Effect of Some Factors on the Growth of *Capsicum annuum* L. Cell Suspension Culture and Biotransformation of Hydroquinone to Arbutin

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ABSTRACT

This study investigates the effect of the type of saltbase and sucrose concentration on the growth of Capsicum annuum L. (Solanaceae) cell-suspension culture and the influence of the concentration and method of addition of hydroquinone as well as the time of exposure on the biotransformation of hydroquinone to arbutin. The optimum medium for cell growth is a full-strength Murashige & Skoog liquid media supplemented with 2% (w/v) sucrose, 4.52 µM 2,4-dichlorophenoxyacetic acid (2,4-D), 0.44 µM benzylaminopurine (BAP), pH 6.0 and aerated on a gyratory shaker in a 24-h dark condition. Cell growth reaches a maximum of 4.5 times of the original cell volume between day 17 and 21 of the culture. The highest biotransformation is achieved when 15.57 mM hydroquinone is added into four equally-divided portion of 3.89 mM on each of the four days and the samples are harvested on day 5 after the first hydroquinone addition. HPLC analysis of these samples yields 555.60?19.31 mg/L of arbutin.

Key words: Capsicum annuum, Arbutin, Hydroquinone, Plant tissue culture, Biotransformation, High-performance liquid chromatography (HPLC)

INTRODUCTION

The use of plant cell cultures as a source of enzymes to biotransform exogenously-supplied chemicals into desired products of higher value has been widely studied in recent years (Yokoyama, 1996; Rao and Ravishankar, 2002). Examples of reactions that were reportedly performed by plant cells including oxidation, reduction, acetylation, esterification, hydroxylation, methylation, isomerization and glycosylation (Giri et al., 2001). These processes are particularly useful for compounds of which the structures are complex or the positions to be modified are very specific and could not be satisfactorily achieved by chemical synthesis or semisynthesis. At present, a number of natural flavors and fragrances as well as phytochemicals used in cosmetics, are conveniently manufactured through biotransformation of plant cell cultures (Kim, 2005; Kondo et al., 2006)