

# Logbook

Aleena Shariff

## Contact information:

Phone:

Email: aleenas13@educbe.ca

# Schedule

December: Finalize my topic and start inputting information on my CYSF platform

January-February: Research, edit and start putting things on my tri-fold

March: Make sure all my information is online and finish putting research (pictures, graphs and charts) on tri-fold

# Background Research and Research

Problem: How does genetic modification affect our environment?

## What Is Genetic Modification

- Technique to modify the characteristics of a animal, plant or micro-organism or human
- When a piece of DNA is transferred from one organism to another
- Done through targeted removal of desired genes from an organism and transferred to another organism

## Genetic Modification in Plants

eisgenesis	transgenesis	cisgenesis example	transgenesis examples
The transfer of genetic material obtained from a related plant	The transfer of genetic material obtained from a non-related species	cross-fertilizing heterozygous plants which propagate vegetatively (ie. potatoes, apples, bananas)	Food crops genetically modified for pest and herbicide resistance

Plants

### Pros and Cons

Pros	Cons
<ul style="list-style-type: none"> <li>• Smaller use of pesticides</li> <li>• Disease and drought resistant plants which require fewer environmental resources (ie. water, fertilizer etc.)</li> <li>• Faster growing plants and animals</li> <li>• More nutritious food which is also tastier</li> <li>• Increased shelf life</li> <li>• Food with more desirable traits</li> </ul>	<ul style="list-style-type: none"> <li>• Affect biodiversity (Ex existing species)</li> <li>• Can be taken over by more dominant new species</li> <li>• Increased herbicide use</li> <li>• Weeds that can not be killed by herbicides because use of GM herbicide tolerant crops (superweeds)</li> <li>• Some insects now have resistance to toxins in GM insect-resistant crops (superpests)</li> <li>• Contamination (serious ecological, economic, social impacts)</li> </ul>
<p>Medicinal foods that could be used as vaccines or other medicines</p> <p>patatoes produce less of a cancer causing substance when fried</p> <p>Example</p>	<p>negative impacts on non-target organisms and about soil and water ecosystems.</p> <p>GM contamination threatens organic certification and the future of organic food and farming</p> <p>Herbicide sales in Canada increased 234% since GM crops have been introduced 1994-2020</p> <p>Herbicide tolerant crops (superweeds)</p> <p>GM herbicide tolerant crops (superweeds)</p> <p>some insects now have resistance to toxins in GM insect-resistant crops (superpests)</p> <p>Contamination (serious ecological, economic, social impacts)</p> <p>Gene flow from GM crops is a threat to nearby and wild crop relatives, non-GM crops and foods, and organic farming</p>

# Evolution of Research

## Animals

### Pros

- better able to resist disease
- grow faster
- more efficient (require less feed than current species of animals)

### Cons

- alteration of an animal's normal genetic homeostasis
- lameness (state of being unable to walk because of leg or foot pain)
- susceptibility to stress
- reduced fertility

## Micro-Organisms

### Pros

- greater food security
- In agriculture
  - increased crop yields
  - reduced costs for food or drug production
  - reduced need for pesticides
- enhanced nutrient composition and food quality
- resistance to pests and disease (insects)
- medical benefits to the world's growing population
- tolerance to atmospheric stress, such as temperature, salinity, drought and floods
- resistance to viruses, fungi and bacteria
- herbicide tolerance
- insect resistance

### Cons

- changes in the interaction between plant and biotic environment:
- Persistence and invasiveness
- Selective advantages or disadvantages
- Transfer of genes
- Interactions with target organisms (e.g. induction of resistance in pests to which plants are resistant)
- Interactions with non-target organisms (e.g. effects on bees and other non-pest insects, with consequences to biodiversity)
- Interactions with the soil ecosystem with consequent biogeochemical effects
- changes in the interaction between plant and abiotic environment:
- Alterations in greenhouse gas emissions
- Variations in sensitivity to climatic effects
- Modifications to sensitivity to soil abiotic factors (salinity, minerals...)

Evolution

Pros

Cons

(4)

- Harm to human or animal health; ← micro-organisms
- Toxicological effects
- Allergenicity
- Changes in nutritional value
- Transfer of antibiotic resistance

### Long Term Effects of Genetic Modification

- GMD's can contribute to the development of cancer by raising levels of potentially carcinogenic substances in the body
- Supports climate change mitigation → data: Figure 2
- Increase in allergies
- Increase in antibiotic resistance
- Problems with Endocrine system
- Reproductive system disorders → congenital brain defects
- Increased aging symptoms
- Cancerous tumor growth
- Autism prevalence → Data: citation 18
- Inflammatory Bowel Disease → Data: citation 19
- Intestinal infection → Data: citation 20
- Acute Renal Failure → Data: citation 21
- Hepatitis C
- ADHD → Data: citation 22
- Anxiety → Data: citation 23
- Schizophrenia → Data: citation 24
- Liver and intrahepatic bile duct cancer → Data: citation 25
- Kidney and Renal Pelvis Cancer → Data: citation 26
- Urinary/Bladder Cancer Incidence → Data: citation 27
- Thyroid Cancer Incidence Rate → Data: citation 28
- Deaths due to Acute Myeloid Leukemia
- Incidence of Diabetes → Data: citation 29
- Deaths due to Stroke → Data: citation 30
- Deaths from senile Dementia → Data: citation 31
- Deaths from Alzheimer's → Data: citation 32
- Deaths from Parkinson's Disease → Data: citation 33

Do not use Senile Dementia because Dementia is the medical term (not senile dementia)

did not work link

~~page 33~~ ~~Data: citation 33~~

- Deaths due to Obesity → Data: citation 32
- Death due to Hypertension → Data: citation 33
- Anemia → Data: citation 34

(5)

- Insomnia
- Vitamin D deficiency

### Human's

Pros	Cons
In the future	Potential Risks
• prevent, treat, or cure certain inherited disorders...	↓
• cystic fibrosis	• certain types of cancers
• alpha-1 antitrypsin deficiency	• allergic reactions
• hemophilia	• damage to organs or tissues if an injection is involved
• beta thalassemia	• unwanted immune system reaction
• sickle cell disease	(may cause inflammation, and in severe cases → organ failure)
• Also may be used to treat cancer or infections, including HIV	• forgetting the wrong cells (cells may be damaged causing other illness or diseases like cancer)
	• Infections caused by disease
	• Possibility of causing a tumor

Hilroy

## Overall Impacts of Genetic Modification (on the environment and humans)

- smaller use of pesticides
- Affect biodiversity
- Disease and drought resistant plants conserve environmental resources
- Increased herbicide use
- "Superweeds"
- Faster growing plants and animals
- Tastier nutritious food
- "Superpests"
- Increased supply of food, reduced cost, longer shelf life
- Contamination
- Food with more desirable traits
- Better resistance to disease
- Longevity
- more efficiently reproduce
- Susceptibility to stress
- reduced fertility
- Alterations of an animal's normal genetic homeostasis
- tolerance to atmospheric stress
- Herbicide tolerance
- Insect resistance
- Persistence and invasiveness
- Transfer of genes
- Interactions with target and non-target organisms
- Interactions with the soil ecosystem with consequent biogeochemical effects
- Alterations in Greenhouse Gas Emissions
- Variations in sensitivity to climatic effects
- Modifications to soil sensitivity to soil abiotic factors
- In the future may be used to prevent, treat or cure certain inherited disorders

- In the future may be used to treat cancer or infections, including HIV
- Harm to human and/or animal health
- Toxicological effects
- Allergenicity
- Changes in nutritional value
- Transfer of antibiotic resistance

Ways in which humans can help reduce negative effects of genetic modification on the environment (and what it does)

- Buy organic!
- cuts pollution
- helps soil health
- fights soil erosion
- organic farming supports pollinators
- avoids chemicals
- Promotes biodiversity
- saves energy
- fights global warming / mitigates climate change
- contains fewer pesticides
- preserve ecosystems
- supports animal welfare

Look for "non-GMO" labels and avoid at-risk ingredients

- helps keep soil fertile
- reduces soil erosion
- inhibits the development of "superweeds" and "superbugs"
- less toxic chemicals leaching into the soil
- maintains healthy biodiversity among crops and animals
- ensures that no chemicals are making their way into water

8



# References

1. <https://www.wur.nl/en/dossiers/file/genetic-modification-1.htm#:~:text=Genetic%20modification%20is%20a%20technique,them%20to%20the%20other%20organism.>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1525145/#:~:text=Cigenesis%20is%20a%20particularly%20efficient,make%20up%20of%20the%20plant>
3. [https://knowgenetics.org/transgenic-organisms#:~:text=Transgenic%20organisms%20have%20also%20been,%E2%82%AC%20\(genetically%20modified%20organisms\)](https://knowgenetics.org/transgenic-organisms#:~:text=Transgenic%20organisms%20have%20also%20been,%E2%82%AC%20(genetically%20modified%20organisms))
4. <https://medlineplus.gov/ency/article/002432.htm#:~:text=Disease%20%20and%20drought%20resistant%20plants,Faster%20growing%20plants%20and%20animals>
5. <https://www.government.nl/topics/biotechnology/consequences-of-gmos-for-biodiversity#:~:text=Genetic%20modification%20produces%20genetically%20modified,by%20more%20dominant%20new%20species>
6. <https://cban.ca/gmos/issues/environmental-impacts#:~:text=Biodiversity%20loss%3A%20The%20case%20of,monarch%20butterfly%20in%20North%20Am>
7. <https://gmoenquiry.ca/wp-content/uploads/2015/05/gm-and-environment-panphlet-Eng.pdf>
8. <https://www.animallaw.info/article/brief-summary-genetic-engineering-and-animals#:~:text=Pros%20of%20Genetic%20Engineering,than%20current%20species%20of%20animals>
9. <https://archive.bio.org/articles/genetically-engineered-animals-frequently-asked-questions>
10. <http://openoregon.pressbooks.pub/mhc/majors/bio/chapter/genetic-engineering/#:~:text=Genetic%20engineering%20is%20the%20alteration,common%20method%20of%20genetic%20engineering>
11. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3078016/>
12. <http://www.vocabulary.com/dictionary/lameness#:~:text=A%20state%20of%20being%20unable,unable%20to%20walk%20without%20limping>

*Hilroy*

13. <https://www.nature.com/scitable/topicpage/genetically-modified-organisms-gmos-transgenic-crops-and-732/#:~:text=Some%20benefits%20of%20genetic%20engineering,to%20the%20world's%20growing%20population>
14. <https://www.proterrafoundation.org/news/gmo-and-non-gmo-pros-and-cons>
15. <https://www.medicalnewstoday.com/articles/324576>
16. [https://www.cell.com/trends/plant-science/fulltext/S1360-1385\(22\)00004-8?returnURL=https://%3A%2F%2Flandinghub.elsevier.com%2Fretrieve%2Fpii%2FS1360138522000048%3Fshowall%3Dtrue](https://www.cell.com/trends/plant-science/fulltext/S1360-1385(22)00004-8?returnURL=https://%3A%2F%2Flandinghub.elsevier.com%2Fretrieve%2Fpii%2FS1360138522000048%3Fshowall%3Dtrue)
17. <https://www.youtube.com/watch?v=uwX2xTF9i-1>
18. <https://www.researchgate.net/figure/Graphet-US-rates-of-autism-prevalence-in-first-grade-served-under-IDEA-compared-with-Figs-271724900>
19. <https://www.researchgate.net/figure/Correlation-between-inflammatory-bowel-disease-and-glyphosate-applications-to-US-corn-and-Fig20-283462716>
20. <https://www.researchgate.net/figure/Correlation-between-age-adjusted-intestinal-infection-deaths-and-glyphosate-applications-Fig3-283462716>
21. <https://www.mdpi.com/1660-4601/16/15/2734>
22. <https://www.researchgate.net/figure/Correlation-between-ADHD-prevalence-and-glyphosate-applications-to-corn-and-soy-crops-Fig7-271724900>
23. <https://www.researchgate.net/figure/Correlation-between-anxiety-prevalence-and-glyphosate-applications-to-corn-and-soy-crops-Fig8-271724900>
24. <https://www.researchgate.net/figure/Correlation-between-schizophrenia-prevalence-and-glyphosate-applications-to-corn-and-soy-Fig9-271724900>
25. <https://www.researchgate.net/figure/Correlation-between-age-adjusted-liver-cancer-incidence-and-glyphosate-applications-and-Fig4-283462716>
26. <https://www.researchgate.net/figure/Correlation-between-age-adjusted-kidney-cancer-incidence-and-glyphosate-applications-and-Fig5-283462716>
27. <https://www.researchgate.net/figure/Correlation-between-age-adjusted-bladder-urinary-tract-cancer-and-glyphosate-applications-Fig9-283462716>
28. <https://www.researchgate.net/figure/Correlation-between-age-adjusted-thyroid-cancer-incidence-and-glyphosate-applications-and-Fig6-283462716>

- 29. <https://regenerationinternational.org/2023/02/19/the-science-based-evidence-to-ban-glyphosate-and-gmo/>
- 30. [https://static1.squarespace.com/static/5b57957f75f9e124c3cb4f814/2670660575d1f9e8ca-c97d011533519506307/disease\\_glyphosate\\_and\\_gmos\\_pamphlet.pdf](https://static1.squarespace.com/static/5b57957f75f9e124c3cb4f814/2670660575d1f9e8ca-c97d011533519506307/disease_glyphosate_and_gmos_pamphlet.pdf)
- 31. <https://researchgate.net/publication/351267041-Effect-of-glyphosate-on-the-growth-and-yield-of-sunflower-plant>
- 32. [www.researchgate.net/publication/351267041-Effect-of-glyphosate-on-the-growth-and-yield-of-sunflower-plant](http://www.researchgate.net/publication/351267041-Effect-of-glyphosate-on-the-growth-and-yield-of-sunflower-plant)
- 33. <https://www.instituteforag.org/article/domestic-consumption-of-glyphosate-between-gmo-and-non-gmo-corn>
- 34. [www.scribd.com/document/351267041-Effect-of-glyphosate-on-the-growth-and-yield-of-sunflower-plant](http://www.scribd.com/document/351267041-Effect-of-glyphosate-on-the-growth-and-yield-of-sunflower-plant)
- 35. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9377665/#:~:text=In%20the%20past%20years%20of%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops>
- 36. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9377665/#:~:text=In%20the%20past%20years%20of%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops>
- 37. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9377665/#:~:text=In%20the%20past%20years%20of%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops,including%20the%20introduction%20of%20genetically%20modified%20crops>
- 38. <https://www.mayoclinic.org/healthy-lifestyle/organic-therapies/about/2023/04/19>
- 39. <https://www.centerforfoodsafety.org/issues/311/ge-facts/shoppers-guide-to-avoiding-ge-food/1846/tips-for-avoiding-gmos>
- 40. <https://www.whyorganic.org/5-ways-going-organic-can-affect-climate-change/>
- 41. <https://www.soilassociation.org/take-action/organic-living/why-organic-is-better-for-the-planet/>
- 42. <https://mcleansmeats.com/why-buying-organic-is-healthier/>
- 43. <https://lequinox.com/blogs/is-eating-organic-better-for-you/>
- 44. <https://twobrothersindia.com/en-us/blogs/informative/five-ways-you-can-save-the-earth-by-buying-organic>
- 45. <https://mavericholls.com/the-environmental-and-health-benefits-of-organic-food/>
- 46. <https://www.centerforfoodsafety.com/blog/8-reasons-why-consumers-choose-to-buy-organic>
- 47. <https://www.prevention.com/food-nutrition/healthy-eating/a20453119/top-10-reasons-to-choose-organic-foods/>
- 48. <https://www.foragerproject.com/blog/choosing-organic-better-for-you-and-the-planet/>
- 49. <https://choosecanadaorganic.ca/21-reasons-to-choose-organic/>
- 50. <https://mcleansmeats.com/5-compelling-reasons-to-buy-organic/>

- 51. <https://allyallfoods.com/pages/why-non-gmo-ingredients>
- 52. <https://www.farmfreshmeat.com/blogs/farm-fresh-blog/how-organic-food-helps-environment>
- 53. <https://www.ccof.org/page/why-organic>
- 54. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7143438/>
- 55. <https://www.downtoearth.org/label-gmo-risks-genetic-engineering>
- 56. <https://www.resilientseeds.com/non-gmo-corn.html>
- 57. <https://allianceforscience.org/blog/2018/02/gmo-maize-safer-than-non-gmo-alternative-scientists-conclude>
- 58. <https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-reports/glyphosate.html>
- 59. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9101798/>
- 60. [www.sciencedirect.com/science/article/pii/S0974694313003289](https://www.sciencedirect.com/science/article/pii/S0974694313003289)
- 61. [www.familyfirsturgentcareconroe.com/good-and-bad-bacteria-understanding-the-difference/](https://www.familyfirsturgentcareconroe.com/good-and-bad-bacteria-understanding-the-difference/)

## Method

Firstly, in late December I finalized my topic. In January I completed a large amount of background research and research. During the month of January I researched what is genetic modification, genetic modification in plants, the pros and cons of genetic modification in plants and the pros and cons of genetic modification in animals. In early February I finished all of research, pros and cons of genetic modification in humans, the long term effects of genetic modification, the overall impacts of genetic modification and ways that humans can reduce the negative effects of genetic modification. In mid February I started working on my google slides to put on my tri-fold. Then in late February to early March I inputted my research on to the CXSF platform <sup>as well as my data</sup> and my data. Then, I wrote my conclusion and what next section and added it to the CXSF platform. After that, I edited my research, did acknowledgements, made my tri-fold and wrote my script for my presentation. Once I finished that I recorded my presentation. Throughout my whole project I continuously added my citations.

14

Entries

December 27, 2023

- Finalize my topic

January 1, 2024

- Finished Ethics Due Care 2A
- Labeled my hypothesis
- Entered my project name

January 2, 2024

- Started research (what is genetic modification)

January 3, 2024

- Researched (what is genetic modification, genetic modification in plants)

January 4, 2024

- Researched (genetic modification in plants, pros and cons of genetic modification in plants)
- Edited Ethics and Due Care 2A

January 5, 2024

- Researched (pros and cons of genetic modification in plants)
- Researched about Methods (how to write them)

January 6, 2024

- Edited Basic Project Info (Brief Description of Project)
- Researched (pros of genetic modification in animals)

January 13, 2024

- Researched (cons of genetic modification in animals)

January 14, 2024

- Researched (long term effects of genetic modification)

January 15, 2024

- Researched (long term effects of genetic modification)

January 26, 2024

- Researched (long term effects of genetic modification)

February 10, 2024

- Researched (pros and cons of genetic modification in humans)
- Edited Basic Project Info
- Edited Ethics Due Care 2A

February 11, 2024

- Researched (long term effects of genetic modification, overall impacts of genetic modification, way humans can reduce the negative effects of genetic modification)
- Edited Basic Project Info

February 17, 2024

- Inputted research on google slides

February 24, 2024

- Inputted research on CYSF Platform

February 25, 2024

- Inputted research on CYSF Platform

March 1, 2024

- Inputted research on CYSF Platform

March 2, 2024

- Finished inputting research on CYSF Platform
- Finished adding data to CYSF Platform
- Finished adding problem

March 3, 2024

- Edited

March 9, 2024

- Tri-fold work
- Finished conclusion
- Edited the pros and cons of genetic modification in microorganisms
- Edited conclusion

March 10, 2024

- Tri-fold work
- Edited research (on CYSF?)
- Did What Next

March 11, 2024

- Tri-fold work

March 12, 2024

- Tri-fold work



March 13, 2024

- Recorded presentation

March 14, 2024

- Finished everything

# Conclusion

As I have <sup>studied</sup> ~~studied~~ genetic modification is the alteration of an organism's (living thing) genotype using recombinant DNA technology to modify an organism's DNA and achieve its desirable traits. There are two types of genetic modification/ genetic engineering in plants: cisgenesis and transgenesis. Cisgenesis is the transfer of genetic material collected from a related plant and transgenesis is the transfer of genetic material collected from a non-related species. There are many merits and demerits of genetic modification in plants. One merit is that disease and drought resistant plants require fewer environmental resources (ie. water, fertilizer, etc.) and one demerit is an increase in herbicide use. There are also ~~pros and cons~~ <sup>pros and cons</sup> of genetic modification in animals. ~~They~~ <sup>for example</sup> they are better able to resist disease but they have a <sup>higher</sup> susceptibility to stress. In microorganisms a positive effect is that there is enhanced nutrient composition and food quality. Although a ~~negative effect~~ <sup>may cause</sup> is that interactions with the soil ecosystem ~~with~~ <sup>with</sup> consequent biogeochemical effects. Genetic modification in humans also have benefits and drawbacks. ~~They~~ <sup>for example</sup> in the future genetic modification may be able to prevent/treat or cure an inherited disorder like beta thalassemia. A drawback is that there is a risk of an unwanted immune system reaction. There are numerous long-term effects of genetic modification like cancerous tumor growth, climate change mitigation, schizophrenia, insomnia, etc. Some ways in which humans can help reduce negative effects of genetic modification on the environment is buying organic, looking for "non-GMO" labels and avoiding at-risk ingredients. Doing all of these things has a positive impact on the environment. In conclusion, there are many advantages and disadvantages of genetic modification in humans, plants, animals, and microorganisms but there are also numerous ways in which humans can help mitigate the negative effects of genetic modification on the environment (plants, animals, and microorganisms).

# What Next?

I can take my research further by researching how genetic modification causes the long term effects.

For example, <sup>as this is</sup> how genetic modification causes schizophrenia.

It would be interesting to research this because then I would know how the long term effects of genetic modification really occur. People would be interested

in learning this because in my project I included the long-term effects but I did not add why they occur. ~~Do Not Use~~

conflicting information  
there is much controversy regarding if genetically modified foods are safe to consume.

I can take my research further by <sup>investigating</sup> ~~researching~~ <sup>how</sup> ~~in~~ <sup>at humans</sup> genetic modification ~~causes~~ <sup>causes</sup> the long-term effects. It

can also take it further by researching if the various medical conditions occur only because of genetic modification. People would be interested in <sup>uncovering</sup> ~~knowing~~ this because then they <sup>understand</sup> ~~know~~ if they should be

~~consuming genetically modified foods. They want to~~ <sup>are safe to consume and at what quantity.</sup> ~~know this so that they know how much~~

~~genetically modified foods they should consume.~~ My future research can be used as a guide for people to

know if they should be buying organic or buying genetically modified foods. My <sup>research</sup> ~~research~~ can also be used for people that want to know if GM-foods are harmful to them.

Why