A Novel Discovery of Promoting Yeast Fermentation with Black Soybean Seed Coat

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Black soybean is a medicine-food plant with high-protein kernel and black seed coat. This study is to investigate the effects, active components and its mechanisms of black soybean on promoting yeast fermentation. The results showed that only the ethanol extract of black soybean seed coat could promote the yeast reproduction. Ethanol content in all groups was determined by GC. It turned out that seed coat extract could improve yeast fermentation at different concentrations. It reached the highest rate of 2.61% at 0.2g/L, which was over twice of control group (0.95%). The yeast morphology was observed by scanning electron microscope. Most cells of the yeast treated with seed coat extract were complete, whereas cells in control group were destroyed. Alcohol dehydrogenase (ADH) gene's cDNA sequences in control and 0.2g/L treated groups were amplified respectively by RT-PCR. The results demonstrated that ADH gene expression in extract group was much higher than that in control. Black soybean seed coat extract could enhance ADH mRNA expression level to strengthen alcohol fermentation. Finally, the main active ingredient was separated and analyzed by HPLC, identified to be Cyanidin-3-O-glucoside by MS and NMR. This study provided the proof that black soybean seed coat extract and the active ingredient could increase the tolerance ability of yeast to ethanol and improve the yeast fermentation efficiency which was prospected to solve the major bottleneck problems in ethanol fermentation industry.

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