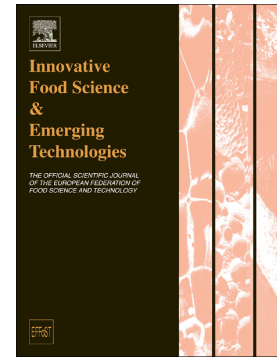


## Accepted Manuscript

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PII: S1466-8564(16)30572-0  
DOI: <https://doi.org/10.1016/j.ifset.2018.01.008>  
Reference: INNFOO 1916

To appear in: *Innovative Food Science and Emerging Technologies*

Received date: 30 October 2016  
Revised date: 6 December 2017  
Accepted date: 23 January 2018

Please cite this article as: Līga Priecina, Daina Karklina, Tatjana Kince , The impact of steam-blanching and dehydration on phenolic, organic acid composition, and total carotenoids in celery roots. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Innfoo(2017), <https://doi.org/10.1016/j.ifset.2018.01.008>

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## The impact of steam-blanching and dehydration on phenolic, organic acid composition, and total carotenoids in celery roots

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**Abstract.** From the nutritional point of view, studying thermal and non-thermal processing effects is highly important for various nutrients which include numerous biologically active components in vegetables used daily. Therefore, the aim of current research was to study steam-blanching (at 1.5 and 3.0 minutes), convective drying, microwave-vacuum (MV) drying and then calculate the effect each had on individual organic acids, individual phenolic compounds, total phenolics, antiradical activity of phenolic compounds and colour within the celery roots. Fresh celery roots contain a trace amount of carotenoids which decreases significantly during drying. Total phenolic content in fresh celeries was determined in lower concentrations than flavonoids and during drying process their content increases. It was determined that celery roots dried with the convective method contained higher total phenolic content than those dried with the MV method, however, the highest flavonoid content was observed in the MV dried root samples which were preheated with steam. The determined individual phenolic compounds in higher amounts were: 3,4-dihydroxybenzoic, 4-hydroxybenzoic, chlorogenic, sinapic and t(3)-cinnamic acids. The determined major organic acids in higher amounts were oxalic, malonic, citric, ascorbic and succinic acids.

**Key words:** Steam-blanching; Drying; Celery roots; Phenolics; Organic acids

### 1. Introduction

Celery root (*Apium graveolens* var *rapaceum*) also known as celeriac is from the *Apiaceae* family *Apium* genus. It can be used both cooked and raw in salads, often used as flavouring in soups, stews and casseroles, but also mashed or baked. Celery roots are sometimes processed for canning, freezing and dehydration. They contain approximately 88% water, different proteins, fats, carbohydrates (dietary fibres and sugars), microelements (Ca, Fe, Mg, P, K, Na, Zn, Cu, Mn, Se) and vitamins (C, thiamine, riboflavin, B<sub>6</sub>) and phytochemicals as phenolic compounds (Lim, 2015; Popova et al., 2014).

Raw vegetables are subjected to some form of preservation in order to make them available for later consumption. Minimally processed vegetables are a rapidly expanding segment of the fresh food industry due to convenience and increased demand by the consumers. Processing is expected to modify the food matrix, and changes could exert a significant influence on the release, transformation and absorption of some nutrients as well as degradation of bioactive compounds due to matrix changes (Ninfali et al., 2005; Patras et al., 2011; Siddiq et al., 2013). Processing of celery roots is usually accompanied by brown discoloration, affecting consumer acceptance. Associated with the fragmentation of cells, enzymes may interact with substrates, resulting in the formation of melanins. For enzymes inactivation of forming unwanted compounds, blanching process is often used. The studies on thermal processing above 60°C *in vitro* have shown to be suitable for inactivation of celery roots polyphenol oxidases (Kasier et al., 2013).

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