

Optimization of Culture Conditions of *Talinum paniculatum* Gaertn. Adventitious Roots in Balloon Type Bubble Bioreactor Using Aeration Rate and Initial Inoculum Density

¹Y.S.W. Manuhara, ²A.N. Kristanti and ¹E.S.W. Utami

¹Department of Biology, Faculty of Science and Technology, Airlangga University, Surabaya, 60115, Indonesia

²Department of Chemistry, Faculty of Science and Technology, Airlangga University, Surabaya, 60115, Indonesia

Corresponding Author: Y.S.W. Manuhara, Department of Biology, Faculty of Science and Technology, Airlangga University, Surabaya, 60115, Indonesia

ABSTRACT

Optimization of culture conditions of *Talinum paniculatum* Gaertn. adventitious roots in the balloon type bubble bioreactor have been done in order to increase its production of adventitious roots and saponin content. Culture conditions were used in this research were combination of aeration rate (0.25, 0.5 and 0.75 vvm) and initial inoculum density (0.5, 1, 2 g/400 mL). Bioreactor with a volume of 1000 mL was filled with 400 mL of liquid MS medium supplemented with IBA 2 mg L⁻¹ were then given sterile air through a microfilter (0.2 µm) with different air flow rates. Into each bioreactor were added of different inoculum density of adventitious roots that had previously been induced from leaf explants of *T. paniculatum* on solid MS medium supplemented with IBA 2 mg L⁻¹. Cultures were maintained for 14 days and sampling was done for every two days to determine the sugar content, conductivity and pH of the medium. The results showed that the combination of aeration rate of 0.5 vvm and inoculum density of 1 g/400 mL was the best treatment that can increase biomass of adventitious roots, whereas the combination of aeration rate of 0.75 vvm and inoculum density of 2 g/400 mL was the best treatment that can be increased of saponin content.

Key words: *Talinum paniculatum* Gaertn., adventitious root, balloon type bubble bioreactor, liquid culture, saponin

INTRODUCTION

Talinum paniculatum Gaertn which is in Indonesia also called java ginseng, has a bulging shape of the roots like *Panax ginseng* root and use as synchronized with *Panax ginseng*, especially its potential in increasing testosterone levels at the low testosterone condition, increasing number and motility of sperm (cell differentiation inductor (induce of sperm viability) and protection of human body from pathogen). In Indonesia, this plant usually was used as traditional medicine. One of the chemical content of the roots of this plant is saponins that are used as aphrodisiac. There are many kind of saponin, like saponin glycoside from *Gynostema penthaphyllum* known as gynposide that are responsible for its pharmacological activities and ginsenoside from *Panax ginseng* (Yin *et al.*, 2014). Since, saponin ginsenoside are the well-known biologically active constituents in Korean ginseng, *T. paniculatum* has also received considerable attention. But java ginseng roots grow very slowly in their natural habitat which is about 2-3 years to get more than