The GMO Labeling Controversy

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Abstract:

This goal of this paper is to outline policy choices and solutions for the genetically modified organism (GMO) labeling controversy. It begins by outlining a brief history of GMOs and how past court decisions have allowed them to become patentable and thus profitable. There are three policy choices presented, and the legal, economic, and political benefits and drawbacks of each policy are addressed. The paper concludes by offering a recommended option, which is a compromise aimed at reconciling the legal and political challenges posed by GMO labeling.

In May a farmer in Oregon found unapproved genetically modified wheat growing in his fields. What followed was a renewed controversy surrounding genetically modified foods (GMOs), and the role they should play in our society. This controversy that has been reappearing in the public spotlight since the first GMO, the "Flavr-Savr" tomato, was approved for commercial use in the US in 1994 (James and Krattinger 1996). Inevitably what this controversy boils down to for the public is a right to know. Does the public have a right to know where their food comes from? In other words, should it be required for GMO foods to have a label? This is a contentions issue; this year alone there have been 95 different bills proposed in 28 different states concerning labeling laws (Kalin 2013). This paper will outline three policy approaches to this divisive issue, with an ultimate focus on the most feasible option.

It is impossible to consider possible policy options before understanding what constitutes a GMO. Due to innovations in the biotechnology arena, we can now alter the DNA sequences of different organisms. In the 1970s scientists developed "recombinant DNA techniques" which allowed scientist to "cut" one part of a DNA sequence from one organism and "paste" into another, creating a unique hybrid DNA sequence that otherwise would not have occurred in nature due to the difference in organism kingdom or phylum (Marchant et al. 2010). It is important to note that this is fundamentally different from breeding practices used before this technology. Prior to recombinant practices, breeders employed selective-breeding. For example, a pure bred Chocolate Labrador is the result of the selective breeding between a Golden Labrador and a Black Labrador. The combination of alleles from the Golden Labrador and a Black Labrador produce the Chocolate Labrador. This is similar to recombinant DNA practices in that DNA is being combined in a novel

way, however, such combinations can only occur between within the same species because of prezygotic and postzygotic barriers that prevent interspecies mating. Biotechnology has allowed scientists to overcome these biological barriers to produce hybrids that would not have existed otherwise. For example, you cannot use selective breeding to cross a tomato with a fish because of the postzygotic barrier of mechanical isolation, which makes it physically impossible for different species to reproduce.

In the early twentieth century scientists turned to chemical mutagenesis and irradiation to produce seeds with desirable traits (Marchant et al. 2010). In other words, scientists would expose seeds to chemicals and radiation to give them specific traits, like a desirable color. However, this type of breeding "produces genetic changes that are far less precise and certain than those possible with genetic engineering" and can cause "mutations in many other parts of the genome… which often have deleterious effects on the organism" (Marchant et al. 2013, 7). Thus, scientists began to seek a more targeted approach to altering genes. The goal was alter the DNA sequence of the organism in such a way that the organism was ultimately improved, not harmed by the process. Scientists found their answer in recombinant technology.

Therefore, a GMO is an organism that whose DNA has been altered by the artificial insertion of foreign DNA. This is done to transfer some characteristic or property that is beneficial to the organism because it does not inherently express those properties. For example, tomatoes are very sensitive to the cold, which can mean a loss of crop if temperatures drop. The Arctic Flounder Fish lives in freezing waters and so has a resistance to the cold. Scientists were able to take the gene that allows for this resistance from the fish and insert it into the tomato, transferring the antifreeze property to the tomato.

Other crops are being inserted with bacterial genes for herbicide and pathogen resistance. These are all examples of genetically modified organisms.

Before jumping into the history of labeling, it's important to understand the scope of GMOs. Most underestimate how pervasive GMOs are in our society. To understand how this happened, it's necessary to jump back to the 1980 *Diamond v. Chakrabarty* Supreme Court decision. In this landmark case, the Supreme Court ruled that "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent" (Chakrabarty 1980). Previously, under the Plant Variety Protection Act (PVPA), breeders were given 20-25 year exclusive use of GMO plants, with exceptions (United States Department of Agriculture 2006, under "Agricultural Marketing Service: Plant Variety Protection Act). However, patents could now be extended to plants, since whether the subject was living or not was irrelevant, and patents offered a more stringent form of protection than coverage under PVPA. Attracted by this type of protection corporations began to "fund substantial research and development efforts" in the agricultural sector (Mascarenhas and Busch 2006, 127). What has resulted from the extension of patents is the "rapid monopolization" of agricultural spheres such as the seed sector. For example, in the seed industry, presently "10 multinational corporations control half of the global seed market" (Mascarenhas and Busch 2006, 127). This rapid monopolization has allowed companies to dominate the GMO market and flood the market with GMO products. For example, Monsanto's Roundup Ready soybeans, which contain a genetically modified herbicide tolerance, accounted for "91 percent of the worldwide GM soybeans…in 2004" (Mascarenhas and

Busch 2006, 129). Thus, the issue of GMOs is not one that can continue to be avoided in the policy arena.

In the past decade the public has faced the growing presence of GMOs by calling for labeling requirements, premised on a right to know attitude, whereby products containing GMO products would have to be labeled as such. The first bill was proposed in 2007 and since then there has been a flurry of legislative activity, and on May 23 of this year the Senate voted against an amendment to the federal farm bill that would have required labeling of GMOs (Wilce 2013). However, earlier this June Connecticut became the first state to pass strict labeling laws, but it will not take effect until it is passed by at least four of the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, New York, Pennsylvania or New Jersey (Kalin 2013). This was done in order to minimize the negative economic effects such labeling laws would have on large companies (Kalin 2013).

Thus, in the absence of a federal law, each state is passing their own labeling laws and this is having an impact on other states. This also affects the way companies to business. For example, General Mills owns and sells Betty Crocker products in every state throughout the US, and Betty Crocker contains GMO products (NON-GMO Project). If Connecticut's law passes then General Mills will have to send different products to Connecticut (labeled) than they do to the other states. Therefore, Connecticut's law would effectively be interfering in interstate commerce. This problem will only become more pronounced as each state takes a different approach to labeling. According to Article I section 8 of the U.S. Constitution, Congress has the power to "regulate Commerce with foreign Nations, and among the several States" (US Constitution). Thus, Congress has the

authority and legitimacy to address this issue because left alone, state dependent GMO labeling acts interfere with interstate commerce. Additionally, such bills also interfere with foreign commerce. In response to the situation in Oregon, Japan, Korea and Taiwan have halted wheat imports from the US. These countries have notoriously strict GMO policies, and they are not alone. It is likely that any law passed by a state, either in support of or against GMO labeling, will affect foreign commerce through export of crops. Again, this is a federal power, so Congress has the authority to step in to prevent state entanglement in foreign commerce.

However, even though Congress has the power to step in, this doesn't necessarily require them to do so. But there is a compelling reason for them to utilize this power, and that is food safety concerns. The US government has a history of being concerned with providing consumes enough information to "assure informed choice by consumers, create and awareness of actions necessary to assure food safety and wholesomeness, and to promote honest and fair dealing in the market place" (Vanderveen 2000, 49). This history of concern with such aspects is supported by the "eight major laws that provide the authority to regulating agencies to implement and enforce food-labeling requirements in the United Sates. These are the Federal Food, Drug, and Cosmetic Act, the Fair Packaging and Labeling Act, the Federal Meat Inspection Act, the Poultry Products Inspection Act, the Egg Products Inspection Act, the Federal Trade Commission Act, the Federal Alcohol Administration Act, and the Tariff Act" (Vanderveen 2000, 49). Therefore, having both the authority and the precedence of involvement, the US government can and should intervene into GMO policy making with the goal of ensuring food safety.

Policy 1

The first policy option is to require labeling of all products that contain GMOs. This would be utilizing the precaution principle, which errs on the side of caution when assessing harmful affects of new technology. As a new technology, there is no conclusive scientific evidence proving either harm or no harm from long-term consumption of GMO products in humans. The best example of this comes from the Flavr Savr tomato. This GMO tomato was supposed to stay riper longer, however when the Calgene researchers responsible for the development of the fruit, conducted a study on the transgenic tomato, "four out twenty female rats fed one of the two lines of transgenic tomato" and then "in the third study gross and microscopic lesions were found in the rats" (GHO). However, researchers continued to support the view that the tomatoes were safe for human consumption, pointing to procedural errors in the previous study. Despite the possible health risks the FDA approved the tomato for human consumption and it was put on the market. Which side was correct in this case is irrelevant. The point is that the evidence for harm of lack of harm was weak for both sides; nobody could prove anything. And consumers were completely unaware of this potential risk. It was this possibility of risk that prompted public outcry for labeling. The issue was not about "scientific evidence of safety but the consumer perception of safety" (Jukes 2000, 3). The common fear is that GMOs will become analogous to smoking, which at first was considered perfectly safe and later linked to cancer. Consumers feel that they cannot choose an item without "comparable information", like the kind nutrition labels provide (Jukes 2000, 2). This information gap is an example of a market failure and the government should intervene accordingly. Required labeling of all GMO products would provide consumers with

information to make a fair decision when purchasing food, and it will assuage consumer fears over unknowingly consuming a possibly harmful product.

Furthermore, there are allergen concerns. According to US National Surveys, 25%-30% of adults claim to have food allergies (Jukes 2000, 6). Data on actual prevalence of food allergies suggest only 1%-2% of adults and 5% of children younger than 4 have food allergies. This is still a substantial amount of people. It is important note that the aforementioned surveys refer to food allergies caused by a "heightened immunologic response" to certain foods like nuts or eggs (Jukes 2000, 6). These are life-threatening allergies that differ from non-immune mediated responses, and so it is a matter of life and death for those who suffer from immune mediated allergies to know what is in their food. This is because a person "allergic to a specific food can avoid the food when is in in pure form but may consume the food accidentally when it is an intentional or unintentional ingredient…death has resulted when an allergic component has been unknowingly consumer" (Jukes 2000, 6). For example, a hypothetical chip brand uses GMO corn. The presence of corn would be indicated on the chip label. However, let's say the GMO corn contains a gene from a nut. This would not be indicated on the nutrition label since it is part of the GMO corn. Now if someone with a severe nut allergy were to pick up the chips, check the ingredient label to ensure there are no nut products and look for the required may contain traces of nuts label, and finding no indication of nuts this customer buys and consumer the chip products. It is not out of the realm of possibility that they could have a life threatening allergic reaction to the chips due to the nut gene present in the corn. Again, there is a gap in consumer knowledge whereby they cannot make fair, safe and comparable choices between different foods. Required labeling would prevent against such scenarios.

Finally, there is widespread public support for labeling laws. According to a 2008 CBS/*New York Times* poll "87% believed that [GMOs] should be labeled (quoted in National Science and Engineering Indicators 2010). These results are not unique. Between 2001 and 2006 the Pew Initiative on Food and Biotechnology conducted a survey which found that only about one-fourth of U.S. consumers favored "the introduction of genetically modified foods into the U.S. food supply" (quoted in National Science and Engineering Indicators 2010). Furthermore, 44% of respondents "reported a negative reaction to the phrase 'genetically modified food" (quoted in National Science and Engineering Indicators 2010). Therefore, if a federal labeling bill were to be introduced, it would likely have large public support that could drive the bill forward.

However, in that same 2008 CBS/*New York Times* poll only 53% expected that is was 'not very likely' or 'not at all likely' that they would buy food that was labeled as GMO (quoted in National Science and Engineering Indicators 2010). In other words, there is widespread support for the labeling of GMOs even if in the end most Americans end up purchasing the GMO labeled product anyway. Do American's have a right no know that supersedes the economic repercussions such an act would have? Such regulations would affect monolithic companies who have very powerful interest groups. These interest groups would be staunchly opposed to regulations because of the economic burden they would impose on companies. For a company that controls 90% of the world's wheat supply, or example, such a change would be astronomically expensive because the entire production and shipping infrastructure would have to be rebuilt to separate GMO from non-GMO. Monsanto's litigation power is unquestionable after the series of cases they have brought against farmers in the past decade. It's likely that a required labeling bill

would meet massive opposition, as the one that the Senate voted down this May did, and would not pass.

Furthermore, if such a bill did pass, there would be First Amendment challenges by corporations being forces to label their products. Corporations are people and as such they have freedom of speech. Requiring mandatory labeling strips them of their constitutional right and gives them grounds for appeal. One case that dealt with this issue was *International Dairy v. Amestoy.* This case dealt with a 1994 statue passed by the state of Vermont which required milk that had been produced from cattle treated with rBST, a synthetic growth hormone approved by the FDA, to be labeled. The district court upheld the statue, basing its justification "on strong consumer interest and the public's right to know" (Amestoy 1996). This decision was appealed to the federal court. The appellants claimed that being required to label their product was a violation of their first amendment rights. The federal court found in favor of International Dairy, stating that "consumer interest" was not sufficient enough to "require manufacturers to disclose about their production methods" (Amestoy 1996). In effect, this decision stated that consumers do not have a right not know, at least not one that supersedes the first amendment rights of corporations. In light of current evidence about GMOs, it is entirely possible that the Supreme Court could rule against a labeling bill as a violation of corporations' First Amendment right. This would effectively crush all efforts to regulate and label GMOs because it would set the precedent that without conclusive data, corporations can produce GMOs as they please. This outcome would be extremely unfavorable to label supporters. This remains a possibility if labeling laws are implemented.

Additionally, requiring GMOs to be labeled would crush them in their infancy because it implies that something is wrong with GMOs. GMOs have the potential to solve many pressing world problems. For example, the Golden Rice Project is being used as a way to reduce mortality in developing countries (Golden Rice Project). Vitamin A deficiency is a problem in developing countries and can cause "marked incidence of blindness and susceptibility to disease, leading to an increased incidence of premature death of small children" (Golden Rice Project). Many of these societies are rice based, so introducing rice that has been genetically engineer to contain vitamin could save the lives of 25% of children could have been saved with this diet (Golden Rice Project). A mandatory labeling law would significantly reduce funds for research and there will be many lost opportunities.

Finally, even if such a law were passed and faced every challenge thrown at it, there would still be implementation and evaluation problems. Who will ensure that a non-GMO product is truly non-GMO? What are the consequences for failing to do so? Additionally, how will success be measured? The implementation of these regulations cannot be compared to smoking regulations because unlike smoking, there is no known health impact of GMOs. As a result, success cannot be measured in decreased cancer incidence, for example.

Policy 2

The second possible policy would be to make it illegal to require the labeling GMO foods. The benefits of this are that it would allow research to continue uninterrupted, would avoid First Amendment challenges, and it would satisfy powerful interest groups. This could be rationalized based on the lack of evidence indicating harm from GMO use.

However, it is likely that the backlash from such a policy would be enormous. Based upon the fact that Connecticut is currently the only state with GMO labeling laws, and similar laws have been shot down in different states across the country, it is fair to say that the GMO labeling proponents do not yet represent a clear majority in the voting segment. However, if a law were passed banning labels on GMO bills, it is possible that the GMO labeling proponents could sway a larger amount of supported to their side. They could boycott companies that are known to use GMOs. In fact, there is already a minority of Americans who boycott General Mills and Kellogg because of their use of GMOs. If a large enough amount of people boycott these companies, they will be harmed in the same way this policy was trying to prevent. It is possible that so many could oppose the bill that it would loose its legitimacy, forcing Congress to waste valuable time and resources to revisit the topic.

Additionally, this could have potentially disastrous effects on our foreign trade. If three countries temporarily banned imports of US wheat because of what happened in one farmer's field in Oregon, such a blanket federal statement supporting GMOs will most likely alienate countries like Japan and France, who have very strict GMO policies. The possible benefits from GMO research may not outweigh the economic implications.

Finally, if such a policy were to be passed, it would result in GMOs becoming irrevocably entrenched into our food supply. In the event that GMOs are found to be harmful, the US would be in a very difficult situation. It would have to overhaul the entire production, shipping and selling of certain crops, which would lead to shortages, and food price increases. That's assuming the non-GMO version of the product could even be produced. The US would become dependent on imports from other countries, and

countries that were dependent on US food exports would also suffer. It would be a disastrous economic and political situation.

Policy 3

The final policy option involves approving GMO containing products up to a certain percent of GMO with no labeling requirement. For example, not allowing any product on the market that contains more than 5% GMOs. This would require the creation of a government regulatory agency to approve each product that contains GMOs. This is not an unprecedented policy. In Japan, if food products "exceed 5 percent they must be labeled as 'GM Ingredients Used' or 'GM Ingredient Not Segregated'" (Non-GMO Report). They also provide Non-GM labels if the product falls below 5 percent but "the processor must be able to show that all non-GM ingredients were identity preserved from production through processing" (Non-GMO Report). The prosed policy is very similar to this, except it does not require labeling, due to the plethora of negative consequences this would bring, as previously detailed under Policy 1.

The biggest benefit to this policy is that it will force large companies to change their infrastructure to separate GMO from non-GMO, but they can do so at their own pace as they grow. This is more economically feasible than requiring sweeping and immediate changes to production and shipping. There are "direct costs of testing and segregation of GM products to comply with mandatory labeling requirements…[and] food shipment disruptions" that would result from forcing such an immediate infrastructure change (Merchant 2010, 53). This policy emulates the path taken by environmental regulations. For example, to reduce air pollution the EPA required CO2 filters to be placed in factory smokestacks. These filters could be attached to existing smokestacks and would reduce

CO2 emissions. Even though this wasn't as effective in reducing CO2 as completely redesigning the factories to reduce CO2 emissions, it allowed business owners to alter their existing structures to meet EPA regulations, without a massive structural change. Forcing all existing companies to change their factory construction would have resulted in a massive backlash and widespread bankruptcy for those who could not afford to upgrade. Creating this slow separation between non-GMO and GMO will prevent GMOs from become too entrenched into our food supply so that in the event evidence emerges indicating harm from consumption, a record will exist of which products contain which GMOs and in what percentages. The product could easily be removed from the market the same way a toy is recalled for newly discovered safety hazards.

Such a policy will also allow GMOs to become just entrenched enough that even the revelation of harm from a single GMO product would not be enough to crush the entire field of GMOs. This would allow research potential to be realized and to continue without the fear of sudden loss of funding. This could spur innovation in desperately needed areas, like biofuel.

This policy is also likely to satisfy foreign countries that are staunchly opposed to GMOs. It is very similar to Japan's policy, for example. In fact this policy may make it easier to trade with these countries because GMO will be strictly separated from non-GMO so there is little to no risk of a non-GMO product containing GMO. In other words, what happened in Oregon was the result of blurring lines between GMO production and non-GMO production. This policy will make companies accountable for this distinction and will result in fewer contaminations.

Finally, the creation of this government organization would shift the focus away from labeling requirements of GMOs to ensure consumer safety to finding products that were mistakenly approved because they contain too high of a percentage of GMO. The government organization proposed in this policy would handle such claims, and the act of consumers taking their grievances to this organization would give it legitimacy and power in deciding GMO matters. For example, the FDA regulates health claims, which is a stated "relationship between a food, food component, or dietary supplement ingredient, and reducing risk of a disease or health-related condition" (FDA, under "Claims That Can be Made for Conventional Foods and Dietary Supplements"). For example, in 2006 the FDA filed a letter of denial pertaining to the proposed link between green tea and reduced cardiovascular disease (FDA 2003, under Qualified Health Claims). Consumers trust the FDA's statements and report health claims that have not been approved by the FDA. This cements the FDA's power to settle these matters. The proposed government agency would act in the same way.

However, creating such a government organization would expensive, and it would be difficult to gather the needed expertise that accompanies GMOs. Additionally, this organization would have to decide which percentages are acceptable levels of GMO. This is extremely subjective, because in practice what is the difference between 5 percent GMO and 6 percent GMO? Furthermore, the organization would have to develop methods to evaluate the success of policy. This will also be very subject and also very difficult to measure. It could me measured in the amount of products approved, or in the amount of products not approved. Every different criterion used for evaluation will produce different levels of success.

Additionally, it is likely that those opposed to GMOs will be opposed to this bill because, in their view, it would not go far enough to ensure consumer safety. However, as previously mentioned, this group is not in the majority. This policy would likely we enough to satisfy the majority of Americans who are on the fence about GMO policies. As a result, the GMO labeling proponents would fade into the minority.

Recommended Option

The best option is policy 3. This is the best compromise between ensuring human health and not crushing a potentially beneficial technology. It takes the benefits from a labeling law while avoiding many of the pitfalls. Economically and politically it is also the most feasible solution. The third policy is not as expensive as mandatory labeling and won't have the serious economic repercussions, both domestic and foreign, that the other policies have.

The third policy is also the most amendable to change. This comes in two forms. It can change with newly revealed information pertaining to GMOs, for example if a particular GMO proves to be harmful, but it can also change during the legislative process so it would be more likely to survive and be implemented. For example, a compromise on the creation of the organization could be the creation of a tiered fee system based on the percentage of GMO each product has. This would allow companies some leeway in the amount of GMOs that are allowed to be in their products. The funds obtained from this could then be given back to states in the form of research on GMOs, or perhaps on science education for K-12 to foster future researchers and avoid the bias that comes from providing government funding to research a specific topic. Such a compromise would satisfy powerful interest groups and also Representatives.

An area of contention could be that such a policy removes the matter of choice from American hands. It would be a government decision about consumer safety without consumer input. However, our society is based on the Roman *Res Republica*, or thing of the people, in which the people elect a representative to speak for them. This is written in the Fourteenth Amendment of the US Constitution, "The House of Representatives shall be composed of members chosen every second year by the people of the several states" and in the Seventeenth Amendment, "The Senate of the United States shall be composed of two Senators from each State, elected by the people (US Constitution). Therefore, through electing their representatives, who will decide whether or not to pass this bill, the American people have effectively voted on this policy.

The creation of this government organization may seem to be a daunting task, but it is actually not so. Currently the US uses a "coordinated framework" to approve GMOs (Merchant 2010, 13). This involved distributing the "regulatory responsibility for the safety of biotechnology products among several federal agencies" (Merchant 2010, 13). The individuals spread across these different government organization would simply be united under one roof. This would reduce government redundancy and translate into a more efficient handling of GMO approval.

Finally, the creation of such an agency in response to a pressing social problem is not unprecedented. In the 1970s following the publication of Rachel Carson's *Silent Spring*, the environmental movement took hold in the US. A whole host of government organizations were created to meet the environmental crisis including the Council on Environmental Quality and Agency for Toxic Substance and Disease Registry. Like the environmental crises, the issue of GMOs is not going away. Instances like the one in

Oregon will continue to appear, and people will continually seek a solution, even if that solution isn't in the best interest of consumers in general or in the United States. The recommended policy allows us to face the GMO controversy with a proactive solution, not a reactive one.

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