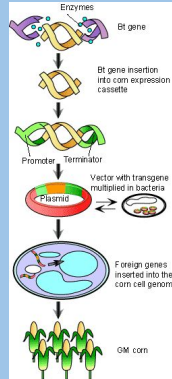


WHAT ARE GMOs

- Genetically modified organisms (GMO)
- They are living organisms whose genetic material has been artificial manipulated in a laboratory through genetic engineering.

HOW ARE GMOS CREATED

- ❖ First, specific genes are targeted for extraction.
- ❖ Then, these few selected genes are transferred into an organism
- ❖ Finally, the organism in which the genes were transferred establishes the desired trait.
- ❖ Research can be done on the resulting traits newly present in the organism in order to compare the difference between the GMO and its conventional counterpart.



Benefits of GMOs

- ❖ Higher and faster crop yield
- ❖ Desirable crop/organism characteristics
- ❖ Produce herbicides (long term resistance)
- ❖ Better taste
- ❖ Increased nutrient

References

(Food and Chemical Toxicology, 2017).

<http://thepowerofgmo.blogspot.com/2012/06/how-are-gmos-made.html>

<https://geneticliteracyproject.org/2014/09/30/do-patents-limit-gmo-research-and-farmers-research-only-a-little/>

<https://www.greenandgrowing.org/gmo-pros-and-cons/>

<https://gmoanswers.com/how-gmos-are-made>

<https://www.nongmoproject.org/gmo-facts/>

Jeff Moyer, Rodale Institute. 2010 Nov 9. Available from

<https://rodaleinstitute.org/gmos-and-sustainable-agriculture/>

Figure 2: (TACA, 2018) <https://tacanow.org/family-resources/gmos-and-asd/>

(Center for Food & Safety, 2018)

<https://www.centerforfoodsafety.org/issues/311/ge-foods/ge-food-and-your-health>

(Detox Project, 2018)

<https://detoxproject.org/glyphosate/whats-the-connection-between-glyphosate-and-genetically-modified-crops/>

GMO SUSTAINABILITY

Claim: Genetically modified organisms are NOT the most sustainable for the environment.

GMOs have become popularized due to desired increases in crop yield. Increased crop yield has led to decrease attention to the environment.

NEGATIVE ENVIRONMENTAL EFFECTS

- ★ Genetically modified crops deplete the nutritional value of soils and food.
 - Viewing higher yields of crops, planters are focussing less on the addition of compost or fertilizers to the soil; which is done for replenishment of nutrients into the soil. (note figure below)
 - This results in inadequate soil environments for GMOs as well as other organisms.
- ★ Disturbances of ecosystems and biodiversity
 - Development of resistant organisms (Food and Chemical Toxicology, 2017).
 - Resistant organisms increase in population, resulting in decreases in populations of the organism they eat (Food and Chemical Toxicology, 2017).
 - Unified production of traits
 - Reduction in natural processes that aid varietal development (Food and Chemical Toxicology, 2017).
 - GMO's outcompete native organisms

Figure 3:



Visual representation of the effects GMO's have on crop land. Left side is crops with nutrient rich soil vs. right side where crops have nutrient low soils.

NEGATIVE ECONOMIC EFFECTS

- ★ Legal issues
- ★ GMO seeds and chemicals needed to grow GMOs are expensive for the producers



- ★ GMOs must be tested and labeled

NEGATIVE SOCIAL EFFECTS

- ★ Consumers have no way of knowing what foods are genetically engineered because the U.S. Food and Drug Administration (FDA) does not require labeling of these products (Center for Food & Safety, 2018).
- ★ New “unexpected effects” and health effects posed by GMOs (Center for Food & Safety, 2018).
 - Toxicity
 - Allergic Reactions
 - Cancer
 - Loss of Nutrition
 - Autism caused by glyphosate (herbicide that attacks weeds and grasses that compete with crops)

Figure 1:

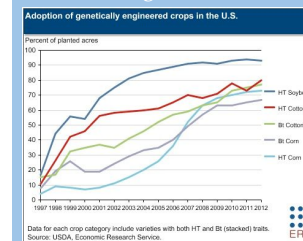
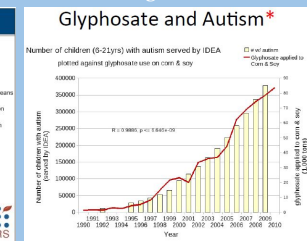


Figure 2:



As the production of GMOs in America rapidly increase (Figure 1), Glyphosate levels and presence of Autism (Figure 2) have increased. There is no direct causation, but the correlation coefficient between Glyphosate and Autism is strong (R = 0.9886). Over 80% of genetically modified (GM) crops grown worldwide are engineered to tolerate being sprayed with glyphosate herbicides (Detox Project, 2018).

