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Popovici C., PhD

Technical University of Moldova

Migalatiev O., Golubi R., Caragia V., PhD, Cartasev A., Coev G., PhD, Bogdan N., Grumeza I.
Scientific and Practical Institute of Horticulture and Food Technologies, Moldova

MODELING OF BIOACTIVE COMPOUNDS EXTRACTION FROM TOMATO BY-PRODUCTS

Tomato by-products are a residue of tomato processing and are generated in large quantities by the tomato processing industry. They are a rich source of lycopene, a red carotenoid and antioxidant, and lignocellulose, the recalcitrant but energy-rich polysaccharide matrix that comprises plant cell walls [1]. The use of tomato by-products in order to obtain new products of higher economic value become an important issue [2].

Tomato by-products were obtained as a result of the manufacturing process of tomato juice at industrial scale at "Orhei Vit" SA. The extraction technique was carried out using the pilot plant HA 120-50-01 C with supercritical carbon dioxide. Using the central composed programs of the second order factorial design of experiments it was constructed the planning matrix in real variables, resulting in the need to perform 30 experiments at 15 extraction regimes. The yield of the lipid fraction extraction was taken as the output factor.



Figure 1 - Experimental samples of tomato by-products

The maximum yield of 74.43% was noted at the extraction parameters of 40 MPa, 70 °C and 90 min and the minimum yield of 24.86% at 20 MPa, 40 °C and 30 min. It was established the final form of the second order regression equation characterizing the process of supercritical fluid extraction of bioactive compounds from tomato by-products. The regression equation allowed the optimization of the output parameters, using the gradient rise method. Thus, optimal parameters for obtaining the bioactive compounds were set: temperature 60 ... 75 °C, pressure 33 ... 42 MPa and time 64 ... 76 min.

These study provide further evidences of the potential of tomatoes by-products as an interesting source of bioactive compounds such as lycopene and β -carotene. As a result of the establishment of optimal extraction regime it will be able to design and prototype innovative functional food products with the addition of CO₂-extract from tomato by-products rich in bioactive compounds, which may have beneficial health effects.

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Reference

1. B.J. Allison, C.W. Simmons. (2017) Valorization of tomato pomace by sequential lycopene extraction and anaerobic digestion. *Biomass and Bioenergy*. Vol. 105, pp. 331-341.
2. Popovici C., Migalatiev O., Golubi R., Caragia V., Cartasev A., Coev Gh., Bogdan N., Grumeza I. (2017) Smart valorisation of industrial tomatoes by-products. Book of abstracts of the 4th NEEFood Congress "Global and Local Challenges in Food Science and Technology", Kaunas University of Technology, Lithuania.