Application of free radical method for decolorization of galactoglucan from *Myriophyllum spicatum* L and evaluation of relationships of chemical and molecular structures with antioxidant and antibacterial activities

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Methods

Aquatic plant: *Myriophyllum spicatum* L
Galactoglucan extraction & radical decolorization with H_2O_2

Crude polysaccharide extraction

Radical decolorization with hydrogen peroxide (H_2O_2)

- H_2O_2 concentration: 0, 0.5, 1, 2, 3, 4%
- Contact time: 12, 18, 24, 48, 72 h

Decolorized samples

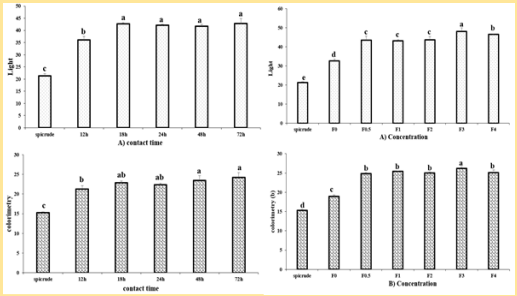
Structural characterization & properties

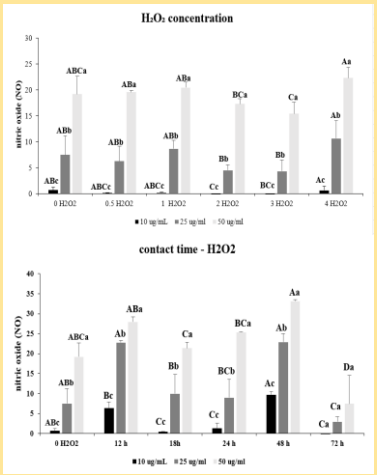
- Appearance & colorimetry
- Chemical composition: Total phenolics ↓ | Uronic acid ~ | Sulfate ~
- Monosaccharide composition (GC–MS)
- **Molecular characteristics:** HPSEC–MALLS (Mw, Mn, Mw/Mn, Rn, Rz)
- Functional groups (FT–IR)
- Surface morphology (SEM)

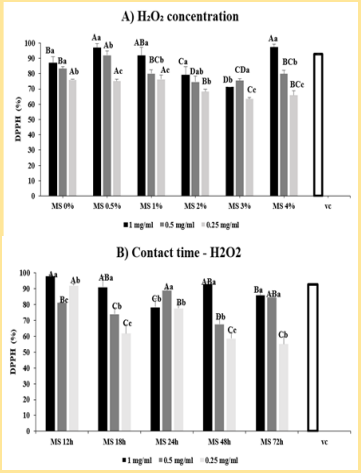
Bioactivity assessment

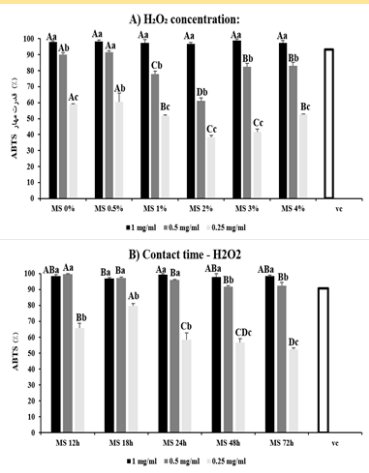
- Antioxidant activity: DPPH | ABTS | •OH | $O_2^{\bullet-}$ | Fe^{3+} reducing power
- Antibacterial activity: Gram-positive & Gram-negative (Disk diffusion)
- Immunomodulatory activity: RAW 264.7 | MTT assay | NO measurement

Outcomes

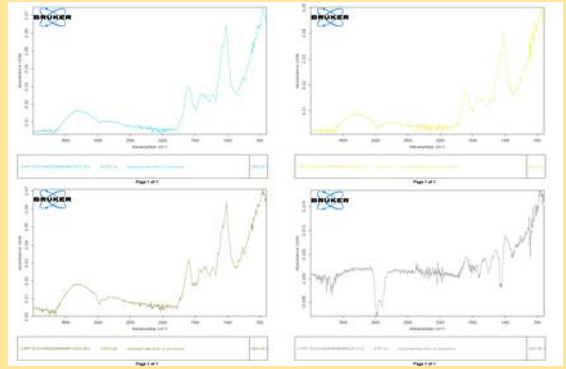








- With increasing H_2O_2 severity, the samples became lighter (L^* ↑, b^* ↑, with minimal change in a^*).
- Total phenolic content decreased markedly, while sulfate and uronic acid were largely preserved.
- Mw decreased, whereas Rn remained nearly constant → indicating controlled hydrolysis.
- Lower-Mw fractions exhibited stronger antioxidant, antibacterial, and immunomodulatory activities.



Financial Sources

This study was supported by …