



# In vitro cell culture of *Rhus coriaria* L.: a standardized phytoextract rich of gallic acid derivatives with antioxidant and skin repair activity

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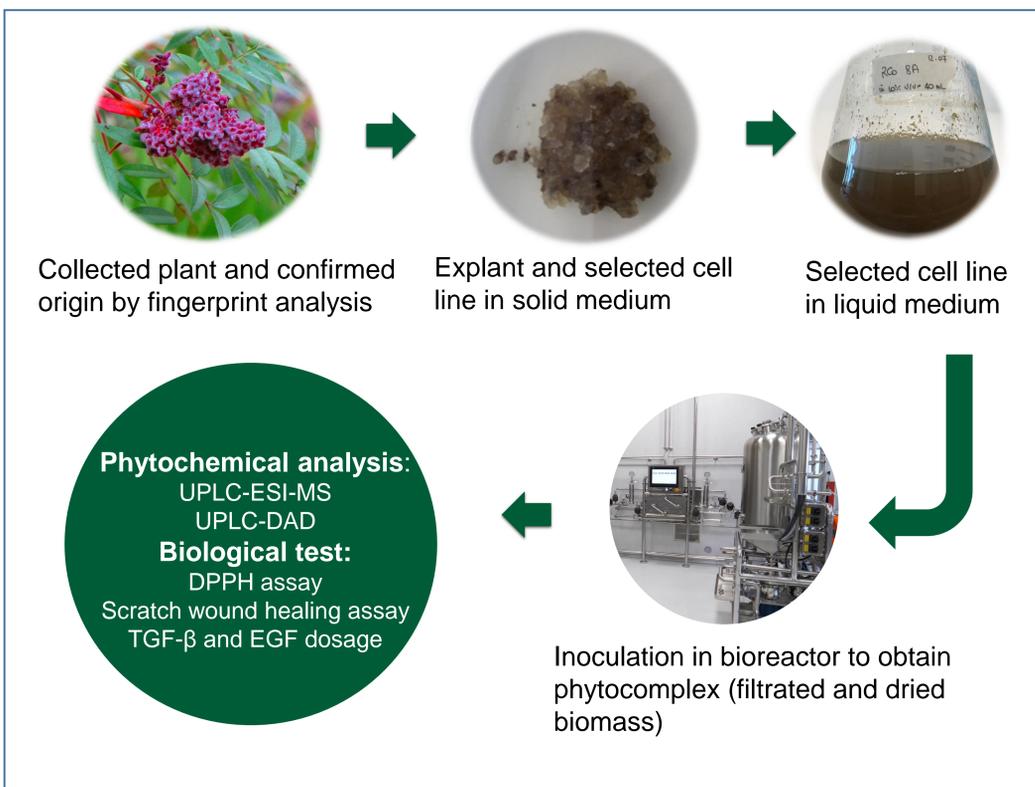
## Introduction:

**Plant cell culture technology** is a technique for growing of plant cells under strictly controlled environmental conditions<sup>1</sup> that makes it possible to provide preparations with a **standardized content** of active substances and a high **safety profile** for the consumer, free from heavy metals, pesticides, aflatoxins, bacterial or fungal contamination<sup>2</sup>.

*Rhus coriaria* is a plant native in southern Europe with powerful antioxidant properties. ***Rhus coriaria* phytoextract** derived from *in vitro* cell cultures has a high and standardized content of gallic acid derivatives<sup>3</sup>, phenolic compounds with great antioxidant activity.

The aim of this study is to demonstrate the **antioxidant and skin repair activity** of a new *Rhus coriaria* phytoextract obtained by *in vitro* plant cell cultures and its possible **applications in cosmetic products**.

## Materials & Methods:



## Conclusions:

***Rhus coriaria* phytoextract** derived from *in vitro* cell cultures has a **high and standardized content** of gallic acid derivatives, expressed as equivalent of gallic acid.

***Rhus coriaria* phytoextract** demonstrated the **ability to induce** significant keratinocytes migration and **wound healing** under stress condition after 6h and 24h of treatment at the concentration of 0.1 mg/mL and showed a **high antioxidant activity**.

***Rhus coriaria* phytoextract** is a new ingredient for cosmetic products with antioxidant and skin repair activity with **sustainable and safety** features related to the production process.



no pesticides



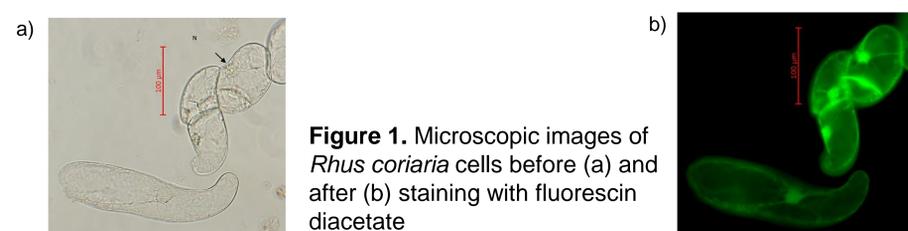
no fertilizers



no solvents

## Results & Discussion:

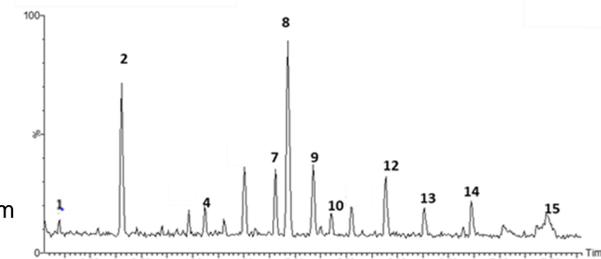
A cell line stable both in solid and liquid RC Medium was obtained starting from few young leaves of *Rhus coriaria*. It was characterized by small elongated cells with lateral nucleus and rich in cytoplasmic strands.



**Figure 1.** Microscopic images of *Rhus coriaria* cells before (a) and after (b) staining with fluorescein diacetate

The total content of **gallic acid derivatives** (7.6% w/w), expressed as equivalent of gallic acid, was increased and optimized using RC final liquid Medium with a specific quantitative composition and it is due to the high plasticity of the differentiated cells cultured under controlled conditions.

**Figure 2.** UPLC-MS chromatogram of *Rhus coriaria* sample



id	rt	m/z(-)	fragments	putative identification
1	2,44	331,066	169,014	gallic acid hexose
2	3,3	399,148	171,9463; 263,0213	ui
4	4,117	371,098	161,0238; 163,039	coumaric acid hexose
5	4,3	341,085	-	caffeic acid hexose
7	4,8	289,071	*	catechin*
8	4,9	325,09	163,036	coumaric acid hexose
9	5,179	325,094	-	coumaric acid hexose**
10	5,35	635,092	287,055	trigalloyl hexose**
12	5,889	447,094	285,0394	tetrahydroxyflavone hexoside
13	6,264	447,09	163,0031; 227,0709; 245,0804; 255,0296; 285,0394	tetrahydroxyflavone hexoside
14	6,723	469,05	-	pentagalloyl esoxide**
15	7,452	621,057	-	eptagalloyl esoxide**

**Table 1.**

The main metabolite of *Rhus coriaria*.

Rt= retention time;

ui= unidentified;

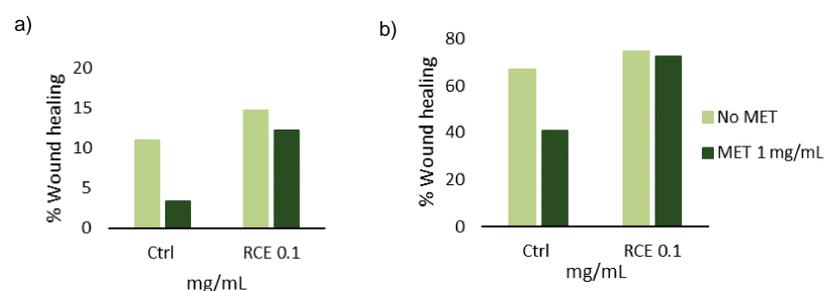
\* confirmed by comparison with

authentic standard

\*\*not confirmed by

fragmentation.

*Rhus coriaria* phytoextract at the concentration of 0.1 mg/mL was able to induce significant keratinocytes migration and **wound healing** after 6h and 24h of treatment. Under stress condition, such as the administration of corticosteroids, the physiological ability of epidermis cells to repair damage induced by abrasions or wounds was impaired (-73% at 6h and -39% at 24h). The activity of *Rhus coriaria* phytoextract did not involve EGF and TGF-β growth factors but it showed a high **antioxidant activity** that could be at the base of its biological function.



**Figure 3.** Wound healing activity on keratinocytes of *Rhus coriaria* after 6h (a) and 24h (b) of treatment, with and without 6α-methylprednisolone (MET).

## References:

- Georgiev V (2015) Mass propagation of plant cells- an emerging technology platform for sustainable production biopharmaceuticals. *Biochem Pharmacol* 4:5.
- Georgiev V, Slavov A, Vasileva I, Pavlov A (2018) Plant cell culture as emerging technology for production of active cosmetic ingredients. *Eng Life Sci* 18:779-798.
- Pressi G, Bertaiola O, Guzzo F, Biagi M. Fitocomplesso ed estratto di linea cellulare meristemica di *Rhus coriaria*. Patent ITA 10202000028136, 24 November 2020.