

The Role of Science Communication in the Public Perception of Genetically Modified Mosquitoes

Katherine Dunning

Social media connects people across the globe, but it can also create echo chambers and confirm unscientific opinions. Individuals or organizations with ulterior motives, such as their own financial profit, often share graphics and memes with anti-science and fear-based content. Despite this overwhelming presence of “alternative facts,” scientists must actively spread scientific literacy and the benefits of fact-based discoveries. For instance, there is much misinformation on the Internet about genetically modified organisms (GMOs), which has spread fears and claims that are not supported by a scientific consensus. I did a Google Images search in February 2018 and found that the top ten images from the search for “GMO” included three pictures of needles being injected into fruit and four other similar scare-tactic images. However, scientific research into GMOs does not involve sticking needles into fruit; these images are likely a dramatic marketing statement by anti-GMO lobbyists. While it is natural to fear the unknown, we can begin to understand the valuable impacts of such technology by educating ourselves with empirical information and talking to scientists, farmers, and others who benefit from these advancements.

As a proposed approach to combat the memes and myths, I designed this infographic about genetically modified mosquitoes and the human health benefits they offer in tropical regions of the world. When designing my infographic, I focused on creating a narrative that defines the problem, pro-

motes a solution, and addresses the safety concerns of mosquito control mechanisms. This structure is meant to highlight the public’s concerns and emphasize the care that must be taken in regards to new technology. Although this particular GMO will not directly benefit Canadians, it is still important to be educated and to support this technology—doing so might ease regulations in the regions that will benefit from such advances.

Information is our best defense against fear. After creating my infographic, I sent it to friends with varying degrees of scientific education and asked for their opinions regarding the graphic and GMOs. The results indicated that people were conflicted about GMOs. This was perfectly articulated by one respondent, who noted that they were “torn between support and suspicion” because they “didn’t really know enough.” Spreading scientific literacy instead of fear on our social media platforms can be a first step toward improving public awareness and acceptance of new technologies which have the potential to benefit humans and the environment.

If you would like to learn more about the societal benefits of GMOs, I recommend listening to “Talking Biotech,” a podcast by Dr. Kevin Folta. The podcast provides an accessible and science-based approach to talk about GMOs. It addresses many common safety concerns by interviewing a wide range of guests, including researchers, farmers, and concerned parents.

Next Generation Mosquito Control



- *Aedes aegypti* mosquito transmits **deadly diseases** such as dengue, yellow fever, chikungunya, Zika virus, and others.
- This mosquito is an **invasive species** in Europe, the United States, Central and South America, the Middle East, Southeast Asia, the Pacific Islands, and northern Australia.¹

The *Aedes aegypti* problem

400 Million
Dengue
Infections
per Year²

200 Million
Americans
in Range of
Zika¹

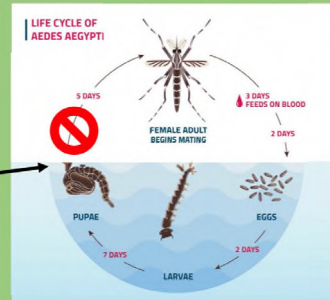
No Effective
Vaccines for
these
Diseases²

Developing
Insecticide
Resistance³

- Current control mechanisms include using insecticides, but these **harm beneficial insects** like bees.
- However, *A. aegypti* mosquitoes are becoming resistant to insecticides.³
- A common control method is the sterile insect technique, but this is **not effective for mosquitoes** due to high populations.⁴
- **We need new mosquito control methods!**

What can be done?

- The British company Oxitec has developed a genetically modified Friendly™ *A. aegypti* mosquito that has been proven to **reduce mosquito populations by more than 90%**.⁵
- Oxitec releases genetically modified males with a **self-limiting gene** which will mate with wild females.
- 95% of the resulting offspring **die before reaching adulthood** and being able to spread diseases.⁶
- This method does not have negative impacts on non-target species.⁴



Is it safe?



- Approved by the FDA and EPA for use in USA.⁷
- Oxitec releases **99.99% male** mosquitos, which do not bite and cannot transmit disease.
- 95% of released males die within 25 days in the wild.⁶
- 90%+ reduction in mosquitos is predicted to help **prevent dengue epidemics**.⁵
- The self-limiting gene is **non-toxic** when the mosquito is consumed by predators and is **non-allergenic** to humans.⁶

Sources:

1. Bogoch, I. I.; et al. Anticipating the International Spread of Zika Virus from Brazil. *The Lancet* 2016, 387 (10016), 335–336.
2. Hadinegoro, S. R.; et al. Efficacy and Long-Term Safety of a Dengue Vaccine in Regions of Endemic Disease. *N. Engl. J. Med.* 2015, 373 (13), 1195–1206.
3. Vontas, J.; et al. Insecticide Resistance in the Major Dengue Vectors *Aedes Albopictus* and *Aedes Aegypti*. *Pestic. Biochem. Physiol.* 2012, 104 (2), 126–131.
4. Alphey, L. Re-Engineering the Sterile Insect Technique. *Insect Biochem. Mol. Biol.* 2002, 32 (10), 1243–1247.
5. Carvalho, D. O.; et al. Suppression of a Field Population of *Aedes Aegypti* in Brazil by Sustained Release of Transgenic Male Mosquitoes. *PLoS Negl. Trop. Dis.* 2015, 9 (7), e0003864.
6. Phuc, H. K.; et al. Late-Acting Dominant Lethal Genetic Systems and Mosquito Control. *BMC Biol.* 2007, 5, 11.
7. U.S. Department of Health and Human Services. Clarification of FDA and EPA Jurisdiction Over Mosquito-Related Products. October 2017.