

Supercritical CO₂ Extraction of Tomato Wastes

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The supercritical carbon dioxide (SC-CO₂) extraction is a method that assures a high ecological level of lipid extraction using pure and harmless carbon dioxide as a solvent and excluding the possibility of environment and end product pollution.

In the Republic of Moldova, the annual volume of manufactured tomatoes is about 80,000 tons from which remain about 3,000 tons of wastes. Nowadays, tomato wastes are used as livestock feed or as fertilizer. Nevertheless, they contain biologically active compounds: carotenoids, tocopherols, flavonoids, essential fatty acids and many others, that could be used to obtain high-quality organic products.

In order to study the method of SC-CO₂ extraction the fresh tomato wastes were dried from 79.0% to 5.2% of water at 42-45°C. Dried tomato wastes (DTW) contained 93.5% seed, 5.0% peel and 1.5% pulp. The highest oil yield in relation to the lipid content of DTW was 66.9%.

From the results obtained the DTW composition was as follows: 5.20% water, 21.19% lipid, 38.46% protein, 18.75% carbohydrates, 12.86 % fiber, 3.5% ash, 9.60 µg carotenoid. After the SC-CO₂ extraction the defatted DTW consisted of: 5.36% water, 5.00% lipid, 47.03% protein, 21.73% carbohydrates, 17.86% fiber, 4.02% ash, and 3.32 µg carotenoids.

The fatty acid composition of SC-CO₂ extract from DTW was as follows: 59.28% linoleic acid, 21.39% oleic acid, 13.69% palmitic acid, 3.00% stearic acid, 2.49% linolenic acid and 0.15% myristic acid. Thus, the unsaturated fatty acids (83.16%) are predominant, particularly polyunsaturated fatty acids (61.77%). Consequently, SC-CO₂ extract from DTW is a good source of polyunsaturated fatty acids ω-6 and ω-3. It is also a good source of provitamin A (the carotenoid content - 421.0 µg).

As shown, CO₂ extract and defatted DTW are good sources of biologically active compounds, which can be used to enrich food products.