

Abstract

Our study aims to identify flavor active compounds in algae samples using both instrumental analysis and human sensory evaluation. Four kelp (*Ascophyllum nodosum*) and three microalgae (*Arthrospira platensis*, *Chlorella vulgaris*, and *Dunaliella salina*) powders were characterized for their flavor profiles using headspace solid-phase microextraction and gas chromatography-olfactometry-mass spectrometry (HS SPME/GC-O-MS).

Background

Algae is a nutrient dense and sustainable source of alternative proteins. Algae has a distinctive ocean-like flavor and has the potential to be used in alternative seafood. Volatile profiles of different species of algae vary significantly. Comparison of the flavor compounds of different algae species is needed for determining its use in alternative seafood products.

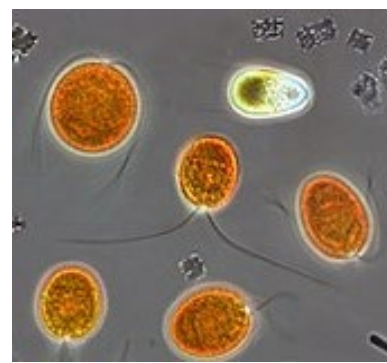
Methodology

- HS SPME was used to extract volatile compounds.
- Sample preparation for each vial was completed by mixing 1g of algae powder with 10 mL deionized water until homogenous.
- One microliter of internal standard was added.
- Each vial was heated in a water bath at 60 °C for 20 minutes. SPME fiber was inserted, then heated for an additional 35 minutes.

Macroalgae

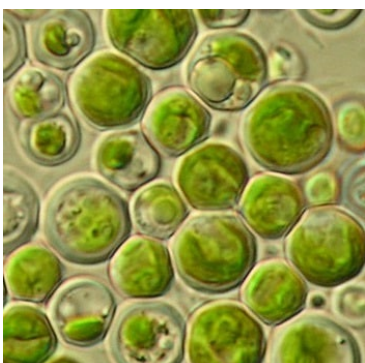


Kelp (*Ascophyllum nodosum*)

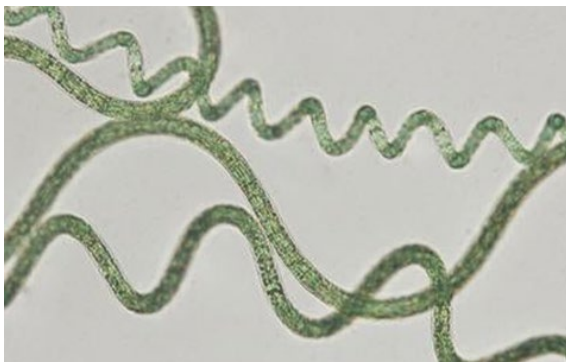


Dunaliella salina

Microalgae



Chlorella vulgaris



Spirulina (Arthrospira platensis)



Ascophyllum nodosum



Dunaliella salina (left),
Chlorella vulgaris (right)



Headspace Solid-Phase Microextraction



Gas Chromatography-Olfactometry-Mass Spectrometry

Acknowledgements

This research was funded by San Diego State University Seed Grant and School of Exercise and Nutritional Science (ENS) Research Grant.

Results

Over fifty volatiles were detected, including pleasant aroma compounds such as D-limonene (citrus and fresh aroma) and linalool (citrus, floral, sweet), as well as undesirable compounds like (E)-2-octen-1-ol (soap and plastic aroma). Numerous volatiles from seafood were detected in the algae samples. All four kelp samples and *A. platensis* powder contained 1-octen-3-ol, which presents a mushroom and green aroma and is a key-aroma compound of crab, tuna, and salmon. *A. platensis* and *C. vulgaris* contain the flavor compound tetramethyl pyrazine, which is found in crab and shrimp, and presents a grassy and musty aroma.

