

Evaluation of the Capabilities of *Saccharomyces cerevisiae* and *Lactobacillus plantarum* in Improvement of Total Phenolic Content and Antioxidant Activity in Carob Kibble

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Abstract : Carob kibble has recently received attention due to the presence of high level of polyphenol antioxidants. The capacity of microorganisms to improve antioxidant activities and total phenolics in carob kibble was investigated in the study. Two types of microorganisms including lactic acid bacteria *Lactobacillus plantarum* (*L. plantarum*) and yeast *Saccharomyces cerevisiae* (*S. cerevisiae*) were used in single and in their combination as starters. The total phenolic content was determined by the Folin-Ciocalteu method. Antioxidant activities were assessed scavenging capacity using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid (ABTS). The study found that *S. cerevisiae* alone considerably improved 55% total phenolics content at 15 h, while *L. plantarum* caused in a loss of 20% through the process. Antioxidant capacity of the yeast-fermented samples significantly increased by 43 % and 10 % in ABTS and DPPH assays, respectively. However, reduction of 13 % and 32 % inhibition were recorded in the carob treated with *L. plantarum*. In the combination of *S. cerevisiae* and *L. plantarum* (1:1), both total phenolic content and antioxidant activity of carob kibble were a similar trend as these of *S. cerevisiae* single, but a lower improvement. The antioxidant power of the extracts was linearly correlated to their total phenolic contents ($R=0.75$). The results suggested that *S. cerevisiae* alone was the better for enhancement of both total phenolic content and antioxidant activity in carob kibble using submerged fermentation. The efficiency of fermentation reached the highest at 15h. Thus submerged fermentation with *S. cerevisiae* offers a tool with simple and cost effective to further increase the bioactive potential of carob kibble, which is in use for food, cosmetic and pharmaceutical industries.

Keywords : antioxidant activity, carob kibble, *Lactobacillus plantarum*, *Saccharomyces cerevisiae*, total phenolics

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