

Ecotoxicological evaluation of *Humulus lupulus* cosmetic grade extracts

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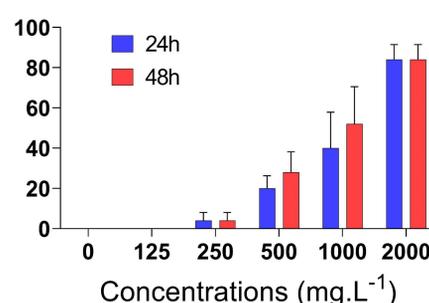
Introduction:

- Humulus lupulus* L., commonly known as hop, is widely used in beer production [1]. However, it has also been used in traditional medicine due to their sedative properties, and also as a treatment for pneumonia, headaches, and skin injuries, among others [2,3].
- Besides these traditional applications, bioactive compounds are continuously being discovered and extracted from hop. These bioactive compounds have the potential to be used in food, pharmaceuticals and cosmetics [4].
- In this work, extracts obtained from *H. lupulus* cultivated in Portugal were studied for their properties as a new source of cosmetic ingredients under the framework of the project INOVEP.
- Considering their prospective industrial application a thorough risk assessment must be performed. In this line, and following the *Precautionary Principle* underlying European law, the environmental safety of *H. lupulus* extracts was studied using *Daphnia magna*, a recommended organism to perform aquatic toxicity tests [5].

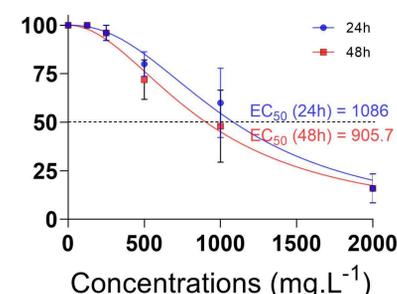
Results & Discussion:

Effect of *H. Lupulus* chloroformic extract (flowers) on *D. magna* immobilisation:

% immobilisation



% survival



- Only the **chloroformic extract obtained from the flowers caused observable immobilisation of *D. magna* after 48h of exposure**, although at very high concentrations.
- The obtained **EC₅₀ values varied from 1086 mg.L⁻¹ after 24h of exposure to 905.7 mg.L⁻¹ after 48h of exposure**.
- All the other extracts did not cause observable effects on *D. magna* up to the highest concentrations tested.**
- According to the Globally Harmonised System for Classification and Labelling of Chemicals (GHS) proposed by the United Nations (UN) [7], **all the extracts tested can be classified as not toxic to aquatic systems.**

Acute toxicity results of the different *H. lupulus* extracts tested and GHS classification

Type of extract	Parts used	48h EC ₅₀ (mg.L ⁻¹)	GHS Classification [7]
Chloroformic	Aerial parts	> 2000	Not classifiable as toxic to aquatic systems
	Flowers	905.70	
Ethanolic	Aerial parts	> 400	(48h EC ₅₀ > 100 mg.L ⁻¹)
Hydro-ethanolic	Aerial parts	> 800	
Methanolic	Aerial parts	> 800	
	Flowers	> 400	

Conclusions:

All the tested extracts showed no acute effects to *Daphnia magna* up to the limit concentration to be considered toxic to aquatic life (>100 mg.L⁻¹) according to the Globally Harmonized System for Classification and Labelling of Chemicals (GHS) of the United Nations.

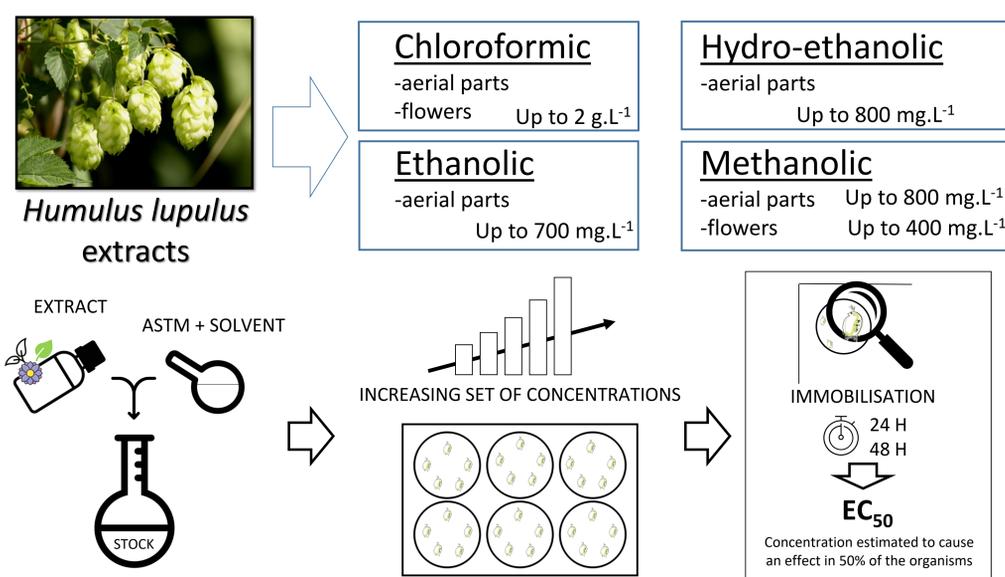
Aknowledgments:

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Materials & Methods:

Acute toxicity tests with *Daphnia magna*

According to the OECD Guideline no. 202 [5]



D. magna culture

- pH: 7.6 – 8.0
- Temperature: 20±1° C
- Photoperiod: 16/8 (light/dark)
- Diet: *Raphidocelis subcapitata* (Diet)

Validation test with reference toxicant

- Toxicant: **K₂Cr₂O₇**
- Concentration range: [0.2 - 0.4 - 0.8 - 1.6 - 3.2] (mg.L⁻¹)
- Result: 24h EC₅₀ = 1.68 mg.L⁻¹
- Certified range: EC₅₀ between 0.6 – 2.1 mg.L⁻¹ [6]

References:

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