

Abstract of Master's Dissertation

No.1

Course	Health Innovation course (MSc)	Name	Shinsuke Nojiri
Thesis Title	Overwintering strategies of <i>Aedes aegypti</i> introduced in southern Japan in 1940's		
<p>Abstract of Master's Dissertation</p> <p>Introduction: <i>Aedes aegypti</i> is a vector of infectious viruses, including dengue fever virus, distributed in the tropics and subtropics. However, <i>Ae. aegypti</i> was present in Ushibuka, Amakusa-gun, Kumamoto Prefecture, which is in the temperate zone, for eight years (1944-1952) during and after World War II. The key to the settlement of <i>Ae. aegypti</i> in Japan is whether it can overwinter. There are few studies on the overwintering of <i>Ae. aegypti</i> in the temperate zone. The information of overwintering ability of <i>Ae. aegypti</i> will be useful when the species invades Japan in the future. In this study, the overwintering ability of <i>Ae. aegypti</i> was tested in laboratory experiments following two hypotheses about the overwintering habitat in Ushibuka: "Hypothesis 1: Eggs overwintered in the water of a fire prevention tank" and "Hypothesis 2: Eggs overwintered on the inside wall of a fire prevention tank without being submerged in water".</p> <p>Methods: 30 eggs of <i>Ae. aegypti</i> were placed in each 30 ml cup, all cups were distributed to each of the three experimental conditions, "SUBMERGED" in which eggs were kept in water at overwintering condition, "UNSUBMERGED" in which eggs were kept dry at overwintering condition, and "CONTROL" in which eggs were kept dry at 20°C. The temperature in SUBMERGED and UNSUBMERGED conditions was varied at 15°C for 2 weeks, 10°C for 4 weeks, 5°C for 8 weeks, 10°C for 4 weeks, and 15°C for 2 weeks. In SUBMERGED condition, eggs were submerged in 30 ml of tap water pumped one day prior and fed 0.01 g of food, while in UNSUBMERGED and CONTROL conditions, the eggs were kept dry. At every four weeks during the 20 weeks experiment, five cups of each condition were selected and placed at 20°C to examine the hatching rate as the survival of eggs.</p>			

* The abstract, containing the objective, method, result and conclusion should not exceed 300-500 words and printed double sided on A4 paper)

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<p>Results: The mean (\pmSD) cumulative number of SUBMERGED eggs hatching after two weeks at 15°C water temperature was 14.9 ± 2.5 out of 30 eggs. However, when the water temperature dropped to 10°C after three weeks, almost no hatching occurred, and all hatching larvae died five weeks after the start of the experiment. After 20 weeks, we compared the hatching rate of SUBMERGED eggs with that of UNSUBMERGED eggs at 20°C. The median of hatching rate of the five cups was 0% in the SUBMERGED condition and 53% in the UNSUBMERGED condition. The hatching rate of eggs in UNSUBMERGED condition was significantly higher than one in SUBMERGED.</p> <p>Conclusions: In Ushibuka, <i>Ae. aegypti</i> eggs were suggested to have a high probability of "Hypothesis 2: Eggs overwintered on the inside wall of a fire prevention tank without being submerged in water". In comparison with previous studies, the results suggest that the survival rate of <i>Ae. aegypti</i> eggs were higher in high humidity environments (90-95%) than in low humidity environments (65-75%). (467 words)</p>			

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