About sterile females contamination and residual fertility in a mosquito control program using the Sterile Insect Technique. Impact on Dengue control.

Yves Dumont[1,2,3], Ivric Valaire Yatat-Djeumen[2,4,5]

[1]CIRAD, UMR AMAP, F-97410 Saint-Pierre, France
[2]AMAP, Univ Montpellier, CIRAD, CNRS, INRA, IRD, Montpellier, France
[3]Department of Mathematics and Applied Mathematics,
University of Pretoria, Pretoria, South Africa
yves.dumont@cirad.fr

[4]National Advanced School of Engineering of Yaoundé,
University of Yaoundé I, Cameroon
[5]UMI 209 IRD/UPMC, UMMISCO, Bondy, France
yatat.valaire@gmail.com

The Sterile Insect Technique SIT is a technique to control vectors of diseases by releasing sterile males. However, after the ionization/sterilization process, sterile males are never 100% sterile such that there is a small percentage, ε, of sperms or individuals that remain fertile [1]. Sex-separation is also a complex process, such that females eggs or pupae can contaminate the males buckets, and, then, be sterilized and released. Since only females are vectors, this could be problematic when an arthropod virus, like DENV, is circulating [2]. Both issues always occurring simultaneously in SIT programs, it is important to take them into account in SIT models and to derive thresholds and/or upper bounds.

To this aim, we develop and study an entomological-epidemiological model that includes releases of sterile insects, residual fertility, and mechanical control, i.e. the removal of breeding sites. We provide numerical simulations when DENV is circulating, like in La Réunion [3]. This work is an extension of [2].

Keywords: Sterile Insect Technique, Dengue, mathematical model, epidemiological model, residual fertility, sterile females contamination, qualitative analysis, control

References

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