

Interim report MRCU/Oxitec - October 18 2016
Friendly *Aedes aegypti* project in West Bay

Introduction

The project was announced on May 5th 2016 and was followed by a variety of community engagement activities that ensured the majority support of the Caymanians. The first release was conducted on July 28th in the Public Health Clinic of West Bay in presence of the Timothy McLaughlin, the Public Health surveillance officer. The production and releases were ramped up and OX513A males started to be distributed in the treatment area mid-August. In parallel, the monitoring in the treatment and comparator areas, started in 2015, continued in order to evaluate the suppression of the *Aedes aegypti* and enable dynamic adaptive management of the programme.

Community engagement

Every Friendly *Aedes aegypti* project starts with an initial intense community engagement period adapted to the local conditions and culture, generally in collaboration with public services. In Cayman Islands, the Mosquito Research and Control Unit and the Public Health Department provided resources to help spread information and reply to questions about the project.



A number of activities were conducted including door-to-door visits in the release area, information booths and distribution of leaflets in several locations on Grand Cayman, a public meeting, radio and television talk shows as well as public service messages in the newspaper and on the radio.

A public opinion survey conducted in July revealed that 80% of the population of Grand Cayman had heard about the project and that 69% supported the Friendly *Aedes aegypti* project, validating the strategy followed. Activities to reach out to the community have continued since the beginning of the releases and will continue throughout the project.

Releases

The first release of OX513A males was conducted on July 28th 2016. The production was ramped up to operational schedule, three batches per week, from the beginning of August 2016. Consequently, full operational releases effectively started in mid-August at the average level of circa 300,000 OX513A males per week (from week 33 to 41, figure 1). The quality of the males released was confirmed by the quality control processes conducted in the production facility ensuring that the OX513A males were in optimal conditions to find and mate with the wild *Aedes aegypti* females.

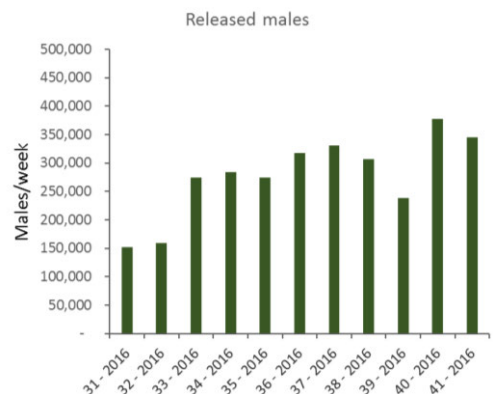


Figure 1: Number OX513A males released per week in the treatment area of West Bay.

Monitoring

Monitoring in the treatment and comparator areas started in 2015. Ovitrap traps that mimic the breeding sites and are used to collect eggs laid by the females, are used to follow both presence (Ovitrap Index: proportion of positive traps) and abundance (average number of eggs per trap) of the local population of *Aedes aegypti*. Through regular monitoring of the population in both the treatment and control areas, a sharp seasonal population increase of *Aedes aegypti* in early June 2016 was detected (Figure 2, after Week 23 - 2016) that has been maintained since that date although there have been some natural variations in the wild population.

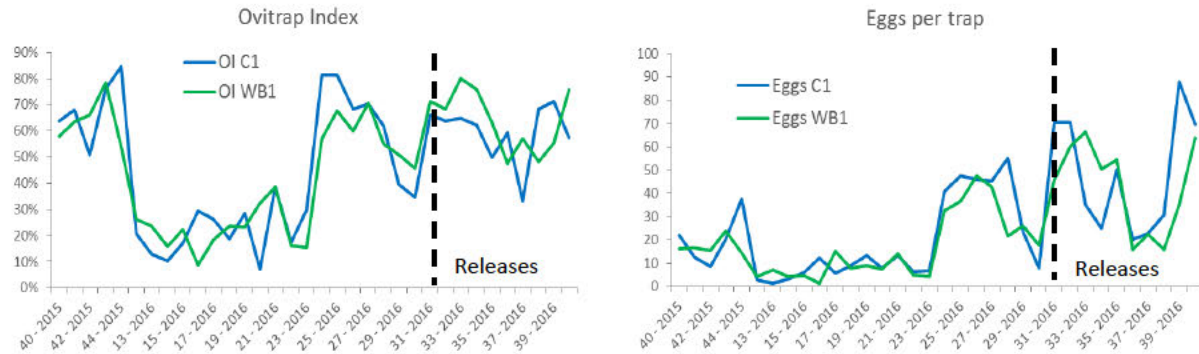


Figure 2. *Aedes aegypti* wild population monitoring results. (A) Ovitrap index: proportion of collected ovitraps that were positive for *Aedes aegypti*. (B) Eggs per trap: average number of eggs per ovitrap collected. The dotted line shows the start of the releases. C1: Comparator area; WB1: Treatment area.

Within the treated area, ovitraps can additionally be used to assess mating fraction (proportion of the wild females that are mated with OX513A males) by detecting the fluorescent marker in the larvae hatched from the eggs collected. This is a key metric that allows dynamic adaptive management of the releases to respond to the local population density thereby ensuring efficiency. For operational use, we target >50 % mating fraction for rapid suppression.

Following the first releases, fluorescent larvae were detected in the ovitraps in August. Due to the pre-mated females present before the start of the releases - females *Aedes aegypti* mate only once in a lifetime of 2 to 4 weeks - it is expected that the fluorescence will increase in the 4 weeks of initial releases before stabilising. The fluorescence observed in the ovitraps stayed below 10% until a sharp increase above 30% in October 2016 (figure 3). The absence of major rains in West Bay in September is likely to have caused a decrease in the wild population and resulted in an increase in the mating fraction as more OX513A males were able to compete for females. Though encouraging, the recent increase in mating fraction remains below our 50% target.

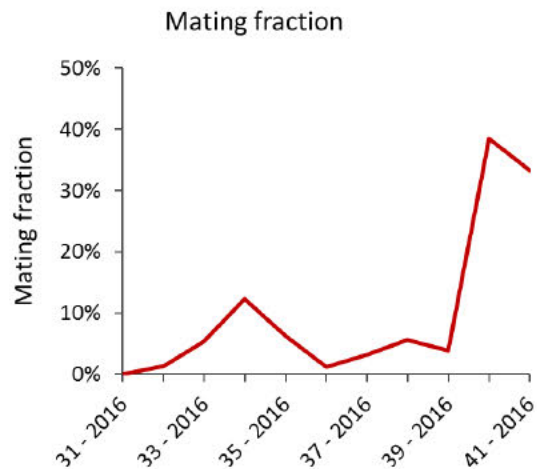


Figure 3: Mating fraction in the treatment area.

Conclusion/Recommendation

A key attribute of Oxitec technology is the fluorescent marker that facilitates adaptive release rates tailored to local population. Following 8 weeks of releases, production has been successfully established and sustained releases of 300,000 males/week have been conducted. Field collected samples show the released males are successfully mating with wild *Aedes aegypti*, but that the mating fraction is currently falling short of the targeted 50%. Population monitoring has shown high local population, expected at this time of year, and this is the most likely cause for not yet hitting 50% mating fraction. Routine quality assessment has shown no issues with male quality.

The optimal start for such a program is during the dry season when *Aedes aegypti* population is low, requiring lower release rates of OX513A males. Once control is achieved, it is possible to maintain and prevent seasonal increase with low release numbers. Indeed, this was the original plan for this project, but due to various administrative and judicial delays the releases were not initiated before the rains and corresponding increase in local mosquito population.

In order to achieve suppression of the population of *Aedes aegypti* with the shortest delay, an increase of the production levels is planned by using the entire existing mobile production facility described in the initial permit application for larval rearing and pupae sorting. The sorted males will be transferred to a separate insectarium built to ACL-2 standards where, using the existing processes, they will be put into release pots and fed until ready for release. This planned change should facilitate increasing the release rate above 500,000 OX513A males per week.

At the same time, the steering committee has decided that it may conduct targeted larvicide and adulticide treatments in both treatment and comparator areas before the end of the rainy season in November and/or December to bring the wild population down and hence boost the mating success of the release OX513A males. Using chemicals in synergy with the releases of OX513A males has always been envisaged as an appropriate use of the Oxitec solution within Integrated Vector Management strategy, consistent with recommendation from the World Health Organization for *Aedes aegypti* control. The adulticide applications which may be used would not have a residual effect and will be timed to minimise their impact on the released males.

Given the level of the wild population in the area at the moment, these two adjustments to the program, increased releases and chemical applications, are expected to speed up the suppression of the *Aedes aegypti* population.