

CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME III

Editors:

Md. Zahangir Alam
Ahmed Tariq Jameel
Azura Amid



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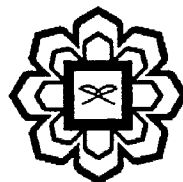
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**Department of Biotechnology Engineering
Faculty of Engineering
International Islamic University Malaysia**



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CHAPTER 36

EFFECT OF HOMOGENIZATION IN BREAKING PROTEIN-CAROTENOID COMPLEXES FOR RELEASING ACTIVE COMPOUNDS

Parveen Jamal, Irwandi Jaswir, Nurhasri Mulyadi Hashim
and Saiful Mohammad Nizam Azmi

Department of Biotechnology Engineering, Faculty of Engineering,
International Islamic University Malaysia, P.O. Box 10, 50728 Kuala Lumpur, Malaysia

ABSTRACT

The effect of homogenization in breaking protein-carotenoid complexes from cassava leaves was examined by monitoring three process conditions; amount of solvent per 0.5 g sample (ml), homogenization speed (rpm) and homogenization time (s). Acetone-n-hexane (1:1, v/v), tetrahydrofuran-methanol (1:1 v/v) and acetone were employed in the extraction process. The solvent that exhibited the best characteristics in extracting the highest β -carotene yield from the sample was selected for the optimization of process conditions for maximum β -carotene concentration, utilizing Face Centered Central Composite Design (FCCD) from Design Expert software, version 6 (DX6). A total of 20 experiments comprised of three factors, three levels and 6 center points were conducted to facilitate the optimization process. The maximum β -carotene yield of 17, 544 $\mu\text{g}/100$ g sample was achieved with the solvent ratio of 12 ml to 0.5 g sample, homogenization speed of 22000 rpm and homogenization time of 57 s.

Keywords: Protein-Carotenoid Complexes, β -carotene, Cassava Leaves, Homogenization, Face Centered Central Composite Design.

INTRODUCTION

Food and pharmaceutical industries of today are increasingly supporting the substitution of synthetic antioxidants by “safer natural mixtures”. This inclination is largely due to the increased demand from consumers for the use of natural antioxidants in their daily commodities. Among these, carotenoids comprise the group of the most abundant micronutrients in fruits and vegetables and their dietary intake is associated with a lower occurrence of certain types of cancer as well as with enhanced protection against cardiovascular disease (Kiokas et al., 2009).

Over decades of research, carotenoids have found its many uses in industrial applications besides being a natural and major dietary source of vitamin A precursor and antioxidants for the human body (Shen et al., 2009). Carotenoids, especially β -carotene, are used as food additives due to its nutritional properties. They are also added to various cosmetic and body-care products as a non-harmful colorant to improve the appearance of the