A study on the raw materials standardization for industrialization of *Sargassum horneri* (Turner) C. Agardh

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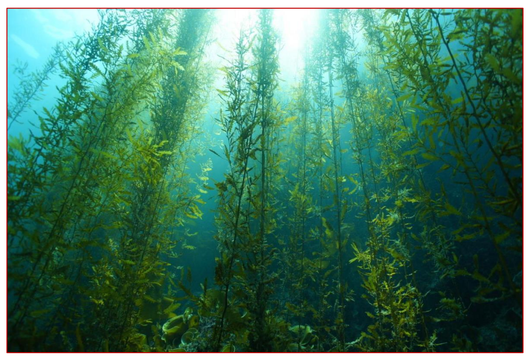
ABSTRACT

A large quantity of around 10,000 tons of *Sargassum horneri* (Turner) C. Agardh is generated every year, polluting the coasts of Jeju and the southern coast, damaging the coastal landscape, as well as being wound around the ship's scour, causing difficulties in fishing boats. In this study, a raw material standardization study was conducted for the industrialization of *S. horneri* (Turner) C. Agardh. First, optimal conditions for drying and washing methods were established for the standardization of raw materials for algae, and optimal conditions were established through content analysis using fucoxanthin, an indicator component, by obtaining samples every month. As for the drying method of *S. horneri* (Turner) C. Agardh, it was confirmed that hot air drying was the best. As for the washing method, it is better to wash in saline groundwater (magma seawater) than in fresh water, and it was confirmed that it is best to incubate for 24 hours or more rather than saline groundwater. It was analyzed that the index component content was highest in march. Next, for functional and toxicity evaluation of *S. horneri* (Turner) C. Agardh, anti-oxidant, anti-inflammatory and immune enhancing efficacy and cytotoxicity were evaluated. Cytotoxicity of *S. horneri* (Turner) C. Agardh was not observed, and it was confirmed that although it had an antioxidant effect, it had no anti-inflammatory and immune-enhancing effects. In conclusion, this study suggested the standardization of raw materials through the analysis of the index components and the functional evaluation of *S. horneri* (Turner) C. Agardh, and it can be used as basic data for future industrialization.

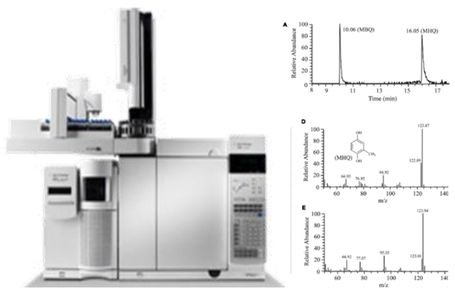
INTRODUCTION



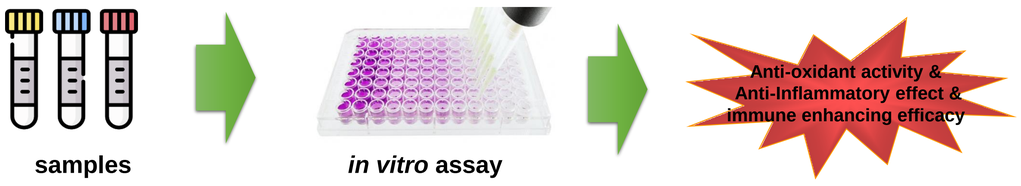
- ✓ **Scientific name : *Sargassum horneri* (Turner) C. Agardh**
- ✓ **Family name : Sargassaceae**
- ✓ **Distribution area : North Pacific Ocean, Conterminous 48 United States etc.**
- ✓ **Problem : marine pollution, damaging the coastal landscap, odor release etc.**

METHODS

<Drying process of *S. horneri* (Turner) C. Agardh >



<Analysis on analytical marker of *S. horneri* (Turner) C. Agardh >



< Assessment methods on bioactivity of *S. horneri* (Turner) C. Agardh >

CONCLUSION

- **As for the drying method of *S. horneri* (Turner) C. Agardh, it was confirmed that hot air drying was the best. As for the washing method, it is better to wash in saline groundwater (magma seawater) than in fresh water, and it was confirmed that it is best to incubate for 24 hours or more rather than saline groundwater.**
- **Cytotoxicity of *S. horneri* (Turner) C. Agardh was not observed, and it was confirmed that although it had an antioxidant effect, it had no anti-inflammatory and immune-enhancing effects.**
- **This study suggested the standardization of raw materials through the analysis of the index components and the functional evaluation of *S. horneri* (Turner) C. Agardh, and it can be used as basic data for future industrialization.**

REFERENCE

- **Kalu Kapuge Asanka Sanjeewa et. al., Anti-inflammatory activity of a sulfated polysaccharide isolated from an enzymatic digest of brown seaweed *Sargassum horneri* in RAW 264.7 cells (2017), *Nutr Res Pract*, 11(1), 3-10.**
- **Weon-Jong Yoon et. al., Anti-inflammatory effect of sargachromanol G isolated from *Sargassum siliquastrum* in RAW 264.7 cells (2012), Arch Pharm Res, 35(8) 1421-1440.**

EXPERIMENTAL RESULTS

<Table 1> Analysis results on nutritional and inorganic component in variety sample of *Sargassum horneri* (Turner) C. Agardh

Test Items	January	February	March	April	May
calorie(kcal/100g)	259.0	254.8	252.0	262.3	277.2
carbohydrate(g/100g)	55.5	49.0	44.1	52.7	57.6
moisture(%)	9.0	9.1	10.6	9.9	9.7
ash(%)	26.9	27.9	27.4	30.3	27.1
protein(g/100g)	8.1	13.3	17.0	11.5	9.9
fat(g/100g)	0.5	0.6	0.9	0.6	0.8
sugars(g/100g)	0.0	0.0	0.0	6.6	7.1
saturated fat(g/100g)	0.3	0.4	0.5	0.4	0.5
trans fat(g/100g)	0.0	0.0	0.0	0.0	0.0
cholesterol(mg/100g)	0.0	0.0	0.0	0.0	0.0
natrium(mg/100g)	5236.2	5383.7	4943.3	3388.1	4731.3
dietary fiber(g/100g)	50.0	44.7	37.6	34.3	34.8
lead(mg/kg)	불검출	불검출	불검출	1.3	0.7
cadmium(mg/kg)	0.6	0.9	2.1	1.6	0.8
arsenic(mg/kg)	60.5	79.4	101.5	213.7	266.5
Mercury(mg/kg)	0.0	0.0	0.0	0.0	0.0

Test Items	March sample		
	control	40℃_fresh water	40℃_sea water
calorie(kcal/100g)	252.0	289.2	251.4
carbohydrate(g/100g)	44.1	52.4	46.0
moisture(%)	10.6	10.3	9.3
ash(%)	27.4	18.9	28.7
protein(g/100g)	17.0	17.1	15.4
fat(g/100g)	0.9	1.3	0.7
sugars(g/100g)	0.0	0.0	0.0
saturated fat(g/100g)	0.5	0.8	0.3
trans fat(g/100g)	0.0	0.0	0.0
cholesterol(mg/100g)	0.0	0.0	0.0
natrium(mg/100g)	4943.3	2936.1	6550.6
dietary fiber(g/100g)	37.6	54.0	41.4
lead(mg/kg)	불검출	불검출	불검출
cadmium(mg/kg)	2.1	2.1	0.9
arsenic(mg/kg)	101.5	62.9	67.8
Mercury(mg/kg)	0.0	0.1	0.1

Test Items	March sample		
	control	1hr_saline groundwater	24hr_saline groundwater
calorie(kcal/100g)	252.0	252.1	237.5
carbohydrate(g/100g)	44.1	45.2	44.0
moisture(%)	10.6	9.4	9.5
ash(%)	27.4	28.7	32.2
protein(g/100g)	17.0	15.7	13.4
fat(g/100g)	0.9	0.9	0.9
sugars(g/100g)	0.0	0.0	0.0
saturated fat(g/100g)	0.5	0.3	0.3
trans fat(g/100g)	0.0	0.0	0.0
cholesterol(mg/100g)	0.0	0.0	0.0
natrium(mg/100g)	4943.3	5656.0	7690.4
dietary fiber(g/100g)	37.6	38.3	42.1
lead(mg/kg)	불검출	불검출	불검출
cadmium(mg/kg)	2.1	1.4	0.5
arsenic(mg/kg)	101.5	78.0	23.7
Mercury(mg/kg)	0.0	0.1	0.0

<Table 2> Analysis results of analytical marker in variety sample of *Sargassum horneri* (Turner) C. Agardh

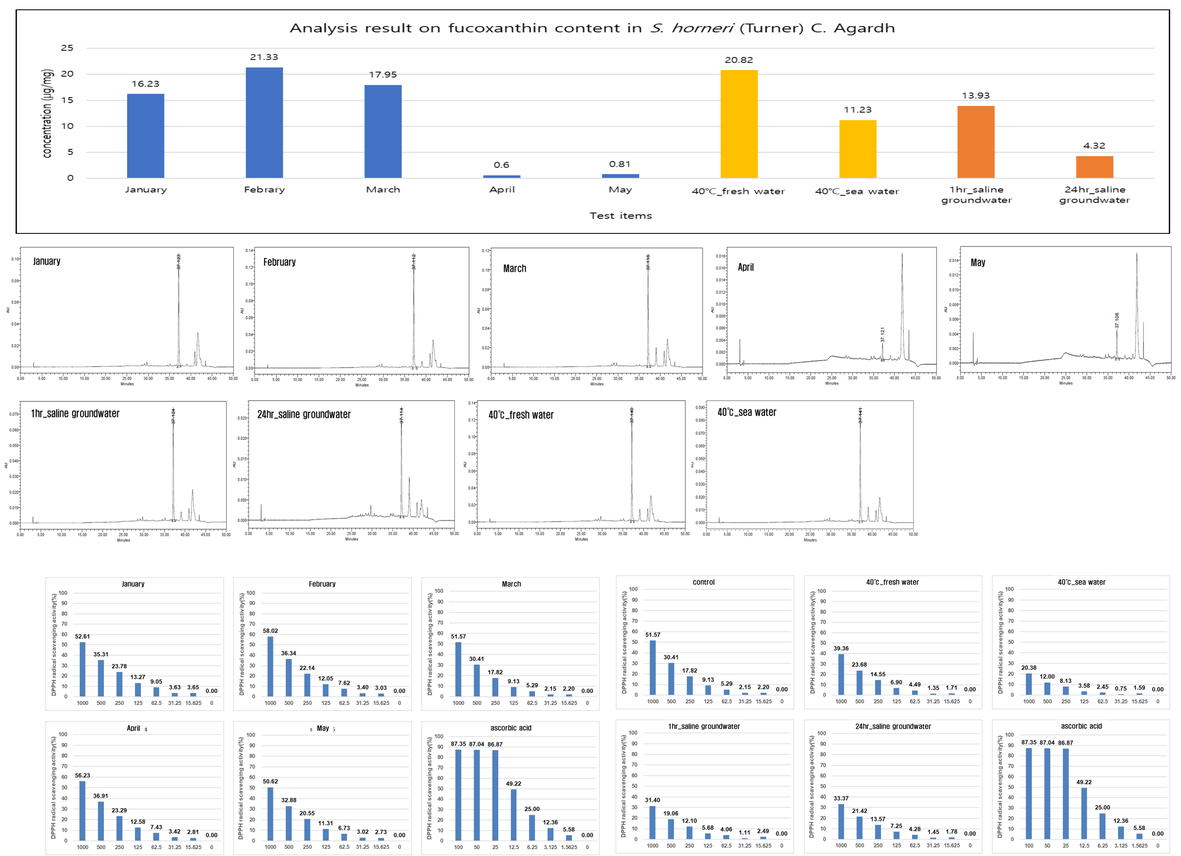


Figure 1. Anti-oxidant activity on variety sample of *S. horneri* (Turner) C. Agardh. DPPH radical-scavenging activity was determined according to the methods of Blois [Blois, 1958]. The scavenging activity was estimated by measuring the absorption of the mixture at 517 nm, reflecting the amount of DPPH radical remaining in the solution. Ascorbic acid was used as positive controls.

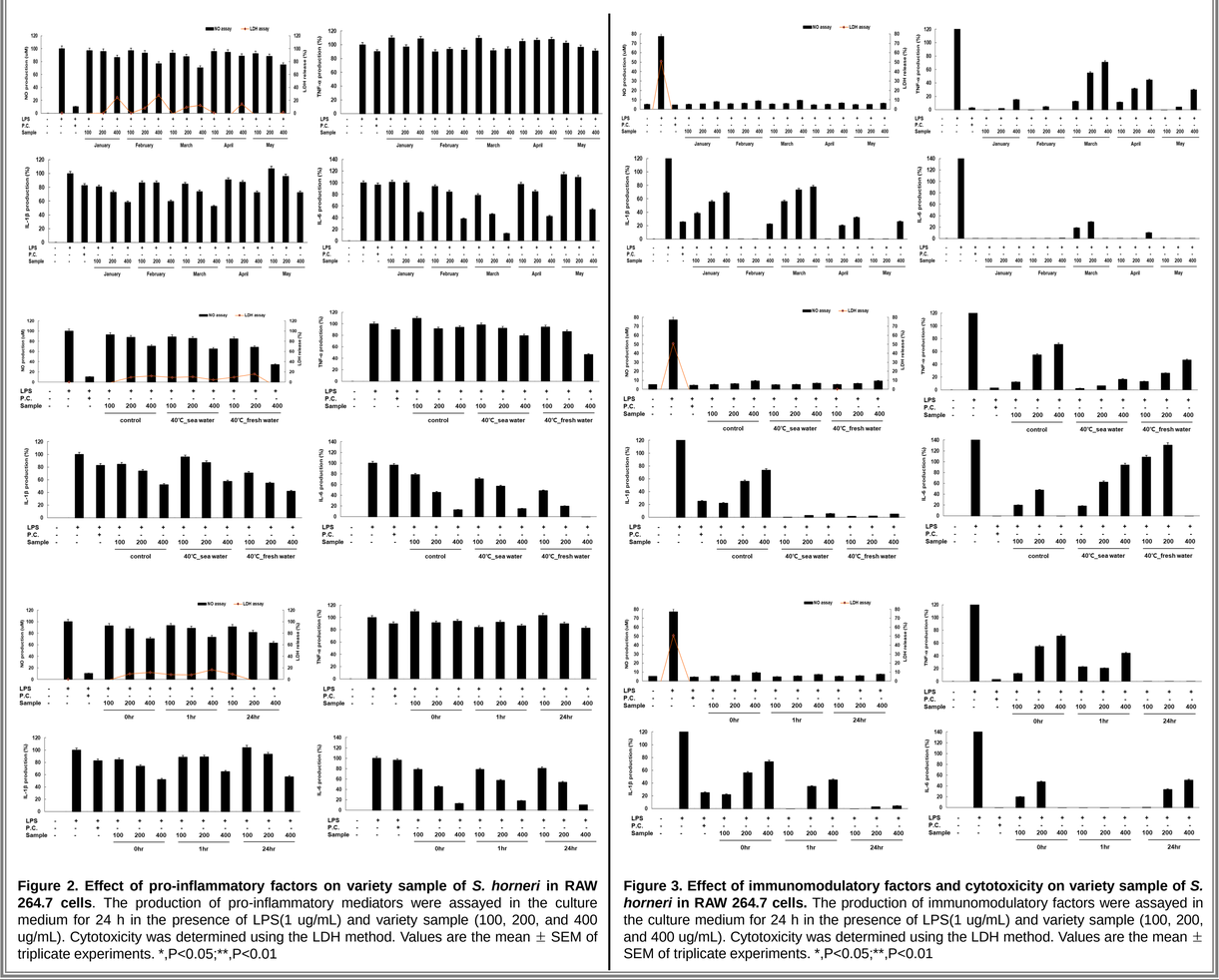


Figure 2. Effect of pro-inflammatory factors on variety sample of *S. horneri* in RAW 264.7 cells. The production of pro-inflammatory mediators were assayed in the culture medium for 24 h in the presence of LPS(1 ug/mL) and variety sample (100, 200, and 400 ug/mL). Cytotoxicity was determined using the LDH method. Values are the mean ± SEM of triplicate experiments. *,P<0.05;**,P<0.01

Figure 3. Effect of immunomodulatory factors and cytotoxicity on variety sample of *S. horneri* in RAW 264.7 cells. The production of immunomodulatory factors were assayed in the culture medium for 24 h in the presence of LPS(1 ug/mL) and variety sample (100, 200, and 400 ug/mL). Cytotoxicity was determined using the LDH method. Values are the mean ± SEM of triplicate experiments. *,P<0.05;**,P<0.01

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