

The Stability of Vegetable-Based Synbiotic Drink during Storage

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Abstract : Globally, there is a great interest in promoting the consumption of fruit and vegetables to improve health. Due to the content of essential compounds such as antioxidants, important amounts of fruits and vegetables should be included in the daily diet. Juices are good sources of vitamins and can also help increase overall fruit and vegetable consumption. Starting from this trend (introduction into the daily diet of vegetables and fruits) as well as the desire to diversify the range of functional products for both adults and children, a fermented juice was made using probiotic microorganisms based on root vegetables, with potential beneficial effects in the diet of children, vegetarians and people with lactose intolerance. The three vegetables selected for this study, red beet, carrot, and celery bring a significant contribution to functional compounds such as carotenoids, flavonoids, betalain, vitamin B and C, minerals and fiber. By fermentation, the functional value of the vegetable juice increases due to the improved stability of these compounds. The combination of probiotic microorganisms and vegetable fibers resulted in a nutrient-rich synbiotic product. The stability of the nutritional and sensory qualities of the obtained synbiotic product has been tested throughout its shelf life. The evaluation of the physico-chemical changes of the synbiotic drink during storage confirmed that: (i) vegetable juice enriched with honey and vegetable pulp is an important source of nutritional compounds, especially carbohydrates and fiber; (ii) microwave treatment used to inhibit pathogenic microflora did not significantly affect nutritional compounds in vegetable juice, vitamin C concentration remained at baseline and beta-carotene concentration increased due to increased bioavailability; (iii) fermentation has improved the nutritional quality of vegetable juice by increasing the content of B vitamins, polyphenols and flavonoids and has a good antioxidant capacity throughout the shelf life; (iv) the FTIR and Raman spectra have highlighted the results obtained using physicochemical methods. Based on the analysis of IR absorption frequencies, the most striking bands belong to the frequencies 3330 cm^{-1} , 1636 cm^{-1} and 1050 cm^{-1} , specific for groups of compounds such as polyphenols, carbohydrates, fatty acids, and proteins. Statistical data processing revealed a good correlation between the content of flavonoids, betalain, β -carotene, ascorbic acid and polyphenols, the fermented juice having a stable antioxidant activity. Also, principal components analysis showed that there was a negative correlation between the evolution of the concentration of B vitamins and antioxidant activity. Acknowledgment: This study has been founded by the Francophone University Agency, Project Réseau régional dans le domaine de la santé, la nutrition et la sécurité alimentaire (SaIN), No. at Dunarea de Jos University of Galati 21899/ 06.09.2017 and by the Sectorial Operational Programme Human Resources Development of the Romanian Ministry of Education, Research, Youth and Sports through the Financial Agreement POSDRU/159/1.5/S/132397 ExcelDOC.

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