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Introduction

The Hops (*Humulus lupulus* L.) are known worldwide as an essential flavor in the beer industry. Its compounds have been showing health benefits in terms of phytochemical, pharmacological and biological profiles, due to their antimicrobial, antioxidant, anti-inflammatory and anticancer activities.[1]

Objectives

This study intends to develop a gel formulation incorporating hydroalcoholic extracts of different varieties of hops such as Cascade, Polaris and Spontaneous, from the cones and the vegetative plant parts, in different percentages.



Material and Methods

- The essential oil of *Thymus zygis* was used as a natural conservative and the analysis of the composition was made by GC and GC-MS [2]
- Preparation of extracts by solid-liquid extraction with an 80% etanolic solution
 - Varieties: Cascade, Polaris, and
 - Spontaneous
- Determination of physical-chemical parameters and stability and ability to inhibit microbial growth in bacteria and yeast;
- Analysis of phenolic compounds by Folin-Ciocalteu.

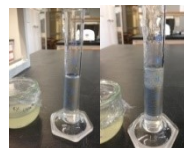


Results

- ✓ In hop extracts there was no microbial activity;
- ✓ The various dilutions of thyme *zygis* oil at 5% were tested on *Escherichia coli* bacteria: MIC (minimum inhibitory concentration) was 1/8 and MBC (minimum bactericidal concentration) was 1/16, *Staphylococcus aureus*: MIC = 1/32 and MBC = 1/64 and *Pseudomonas aeruginosa*: MIC = 1/2 and MBC = 1/4.

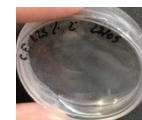


Components	<i>T. zygis zygis</i>	Components	<i>T. zygis zygis</i>
α-Thujene	1,6	cis-Linalool oxide	0,60
α-Pinene	0,8	cis-Sabinene hydrate	0,10
Camphene	1,0	Camphor	3,20
3-Octanol	1,00	Borneol	1,20
β-Myrcene	1,00	Terpinen-4-ol	0,60
α-Terpinene	1,40	α-Terpineol	0,10
p-Cymene	24,10	Thymol	0,30
Limonene	0,20	Carvacrol	43,60
trans-β-Ocimen	1,10	Yields (v/w)	1,14
trans-Sabinene hydrate	15,80		



- ✓ The relative density obtained values of 1 and 0.857;

- ✓ In the light test there was phase separation in the samples, which may be related to the manufacturing technique of the formulations;



- ✓ For the yeast *Candida albicans*, discs of various dilutions of the essential oil of thyme *zygis* at 5% were placed, the halos went to 1/2 had 0.95cm, 1/4 had 0.6cm, 1/8 had 0.2cm and for 1/16 there was no halo;

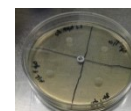


Table 1: Yields and percentage composition of the essential oils isolated from the aerial parts of *T. zygis zygis* collected during Flowering state.

- ✓ The yield of the essential oil of *Thymus zygis zygis*, based on the dry mass of the plant, was as follows 1.14%;
- ✓ GC-MS analysis of the essential oil of *T. zygis zygis* oil showed the presence of Carvacrol with 43.6%, followed by Cymene 24.10% and trans-Sabinene hydrate 15.8%.
- ✓ Its total phenolic compounds in the hop varieties are more concentrated in the flowers than in the vegetative parts;

Sample	Total Phenolic Compounds (mg GAE/g dried plant)	
	Vegetative parts	Flowers
Cascade	2.05±0.66	10.39±2.05
Polaris	1.05±0.22	22.71±2.44
Spontaneous	3.08±0.53	-

Table 2: Total phenol compounds expressed in Gallic acid 1-hydrate, in the different plants extracts

	Dilutions of hops extracts 100ul			
	1/2	1/4	1/8	1/16
Cascade				
Flor	0,5cm	0,5cm	0,4cm	0,3cm
Vegetal	0,5cm	0,5cm	0,5cm	0,5cm
Polaris				
Vegetal	0,75cm	0,74cm	0,70cm	0,70cm
Flor	0,70cm	0,70cm	0,65cm	0,65cm
Espontâneo				
Vegetal	0,5cm	0,5cm	0,4cm	0,3cm
Flor	0,5cm	0,5cm	0,3cm	0,3cm

Table 3: For the yeast *Candida albicans*, disks of various dilutions of the hop varieties (Cascade, Polaris and Spontaneous) of the vegetative and floral parts were placed, the halos were:

Conclusions

However, this formulations anti aging with phenols from Hop can be development in order to obtain formulations with relevant properties for the consumers and the cosmetic industry.

References

- [1] Goes, H., Morais, J. S., Pedro, L., & Sousa, M. J. (2019). Estudo cromatográfico de compostos bioativos em cultivares e espontâneos de lúpulo. Bragança.
- [2] Figueiredo, M. V. B., Martínez, C. R., Burity, H. A., and Chanway, C. P. (2008). Plant growth-promoting rhizobacteria for improving nodulation and nitrogen fixation in the common bean (*Phaseolus vulgaris* L.). World J. Microbiol. Biotechnol. 24, 1187–1193. doi: 10.1007/s11274-007-9591-4

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