

# Stable introduction of *Wolbachia* infection into the mosquito *Aedes aegypti*

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*Wolbachia* is a bacteria which infects arthropod species, including a high proportion of insects ( 60% of species). Its interactions with its hosts are often complex, and in some cases it is considered as an endosymbiont.

While *Wolbachia* is commonly found in many mosquitoes it is absent from the species that are considered to be of major importance for the transmission of human pathogens. The successful introduction of a life-shortening strain of *Wolbachia* into the dengue vector *Aedes aegypti* that decreases adult mean life has recently been reported.

Moreover reports indicate that the population of mosquitoes harboring *Wolbachia* is less efficient to transmit dengue. Then it is considered that using *Wolbachia* can be a viable option for controlling the incidence of the dengue.

We consider different models of increasing complexity for the introduction of *Wolbachia*. Taking into account the epidemiology of the infection of *Wolbachia* in the mosquito population and concurrent hypotheses. We use these models to explore interactions between host population dynamics and *Wolbachia* infection.

In all the models we obtain bistable dynamics. Three equilibria do exist :

- An equilibrium without infection which is asymptotically stable ;
- a second equilibrium, where all the population is infected, which is also asymptotically stable ;
- and a “coexistence” equilibrium which is unstable.

Some simulations, with sensible biological parameters, are shown to indicate that the basin of attraction for the equilibrium, corresponding to the full infected population, is non negligible. Thus the stable introduction of *Wolbachia* into the dengue vector *Aedes aegypti* seems a viable biological methods to reduce dengue transmission.

The results presented here has been obtained by a Brazil-French team of a CAPES-COFECUB project.