draws upon the scientific counter discourse as scientific studies demonstrating adverse health effects are taken up and reproduced in populist voices. Taken together, the scientific and populist counter discourses resist the preferred narrative of Monsanto's agricultural assemblage and may be regarded as collectively constituting a supra counter discourse.

The supra counter discourse, is promoted by diverse agents, including scientists Árpád Pusztai, Gilles-Eric Séralini, and Vandana Shiva, and Percy Schmeiser, the Canadian farmer who was sued by Monsanto. Schmeiser rises to the position of folk hero in the populist counter discourse. Despite their disparate voices, the scientific and populist counter-discourses collectively resist Monsanto's narrative of safety by questioning the efficacy of federal regulatory bodies, as well as lack of independent research. Monsanto's dominant discourse asserts that the world will need more food by 2050 to feed nine billion people, the counter discourses collectively reject this premise and suggest that current agricultural practices already yield enough food for more than nine billion people. In addition to the supra counter discourse, there are alternative agricultural visions that resist Monsanto's discourse such as marker assisted breeding and agroecology. This chapter will explicate the supra counter discourse more fully and review the alternative agricultural visions that resist Monsanto's assemblage of Roundup and Roundup Ready seeds.

Contested History of Monsanto

The history of the company is where most counter discourse discussions begin, and perhaps for good reason, it seems as though Monsanto has chosen to omit what it produced previously and how many lawsuits it has been involved in—again this is according to its own website ("Company History," 2013). Monsanto's own history, according to its website, is scant of events prior to the inception of Roundup, including PCBs ("Company History," 2013). Monsanto writes of itself that it is a relatively new company despite being founded in 1901,

> Monsanto is a relatively new company. While we share the name and history of a company that was founded in 1901, the Monsanto of today is focused on agriculture and supporting farmers around the world in their mission to produce more while conserving more. We're an agricultural company. Below is an interactive presentation with photos, videos and Monsanto stories. We invite you to explore the Monsanto history today. ("Company History," 2013)

Many critics start their villainization of Monsanto with its supposed dubious history. Monsanto was founded in 1901 by John Francis Queeny; the namesake of the company was his wife's maiden name, Monsanto. The company originally produced the now ubiquitous saccharin ("Company History," 2013; Louv, 2013; Robin, 2010). Monsanto's timeline on its "Company History" webpage (2013) glosses over the contested history offered by its critics. This rhetorical repositioning in its own narrative may be because Monsanto wrote off a $700 million dollar judgment to one of its subsidiaries, Solutia Inc., and then separated itself from Solutia Inc. (Robin, 2010).

Polychlorinated Biphenyls. Monsanto was a humble chemical company producing sweeteners and swiftly moved in to producing plastics, including PCBs, by 1929. During World War I, there was a sugar shortage and Monsanto saw saccharin take off and stock prices soared; Monsanto argued that saccharin was the best way for the military to save money on feeding the troops and subsequently civilians also started purchasing the sugar substitute (Hicks, 2010). The company grew and expanded its operations to include manufacture of PCB, Polychlorinated Biphenyl in 1929 (Louv, 2013: Robin, 2010). PCBs were a modern marvel of man-made organic compounds, and due to their

> non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications. ("Polychlorinated Biphenyls," 2014)

According to the EPA, PCBs are found in virtually every cell in every living thing in the world and have been shown to cause cancer, among other adverse health effects on nearly every system in the human body ("Polychlorinated Biphenyls," 2014). Monsanto was the only manufacturer of PCBs in the US (Robin, 2010), and the compound was ubiquitous in industrial application until it was banned in 1979 because of how toxic and persistent it is in the environment ("Polychlorinated Biphenyls," 2014; Robin, 2010). Patent laws at the time allowed Monsanto to enjoy a near monopoly in the world market on PCBs; Monsanto sold the compound in the US as Aroclor, and PCBs were known "by the name Pyralène in France, Clophen in Germany, and Kanechlor in Japan" (Robin, 2010, p. 17).

In 1929, Anniston, Alabama became home to one of the most prolific PCB plants in the US. The plant was purchased by Monsanto in 1934. The plant brought jobs to an idyllic small town that previously had claims to the best sewer system in the US (Robin, 2010). It's interesting to note that Robin's (2010) account of Anniston is one of bucolic imagery and serenity until Monsanto moves in, which creates a punctuation of downfall. Today, Anniston enjoys abnormally high rates of rare cancers, learning disorders, reproductive problems, and a whole host of other issues (Louv, 2013; "Polychlorinated Biphenyls," 2014; Robin, 2010).

Mars Hill Baptist Church of Anniston, Alabama was approached by Monsanto and offered one million dollars for the property. Several members in the surrounding neighborhood had also had similar offers from the chemical giant. In 1996, former US Senator Donald Stewart, now a lawyer in Anniston, had been contacted by the residents of the west side of town and asked to come to the Mars Hill Baptist Church. The church and surrounding properties were located directly across from the PCB plant and the

residents were suspicious of Monsanto's interest in their properties (Robin, 2010). Later it was revealed during the following court trial,

> From the 1930s to 1971 Monsanto manufactured polychlorinated biphenyls in a neighborhood in western Anniston populated mostly by poor blacks living in ramshackle wooden houses. Many of those who lived in the area worked at the plant, which manufactured the fire-resistant chlorine compounds used as coolants and lubricants in electrical equipment. During production the company deposited waste chemicals into landfills located on company property. (Kitchens, 2004)

While Donald Stewart was preparing the case against Monsanto, a resident of Anniston sought the help of the legendary Johnnie Cochran (Kitchens, 2004; Robin, 2010).The residents of Anniston brought a class action lawsuit against the chemical giant and won a 700 million dollar judgment against Monsanto and its subsidiaries (Kitchens, 2004; Louv, 2013; Robin, 2010).

Perhaps what is more bolstering to critics' argument against Monsanto is not the triumph in the court room but rather what was revealed during the trial. Critics charge Monsanto with knowing as early as 1937 that PCBs were highly toxic and chose to continue producing them (Robin, 2010).

In 1937, Dr. Emmett Kelly, Monsanto's medical director, was invited to a meeting at the Harvard School of Public Health, also attended by PCB users such as Halowax and General Electric, along with representatives of the U.S. Public Health Service. At this meeting, Cecil K. Drinker, a Harvard researcher, presented the results of a study he had conducted at the request of Halowax: a year earlier, three employees of that company had died after being exposed to PCB fumes, and several had developed a terribly disfiguring skin disease, which was then unknown but later named chloracne (Robin, 2010, p. 22).

During the trial, an additional half a million internal documents were released showing that Monsanto knew of the danger but decided to continue manufacturing the compound as well as diversify to prepare for the eventual revelation that the company had contaminated an entire community (Robin, 2010). Anniston, Alabama is now home to an EPA Superfund Site still in the process of being decontaminated ("Anniston PCB Site," 2013).

Agent Orange and Dioxin. The infamous defoliant, Agent Orange, also manufactured in part by Monsanto, enjoys a similar dubious history. Agent Orange was used during the Vietnam War in North Vietnam and part of South Vietnam to reduce forest coverage for guerilla style attacks from the Vietnamese (Robin, 2010). The defoliant is equal parts 2,4,5-Trichlorophenol (2,4,5-T) and 2,4-Dichlorophenoxyacetic acid (2,4-D) (Robin, 2010). US President John F Kennedy authorized the use of the defoliant at the behest of the President of South Vietnam, the operation was dubbed "Operation Ranch Hand" (Louv, 2013; Robin, 2010). Agent Orange is infamous for its alleged ties to high rates of cancer and birth defects in those exposed including US Military personnel. Monsanto is of particular interest in the Agent Orange debacle because their 2,4,5-T pesticide was manufactured and contaminated by 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) or as it is commonly referred to as dioxin.

Operation Ranch Hand officially began on January 13th, 1962 with the first barrels of Agent Orange arriving in July of the previous year in Saigon. At the time, the Government claimed the two herbicides were safe to use synergistically in destroying foliage along roadways, waterways, and destroying crops that were feeding the Viet Cong (Robin, 2010). "Between [1962] and 1971, an estimated 20 million gallons of defoliants were sprayed on 8 million acres of forests and crops. More than three thousand villages were contaminated, and 60 percent of the defoliants used were Agent Orange, which is the equivalent of more than eight hundred pounds of pure dioxin" (Robin, 2010, p. 45). For reference, a 2003 study published by Columbia University suggests just eighty grams of dioxin dissolved in municipal water can eliminate a city of eight million people ("Le Monde provides precedent for an Agent Orange payout," 2005; Robin, 2010).

According to several critics (Louv, 2013; Robin, 2010) the issues of Monsanto's dioxin manufacture is not the production itself but rather the fervent attempt to maintain its discourse of safety, There are numerous accounts of dioxin contamination damage such as the Times Beach Superfund site and the Italian Seveso plant explosion.

Another incident that the dominant counter discourse utilizes to make its case is what happened to Times Beach, Missouri. Times Beach was an idyllic beachfront town that in 1971 had the roads paved

by Bliss Waste, using industrial waste from surrounding companies to create its pavement, primarily Monsanto (Louv, 2013; Robin, 2010). Shortly after Bliss Waste paved the roads for the town, hundreds of domestic animals and local wildlife died. The EPA had been contacted but neglected to come until two children fell extremely ill post paving. The EPA's testing of suspected contaminated materials revealed "alarming levels of toxic products: 1,590 ppm of PCBs, 5,000 ppm of 2,4,5-T (a powerful herbicide manufactured by Monsanto), and 30 ppm of dioxin" (Robin, 2010, p. 35). The dioxin contamination was 300 times the limit set by the EPA. People were experiencing issues including but not limited to chloracne, hypothyroidism, and cancer. The residents of Times Beach attempted to sue, however, Monsanto claimed there was no way to track the contaminants back to the company, and the case was dismissed (Robin, 2010).

In addition to the Times Beach disaster, critics argue the Seveso disaster in Italy should have alerted Monsanto to harms of 2,4,5-T and dioxin. On July 10th, 1976 in the Italian chemical factory in Icmesa owned by multinational Hoffmann-La Roche, there was an explosion in the factory that left a mysterious orange cloud over the town. A cloud of dioxin had been released over the town of Seveso, and within days "more than three thousand domestic animals died of poisoning, while dozens of residents developed chloracne" (Robin, 2010, p. 39).Hoffman-La Roche later revealed their manufacture of the herbicide 2,4,5-T also derived dioxin, introducing the world to the previously unknown compound (Robin, 2010).

While Monsanto was not responsible for the Seveso catastrophe and could not be unequivocally tied to the Times Beach event, these events should have alerted the company to the danger of its production of Agent Orange and 2,4,5-T. At least, that is what those arguing for skepticism of Monsanto suggest,

> Not only did Monsanto fail to call into question the manufacture of 2,4,5-T, but the company did not hesitate to work closely with Pentagon strategists to develop its use as a chemical weapon. Following a Freedom of Information Act request to the Pentagon, the St. Louis Journalism Review

> revealed in 1998 that Monsanto had conducted a regular correspondence beginning in 1950 with the Chemical Warfare Service dealing with the military use of the herbicide. (Robin, 2010, p. 41)

Monsanto had its own explosion in 1948 that also would have alerted the company to the hazards of dioxin. In fact, critics claim the company knew about the hazards because following the explosion in the Monsanto-owned 2,4,5-T factory in Nitro, West Virginia, Monsanto hired Dr. Raymond Suskind from the Kettering Laboratory to perform a "discreet medical follow-up of the affected personnel" (Robin, 2010, p. 36). The affected personnel, which included both those exposed in the explosion and those involved in the clean-up that followed, developed experienced nausea, vomiting, headaches, and developed chloracne, a previously unknown skin disease. Suskind's report, which was presented to Monsanto on December 5th, 1949 but kept secret until the mid-1980s trial Kemner v. Monsanto, showed that seventy-seven people employed at the factory had developed what is now known as chloracne and other symptoms; Suskind suggested that the mysterious skin disease was a direct result of the exposure (Robin, 2010).

Suskind continued to secretly follow-up with six particularly affected individuals in 1950, these individuals had also developed respiratory problems, liver problems, central nervous system troubles, impotence, and skin so dark that one worker reported being mistaken for African American. Robin (2010) traces Suskind's work for Monsanto from 1953 to 1976, which eventually expanded the cohort to thirty-six workers. Of the thirty-six in the cohort, thirteen had died at the average age of fifty-four as of the *Kemner v. Monsanto* trial (Robin, 2010). Similar to the way the company handled PCBs, Monsanto "hid the data in a drawer and said nothing to the health authorities and certainly not to its workers" (Robin, 2010, p. 37).

Gerson Smoger, a lawyer that has represented many Vietnam veterans harmed by dioxin, has specialized in environmental pollution cases including the Times Beach case. Smoger suggests that not only did Monsanto know of the problems of dioxin, the company deliberately concealed it from Government health officials. His proof is an internal confidential memorandum dated February 22,1965 from Dow, the other manufacturer of Agent Orange, noting the toxicity tests of 2,4,5-T on rabbits had shown development of severe liver lesions. This document asked whether or not to inform the

Government. The memorandum made record of criticism Dow received from Monsanto regarding revealing the secret of dioxin (Robin, 2010).

Additionally, a 1970 National Institutes of Health study found that mice subjected to 2,4,5-T developed fetal malformations and stillbirths (Robin, 2010). The study showed that 2,4,5-T "adversely affects the development and viability of the mouse and rat fetus" (Courtney, Gaylor, Hogan, Falk, Bates & Mitchell, 1970, p. 866). This study seems to have punctuated the use of 2,4,5-T and its end.

In 1978, the first class-action lawsuit was brought forth by Vietnam veterans against Monsanto and it was dismissed because the plaintiffs could not prove dioxin was to blame. In 1979, a derailed freight train in Sturgeon, Missouri contaminated the entire community with dioxin, leading to another class-action lawsuit by sixty-five residents of Sturgeon (Robin, 2010). These events were on the heels of the Seveso, Italy contamination; dioxin had previously enjoyed quiet ubiquity but it was now in the forefront of the media. According to Robin (2010), Monsanto doubled up on obfuscation. The company hired Raymond Suskind to perform yet another study on the survivors of the Nitro factory explosion, and in 1978 Suskind supervised three epidemiological studies, which were then reviewed and published by Dr. George Roush—Monsanto's medical director—in 1980, 1983, and 1984. The studies concluded there was no connection between 2,4,5-T and cancer (Robin, 2010).

The studies published by Roush are the primary reason that Vietnam veterans had been denied reparations in their first class-action lawsuit against Monsanto. In a twist of events, the *Kemner v. Monsanto* trial revealed that the 1980, 1983, and 1984 studies supervised by Suskind and reviewed by Roush were indeed severely flawed,

> The group of those "exposed" included only the workers present on the day of the accident that had also contracted chloracne; those who had been present but had not gotten the disease were excluded from the group, whereas Suskind knew perfectly well that the absence of chloracne did not necessarily imply lack of exposure. Conversely, anyone with skin problems (psoriasis, acne, and the like) was included in the cohort of the "exposed," whereas workers on the production line

who were absent on the day of the accident were systematically placed in the control group of the "not exposed," even if they were suffering from chloracne. (Robin, 2010, p. 50)

The study published in 1983 […] was supposed to compare the state of health of 884 of the factory's employees, including those working on the 2,4,5-T production line (the "exposed" group) and "all the others" (the control group), including "employees holding a job having plant-wide responsibilities with the potential for exposure to 2,4,5-T were, for the purposes of this study, considered to be non-exposed," as the two authors acknowledged. The result was that rates of cancer were lower in the exposed group than in the non-exposed group. The trick was having included in the study only employees working in the factory and/or having died between January 1, 1955, and December 31, 1977. In other words, those who had worked at Nitro between 1948 and 1955 were excluded, as were those who died after 1977. This arbitrary protocol made it possible to exclude from the study twenty workers who Monsanto knew had been exposed (notably in the 1949 accident), nine of whom had died of cancer and eleven of heart disease.

Furthermore, four workers who had died of cancer and had been classified as "exposed" in the 1980 study were placed in the control group in the 1983 study […] The [study] published in 1984 by Raymond Suskind and Vicki Hertzberg, a colleague at the Kettering Laboratory, in the prestigious *Journal of the American Medical Association* crossed all bounds. At a hearing in the *Kemner* case, Roush acknowledged that instead of the four cases of cancer recorded in the exposed group, there were twenty-eight (the other twenty-four had been omitted for some reason). (Robin, 2010, p. 51)

According to the supra counter discourse, the studies revealed during the trial are a farce to protect Monsanto from lawsuits and demonstrate the lengths to which the company has gone to and will likely do again.

Marie-Monique Robin's (2010) account of the aforementioned events presents a well-developed and well-researched history of the conglomerate, her work encompasses a great deal of others' work as well as her own conclusions. Many organizations such a *Food Democracy Now* and *March against*

Monsanto utilize her book *The World According to Monsanto* (Robin, 2010) to argue against any regulation that favors Monsanto and its agricultural assemblage. This thesis utilized a great deal of her work to describe the starting point of the supra counter discourse for these reasons. The above writing is the hidden history of Monsanto, a history that is not listed on their company history page nor is it in such great detail on its Wikipedia page, events that can be corroborated by court documents but conveniently forgotten about. Critics are all too eager to remind their audience of what Monsanto has said of its products, what it has done, and what the company has been convicted of.

Organizations critical of Monsanto (e.g., GMWatch.org and Food Democracy Now) that have rallied around fighting the rhetoric of GMOs and Monsanto always begin by reminding the reader that the company has deceived in the past and will likely continue to deceive ("Monsanto: A History," 2014). This sort of rallying point asks the reader to examine a great deal about their assumptions of not only the necessity of GMOs and Roundup but also whether or not the technology of GMOs and Roundup are truly safe. Monsanto established safety of Roundup and Roundup Ready seeds in Chapter Two of this thesis as the supra counter discourse challenges the same establishment of safety in Chapter Three by the counter discourse authors. Monsanto's declaration of safety relies on EPA regulation of Roundup as a pesticide and a seminal toxicology literature review by Williams, Kroes, and Munro (2000) that reviewed 188 studies on the herbicide. The regulation of Roundup Ready seeds is like that of conventional crops because the Roundup Ready crops are GRAS (Acosta, 2014; Bereano, 2014; O'Neil, 2014).

Rearticulating Safety

David Vogel (2012) quotes George W. Bush in discussing the precautionary principle "if we wait for threats to fully materialize, we will have waited too long" (p. 19).

Bush was addressing the US Military Academy's Class of 2002 in his commencement address when he was quoted with the above, he was discussing terrorism in a post-9/11 world (Gilmore, 2002). The turn of phrase is useful in conceptualizing the angst and anxiety that critics of GMOs feel about Monsanto, Roundup, and Roundup Ready crops. The next section explores the counter discourse of

safety, first examining the counter discourse surrounding distrust of federal agencies, such as the EPA, and then examining the counter discourse developed by scientists and grassroots campaigns.

Suspect Federal Agencies

Monsanto describes the safety of its products by recalling studies that have shown Roundup to be safe and EPA approved. Authors of both populist and scientific counter discourses take issue with this declaration because it seems to be the same circular logic as seen with dioxin and 2,4,5-T, these Monsanto products are safe because Monsanto says they are safe. The studies Suskind supervised were ultimately discredited, the experimental group and control group were conflated to show that there was no link of dioxin and cancer or negative health outcomes (Robin, 2010). Worse still, these fraudulent studies were the basis of the EPA's classification of dioxin as a type B2 carcinogen—a probable human carcinogen and not "considered a priority pollutant and thus was not subject to regulation on atmospheric emissions provided for under the Clean Air Act" (Robin, 2010, p. 52). Cate Jenkins, an EPA chemist who had been with the EPA since 1978, had been sent the evidence of fraud by Greenpeace. Once she had realized the implications of Monsanto's epidemiological studies on EPA classification of dioxin, Jenkins called for a "scientific audit" (p. 52) of the studies provided by Monsanto (Robin, 2010)

Jenkins subsequently became a whistle-blower when Monsanto became aware of her internal memorandum "Newly revealed fraud by Monsanto in an epidemiological study used by EPA to assess human health effects from dioxins" sent on February 23, 1990 (Robin, 2010; "Monsanto -- more than 30 years of successful scientific fraud," 2014) and she was fired by the EPA after Monsanto found out about it and its subsequent leak to the media. Of course, after Jenkins gained whistle-blower status, she was reinstated and transferred to a position where she could do less damage. Jenkins appealed to the US Labor Board and the EPA was ordered to fully reinstate her to her prior position (Robin, 2010). Jenkins is one succinct example of a vocal critic being attacked by Monsanto. There are several others that have been subject to the company's wrath that will be described later in this chapter. Jenkins' story is not unique and neither is the history of regulation as demonstrated in the previous chapter.

The question of safety of GMOs and Roundup rests on the idea of suspect regulatory bodies. Mesnage et al. (2014) suggests there is a disconnect between the EPA and sound regulation of Roundup and it is economic in nature, “this inconsistency between scientific fact and industrial claim may be attributed to huge economic interests, which have been found to falsify health risk assessments and delay health policy decisions” (p. 7). This chapter demonstrates the delay of health policy decisions in how the EPA and TSCA handled PCBs, 2,4,5-T, and dioxin in the Contested History section.

Moreover, it is not just scientists writing of an asynchrony between science and policy, the public at large is as well. Millions Against Monsanto – OrganicConsumers.org has a Facebook page with almost 700,000 subscribers which regularly circulates images that indict the FDA, EPA, and USDA. March against Monsanto also has a Facebook page, with over 800,000 subscribers, which does the same. Organic Consumers Association has over 850,000 Facebook subscribers and posts frequent criticisms of regulatory agencies in the US. Social media has become a platform of analysis for many scholars as it shows public discourse rather well; the social media accounts that deploy populist counter discourses against Monsanto can be argued to show national public attitudes. The following images are pulled directly from each organization’s Facebook page.

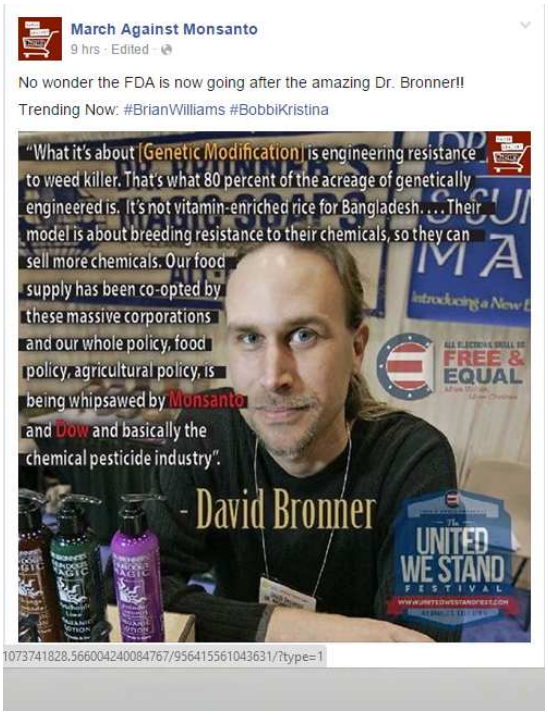

Figure 3 Screenshot of March against Monsanto Facebook image

Figure 4 Screenshot of March against Monsanto Facebook image

Figure 5 Screenshot of Organic Consumers Association Facebook image

Figure 6 Screenshot of Millions against Monsanto Facebook Image

It is interesting to go through the social media accounts of organizations opposed to Monsanto and GMOs especially when they are juxtaposed against one another. Monsanto says their products are safe because the EPA says they're safe, but at the very least, critics of GMOs do not trust the EPA to make decisions in the public's best interest.

Critics of both Monsanto and Federal agencies never fail to suggest "revolving door" politics are to blame, this is the idea that Monsanto (and other large corporations) place people in regulatory or political positions that give them the ability to legislate in ways that benefit Monsanto. Favorite examples

include Linda Fisher and Michael Taylor (Kanthan, 2013; Robin, 2010), as well as Clarence Thomas, the Supreme Court Justice (Kanthan, 2013). Linda Fisher was at one point the EPA Administrator and the Vice President of Monsanto (Kanthan, 2013; Robin, 2010). Michael Taylor "perfectly embodies the revolving door system and, beyond that, the links between Monsanto and US regulatory agencies" (Robin, 2010, p. 106), Taylor was in place as the deputy commissioner for policy of the FDA and supervised the approval and regulation of recombinant bovine growth hormone and GMOs (Robin, 2010). Supreme Court Judge Clarence Thomas has refused to recuse himself from any cases involving Monsanto; he also worked for the company in the 1970s as an attorney (Kanthan, 2013; "Monsanto, the Government, Monopoly Claims," 2015). Kanthan (2013) suggests,

> Monsanto has had influence in practically every area of the government: Secretary of Agriculture (Ann Veneman—board of directors of a Monsanto subsidiary), Secretary of Defense (Donald Rumsfeld made millions of dollars when his company was bought by Monsanto), EPA Administrator (William Ruckleshaus—Monsanto's board of directors), U.S. Trade Representative (Mickey Cantor-- Monsanto's board of directors), FDA Commissioner (Michael Friedman—VP of Monsanto), Deputy Director of FDA (Margaret Miller—top scientist at Monsanto), EPA Administrator (Linda Fisher—VP at Monsanto), and on and on. (p. 17)

Authors of the supra counter discourse are often implicitly asking the reader to examine how much they know of regulatory bodies before they decide whether or not to trust these agencies' decisions and regulations. As it currently stands, Roundup is perfectly safe according to the EPA ("EPA R.E.D. Facts Glyphosate," 1993) and GMOs are substantially equivalent to their conventional counterparts according to the FDA (Bereano, 2014; Kanthan, 2013; Louv, 2013; O'Neil, 2014; Robin, 2010) and GRAS (Acosta, 2014). The counter discourse is largely concerned with explaining the science behind GMOs, how the seeds are created and their effect on humans, animals, and ecological studies.

Safety

Monsanto rarely discusses what its GMO products are designed to do, this represents a gap in the dominant discourse that the authors of the counter discourse are willing to fill. The science of GM

technology rests on what Roundup and its active ingredient, glyphosate, does to the plant it is sprayed upon. Glyphosate was discovered in the late 1960s, and,

> It destroys all forms of vegetation because of the way it works: it is absorbed by the plant through the leaves and quickly carried by the sap to the roots and rhizomes. There it inhibits an enzyme essential for the synthesizing of aromatic amino acids, which leads to a decrease in the activity of chlorophyll as well as of certain enzymes. This causes the necrosis of tissue, leading to the death of the plant. (Robin, 2010, p.70)

The way Robin (2010) describes the science of Roundup is not unlike Monsanto's explanation, Roundup works by,

> disrupting a plant enzyme involved in the production of amino acids that are essential to plant growth; […] when the products are applied to green leaves or stems, the active ingredient moves throughout the plant so the entire plant dies. A few days after treatment, the plant wilts and yellows. Then, as the plant tissue deteriorates, the plant turns brown. At the same time the roots or rhizomes are deteriorating so the plant cannot generate. ("History of Monsanto's Glyphosate Herbicides," 2005)

This is generally where the similarities end between Monsanto's discourse of safety and the scientific counter discourse of safety end. Then-editor of the *Journal of Pesticide Reform* Caroline Cox (1998) describes the disconnect between industry's establishment of safety and laboratory studies of the substance as "striking" (p. 1) noting that adverse effects include,

> medium-term toxicity (salivary gland lesions), long-term toxicity (inflamed stomach linings), genetic damage (in human blood cells), effects on reproduction (reduced sperm counts in rats; increased frequency of abnormal sperm in rabbits), and carcinogenicity (increased frequency of liver tumors in male rats and thyroid cancer in female rats). (Cox, 1998, p. 1)

Cox's (1998) conclusions regarding risk and glyphosate give insight to a story NPR ran in April of 2014 about a strange form of kidney disease in Central America affecting young male agricultural workers that had taken hold over the last twenty years which was similar to an event that happened in Sri Lanka

(Beaubien, 2014). In Sri Lanka, however, Roundup and glyphosate were banned in response to the mystery disease (Beaubien, 2014), a solution that has yet to be implemented in Central America—likely because Central America is home to Brazil and Argentina, second and third largest provider of GM crops (Beaubien, 2014). Cox (1998) notes a similar effect amongst farmers who are exposed to Roundup where exposure is associated with "an increased risk of miscarriages, premature birth, and the cancer non-Hodgkin's lymphoma" (p. 1).

Swedish researchers found a link between glyphosate and hairy cell leukemia, a rare form of non-Hodgkin's lymphoma (Hardell & Eriksson, 1999; Hardell, Eriksson, & Nordstrom, 2002). Epidemiology researchers in the US found a correlation between Roundup and non-Hodgkin's lymphoma in Canada and the US which increased as exposure to the pesticide increased, especially in men exposed for two days or more each year to glyphosate (De Roos, Zahm, Cantor, Weisenburger, Holmes, & Burmeister, 2003; McDuffie, Pahwa, McLaughlin, Spinelli, Fincham, Dosman, Robson, Skinnider, & Choi, 2001).

Another study found that not only is glyphosate carcinogenic, transmutagenic, and reprotoxic on *in vivo* cells, its Roundup incarnation shows amplified effects which suggests that Roundup is more damaging than its active ingredient (Gasnier, Dumont, Benachour, Clair, Chagnon, & Séralini, 2009). Mesnage et al. (2014) confirmed the conclusions of Gasnier et al. (2009) when they found Roundup to be 125 times more toxic than glyphosate alone. Additionally, MIT research scientist Dr. Stephanie Seneff charges Roundup with the rise of autism and other environmental effects; Seneff suggests that science was wrong when it said that glyphosate does not affect humans in the same way it affects plants—glyphosate destroys gut bacteria and that in turn destroys immune systems (Jackson, 2014). In summary, there is no want for those looking for scientific studies of Roundup and demonstration of harm.

Monsanto cites yet another literature review performed by John P. Giesy, Stuart Dobson, and Keith R. Solomon (2000) to argue Roundup's persistence in the environment as unlikely as it has a thirty-two day half-life in soil and it dissipates rapidly in water ("Summary of Ecotoxicological Risk Assessment for Roundup Herbicide," 2005). This statement is in contrast to declarations of persistence by the US EPA—in EPA studies glyphosate has been shown to persist in soil for over 100 days in field tests (Cox,

1998). According to its critics, Monsanto has continuously suggested that Roundup is no more dangerous than salt (Louv, 2013; Robin, 2010). For example, in France, the Roundup advertising campaign featured a dog gnawing on a bone dug up from a Roundup treated yard and a voiceover stating “If, like Rex, you hate weeds in your garden, here’s Roundup, the first biodegradable herbicide” (Robin, 2010, p. 69). The advertisement ran for three years in France while Monsanto was being sued for false advertisement of biodegradability by the French Government after bodies of water around the country were found to be heavily contaminated by the herbicide (Robin, 2010). This understanding of the scientific counter discourse of Roundup is pivotal to understanding the GMO discourse and the supra counter discourse.

Roundup Ready Seeds. In the dominant discourse, many are arguing for the sake of progress when arguing for the implementation and acceptances of GMOs. As established previously, what most GMO crops are actually designed to do is a gap in the dominant discourse. This gap represents another place where the counter discourse must fight to educate the public on the dangers of the herbicide because many people are ignorant of what GMOs are commercially designed to do—70% of GMOs are Roundup Ready crops (Robin, 2010; *The World According to Monsanto*, 2008).

Roundup Ready crops are designed to be able to withstand exposure to large amounts of Roundup and that is their sole purpose commercially. In fact, the seeds come with a user agreement that requires the farmer to use Monsanto products only (Kanthan, 2013; Krimsky & Gruber, 2014; Louv, 2013; Robin, 2010).

Voices of the populist counter discourse can be found in documentaries such as *Food, Inc.* (2008), *GMO OMG* (2013), *The World According to Monsanto* (2008), and *Seeds of Death* (2012); such documentaries suggest that the patenting of seeds is the patenting of life itself, a sentiment that activist and scientist Dr. Vandana Shiva agrees with. The problem then becomes how does a corporation own the Roundup Ready genes? According to *Food Inc.* (2008), this was granted by the patent office because the genes of Roundup Ready seeds are substantially different from their conventional counterparts. This of course is convenient at best, given that the technology is generally recognized as safe (Acosta, 2014)

and substantially equivalent (Bereano, 2014; Kanthan, 2013; Louv, 2013; O'Neil, 2014; Robin, 2010) to conventional crops.

During the 1980s, Monsanto scientists were desperately trying to find an economic niche for their gene experiments according to Marie-Monique Robin (2010), and they found their niche in the garbage,

> The search lasted for more than two years, until the day in 1987 when engineers thought of rummaging through the garbage in Monsanto's Luling plant, located 450 miles south of St. Louis. At this site on the banks of the Mississippi, Monsanto produced millions of tons of glyphosate annually. Decontamination pools were supposed to treat production residues, but some of the residues had contaminated nearby land and ponds. Samples were taken to collect thousands of microorganisms in order to detect the ones that had naturally survived glyphosate and identify the gene that gave them that invaluable resistance. (p. 139)

Eventually, the gene was successfully inserted into soybeans through the use of a "gene gun" (Robin, 2010, p. 140), which is as violent as it sounds, "it works by attaching genetic constructs to microscopic gold or tungsten bullets and shooting them into a culture of embryonic cells" (Robin, 2010, p. 140-141). This successful insertion of genes into soybeans lead to the patenting of the seeds in 1996 by Monsanto ("Company History," 2013) and subsequently more and more seeds have become Roundup Ready—Corn, Sugar Beets, Alfalfa, Cotton, Sorghum, and Wheat ("Agricultural Seeds," 2015). More worrisome to Monsanto's critics is that in the US upwards of 70% of non-organic processed food contains GMOs particularly those that have corn or soy ingredients (*Food Inc.*, 2008; *GMO OMG*, 2013; Kanthan, 2013; Krimsky & Gruber, 2014; Robin, 2010; *Seeds of Death*, 2012).

The ubiquity of Roundup Ready crops and GMOs is one of the major concerns of the supra counter discourse as many question the safety of such. Krimsky and Gruber (2014), editors of the book *The GMO Deception*, articulate the concerns of ubiquity within the counter discourse, "proponents of GMOs frequently state that they have been fully studied and proven safe. It's an often repeated claim, not just by industry but by many otherwise independent and free-thinking people. But repeating a claim does not make it true" (Gruber, 2014, p. 31-32). Critics of Roundup and Monsanto are not convinced of the

safety of Roundup Ready crops. Both scientist and populist critics criticize transgenic seeds and Roundup Ready crops beyond the herbicide because of the imprecise nature and archaic understanding of gene manipulation in plants,

> The use of genetic engineering, or recombinant DNA technology, to genetically modify crops is based on the understanding of genetics and gene regulation that was current twenty to thirty years ago […] Given that genes are the blueprints for every structure and function of every part of every living thing, by modifying these genes one should be able to modify the structure or function of any part of any organism. (Fagen, Antinou, & Robinson, 2014a, p. 28)

Scientists, according to Fagen et al. (2014a), have no idea what the gene insertion will do to genetic expression of the organism in which it is inserted. There is a great deal of unintended consequences, when one gene is changed in a plant, it can give rise to a multiplicity of changes (Fagen et al., 2014a). Unintended consequences are indeed of great concern to critics of GMOs. Árpád Pusztai, the world's foremost researcher on plant lectins, set out to settle the question of GM crop safety in the UK in the late 1990s when he performed a study with rats and GM Snowdrop lectin potatoes (Robin, 2010; Anderson, 2014). Ultimately, Pusztai found that the experimental group fed GM lectin potatoes showed damage to their intestines while the control groups did not, Puszstai and others suggest this is evidence of unintended negative health outcomes of GM technology as lectins on their own are not harmful to mammals (Anderson, 2014). Ironically, Pusztai was a proponent of GMO technology and was trying to create a scientifically sound protocol so that it could be regulated in the European Union (Smith, 2013).

Similarly, Gilles-Eric Séralini, a toxicologist and professor at the University of Caen, and associates (2014) performed a long-term two year study with rats and Monsanto NK 603 transgenic Roundup Ready corn,

> Séralini and his team exposed rats to GM maize and Glyphosate and studied them for two years. They found that female rats died at a rate two to three times greater than controls. Female rats developed large mammary tumors more often and earlier in life than the control groups. In treated male rats, liver congestion and necrosis were observed 2.5 to 5.5 more frequently than controls;

> severe kidney disease was found to be 1.3 to 2.3 times greater with large palpable tumors occurring four times more than controls. (Krimsky, Séralini, Mesnage, & Bernay, 2014, p. 47-48)

Séralini et al. (2014) was addressing the fact that Industry toxicity trials on Roundup Ready crops are only three months. Critics that charge Monsanto with manipulating data by performing very short (three month) toxicity trials and using older rats (Krimsky et al., 2014; *Seeds of Death*, 2012; Séralini et al., 2014; Smith, 2013; Newman, 2014) Often critics charge regulatory agencies with relying on a summary of these short trials instead of the raw data before implementing regulation of Roundup Ready crops and other GMOs (Kanthan, 2013; Louv, 2013; Robin, 2010).

Creating Heroes. The dominant discourse deployed by Monsanto suggests there is indeed scientific consensus that Monsanto's agricultural assemblage of Roundup and Roundup Ready crops are safe. The populist counter discourse deployed by activists suggests that the scientific consensus is not out of agreement but rather because scientists are afraid that voicing their concerns will lead to the eventual destruction of their reputation (Robin, 2010; Smith 2013). The common examples of this phenomenon can be seen in the fallout from both Pusztai's study and Séralini's studies on GMO technology. Jon Entine of *Forbes* and the Genetic Literacy Project (a pro-biotechnology group) writes about the "Séralini Affair" (Entine, 2014b) with a heavy hand, primarily citing pro-GMO/anti-activist sources in the bylines. Gilles-Éric Séralini had studied Roundup and GMOs for quite some time before he had provoked the wrath of Monsanto (Krimsky et al., 2014). There are accusations that several of Séralini's harshest critics had "undisclosed financial relationships with Monsanto" (Fugh-Berman & Sherman, 2014) and the entire process by which the article was retracted "reek[ed] of industry pressure" (Fugh-Berman & Sherman, 2014; Robinson, 2013).

Árpád Pusztai's story is similar; Pusztai appeared on television on August 10th, 1998, shortly after the conclusion of his study on GM potatoes. The interviewer asked Pusztai if he would eat transgenic potatoes, Pusztai replied "No. And as a scientist actively working in the field, I find it's very unfair to use our fellow citizens as guinea pigs" (Robin, 2010, p. 181). The Rowett Institute, the best European nutrition laboratory, where Pusztai worked seemed nonplussed at first, according to Robin (2010) Pusztai was

praised by the Rowett Institute for being so upfront. The institute fired Pusztai and put him under a gag order regarding his study and raw data just two days later. Shortly afterward, a disinformation campaign began wherein another Rowett Institute scientist claimed that Pusztai had confused the Snowdrop lectin with concanavalin A lectin—a lectin known to be toxic (Robin, 2010). The controversy eventually lead to a hearing with the House of Commons Science and Technology committee, Pusztai was able to access his data again and send it to twenty colleagues he had worked with previously, who then verified its validity. The whole affair seems to have sparked the general distrust of GMOs in Europe as the affair was front page news on many EU newspapers (Robin, 2010). There are whispers that link all this controversy to the Tony Blair administration and to Monsanto itself (Smith, 2013). In spite of all the unrest, Pusztai did go on to publish the study's results in the prestigious *Lancet*. However, according to Jeffrey Smith (2013), despite Pusztai's work, there is still no scientifically sound protocol for determining harm of GMOs in the EU.

In the US, according to the populist counter discourse, Monsanto and other biotechnology companies hold the keys to scientific inquiry regarding the safety of GMOs (Louv, 2013; Robin, 2010; Smith, 2013). First, Monsanto will not grant access to the seeds or even the gene of which they would like to study without adding in the stipulation that the study may not be published without their express authorization—and the company ultimately owns the data (Robin, 2010; Anderson, 2014). Second, more often than not, there is very little funding in the US to study the effects of GMOs in independent studies—Pusztai was originally working through a grant that had intended to prove that GMOs are safe (Smith, 2013). In many respects, despite the controversy galvanizing to Monsanto's critics, the subsequent silencing is far more insidious than the initial attacks.

Stories of industry attacks and other dubious behaviors by Monsanto, its PR specialists, and lawyers are seen as galvanizing for the supra counter discourse. This thesis argues that instead of quieting the activists and scientists who speak out against the company and its products, attacks such as those on Séralini and Pusztai are absorbed and reproduced within the supra counter discourse because it stands in contrast the benevolent image that Monsanto has cultivated for itself. Monsanto's philanthropic

image is one similar to a St. Nick bringing food to the world, however, Monsanto's answer to the necessity of GM technology is food scarcity—Robb Fraley of Monsanto fame says there will be nine billion people to feed by 2050 (Monsanto Company, 2013). In the face of scientific uncertainty, criticism, and ubiquity Monsanto must answer the question of necessity and how it benefits the consumer: simply put Monsanto will feed the world and end food-scarcity. The following section outlines how Monsanto's critics and authors of the supra counter discourse dismantle and address the claims of Monsanto's discourse.

Rearticulating Necessity

In an interview with Samuel Anderson (2014) of *GeneWatch* Pusztai is quoted as saying of GMOs "We have to consider this, if it gives any advantage to the consumer. The consumers are carrying all of the risks but they aren't getting any of the benefits. That's one of the reasons why the biotech companies are now touting this idea, 'the world is short of food, we're going to provide it.'" (p. 46). The idea of GMO necessity is purported by Monsanto but also exacerbated by concerns of food scarcity in general. There are food deserts in the US and extreme droughts in other countries that sound terrifying in the Western World, rhetoric that promises to solve these crises is persuasive and effective. This section looks at how the counter discourse argues against the ideas of GMOs being the only way to ensure fewer people will go to bed hungry.

On a surface level, the assertion that GMOs are the best or only way to feed the world would imply the entire world should indeed begin using GM technology. The issues of food scarcity have very little to do with the amount of food produced, Raj Patel (2012) author of *Stuffed and Starved* argues that food insecurity amongst the poor is very much a social and economic problem rather than a production problem. This sentiment echoes throughout the populist counter discourse (Bittman, 2013; Fagen, Antoniou, & Robinson, 2014b; Gimenez, 2012; Woodward, 2014). As of this writing, many estimate the world has more than enough food being produced to feed as many as fourteen billion (Woodward, 2014)—five billion more than Monsanto is suggesting the need to ramp up production for. Patel (2012) suggests that "feeding the world" is a concern of Westerners and the argument of such is designed to sway Westerners towards accepting GM technologies. Grassroots campaigns echo the sentiment, the

Facebook page of Millions Against Monsanto by OrganicConsumers.org features images that promotes and proselytizes this specific claim through social media—a powerful tool in grass-roots advocacy.

Figure 7 Screenshot of Millions Against Monsanto Facebook image

And another image that displays the counter discourse in action from Millions Against Monsanto by OrganicConsumers.org,

Figure 8 Screenshot of Millions against Monsanto Facebook image

In addition to already being able to feed the world, potentially twice over (Woodward, 2014), many within the populist counter discourse are calling for the recognition of organic farming's ability to produce nearly as much or as much food as GM technology and potentially heal the Earth.

Figure 9 Screenshot of Millions against Monsanto Facebook image

Figure 10 Screenshot of Organic Consumers Association Facebook image

Often there are hyperlinks to articles that refute the mainstays of the dominant discourse such as GMOs are perfectly safe and the best way to feed the world. The populist counter discourse dispels these "myths" in the same way it deals with the dominant discourse in general, in a head-on direct refutation of claims as seen in Christina Sarich's (2014) online article titled "8 Proofs We Don't Need GMOs to Feed the World," which has been re-blogged several times over online. According to Sarich (2014), one organic rooftop garden can feed 9000 people if done correctly; small organic farms are successful even in big cities; even some airports (i.e., La Guardia Airport) are choosing to serve sustainable non-GM food to their patrons; the United Nations noted that organic agriculture may be exactly what is needed to feed the world; low-tech sustainable agriculture is proving to increase yields on poor farms by upwards of 70%; urban gardens do not even need dirt in some cases (Aquaponics) to be sustainable; several US states have taken action moving toward a more sustainable model of agriculture; and finally organic home gardeners are seeing increased yields. Sarich's (2014) writing is a playful interaction with the dominant discourse, but it is certainly not unique. There are hundreds of websites and webpages that have similar write-ups regarding Monsanto's claim of Biotech being necessary to feeding the world.

Refuting Monsanto's Claim of Saving the Farmer. According to an interview with Dr. Vandana Shiva conducted by *Takeaway* host John Hockenberry (2014), Roundup Ready crop yields have dwindled over the years and lead the way for super weeds resistant to Roundup to take hold in Roundup Ready fields. Smith (2013) and Robin (2010) have written about the rise in Roundup costs associated with Roundup Ready fields over time in both the US and in South America. If the Roundup costs are eventually higher for those most impacted by food scarcity, how do Roundup Ready crops and GMOs offer a solution that is supposed to feed the world? This is a question asked by the authors of the supra counter discourse not only in the refutation of Monsanto's claims but also of the agribusiness model in general. The most common answer is that Roundup Ready crops do so by becoming a symbiotic relationship between Monsanto and the farmer that increasingly benefits the farmer (Robin, 2010).

In the US, patent laws prevent a great deal of use for farmers. As discussed earlier, Monsanto limits the amount of scientific inquiry that can be done on its patented genes. That same patent dictates how farmers can use that seed, including limiting one's ability to share with researchers per the Technology User Agreement (Bereano & Phillipson, 2014). The Technology User Agreement requires the end-user (the farmer) to not save seed, to use Monsanto products (namely Roundup), and to allow Monsanto to inspect their crops to verify compliance (Bereano & Phillipson, 2014). Patent infringement has become a large part of the counter discourse. Percy Schmeiser, the Saskatchewan canola farmer who was sued by Monsanto for patent infringement, has become the poster-boy for the populist counter discourse. Percy Schmeiser is featured in the documentary *Seeds of Death* (2012), as well as in *Food Inc.* (2008).

Schmeiser has become a folk hero within the supra counter discourse. The song of his triumph against Monsanto began in 1997 when he found Roundup tolerant soybean plants on his land, likely due to cross-pollination from neighboring fields ("Percy Schmeiser," 2015; Robin, 2010). According to Monsanto's website, Schmeiser then allegedly saved the Roundup tolerant seeds and replanted them in 1998 ("Percy Schmeiser," 2015); it was then that Monsanto asked Schmeiser to pay Technology Use fees to the company for using their genes without a license ("Percy Schmeiser," 2015). Schmeiser refused to

pay the licensing fees because he did not want the tolerant plants in his fields (Robin, 2010; Makin, 2004). The Supreme Court of Canada ruled in favor of Monsanto; Schmeiser had indeed violated patent licenses by saving seed and replanting (intentionally according to Monsanto) the tolerant plants ("Percy Schmeiser," 2015). According to science policy analyst at the Center for Food Safety Bill Freese (2014),

> Monsanto has pursued thousands of farmers for allegedly saving and replanting its patented Roundup Ready soybean seeds. An analysis by Center for Food Safety has documented court-imposed payments of more than $21 million from farmers to Monsanto for alleged patent infringement. (p. 115)

Schmeiser is seen as a hero because he stood up to the agribusiness giant by refusing to pay the technology fees on plants he did not want (Robin, 2010). In addition to appearing in various documentaries chronicling the dubious nature of GMOs, Percy Schmeiser has been the subject of his very own film *David v. Monsanto* which came out in 2009. According to the populist counter discourse, the issue of GM technology and patents comes down to a battle between public and private control of food systems (Bereano & Phillipson, 2014). The patenting of seeds ultimately means control of the seeds and any food that yields from it. Perhaps in the US, this is not necessarily an alarm-ringing issue outside the farming community, but in the rest of the world where small-holding subsistence farming is a way of life it is a huge problem. Several poor and hungry nations have refused food aid on the basis of rejecting the patenting and control of the seeds. Zambia and Zimbabwe have refused US food aid on the basis that some of it may be GM maize (corn) (Mpofu, 2010). Haiti refused Monsanto donated seeds in 2010, promising to burn any that came into the country on the basis that one cannot patent life (*GMO OMG*, 2014; Bell, 2010).

The supra counter discourse and the dominant discourse agree that between population growth and climate change there is a need to find a way to increase yields through the already cultivated land. The populist counter discourse discusses alternative agricultural visions such as agroecology and marker-assisted breeding as a means to do this.

Alternative Agricultural Visions

Thus far, throughout this thesis, biotechnology has been used synonymously with GM food and more specifically Roundup Ready seeds. There are many safe and effective forms of beneficial biotechnologies that utilize genetics, one such technology which has great application potential in food systems is Marker Assisted Tracking or Selection (Fagen et al., 2014b; Folger, 2014). It differs from gene insertion technologies such as Roundup Ready seeds in that it marks certain known genes and then tracks them in breeding trials to "create crop varieties that deliver high quality, high yields, and resistance to pests and stress" (Fagen et al., 2014b). This form of biotechnology is already being utilized by the International Rice Research Institute in the successful breeding of a flood-tolerant rice variety and as a result they are attempting to breed a drought tolerant rice variety (Folger, 2014). Fagen et al. (2014b) assert that marker assisted selection is different from GM crops and modern agriculture because "these methods are adaptable and therefore can be made compatible with the geography, climate, and culture where they're implemented" (p. 66). Marker assisted tracking finds itself in the supra counter discourse as a reprieve from the constant demonization of GM technology and Monsanto. However, the concept of working synergistically with the land finds itself in the discourse of agroecology.

Agroecology and Local Food Movements. Agroecology is the interdisciplinary scientific discipline that utilizes "ecological theory to study, design, manage and evaluate agricultural systems that are productive but also resource conserving" ("Agroecology in Action," 2000). Agroecology is reflexive and reflective of itself as it approaches agriculture with consideration not only for the land but also the people working the land. Agroecology is similar to what Dr. Vandana Shiva teaches regarding biodiversity, according to Greenpeace, Shiva was in Tanzania earlier in 2014 to champion the implementation of agroecology. Greenpeace quotes Shiva in regards to agroecology, "Globalized industrialized food is not cheap: it is too costly for the Earth, for the farmers, for our health. The Earth can no longer carry the burden of groundwater mining, pesticide pollution, disappearance of species and destabilization of the climate. Farmers can no longer carry the burden of debt, which is inevitable in industrial farming with its high costs of production. It is incapable of producing safe, culturally appropriate,

tasty, quality food" (Salaam, 2014). Agroecology seems to equate to small-subsistence farming, which reportedly provides 70% of the world's food ("Agroecology in Action," 2000; Salaam, 2014). The monocultures of GMOs and Roundup Ready crops do not fit in the discourse of agroecology, but it is important to note that even large-scale commercial organic farming will not fit either. Agroecology is akin to the local food movement, a movement in the US that is embodied by farmers markets and small family farms.

Polyface Farm in Swoope, VA run by Joel Salatin has become the face of the American agroecology movement. Salatin has been featured in Michael Pollan's (2007) *Omnivore's Dilemma* as the alternative vision to concentrated animal feeding organizations (CAFO—where animals are raised for slaughter on a grand scale). *Food Inc.* (2008) featured Salatin discussing the politics of small-scale farming in the US while slaughtering and processing chicken. Salatin suggests that synergistic agricultural systems are the only way to continue to feed the world; he asserts the agri-industrial complex will destroy all our arable land. Polyface Farm boasts a closed-system of ecology: the cows, chickens, and pigs work together to keep the farm going and prevent outside inputs such as Roundup or Atrazine (Pollan, 2007). Salatin is quoted in a *MotherEarthNews* interview as saying of the recent organic movement: "intuitively, people understand that the historical use of the word "organic" identified an idea and a paradigm rather than a visceral list of dos and don'ts" (Phelps, 2008). The supra counter discourse and alternative agricultural visions often assert the foods their parents' generation was organic simply because there was no option to grow food with questionable pesticides, fertilizers, and GMO seeds.

Conclusion

This chapter focused primarily on scientific and populist counter discourses that collectively constitute the supra counter discourse of the assemblage of Roundup and Roundup Ready crops in the US. This is not to suggest that other countries do not have their own dominant or counter discourse of GMOs, but rather it was outside the scope of this chapter. Sometimes the discourses in other countries are absorbed into the discourse in the US, as seen in the discussion of Haiti refusing Monsanto's donated seed in 2010, to demonstrate the questionable nature of GMOs in the US. Third World countries do not

want GMO foodstuffs while their people are starving and yet citizens in one of the most developed country in the world are eating GMO foodstuffs.

Additionally, the supra counter discourse focuses on dismantling the dominant discourse deployed by Monsanto, first by exposing a buried history that suggests Monsanto has asserted the safety of its products in the name of profits despite knowing their products are hazardous. The contested history chronicled by Monique-Marie Robin (2010) and Jason Louv (2013) puts long forgotten disasters that Monsanto is responsible for in the forefront of the supra counter discourse. PCBs in Anniston, Alabama, Dioxin in Times Beach, Agent Orange contamination in US Vietnam Vets all remind the audience that Monsanto has betrayed the American public before, they have put profits above people time and time again and they are likely to do so in the future. There are federal agencies like the EPA, FDA, and USDA that are put in place to stop companies like Monsanto from harming the public with their products, but the supra counter discourse indicts federal agencies as well. Federal agencies have declared Roundup and Roundup Ready crops safe in spite of a lack of scientific consensus, according to the supra counter discourse, these agencies must at least be suspect.

The supra counter discourse utilizes the independent research that links Roundup herbicides to negative health and ecological outcomes. The supra counter discourse further resists Monsanto's dominant discourse by reviewing the scientific research that questions the safety of Roundup Ready crops and other GMOs. The scientists associated with research that resists Monsanto's dominant framing of its assemblage often become heroes in the supra counter discourse, in addition to experts. Scientists who have experienced negative professional outcomes after publishing their research, such as Gilles-Eric Séralini, become part of the discourse that challenges Monsanto's cultivated image of benevolence. Similarly, Percy Schmeiser's struggle with Monsanto was taken up by the supra counter discourse to question Monsanto's image.

Monsanto's dominant discourse asserts that the agricultural assemblage of Roundup and Roundup Ready seeds is necessary to feeding the nine billion people expected to inhabit the earth in 2050. The supra counter discourse resists Monsanto's assertion and suggests that current agricultural

production is currently overproducing food. The supra counter discourse suggests food insecurity is a matter of social economic status and access to food.

There are no laws in the US to regulate GM crops because they're generally regarded as safe (GRAS), so in addition to undermining the federal agencies interest in public safety, the supra counter discourse has to deconstruct the dominant discourse of safety and create its own. The construction of safety in the supra counter discourse begins by reevaluating whether or not Roundup is safe and then ends by questioning the extension of safety Roundup Ready crops received from Roundup's established discourse of safety. Roundup is not safe according to the counter discourse, it does not simply reduce to salt after 24 hours (an assertion made by Monsanto) but rather persists in its environment and it has been linked with several devastating cancers. Roundup Ready crops are designed to withstand Roundup. The supra counter discourse argues there is far more to GMO crops than just pesticide resistance.

CHAPTER 4

INTERACTION OF THE DISCOURSES

In March of 2013, President Obama signed House Resolution (HR) 933 into law. HR 933 is officially known as the "Consolidated and Further Continuing Appropriations Act," as it was a funding bill designed to prevent government shutdown. HR 933 also became colloquially known as "The Monsanto Protection Act." In its final iteration, sec 735 "The Farmer Assurance Provision" of HR 933 was inserted by Senator Blunt which prevented federal courts from barring the USDA regulating the planting of GMOs in the event that evidence was discovered showing potential harm (Horrigan, 2013; Louv, 2013; Sheets, 2013a). Senator Roy Blunt reportedly received campaign donations from Monsanto totaling $108,000 since 2010, and apparently it took the senator some time to admit he was responsible (Horrigan, 2013). More disconcerting than the provision itself, many members of Congress reportedly had no idea that the provision had been added to what was supposed to be a budget bill (Sheets, 2013a),

The passing of HR 933—specifically sec 735—sparked serious outrage in the public, within the few days of its passing the House of Representatives and the Senate but before it was signed into law by the President, more than 250,000 signatures had been collected and sent to the White House by activist group *Food Democracy Now* demanding the law be vetoed to prevent "The Monsanto Protection Act" from also being passed (Lennard, 2013; Sheets, 2013b). In addition to the signatures protesting the act, there were protests in front of the White House, first calling the President to veto the bill and then condemning him because he failed to do so (Sheets, 2013b). Apparently, the passing of The Monsanto Protection Act galvanized more protests as it was linked to *March Against Monsanto* protests later in 2013 (Schirtzinger, 2014).

April of 2014 marked more congressional movement in regards to GMOs, Republican congressman Mike Pompeo introduced a bill, the Safe and Accurate Food Labeling Act," that would block individual states from requiring labeling on foods containing GMOs (Gillam 2014a), it has become known as "The Dark Act" among activists. Carey Gillam (2014a), journalist for Reuters, quotes the congressman apropos the bill "we've got a number of states that are attempting to put together a patchwork quilt of food

labeling requirements with respect to genetic modification of foods," Pompeo suggests that this does nothing but confuse and scare the consumer. The Safe and Accurate Food Labeling Act seeks to address this uncertainty (Gillam, 2014a).

The Monsanto Protection Act expired in September of 2013 (Lutey, 2013). The Dark Act has not gained any legislative ground since its introduction in 2014 ("H.R.4432 - Safe and Accurate Food Labeling Act of 2014," 2014). Section 735 of HR 933 and The Dark Act showcase backdoor dealings in the legislature that have had very little public input—there was no fight over public opinion. State ballot measures differ in that as they are wholly decided by individual votes. In 2012, California's ballot measure that would require GMO labels on food was defeated and in 2013 the same happened in Washington, journalist Carey Gillam (2014b) notes that it was a close race in both states. The protests surrounding HR 933 and numerous state ballot measures paint a picture of urgency in the United States surrounding GMOs, people are at the very least concerned about what they are eating as evidenced by outrage at Congress for what amount to pro-business house resolutions. The interesting thing in the dominant discourse deployed by Monsanto, though is there is very little in the way of support for legislative attempts that don't involve the public (i.e., state ballot measures). Most the media stories about HR 933 are after the fact, and subsequently what is available is a negative reaction to the news of subversive legislation.

The year 2014 was an extremely busy year for Monsanto and GMOs in general, twenty-seven states reportedly were working on mandating labels for GMO in food and 66 active bills and ballot initiatives in the works (Gillam, 2014b). Of those in the works, this chapter will focus on Colorado and Oregon's efforts to label genetically engineered ingredients. On November 4th, 2014 Colorado and Oregon residents voted on GM labeling initiatives. Prior to the vote, it seemed that everyone had an opinion even Steamboat Today took a position on the Colorado proposition that would require GMO labeling in the state. The GMO labeling efforts in 2014 represent a unique case study in which to analyze the dominant discourse of GMOs and the dominant counter-discourse. In the months leading up to the November 4th, 2014 election, Monsanto appeared to be quiet while many media outlets were discussing the topic of mandatory GMO labeling. The first part of this chapter focuses on explaining the initiatives,

then will focus on the discourse of Monsanto and opponents of labeling, and finally on proponents of labeling.

State Measures. The GMO labeling ballot measure Colorado was Proposition 105. Prop 105 would have established a separate labeling system for packaged foods that contain GMO ingredients (Runyan, 2014a; Runyan, 2014b). The labeling initiative in Colorado would have only applied to foods that currently have nutrition labels, primarily processed foods, and not to meat, dairy, alcohol, or food from restaurants (Estabrook, 2014),

The GMO labeling ballot measure in Oregon was Proposition 92; similar to Colorado, Oregon's GMO label would require a declaration of GMO ingredients on packaged foods (Runyan, 2014a; Runyan, 2014b). Oregon's measure would have only applied to raw and packaged foods ("Oregon GMO Labeling measures draws big bucks from supporters, opponents," 2014).

Opponents argue that labeling packaged foods for GMO ingredients would be burdensome to Colorado and Oregon farmers and food producers (Runyan, 2014a; Runyan, 2014b). However, proponents of labeling disagree; Oregon's *Right to Know campaign* and Colorado's *Right to Know* campaign mirror each other in contesting that notion. According to the respective websites for the initiatives, would require no additional action from the farmers and only impose labeling on the companies producing the processed food ("Faqs & Resources," 2014; "Why Label GMO Foods," 2014). Similar measures have been brought forward in Washington, California, Connecticut, Vermont, and Maine (Law, 2014; Chappell, 2014). GMO labeling initiatives have passed in Vermont, Connecticut, and Maine, but Connecticut and Maine have conditions to be met before the labeling is enacted, primarily that the surrounding states have to also enact similar measures (Chappell, 2014). According to the Library of Congress, 90% of people polled would like to know if they're eating GMOs with their food (Acosta, 2014). A similar poll in Colorado prior to the November ballot reported that over 50% of CO respondents wanted GMO labels and would vote *Yes on 105* (Sexton, 2014). In Colorado alone, 171,000 (145% of the signatures needed to put the initiative on the ballot) people wanted a genetic engineering label initiative

on the ballot as they signed the initial petitions (Cooper, 2014). This is interesting because it seems that unfettered and given a choice, people want to know if they are eating GMOs.

In Colorado, a dissenter of proposition 105 proposed it could cost millions of dollars to implement, much more than the estimate proposed by the Colorado Legislative Council of $113,000. The anonymous author of a Steamboat Today article goes on to suggest that labeling GM foods would devalue foods by implying they were inferior to deserve such a label ("Our view: Proposition 105 is costly and confusing," 2014). Right to Know Colorado and Right to Know Oregon both cite the same studies on their websites that GMO labels would cost no more than $2.30 per person annually; that's less than a penny a day (Chokshi, 2014).

The USDA and American Medical Association consider GMOs completely safe, and 75% of processed foods in America are made with genetically engineered ingredients. People who want to avoid GMOs should continue to buy organic or GMO-free labeled foods; in the anonymous author's opinion, an additional label is unnecessary ("Our view: Proposition 105 is costly and confusing," 2014). A sentiment echoed in Oregon by biotech companies including Monsanto (Gillam, 2014b). Anti-labeling monies came from seed, food, and biotech companies (Gillam, 2014b) with 4.7 million dollars coming from Monsanto alone in Colorado as of October 14, 2014 (Knowles, 2014).

In Oregon, Monsanto contributed 5.9 million dollars to the No on 92 campaign ("Oregon Mandatory Labeling of GMOs Initiative, Measure 92," 2014). In both states, the opponents of the ballot measures outspent proponents by a great deal—20.8 million dollars were spent to oppose the initiative in Oregon while only 11.2 million in donations supported it ("Oregon Mandatory Labeling of GMOs Initiative, Measure 92," 2014), and in Colorado just over 700 thousand dollars supported *Yes on 105* campaign and 12.6 million dollars were against it ("Colorado Mandatory Labeling of GMOs Initiative, Proposition 105," 2014).

The Deployments of the Anti-Labeling Discourse

Many news stories attempted to present both sides by citing citizens who want labels and farmers claiming they would be affected by labeling initiatives in Colorado and Oregon. For example, a farmer in

Colorado claims he grows GMO sugar beets; when the beets are processed into sugar, the sugar is genetically identical to regular and even organic sugar (Runyan, 2014c). He asks how it is fair he now has to label his GMO-but-not-really-GMO sugar when the final product should bear no resemblance to its GMO primary ingredient (Runyan, 2014c). Other articles cite farmers claiming that they will have to purchase more farming equipment to maintain segregation if they grow both conventional and GMO crops if the ballot measures go through (Runyan, 2014c). Ultimately, journalists asserted that these extra costs will be passed along to the consumer and indeed raise annual grocery costs (Stiles, 2014). Some advertisements in Oregon claim that the costs to farmers will be in the millions of dollars if the initiative passes (Mahoney, 2014). In fact, one journalist asserts that the annual cost to Oregon residents would be upwards of $500 for a family of four (Stiles, 2014). These kinds of claims present a red herring fallacy as the ballot measures in both states would only require the labeling of GMO ingredients, not the segregation of the ingredients, and suggesting otherwise is meant to divert attention from the real issues.

Monsanto is opposed to GM food labels primarily because “in the absence of any demonstrated risks” (“Labeling Food and Ingredients Developed from GM Seed,” 2013), a label suggests that GM foodstuffs are inferior to their conventional counterparts (“Labeling Food and Ingredients Developed from GM Seed,” 2013). The FDA has declared GM crops to be GRAS and not substantially different from conventional produce, and Monsanto agrees with the FDA about the safety of GM technology.

Monsanto states it is committed to public health and safety, “and the safety of biotech crops is well-established. [Monsanto] agree[s] with the conclusions of multiple health societies, hundreds of independent scientific experts and dozens of governments around the world who have determined that food ingredients and products made from biotech crops are as safe as their conventional counterparts” (“Labeling Food and Ingredients Developed from GM Seed,” 2013). The Roundup Ready system is a “reduced tillage” (“Agronomic Practices,” 2015) system. According to its proponents, it helps reduce topsoil loss by precluding the farmer from tilling the land before planting for the system, he can simply spray Roundup herbicides to kill weeds and prep soil before planting for the season, and then again periodically to keep weeds from taking over fields (“Agronomic Practices,” 2015). Certainly, many non-

organic farmers are utilizing GM seeds because of this labor-saving and resource-saving technology, roughly 90% of all processed food contain GMOs (Moritz, 2014). In the absence of demonstrated risk of harm and in the face of ubiquity, it makes sense that labels are seen unnecessary in the world of biotechnology.

The attempt to examine the *No on 105* and *No on 92* political ads has been only partially executed as many of the advertisements and other texts (e.g., websites) have been removed and dismantled from public view. Neither the *No on 105 Coalition* in Colorado or the *No on 92 Coalition* in Oregon even have a proper website as of this writing, which is odd as it was a widely funded campaign—$33.4 million dollars between Colorado and Oregon donors. Some webpages of each coalitions' sites were located through Google's cache, which allowed the researcher to put together pieces of the dominant discourse. Another source in piecing together the dominant discourse and anti-labeling discourse has been each coalition's short-lived Twitter accounts.

There are three frequently used themes by both coalitions, prop 105 and 92 will be costly to small business and families, will be misleading to consumers, and are of unscientific merit. Less prominent themes include National regulations would be more effective and would ease the burden on Coloradan and Oregonian farmers, and experts former Agriculture Commissioner of Colorado Don Ament and nutrition educator Amber Clay. It cannot be confirmed that Don Ament and Amber Clay were part of the political advertisements as a direct viewing of the political advertisements was not available, however the rebuttals available on the *Right to Know Colorado* website suggest both individuals were.

The Twitter accounts for the *No on 105* and *92* coalitions are still live and available, but there are only 21 and 47 followers respectively as of this writing; it is difficult to unequivocally assert that the Twitter accounts are modes of deployment for the dominant discourse. Unfortunately, it is one of the only sites of analysis that remain. The following screen shots, however, are what inform the above analysis.

Twitter Screenshots.

***Oregon*.**

Figure 11 Screenshot of No on 92

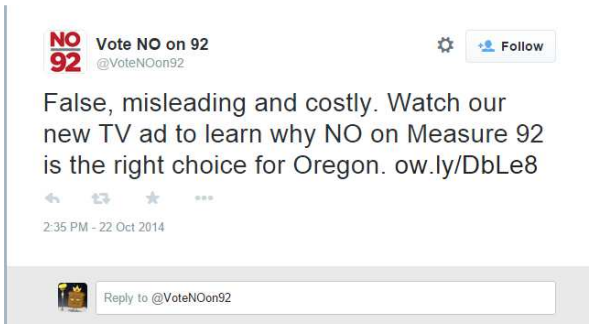

Figure 12 Screenshot of No on 92

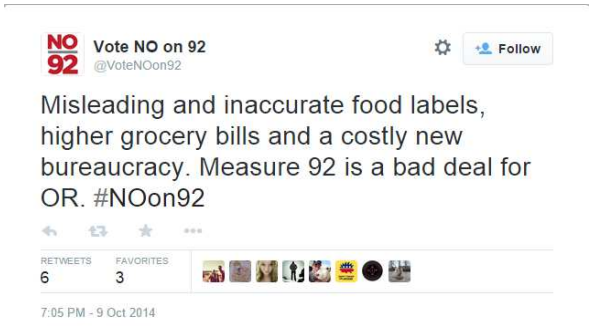

Figure 13 Screenshot of No on 92

Colorado.

Figure 14 Screenshot of No on 105

Figure 15 Screenshot of No on 105

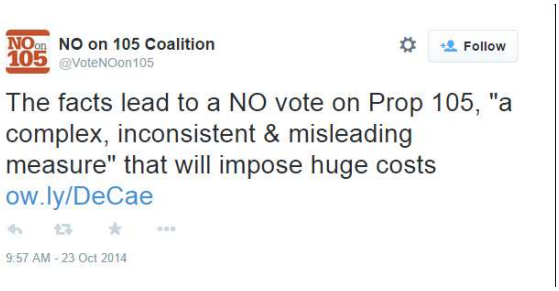

Figure 16 Screenshot of No 105

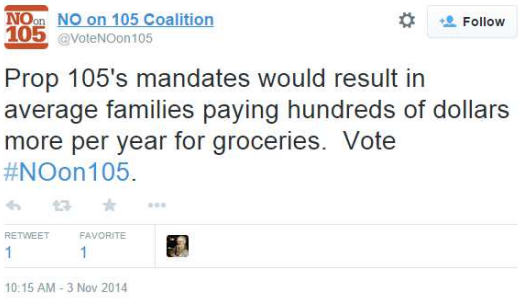

Figure 17 Screenshot of No on 105

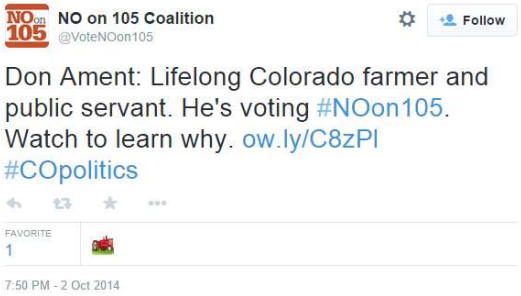

Figure 18 Screenshot of No on 105

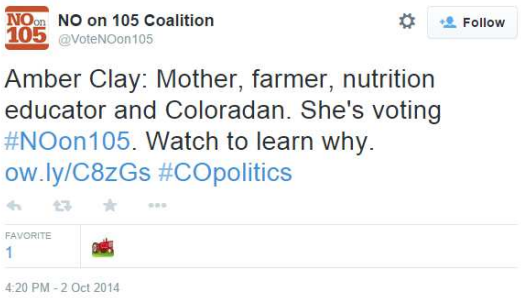

Figure 19 Screenshot of No on 105

What is especially interesting given that the majority of money donated to the *No on 105* and *No on 92* efforts was from Monsanto is the fact that each coalition's account mirrored each other's tweets.

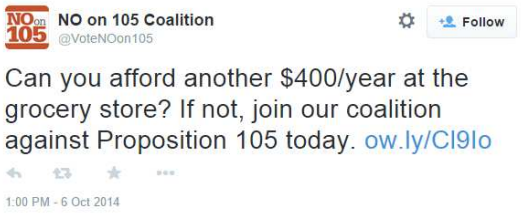

Figure 20 Screenshot of No on 105

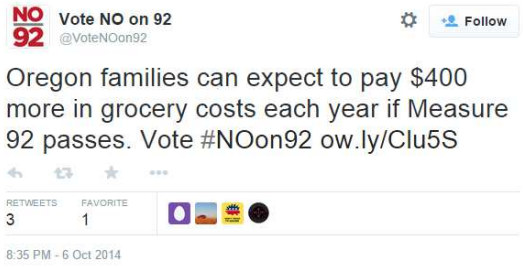

Figure 21 Screenshot of No on 92

Figure 22 Screenshot of No on 105

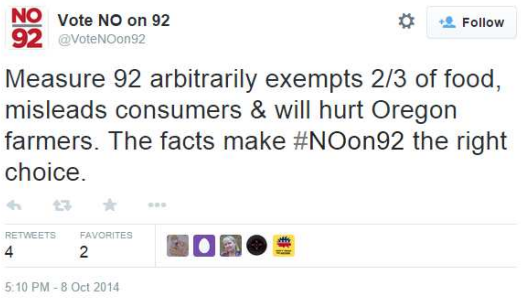

Figure 23 Screenshot of No on 92

Experts were created through Don Ament and Amber Clay in Colorado. Don Ament was the Agriculture Commissioner for a number of years, and Amber Clay is a nutrition educator and a mom. Amber represents the educated consumer, she is the expert that anyone can see themselves reflected in, the everyday "hero" trying to do the best for her family is not only unconcerned about GMOs, but completely against labeling them. Don Ament is the quintessential farmer, the man who can go on to represent all farmers. These experts are recreated in the images of those experts in the dominant discourse deployed by Monsanto. This is not a scientific debate so no scientists are required or necessary; it's about saving the family and the consumer from costly measures—Monsanto is the savior to farmers in its own estimation. The next section is an account of the political advertisements on the other side of the debate, the proponents of labeling.

The Deployments of the Pro-Labeling Discourse

Alternatively, the general argument of proponents of labeling initiatives is that if GMO ingredients pose no risks then why not label them? Proponents are not suggesting (at least on a surface level) that GMOs are harmful but rather they would like to know if they're eating them (Sexton, 2014). Of course, opponents including Monsanto suggest that those who are unknowledgeable about food and nutrition may see the label as a mark of inferiority or a health warning ("Labeling Food and Ingredients Developed from GM Seed," 2013; Sexton, 2014). To mitigate this campaign of transparency by proponents of labeling, Monsanto (and many others including the Grocery Manufacturers Association) contributed a considerable sum of campaign money.

Much like how the dominant counter-discourse seems to absorb attacks and appropriate them for their own use, the proponents of GMO labeling in Oregon and Colorado use the dollar amount being contributed by Monsanto to their opponents as evidence of something dubious at best and sinister at worst—and not to mention solicit more donations (Ruiz, 2014). Larry Cooper, campaign co-chair of *Right to Know Colorado* wrote in an opinion piece for the *Denver Post*,

> Over the last two years, the world's largest chemical and biotech seed companies and America's giant food manufacturers have spent nearly $70 million to defeat GMO labeling initiatives in California and Washington. In just three weeks, those opposed to Proposition 105 raised $1.4 million, dwarfing the $22,000 raised by *Right to Know Colorado*. While these spending differences are staggering, *Right to Know Colorado's* statewide grassroots support will continue to fight for greater transparency in our food system through this GMO labeling initiative despite the well-funded corporate opposition. (Cooper, 2014)

The grassroots campaigns like *Right to Know Colorado* and *Right to Know Oregon* write as though it is a David and Goliath story, which is not necessarily unfounded. It pits the narrative of big business standing up for the little guy (i.e., the farmers, food processors, and consumers) against itself—these ballot initiatives have been put together by the little guys (i.e., grassroots campaigns).

The proponents of prop 105 and 92 are spending a lot of time refuting the claims of their opponents as well, much like the dominant counter-discourse does in Chapter Three. Also bear in mind how the dominant discourse of safety Monsanto purports from Chapter Two, and you'll see the opponents doing the same by suggesting that GMOs are safe, even if they're designed specifically to withstand a great deal of pesticide, the pesticide itself is safe, so the GMO is safe. The *Yes on 92* campaign refutes that claim in a political advertisement featuring the EPA scientist first tasked with studying GMOs in the 1990s, Dr. Ray Siedler PhD, speaking about the differences between conventional corn and Roundup Ready corn. In the advertisement, he has a handful of yellow corn kernels and a clear bag of blue corn kernels. He says of the blue corn, "these are engineered to withstand huge doses of pesticides. That blue coating is five toxic chemicals that end up in our food. The chemical companies making these seeds

made Agent Orange and claimed it was safe, too" (Oregon Right to Know, 2014a). Siedler then asks the viewer if they would like to know which one they're eating, then they must vote "Yes" on 92. This advertisement is powerful, it creates ethos around the scientist, Dr. Ray Siedler PhD, Former Senior Scientist, Environmental Protection Agency. Dr. Ray Siedler PhD is redundant but it very effective for marking him as an expert, coupled with Senior Scientist at the EPA, his testimony is beyond reproach. It is effective and persuasive, and one of the few political ads that was found that confronts Monsanto's discourse of safety in such an accessible way.

Many of the advertisements for the *Yes* campaigns follow similar styles where an "expert" is on screen and he refutes the claims of the No campaigns. One video even features Michael Hanson of the Consumer Union, from Consumer Reports, discussing the costs associated with labeling GMOs in other countries—there were no costs associated with GMO labeling initiatives in the 64 countries who do require GMO ingredients to be declared. Michael Hanson, and by extension Consumer Reports, endorses the Yes on 92 ballot initiative. Consumer Reports, according to the ad, is supposed to provide unbiased information to consumers; their endorsement must then be because the initiative is unbiased. This ad finishes with Michael Hanson's voiceover "vote Yes on 92, a clear well-written plan giving you the right to know what is in your food" (Oregon Right to Know, 2014b) and a mom with her several children eating around a table with a red gingham tablecloth. These visual cues tell the viewer that this is about families have a right to know what they're feeding their children. This advertisement is also especially persuasive, an unbiased account of costs associated with GMO labeling and the right for moms to know what is in their children's food. Michael Hanson represents yet another expert in the discourse of labeling initiatives.

Yes on 105 campaigns put together by *Right to Know Colorado* are very similar in style, but utilizes more tongue-in-cheek dialogue. In one advertisement, celebrity Danny DeVito is in the face of the viewer, literally as his face takes up most of the frame, and he is confrontationally saying "what makes you think you have the right to know," celebrity trainer Gillian Michaels says incredulously "who do you think you are," comedian Bill Mahar says condescendingly "you shouldn't know your food is genetically modified," actor John Cho says "you might do something dumb," actor Glenn Howerton follows up with a

furrowed brow and grandiose hand gestures “like looking at labels and making decisions” (Right To Know Colorado-Label GMOs, 2014a). This account covers the first 12 seconds of the TV spot, but it continues with celebrities acting in a mock-paternal way (suggestive of the way Monsanto and other opponents of labeling discuss cognitive misers) for 31 seconds.

Another ad features some of the same actors in lab coats with a company name on the pocket, for example Danny DeVito is in a coat with Monsanto monogramed on the pocket. The actors are outwardly mocking the faux-paternalism (Right To Know Colorado-Label GMOs, 2014b) that could be construed from Monsanto’s website (“Labeling Food and Ingredients Developed from GM Seed,” 2013). These *Yes on 105* advertisements are fairly confrontational, but not with the viewer, they confront the way that opponents of labeling tend to speak of laymen’s potential interpretation of such labeling. It’s a familiar ironic trope that is seen in television frequently, the viewer should recognize the trope as ironic condescension of outside sources, in this case the way the opponents discuss labeling of GMOs as confusing. This stylistic choice may be a result of the fact that these actors are probably not experts on GMOs, but it may also serve to highlight that people who are not unbiased experts are pouring money into the opposing coalition. Glenn Howerton and Danny DeVito probably know as much about GMO labeling as the average consumer so it’s ironic that they would “play” experts in advertisements and perhaps this may disrupt some of the internalization of the opponents’ message. Both advertisements attack the assumptions of the *No* campaigns through parody, suggesting that the conclusions of the *No* campaigns are fatally flawed.

Right to Know Colorado and *Right to Know Oregon* appear to be connected in some ways, though perhaps not officially. *Right to Know Colorado’s* website features some of the same political advertisements as *Right to Know Oregon* with the appropriate “Yes on 105” (CO) inserted instead of “Yes on 92” (OR). They also cite many of the same facts regarding GMO labeling, namely that 64 countries including the UK and Japan require food labels to declare genetic engineering (“Faqs & Resources,” 2014). In addition to 64 countries labeling GMOs, there have been no associated costs to consumers in those countries according to the Michael Hanson political ad. Scott Faber (2013) threw his opinion into

the game as well. In a Huffington Post blog, Scott Faber (2013), former Vice President of the Grocery Manufacturers Association (GMA) and current Vice President of Governmental Affairs of the Environmental Working Group, wrote about what drives food costs as he experienced it in the GMA. He suggests that changing a label has no real impact on the costs of food,

> manufacturers are constantly changing their labels to highlight product innovations or to make health claims. Although it varies from product to product, the average "refresh" cycle for a food label is about a year. Adding the words "may contain genetically engineered ingredients" will add as much to the cost of making food as adding the words "can help reduce cholesterol" -- nothing. (Faber, 2013)

Similar assertions can be found on the *Right to Know Colorado* and *Right to Know Oregon* websites and in their advertisements, but this is a former GMA lobbyist asserting that GMO labels are not costly. Scott Faber (2013), while not particularly prominent in the discourse, echoes the opinions and assertions of the coalitions for labeling with added expertise.

Right to Know Colorado and *Right to Know Oregon* also both cite Consumer Reports, which speaks to the unbiased nature of the report and its applicability crosses state lines. In terms of similarity, however, it interesting that Oregon had a great deal of focus on families and children having a right to know what is in their food (“Why Label GMO Foods,” 2014), while it seemed *Right to Know Colorado* appeared to lean more toward individualized choice and transparency. For example, one political advertisement in Colorado showed a cartoon of a man shopping in the dark holding two ears of corn. The voice-over asks why Coloradans are shopping in the dark about genetically engineered labels, then goes on to state that some foods like corn are registered pesticides with the EPA, and the light clicks on audibly. While this is not wholly different from the unique ads in Oregon, there is little to no mention of children and families. This may explain the vast difference in votes between the two states, Colorado’s 105 ballot initiative was opposed by 65.47% of voters (“Colorado Mandatory Labeling of GMOs Initiative, Proposition 105,” 2014) while Oregon’s 92 ballot initiative was opposed by a much slimmer 50.03% (“Oregon Mandatory Labeling of GMOs Initiative, Measure 92,” 2014). Both measures were opposed and

defeated, ultimately. It's unclear as to why, other than the outrageous outspending by those opposed to the initiatives as the *Right to Know* campaigns were robust and persuasive, but without funding, their reach and impact was limited. As stated earlier, *No on 105* and *No on 92* political advertisements were removed from YouTube and other media sites but the news articles and Twitter accounts painted them as flat but extremely persuasive.

Labeling activists assert that despite ballot losses, the fight is long from over as evidenced on their respective websites and editorials (Cooper & Cooper, 2014; Law, 2014; "Race to Require Labeling of Genetically Engineered Foods Remains Too Close to Call," 2014; Runyan, 2014a, 2014b; Wozniacka, 2014). It's still considered a victory that the initiatives made it to each state's ballots and there was a voter turnout; this means that people are becoming more aware of agricultural systems of production.

Conclusion

When comparing how legislation comes to pass in the public forum (e.g., state ballot measures) and HR 933—the Monsanto Protection Act—and The Dark Act introduced to Congress by Mike Pompeo, the differences are staggering. When there is no public dominant discourse deployment to examine because public opinion is not part of the equation, Congressman Mike Pompeo and others like him are able to act independently of the people. Given a choice, 90% of people polled say they want GMOs labeled (Acosta, 2014), but the initiatives to do so continue to fail. In the absence of a national standard, people seem to be wary of what it will mean to have GMOs labeled which makes the debate between the dominant discourse and the supra counter discourse especially interesting.

Opponents of labeling created experts in Don Ament and Amber Gray, two people who are more like everyday people than scientists. They were able to successfully reroute the argument from public knowledge of GMOs to costs associated with that knowledge to the consumer, small business owner, and the farmer. Anti-Labeling activists were able to reproduce the dominant discourse of Monsanto's products in that they are safe as there has been no demonstrated risk of harm in either the herbicide the plant is designed to withstand or the plant itself.

Proponents of labeling found industry experts, Dr. Ray Siedler, former EPA senior scientist, and Michael Hanson of *Consumer Reports*. Their expertise is different from Ament and Gray as they did not have to cultivate their expertise on the issue. Siedler and Hanson represented real people who could attest to their respective expertise, this is no different from the reification of people like Árpád Pusztai, Gilles-Eric Séralini, and Percy Schmeiser in Chapter Three. What is different, however, is that there was little debate about the safety of GMOs from the proponents of labeling in that they did not argue harm—rather that they simply wanted to know what they were eating. This is most likely a rhetorical device because there is no scientific consensus of harm by GMOs, so it would be difficult to argue that in a public forum. Still, the proponents lead a robust and persuasive campaign that galvanized a voter turned, and perhaps the only detriment is the lack of funds to widely distribute the campaign.

Monsanto continues to be linked to legislation that pertains to GMOs, but in state ballot measures, the company appears to be all but absent. Monsanto donated a great deal of money to defeat labeling in Oregon and Colorado in 2014, as did many other companies whose products rely on GMOs to keep costs down. This suggests that “money talks,” indeed. Coloradans and Oregonians, despite expressing concerns over GMOs, voted to defeat the initiatives that would require labels. In the absence of demonstrated risk, people were swayed by the supposed costs associated with labeling. However, the supra counter discourse mobilized a great deal of people to vote, and this is very telling about how the dominant and counter discourses interact and offers insight into how future campaigns could be articulated to be more effective in mobilizing people.

CHAPTER 5

EPILOGUE

Genetically Modified Organisms represent one of the most salient topics of public discussion in the last two decades. Rachel Carson's Silent Spring (1962) may have been the catalyzing text to set the stage for the modern environmental movement. The public was concerned about DDT and other toxic substances in the environment and Roundup, by all scientific measure of the 1970s, was shown to be safe. Roundup was adopted with enthusiasm and became one of the most used herbicides in the world in the decades that followed. Chapter Two chronicled the legislation that marked the new age of risk aversion following the political galvanization by Silent Spring and some changes in scientific risk conceptualization that may have contributed to the eventuation of Monsanto's biotechnology assemblage. Monsanto introduced its first Roundup Ready Seed to be used in conjunction with the herbicide in 1996 and has introduced several Roundup Ready crops since.

Since 1996, GMOs and Roundup Ready crops have been the subject of a great deal of debate in the United States. While Monsanto is not the only company developing GMOs to be used in conjunction with its herbicides, it is the most visible and most villainized by the supra counter discourse. Monsanto's website and public relation campaigns are the main methods of deployment for its discourse. One has to question who the website and public relations campaign are designed for. Are they designed for the public at large, industry insiders such as farmers, or journalists? It appears the entirety of the websites and social media campaigns are designed to be accessible to the lay-person. The audience of the dominant discourse was not the focus of this thesis, but an investigation of the audience may give more insight into the genesis and eventuation of the dominant discourse.

Monsanto has developed a narrative where it is going to save the world through its biotechnology assemblage by 2050, Monsanto is the hero in its narrative as evidenced by its various public relations campaigns (e.g., America's Farmers) and social media campaigns (e.g., YouTube and Facebook). The world is hungry and Monsanto is going to feed it. Monsanto positioned its products in the narrative as the keys to the future of agriculture. What is more interesting is the cultivation of science as almost religious

in Monsanto's discourse as illustrated by their seminal texts that Monsanto refers to repetitiously to articulate safety in regards to Roundup and to dispute research that stands in contrast as "bad science." The researchers and scientists responsible for this articulation are exalted, ethos is built up and reproduced to solidify the worldview through their science. For example, Robb Fraley, one of the scientists responsible for the development of Roundup Ready crops, is featured in a variety of Monsanto's PR spots on its YouTube account. Another example is William, Kroes, and Munro's (2000) work; it is repeatedly referred to in both the safety discourse and in response to contradictory research.

The timing of Monsanto's public participation was extremely important to the deployment of the dominant discourse, Chapter Two noted that while Monsanto was effectively silent during the months leading up to the 2014 Colorado and Oregon ballot initiatives that would have required labeling of genetically modified ingredients, there were many journalists reproducing the dominant worldview and acting as a mouthpiece for recent scientific publications that favored GMOs. Monsanto's silence about mandatory labeling is similar to the reconstruction of the anti-labeling coalition's discourse deployments in both Colorado and Oregon as chronicled in Chapter Four; Monsanto was a silent provider of funding that allowed for the wide proliferation of the dominant discourse. The day following the elections, Monsanto launched a site that allows for more direct exchange between its critics and the company (i.e., discover.monsanto.com). The silence of the company during political showdowns between the pro- and anti-labeling crowds is likely deliberate as Monsanto has been referred to as a villain years by popular press writings and agricultural documentaries. The interesting thing is the timing of Monsanto rebranding itself as transparent following an election where the anti-labeling campaigns were removed from the internet. Monsanto's silence prior to the elections appears to be an implicit acknowledgment of its critics.

The critics of Monsanto frequently reject the narrative of the company, Monsanto argues that it is a different company from the one founded in 1901 by John Queeny, only sharing the name. While this rhetorical positioning may be persuasive for the lay-person which Monsanto's website is designed for, it does little to assuage the criticisms of the company. Authors of the supra counter discourse fight it fiercely by keeping a detailed record of Monsanto's history. With every platform available, Monsanto's critics

remind people of the products that made Monsanto successful—PCBs, DDT, and Agent Orange—all products that were modern marvels in their time and eventually shown to be devastating to both human and environmental health. Monsanto articulated the safety of its previous products much in the same way as GMOs, through science and necessity. The authors of the supra counter discourse charge that Monsanto was perfectly aware of the harm their products were producing and continued to champion their use by asserting their safety. The evidence the supra counter discourse offers of Monsanto's knowledge is convincing, so much so that it convinced a jury to award the citizens of Anniston, Alabama a $700 million dollar judgment in 2006. The authors of the supra counter discourse are explicitly asking people if they can and should trust Monsanto about Roundup and Roundup Ready crops assemblages if one could not trust the assertions of safety regarding Monsanto's PCBs and Agent Orange. The deployment of the supra counter discourse has gained ground in recent years as evidenced by the proliferation of popular media sites pitted against Monsanto, frequency of news stories concerning Roundup, and the volume of books, and documentaries coming out every year contesting Monsanto's history. The retelling of Monsanto's history may explain Monsanto's own tactical silence and subsequent public rebranding. If Monsanto is indeed responding to the supra counter discourse in the designing of recent public relations and social media campaigns, this speaks to the perceived relevance of its criticisms.

Chapter Three also outlined how the supra counter discourse develops its own articulation of safety and necessity. The supra counter discourse rejects Monsanto's articulation of safety through federal regulation by questioning the integrity of the EPA, FDA, and USDA. The Toxic Substance Control Act of 1976 was supposed to set an expectation that EPA approved substances are safe and with the implementation of the legislation came criticisms that perhaps the EPA was underpowered in how it can regulate and govern. Later criticisms suggested that the EPA only requires a summary of potential harm and safety from the company registering a substance, Monsanto's critics suggest the federal agencies are underpowered and the agencies have been co-opted by Monsanto (and other industry giants). Monsanto's critics suggest that regulatory capture is evidence of such co-opting, this is performed by the

installing of regulatory agency decision makers that will favor Monsanto. The supra counter discourse discredits the claim that the Roundup Ready system is safe by discrediting the federal regulatory bodies that have declared it safe. Much like the evidence suggesting one cannot trust Monsanto; the evidence against the current regulation of Roundup and Roundup Ready crops is very persuasive.

The supra counter discourse articulates a voice of authority through the research of independent scientists. The research reviewed in popular media sites such as Marie-Monique Robin's (2010) The World According to Monsanto and the documentary Seeds of Death (2012) stand in stark contrast to Monsanto's science. Chapter Three reviewed studies that suggested exposure to Roundup is linked to several kinds of lymphoma cancers in men as well as studies that suggested severe health consequences in laboratory animals. The dominant discourse and supra counter discourse both articulate safety similarly, but the supra counter discourse also absorbs Monsanto's criticisms of scientist who suggest either Roundup or Roundup Ready crops are dangerous. Both Árpád Pusztai and Gilles-Eric Séralini experienced professional repercussions that followed the reveal of their studies that suggest GMOs are dangerous. The supra counter discourse uses the experiences of scientists who have spoken out or published on GMOs as evidence that Monsanto is silencing dissent and this is all the more reason to not trust their deployments. Effectively, Séralini and Pusztai become folk heroes in the supra counter discourse narrative of Monsanto. Much like Séralini and Pusztai, other people touched personally by the far-reaching power of Monsanto, such as Canadian farmer Percy Schmeiser, become heroes.

In addition to redressing people as heroes, the supra counter discourse also reminds its audience that Monsanto feeding the world may be a noble goal, there is already more than enough food for the world's population. Perhaps Monsanto focuses so heavily on feeding more and more people in its campaigns because it is cultivating its public image as benevolent. This may be a response to the barrage of demonizing rhetoric directed at the company. Critics flatly refuse Monsanto's premise that the world needs more food; instead they suggest there are enough calories being produced to feed the world twice over. Moreover, the authors of the supra counter discourse suggest a lack of access to food is symptomatic of a social-economic issue.

The voices of the dominant discourse and the supra counter discourse seem to interact rarely, but in the last few elections, there has been a fight over public opinion of GMOs. Chapter Four recounted the pro- and anti-labeling coalitions in the 2014 state elections of Colorado and Oregon. The advertising of each campaign provides insights into the discourses interactions. The anti-labeling discourse, while difficult to reconstruct as it had been largely removed from the internet, focused on GMOs being necessary to provided inexpensive food and labeling GMOs would put financial burdens on farmers. This is a logical extension of Monsanto's assertion that GMOs are necessary to feed the world and maintaining Monsanto's self-constructed heroic and savior like image. The anti-labeling coalitions also redressed mandatory GMO labeling as a non-issue by reminding people that GMOs have been part of the food system for nearly twenty years and labeling at this point would just raise food costs.

The pro-labeling coalitions built a campaign out of transparency, which is a slight divergence from how the supra counter discourse campaigns. The major players promoting the supra counter discourse tend to be referenced by Monsanto as alarmist and anti-science. Anticipating this type of attack, the pro-labeling faction avoided the question of scientific "fact" by instead focusing on transparency, arguing that genetically engineered ingredients be labeled so that people can make fully informed choices. The decision to avoid debating facts was likely a deliberate rhetorical choice to avoid connections being drawn to scientists who have been deemed unscientific by their peers as a result of suspected industry pressure. Instead the pro-labeling focused on refuting the anti-labeling claims, a strategy that is in line with the supra counter discourse,

Although the Colorado and Oregon attempts to mandate labeling ultimately failed to affect change in labeling genetically engineered ingredients, they did raise awareness nationally and locally in each of those states. Many people suggest the state ballot measures were still a success because of this awareness raising effect. For example, the Law Library of Congress notes that 90% of people when polled want to know if they're eating GMO ingredients (Acosta, 2014). This finding, in conjunction with the turnout numbers in Colorado and Oregon elections, reveal something startling. Genetically modified crops are flourishing in the US while most people are unaware they are consuming them. In the 64 countries

that require labeling of GMOs, there is very little use for the crops. The voter turnout suggests the general acceptance of GMOs in the US is not an American characteristic but rather it is may be symptomatic of ignorance about, and alienation from, the agricultural food system, which is a much larger problem in and of itself.

Genetically modified organisms are a salient and interesting flashpoint in the modern discussion of agriculture, but perhaps it is just the beginning of the conversation needed surrounding big agriculture. People in the US appear alienated from their food. Many do not consider the source of food beyond that of the grocery store. GMOs may be serving to distract consumers from other issues of big agriculture, for example, why are so few people questioning the agricultural system that requires a plant that can withstand heavy doses of herbicide? What niche did GMOs fill when they were first introduced? GMOs are symptomatic of a more encompassing agricultural-chemical assemblage that is inherently broken.

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