

Developing Seafood Flavors from Macroalgae

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Abstract

The study aims to generate seafood flavors from macroalgae through protein hydrolysis and Maillard reactions under controlled conditions. Human sensory evaluation and instrumental analysis of volatiles are combined for the identification of the character-impact compounds. The findings will advance the understanding of the sensory impact of specific flavor compounds that will help guide the formulation of alternative seafood products.

Background

Alternative seafood products have grown considerably in the past few years. Flavor is a key quality determinant of these products. Macroalgae has an inherent seafood odor and rich glutamate content. Enzymatic hydrolysis will release umami amino acids as well as providing precursors for Maillard reactions which have shown promising results in enhancing seafood flavor.

Preliminary results

- Kelps contain a variety of volatiles that also exist in seafoods.
- Protein hydrolysates and added precursors (glucose and ribose) can form strong desirable flavor (crab cake and canned tuna alike) following thermal treatments.

Methods

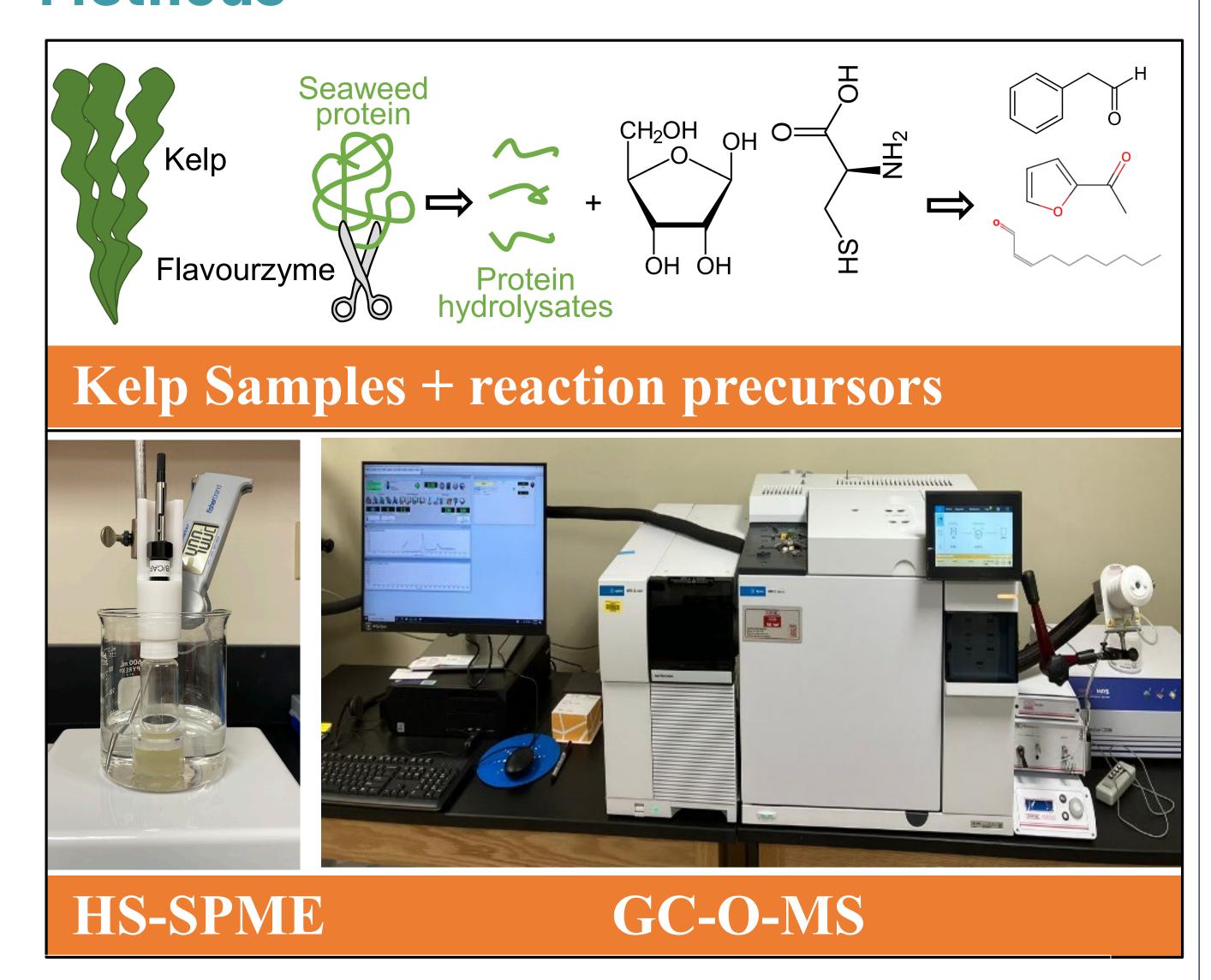


Figure 1: Experimental Design

Table 1: Important volatile compounds in kelp samples

	БТ	Compounds in			
No	RT	Algae	Odor-Data base	RI-HP-5	Presence in Seafood
1	5.042	Hexanal	fresh, green, fatty	813	Dolphin fish, tuna, salmon
2	7.49	Heptanal	green, aldehydic, oily	913	Lobster, crab, Tuna, salmon, mackerel
3	8.912	2-Heptenal, (Z)-	N/A	968	Sole
4	9.376	2-Octenal, (E)-	fresh, cucumber, herbal	985	Tuna, trout
5	0.520	1 Octob 2 ol	mushroom,	001	Crob Tuna Calman
5	9.539	1-Octen-3-ol	earthy, green	991	Crab, Tuna, Salmon
6	10.13	Octanal	strong, fruity	1015	Crab, Tuna
7	10 700	D-Limonene	citrus, orange, fresh	1042	Trout colmon
1	10.790	D-LIIIIOHEHE		1042	Trout, salmon
8	10.862	Eucalyptol	eucalyptus, herbal, camphoreous citrus, floral,	1044	Sole, shrimp
9	12.628	Linalool	sweet	1115	Mandarin fish raw
10		Nonanal	waxy, aldehyde, rose	1120	Crab, cooked carb, tuna
11	13.757	Camphor	camphoreous	1160	Shrimp
12		Terpinen-4-ol	peppery, woody, earthy	1191	Mandarin fish (raw & cooked)
13	14.873	α-Terpineol	pine, terpenic, lilac	1203	Mandarin fish, catfish, tilapia
14	16.778	2-Undecenal	fresh, fruity, orange	1275	Catfish, tilapia
15	23.196	Caryophyllene	sweet, woody, spicy	1440	Sturgeon, caviar
16	25.939	Pentadecane	alkane , waxy	1515	Crab, tuna, anchovy, hake, mussels
17	27 578	Hexadecane	odorless	1613	Whitefish, trout, catfish, tilapia
18		Heptadecane	fuel-like	1713	Crab, anchovy, hake
10	20.131	Ticpladecarie	IUCI-IINC	1710	Orab, andriovy, make

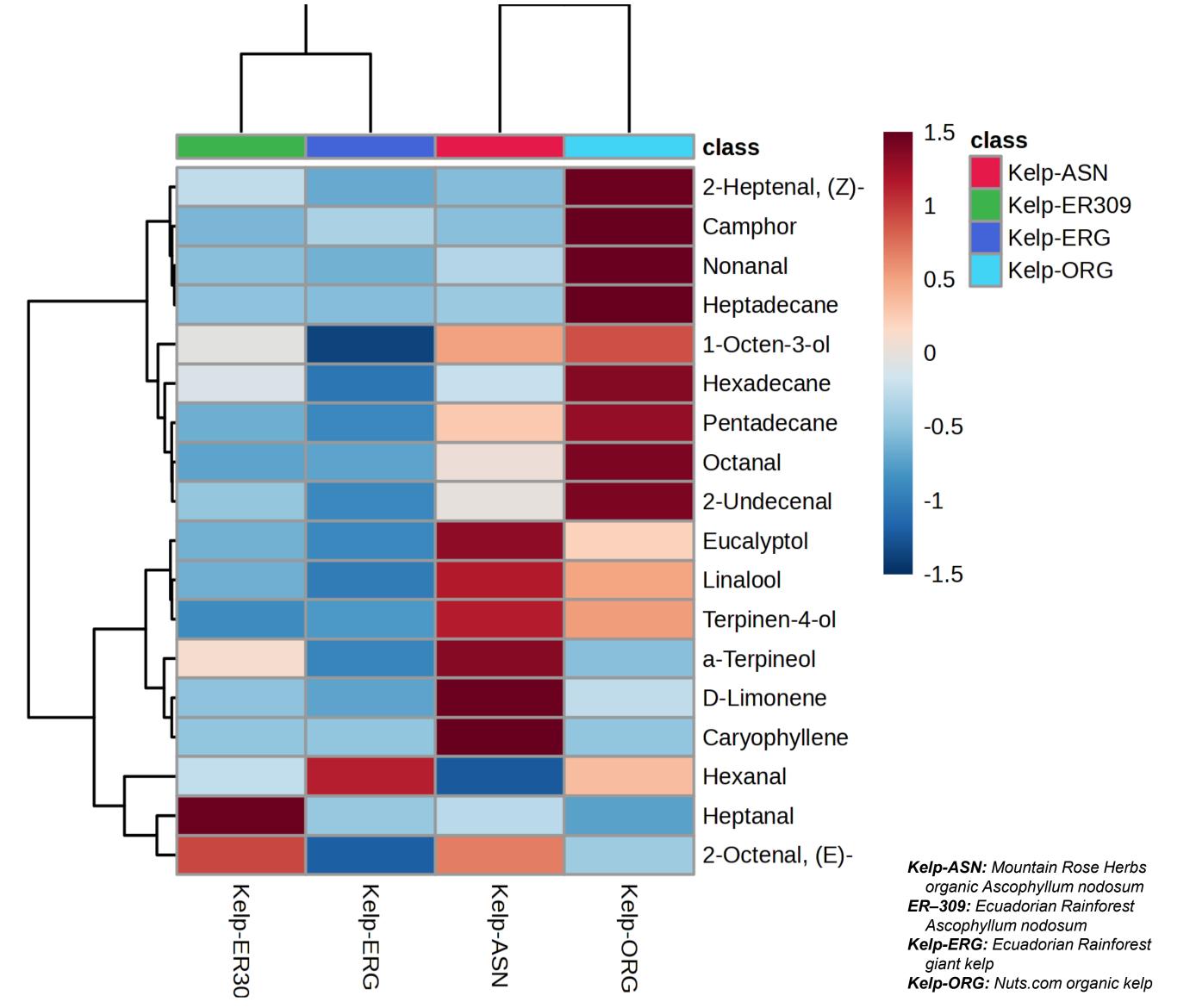


Figure 2: Peak areas of key volatiles in kelp samples

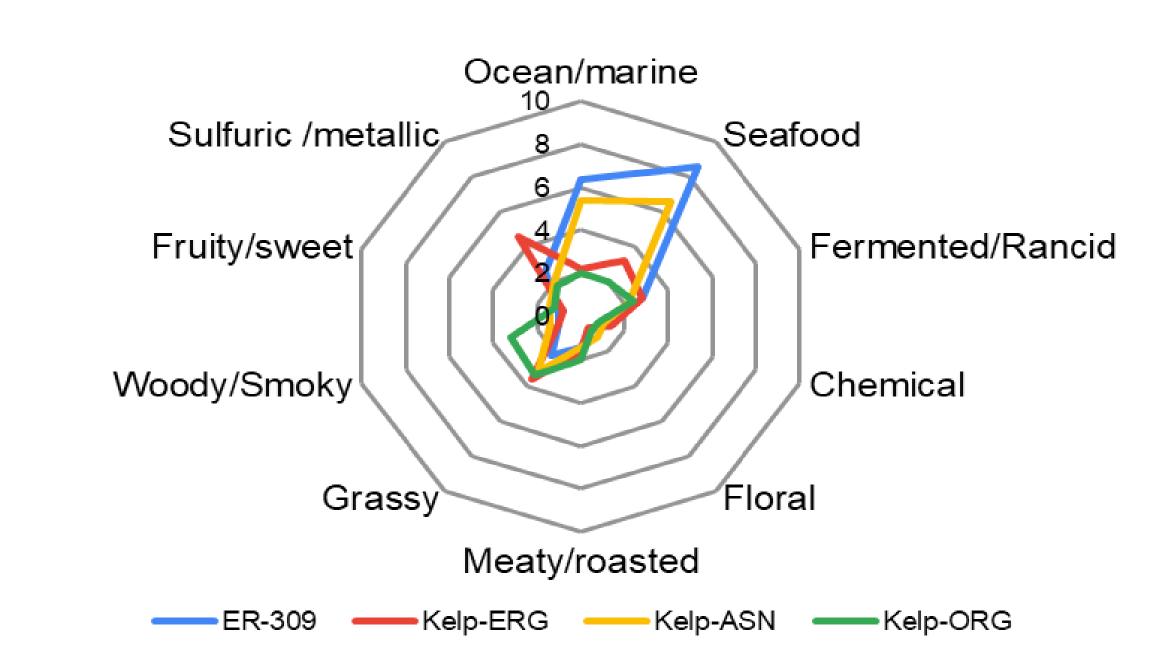


Figure 3: Aroma evaluation of Kelp samples

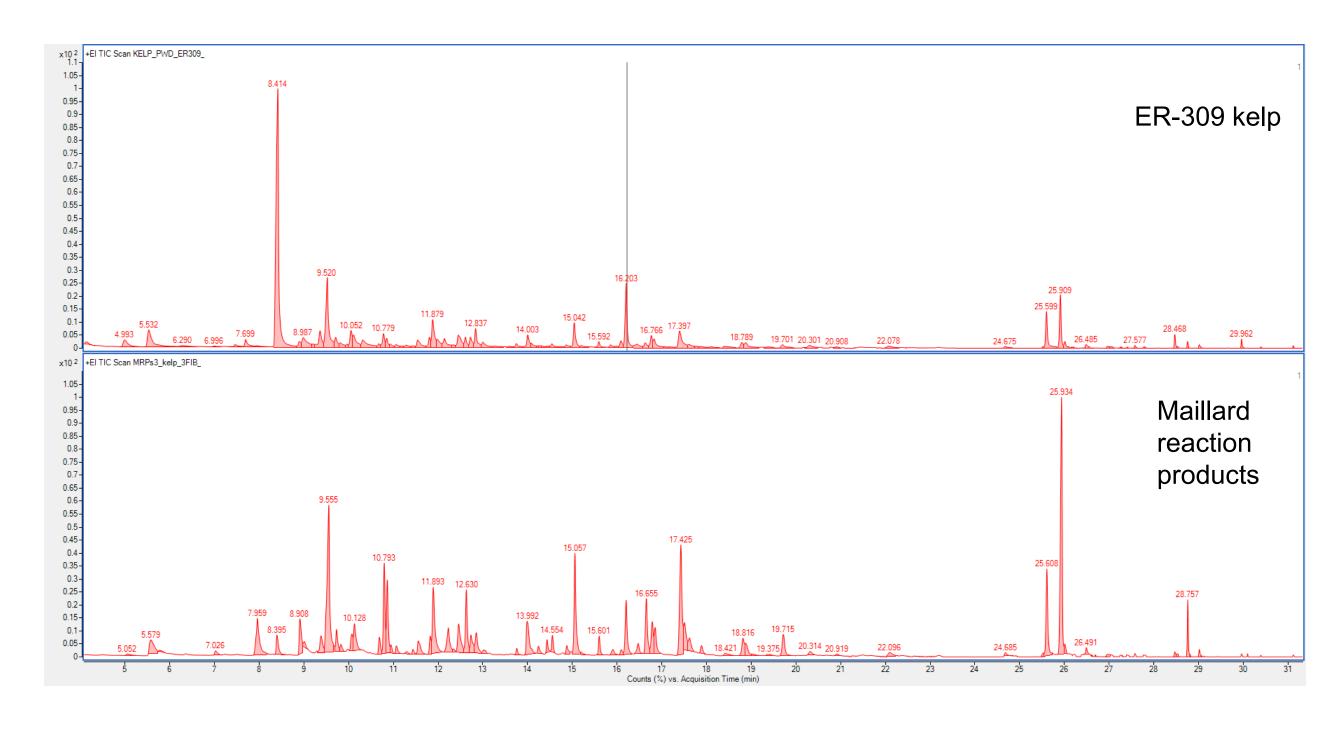


Figure 4: Total ion chromatogram of the ER-309 kelp sample and its Maillard reaction products.

Table 2: Maillard reaction products in ER-309 kelp sample

No	RT	Maillard reaction products	Odor-Data base	RI-HP-5
1	7.862	Ethanone, 1-(2-furanyl)-	Nutty, Almondy	928
2	9.15	2-Furancarboxaldehyde, 5-methyl-	Bready, Coffee	977
3	11.227	Benzeneacetaldehyde	Green , floral	1059
4	11.459	5-Octen-2-yn-4-ol	Fruity, Berry	1069
5	11.571	Isopinocarveol	Woody, Warm	1073
6	11.897	2-Decen-1-ol, (E)-	Citrus, Rose	1086
7	15.101	3,5-Heptadienal, 2- ethylidene-6-methyl-	Spicy	1212
8	16.642	2-Decenal, (Z)-	Fatty	1270
9	17.181	3-Decyn-2-ol	Fatty, Waxy	1290
10	17.625	2,4-Dodecadienal, (E,E)-	Brothy, Fatty	1304
11	25.9	Nonadecane	Bland	1513
12	26.182	Butylated Hydroxytoluene	Phenolic	1529
13	26.972	I-Gala-I-ido-octose	Fatty	1574

Acknowledgement

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