

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA17108

STSM title: *Vector control of Aedes albopictus using the Sterile Insect Technique: monitoring and assessment tools*

STSM start and end date: 05/09/2020 to 19/09/2020

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PURPOSE OF THE STSM:

(máx. 200 words)

The Sterile Insect Technique (SIT) is a pest insect control strategy that consists in the production of sterile males through irradiation and releasing them in the environment to mate with wild females resulting in no offspring and insect population suppression. The success of an Integrated Vector Management program (IVM) targeting the mosquito *Aedes albopictus* that includes the SIT component relies on the ability of the irradiated sterile males to survive, disperse and compete sexually to induce sterility in wild females.

In this training, we aimed to test the dispersal capacity and longevity of irradiated and non-irradiated males of *Ae. albopictus* at the same environmental conditions and habitats. Thereby, after an accurate plan for the logistical operation setup in advance in the host institution, a Mark-Release-Recapture (MRR) study was performed. Briefly, sterile male *Ae. albopictus* mosquitoes' and non-sterile males' were marked and released in the SIT target region of Vravrona, municipality of Markopoulo. Recapture sessions were performed 3-5 days after the release by Human Landing Collections (HLCs) and collected mosquitoes were transferred alived to the laboratory to record lifespan.

Baseline data collection from monitoring activities were continuously ongoing with Biogents Sentinel traps (BGS) and ovitraps to assess *Ae. albopictus* population phenology.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(máx 500 words)

MOSQUITOES:

1. **SIT release males** produced in Centro Agricoltura Ambiente (CAA, Bologna, Italy)), irradiated at 35 Gy, transferred from Italy and released in Vravrona;
2. **Non-SIT release males** produced in CAA, transferred from Italy and released in Vravrona;
3. **SIT lab males** produced in CAA lab, irradiated at 35 Gy, transferred from Italy to Greece, but not released;
4. **Non-SIT lab males** produced in CAA lab, transferred from Italy to Greece, but not released;
5. **Laboratory strain males** produced in BPI laboratory;
6. **Wild males collected in Loutsa**

MRR TRIAL:

An equal number of sterilized and non-sterilized males of the Vravrona strain were dusted with different colors and release from one point at the same time on Friday Sept 11. The recapture sessions were performed at day 3, 5 and 7 after the release in HLCs of 10 min at 30 sites in an area up to 250 m distance from the release point. The recovered males were immediately transported to the laboratory and placed in individual cages with 5% sugar solution for recording their remaining lifespan. The same number of mosquitoes for all the treatments (not released, lab and control) were kept in the laboratory in individual cages as a reference baseline for longevity estimation.

MAIN ACTIVITIES AND TECHNIQUES ADDRESSED IN THE STSMS

The work plan took place in Benaki Phytopathological Institute (BPI) and SIT target field areas. The main activities and techniques addressed in this work were:

1. Sterile males packaging, transport and logistics;
2. Marking of adult mosquitoes with fluorescent pigments;
3. Sterile males release in ground;
4. Ovitrap management and assessment;
5. Collection and management of the oviposition supports;
6. Egg hatching practices from oviposition supports;
7. Classification and quantification of ovitrap catches (total number of eggs, hatched, unhatched, destroyed);
8. BGS traps management and assessment;
9. Human Landing Collections (HLCs);
10. Identification and quantification of mosquitoes from HLCs and BGS collections;
11. Calculation of mortality in sterile male mosquito's releases;
12. Calculation of longevity of released sterile male mosquitoes.

In the BPI laboratory, hatching practices of invasive mosquito species, adult rearing, larval rearing, insectary procedures and ovitrap assessment was performed, together with the analyses of HLCs, BGS traps and ovitraps collections. The efficiency of various trapping was evaluated.

In the field, after *Ae. albopictus* males' releases, HLC was performed every two days in target and control areas.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

(máx 500 words)

The hatching rates of the *Aedes albopictus* population for the period in study were **less than 50%** in SIT area **and more than 90%** in control area 1 and 2.

A total of 25,000 sterilized *Ae. albopictus* were released in the target area. For the post releases recaptures HLC was employed 3, 4, 5, 6, 10 and 11 days after the release. More than 300 **SIT release males and non-SIT release males** were obtained and set in lab individual cages. Results are not yet available since the experiment is still continue. Based on the observations the dispersal ability of the SIT and non-SIT released males was apparently the same.

During this work I increased my knowledge in:

1. Organizing MRR experiments: procedure of collecting, marking, selecting sites for release, releasing and monitoring through human landing and BG-adult traps;
2. Evaluating the efficiency of various trapping methods like human landing and BG-Sentinel;
4. Performing egg hatching protocols of invasive mosquito species;
5. Developing an ovitrap and BGS trap surveillance network in SIT area;
6. Assessing cost-efficiency of various options for surveillance;
7. Calculating mortality rates in sterile male mosquito releases and longevity.

FUTURE COLLABORATIONS (if applicable)

(máx 500 words)

During the STSMS I had the opportunity (i) to discuss the potential implementation of a small-scale SIT project in Portugal, (ii) to increase my network by meeting other colleagues working in the field of vector control, (iii) to plan and develop activities that can be performed to increase public awareness and local community involvement, and (iv) to plan future research projects in Portugal.

All the results produced during this fellowship are part of the vector control strategy in the region, with reference to Benaki Phytopathological Institute (BPI).

The project application with the reference PTDC / BIA-ZOE / 6474/2020 and untitled **Integrated vector management for the control of the Asian tiger mosquito (*Aedes albopictus*) in Portugal using the Sterile Insect Technique (SIT)**, in which BPI is a participating institution represented by Dr. Antonios Michaelakis, is currently under evaluation and we are looking forward to continue working synergistically in the SIT field.