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Evaluation of Fermentation Effect on Antioxidants Amplification in Dandelion Root Extracts

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Introduction: Fermentation is a process of partial decomposition of the fermented substrate due to the activity of various microorganisms involved. It is one of the most useful biocatalytic processes that may beneficially improve the bioactivity of plant extracts. Accordingly, this study investigates the fermentation effects of underutilized dandelion root dust (*Taraxacum officinale* L.) on phenolic content and antioxidant activity potential in the produced extracts. The dandelion root was collected as dust remaining after the processing for the industrial tea blends preparation, thus is classified as a second-rank raw material, possessing low or no commercial value. Regarding the fermentation effects, the focus was on the contributions of various microorganisms, including the yeasts *Saccharomyces cerevisiae* and *Saccharomyces cerevisiae var. boulardii*, a yeast-like fungus *Aerobasidium pullulans,* and lactic acid bacteria (LAB) *Lactobacillus rhamnosus* ATCC® 7469™.

Experimental: Fermentation is a process of partial decomposition of the fermented substrate due to the activity of various microorganisms involved. It is one of the most useful biocatalytic processes that may beneficially improve the bioactivity of plant extracts. Accordingly, this study investigates the fermentation effects of underutilized dandelion root dust (*Taraxacum officinale* L.) on phenolic content and antioxidant activity potential in the produced extracts. The dandelion root was collected as dust remaining after the processing for the industrial tea blends preparation, thus is classified as a second-rank raw material, possessing low or no commercial value. Regarding the fermentation effects, the focus was on the contributions of various microorganisms, including the yeasts *Saccharomyces*

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cerevisiae and *Saccharomyces cerevisiae var. boulardii*, a yeast-like fungus *Aerobasidium pullulans*, and lactic acid bacteria (LAB) *Lactobacillus rhamnosus* ATCC® 7469™.

Results: During the fermentation of dandelion root, a single yeast culture demonstrated the highest efficiency in enhancing the levels of antioxidants in the resulting extracts, significantly outperforming the control sample. Specifically, the probiotic yeast *S. boulardii* induced a substantial increase in TPC, with a 2.5-fold rise to 68.4 mg GAE/g dm. Additionally, TFC levels increased 2.8 times, reaching 44.9 mg QE/g dm, while the FRAP showed a 3.9-fold increase, totalling 417.2 μmol Fe^{2+}/g dm, when compared to the control. Following *S. boulardii*, *S. cerevisiae* emerged as the next most effective yeast for dandelion root fermentation. A combination of *L. rhamnosus* and *S. cerevisiae* also showed good performance, although the fermentation with *L. rhamnosus* alone led to only a negligible increase in the content of bioactive compounds and antioxidant activity. The results of this study are valuable in promoting the value-added fermentation effect in the utilization of dandelion root extracts as supplements in food and pharmaceuticals that offer enhanced health benefits. The approach taps into readily available industrial residues to be creatively exploited in useful and profitable ways.

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