

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

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

STSM title: Identification, field monitoring/surveillance and MRR of AIM species

STSM start and end date: 17/10/2022 to 21/10/2022

Grante name: Abderrahmane Zahri

PURPOSE OF THE STSM:

Mosquitoes are a group of arthropods characterized by great importance in the field of public health due to their ability to transmit multiple pathogens of medical and veterinary importance to humans and animals. Climate change, the impact of urbanization, and the global movement of people, animals, and goods are increasingly driving vector-borne diseases. Therefore, the development and implementation of vector control programs require knowledge about vector distribution, abundance, and seasonality, as well as an understanding of their interaction with the environment. A large number of mosquito species, belonging mainly to the genera *Aedes* and *Culex*, transmit Rift Valley Fever, which is a zoonotic vector-borne disease that affects livestock (e.g., cattle, sheep, goats, and camels), resulting in severe economic losses due to abortions and newborn deaths. Reduced production exacerbates economic losses through lower market prices for livestock and livestock products, trade restrictions, and additional costs associated with surveillance plans. The aim of the AIM COST Short Term Scientific Mission was to allow Abderrahmane Zahri as an PhD student to have a training in morphological identification of mosquito species in Serbia for the acquisition of solid skills in taxonomy and systematics, training on surveillance methods used in the field for *Aedes* invasive species in urban and rural areas, get the knowledge about Mark-release-recapture of sterile *Aedes albopictus* males, to be trained in mosquito rearing of *Culex pipiens* and *Aedes albopictus*, to get knowledge about SIT and to promote future medical and veterinary entomology research exchanges and opportunities among University of Novi Sad and the Institut Agronomique et Vétérinaire Hassan II.



DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

1- Training in morphological identification of mosquito species in Serbia for the acquisition of solid skills in taxonomy and systematics:

Morphological identification of mosquitoes of medical and veterinary interest was based on a identification key Becker et al. (2010). This identification was performed on collections of Culicidae from the Vojvodina Province, Serbia, available in the laboratory of the Center of Excellence One Health - Vectors and Climate of the University of Novi Sad, Faculty of Agriculture.

The species of mosquitoes identified are the following: *Culex pipiens*, *Aedes albopictus*, *Anopheles hyrcanus*, *Culiseta annulata*, *Coquillettidia richiardii*, *Aedes cinereus*, *Aedes vexans*, *Aedes caspius* and *Aedes sticticus*.



2- Laboratory procedure for *Culex pipiens* biotype *molestus* and *Aedes albopictus* rearing:

Culex pipiens complex is composed of two biotypes: *Cx. p. pipiens* and *Cx. p. molestus*. The first one inhabits above ground breeding sites (epigeic), mates after swarming in open areas (eurygamous), feeds primarily on birds, undergoes winter diapause (heterodermic), and requires a blood meal to develop eggs (anautogenous). The second biotype is found in underground habitats (hypogea), mates in confined spaces (stenogamous), feeds more frequently on mammals, does not diapause (homodynamic) and can complete its first gonotrophic cycle without a blood meal (autogenous). We can breed *Aedes albopictus* which has an invasive character and has been considered particularly suitable for the SIT (**Sterile Insect Technique**) as a species-specific and environmentally friendly method of pest control, which consists of inducing sterility in the natural population by releasing a large number of mass-reared male insects sterilized by irradiation.

Materials and Methodology



Mosquitoes and rearing methods: The mosquito strain used, was obtained from field-collected material and maintained under laboratory conditions. Larvae obtained after hatching procedures are reared in white plastic trays containing 2 liters of demineralized water (no chlorine) and fed with dog and cat food. The produced larvae were metamorphosed into pupae and these were collected at the beginning of pupation in order to keep them within the population reared in the cages.



Cage description and operation: Each cage has a rectangular shape and has an opening in the center connected to a fabric sleeve to access and operate inside the cage and inside each cage there are devices for feeding with sugar (A transparent plastic cup containing 10% sugar solution and plugged by a fabric that is suspended upside down in the cage). Pupae were collected daily and introduced in rearing cage. Every second day eggs were collected and place in rearing trays. It should be noted that for the biotype *molestus* of *Culex pipiens* does not require a blood meal to produce eggs but it is not the case for *Aedes albopictus*. They get blood meal from human arms.

Eggs collection: they are collected after their laying at the water surface inside the



plastic trays filled with non-chlorinated water.

3- Field monitoring of AIM species:

Monitoring is based on repetitive sampling every week for an extended period of time involving the coverage of 20 ha area. Ovitrap traps are the best option for mosquito monitoring and surveillance because of their low cost and ability to cover large areas. A field trip was made to the Telep, part of Novi Sad to collect the ovitrap sticks with eggs and use a automatic aspirator to collect the adult mosquitoes by HLC method. The results obtained by HLC are presented in the following table:

Positions	Males	Females
T1	(5) <i>Aedes albopictus</i>	(7) <i>Aedes albopictus</i>
T2	(0)	(1) <i>Aedes albopictus</i>
T3	(0)	(0)
T4	(0)	(1) <i>Aedes albopictus</i> (1) <i>Culex pipiens</i>
T5	(0)	(0)
T6	(0)	(1) <i>Aedes albopictus</i>
T7	(0) <i>Aedes albopictus</i>	(3) <i>Aedes albopictus</i>
T8	(0)	(1) <i>Aedes caspius</i>
T9	(0)	(0)
T10	(0)	(0)
T11	(0)	(0)
T12	(0)	(0)



FUTURE COLLABORATIONS (if applicable)

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The establishment of a partnership between researchers affiliated with the center of excellence One health - climate and vectors of the University of Novi Sad - Faculty of Agriculture and the unit of parasitology and parasitic diseases of the Agronomic and Veterinary Institute Hassan II will be possible as a result of this STSM. For this purpose, the joint activities should be initiated in this direction.

This STSM has improved my knowledge about mosquito biology, mosquito morphological identification and monitoring of invasive species.

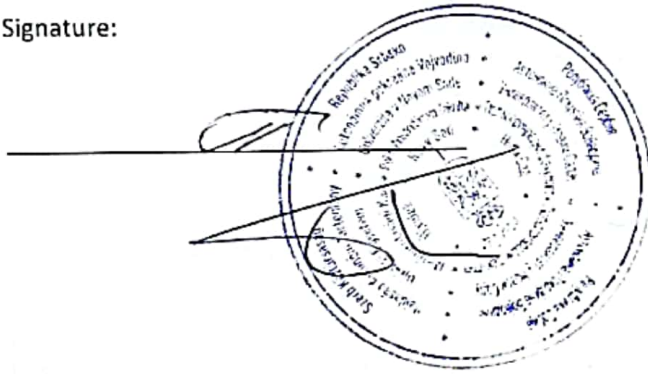
Date: 20/10/2022

Prof. dr Dusan Petric

Center of Excellence One Health - Vectors and Climate

University of Novi Sad, Faculty of Agriculture

Signature:

A handwritten signature in black ink is written over a circular official stamp. The stamp contains text in Serbian, including "Republika Srbija" and "Univerzitet u Novom Sadu". The signature is a cursive scribble that partially obscures the stamp's details.