EXPRESSION OF RECOMBINANT LECTIN FROM RED ALGAE Hypnea cervicornis IN Escherichia coli

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INTRODUCTION: Lectins from algae have a vast array of biotechnological applications. The lectin from red macroalgea Hypnea cervicornis (HCA) has been studied for its biological activities, which include anti-inflammatory and antinociceptive effects. However, studies have been limited by the yields of HCA when recovered from its native producer. OBJECTIVE: In this study, the best conditions from production of HCA using E. coli as expression system were determined. MATERIALS AND METHODS: The synthetic gene for HCA was built from the polypeptide sequence of the native protein and using codon optimization for bacterial strains of interest. The synthetic gene was acquired originally in the cloning vector pCR2.1 TOPO. The gene was transferred to pMAL2TEVNx using Ncol and XhoI restriction enzymes. The plasmids were inserted in the desired bacterial strains (E. coli BL21(DE3) and DH5α for expression and cloning, respectively) using thermal shock. Positive clones were selected for expression assays, in which the combinations of the following parameters were tested: temperature (37, 30, 25, 20 and 16 °C), inductor (isopropyl-β-D-thiogalactopyranoside) concentration (0.5, 1.0 and 1.5 mM) and time after induction for cell recovery (2, 4, 6 and 16 hours). The results were evaluated using SDS-PAGE. RESULTS AND DISCUSSION: The gene insertion was confirmed using electrophoresis after enzymatic digestion and sequencing, which also certified the cloning of the correct reading frame. Multiple validated clones were obtained for both cloning and expression strains. The protein of interest was present in every combination of parameters tested. The combination with the highest protein production was: temperature of 30 °C, 1.5 mM of inductor and cell recovery 16 hours after induction. CONCLUSION: The HCA production in a bacterial system was efficient. High yields of recombinant HCA is desired to further investigate its biotechnological potential.

Keywords: Hypnea cervicornis, lectin from algae and recombinant protein.
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