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Chemical composition of high-pigment tomato puree with lycopene extract from tomato by-products

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The industrial processing of tomatoes into tomato products generates large amounts of by-products, such as peel, pulp, and seeds. These by-products create a major disposal problem for the industry in terms of costs and potential negative impact on the environment, but they also represent a promising, low-cost source of carotenoids (primarily lycopene) which may be used in the end-products because of their favourable nutritional and technological properties [1]. Nowadays the development of more attractive functional food is important for the consumers' health. The use of concentrated carotenoids extracts from tomato by-products in traditional foods may improve functional properties of the product while increasing the efficiency of the industrial processing of tomatoes [2]. In red tomatoes lycopene is almost exclusively found in the all-*trans*-form, but during processing lycopene can undergo isomerisation which may enhance its antioxidant properties and biological functions. Therefore, the aim of the research was to evaluate and select tomato cultivars with the highest content of pigments and to study the chemical composition of the processed tomato product (high-pigment tomato puree) enriched with lycopene extract from tomato by-products.

Carotenoids and its *cis*-isomers (lycopene and β -carotene) in tomatoes and extract from tomato by-products were determined by high performance liquid chromatography (HPLC/DAD). The antioxidant activity of extracts was evaluated spectrophotometrically.

The carotenoids were analysed in freeze-dried fruits of five different tomato cultivars (tomatoes were grown in LRCAF Institute of Horticultural (Lithuania) greenhouses collection). The highest amount of lycopene (9.5 mg 100g⁻¹ fw) was established in red colored fruits of Lithuanian cultivar 'Svara'. Tomato puree made of 'Svara' fruits and enriched with supercritical CO₂ extract from tomato by-products had the highest content of carotenoids and the highest antioxidant activity. The oleoresin added to tomato purees increased carotenoids content and antioxidant activity of the product, thus improving its functional properties. In the final product the content of more bioavailable *cis*-lycopene was up to 3 times higher.

Keywords: lycopene isomers, β -carotene, tomato by-products, supercritical fluid extracts

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