SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT

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

Action number: COST Action CA17108, GP3 APPROVED STSM
STSM title: Strategies for surveillance of *Aedes japonicus*
STSM start and end date: 23/08/2021 to 20/09/2021
Grantee name: Sergio Magallanes Argany

PURPOSE OF THE STSM:

According to research Coordination 1, 2, 4, and 6 of the AIMCOST, this STSM would allow me to improve my knowledge about current methodology and sampling practice, monitoring and identification of Aedes invasive mosquitos (AIMs), such as *Ae. albopictus* and *Ae. japonicus*. Moreover, due to the experience of Adolfo Ibañez-Justicia in spatial distribution models applied to mosquito vector species, I will be able to learn these analytic tools indispensable to prevent and predict the future spread of IMS in Europe.

In addition, the NVWA could provide me with the required knowledge to promote and harmonize surveillance strategies, and the development of guidelines containing recommendations for best practice for sampling, site surveillance, and spatial modelling. With this knowledge I will to adapt at the needs of the actual situation of the AIM's in the south-east of Spain. During this STSM will also transfer knowledge about the effectiveness of each type of mosquito trap and on most cost-effective, locally tailored, and sustainable AIMs control methods used in Netherlands, and evaluate the possible adaptation in my country (Spain).

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

During the first week, I have received theoretical training about strategies of surveillance in the different points of entry where AIMs could be arrive from other countries. I have learned the strategies that the Centre for Monitoring of vectors (CMV) use when one AIM it is found in one of the multiple possible entry points in Netherland. Adolfo Ibañez also trained me on how to use ArcGIS to define the areas of control and how to extract data (addresses) for organizing door-to-door mosquito control actions.

Regarding training in the laboratory, I work with trained experts of the CMV, and they have trained me on the basic and specific theorical information necessary to identify not only adult AIMs but also larvae of AIMs mosquito (Figure 1).

In respect of fieldwork, I have participated in a Latin square research to test the effectivity of four different traps and different commonly lures used. Moreover, I collected samples of adult and

larvae mosquitos in Lelystad, one of the areas where *Aedes japonicus* is estabilised. Here, I also controlled four ovitraps, two in allotment gardens and two inside the forest (Figure 2 and 3).

Figure 1Training with experts

Figure 1 Ovi trap in allotment garden

Figure 3 Ovi Trap in forest

The second week, after the theoretical traning on mosquito surveillance I visited some critical AIM's points of entry such as the airport of Amsterdam, where I was able to see with the CMV inspectors where BG traps are placed in the airport. I also was present during the inspection of the interior of the cargo planes as well as the luggage containers of high-risk travels are done.

I tried my recently knowledge about identification of adults and larvae mosquito. I started with my practical training in the identification with the samples that the Centre for Monitoring of vectors (CMV) has in their collection.

During the third week I spent time identifying both AIMs and native mosquitoes at the species level. Learning to recognize key characteristics for the identification of these mosquitoes even if their conservation was not optimal. For this, I have participated in the identification processes of mosquitoes from traps located throughout the Netherlands for the surveillance of AIMs. In addition, to continue with the learning of the morphology, I was trained on identification of mosquito larvae to genus level. Essential part for an early detection in the case of AIMs.

At the end of the third week, I went back to field work in Lelystad. We collected new samples from both larvae and adult mosquitos of *Aedes japonicus*. In addition, we proceeded to review the ovitraps located in the two different environments (forest and allotment garden) for the detection and collection of AIM eggs.

In the last week I have used all the samples collected during the previous weeks to make an collection of the main species of mosquitoes that share habitat and breeding area with *Aedes japonicus*, in order to use them in the future as a reference for the identification of these species.

Finally, we have done a day in which I have been able to explain to the CMV staff the technique for the dissection of the salivary glands and the midgut of the mosquitoes for the subsequent detection of possible pathogens.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

Since the objectives we set for this STSM were the acquisition of knowledge and skills in relation to the detection, monitoring, surveillance, and development of preventive strategies that are currently being applied by CMV for the control and detection of AIMs, I have had the opportunity to:

First, learn on the AIM's surveillance systems that the CMV has developed. I have been able to collect information both from field work and from the management and organization of the inspectors during the survey of the different points of entry, susceptible to receive AIMs such as airports, or tire import companies. In the case of urban gardens, we have determined the areas where we can find a greater concentration of breeding sites for AIMs. I have also learned in the field on the specific behaviour of *Aedes japonicus*, where to find larvae in urban gardens, where to detect adults (nearby wooded areas) by human landing (Figura 4). At the airport, the areas where suitcases arrive and are inspected are points where more intense surveillance is required, for this purpose BG Mosquitaire plus CO_2 and BG GAT traps are used that allow the traps to be active 24 hours a day for long periods of time. In addition, aircraft arriving from areas where there is a high abundance of AIMs are inspected, and containers containing baggage are intensively checked by inspectors. Another area that is likely to favour the invasion of these species are the used tire companies. To detect and monitor these areas, it is essential to know which are the preferred habitats for AIMs. This STSM has allowed me to work with the inspectors and learn from their experience (Figura 5 y 6).

Figure 4 Sampling collected by humand landing

Figure 5 y 6 Inspector and I working in a tire companies

Being able to be with them during their work has allowed me to learn the guidelines to follow for the detection of these AIMs not only at airports but also at other points sensitive to the entry of these invasive species.

As far as laboratory work is concerned, I have been able to collect samples of mosquito species present in the Netherlands (including AIM's), to have a reference to be able to propose this type of surveillance in the areas of my country that may require it. I have also acquired new skills in the identification of both adult and larval mosquitoes. Moreover, I have learned to make collections of mosquitoes using entomological needles and I have been able to prepare a collection with the most representative species of the areas where I have worked including several samples of *Aedes japonicus* both males and females, which I will be able to use as a reference in the future.

Finally, I have been able to test and learn to use multiple types of traps such as Mosquito Magnet Liberty Plus, BG-GAT, BG-Mosquitaire CO_2, BG-Pro, and BG sentinel, and gravity trap with multiple attractants such as CO_2 produced by dry ice or by fermentation, hay infusion or CO_2 tank.

FUTURE COLLABORATIONS (if applicable)

Although the stay was mainly for learning and training purposes, we were able to initiate several experiments such as Latin square experiments, in which we wanted to test the efficiency of the different traps and attractants used. This experiment is in progress but requires more time. Once it is finished, I will take care of the analysis to see what the results are and to extract patterns of use according to the target species. We have several ideas to use the huge database they have at CMV to model patterns of diversity, abundance, and richness of not only invasive species but also species carrying pathogens to prevent possible outbreaks of infectious diseases.
Finally, we have been working on a book chapter on the expansion of some mosquito species such as *Ae. japonicus* and the implication of anthropogenic landscape transformation on vector populations.

The STSM grantee
Sergio Magallanes Argany
University of Extremadura
Date: 20/09/2021

Signature

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