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EXTRACTION OF CHLOROPHYLLS AND CAROTENOIDS FROM NATURAL SOURCES

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The growing consumers' concern for possible long-term adverse effects of artificial molecules commonly used in food industry has led to an increased interest in natural products. At the same time, there is a demand for a more eco-sustainable use of natural matrices, which justifies the search for by products that have no other application to be explored in the development of novel food products [1,2]. Together with the fact that large amounts of carrot aerial parts and fresh tomato wastes (resulting from crop growing, packaging, processing, storage, and sale) are discarded worldwide, the recovery of valuable colorant biomolecules from these agri-food wastes represents a crucial step of the circular economy by reintroducing them into the food chain as ingredients [3]. Chlorophylls are the most abundant pigments in plants, responsible for green coloration, and carotenoid compounds are lipophilic pigments responsible for yellow, orange, and the red colours of certain plant matrices. In addition to their great colouring capacity, these classes of pigments also exert several bioactive properties, which corroborates the importance of their application in food [3,4]. In this context, the present study aimed to explore these natural pigments, more specifically chlorophylls in the aerial parts of carrots and tomatoes, and carotenoids in tomato fruit bio-residues.

Maceration and ultrasound assisted extractions (MAE and UAE, respectively) were used, being applied to maximize the extraction yield of chlorophyll and carotenoid compounds. For the extraction, green solvents were prioritized, namely water, ethanol (90%), and hexane. The parameters affecting pigment recovery were varied for each technique, more specifically, time, power, and solvent for UAE, and time and solvent for MAE. The extractions were carried out protecting the samples from light to avoid the pigments degradation. The results were monitored through the implementation of a chromatographic method, HPLC coupled to a diode array detector (DAD) and mass spectrometry (MS), in order to obtain the individual profile of both samples, and also to determine the concentration of chlorophylls and carotenoids. UAE proved to be more effective than MAE, with increased extraction yields in the extractions performed employing higher ultrasonic power. The assessed bioresidues proved to have great potential to be used as sources of natural pigments that can find application in several industrial fields as colorants, namely food, pharmaceutical, and cosmetic, among others.

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