Full Length Research Paper

Perceptions and attitudes of geography teachers to biotechnology: A study focusing on genetically modified (GM) foods

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This study reports the perceptions and attitudes of geography teachers towards biotechnology and genetically-modified (GM) foods in Turkey. A survey was conducted with secondary school geography teachers attending teacher workshops in various parts of the country in 2008 and was responded to by 78 teachers from 31 different provinces. The study not only revealed important results about the perceptions of geography teachers towards biotechnology and GM foods but also provided an understanding of the current perceptions of the public towards these two fields in the country. The study revealed that teachers did not have enough information about biotechnology and GM foods. This lack of knowledge played an important role in determining teachers' perceptions and attitudes towards these two fields. The majority of teachers supported the use of biotechnology for disease treatment and medicine production. However, their support declined very sharply with regard to cloning human cells, producing GM foods, and cloning animals. General attitudes of teachers to GM foods were mainly negative. The majority of teachers thought that GM foods were risky for human health and the environment. This negative attitude of teachers towards GM foods is likely to continue until the public becomes better informed about biotechnological applications and the positive outcomes of producing GM foods.

Key words: Biotechnology, GM foods, perceptions, attitudes, geography education, Turkey.

INTRODUCTION

The world has witnessed rapid technological innovations and developments in the first quarter of the 21st century. Biotechnology is one field in which significant technological developments affect the whole of humanity today in terms of economic, social, political, and environmental consequences. Biotechnology was defined by the United Nations (1992) as any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. According to this definition human beings have been utilizing biotechnology for thousands of years. Crops whose genetics have been altered through breeding with other plants and by introducing them to new geographies are the only one example of the utilization of biotechnology. In the past biotechnology was primarily used for protecting crops from disease and harmful insects but its use has spread to many different areas especially over the last two decades. Current research in biotechnology

focuses mainly on health, industry, the environment, and agriculture. Due to the effects on public health genetically-modified foods (GM foods) have become the subject of ongoing biotechnological research public debate.

GM foods contain genes that are inserted artificially as opposed to being acquired through sexual means (Felicia, 2004). A modified gene or a gene from another organism is inserted under laboratory conditions, and as a consequence the genetic characteristics of the food are modified. GM foods first went on sale on a wide scale in the early 1990s (Felicia, 2004). Rot-resistant tomatoes were the first commercially grown GM food (Martineau, 2001). Following these, other GM foods such as soybean, corn, cotton, potatoes, and sugar beet became available at markets as well as some other products such as vegetarian cheese (Durant et al., 1998). The US was among the first countries where GM foods were grown.

Soybeans were first grown in the US in the early 1990s (Hoban, 1999). In 1999 40% of corn, 50% of cotton, and 45% of soybean acres planted were genetically modified in the US. In the same year at least 60% of food products in US supermarkets were genetically modified (Beachy, 1999). The percentage of genetically-modified crops which were planted in the US in 2006 was 61% for corn, 83% for cotton, and 89% for soybeans (USDA, 2006), nor was the spread of GM foods slower in many other parts of the world. The total area planted with GM crops increased rapidly from 2 million ha in 1996 to 68 million ha in 2003. The main producer was the US with 66%, followed by Argentina (23%) and Canada (6%) in 2003 (Purchase, 2005).

While the use of GM foods is increasing very rapidly around the world, an intense debate is going on over them (Varzakasa et al., 2007; Saher et al., 2006; Durant et al., 1998). Two different views can be identified upon observing the debate closely. The proponents of the first view hold that since the world population and the consequent need for food is expanding rapidly GM foods may be a solution to hunger both today and in the future (Purchase, 2005). The positive outcomes of the application of GM foods to date are used as significant evidence by the proponents of this view. The successes of genetic engineering in improving crop yield, increasing resistance of crops to environmental stresses, improving the taste and appearance of food, increasing the nutritional quailties of foods, and reducing the dependence of food on fertilizers and pesticides strengthen the view of those who think that the use of GM foods and investment in this field should be supported. The supporters of the second view, however, hold that there is enough food in the world and the hunger which is seen in different parts of the world today is not a result of lack of production but rather arises from problems in food distribution and politics. They hold that foods which have been derived from genetically-modified organisms carry risks for both human health and the environment (Varzakasa, 2007; Saher, 2006; Gaskell et al., 2000; Durant et al., 1998).

The perceptions and attitudes of the public to GM foods is a significant factor affecting the amount of GM food production and consumption in different countries around the world. According to Purchase (2005), public perceptions and attitudes about emerging biosciences and other new technologies are among the most important factors determining the likelihood of successful development and implementation of technology. At a committee of the European parliament in July 2001 discussing a common basis for European Community rules on biotechnology, public acceptance was emphasized as a requirement to introduce a new technology (Gaskel and Bauer, 2001). Production and consumption of GM foods are governed very differently in the US and the European Union. Many different varieties of GM foods have been produced in the US while a few varieties have been approved in the EU (Jackson, and Anderson, 2005). This is due to the fact that people in the US think more positively about GM

foods while attitudes of Europeans to GM foods are more negative despite their positive view of science and technology (Purchase, 2005; Gaskell et al., 2003; Hoban, 1999). As a result of this negative attitude the importation of many GM crops, including Bt maize, were banned in European countries like Austria, Italy and Luxembourg (Grabner et al., 2001). It was in 2004 that the self-imposed moratorium on importing GM food within Europe was lifted (Spence and Townsend, 2006) and increase in public awareness towards GM foods played an important role in this change. As it can be seen from these historical examples, understanding the perception and attitudes of the public towards GM foods is crucial for policy makers and biotechnology companies.

Many studies have been conducted to examine the perceptions and attitudes of public to biotechnology and GM foods in different countries over the last 15 years (Tenbülta et al., 2008; Februhartanty et al., 2007; Spence and Townsend, 2006; Huang et al., 2006; Qin and Brown, 2006; Jackson, and Anderson, 2005; James and Burton, 2003; Cook et al., 2002; Morris and Adleyb, 2001; Macer and Chen, 2000). The results of these studies reveal that the perception and attitudes of public to GM foods differ not only from country to country but also from time to time even within the same country. The result of the Eurobarometer study, conducted in Europe, indicated that the majority of European countries do not support GM foods (Gaskell et al., 2003). Other studies revealed that public attitudes toward GM foods in New Zealand, Indonesia, China and Japan have been found to be reasonably favorable in comparison to other countries, especially the US and European countries (Februhartanty et al., 2007; Huang et al., 2006; Cook et al., 2002; Macer and Chen, 2000). The studies indicate that the perceptions and attitudes of public to GM foods change according to a number of different factors. Informing public about GM foods and the risks they carry is the most important of these factors. The perception of public changes positively toward GM foods if they learn that the consumption of GM foods is healthy and does not entail any risk (Purchase, 2005; Hoban, 1998). According to Tenbülta et al. (2008) public trust in science, government, and biotechnology companies is also another factor changing the perceptions and attitudes of public to GM foods. Ethics, the role of the media, the type of genetic modification, and some demographic attributes of public, such as age, education and socio-economic characteristics, have been indicated as factors determining the perceptions of public to GM foods in other studies (Hoban, 1998; Cook et al., 2002; Tenbülta et al., 2008; James and Burton 2003; Huang et al., 2006).

Public awareness is the key factor in determining whether the consumption of GM foods will increase and investment in the field of GM foods will be supported by governments. Educational institutions play a significant role in the generation of awareness about biotechnology and GM foods. The role of teachers is of great importance in equipping students with knowledge about biotechnology

Table 1. What do teachers think about different types of technologies?

Ideas	Types of Technology n= 78						
	Computer and Information	Communication	Space Studies	Internet	Biotechnology	Solar Energy	Nano-technology
It will improve our way of life positively	74	65	27	47	44	53	46
It will not have any important effect on life	2	10	41	8	23	23	29
It will deteriorate the situation we are in right now	2	3	10	23	11	2	3

Note: The numbers indicate how many times each idea was expressed by teachers for each type of technology.

and GM foods. Official attitudes towards GM foods are not reflected in secondary school curriculums in many countries due to the fact that studies and risk assessments in the use of GM foods give very contradictory results. The consumption of organic crops is promulgated in some secondary school curriculums. However, curriculums do not include an answer as to whether GM foods are definitely risk-free or not. Hence, teachers' perceptions and attitudes to GM foods are very significant as these directly affect students' perceptions and attitude. Various studies have been conducted so far to determine attitudes of tertiary students pursuing different majors towards biotechnology and GM foods (Massarani, 2005; Michael and Heaseon, 2003; Dawson and Schibeci, 2003; Priest, 2000; Gunter et al., 1998). The aim of this study, however, was to determine the perceptions and attitudes of secondary school geography teachers towards biotechnology and GM foods in Turkey. The study also aimed at determining if teachers incorporate the topic of GM foods into their geography lessons and if they recommend the consumption of GM foods to their students.

METHOD

A survey form was used in the study to determine the perceptions and attitudes of geography teachers to biotechnology and GM foods. Twenty-one questions were asked in the survey form in three different sections. The first section consisted of questions relating to personal characteristics and work experiences of teachers. The second section consisted of questions relating to biotechnology while the third section consisted of questions relating to GM foods. The majority of the questions in the survey form were yes/no or multiple choice in type. Four questions were based on a Likert scale and only two open-ended questions were included in the survey. The survey was conducted in Turkey with secondary school geography teachers in 2008. Around 200 survey forms were mailed to teacher workshops which were organized for secondary school geography teachers in various parts of the country in 2008. Frequency analysis was the main method used to evaluate the results of the study.

RESULTS AND DISCUSSION

The survey was responded to by 78 secondary school

geography teachers from 31 different provinces of Turkey. 74% of the teachers who responded to the survey were male. The majority of the teachers (55%) were between 28-35 years of age. The age of 26% of the teachers was between 36-43 years while those between 20-27 years accounted for 15% of the total. Only 4% of the teachers indicated that they were over 44 years old. 55% of the teachers indicated that they had over 10 years of work experience in geography education. Only 5% had over 20 years of work experience. 18% of the teachers had work experience of between 1-4 years and 27% had work experience of between 5-9 years.

The teachers were asked whether they had heard the word biotechnology before. 96% of the teachers answered this question positively. Only three teachers indicated that they had not heard the word before. The teachers were also asked if they knew enough about applications of biotechnology. 18% of the teachers said that they did not have any idea about its applications while 64% of the teachers indicated that they knew a little about it. 17% of the teachers, however, indicated that they knew enough about the possible risks of using biotechnology. Only 1 teacher said that he was well-informed about biotechnology and its applications.

In the survey the teachers were presented with a table of seven types of technology and asked how each of the seven technologies will affect mankind within the next 30 years (Table 1). As seen in Table 1, the majority of the teachers (74 and 65 teachers) said that computer and information technologies and communication technologies will improve our way of life positively in the future. The number of teachers who thought that biotechnology will improve our way of life positively in the future was 44 out of 78. Geography teachers rated biotechnology as the sixth most important technology among the seven given types (Table 1).

In another question teachers were presented with four ideas about five different application areas of biotechnology and asked to choose one of the ideas for each application area (Table 2). The results shown in Table 2 revealed that teachers had different attitudes towards different application areas of biotechnology. The majority

Table 2. Teachers' opinions about application areas of biotechnology.

Application areas of biotechnology	Ideas	Response (%) n=78				
		AS	A	N	D	DS
Disease Treatment	It is useful for society	57	37	5	1	-
	It is risky for society	3	33	30	33	1
	It is ethically acceptable	18	53	19	10	-
	Further research should be supported	50	42	5	3	-
Medicine Production	It is useful for society	50	36	6	5	3
	It is risky for society	6	22	24	42	6
	It is ethically acceptable	19	56	19	5	1
	Further research should be supported	52	38	4	5	1
Cloning Human Cells	It is useful for society	17	22	9	26	26
	It is risky for society	40	33	17	9	1
	It is ethically acceptable	6	19	19	23	33
	Further research should be supported	12	26	15	21	26
Producing genetically modified foods and crops	It is useful for society	12	18	19	33	18
	It is risky for society	41	31	15	12	1
	It is ethically acceptable	3	27	21	36	13
	Further research should be supported	12	24	15	31	18
Cloning animals	It is useful for society	8	22	22	30	18
	It is risky for society	32	36	22	10	-
	It is ethically acceptable	4	17	23	37	19
	Further research should be supported	10	22	15	32	21

Note: Agree Strongly (AS); Agree (A); Neutral (N); Disagree (D); Disagree Strongly (DS).

of the teachers thought that using biotechnology for disease treatment and medicine production is useful for society. 94% of the teachers indicated that biotechnological applications for disease treatment are useful while 86% of the teachers expressed the same positive attitude to medicine production. Teachers did not show the same positive attitude towards the other three application areas of biotechnology. The percentage of the teachers who thought that biotechnological applications for cloning human cells, producing GM foods, and cloning animals are useful for society is less than 40%. Around 50% of the teachers disagreed or strongly disagreed with the idea that biotechnological applications for cloning human cells, producing GM foods, and cloning animals are useful for the society (Table 2).

The rest of the teachers were neutral or disagreed with this idea (Table 2). The teachers' risk perception changed when focusing on the other three application areas of biotechnology. Around 70% of the teachers thought that using biotechnology for cloning human cells, GM foods, and cloning animals is risky for society. Around 70-75% of the teachers thought that using biotechnology in disease treatment and medicine production is ethically acceptable. However as far as the applications of cloning

human cells, GM foods, and cloning animals were concerned, the teachers' support declined rapidly to less than 30%. A similar picture is seen in the teachers' perception when Table 2 is evaluated in terms of whether teachers think that further research should be supported in the given five application areas of biotechnology. Over 90% of the teachers thought that further research should be supported in using biotechnology for disease treatment and medicine production. However this support declined sharply to less than 40% with regard to cloning human cells, GM foods, and cloning animals (Table 2).

The survey included 10 questions about GM foods. In the first question teachers were asked if they had heard the term GM foods before. 97% of the teachers answered this question in the positive. However when the teachers were asked if they knew enough about GM foods, 72% of them responded negatively. 22% of the teachers responded NO when asked if they had enough information about the possible risk of using GM foods. 63% of the teachers said that they knew a little about the risk of using GM foods, with only 15% responding in the negative. Teachers were also asked whether they had seen GM foods at supermarkets while shopping. 49% of the teachers responded YES and 12% NO, with 39% res-

Table 3. Teachers' opinions about GM foods.

Ideas	Response (%) n=78				
	AS	A	N	D	DS
GM foods are dangerous for human health	50	38	8	4	-
There are no enough educational programs regarding GM foods in newspapers and televisions	49	41	5	4	1
GM foods constitute a great risk for environment	29	43	24	4	-
GM foods are very important for feeding rapidly increasing human population in the world	4	22	18	43	13
GM foods should be increased in variety	1	3	24	54	18
GM foods are not natural even though they look healthy	45	37	9	6	3
Organic agriculture should be supported instead of GM foods	74	23	3	-	-
GM foods look better in appearance and are more delicious than their organic counterparts	4	1	14	41	40

Note: Agree Strongly (AS); Agree (A); Neutral (N); Disagree (D); Disagree Strongly (DS).

ponding "I had no idea" to this question. The teachers who said YES in this question were also asked if they could write the names of the GM foods they had seen at supermarkets. The tomato was the most frequent example (27 teachers) of genetically-modified food given by teachers. Watermelon, cucumber, pepper, corn, egg-plant, potato, soybean, strawberry, and pear were the other food recognized by teachers as genetically modified. In another question teachers were asked if they pay attention to whether the foods they buy from supermarkets are genetically modified or not. 40% of the teachers responded YES and 60% NO. Teachers were asked if they consume GM foods. 41% responded that they did consume GM foods. Only 16% responded NO to this question while 38% of them said that they did not know if the foods they consumed were genetically modified.

Table 3 consists of teachers' opinions about 8 ideas regarding GM foods. As seen in the table, a large majority of teachers (88%) thought that GM foods are dangerous to human health. A similar percentage of teachers (72%) thought that GM foods are also dange-rous for the environment. Only a forth of teachers (26%) thought that GM foods are very significant with regard to feeding the rapidly increasing human population of the world. 56% of teachers did not agree with this idea. A great number of teachers (72%) did not think that GM foods should be increased in variety. A similar number of teachers (82%) thought that GM foods are not natural even though they look healthy. Nearly all teachers (97%) thought that organic agriculture should be supported instead of GM foods. 81% of teachers did not agree with the idea that GM foods look better in appearance and are more delicious than their organic counterparts (Table 3).

Foods are genetically modified for different purposes. Teachers were asked in the survey whether they would prefer consuming foods which were genetically modified for a range of 6 different purposes. The answers are ex-pressed in Table 4. As the overall results in the table

reveal, the majority of teachers did not want to consume foods that had their genes modified irrespective of the purpose. A great number of teachers (90%) did not want to consume foods which were genetically modified to improve their productivity. A similar percentage of teach-ers (87%) did not approve of foods genetically modified to improve their taste and appearance. Teachers only approved the genetic modification of foods to produce different substances like oil fuel, with 62% in favour of this (Table 4).

The last two questions of the survey were aimed at determining whether teachers incorporate topics of GM foods into their geography lessons and if they suggest that their students should consume GM foods. Two thirds of the teachers surveyed (68%) indicated that they incur-porate the topic of GM foods in their lessons. However, nearly all the teachers (99%) said that they would not suggest that their students should consume GM foods.

Conclusion

The study revealed that teachers did not have enough information about biotechnology and its applications although the majority of them (96%) had heard the word biotechnology before. Less than a fifth of teachers (18%) indicated that they knew enough about biotechnology. This lack of knowledge affects teachers' expectations about biotechnology. For the majority of teachers, bio-technology was rated sixth among seven technologies which will improve our way of life positively in the next 30 years. Teachers were more positive about other types of technologies including computer and information, com-munication, solar energy, nanotechnology, and internet.

The study also revealed that teachers expressed diffe-rent attitudes towards various application areas of biotechnology. The majority of teachers supported the use of biotechnology for disease treatment and medicine production. Teachers generally thought that the use of

Table 4. What do teachers think about the aims of genetic modification?

Aims of genetic modification	Response (%) n=78	
	I would prefer	I would not prefer
To modify crops genetically to increase their productivity	10	90
To modify crops genetically in order to increase their resistance to environmental conditions like drought and high salinity	38	62
To modify foods genetically to increase their nutritional qualities	27	73
To modify foods genetically to improve their taste and appearance	13	87
To modify foods to reduce their dependence on fertilizers and pesticides	33	67
To modify foods and crops genetically to produce different substances like bio fuel.	62	38

biotechnology is ethically acceptable and further research should be supported in these two application areas. However, a majority of teachers did not support the use of biotechnology for cloning human cells, producing GM foods, and cloning animals. Teachers generally thought that biotechnological studies should not be supported in these three application areas because they pose a risk for society and are ethically unacceptable.

The study revealed important aspects of teachers' perception and attitudes towards GM foods. It is clear from the results that the majority of teachers (72%) did not have enough information about GM foods although 97% of them indicated that they heard the term GM foods before. Almost half of the teachers stated that they were aware of GM foods sold at supermarkets. However, 39% of teachers said that they had no idea if GM foods are sold at supermarkets they shop at. A variety of vegetables and fruits such as tomatoes, watermelons, cucumbers, peppers, soybeans, strawberries and corn were identified as GM foods by teachers. It appears that teachers were not greatly concerned about whether foods they buy from supermarkets are genetically modified or not. Only a small number of teachers (16%) stated that they did not consume GM foods while 60% of teachers said they did not pay attention to whether or not the foods they consume are genetically modified.

The overall results of the study revealed that general attitudes of teachers towards GM foods are negative. Teachers think that GM foods are dangerous for human health and the environment.

Teachers did not believe that GM foods will be a solution to possible global food shortages that may be seen in the future. Instead of increasing investments in field of GM foods, teachers mostly thought that organic agriculture should be supported due to the fact that GM foods are not as healthy and tasty as their organic counterparts although they are better in appearance. Another important result of the study was that teachers did not support biotechnological applications in order to modify foods genetically to improve their taste, productivity, nutritional qualities, and appearance. However most of the teachers supported genetic modification of foods to produce different substances like oil fuels. Around two third of teachers incorporated the topics of

GM foods into their geography lessons. The answers of teachers to the last question of the survey summarize the attitude of teachers towards GM foods. Nearly all teachers (99%) stated that they would not recommend that their students consume GM foods.

The overall study reveals that the perceptions and attitudes of the public towards GM foods are generally negative in Turkey, not unlike many European countries. As indicated in other studies, the perception of the public changes positively toward GM foods if it is known that consuming GM foods is healthy and does not entail any risk (Purchase, 2005; Hoban, 1998). TVs and newspapers in Turkey do not provide the public with enough information about the safety of GM foods. The negative attitude of the public towards GM foods is likely to change in Turkey by making the public more aware of biotechnological applications and positive outcomes of GM food production.

REFERENCES

Beachy RN (1999). Facing fear of biotechnology. Science 285: 335.
Cook AJ, Kerr GN, Moore K (2002). Attitudes and intentions towards purchasing GM food. J. Econ. Psychol. 23(5): 557-572.
Dawson V, Schibeci R (2003). Western Australian school students' understanding of biotechnology. Int. J. Sci. Educ. 25(1): 57-69.
Durant J, Bauer MW, Gaskell G (1998). Biotechnology in the public sphere. A European Sourcebook. Science Museum.
Februhartanty J, Widyastuti TN, Iswarawanti DN (2007). Attitudes of agricultural scientists in Indonesia towards genetically modified foods. Asia Pac. J. Clin. Nutr. 16(2): 375-380.
Felicia W (2004). Future of Genetically Modified Crops: Lessons from the Green Revolution. Rand Corporation. p. 39.
Gaskell G, Allun N, Bauer M, Durant J, Allansdottir A, Bonfadelli H, Boy D, Ceveigne S, Fjaestad B, Gutteling J, Hampel J, Jelsoe E, Jesuino J, Kohring M, Kronberger N, Midden C, Nielsen T, Przestalski A, Rusanen T, Sakellaris G, Torgerse H, Twardowski T, Wagner W (2000). Biotechnology and the European public. Nat. Biotechnol. 18: 935-938.
Gaskell G, Bauer MW (2001). Biotechnology in the years of controversy: A social scientific perspective. In: Gaskell G, Bauer MW (eds) Biotechnology: 1996-2000 the years of controversy. Science Museum.
Gaskell G, Allum N, Stares S (2003). Europeans and Biotechnology in 2002: Eurobarometer 58.0. Brussels: European Commission.
Grabner P, Mampel J, Lindsey N, Torgersen H (2001). Biopolitical diversity: The challenge of multilevel policy-making. In: Gaskell G, Bauer MW (eds) Biotechnology: 1996-2000 the years of controversy. Science Museum.

Gunter B, Kiderlerer J, Beyleveld D (1998). Teenagers and Biotechnology: A Survey of Understanding and opinion in Britain. Stud. Sci. Educ. 32(1): 81-112.

Huang J, Qiu H, Bai J, Pray C (2006). Awareness, acceptance of and willingness to buy genetically modified foods in Urban China. Appetite. 46(2): 144-51.

Hoban TJ (1999). Consumer acceptance of biotechnology in the United States and Japan. Food Technol. 53(5): 50-53.

Hoban TJ (1998). Trends in consumer attitudes about agricultural biotechnology. AgBioForum 1(1): 3-7.

Jackson LA, Anderson K (2005). What is behind GM food trade disputes? World Trade Rev. 4(2): 203-228.

James S, Burton M (2003). Consumer preferences for GM food and other attributes of the food system. Austr. J. Agric. Resour. Econ. 47(4): 501-518.

Macer D, Chen MA (2000). Changing attitudes to biotechnology in Japan. Nat. Biotechnol. 18: 945-947.

Martineau B (2001). First fruit: The creation of the *Flavr Savr* Tomato and the birth of biotech foods. New York: McGraw-Hill.

Massarani L (2005). Attitudes towards genetics: a case study among Brazilian high school students. Public Understanding Science. 14(2): 201-212.

Michael SF, Heaseon K (2003). Attitudes about genetically modified foods among Korean and American College Students. AgBioForum. 6(4): 191-197.

Morris SH, Adleyb CC (2001). Irish public perceptions and attitudes to modern biotechnology: An overview with a focus on GM foods. Trends Biotechnol. 19(2): 43-48.

Purchase IFH (2005). What determines the acceptability of genetically modified food that can improve human nutrition? Toxicol. Appl. Pharmacol. 207(2): 19-27.

Priest SH (2000). US public opinion divided over biotechnology? Nat. Biotechnol. 18: 939-942.

Qin W, Brown JL (2006). Consumer opinions about genetically engineered Salmon and information effect on opinions. Sci. Commun. 28(2): 243-272.

Saher M, Lindeman M, Hursti UK (2006). Attitudes towards genetically modified and organic foods. Appetite. 46(3): 324-331.

Spence A, Townsend E (2006). Examining consumer behavior toward genetically modified (GM) food in Britain. Risk Anal. 26(3): 657-670.

Tenbülta P, De Vriesa NK, Breukelenb GV, Dreezensc E, Martijnc C (2008). Acceptance of genetically modified foods: The relation between technology and evaluation. Appetite 51(1): 129-136.

UN (1992). The Convention on Biological Diversity, Article 2. Use of Terms. Retrieved on July 25, 2008, http://www.cbd.int/convention/articles.shtml?a=cbd-02

USDA (2006). Adoption of genetically engineered crops in the U.S., Economic Research Service. Retrieved 28 July, 2008, http://www.ers.usda.gov/Data/BiotechCrops/

Varzakasa TH, Chryssochoidisb G, Argyropoulosc D (2007). Approaches in the risk assessment of genetically modified foods by the Hellenic Food Safety Authority. Food Chem. Toxicol. 45(4): 530-542.