

Chapter I: Introduction

1.1 Background

Calophyllum inophyllum is an evergreen pantropical tree belonging to the Calophyllaceae flowering plant family native to the Indo-Pacific region which includes Africa, India, South East Asia, Australia and the Pacific islands (Ansel, J.-L. et al 2016). Locally called as "Tamanu" in French Polynesia or "Nyamplung" in Indonesia, different parts of the tree (leaves, roots, bark, fruit, nut, nut oil as well as its resin) have seen use in not only traditional medicines and cosmetics but also for furniture making throughout the Indo-Pacific region (Ginigini, J. et al 2019). The oil extracted from the nut is well known to treat different kinds of skin infections (burns, eczema, acne, atopic dermatitis, etc) and has also been shown to exhibit wound healing and analgesic properties (Raharivelomanana, P., et al 2018). Tamanu oil is capable of exhibiting antioxidant effects by reducing intracellular ROS production (Said, T., et al 2007). Tamanu oil also promotes wound healing in keratinocyte cells and in fibroblast cells (Andel, J. L., et al 2015), and the neoflavonoid constituents of tamanu oil (calophyllolide, inophyllum C, and inophyllum E) have been shown to be capable of exerting antibacterial effects (Yimdjo, M. C., et al 2004).

Atopic dermatitis (AD) is a common chronic skin inflammatory disease which is characterized by multiple complex factors which include impairment of the epidermal barrier function, cutaneous inflammation, as well as the dysbiosis of cutaneous microbiota. This disease is most common in infants and children with a prevalence rate of approximately 20%, especially in developed countries (Weidinger, S. & Novak, N., 2016). Complications of AD are generally caused by infection of the skin layer with bacteria, most commonly *Staphylococcus aureus* and occasionally beta-haemolytic streptococci (Altunbulakli, C. et al 2018). The colonization of the skin by *S. aureus* has been shown to cause an increase in the severity of AD (Byrd, A. L., et al 2017). The increase in severity is associated with the formation of *S. aureus* biofilm at the surface of the infection site which obstructs the sweat ducts in the skin lesions (Sonesson, A., et al 2017).

In addition, the presence of biofilm-producing *S. aureus* shows an increase in resistance against host immune responses as well as reduced susceptibility to antibiotics (Sonesson, A., et al 2017).

While tamanu oil as well as its compounds has been well tested to assert antibacterial effects against *S. aureus* (Léguillier, T., et al. 2015), there are no records on its capability on inhibiting *S. aureus* biofilm formation. This project aims to test the antibacterial activity of tamanu seed extract (polar and nonpolar fractions) as well as its capability on inhibiting biofilm formation.