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Our Experience in Collecting Tiger Mosquitoes Using Ovitraps in Strumica, Gevgelija and the Border Crossing to Greece

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Abstract: Collecting eggs of Aedes (Stegomyia) albopictus (Skuse, 1894) (Diptera, fam. Culicidae), i.e. Asian tiger mosquito was carried out in August 2016. Fourteen (14) ovitraps were placed at 3 different places: the area Banja Bansko (near Strumica), Mrzenci (Gevgelija) and at the border crossing between Macedonia-Greece (Bogorodica). During one month the ovitraps were exposed for two weeks, near the vegetation that mosquitoes use as resting places, also in the places where people are present and close to potted flower arrangements. The collected eggs from the ovitraps were returned to the Entomological laboratory of the P.H.O. Center for public health-Skopje and put in an entomological (hand-made) cage. Under the optimum moisture and temperature, after a few days the adults emerged. The determination of species was performed using a binocular magnifier. A total of 50 mosquitoes were collected, of those 23 were male *Ae. albopictus* and 27 were female *Ae. albopictus*. These examples were verified by prof. Dusan Petric and the Medical entomology laboratory at the Faculty of Agriculture Novi Sad (Republic of Serbia). The presence of *Ae. albopictus* in the Republic of Macedonia was for the first time determined. We are now even more motivated to investigate and prove the presence of tiger mosquitos in other locations in Macedonia.

Key words: Asian tiger mosquito, ovitraps, collecting eggs, Republic of Macedonia.

1. Introduction

World economic trade and global climate change are fundamental prerequisites for intensive distribution of vectors whose transmitted pathogens and they are dangerous for the human health. For that it is necessary a thorough study of ecology and the expansion of vectors. One of the most important vectors of infectious diseases belongs to mosquitoes. They are a transmitter of Arbovirus, Malaria, Filariasis etc. and in Macedonia there are 51 species of the family Culicidae, which are native. However, there is a significant probability for introduction of invasive species, which are native to African-Asian continents, knowing that their presence is established in our neighboring countries, in Albania in 1979 (Savvopoulou et al. 2011) and in Greece (Samanidou-Voyadjoglou et al. 2005) between 2003-2004.

Until now the presence of invasive mosquitoes, particular species *Aedes* (*Stegomyia*) *albopictus* [2] or Asian tiger mosquito has not yet been discovered in Macedonia.

The world is threatened by an epidemic diseases caused by viruses (ex. Zika epidemic) whose are transmitted by the invasive mosquitoes. Therefore, there is a great need for the cooperation between P.H.O. Center for Public Health and the Ministry of Health of the Republic of Macedonia to conduct scientific research to prove the presence or absence of the Asian tiger mosquito which is a potential carrier of

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different viruses. In order to prove the presence of Asian tiger mosquitoes in Macedonia, the expert team from the Department of disinfection, fumigation and Pest control in P.H.O.-CPH Skopje set up ovitraps (ovipozitors) in the southern and southeastern Macedonia.

Discovery of invasive mosquitoes in this region indicates the highest probability of their presence in the neighboring countries, because the South is a crossroads of trade, the probability of the impact of the Mediterranean climate, etc.

2. Material and Methods

The places where we performed the research of the presence of Asian tiger mosquitoes are located far from our office in Skopje (app 130 km/81 miles) so we decided that using ovitraps is the best options for this research. Ovitraps were set up for a period of one month starting from July 21st 2016 year until August 18th 2016 year. They were replaced each 10-15 days. Ovitraps were transported to the Entomological laboratory in DDD Office in Skopje.

Ovitraps were set up in three (3) locations at 14 different points (Fig. 1).

The first location is a private restaurant at the border crossing point. Latitude 41.1406 and Longitude 22.5489. Five (5) ovitraps around the restaurant were set up and around the potted flowers arrangements (Figs. 2-4). Outdoor garden at the restaurant (border crossing) allows the continued presence of domestic and foreign visitors. The increasing economic trade and frequency of heavy goods vehicles were a prerequisite for choice of this location.

The second location is at the restaurant, “JavorGoko” which is located in a rural region Mrzenci municipality Gevgelija. Latitude 41.1625 and Longitude 22.506944.

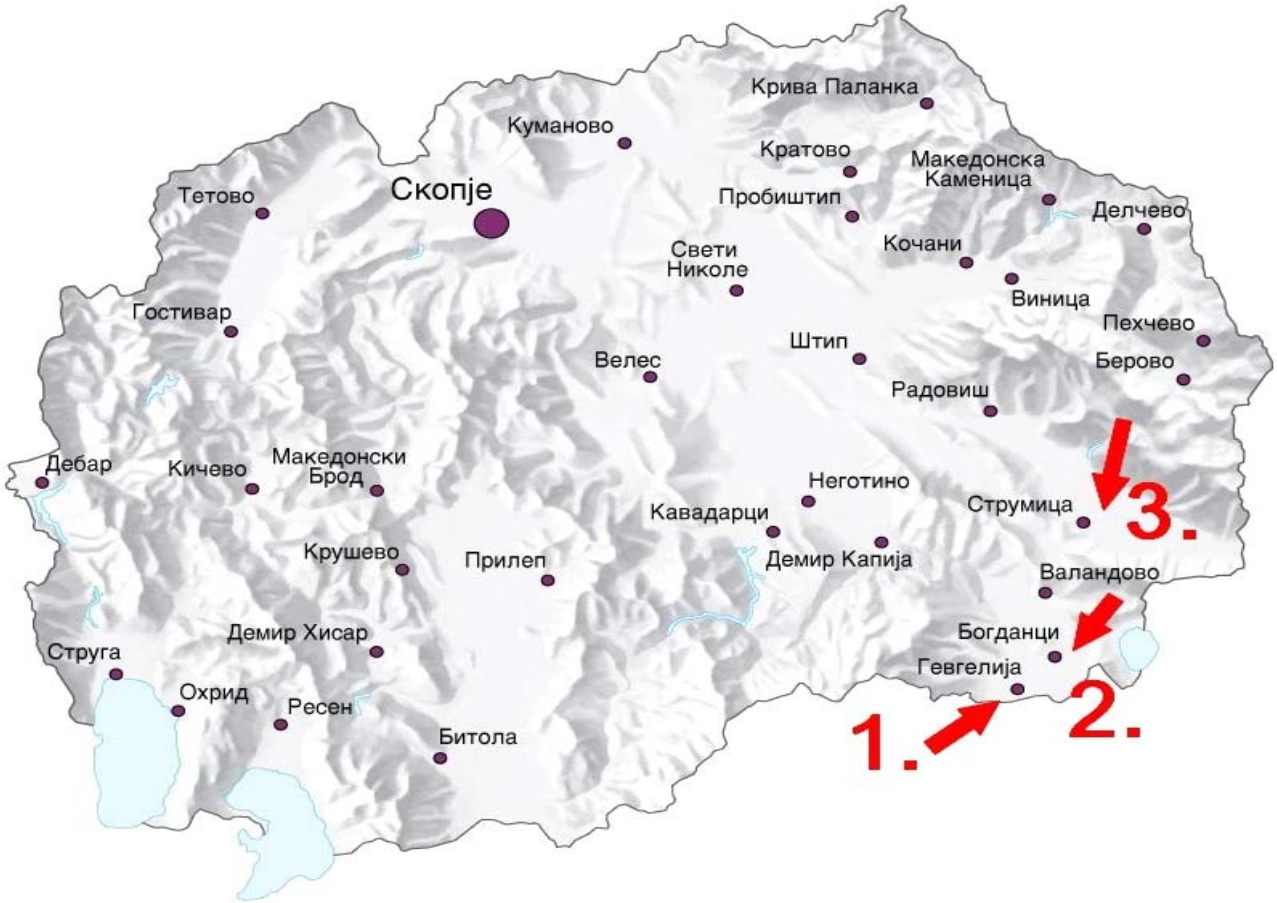

Fig. 1 Locations where research of Asian tiger mosquito presence is done.
Source: Google map of Macedonia.

(a) (b)

Fig. 2 Ovitraps in potted flowers arrangements in front of the private restaurant at the border cross (Photo: N. Sokolovska).

Fig. 3 Checking ovitraps at the border cross (Photo: Lj. Nedelkovski).

Fig. 4 Collecting eggs from ovitraps at the border cross (Photo: Lj. Nedelkovski).

Locality is extremely naturaland there is a beautiful summer terrace in the shade of the 700 years old maple (Figs. 5 and 6) with the decorative made little steam (meaning of steam in this sentence?) in the garden of the restaurant (Fig. 7). This structure and location of the restaurant lures thousands of visitors on a short vacation. Five (5) ovitraps were also placed around the restaurant.

The third location was at the grill-bar “Vlade” a few kilometers away from Banja Bansko, Strumica. Latitude 41.38333 and Longitude 22.75. Locality touch two different orographic and biographical sections, the forest on mount Belasica by the oneside, Strumica valley with river Dermen on the other side, the immediate vicinity of the spa, transit passengers and visitors to the spa and the restaurant create ideal conditions for growth and development Asian tiger mosquito (Figs. 8 and 9). Four (4) ovitraps around grill-bar “Vlade” were set up.

3. Results

After the withdrawal of ovitraps they were put in (hand-made) cages (Fig. 10) at the Entolomological laboratory in the Unit DDD-Skopje, where under appropriate conditions mosquitoes adult emerged (Fig. 12).

Mosquitoes have a full cycle of development (holometabolia), i.e. egg, larva, pupa and imago. Adults of mosquitoes began to developing the next day because there was a ditch pupa stage, then

(a) (b)

Fig. 5 The restaurant "JavorDoko" in Mrzenci and surrounding (Photo: N. Sokolovska).

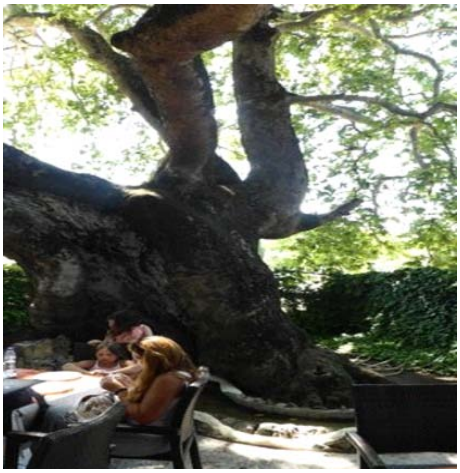

Fig. 6 Outdoor garden at the restaurant "JavorGoko" (Photo: N. Sokolovska).

Fig. 8 The river beside gril-bar "Vlade" (Photo: N. Sokolovska).

Fig. 7 Little steamin the garden of the restaurant "JavorGoko" (Photo: N. Sokolovska).

Fig. 9 The summer terrace at the grill-bar "Vlade" (Photo: N. Sokolovska).

different larval stages of development and eggs. After several days the development of mosquitoes has been completed, adults were collected by (hand-made) aspirator (Fig. 11) for the purpose of the final determination of mosquitos' species.

Determination of the invasive mosquitoes adults based on their taxonomic-morphological features were done with a binocular magnifier. After the determination, the adults were sent to the Laboratory of Medical Entomology, Agricultural faculty—Novi

Fig. 10 Hand-made cage (Photo: N. Sokolovska).

Fig. 11 Hand-made aspirator (Photo: N. Sokolovska).

(a)

(b)

Fig. 12 *Ae. albopictus* adults (Photo: N. Sokolovska).

Sad, Institute for Fitomedicina for verification. After few days we received the written notification that the presence of invasive mosquitoes *Ae. albopictus* in the southern and southeastern part of the Republic Macedonia was verified.

By receiving written notification, the professional team of Unit DDD at P.H.O. Center for Public Health Skopje achieves their aim of resolving the hesitation about the presence or absence of *Ae. albopictus* in the territory of Republic of Macedonia. Now already we can surely say that *Ae. albopictus* or Asian tiger mosquito is present in Macedonia.

4. Conclusions

The exploration will continue during the next years to have an insight about the expansion of Asian tiger mosquito on the territory of Macedonia. The importance of this evidence is of paramount importance primarily for public health protection from infectious diseases and to prevent epidemics. Based on the evidence, we will be able to control the population of mosquitoes (quantitative composition) on time with more efficiency. Also, we must ensure implementation of larvicidal treatment and quality disinsection, as well as timely control of the occurrence and spread of infectious diseases transmitted with mosquitoes and expansionin our country and neighboring european countries.

References

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