Phytochemical and pharmacological study of *Plectranthus ecklonii* Benth.

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1.Introduction: All over the world, plants have been used to prevent and treat a variety of diseases, as it has been compiled in traditional medicine books. Therefore, they continue to be important sources of drugs nowadays. *Plectranthus* species (*Lamiaceae* family) have a widespread ethnobotanical use and are often cited by its medicinal properties and applications, particularly in folk medicine. This can be justified by their reported richness in valuable biologically active compounds such as phenolic compounds and diterpenes, specifically, different types of royleanones.

2. Objectives: This work enumerated the metabolites isolated to date from *Plectranthus ecklonii* Benth., extracts and their biological activities. The HPLC analysis presented is part of an ongoing project at CBIOS of identification, quantification and evaluation of the bioactive components (in particular, diterpenes and hydrocinnamic acids) in different species of *Plectranthus*.

3. Materials and Methods: Bibliographical review using the information compiled from books and electronic databases (Web of Science, PubMed, among others) and experimental work [1-3]:

1. Extract preparation procedure

Fig. 1 - *Plectranthus ecklonii*

Acetonic extracts→ Maceration and ultrasounds

Aqueous extracts→ aqueous extracts: Decoction, infusion, microwaves and ultrasounds

2. Quantification by HPLC-DAD Analysis

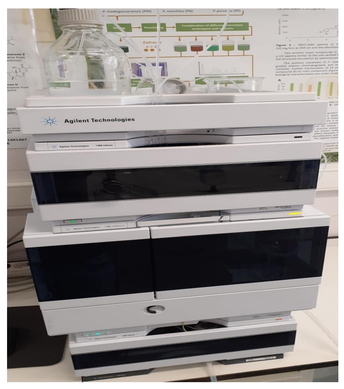

Fig. 2 – HPLC-DAD

4. Results and discusión:

1. Diterpene: Parvifloron D quantification (430 nm) in *P. ecklonii* extracts (1 mg/mL)

Solvent / Extraction method	Parvifloron D (µg/mg)
Acetone /Maceration	136,75
Acetone / Ultrasounds	166,10
Acetone / Supercritic fluids	2,22
Water / Decoction	2,44
Water / Infusion	1,02
Water / Microwaves	1,18
Water / Ultrasounds	1,15

2. Phenolic compounds: Caffeic (Caf), rosmarinic (RA) and chlorogenic acid (Clor) quantification (290 nm) in *P. ecklonii* extracts(1 mg/mL)

Solvent / Extraction method	Caf (µM)	RA (µM)	Clor (µM)
Acetone / Maceration	3,89	43,86	9
Acetone/ Ultrasounds	5,27	14,33	5,54
Acetone / Supercritic fluids	0,78	0	0
Water / Decoction	36,03	224,28	18,81
Water / Infusion	15,83	112,73	11,89
Water / Microwaves	20,8	183,86	15,66
Water / Ultrasounds	15,34	88,18	10,39

5. Discussion & conclusions:

Twenty-eight compounds had been isolated from the plant with different activities (antimicrobial, antitumor, antioxidant and anti-inflammatory)

The results did not show marked differences between each extraction method (Table 1 and 2), but between the solvents used (acetone and water)

In the extraction of hydrocinnamic acids, the results clearly show that higher levels of compounds were obtained with the most polar solvent, that is, water. Of the applied techniques, the decoction was the one that allowed to detect greater amounts of compounds, which is in accordance with what is described in the literature [4]

The highest value of parvifloron D (1) was obtained in the acetonic extract prepared by ultrasound (Table 1).

Rosmarinic acid (RA) is undoubtedly the predominant compound in the aqueous extracts of *P. ecklonii*

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7. References: **[1]** Rijo, P., Gaspar-Marques, C., Simões, M.F., Jimeno, M.L., & Rodríguez, B. (2007). Further diterpenoids from Plectranthus ornatos and P. grandidentatus. Biochemical Systematics and Ecology, 35, 215-221. **[2]** Kubínová, R., Švajdlenka, E., Schneiderová, K., Hanáková, Z., Dall'Acqua, S., & Farsa, O. (2013). Polyphenols and diterpenoids from Plectranthus forsteri "Marginatus." Biochemical Systematics and Ecology, 49, 39–42. doi:10.1016/j.bse.2013.03.029 **[3]** Rijo, P., Falé, P.L., Serralheiro, M.L., Simões, M.F., Gomes, A., & Reis, C. (2014). Optimization of medicinal plant extraction methods and their encapsulation through ectrusion technology. Measurement, 58, 249-255. **[4]** Gomes, A., Jerónimo, A., Reis, C., & Rijo, P. (2012). New treatment strategies with plant extracts teas for Alzheimer's disease. Biomed Biopharm Res., (9) 2:242.