

Aelimin+Mosquito Control Research Project



INSTITUT LOUIS MALARDÉ (ILM)



A blood feeding *Aedes polynesiensis*

Mosquitoes are a major nuisance to public health and tourism in the Pacific and elsewhere. Despite much effort to control them in French Polynesia and on a global scale with classical methods including insecticides, mosquitoes remain one of the biggest threats to man. This is due in part to their capacity to develop resistance to insecticides. Furthermore, insecticides are less and less acceptable considering current efforts to protect and preserve the biodiversity of Pacific islands.

PROJECT DESCRIPTION:

Researchers from Institute Louis Malardé are investigating a novel Sterile Insect Technique (SIT) for controlling mosquitoes. Developed in collaboration with the University of Oxford, this population suppression strategy relies on the release of large numbers of incompatible males mosquitoes to seek, court and mate wild females, thereby reducing their reproductive capacity.

The Aedes elimination (AeLIMIN+) research project offers significant potential benefits, firstly by aiding in the control of *Ae. polynesiensis* mosquitoes, which transmit infectious diseases such as dengue, Zika, or Chikungunya, and secondly in providing environmentally sustainable solutions. The development and field assessment of efficient control methods such as this, are therefore of vital importance to the health and wellbeing of (Pacific island) communities and the environment.

An incompatible *Aedes polynesiensis* (SIT) male (credit: ILM, J. Marie)



The AeLIMIN+ project will be conducted in three phases:

- **Field Characterization:** GPS and entomological field data are being collected on Tetiaroa to characterize and monitor the dynamics of the *Ae. polynesiensis* mosquito in space and time before, during, and after SIT intervention. Mosquito surveillance relies on a network of mosquito trapping devices that have been deployed on multiple islets across the atoll.
- **Integrated Control Intervention:** Suppression treatment will consist of classical control measures (e.g. removal of breeding containers) complemented with the Sterile Insect Technique. Large numbers of sterilizing males (male mosquitoes do not bite) will be released each week for a period of 8-10 months. The effectiveness and sustainability of this integrated approach will be assessed before, during, and after intervention by monitoring three key indicators:
 - Population fertility
 - Population abundance
 - Physiological age in wild females (which live between 3-4 weeks on average)
- **Surveillance and Prevention:** By the end of the control intervention, it is anticipated that the targeted mosquito population will have collapsed and might even be eliminated in the treated area. If successful, the strategy will be applied to other islets of Tetiaroa particularly those used by sea birds for nesting. Mosquito surveillance will assess the sustainability of the control intervention over time. These measures will also detect and manage any rare introductions of *Aedes* mosquitoes from other distant islets.

WHY IT'S IMPORTANT:

Controlling the mosquito population has obvious implications for minimizing the spread of diseases. It helps relieve pressure on the healthcare system, not just in French Polynesia but also around the world, and helps people avoid debilitating diseases and even death. As a closed ecosystem, Tetiaroa is a perfect study site for this kind of project where the lines of research are clear and measurable. This project is supported by Tetiaroa Society, Pacific Beachcomber, and the French Polynesian Health and Research authorities. It has also received expert support from the INFRAVEC European Consortium.

PRINCIPAL INVESTIGATOR:

Dr. Herve Bossin, Ph.D. is the Head of Medical Entomology at Institut Louis Malardé. His research focuses on the development and testing of novel mosquito surveillance and control methods that are likely to benefit the health and wellbeing of Pacific island communities.

RESEARCH SCIENTISTS:

The next phase of research will focus on the characterization and surveillance of mosquito populations outside Tetiaroa (monitoring the distribution of pest species, their abundance and seasonal fluctuations) to prepare for large-scale implementation of innovative mosquito control strategies. Once collected, the field data will help construct entomological risk maps and devise more efficient control methods to prevent transmission of mosquito-borne diseases in the Pacific.

SUPPORT RESEARCH ON TETIAROA:

This research is sponsored in part by Tetiaroa Society, a non-profit organization established to help protect Tetiaroa, promote sustainable activities, and support scientific research targeted at understanding and protecting delicate island ecosystems.

We invite you to experience the life of a scientist in the field and better understand our work by joining investigators studying on the atoll. If you are interested, please contact one of our scientists on the atoll or the concierge at The Brando.

We also invite you to make a financial contribution to Tetiaroa Society to support the world-class science taking place on the atoll. Your donation will support us in our mission and the next phase of this project. If you want your funds to be used exclusively for this research project, please note this when you donate. Donations can be made online at www.tetiaraosociety.org. Thank you for your generosity, participation, and support.

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