

POPULATION MONITORING OF AEDES ALBOPICTUS TO ASSESS OF THE EFFECTIVENESS OF INSECTICIDE-BASED CONTROL STRATEGIES AND THE RISK OF ARBOVIRUS TRANSMISSION

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The mosquito *Aedes albopictus* has a day-biting anthropophilic behaviour and represents a significant nuisance and a health concern due to its ability to transmit human pathogens, such as chikungunya, dengue and zika virus and dirofilaria nematodes. In Italy, the species has been first reported in 1990 and since then has spread to most of the country. In 2007, it has been involved in an outbreak of chikungunya virus in Emilia Romagna region. Common practices to reduce the nuisance and potential health threat in Italy imply calendar-based larvicide treatments of street catch basins - which represent the main non-removable urban breeding site - and/or insecticide ground spraying. The planning of these interventions, the evaluation of their effectiveness, as well as the evaluation of the risk of disease transmission rarely benefit of adequate monitoring of the mosquito abundance and dynamics.

This PhD project aims to exploits data collected by the Medical Entomology group of the DSPMI using novel mathematical and statistical approaches in order to: 1) identify spatio-temporal hot spots of *Ae. albopictus* abundance to guide control intervention; 2) assess the effectiveness of common insecticide-based control strategies in urban area; 3) assess the risk of arbovirus transmission. So far, the following results have been obtained:

1) Hot-spots of *Ae. albopictus* abundance have been identified in highly urbanized environment by analysing data from seasonal-long monitoring carried out in 2012 along a 70 km transect encompassing the city of Rome. Moreover, data highlighted a bimodal seasonal dynamic with a late peak of mosquito abundance in October that may be linked to the peculiar climatic condition of Rome and extends the period of risk of disease transmission compared to what previously expected.

2) The combined effect of multiple adulticide sprayings and larvicide treatments of catch basins in the area of Umberto I hospital in Rome carried out in 2013 achieved a lack of *Ae. albopictus* population expansion expected during August, despite the apparent limited impact of single adulticide sprayings. This represents one of the first assessment of the effectiveness of the most common control strategies carried out by many Municipalities in Italy.

3) In the next stages of the PhD project, the risk assessment of introduction and transmission of diseases will be carried out by mathematical modelling and *ad hoc* experiments in the 2016-2017 mosquito reproductive season.