Conventional and Ultrasound Assisted Extraction (UAE) of Lycopene from *Siriana F1* hybrid and *Pontica 102* Tomatoes

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Carotenoids are lipophilic compounds and are usually coloured yellow, orange or red. They are one of the most widespread naturally occurring pigments endowed also with probably the most varied functions as demonstrated by their role in photokinetic and phototropic response in plants and fishes and as vitamin A precursors in birds and mammals [1-3].

Tomatoes are one of the most popular vegetables in the world, they are rich in lycopene, phenolics, organic acids, fibres and many other nutritional beneficial components. For this reason, in the European Union (E.U.), tomatoes occupy the largest area of the total vegetable area (11.7% at E.U. level), moreover in Romania, tomatoes are grown on over 24,300 hectares which represent 9.5% of the area at E.U. level. However, the tomatoes processing generates an important amount of waste, ranging from 3 to 7 % of their weight, which could be an important secondary green resource for valuable products.

The aim of this study was the use of green solvent and technique for extraction of carotenoids from two types of tomatoes (green-house grown - Siriana F1 hybrid and open field grown, season - Pontica 102), using different solvents and two types of ultrasound processing equipment with different diameters of the ultrasonic horn.

The novelty of this study resides in the study of the influence of ultrasonic irradiation delivery method on the efficiency of the extraction process. Due to the antioxidant capacity of the carotenoids the utilization of ultrasounds for the enhancement of the process must be done in a controlled manner to limit degradation of the useful compounds by the free radicals generated during sonication.

Two types of tomatoes (Siriana F1 hybrid, early, greenhouse grown tomatoes and Pontica 102, open field grown, season tomatoes) were considered for the extraction of active principles (lycopene and beta-carotene) in conventional and US assisted conditions using two different US processing equipment and a bio-based renewable solvent.

The extraction study from dried skins residues afforded high lycopene concentrations: 48 mg/100 g – from of S*iriana F1* hybrid, while for the season tomatoes *Pontica 102*, 72 mg/100 g of plant were recovered using hexane in conventional conditions. This aspect makes appealing the valorisation of tomato skins waste for the recovery of valuable carotenoids (lycopene and beta-carotene). In order to improve the extraction process, two directions were explored: the use of a bio-based, renewable, biodegradable, environmentally friendly and non-toxic solvent and the use of ultrasounds. Both methods allowed for the increase of carotenoids recovery rate. Nevertheless, US irradiation delivered through a high-power density method (metal sonotrode) leads to carotenoids degradation at long US exposure intervals, in sensible solvents such as FAEE. Thus, when US assisted extractions shorter times are to be considered and both the power density in terms of W/mL and US delivery method must be carefully selected in order to mitigate the US free radical generation capability.

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