

Border Issues with GM mosquito releases



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Open releases of UK biotech company Oxitec's genetically modified (GM) mosquitoes in Brazil began in February 2011 and production is now being scaled up to 2.5 million transgenic mosquitoes per week. To date Brazil has not consulted neighbouring countries on releases of Oxitec's living modified mosquitoes.

In contrast, Brazil has recently announced that it will consult neighbouring countries on plans to conduct experiments with releases of mosquitoes infected with the bacterium *wolbachia*, which is thought to reduce the transmission of dengue fever. This is a non-GM approach (the bacteria are not genetically modified).

The decision not to consult neighbouring Parties in the case of GM mosquitoes is wrong because:

- The international community has chosen to develop a specific legal framework for LMOs under the Cartagena Protocol, it has not done so for non-GM approaches;
- GM mosquitoes may pose risks to biological diversity and human health;
- GM mosquitoes may spread easily to other countries via a variety of dispersal mechanisms, for example in breeding sites, such as tyres, in people's clothing and by road, rail and sea;
- The release of Oxitec's GM mosquitoes will set an important precedent for future releases of other GM insects.

Oxitec's genetically modified mosquitoes

Billions of Oxitec's GM mosquitoes are expected to be released in Brazil in attempts to suppress the wild population of mosquitoes. Repeated ongoing releases of many millions of mosquitoes will be required.

Preliminary results from open release experiments in Brazil show that a release ratio of fifty-four GM mosquitoes to one wild type male was used in the final phase of the experiments. More than half a million mosquitoes a week were produced during this late phase of the experiments and the releases were concentrated in a small area of houses in Itaberaba (Bahia), less than 500m by 200m. Brazil is now scaling up production of Oxitec's living modified mosquitoes, with the aim of releasing 2.5 million GM mosquitoes per week. Additional sites are being considered for future releases.

Oxitec's GM mosquitoes are not sterile: they breed with wild mosquitoes and most of the offspring die at the larval stage. Although only small percentage of the GM mosquito offspring (3-4%) are expected to survive to adulthood this could mean very large numbers due to the billions that will be released:

- If a ten million GM mosquitoes are released a month, 30 to 40 thousand could survive each month and half of these will be GM females which bite humans to feed on their blood;
- If the GM mosquitoes are exposed to sufficient levels of the common antibiotic tetracycline in the environment a much higher percentage could survive: Oxitec reports a 15% survival rate for the offspring of GM mosquitoes fed cat food containing chicken contaminated with tetracycline;

- Over time, resistance can evolve to the genetic trait, increasing the survival rate of future generations of GM mosquitoes.

The GM *Aedes aegypti* mosquitoes currently being released in Brazil have eggs which can survive several months under dry conditions in a dormancy state: the GM mosquito eggs are then easily dispersed. The other species of GM mosquito *Aedes albopictus* which Oxitec is developing has spread worldwide via breeding sites in tyres. Mosquitoes are easily transported anywhere where there are movements of people: on boats, trucks or trains.

Failure to consult sets bad precedent for other GM mosquitoes

Other research groups are developing GM mosquitoes which contain different traits (such as reduced disease transmission). These are meant to spread throughout the wild population, entirely replacing the wild mosquito population with a GM mosquito population. Unless a precedent is established now to consult with neighbouring countries, other kinds of GM mosquitoes could be released in future without any cross-border consultation.

Failure to consult sets a bad precedent for other GM insect species

Oxitec is collaborating with multinational agriculture company Syngenta to develop living modified *Lepidoptera* (a large group of insects, including moths and butterflies), including living modified pink bollworms intended to be used in combination with living modified cotton, in an attempt to slow the development of Bt-resistant bollworms. The company is working on a wide variety of transgenic agricultural pests, including tomato borers, diamondback moths, olive flies, pink bollworm, fruit flies (Mediterranean, Mexican, Oriental and Queensland species) and red flour beetles.

These living modified insect pests contain a female-killing form of Oxitec's lethality trait, which will allow the male offspring of insects to survive. These transgenic insects are intended to be released in similarly large numbers to transgenic mosquitoes, with the aim of suppressing wild pest populations. Such releases will raise additional concerns regarding the transport of both (i) living adult modified pests; and (ii) dead modified larvae or pupae; in or on fruit and vegetables or other foodstuffs.

In the longer term, other GM insects, such as pesticide-resistant bees, could be developed.

Cross-border consultation may become increasingly important if an international market for GM agricultural pests and other insects develops in the future. Failure to conduct cross-border consultation on Brazil's current experiments sets a bad precedent for future uses of other GM insects.

Lack of information and poor quality risk assessments

To date, Brazil has not published any information on the Biosafety Clearing House about its open release of about 10 million of Oxitec's GM mosquitoes since February 2011. The risk assessment for these releases is only available via the website of the UK parliament¹ (as the result of a parliamentary question): it was not published or consulted on within Brazil or with neighbouring states. Critiques of Oxitec's risk assessments have been published by independent scientists² and by civil society organisations^{3,4}: but experts from neighbouring

¹ Brazil notification documents. <http://www.parliament.uk/deposits/depositedpapers/2011/DEP2011-1744.zip>

² Reeves RG et al. (2012) Scientific Standards and the Regulation of Genetically Modified Insects Lehane MJ, ed. PLoS Neglected Tropical Diseases, 6(1), p.e1502. <http://www.ploscollections.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0001502;jsessionid=C3DC4FD0650E395B0FD63D275A9703B5#pntd-0001502-g001>

countries have been given no opportunity to comment. Preliminary results have not yet been published in a scientific journal, but a decision has already been taken to scale up production and seek new release sites in Brazil.⁵

This sets a dangerous precedent in which emergency measures may need to be put in place in future by other states, without any prior knowledge of releases or associated risk assessments. Lack of transparency also makes countries dependent on information provided by the commercial company which has created the transgenic organism.

Contrast with consultation on non-GM approaches

Brazil has recently announced that it plans to consult neighbouring countries on a plan to conduct experiments with releases of mosquitoes infected with the bacterium wolbachia, which is thought to reduce the transmission of dengue fever.⁶ This is a non-GM approach (the bacteria are not genetically modified). The international community has chosen to develop a specific legal framework for LMOs under the Cartagena Protocol - it has not done so for non-GM approaches. It is therefore difficult to understand why large-scale releases of GM mosquitoes in Brazil do not merit equivalent or greater attention to cross-border issues.

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³ GeneWatch UK (2012) Oxitec's Genetically Modified Mosquitoes: Ongoing Concerns. http://www.genewatch.org/uploads/f03c6d66a9b354535738483c1c3d49e4/Oxitec_unansweredQs_fin.pdf

⁴ Third World Network (2010) Genetically engineered *Aedes aegypti* mosquitoes: Are there risks? 13th December 2010. http://www.biosafety-info.net/file_dir/8147755984d0e21def079c.doc

⁵ PAT (2012) Transgenic Aedes Project Progress Report, Feb 2011-Mar 2012.

⁶ Brazil: Tries natural method to eradicate dengue. Rio de Janeiro, 25th September 2012 (IPS/Fabiana Frayssinet) <http://www.ipsnews.net/2012/09/brazil-tries-natural-method-to-eradicate-dengue-fever/>