

CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME III

Editors:

Md. Zahangir Alam
Ahmed Tariq Jameel
Azura Amid



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

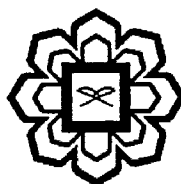
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**Department of Biotechnology Engineering
Faculty of Engineering
International Islamic University Malaysia**



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Md. Zahangir Alam, Ahmed Tariq Jameel & Azura Amid: Current Research and Development in Biotechnology Engineering at IIUM Volume III

ISBN: 978-967-418-144-4

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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CHAPTER 26

FERMENTATION OF VINEGAR FROM STAR FRUIT (*AVERRHOA CARAMBOLA*)

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ABSTRACT

Fermentation of star fruit juice was conducted to produce vinegar using the yeast *Saccharomyces cerevisiae* and *Acetobacter aceti* bacteria. The acetic fermentation was carried out for 120 hours in shake flasks with ethanol concentration of 4, 6 and 8% (v/v), inoculums size of 6, 8 and 10% or ml (v/v) and agitation of 150, 200 and 250 rpm. Two level factorial designs from Design Expert are applied for experimental design and analyses of acetic acid and ethanol were conducted using ANOVA analysis to select the optimized results. . The experiment showed that the optimum conditions for acetic fermentation is with 8% (v/v) of ethanol and 10% inoculums (v/v) and 250 rpm agitation speed. The vinegar obtained had a concentration of acetic acid of 2.855% which was higher than predicted value obtained from the selected fermented star fruit juice and the efficiency of acetic fermentation was 32.5%.

Keywords: Star Fruit Juice, Vinegar, Acetic Acid, Vinegar Fermentation

INTRODUCTION

A relatively cheap source of raw material consisting of local star fruit juice was source out in the fermentation of vinegar to replace the costly media or use of other foreign fruit such as apple, persimmon and others in the production of fruit vinegar. Star fruit is easily grown in Malaysia and thus can provide ample supply of the fruit juice for fermentation of fruit vinegar which has commercial potential in the market. In the fermentation process alcohol is produced first from yeast (Naim, 1999) where sugar is changed into alcohol (without air) and followed by acetic acid fermentation in the presence of air by the acetic bacteria (Joyeux *et al*, 1984 ; Drysdale *et al*, 1989) to produce the vinegar. A direct fermentation process using various pH, agitation speed and inoculums was conducted as this are major factors affecting the fermentation process that need to be optimized.

METHODOLOGY

Pure culture of *Acetomonas aceti* obtained from the Microbiology Lab. of our Department were inoculated using 6%,8% and 10% inoculums size (having 5×10^6