# Antioxidant Bioactivity of Seaweed Lipid Extracts

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## Introduction

- Seaweed is a macroalgae which is found in seawater and rocky costal areas.
- There are multiple bioactive compound's present in seaweed;

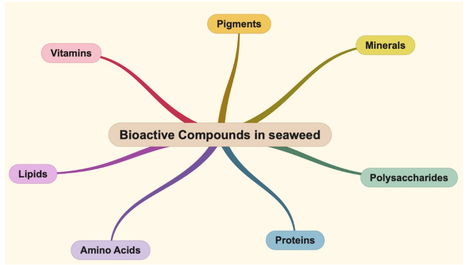


***Figure 1.*** Bioactive compounds that seaweed produce, adapted from El-Beltagi et al (2022)[1].

- These bioactive compounds can generate different bioactive properties; anti-inflammatory, antioxidant, antitumoral, anticancer, antibacterial, e.t.c.

## Methods

- 2-diphenyl-1-picrylhydrazil (DPPH) radical scavenging assay[2] was used to test antioxidant activity.
- Seaweed extracts were taken from original liquid form, dried down using Techne Dri-Block Digital Heater at 42°C .
- Then they were reconstituted with ethanol.

**Prepare DPPH solution**
- Dissolve 7.89 mg of DPPH powder in 100 ml of ethanol.
- Incubate in dark for 2 hours.

**Mix Reagents together**
- **Blank:** Ethanol
- **Negative** Control: DPPH and ethanol
- **Positive Control:** Ascorbic acid, DPPH and ethanol
- **Sample: Mix** 1,000 µl of DPPH with 800 µl ethanol. Then add in 200 µl of seaweed extract.

**Incubate and read absorbance**
- Incubate reagent mix in a dark space at room temperature for 30 minutes.
- After 30 minutes read absorbance at 517 nm.

RSA is measured using Radical Scavenging Activity (%) Equation:

$$Radical\ Scavening\ Activity\ (\%) = \frac{A0 - A1}{A0}\ x\ 100$$

Where A0 = Absorbance of negative control, A1 = Absorbance of sample.

## Results

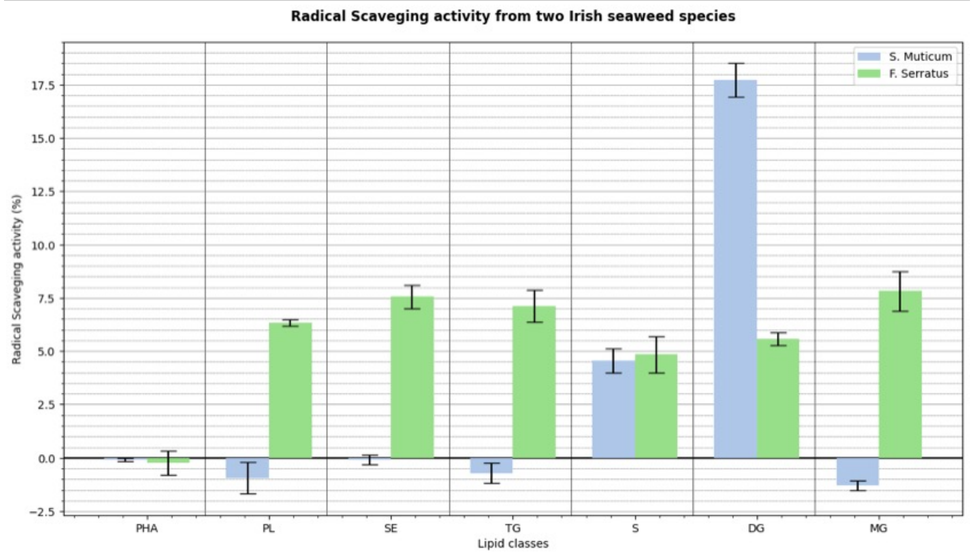


***Figure 2.*** Comparison of Radical Scavenging Activity (%) of *S.Muticum* lipid fractions (blue) and *F.Serratus* lipid fractions (green); PHA= polvhydroxvalkanoate, PL= polar lipids, SE= steryl esters, TG= triglycerides, S= sterols, DG= diacylglycerols and MG= monoglycerides.

The most abundant lipid fractions for RSA was; Diacyglycerols (17.7%) for *S. Muticum* species, Monoglycerides (7.83%) for *F. Serratus* species, and PHA lipid fraction had no RSA for both species.

***Table 1.*** Radical scavenging activity of three Irish Seaweed species.

| Seaweed Species | Radical Scavenging Activity (RSA %) Mean ± Standard Deviation | |
|---|---|---|
| | **0.03g of total Seaweed extract (2g)** | **0.1g of total Seaweed extract (2g)** |
| ***S. Muticum*** | -2.06 ± 0.97 | 0.111 ± 0.27 |
| ***L. Digitata*** | -1.77 ± 1.93 | N/A |
| ***F. Serratus*** | 3.84 ± 0.27 | 15.8 ± 3.23 |

The highest Radical Scavenging Activity was observed from *F. Serratus* at both 0.03g and 0.1g of total Seaweed extract. Low RSA was detected from 0.1g of *S. Muticum* while no RSA from the 0.03g extract. No RSA was seen from *L. Digitata* species.

## Conclusion

### Some limitations within the research project include;

- Light entering the test tubes and affecting the RSA results
- Results *in vivo* and *in vitro* can be different

### Further testing can be performed;

- Increasing concentrations of total seaweed extract.
- Verify composition of each lipid fraction by gas chromatography
- Test other compounds in seaweed

### Significance of results

- Total seaweed extract concentration influences antioxidant activity.
- Different lipid fractions display varying amounts of antioxidant activity.

## References

1. El-Beltagi, H.S., Mohamed, A.A., Mohamed, H.I., Ramadan, K.M.A., Barqawi, A.A. and Mansour, A.T. (2022) 'Phytochemical and Potential Properties of Seaweeds and Their Recent Applications: A Review', *Marine Drugs*, 20(6), 49, available: http://dx.doi.org/10.3390/md20060342 [Accessed 15 Dec. 2022].

2. Kedare, S.B. and Singh, R.P. (2011). Genesis and development of DPPH method of antioxidant assay. *Journal of Food Science and Technology*, [online] 48(4), pp.412–422. doi:https://doi.org/10.1007/s13197-011-0251-1 [Accessed 15 Jan. 2023].