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Optimization for Production of Carboxymethylcellulase (CMCase) by *E.coli* JM109F having the gene coding for CMCase from *Bacillus amyoliquefaciens* DL-3 by the Orthogonal Array Method

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The microorganism isolated from soil was identified as *Bacillus amyoliquefaciens* by nucleotide sequencing of genes coding for 16S rDNA and gyrase A and was named *B. amyoliquefaciens* DL-3. It was cultivated in the medium containing 2.0% (w/v) glucose, 0.25% yeast extract, 0.5% K_2HPO_4, 1% NaCl, 0.02% $MgSO_4 \cdot 7H_2O$ and 0.06% $(NH_4)_2SO_4$ at 37°C for 72 hr. The gene coding for carboxymethylcellulase (CMCase) of *B. amyoliquefaciens* DL-3 was isolated and cloned in *E. coli* JM109F. Rice bran and tryptone were chosen as the best of carbon and nitrogen sources for production of CMCase by E. coli JM109F, respectively. Optimal conditions for production of CMCase such as concentrations of carbon sources and nitrogen sources, initial pH of medium, and temperature, were investigated using orthogonal array method with five distinct levels and three factors. The highest production of CMCase was 1,314.2 U/ml from 5.0% (w/v) rice bran and 0.1% (w/v) tryptone under initial pH of 7.5 and 37°C. Optimal conditions of salts for production of CMCase were also investigated using the same method. The highest production of CMCase by *E. coli* JM109F was 1,514.6 U/ml with 0.5% (w/v) K_2HPO_4, 0.025% (w/v) NaCl, 0.04% $MgSO_4 \cdot 7H_2O$ and 0.24%(w/v) $(NH_4)_2SO_4$.

Key words: *Bacillus amyoliquefaciens* DL-3, *E. coli* JM109F, CMCase, Orthogonal Array Method

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Antioxidant and Anti-inflammatory Activities of Metanol Extract of *Commiphora molmol*

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Commiphora molmol is a reddish-brown resinous material, the dried sap of the tree *Commiphora molmol*, native to Yemen, Somalia and the eastern parts of Ethiopia. High quality myrrha can be identified through the darkness and clarity of the resin. Limited scientific studies suggest that myrrha has antibacterial and anti-inflammatory activities. This study determined cytotoxicity of myrrha oil to Raw 264.7 cells and its effect, measured by ELISA. This study was carried out to investigate the cosmeceutical activities of *Commiphora molmol* metanol extracts, by measuring electron-donating ability (using DPPH), nitrite-scavenging ability, and astringent activity. Based on the MTT assay, 12- and 24 h myrrha exposures to 10ppm myrrha had little effect on Raw 264.7 cell (12-h only) viability. At 24 h, 10 ~ 1000 ppm myrrha decreased Raw 264.7 viability 30~38%. In nitrite-scavenging ability test, myrrha inhibited nitric oxide (NO) production and blocked LPS-induced iNOS expression. The DPPH radical scavenging activity was the 88% in 500 ppm of myrrha showed electron donating ability. Astringent effect of myrrha 98% at 500 ppm concentration. These results indicate of myrrha extracts may be useful as a adjuvant for cosmeceutical industry.

Key words: Anti-inflammatory, Astringent, *Commiphora molmol,* Raw 264.7 cell