Tropical Biomedicine 35(3): 610–618 (2018)

Larvicidal and adulticidal activities of castor oil against the dengue vector, *Aedes aegypti*

Wamaket, N.[1], Dieng, H.[2], Komalamisra, N.[1], Apiwathnasorn, C.[1], Morales, R.E.[1], Thanomsub, B.W.[3], Srisawat, R.[1] and Attrapadung, S.[1*]
[1]Department of Medical Entomology, Faculty of Tropical Medicine, Mahidol University, 420/6 Ratchawithi Road, Ratchathewi, Bangkok 10400, Thailand
[2]Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300, Kota Samarahan, Sarawak, Malaysia
[3]Department of Microbiology, Faculty of Medicine, Srinakharinwirot University, Bangkok 10100, Thailand
[*]Corresponding author e-mail: at_siriluck@yahoo.com
Received 14 July 2017; received in revised form 24 May 2018; accepted 17 June 2018

Abstract. Plants contain numerous bioactive compounds that can be used to develop environmentally-safe insect control agents. Castor oil is a vegetable oil derived from the seeds of castor bean and is widely used as an industrial lubricant and medicinal purgative. In search of an alternative natural insecticide, the objective of this study was to evaluate the larvicidal and adulticidal activities of castor oil against the important dengue vector, *Ae. aegypti*. Larvicidal and adulticidal bioassays were conducted following the World Health Organization methods. Larvicidal activity was observed at castor oil concentrations of 10, 25, 50, 75, and 100 ppm; larval mortality was checked after 48 h of exposure and the lethal concentration (LC) at LC_{50} and LC_{90} were 51.38 and 116.26 ppm, respectively. Adulticidal activity was determined by topical application at the concentrations of 1, 5, 10, 15, and 20 µg/mg on female mosquitoes and the mortality was checked after 24 h of exposure. The effective adulticidal activity was apparent with the LD_{50} and LD_{90} values of 6.03 and 25.07 µg/mg against female mosquitoes. The results indicated that castor oil has potential in the practical control of both immature and adult stages of the mosquito vector.

INTRODUCTION

Dengue fever is a serious public health problem, especially in tropical and sub-tropical regions. In 2015, the World Health Organization (WHO) reported that the incidence of dengue throughout the world had grown gradually. There are an estimated 390 million cases of dengue infection each year, with risk of dengue virus transmission in 128 countries (WHO, 2015). In the absence of specific therapeutics, controlling and preventing the disease transmission is mainly focused on the mosquito vector, *Aedes aegypti*. Application of chemical insecticides is highly successful in reducing mosquito densities, but poses risks and hazards to humans, animals, non-target organisms and the environment (Abe *et al.*, 2014). Moreover, the resistance of mosquitoes to chemical insecticides has been increasingly reported (Ponlawat *et al.*, 2005; Aponte *et al.*, 2013). In view of environmental pollution and development of insect resistance to synthetic insecticides, there is an urgent need to promote environment-friendly natural mosquito control products. In general, the natural pesticides contain the chemical compounds that possess wide ranges of biological activities and are safe to humans, the environment, and other non-target organisms. Several natural compounds have been used as model for commercial insecticides, such as synthetic pyrethroids (Mann & Kaufman, 2012). Furthermore, numerous studies have shown that several