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Consumer Attitudes and Policy Directions for GM Labeling and Pollen Drift Regulation: Evidence from the 2006 Vermonter Poll

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Given the uncertainty of the use of genetic engineering in production of genetically modified (GM) foods, it remains the subject of one of the most vitriolic scientific debates throughout the globe. Newer facets of the debate include regulation of GM seed labeling as well as liability pertaining to GM pollen spread to non-GM plants. This study analyzes Vermonter Poll data of 656 respondents for relationships between demographics and opinions about seed labeling and GM pollen drift legislation. Preliminary results demonstrate general trends that the majority of respondents are in support of labeling for GM seeds, and opine that the US government, GM seed producers and GM farmers should be held liable for GM pollen spread, but also reflect some incongruity in attitudes. The article concludes with a discussion of the implications of these results and how they can best inform policy formation regarding this controversial issue.

Key words: consumer opinions, GM pollen drift, GM seed labeling, legislation, survey.

Introduction

Genetic engineering emerged on the forefront of research and development in the 1990s, and is the subject of one of the most vitriolic scientific debates throughout the globe. Although production and sales of genetically modified (GM) food products began approximately a decade ago (GM soybean, corn and cotton became commercially available in 1996), there is still a fair amount of uncertainty and controversy regarding how they should be regulated (Ando & Khanna, 2000; Fernandez-Cornejo & Caswell, 2006; Huffman, 2004; Phillips & MacNeill, 2000). Two areas that have gained increasing attention are requirements for seed labeling and accountability for GM pollen drift (American Medical Association [AMA], 2000; Stewart & McLean, 2004).

Research is growing in the area of consumer attitudes towards labeling and regulation of GMOs (Einsiedel, 2000; Hallman, Gebden, Aquino, Cuite, & Lang, 2003; Hossain, Onyango, Schilling, Hallman, & Adelaja, 2003; Klintman, 2002), and this article seeks to add to this body of literature. This study investigates Vermonters' attitudes on how GMOs should be legislated and will offer policy recommendations for labeling and liability of GM seeds.

Background

While traditional plant breeding, which has been used in agricultural development for centuries, produces a variation in large undefined parts of the plant genome, genetic engineering allows the transfer of a defined or single number of genes in a much shorter amount of time (Schitler & Constable, 2002). In the last half of the 1990s, the presence of GMOs on farms has mushroomed: transgenic farming utilized 2.8 million hectares of global area in 1996 and rose to 67.7 million hectares in 2003 (Food and Agriculture Organization of the United Nations [FAO], 2004). While the debate about GM food does not appear to be resolved soon, its presence continues to grow in agricultural production in the US, with its farmers being the largest producers of GM crops worldwide and usage steadily increasing annually (Pew Initiative on Food and Biotechnology [Pew], 2005a). In 2004, GM soybeans comprised 85% of the total US soybean acreage, GM cotton was present on 76% of total cotton acreage, and cornfields contained 45% GM corn (Pew, 2005a). Shifting the discussion from whether GM foods should be permissible at all to the role of legislation in standardizing GM usage seems more aligned with the growing trend of GM presence in US agricultural fields.

An examination of international trends sheds light on the global implications of domestic promulgation. The variance in legislation worldwide is indicative of the conflicting ideas regarding GM regulation. There appears to be a growing number of consumers that do not wish to allow the market to be the sole determinant and regulator of GM use in food production. Currently, approximately 26 countries globally have either established or plan to institute policies pertaining to labeling

foods that contain GM ingredients; these policies vary drastically (Pew, 2005b; Phillips & McNeill, 2000). For example, US and Canada only mandate food labels when the composition, either nutritional or allergenic, has been modified through genetic engineering (GE), while all food and food components that are comprised of GE DNA/proteins of 0.9% tolerance level must be labeled in the European Union (EU) (Nielsen, Thierfelder, & Robinson, 2003).

The precautionary principle is cited as a major impetus for stringent food labeling, since many countries, particularly in the EU, include the risk of allergens and toxins, nutrient manipulation, loss of biodiversity, and unpredictable consequences as potential dangers of GM foods (Nielsen et al., 2003). On the other hand, the three federal agencies that oversee the use of transgenic organisms in the US—the United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), the Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA)—have deemed that there is no scientific basis to treat GM food differently from conventional food (Pew, 2005b). These regulation discrepancies create difficulty with international trading, and could potentially become quite contentious for the World Trade Organization (WTO). In fact, in 2003 the US government (which has exhibited a favorable acceptance of GMOs), in conjunction with the governments of Canada and Argentina, brought a formal complaint before the WTO, with the precept that EU mandatory labeling policies are hurting exports of food products (Vogel, 2003). In 2006, the WTO ruled that the EU regulations that require labeling are inconsistent with its WTO obligations under numerous WTO Articles (WTO, 2007). The EU is in the process of establishing timeframes in order to adjust its policies in accordance with WTO rules (WTO, 2007). The EU is still looking into how to integrate some of their labeling laws with the WTO policies.

While the food label debate continues, another generation of the dispute has emerged: GM seed labeling. Internationally, directives vary concerning GM *seed* labeling and are usually concordant with the guidelines for GM *food* labeling. In the EU, for example, GM seeds are required to be clearly cataloged, although GM foods comprise a very small minority of total crops grown on the continent (Carter & Gruère, 2005). Conversely, consistent with voluntary food labeling, there are no national US regulations mandating GM seeds be labeled for sale. However, due to growing concern over the possibility and consequences of GM and non-GM seeds mingling, dialogue has increased regarding potential regulations to provide information about seed origins in the US. In 2004, Vermont took one of the first steps nationally by passing a law that requires all GM seeds sold in the state to be labeled and registered (Pavolka, 2004).

Another aspect of the GM debate concerns implications of GM pollen drift. Pollen drift takes place when the pollen (and, subsequently, genes) of one plant is transported, via wind, water, sun, or pollinators such as honey bees, to another plant (Dafni, Kevan, & Husband, 2005). Although pollen drift often occurs in nature and plants have been swapping genes for centuries, it has become a matter of concern in the GM/non-GM crop debate because this type of genetic transfer can lead to "introduction into ecosystems of genes that confer novel fitness-related traits…[and] also allows novel genes to be introduced into many diverse types of crops, each with its own specific potential to outcross" (Snow, 2002, p. 542). Results from this could range from minor to catastrophic and could potentially have major impacts on (a) agriculture, such as the elimination of non-GM seeds from the seed stock; (b) health, if mingling occurs unwitting ingestion of allergens could transpire, and; (c) the economy, since there may be fiscal or legal liabilities associated with selling incorrectly labeled products.

Research demonstrates that pollen drift from GM to non-GM crops is most threatening in close proximity, with distances varying according to the plant type. Eastham and Sweet (2002) detail and add to several studies that examine the possible risk of pollen drift on six major crop types: oilseed rape, sugar beet, potatoes, maize, wheat, and barley. The results illustrate that there are variable risk levels in gene flow, dependent on crop type due to "its own distinctive characteristics of pollen production, dispersal and potential outcrossing" (p. 7). For example, the authors found that oilseed rape has a high potential for gene transfer, in both crop-to-crop gene transfer and from crop to its wild relatives. Maize was characterized as medium to high-risk, since research exhibits that pollen drift can occur to distances further than 200 meters. Root crops, on the other hand, are harvested before flowering, which essentially eliminates the risk of pollen spread (but bolted plants may cause pollen transfer). In general, self-pollinated crops, such as wheat, rice, and soybeans, face minimal risk of drift, while the pollen of open-pollinated plants, such as corn and sorghum, drifts much further (Belcher, Nolan, & Phillips, 2005; Huffman, 2004; Wilson & Dahl, 2002).

Research suggests that some of this risk can be mitigated through the construction of physical barriers, such

as buffer strips, as well as physiological manipulations, such as staggering pollination dates (Hucl & Matus-Cadiz, 2001; Huffman, 2004). These measures, however, may sometimes prove to be not entirely effective, as some studies indicate that pollen drift can occur even beyond the recommended buffer zones (Luna et al., 2001). In fact, Altieri (2005) argues that coexistence between transgenic and non-GM crops is not possible due to gene flow, even when the aforementioned measures are taken, and warns that mingling can lead to permanent damage to the purity of non-GM seeds and the domination of GM crops.

However, not all research concurs that GM crops could pose a threat to non-GM crops. Funk, Wenzel, and Schwartz (2006) found that from two year-long test periods of oilseed rape pollen drift, "transgenic contaminations cannot be reliably detected at distances greater than 30 m" (p. 33). The research concurs with previous studies that show one of the main reasons for this small area of dispersal is that bees, the main pollinator, will remain close to the source to deposit pollen (Thomson & Thomson, 1989; Cresswell, 1994). Moon, Halfhill, Hudson, Millwood, and Stewart (2006) also demonstrated short wind dispersal rates for oilseed rape in both greenhouse and field settings. Lefol, Danielou, and Darmency (1996) found that there was very little risk of gene escape between overlapping oilseed rape and wild mustard transgenic to wild species. Moreover, Wraight, Rangerl, Carroll, and Berenbaum (2000) refuted Losey, Rayor, and Carter's (1999) earlier well-known research on GM corn pollen (which was found to cause higher mortality rates in monarch butterflies) with their results that found that GM Bt corn pollen was not fatal for the instar black swallowtail, indicating that potential nontarget effects of GM crops may be controllable.

However, the Union of Concerned Scientists, in their 2004 report, concluded that "seeds of traditional varieties of corn, soybeans, and canola are pervasively contaminated with low levels of DNA sequences derived from the transgenic varieties" (p.1); this contamination can occur through physical mixing and outcrossing. These differences in findings indicate the lack of agreement in scientific evidence and perhaps the need for a more formal legislative framework.

In 1987 the Coordinated Framework for Regulation of Biotechnology was passed jointly by the aforementioned US agencies to establish guidelines for all aspects pertaining to biotechnology, including the labeling, experimenting, and sales and distribution of GM products (US Department of State [USDS], 2005). To date, these remain only guidelines, and there are no explicit laws that address issues relating to GM pollen drift or liability for such an occurrence (US Regulatory Agencies Unified Biotechnology [USRAUB], 2006). In fact, the issue of liability has been of much concern for farmers and seed manufacturers (Smyth, Khachatourians, & Phillips, 2002). There has been much recent debate about whether gene flow from GM plants should generate liability, by ascribing blame or responsibility to this occurrence. Specifically, GM seed manufacturers or farmers who grow GM crops should be held responsible for any genetic modification and/or pollen drift that subsequently alters non-GM crops.

This debate has been on the forefront abroad, with many discussions in the EU and countries, such as Australia, centering on how to legislate such liability (Beckmann, Soregaroli, & Wesseler, 2006; Dalton, Jones, & Maxwell, 2003). Taking a slightly different angle, Maine legislators are debating a bill that would hold manufacturers of GM seeds liable for any product spread to non-GM crops (Kim, 2007). In Vermont in May of 2006, a compromise version of the Farmer Protection Act was passed in the state senate that allows farmers to pursue a nuisance lawsuit against GE seed manufactures if reasonableness and substantiality are proven. However, Governor Douglass vetoed the bill on May 15, 2006, despite a widespread showing of support for it (Martin, 2006).

Perhaps due to this continued controversy, the fact that scientists disagree on their impacts and survey question wording, consumer attitudes about GMOs in the US are by no means uniform (Hallman et al., 2003; Klintman, 2002; Kolodinsky, Desisto, & Narsana, 2004). As a result, both attitudes and how to regulate them became polarized in the US. A survey conducted by the Pew Initiative on Food and Biotechnology (2005a) reveals that although there is some consumer trepidation over GM foods, consumers would support a more active role on the part of regulators to ensure safety over outright interdiction of GM products. The national study conducted by Hallman et al. (2003) not only demonstrates a slight decline in consumer acceptance of GM foods from 2001 to 2003, but also that contradicting opinions of GM food prevail. Thus, further research is needed to understand to what extent regulations should guide GM food usage, as well as how legislation could most reflect consumer attitudes toward liability when problems arise with GM foods. This study seeks to add to this emerging field by exploring consumer attitudes regarding labeling policies and liability of GM food products, and aims to illustrate relationships between respondent demographics and opinions about

GM regulations in the state of Vermont in order to gain insight into demographic factors on consumer perceptions.

Some of Vermont's policies have set national precedence. Vermont has a history of being on the forefront of cutting-edge jurisprudence, such as being the first state to abolish slavery in 1777, to legalizing civil unions for same-sex marriages. This is particularly true in the environment and agricultural realm: in 1970, Act 250 was passed, which created a wide-ranging land-use permitting system that requires developers and landowners to apply to a local District Environmental Commission and go through a public hearing process in order to "protect the environment; balance development with local, regional, and state issues, and; to provide a forum for neighbors, municipalities, and other interest groups to voice their concerns" (Safran, 2005). Since its inception, Act 250 has led to the preservation of thousands of acres of agricultural land and has fomented the state's rural landscape. Ergo, consumer attitudes in this agriculturally-important land can inform research beyond its borders.

Methodology

This study is based on the 2006 Vermonter Poll, which was conducted by the University of Vermont's Center for Rural Studies. The phone survey used Computer Assisted Telephone Interviewing (CATI) software to contact respondents through random digit dialing in February 2006, from the hours of 4 pm to 9 pm. The survey asked Vermont residents aged 18 years and older questions pertaining to demographics, public policy, and various social issues in the state.

Survey response analysis employed the Statistical Package for Social Scientists (SPSS) version 12. Primarily chi-square, t-, and lambda tests were performed and results reported at the 95% confidence level or greater. For this study, GMOs are defined as a form of biotechnology where scientists selectively and deliberatively move genes from one organism (like a plant, animal, or micro-organism) to a different type of organism in order to achieve certain desired characteristics that would not occur in nature or traditional breeding. The data were coded and analyzed to assess general trends and relationships between age, income, educational attainment, family composition, and where they live in Vermont (rural, suburban, and urban) and opinions on GMOs, labeling policies, and who should bear responsibility of unwanted consequences of GM pollen drift.

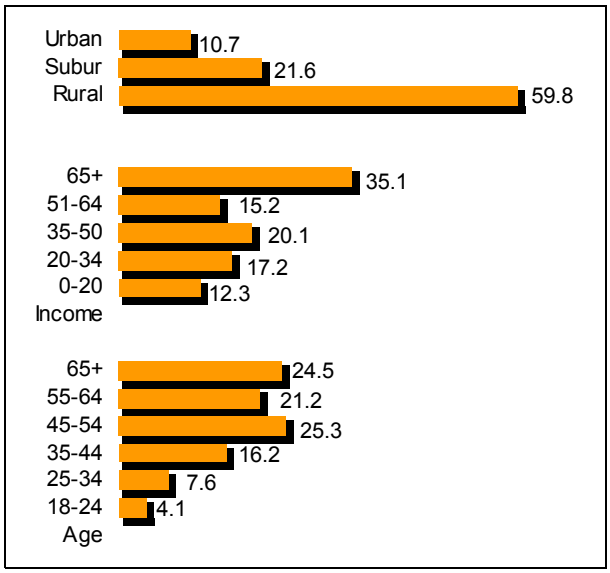

Figure 1. Demographic information (in percentages) (*n*=656).

The statistically representative sample (at the 95% level of confidence) was comprised of 656 Vermonters, of which 43.6% were male and 56.4% were female. The youngest respondent was aged 18, the oldest 92; the mean age of the respondents was 53. The median household income category of the respondents was between $50,001 and $65,000, while the median education level was an associates or technical degree, with 42.8% holding a bachelor's degree or above. Two-thirds of the respondents had no children under the age of 18 in their household.

Analysis and Results

Initial data analysis explored Vermonters' interest in the topic of GMOs, with questions ranging from gathering information on GMOs, the use of GMOs in food, and several questions pertaining to labeling and liability with spreading GM seeds. Care was given to word the questions as neutrally as possible, as researchers aver that opinions toward GM foods are sensitive to word choice (Hallman et al., 2003; Kolodinsky et al., 2004). Vermonters do have an interest in finding out about GMOs, as 58.8% either actively seek information or pay attention to information on GMOs, while 27.3% do not pay attention and 13.8% have not heard or seen information on GMOs. Overall, 58.8% of Vermonters are, to some degree, opposed to the use of GMOs in commercially available food products; 30.2% are neutral, and 11% are supportive on some level. However, this resis-

Table 1. Opinions regarding liability for GM pollen drift to organic crops (*n*=656).

	Vermont government	US government	GM farmer	Organic farmer
	% of respondents			
Yes	48.6	54.4	64.5	19.0
No	51.4	45.6	35.5	81.0
Total	100.0	100.0	100.0	100.0

tance did not drive opinion on prohibition, as less than half of respondents (45.6%) thought that GM seeds should be banned. But this opposition may impel desire for information, since 87% of the respondents expressed some degree of support of labeling GM seed for farmers.

Opinions varied on who should bear legal liability for the unintentional spread of pollen from GM crops to organic farms growing non-GM crops. Vermonters were in most agreement that that the company selling GM seeds should be held liable for spreading GM pollen to organic non-GM crops (72.4%), as well as farmers using GM seeds (64.5%). There was also a strong consensus that organic farmers should not bear liability for GM seed spread (81%). Respondents viewed government as a culpable party, with type of government mattering: more than half the respondents (54.4%) agreed that the US government (specifically the US Department of Agriculture [USDA]) should bear legal liability for the spreading of GM pollen to organic, non-GM crops, while a little more than half (51.4%) did not think that the Vermont government (the Agency of Agriculture-VTAA) should bear liability.

The analysis explored relationships between opinions and demographic characteristics (age, gender, income, education, family composition, and where they live in VT). Several significant relationships pertaining to income were discovered. Income is significantly related to interest for information on GMOs—those who make more than $50,000 are more likely to seek information about GMOs or pay attention if information catches their eye (61.9%) than those in categories of $50,000 or less (56.41%, significance level $\leq$ .01). Additionally, those in the lower-income categories were twice as likely to have not heard or seen information about GMOs: 18.68% as compared to 9% of those who make $50,000+, sig. level $\leq$ .01.

Income is also associated with views on government responsibility. Those in lower income categories are more likely to think that the state (56.8%) or federal government (63.41%) should bear responsibility for GM pollen drift than those in income categories above

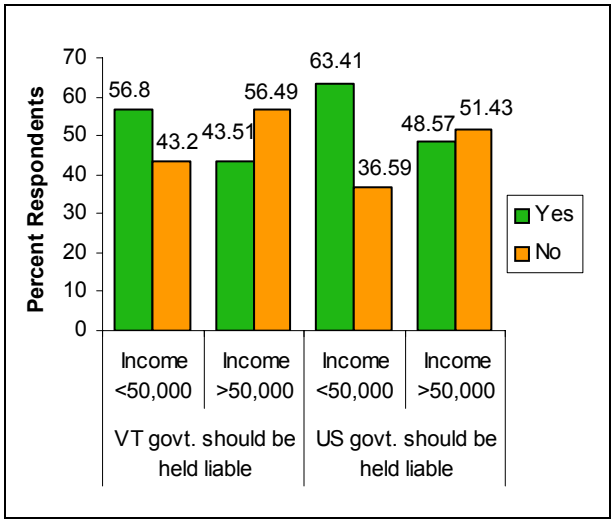

Figure 2. Income and opinions on government responsibility for GM pollen spread (*n*=445, sig. level $\leq$ .05), (*n*=450, sig. level $\leq$ .05).

$50,000 (43.51% VT government and 48.57% federal government; sig. levels $\leq$ .05). Those with a lower income also more strongly opine that the company selling GM seeds should be held liable for GM pollen spread (78.85%) than those with a higher income (67.63%, sig. level $\leq$ .05). There was general agreement across income categories that organic farmers should not be held responsible for the spread of GM pollen to organic crops (87.11% of those in income >$50,000 and 74.34% with incomes of > $50,000; sig. level $\leq$ .01).

Gender also bears import regarding opinions about GMOs. Females tend to be more wary of GMO use in food products, as 65% of the females (in comparison to 51.2% of the males) expressed some level of opposition to the use of GMOs in food products (sig. level $\leq$ .01). Females are also more likely to ascribe liability to the US or Vermont government for the spread of GM pollen to organic, non-GM crops—59.6% of the females thought that the US government should bear legal liability, compared to 47.9% of the males (sig. level $\leq$ .01). Moreover, 54.8% of the females expressed that the Vermont state government should be held liable for GM pollen spread, while only 41% of the males expressed that opinion (sig. level $\leq$ .01). Females (50.8%) were also more likely than males (39.4%) to favor banning the use of GM seeds (sig. level $\leq$ .05). These findings correspond with previous studies that indicate females, who are usually the primary care-giver, are more cautious and less adverse to risk (Davidson & Freudenberg, 1996; Knight, 2006).

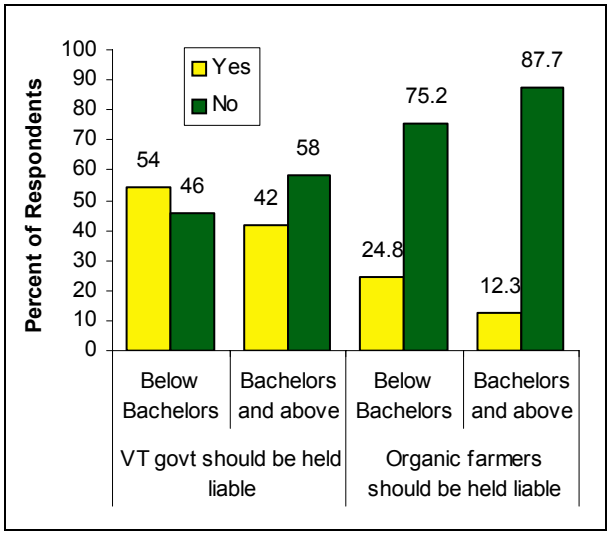

Figure 3. Education level and opinions on who should be held liable for spreading of GM pollen (*n*=484, sig. level ≤ .01), (*n*=521, sig. level ≤ .01).

Educational level is also significantly related to information about GMOs and some opinions about liability for spread of GM pollen. Those respondents with a bachelors degree or above are more likely to seek information out or pay attention to information about GMOs (71.7% as compared to 49.9% with less than a bachelors degree; sig. level ≤ .01). More than half of those with a bachelors degree or above (58%) do not feel that the state of Vermont should be held liable for the spread of GM pollen, while more than half of those with less than a bachelors degree (54%) feel that Vermont *should* be liable (sig. level ≤ .01). Additionally, more respondents with a bachelors degree and above (87.7%) than those with less education (75.2%, sig. level ≤ .01) thought that organic farmers should not be held responsible.

The number of years residing in Vermont was also significant for support of labeling GM seeds (sig. level ≤ .10) as well as seeking information about GMOs (sig. level ≤ .01). Family size was significant for opinions about government liability, both Vermont (sig. level ≤ .10) and US government (sig. level ≤ .05).

It is important to note where relationships were *not* found. Although there were relationships found between where a person lives in Vermont and if they think GM seeds should be banned (sig. level ≤ .05), there was no significant relationship between whether a respondent lives in a rural, urban, or suburban area and opinions related to GMOs and the aspects of legal liability. Age also did not bear significance for opinions on factors about GMOs and legal liability. Moreover, how many people under the age of 18 living in the house did not play an important role in any of the opinions about GMOs. While the majority of total respondents (72.4%) thought that the company producing GM seeds should be held liable, there were no significant trends across demographic characteristics related to that opinion. Furthermore, although the majority of Vermonters (64.5%) felt that GM farmers should bear the responsibility of GM pollen spread, there was no significant correlation with either educational attainment or income levels, demonstrating a general trend of attitudes among the population that cuts across demographic lines.

Conclusions and Recommendations

Results of this study illuminate some important information on this issue. More than half of the respondents are to some degree opposed to the use of GMOs in commercially available food (58.8%), and, correspondingly, the vast majority of Vermonters (86.3%) were in support of labeling GM seeds. This corresponds with earlier national studies, such as the Center for Science in the Public Interest's 2001 poll that indicates 70% of Americans think there should be GM food labels. In 2000, the Angus Reid Group found an increase in the percentage of negative attitudes towards GM products in consumers, from approximately 45% in 1998 to 51% (Winters, 2000). Furthermore, Hallman et al. (2003) found that 89% of respondents would like some type of GM food labeling. This demonstrates that consumers would like to have more knowledge about the origin of their foods, which is not currently mandated by federal legislation. More half of those surveyed in the Vermonter Poll believed that the US government, GM seed producers, and GM farmers should be held liable for GM pollen spread, reflecting the need to establish further standards and regulation of GM farming.

Gender, income, and education seemed to be most closely related with attitudes on GMOs and liability. The higher a respondents' income or education, the more likely they were to seek out information on GMOs. They were also likely not to ascribe liability to the US or Vermont government for the spread of GM pollen to organic crops. Those with higher education levels (bachelors or more) did *not* tend to think that the Vermont government should be held liable for pollen spread, while those with less than a bachelors degree expressed that the VT government should be held liable. Moreover, females tended to harbor more cautious attitudes towards GMOs, and thought that both the Vermont and US governments should bear responsibility for

spreading GM pollen. They were also more strongly in favor of banning GMOs in food products. While overall Vermonters felt that GM seed producers and GM farmers should be held liable for the spread of GM pollen, in the end no clear culpable party to bear liability for the spread of GM pollen was identified across demographic lines.

The majority of Vermonters *do* think that specific parties—the USDA, GM seed producers, and GM farmers—should bear liability for pollen spread, yet opinions varied across gender, income, and education lines, as mentioned above. Further, there were not very strong trends across several demographic characteristics (such as age and household composition); these results demonstrate that although there is a general trend toward regulating GM usage, there is also ambivalence regarding opinions about GMOs, responsible entities, and liability.

What do these results mean for policy direction in Vermont and, possibly, nationally? Many of the findings here correspond with other studies that indicate consumer uncertainty about GM presence in foods (Hallman et al., 2003; Klintman, 2002; Pew, 2005a). These results suggest a consumer desire for regulation to allow for further knowledge about GM presence in foods. The state of Vermont has taken the first steps to make labeling for GM seeds mandatory, which is aligned with the overall attitude of Vermonters. However, the results suggest differences of opinions across demographics regarding which parties should be held liable for the spread of GM pollen, highlighting that further research that continues to explore relationships pertaining to attitudes and demographics is an important next step to inform policy as well as to obtain support for new legislation nationally. This legislation would also have international implications, as food trade is heavily influenced by policies abroad.

A reasonable step for Vermont would be to craft a legislative framework that delineates regulation and enforcement mechanisms which focus on the parties that were most identified by respondents as being responsible for GM pollen spread: GM seed producers, GM farmers, and the USDA. In this study, it was clear that the organic farmer should not be held liable, and the GM seed-manufacturer and the GM farmer should bear the brunt of the responsibility and liability for GM pollen drift. Legislation of this type corresponds well with the GM seed labeling requirement, as farmers could not claim that they were unaware of the presence of GM materials in purchased seeds. Nationally, more research would have to be conducted before taking further steps.

Given that some of the respondents' opinions and attitudes were incongruous, it is evident that consumers are not receiving clear messages regarding GMOs; consider Greenpeace's *FrankenFood* campaign compared to the Golden Rice Project's promotion of GM foods (see greenpeace.org and goldenrice.org for more information). They are also not making across-the-board judgments about this multifaceted issue, as Fischoff and Fischoff (2001) note. Thus, any regulatory effort should be coupled with a statewide educational and information-gathering campaign, to ascertain and refine the public's understanding of this complex topic. GMOs could be addressed in public service announcements as well as community and town meetings, at which all parties could give input to shape the policy framework. Since much of the discord potentially lies within the farming community, this population should be specifically addressed in workshops and forums, including both organic and GM farmers. Further, utilizing the University of Vermont's Extension Department, which has regular contact with the aforementioned populations, would serve well to continue the GM dialogue in order to draft reasonable legislation that best reflects opinions of Vermonters.

Results of the jurisprudence passed in Vermont, which has already taken the first step in regulation, could be considered for broader application across the country. Although the use of biotechnology is supported by the US government, as evidenced by its voluntary labeling scheme and aggressive tactics to promote it in international trade, it may not accurately reflect the will of its citizens. The trends in this study and others, such as Hallman et al. (2003), suggest that consumers would like more information to make decisions about GMOs, and establishing a legislative structure that promotes this preference would bring the government more in concert with public opinion. However, one cannot assume that mandatory labeling would decrease the purchasing of GMO foods. In a national survey, Hallman et al. found that more information does not necessarily lead to disapproval of GM foods, and that the general ambivalence regarding GMOs in the public clearly indicates that the public has not yet made up its mind about this issue. Allowing more information, coupled with informational campaigns, would endorse a more informed public to make educated decisions about this multifarious and contentious issue. Establishing firmer legislation regarding the liability of GM foods would also allow for protection of both GM and non-GM food products.

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