

Alternative vector control methods to manage the Zika virus outbreak: more haste, less speed

Christophe Boëte, Guy Reeves

► **To cite this version:**

Christophe Boëte, Guy Reeves. Alternative vector control methods to manage the Zika virus outbreak: more haste, less speed. *The Lancet global health*, Elsevier, 2016, 4 (6), <10.1016/S2214-109X(16)00084-X>. <inserm-01321157>

HAL Id: inserm-01321157

<http://www.hal.inserm.fr/inserm-01321157>

Submitted on 25 May 2016

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Alternative vector control methods to manage the Zika virus outbreak: more haste, less speed

In their Comment in *The Lancet Global Health* (March, 2016),¹ Laith Yakob and Thomas Walker present the current epidemiological situation of the Zika virus outbreak in the Americas. They argue that, in the absence of a vaccine, the ongoing use of insecticides or the destruction of mosquito breeding sites provides little hope for the containment of this disease. Consequently, they highlight two novel techniques that in their view could provide imminent relief from Zika virus and other vectored diseases. The first one is the continuous mass release of genetically engineered mosquitoes that are partly sterile into the wild. The second approach relies on the use of a vertically inherited endosymbiotic bacterium to restrict arboviruses' replication in mosquitoes. Although the theoretical potential of these novel biotechnological techniques is apparent to many, an imminent role in their use to contain the Zika virus is likely to prove premature. As of yet, no scientific reports have been published on the capacity of either technique to reduce diseases in human populations. Furthermore, the direct evidence that the Release of Insects carrying Dominant Lethal genes (RIDL) approach is effective in reducing the size of the adult female *Aedes aegypti* population is currently based on one published study (appendix).²

With respect to the effect of endosymbiotic bacteria on viral replication or transmission, it is pertinent that although data exist for at least four viral species, the Zika virus is not one of them.³ The proposed link to the current Zika virus situation also makes the untested assumption that either technique could be very rapidly scaled up from the very small numbers of households used in their existing

experimental work and still be proven as resource efficient.

Despite the pressing need for solutions to the rapidly expanding Zika virus transmission, in our opinion it is hard to posit a substantial role for either approach until direct evidence shows a reduced human disease burden.⁴ While we acknowledge that to hold novel or experimental techniques to unrealistically high standards is counterproductive, it is surely uncontroversial to suggest that diverse and credible data must be publicly available before resources and attention are diverted away from current control programmes. Furthermore, in the specific context of ongoing mosquito control it is essential that proponents of any new approaches (biotechnological or otherwise) make efforts not to undermine confidence in techniques likely to remain part of frontline responses.

Increasing insecticide resistance is undoubtedly making control more difficult for some mosquito species, but the assertion that insecticides and the destruction of breeding sites cannot be part of highly successful control programmes is not supported by recent history. Use of insecticides and destruction of mosquito breeding sites had a central role in simultaneously eliminating *Aedes aegypti* from 18 continental countries, including Brazil, between 1947 and 1962.⁵ Effectively fighting mosquitoes and the diseases they transmit has generally required community participation in the application of sustainable and cost-effective approaches. Historical success and failures of vector control should be scrutinised to help avoid the allure of innovations that do not yet possess a suitably solid evidence base. New control techniques should be developed and used, but equally the value of available techniques should not be overlooked. When these available techniques are applied with strategic vision, they can yield impressive results.

RGR has a patent pending (EP2013/077856) that is related to genetically engineered insects. CB declares no competing interests.

Copyright © Boëte et al. Open Access article distributed under the terms of CC BY.

**Christophe Boëte, R Guy Reeves*
cboete@gmail.com

UMR "Emergence des Pathologies Virales", Aix-Marseille Université, IRD 190—Inserm 1207—EHESP, 13385 Marseille, France (CB); and Department of Evolutionary Genetics, Max Planck Institute for Evolutionary Biology, Plön, Germany (RGR)

- 1 Yakob L, Walker T. Zika virus outbreak in the Americas: the need for novel mosquito control methods. *Lancet Glob Health* 2016; **4**: e148–49.
- 2 Carvalho DO, McKemey AR, Garziera L, 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**: e0003864.
- 3 Johnson KN. The impact of *Wolbachia* on virus infection in mosquitoes. *Viruses* 2015; **7**: 5705–17.
- 4 James S, Simmons CP, James AA. Ecology. Mosquito trials. *Science* 2011; **334**: 771–72.
- 5 Brathwaite Dick O, San Martin JL, Montoya RH, del Diego J, Zambrano B, Dayan GH. The history of dengue outbreaks in the Americas. *Am J Trop Med Hyg* 2012; **87**: 584–93.



See Online for appendix