

Attitude Survey: An insight to the opinions and attitude towards modified foods within the public domain

The University of Waterloo iGEM Team is an undergraduate synthetic biology design team that incorporates students from various faculties on campus. Every year the team develops new solutions for tackling current problems in or related to the field.

Thank you for agreeing to take part in this survey measuring the public's opinion on gene editing and genetically modified foods to help assess the usability of this year's Waterloo iGEM project. For a description of the project please see below. This survey should take approximately 5 to 10 minutes to complete. Be assured that all answers you provide will be kept confidential.

Overview of the 2015 Project: Although plants have evolved defenses against viral invaders, plant viruses cost an estimated US\$60 billion loss in crop yields worldwide each year. The Waterloo iGEM team intends to use a system known as CRISPR to help confer resistance against these viruses. The CRISPR system was originally discovered as a form of adaptive immunity for bacteria. It works by integrating fragments of DNA from viral attackers into the bacterial genome, recording a history of infection. It is able to recognize this viral DNA and cut it up before it infects the host. By re-purposing the bacterial CRISPR system to target specific viral invaders of plants, our team hopes to develop a form of defense which plant viruses will not have encountered during their evolutionary arms race.

Knowledgeability

1. How do *you* define genetically modified (GM) foods?

2. How would you rate your level of understanding about GM foods?
1 (not knowledgeable) 2 3 4 (expert)
3. To what extent are you aware of the differences between selection through conventional breeding and mutagenesis?
1 (not aware) 2 3 4 (expert)
4. Where do you obtain knowledge on this subject? Please rank from 1-6 according to the level of frequency.
() websites
() news articles
() scientific journal articles
() word of mouth from people like friends, family
() from food labels
() other, please specify: _____
5. How would you estimate the percentage of available foods which are or contain GM ingredients? Please enter a value from 0-100% / choose from a drop-down menu.

Opinion

1. Do you agree with the sale of GM foods and products containing GM ingredients?

Yes No

If not, please mention why

- a. social
- b. moral
- c. environmental
- d. safety
- e. other; please specify

2. Do you support the feeding of GM foods and products containing GM ingredients to livestock destined for human consumption?

Yes No

3. “The government should require labelling for genetically modified foods.” To what extent do you agree with this statement?

1 (strongly disagree) 2 3 4 5 (strongly agree)

3. Would you support scientific research into the field of GM foods? (vs.How important is research into the field of GM foods?)

Yes No

4. Why or why not?

5. *Historically, genetic modification have introduced traits such as pest-resistance, disease-resistance, nutrition enhancement, and herbicide survival.* What is your impression on the effectiveness and appeal of genetic modification as a solution among alternatives it is attempting to solve (crop loss due to infestation, malnutrition, etc.)?

Effectiveness as a solution	Appeal as a solution
1 (not effective at all)	1 (not appealing at all)
2	2
3 (equally as effective)	3 (equally appealing)
4	4
5 (best among alternatives)	5 (most appealing among alternatives)

6. For your own consumption, how likely would you purchase the following trait selection practices? Please rank from 1-3, with 1 being most likely and 3 being least likely.

- a. If they cost equally.
 - () conventionally bred foods
 - () genetically modified foods
 - () mutagenic foods
- b. If they cost differently, according to today’s prices.

- () conventionally bred foods
- () genetically modified foods
- () mutagenic foods

7. When shopping for groceries, do you make a conscious effort to avoid or seek foods you know to be genetically modified or contain GM ingredients?
 - a. I consciously avoid foods you know to be genetically modified or contain GM ingredients
 - b. I am passive about shopping for foods you know to be genetically modified or contain GM ingredients.
 - c. I consciously seek foods you know to be genetically modified or contain GM ingredients.
8. Do you distinguish between organic and non-GMO?

Yes No
9. From the list below what type of crop would you be open to buy and consume?
 - a. Non-GMO
 - b. Organic
 - c. Grown without pesticides
 - d. GMOs
 - e. Other : Please Specify

Confidence

1. Please rate your degree of confidence in the safety of GM foods.

1 (not confident) 2 3 4 (very confident)

Other

1. Are you more likely to do more research about GMOs after this survey?

Yes No

The following demographics are being asked to describe the study sample and the information collected will remain confidential will not be used to identify you.

Demographic Questions

1. Which gender do you identify with most?
Male
Female
Prefer not to answer
2. What is your age?
 - a. under 20
 - b. 20-29
 - c. 30-39
 - d. 40-49
 - e. 50-59
 - f. 60+
 - g. Prefer not to say
3. Please state your profession.
 - a. Has it influenced your views on genetic modification?
Yes No
4. Which political group do you support the most at the federal level?
Conservative NDP Liberal Green Other; please specify:
5. Which religious typology do you affiliate with?
 - a. Secular Humanist
 - b. Secular Conservative
 - c. Religious Conservative
 - d. Progressive Religious
 - e. Prefer not to say
6. Do you do the grocery shopping for yourself/household?
 - a. Yes
 - b. No
 - c. Prefer not to say
7. Do you have children?
Yes No Prefer not to say
8. What is the highest degree or level of school you have completed?
 - a. high school or equivalent
 - b. Bachelor's Degree
 - c. Trade/technical/vocational training
 - d. Master's Degree
 - e. Professional Degree
 - f. Doctorate degree
 - g. Prefer not to say

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Knowledgeability

1. Have you heard of CRISPR-Cas9 (Clustered Repeating Interspaced Palindromic Repeats) technology?
Yes No
2. Do you know what genes are?
Yes No
3. Where do you obtain knowledge on this subject? Please rank according to level of frequency.
 - a. websites
 - b. news articles
 - c. scientific journal articles
 - d. word of mouth from people like friends, family
 - e. from food labels
 - f. other, please specify: _____

Opinion

1. Which organisms are you okay with being genetically engineered? Check all that apply.
 - a. Plants
 - b. Lab animals
 - c. Household pets
 - d. Livestock
 - e. Humans
 - i. To reduce disease
 - ii. Aestheticsor?
 - i. only those of the age of majority
 - ii. born infants and older
 - iii. germline
2. "I support the following applications of genetic engineering:"
 - a. Medicine
 - b. Industrial
 - c. Research
 - d. Agriculture
 - e. BioArt and entertainment
3. On a scale of 1-5 how comfortable are you with eating a food that has a gene editing tool implemented in in, such as a CRISPR-cas9 system. 1 being no consumption at all to 5 being completely okay with it.

1 2 3 4 5
4. Do you believe that if CRISPR systems were made available in foods that they should be just as regulated?

Yes No
5. Do you believe that CRISPR-cas9 and other gene editing tools should be heavily regulated in research as well?

Yes No
6. From the list below what type of crop would you be open to buy and consumer? Check all that apply.
 - a. Non-GMO
 - b. Organic
 - c. Grown without pesticides
 - d. GMOs
 - e. CRISPR
 - f. Non-CRISPR
 - g. Other: Please Specify
7. "The government should require labelling for foods that have the CRISPR system." To what extent do you agree with this statement?

1 (strongly disagree) 2 3 4 5 (strongly agree)

8. Do you support the feeding of foods and products containing CRISPR technology to livestock destined for human consumption?

Yes

No

Confidence

1. Please rate the safety of the regulation behind the CRISPR-cas9 system or other gene editing tools that are used in widespread in research communities.

1(not safe)

2

3

4

5 (perfectly safe)

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Male

Female

Prefer not to answer

10. What is your age?

a. under 20

b. 20-29

c. 30-39

d. 40-49

e. 50-59

f. 60+

g. Prefer not to say

11. Please state your profession.

a. Has it influenced your views on genetic modification?

Yes

No

12. Which political group do you support the most at the federal level?

Conservative

NDP

Liberal

Green

Other; please specify:

13. Which religious typology do you affiliate with?

a. Secular Humanist

b. Secular Conservative

c. Religious Conservative

d. Progressive Religious

e. Prefer not to say

14. Do you do the grocery shopping for yourself/household?

a. Yes

b. No

c. Prefer not to say

15. Do you have children?

Yes

No

Prefer not to say

16. What is the highest degree or level of school you have completed?

- a. high school or equivalent
- b. Bachelor's Degree
- c. Trade/technical/vocational training
- d. Master's Degree
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