

AEDES (STEGOMYIA) AEGYPTI AND AEDES (STEGOMYIA) ALBOPICTUS IN RUSSIA

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Introduction

Aedes (Stegomyia) aegypti and *Aedes (Stegomyia) albopictus* are known vectors of arboviral infections. On the territory of Great Sochi *A. aegypti* and *A. albopictus* were discovered in 2001 and 2011, respectively. Apparently, these mosquito species were introduced on the Black Sea coast from different countries. Susceptibility level of their populations to insecticides was unknown till to 2016.

For this reason, we carried out the laboratory study for the establishment of diagnostic concentrations of larvicides commonly used for mosquito control in Russia and other countries and for the first time used them to evaluate the insecticide susceptibility of *A. albopictus* populations in the Russian Federation.

Materials and methods

III-IV instar larvae of the insecticide-susceptible strain S-NIID of *A. aegypti* and subpopulations of *A. albopictus* (N = 100-200) collected within the Greater Sochi from 6 locations (Fig. 1) were used in laboratory experiments. *A. albopictus* larvae of most of subpopulations (No. 1, 2, 5, and 6) were collected in cemeteries.

In our experiments following larvicides were used: 50% EC of temephos, technical grade products of DDT, fenthion, malathion, chlorpyrifos, cypermethrin, alphacypermethrin, deltamethrin, lambda-cyhalothrin, and etofenprox and commercially available formulations based on *Bacillus thuringiensis* var. *israelensis* – “Baktitsid” (Bti-1) and “Larviol-pasta” (Bti-2).

Larvicide tests were performed according WHO guidelines (2005). All bioassays repeated three times.

Results and discussion

Typical habitat of larvae in cemeteries are shown in Fig. 2. Diagnostic concentrations (DC = 2 × LC₉₉, mg/L) of larvicides established for insecticide-susceptible laboratory *A. aegypti* strain S-NIID were: DDT – 0,1; temephos – 0,008; fenthion – 0,0002; malathion – 0,18; chlorpyrifos – 0,0164; cypermethrin – 0,119; alphacypermethrin – 0,086; deltamethrin – 0,004; lambda-cyhalothrin – 0,012; etofenprox – 0,05; Bti-1 – 0,09; Bti-2 – 0,013.

Larvae of all natural *A. albopictus* subpopulations (1 – Sochi, cemetery; 2 – Adler, cemetery; 3 – Adler, bridge across Psou River; 4 – Adler, Institute of medical primatology; 5 – Khosta, cemetery; 6 – Loo, cemetery) were fully susceptible to cypermethrin, chlorpyrifos and larvicides based on *Bti*. On the territory of Great Sochi the insecticidal formulations “Cyfox” (25% cypermethrin-based EC) and “Larviol-pasta” are used for mosquito control more often.

Since the mortality of *A. albopictus* larvae from all collection sites after exposure to corresponding DC of tested larvicides is 100%, cypermethrin-, chlorpyrifos-, and *Bti*-based formulations can be used for treatment of mosquito breeding sites in Sochi.



Figure 2. Typical habitats of *A. albopictus* larvae in cemeteries of Sochi

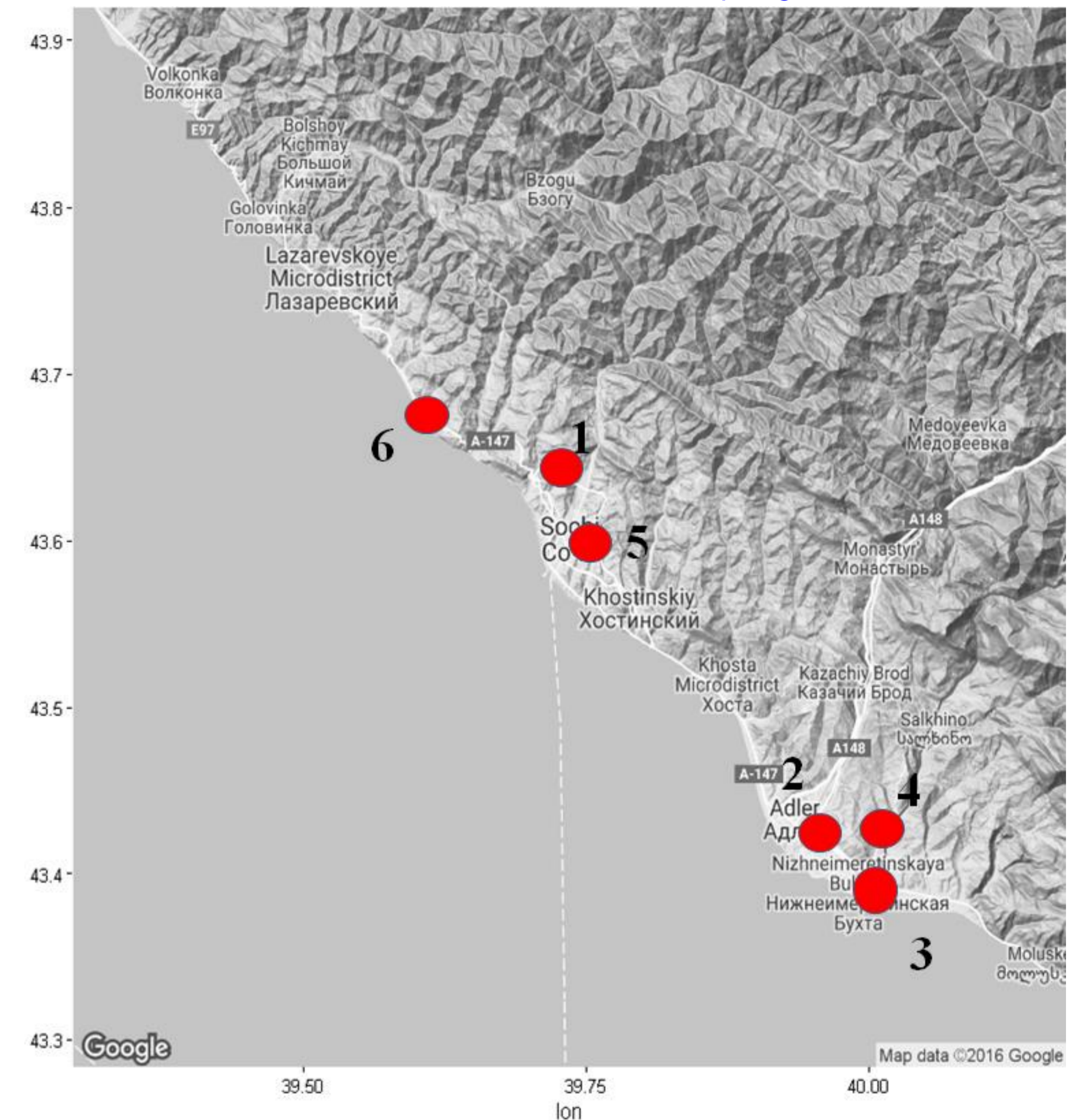


Figure 1. Collection sites of *A. albopictus* larvae

Future research

It is planned to carry out annual monitoring of the susceptibility to larvicides of populations of *A. albopictus* and the related species *A. aegypti* in Sochi and adjacent areas. To prevent the insecticide resistance development in mosquito populations, it is recommended to use larvicidal rotation schemes.

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