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Supercritical Fluid Extraction of Carotenoids from *Ulva lactuca* (Chlorophyta)

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**References**


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**Introduction**

*Ulva lactuca* is an edible species of green macroalgae containing a high amount of nutrients and functional bioactive compounds such as carotenoids. The current market value of commercially used carotenoids was estimated at nearly $1.2 billion in 2010. However, most of the naturally produced and harvested *U. lactuca* biomass is not optimally used nowadays. The main reason is the absence of environmentally friendly, efficient, and industrially viable technologies for extraction processes. Supercritical fluid extraction (SCFE) has become a promising alternative separation technique in the field of food and nutraceutical applications. SCFE was found to be selective in the extraction of desired compounds without leaving toxic residues in extracts and the risk of degradation of thermal labile or easily oxidized compounds such as lipids and carotenoids.

**Objective:** Characterizing the effect of pressure, temperature, and percentage of co-solvent on SCFE of carotenoids from freeze-dried *U. lactuca*.

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**Material and Methods**

- **U. lactuca** was collected from Nakebølle Fjord, Fyn, Denmark
- Algae samples were freeze-dried to reach the uniform particle size of 600 μm
- Carotenoids identification and quantification were performed using HPLC
- Conventional solvent extraction method using EtOH was applied as a reference process versus SCFE

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**Results**

- The main considered carotenoids were fucoxanthin, lutein, and β-carotene

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**Conclusion**

- Increasing the temperature and pressure had a positive effect on the amount of carotenoids extracted
- Applying SC-CO2 was not as efficient as conventional extraction with pure EtOH
- Adding 5% of EtOH as a co-solvent increased the total amount of carotenoid extracted by 70% and 53% compared to using pure SC-CO2 and EtOH, respectively
- The SCFE technique is promising and should be considered for further investigation under different flow rates and scales

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