

**ULTRASONIC APPROACH IN BUTTERFLY PEA EXTRACTION AND
EXTRACT STERILIZATION BY ULTRAFILTRATION FOR EYE DROP
ACTIVE INGREDIENT**

By

Bea Anthika
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SWISS GERMAN UNIVERSITY
EduTown BSD City
Tangerang 15339
Indonesia

Revision after the Thesis Defense on 06 August 2015

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in this thesis.

Bea Anthika

Student

Date

Approved by:

Dr. Dipl.-Ing. Samuel P. Kusumocahyo

Thesis Advisor

Date

Hery Sutanto, M.Si

Thesis Co-Advisor

Date

Dr. Dipl.-Ing. Samuel P. Kusumocahyo

Dean

Date

ABSTRACT

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Dr. Dipl.-Ing. Samuel P. Kusumocahyo, Advisor

Hery Sutanto, M.Si, Co-Advisor

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The aim of this study is to evaluate butterfly pea ultrasound-assisted extraction (UAE) and sterilize the extract using ultrafiltration (UF) membrane for use as an active ingredient in phytopharmaceutical eye drops. The effect of petal-to-leaf (PTL) ratio and extraction time on anthocyanin concentration and antibacterial activity has been studied. The result showed that the optimum configuration was PTL ratio of 1:0 and extraction time of 30 minutes, which significantly yielded anthocyanin concentration of 35.41 ± 0.62 mg/l and exhibited the highest antibacterial activity against *S.aureus* in terms of inhibition zone of 14.75 ± 1.06 mm. Subsequently, feasibility of using UF membrane to sterilize the butterfly pea extract was also studied. Number of bacteria in the extract was varied to check whether UF was able to sterilize the extract regardless of the degree of bacterial contamination. The results showed no presence of bacteria in permeate during 21 days of observation and an increase in anthocyanin concentration as well as antibacterial activity of the extract. In conclusion, UF was very effective to sterilize butterfly pea extract without the application of heat, thus, preserve the heat-sensitive compounds such as anthocyanins.

Keywords: butterfly pea, ultrasound-assisted extraction (UAE), sterilization, ultrafiltration (UF) membrane, antibacterial activity, anthocyanins.



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DEDICATION

This thesis is dedicated for my beloved parents.



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