CHANGES IN ANTIOXIDANT ACTIVITY AND PHENOLIC CONTENT OF CELERY LEAVES AND ROOT DURING OSMOTIC TREATMENT

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Abstract

Celery (*Apium graveolens*) is widely used as a medicinal herb or spice, with prominent antioxidant properties, due to the presence of many bioactive components, mainly phenolic compounds. An understanding of changes in phenolic content and antioxidant activity occurring during preservation of celery is important to develop appropriate drying method and optimal conditions of drying.

In this study, osmotic treatment of celery leaves and root was performed in two osmotic solutions (sugar beet molasses and aqueous solution of sodium chloride and sucrose, prepared using sucrose in the quantity of 1200 g/kg water, NaCl in the quantity of 350 g/kg water and distilled water), at three temperatures (20, 35 and 50 ^{0}C), and three different immersion periods (1, 3 and 5 h), under atmospheric pressure. The aim was to investigate the influence of used osmotic agent type, temperature and dehydration time on the water loss, solid gain, antioxidant activity expressed as ferric reducing antioxidant power (FRAP), while the total phenolic content was investigated by standard Folin–Ciocalteau method (FC). Results have been correlated using regression analysis and statistically evaluated using analysis of variance (ANOVA). Post-hoc Tukey's HSD test at 95% confidence limit, statistically significant at $p < 0.05$ level, has been calculated to confirm statistically significant differences between complex samples. Accuracy of applied assays has been estimated based on coefficients of variation. Principal Component Analysis (PCA) and Cluster Analysis (CA) have been applied successfully to classify and discriminate the different samples, while Standard Score analysis (SS) was used in optimal process parameters determination.

The statistically significant increase in FRAP and FC was noticed in celery leaves and root samples osmotically treated in sugar beet molasses solution, while FRAP and FC values were decreased for samples treated in sodium chloride and sucrose solution. The strong correlation between FRAP and FC assays was found.

It was concluded that the optimum condition for osmotic treatment of celery leaves and root, from the aspect of antioxidant increase, were at temperature of 50 ^{0}C and treatment time of 5 hours, in sugar beet molasses as osmotic solution.

Key words: *Osmotic treatment, Celery, Sugar beet molasses, Antioxidant activity, Phenolic content.*