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## The iridoids of in vitro propagated *Nepeta cyrenaica* Quézel & Zaffran

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pharmaceuticals



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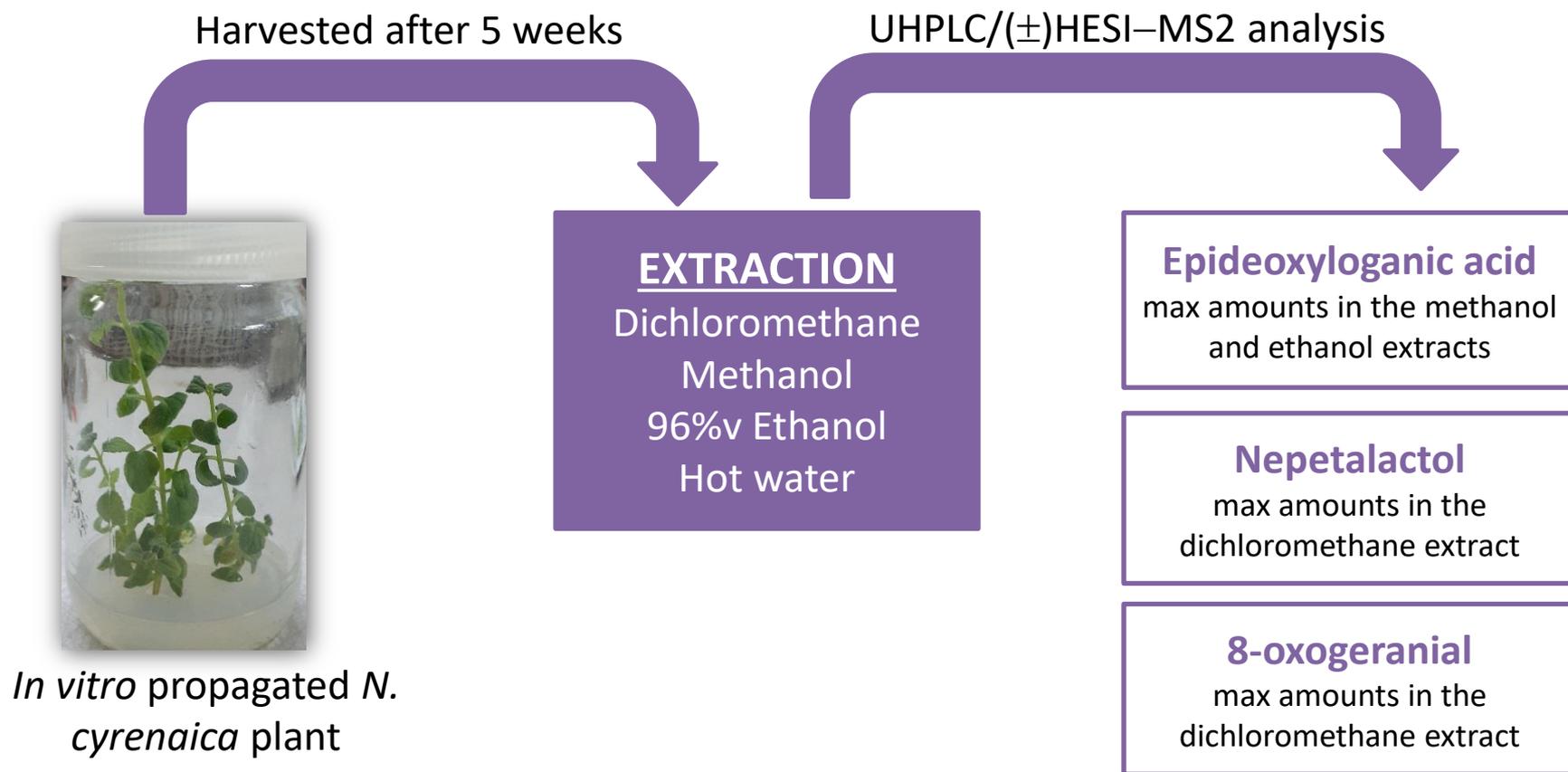
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# The iridoids of *in vitro* propagated *Nepeta cyrenaica* Quézel & Zaffran

## Graphical abstract



## Abstract

*Nepeta cyrenaica* Quézel & Zaffran (Lamiaceae), an endemic species of the Libyan flora, has been scarcely explored till now. Since *Nepeta* species are proved as pharmacologically active plants rich in iridoid monoterpenes and, this study was aimed to quantify the iridoids present in different extracts of *in vitro* propagated *N. cyrenaica*. The seeds collected from natural habitat were germinated, and the shoots were harvested after 5 weeks. The extraction was done using classic maceration procedure by dichloromethane, methanol, 96% ethanol, and hot distilled water. Subsequently, the extracts were subjected to UHPLC/(±)HESI–MS2 analysis of iridoids. Two iridoids were identified and quantified, namely epideoxyloganic acid and nepetalactol, as well as their precursor 8-oxogeranial. Iridoid glucoside epideoxyloganic acid was the most abundant in the methanolic and ethanolic extracts (1255.37 and 1262.78 µg/100g dry extract), followed by aqueous extract. On the other hand, 8-oxogeranial and nepetalactol reached maximal amounts in the dichloromethane extract (476.80 and 1039.52 µg/100g dry extract, respectively). The results of this study indicate that high antioxidant and enzyme-inhibiting effects of dichloromethane extract confirmed in our previous study could be attributed to its iridoid content, which was particularly high due to the low polarity of this extraction solvent. In conclusion, endemic *N. cyrenaica* could be efficiently propagated *in vitro* as a iridoid-rich plant with great biological potential.

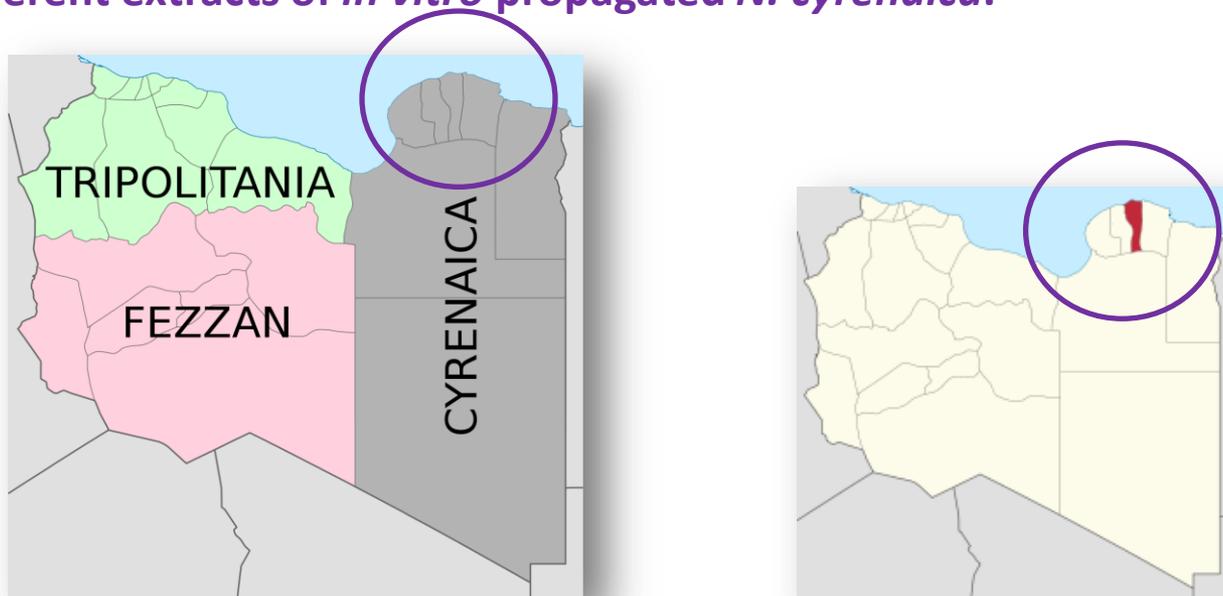
**Keywords:** *Nepeta cyrenaica*; *in vitro* propagation; extracts; iridoids;

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## Introduction

- ❖ *Nepeta cyrenaica* Quézel & Zaffran (Lamiaceae) is an endemic species of the Libyan flora.
- ❖ Although *N. cyrenaica* is used for honey production in the **Al-Jabal Al-Akhdar district (Cyrenaica region, Libya)**, this plant has been scarcely explored till now.
- ❖ Since *Nepeta* species are proved as pharmacologically active plants rich in iridoid monoterpenes, **this study was aimed to quantify the iridoids present in different extracts of *in vitro* propagated *N. cyrenaica*.**



## Material and Methods

- ❖ The seeds collected from natural habitat (Al-Jabal Al-Akhdar district, Cyrenaica region, Libya) were germinated, and the shoots were harvested after 5 weeks.
- ❖ The extraction was done using classic maceration procedure by dichloromethane, methanol, 96% ethanol, and hot distilled water.
- ❖ Subsequently, the extracts were subjected to UHPLC/(±)HESI–MS2 analysis of iridoids.



*N. cyrenaica* plants on the medium

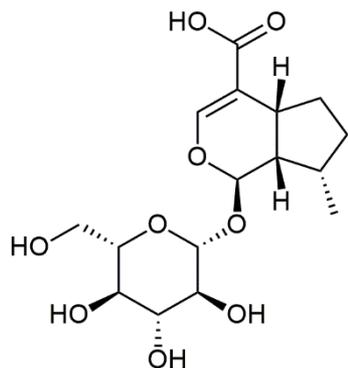


*N. cyrenaica* explants on the medium

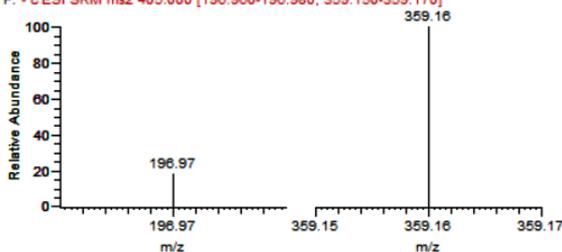


*N. cyrenaica* plants after 5 week in the culture

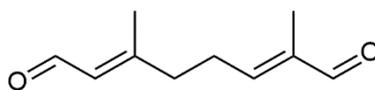
# Results and discussion



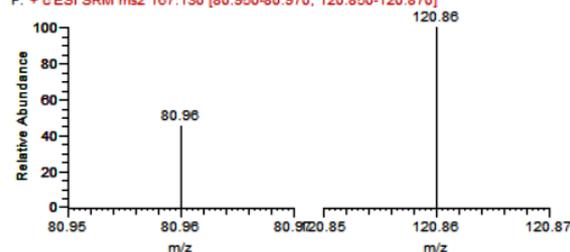
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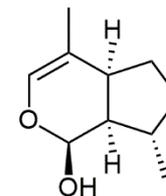
**1,5,9-Epideoxyloganic acid**



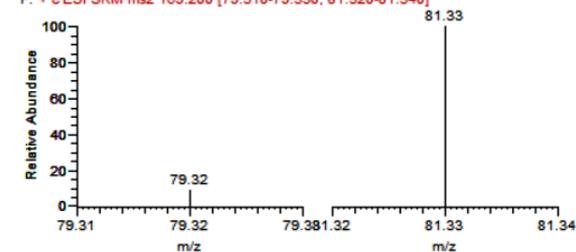
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**8-Oxogeranial**



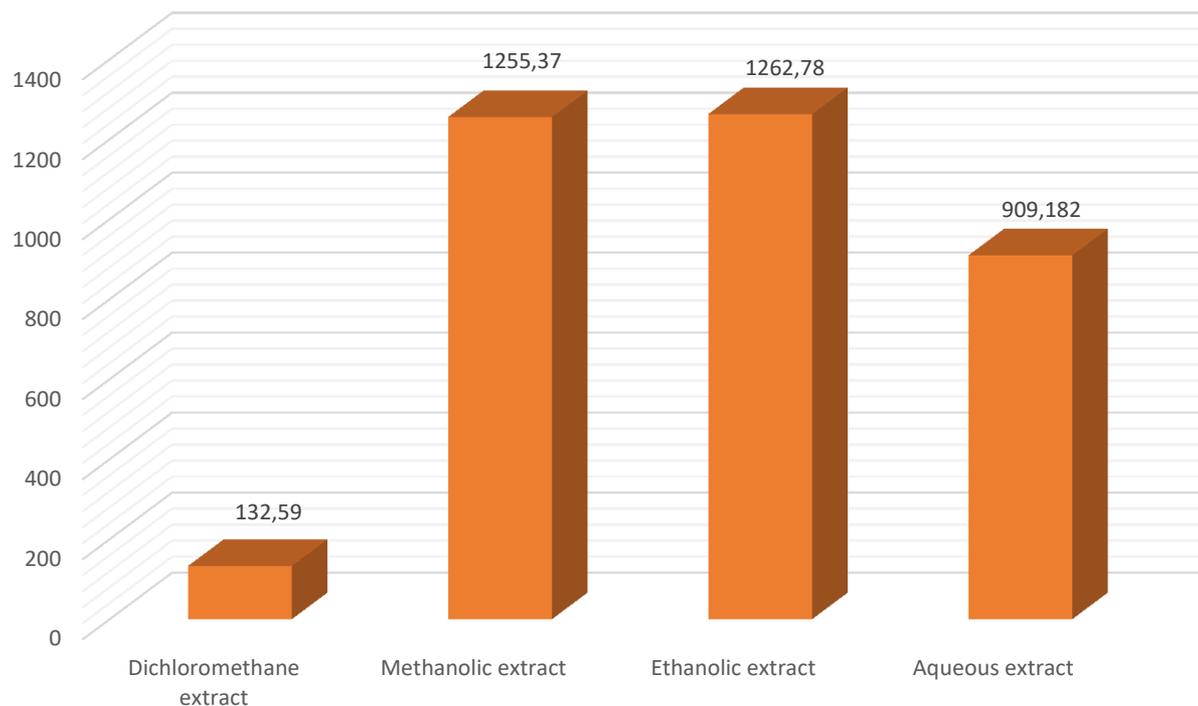
F: + c ESI SRM ms2 169.200 [79.310-79.330; 81.320-81.340]



**Nepetalactol**

## Results and discussion

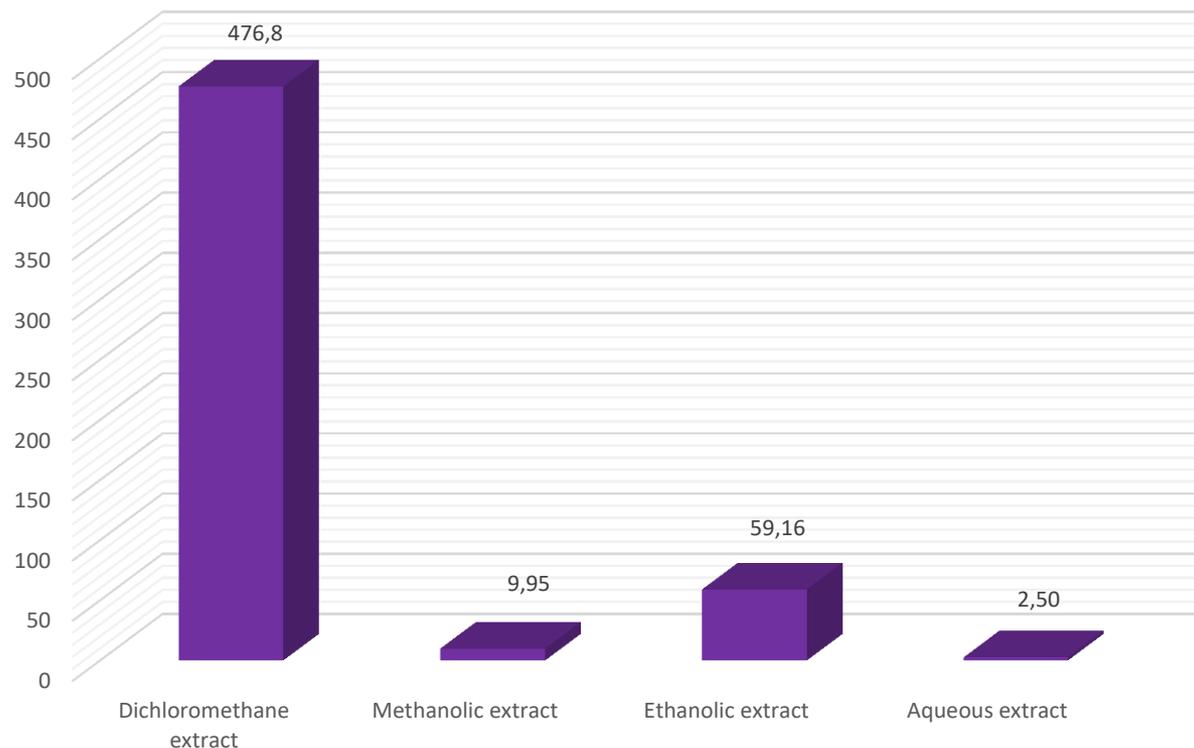
### Epideoxyloganic acid



**The methanolic and ethanolic extracts** had the highest content of **epideoxyloganic acid** ( $>1200 \mu\text{g}/100\text{g}$  dry extract)

# Results and discussion

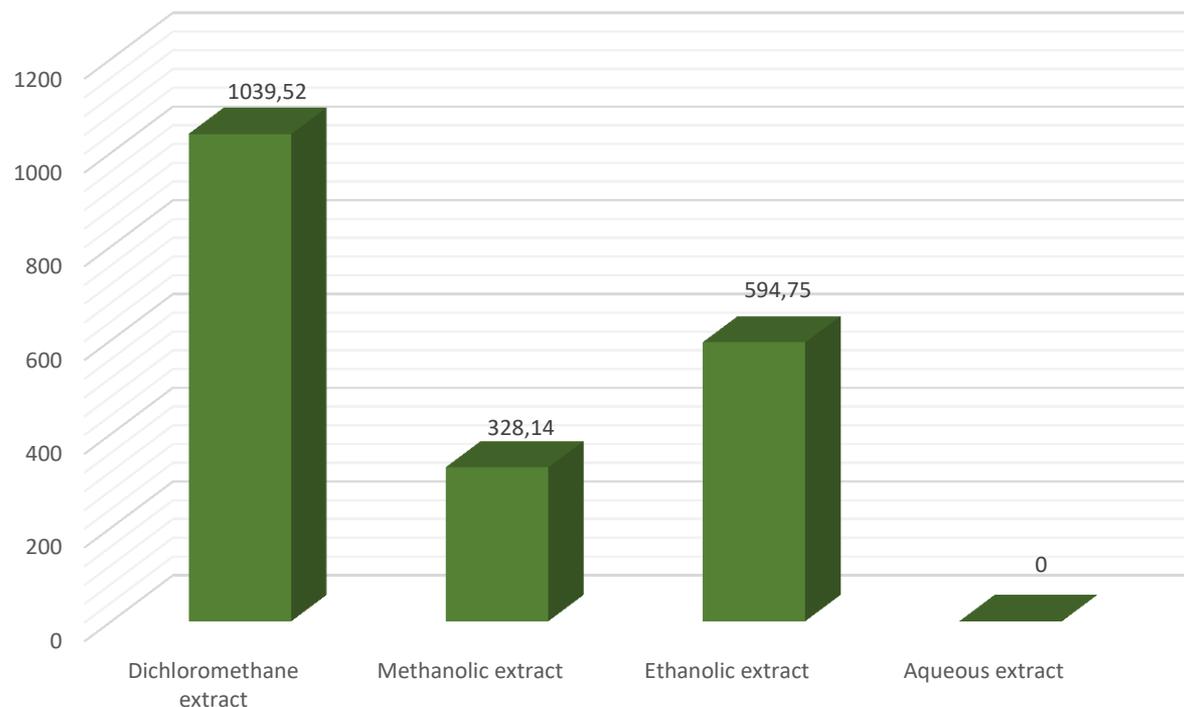
## 8-Oxogeranial



**The dichloromethane extract had the highest content of 8-oxogeranial (476.80  $\mu\text{g}/100\text{g}$  dry extract)**

## Results and discussion

### Nepetalactol



**The dichloromethane extract had the highest content of nepetalactol ( $>1039.52 \mu\text{g}/100\text{g}$  dry extract)**

## Conclusions

The results of this study indicate that high antioxidant and enzyme-inhibiting effects of dichloromethane extract confirmed in our previous study (Alimpić et al., 2021) could be attributed to its iridoid content, which was particularly high due to the low polarity of this extraction solvent.

The endemic *N. cyrenaica* could be efficiently propagated *in vitro* as a iridoid-rich plant with great biological potential.

Alimpić Aradski, A., **Oalđe Pavlović, M.**, Gašić, U., Todorović, S., Mišić, D., Giweli, A., Marin, P.D., Duletić-Laušević, S. (2021): Antioxidant and enzyme inhibiting properties of extracts of *in vitro* grown *Nepeta cyrenaica* Quézel & Zaffran (Lamiaceae). In Proceedings of the 7<sup>th</sup> International Electronic Conference on Medicinal Chemistry, 1–30 November 2021, MDPI: Basel, Switzerland, DOI:10.3390/ECMC2021-11422.

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