Antioxidant Analyses of *Lemna minor*, an Aquatic Plant of Emerging Interest for the Food Industry

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Introduction

Holds significant economic potential across various industrial sectors;

High biomass production, substantial protein content, and adaptability to diverse climatic conditions;

Traditionally consumed in Southwest Asia, *Lemna minor* is now emerging as a novel food source in Europe.

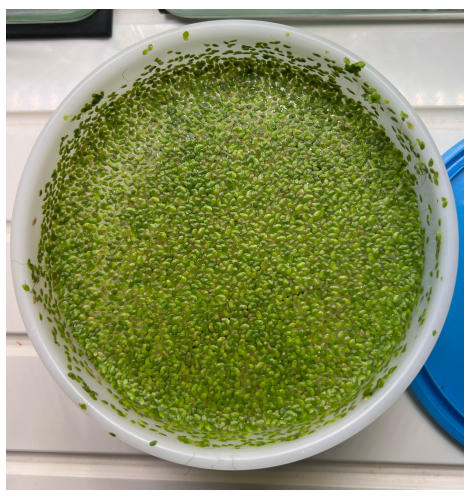

Fig.1 - *Lemna minor* L., Subfamily Lemnaceae, composed of 36 species

Materials and Methods

This present work examines two antioxidant activity tests, for two previously determined pH (6.5 and 9.5) and for three photoperiods (12, 8 and 4 hours).

- Thiobarbituric acid reactive species (TBARS) inhibition;
- 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging.

For this purpose, the plants were subjected to a solid-liquid extraction in ethanol (80:20) 1g/mL for 1 hour, after which they were filtered and re-extracted, followed by a second extraction with fresh solvent. After the extraction, the supernatant was lyophilized, and the resulting powder was used for antioxidant activity assays

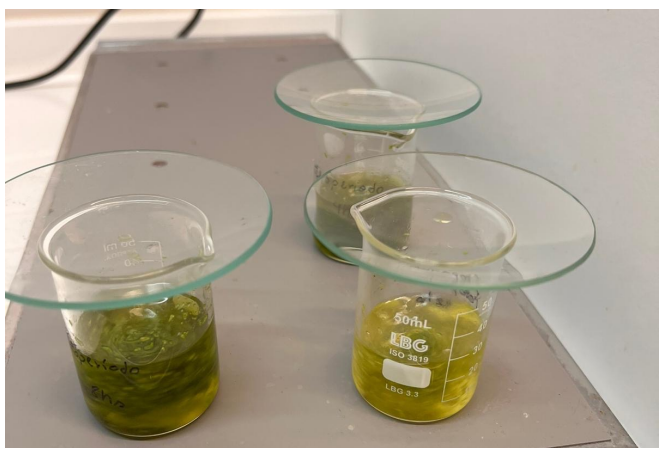

Fig.2 – Extraction of *L. minor*

Fig.3 –Filtration

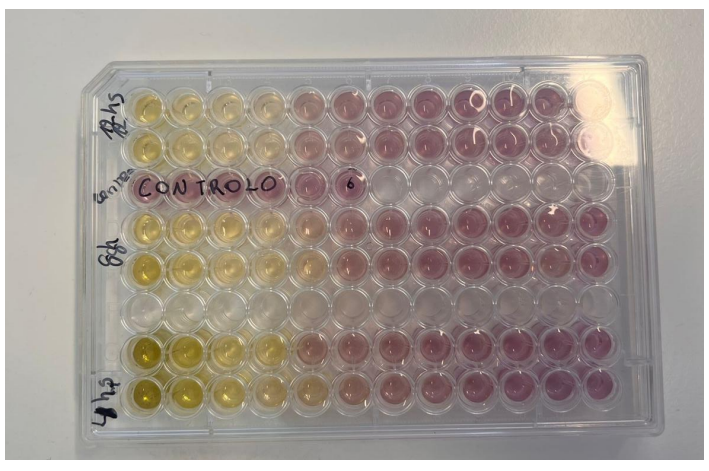

Fig.4 –DPPH assay

Results

TBARS and DPPH assays for pH 6.5 and 9.5

	TBARS	DPPH
pH 6.5	0.74 ± 0.06*	1.05 ± 0.03*
pH 9.5	0.57 ± 0.02	0.61 ± 0.01

Thus, plants with higher antioxidant activity were those that were subjected to growth at pH 9.5, resulting in a lower EC_{50} value, which represents a lower concentration of extract needed to neutralize 50% of the oxidative species.

Different photoperiods of 12h, 8h, and 4h.

	TBARS	DPPH
12h	0.53 ± 0.03c	0.79 ± 0.01[c]
8h	0.37 ± 0.03[b]	0.58 ± 0.06[b]
4h	0.12 ± 0.002[a]	0.54 ± 0.07[a]

The highest antioxidant activity was found in the extracts of plants with lower light radiation, 4 hours, being significantly higher than at 8 hours. The lowest activity was found for 12 hours of radiation.

Thus, with respect to pH, the values are as expected, demonstrating that under an alkaline and highly stressful environment, the plant produces secondary metabolism compounds for its protection against this aggression, with these compounds being quite antioxidant. At an optimal pH for its growth, the plant focuses its energy on growth and reproduction, not needing to synthesize protective molecules. Regarding photoperiod, it is concluded that longer radiation time may not be among the factors that most contribute to the synthesis of secondary metabolism compounds.

Conclusion

L. minor plants can grow at pH levels significantly different from the optimal, as well as under various photoperiods, albeit more slowly. Despite this slower growth, they produce large quantities of antioxidant compounds, making them a potential source for these compounds in industries beyond the food sector

This work fulfils specific points in Food Supplement Production within the Sustainable Development Goals (SDGs), namely numbers 2,12,14. It`s a sustainable, protein-rich plant that helps combat hunger and improve food security. Promotes sustainable agricultural practices with low environmental impact. It`s ability to purify water supports the protection and restoration of aquatic ecosystems, enhancing biodiversity.

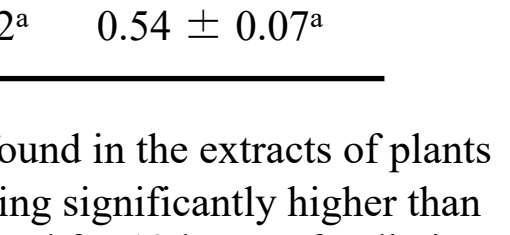

Fig.5 – Sustainable Development Goals

Acknowledgments

This work was supported by the Foundation for Science and Technology (FCT, Portugal) through national funds FCT/MCTES (PIDDAC), CIMO (UIDB/00690/2020 and UIDP/00690/2020) and SusTEC (LA/P/0007/2021). S. Heleno and M. Carocho thank FCT for their individual employment program (CEEC-IND/00831/2018, CEECIND/03040/2017). L. Barros thanks FCT for her institutional contract. F. Macedo thanks FCT for his PhD grants (2023.04962.BD). The authors are also grateful to CIMO's funded project "AquaProt (EXPL2021CIMO_04)", to which Diana Sosa thanks for her grant.