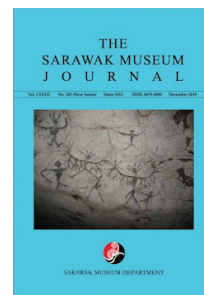




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PRELIMINARY OBSERVATIONS ON THE USE OF GENUS *TOXORHYNCHITES* LARVAE IN THE BIOLOGICAL CONTROL OF MOSQUITOES

Wong Siew Fui, Ichiro Miyagi, Takako Toma and Takao Okazawa

ABSTRACT

The predatory behaviour of fourth instar *Toxorhynchites* larvae on the larvae of genus *Culex*, *Armigeres* and *Aedes* were recorded in the experiments. *Toxorhynchites splendens* was collected from the green mature coconut traps and *Toxorhynchites licesteri* was collected from the bamboo with holes at the internodes or cut bamboo. In each experiment, two fourth instar *Toxorhynchites* were used as predators and two preys were observed after every three hours. At the end of the experiments, *Tx. splendens* and *Tx. licesteri* showed selective consumption of the genus *Culex*, *Armigeres* and *Aedes*. However, only *Tx. licesteri* and genus *Armigeres* species are not significant and randomly consume the preys. *Toxorhynchites* species can be considered or applied as part of the biological control programme of mosquitoes in general.

Keywords: *Toxorhynchites*, predator mosquitoes, prey preference



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INTRODUCTION

The genus *Toxorhynchites* is divided into four subgenera, namely *Afrorhynchus*, *Ankylorhynchus*, *Lynchiella* and *Toxorhynchites*, consisting of 94 species (Harbach 2019). Mosquitoes of genus *Toxorhynchites* are different with other mosquito species because adult mosquitoes feed only on nectar of flowers or other plant juices and never take blood meals (Bonnet and Stephen 1951; Collins and Blackwell 2000; Arunkumar and Sangaran 2012; Godoy *et al.* 2015). Larvae of genus *Toxorhynchites* are predatory on the same genus or other mosquito genus and also some small aquatic invertebrates such as ceratopogonid larvae (Toma and Miyagi 1992; Toma 2000). The larvae of genus *Toxorhynchites* breed naturally in artificial containers, coconut husks, bamboo stumps, bamboo internodes,

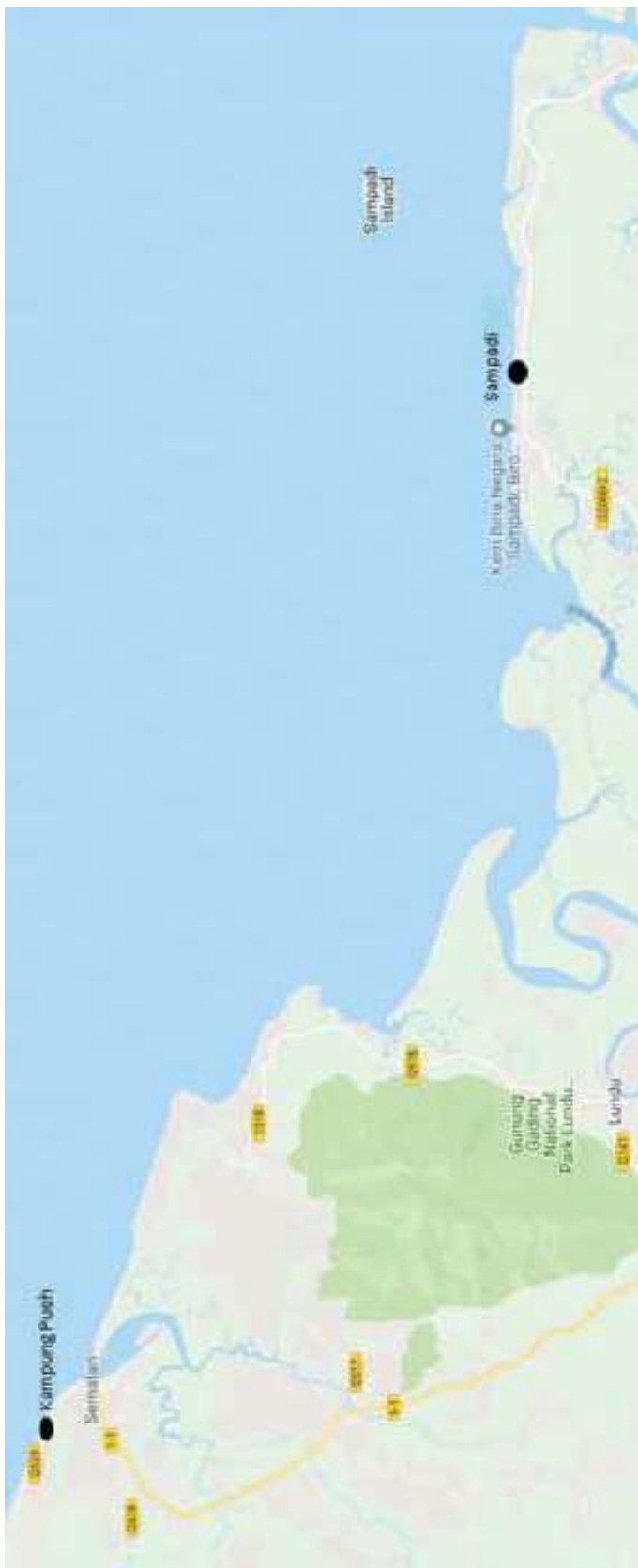


Fig. 1: The black spot indicated location of data collection for this study. (Modified from: https://www.google.com/maps/d/embed?mid=1K2r_wKycBgnVKAAe5CtE9m9EaeA&ie=UTF8&hl=en&msa=0&ll=1.7448994041120043%2C109.92791096822475&spn=2.745003%2C2.746582&z=12&output=embed).

plant axils, pitcher plants, and tree holes, which are common oviposition habitats (Benzon *et al.* 1988; Taylor 1989; Mogi and Chan 1996; Collins and Blackwell 2000; Toma 2000; Juliano and Gravel 2002; Albeny *et al.* 2011; Wong *et al.* 2012).

Generally, there are 113 genera and nearly 3,564 species of mosquitoes from family Culicidae in the world (Harbach 2019). Most of the disease carrying mosquitoes suck blood from humans and animals such as frogs, snakes and livestock animals to develop their eggs and some species may transmit pathogens of malaria parasites, filarial, dengue fever and yellow fever (Toma 2000). In Sarawak, most of these diseases are vectored by *Aedes* and *Anopheles* mosquitoes (Chang and Jute 1986; Sing and Daneshvar 2010; Jeyaprakasam *et al.* 2020). Therefore, it is important to find ways to survey and control mosquitoes.

Genus *Toxorhynchites* is recognised as a biological control agent and was used as predator mosquitoes to reduce the pest mosquitoes without causing any detrimental effects in naturally occurring populations (Toma 2000). The aim of this research is to study the use of predator mosquitoes on other mosquito larvae occurring in the wild. The research will evaluate the use of *Toxorhynchites* mosquitoes as a potential predator to reduce the larvae population of mosquitoes in the wild.

MATERIALS AND METHODS

This study was conducted in a smallholder coconut farm in Sampadi (Fig 1). Prior permission was obtained from the land owners before the study commenced. Mature green coconuts with a hole were randomly selected and picked at the coconut farm. Water in the coconut was poured out and replaced with fresh rain water. All the larvae of genus *Armigeres* found in each coconut trap were collected and transferred into containers (7.5 cm diameter x 7.0 cm height). Larvae of genus *Toxorhynchites* were also collected from the coconut traps by pipette and transferred separately into small containers (2.5 cm diameter x 4.0 cm height). Larvae of genus *Aedes* and *Culex* were collected from the discarded containers, tins, vases, plates and so on in the coconut farm. All the containers were labelled and left *in situ*.