Influence Of Herbicide Tolerant Corn On Infertility In Humans

Rationale

The original claim states that ‘Genetically modified organisms (GMOs) have a negative impact on health’. With this claim, the broad question was, does genetically modified organisms have a negative impact on health? In order to narrow the research question down and make it more specific, it had to be broken down in to several parts including, what type of genetically modified organism? What kind of negative impact on health? And, who does this negative health impact affect?

Types of different genetically modified organism can include animals, crops and microorganisms, genetically modified crops has been chosen as crops like corn are the most common organism to be genetically modified. (BuiltLean. 2017, December 7) In order to make the research question even more specific, a certain type of crop must be focused on. Genetically modified corn will be the crop investigated to see if it causes any type of negative impact on health because corn is the most commonly modified crop in the US as almost 85% of all corn grown in the US are genetically modified to be herbicide-tolerant. (BuiltLean. 2017) According to Gmwatch, Corn that are genetically modified to be herbicide-tolerant has shown to cause infertility in humans.

After narrowing down each segment of the original claim, a new and more specific research question has been developed: Does herbicide-tolerant corn cause infertility in humans?

Background

Genetically modified organism or GMOs are organisms whose genomes has been engineered or altered in the laboratory in order to replicate certain favourable traits. (Diaz J.M., Fridovich-Keil, J.L.) GMOs are often used on crops, livestock and pet breeding in order to produce certain desirable traits to increase income per year.

Genetically modified crops are extremely common in our everyday lives, it appears in the corn we eat to the cotton in our clothes. It all started in 1994 in the united states when genetically modified food was first approved for consumption and by 2010, 90% of all corn, cotton and soy beans are genetically modified and covers more than 10 million square kilometres of land worldwide. (Diaz J.M., Fridovich-Keil, J.L.) But how is crops even genetically modified?

In order to understand how a crop’s genetics are modified, knowledge of DNA must first be introduced. DNA or deoxyribonucleic acid is the hereditary material in human and almost all other organisms. DNA in our body are what makes us who we are, it decides certain characteristics like what we look like, what our tastes are and how tall we will be. Most of our DNA are stored in the nucleus of our cells, these DNA are called nuclear DNA. (What is DNA? - Genetics Home Reference – NIH) A genome is an organism’s complete set of DNA. (What is a genome? - Genetics Home Reference – NIH)

According to royalsociety.org, GM crops are made by adding a specific stretch of DNA into a plant's genome. This could change how the plant grows and/or making it resistant to a certain disease such as being herbicide tolerant. (Royalsociety)

Infertility refers to when a couple have been unable to conceive a child after 1 year of unprotected sex.

Evidence

Herbicide glyphosates are extremely commonly used on crops like corn to kill weeds and other unwanted plants. Corn that are genetically modified to be herbicide tolerant as the name suggest will not be affected or killed by herbicide sprayed. However, humans are not herbicide tolerant and if traces of herbicides remain on the crops we consume, it may cause serious health problems. According to aljazeera.com, 'UK scientists says a first-ever long-term study shows popular weed-killer Roundup caused severe liver damage in rats.' This article also states that in recent years, herbicides used to assist in growing genetically modified crops links to a wide range of health problems including, birth defects, reproductive and neurological problems which includes infertility, cancer and even DNA damage. If any traces of herbicide happen to remain on food we eat, it could cause harmful effects to our body.

Herbicide causes health issues when it enters our body, but how does it enter our body? Herbicides are sprayed on crops at several stages of production in order to prevent any unwanted weeds from growing, it is also applied immediately prior to harvesting insuring that the products are not harmed by any remaining weeds. If the herbicide is not then cleared properly, it may seep into the corn itself and cause harmful effects to us, the consumers.

Global uses of herbicide have dramatically increased over the past decade as shown in graph 1 below. Uses of herbicide globally in 1995 is a mere 67078 kilogram whereas, in 2014 the use of herbicides increased by over twelve times. This is likely due to the appearance of GM crops being resistant to the chemicals used in herbicides.

Graph 1: Rifai, R. (2017, January 22). Study linking Roundup to serious disease fuels debate. Retrieved from https://www.aljazeera.com/indepth/features/2017/01/study-linking-herbicide-disease-fuels-debate-170116140401709.html

Exposure to herbicides has been linked to reproductive problems such as infertility, increased chance in miscarriage and premature birth. As depicted in graph 2 below, study by the US department of health shows that as the amount of glyphosate increases, it is directly linked to the decreasing of sperm density in male rats. (Cox, C.) Originally, the sperm density of the male rats are at approximately 620 million sperm count, as the amount of glyphosate in their food increases to approximately 2.5%, their sperm count significantly drops to below 500 million. This can be directly related to effects herbicides have on humans and how herbicides causes infertility.

Graph 2: Cox, C. (n.d.). Retrieved from http://www.eastbaypesticidealert.org/Glyphosate Factsheet 1.htm

Evaluation

Trends in graph 1 shows that an increase in herbicide use immediately following the introduction of herbicide tolerant crops which will increase farmer's profit by killing unwanted weeds and making crops unharmed.

Evidence presented above are insufficient to prove that there are issues relating infertility in humans that are caused by herbicides used by farms. The first source presented by Rifai, R. includes many statements said by 'scientist', however none of the scientist are actually named therefore it could be forged and simply be false. Contrary to the statements made however, the graph provided by the source is reliable as it originated from a peer-reviewed journal website founded in 1989. (Cox, C)

Graph 2's data shows a deliberate drop in sperm density when the glyphosate percent in food increases to over 2.5% causing sperm density to be below 500 million. A sperm count below 500 million causes infertility as millions of sperm is shot out by the male penis and only one sperm reaches the egg to fertilise it and often all sperm dies out before the egg is fertilised. (Winfertility)

Data shown in graph 2 are proven to be accurate on the surface because it sources from the US department of health. However, as you continue reading the website, it debates the accuracy of the data provided as it states that 'test done on glyphosate to meet registration requirement have been associated with fraudulent practices'. It is stated on eastbaypesticidealert, the EPA (Environmental Protection Authority) had cases of 'routinely falsification of data' and the IBT, one of the largest laboratories in support of pesticide registration were described to have falsified a number of their test regarding toxicity of herbicides. (Cox, C.)

Hypothetically speaking, if all data in the second source were accurate, testing was only done on rats which cannot be directly associated with human bodies as we are built different. Certain chemicals are deadly to rats but harmless to us and vice versa.

Conclusion

To conclude this report, the claim, genetically modified organisms (GMOs) have a negative impact on health cannot be fully supported because it covers too many topics and is not specific enough to prove. The research question, 'Does herbicide tolerant corn cause infertility in humans' also cannot be proved to be correct because data that has been gathered are not proven to be completely true, leaving too many unknown factors.

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