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STUDIES ON THE BIOCONVERSION OF GLYCYRRHIZIN

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2005

بسم الله الرحمن الرحيم

وَقُل رَّبِّ أَدْخِلْنِي مُدْخَلَ صِدْقٍ
وَأَخْرِجْنِي مُخْرَجَ صِدْقٍ وَاجْعَل لِّي مِن
لَّدُنكَ سُلْطَاناً نَّصِيراً ﴿٨٠﴾

صدق الله العظيم

صورة الإسراء الآية ٨٠

DEDICATION

To my dearest parents

To my beloved husband

To my family

I wish them the very best

of all for ever.

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LIST OF ABBREVIATIONS

GL	= Glycyrrhizin, Glycyrrhizinic acid
GA	= Glycyrrhetic acid, Glycyrrhetinic acid
GAMG	= Glycyrrhetic acid monoglucuronide
3-oxo-GA	= 3-oxo-glycyrrhetic acid
CLS	= Corn steep liquor
T.B.E.	= Total bioconversion efficiency

ABSTRACT

Hala Abdel Salam Amin. Studies on the Bioconversion of Glycyrrhizin. Ph. D. Cairo University, Faculty of Science, Botany Department, 2005.

Glycyrrhizin (GL), the well-known sweet saponin of licorice, has been used as a food-additive and as a medicine. Its aglycone, glycyrrhetinic acid (GA) sowed antiinflamatory, antiulcer and antiviral properties. GA is now produced form GL by acid hydrolysis. However, it is difficult to obtain GA in a good yield by this method, because many by-products are also produced.

To produce GA from GL, we have screened microorganisms for activity to hydrolyze GL. It was found that *Aspergillus niger* NRRL 595 hydrolyzed GL to yield Glycyrrhetinic acid (GA) and 3-oxo-glycyrrhetic acid (3-oxo-GA). The conditions for cultivation of this fungus with the maximum hydrolytic activity for the maximum yield of GA were investigated. Based on the results, *A. niger* NRRL 595 was cultivated with a medium composed of 1.75 % GL, 0.5 % glucose, 0.8 % corn steep liquor at pH 6.5 at 32°C for 96 h. The cultivation of fungal cells under the latter conditions afforded GA and 3-oxo-GA in a yield of 65 % and 22 %, respectively.

A. niger NRRL 595 cells and spores - immobilized by entrapment in calcium alginate and adsorping on glass wool - were used for hydrolysis of GL to GA and 3-oxo-GA. The bioconversion efficiencies of

the immobilized cultures were less than those obtained with the free cells. In contrast to that, repeated batch biotransformation with fungal spores immobilized on glass wool could be successfully maintained for longer than 40 days. During the first 12 days of operation, (i.e. three batch cycles), the bioconversion efficiencies increased gradually and reached 93 % at the third run.

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