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

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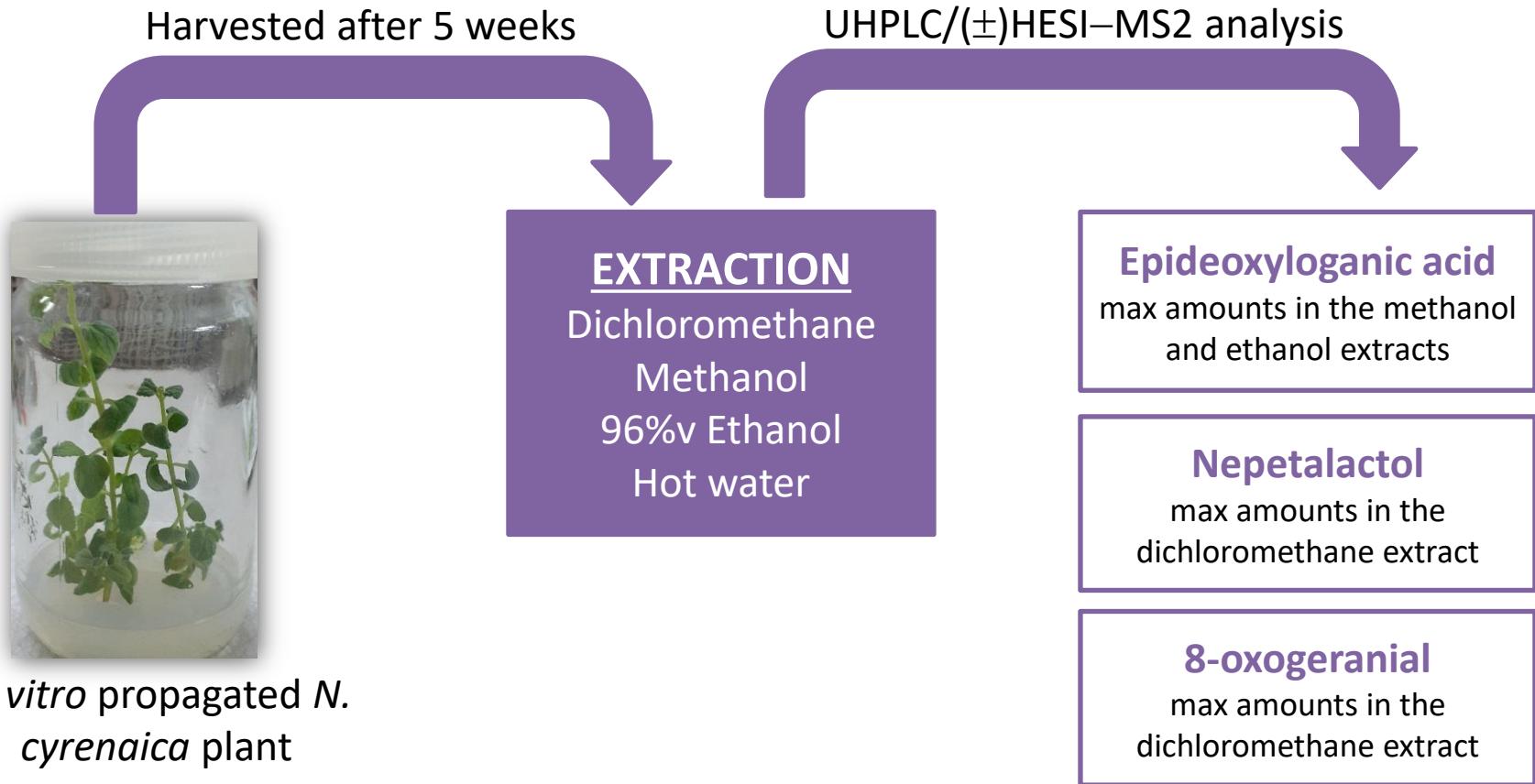
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The iridoids of *in vitro* propagated *Nepeta cyrenaica*

Quézel & Zaffran

Graphical abstract



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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

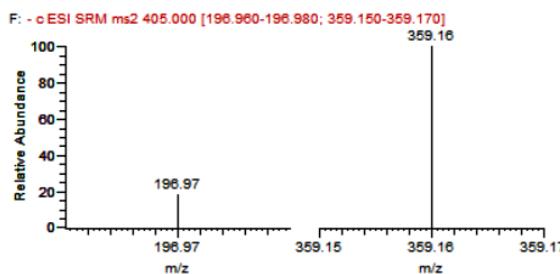
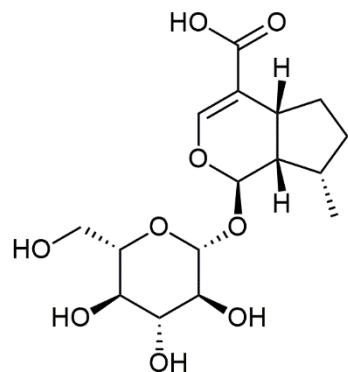


N. cyrenaica explants on the medium

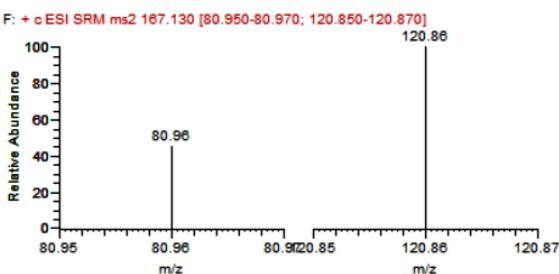


N. cyrenaica plants after 5 week in the culture

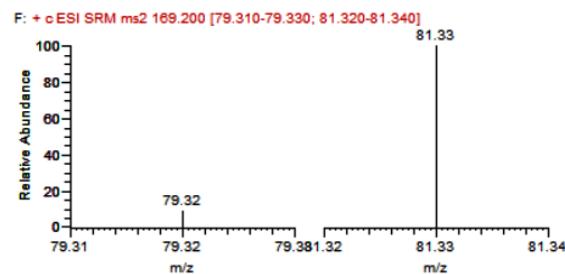
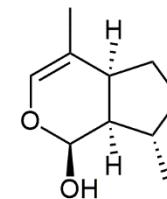
Results and discussion



1,5,9-Epideoxyloganic acid



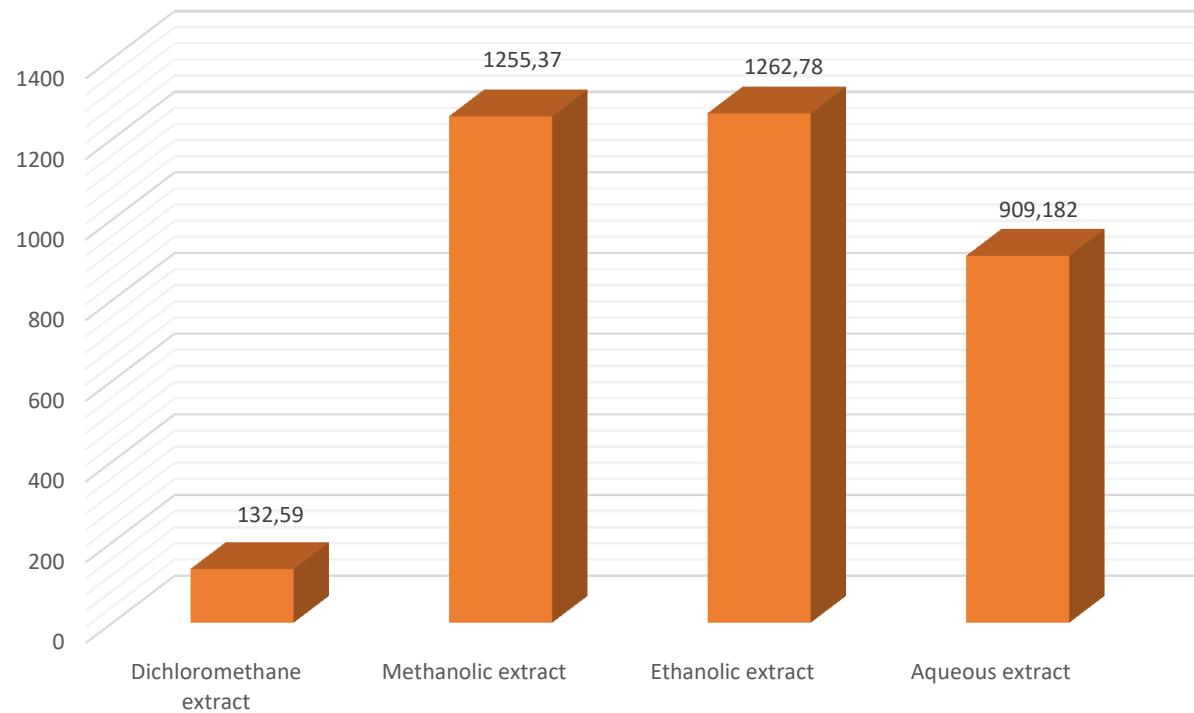
8-Oxogeranial



Nepetalactol

Results and discussion

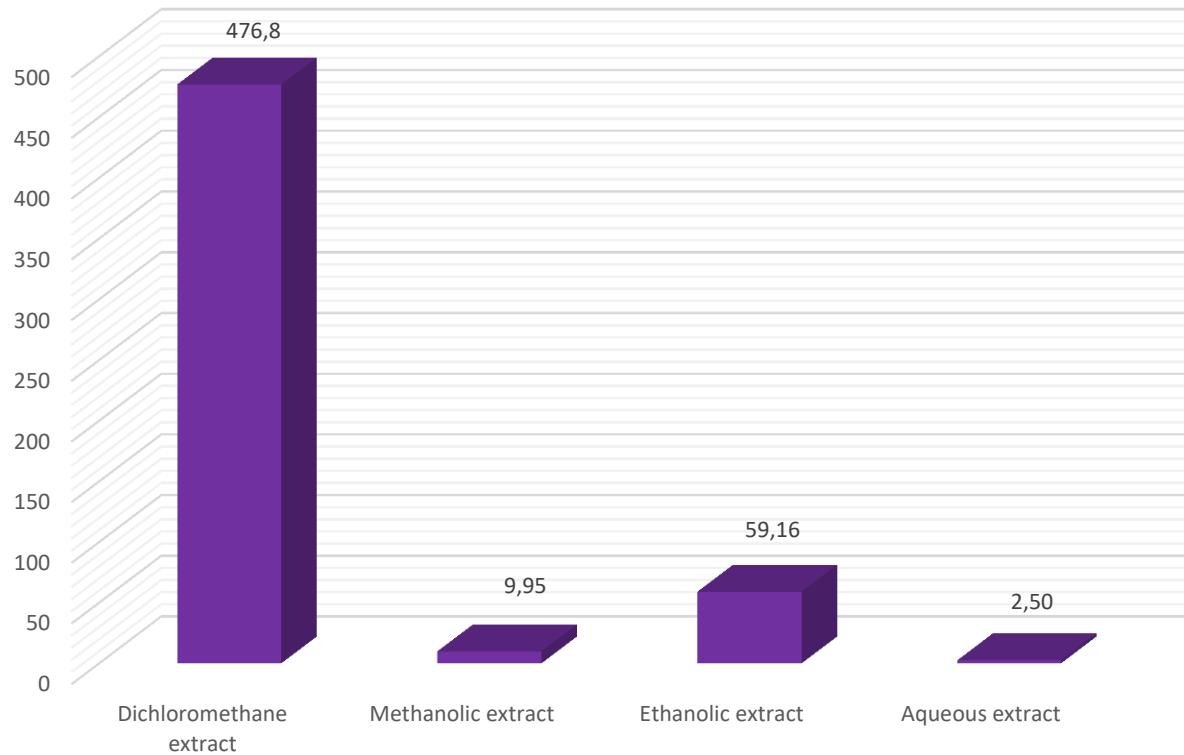
Epideoxyloganic acid



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

Results and discussion

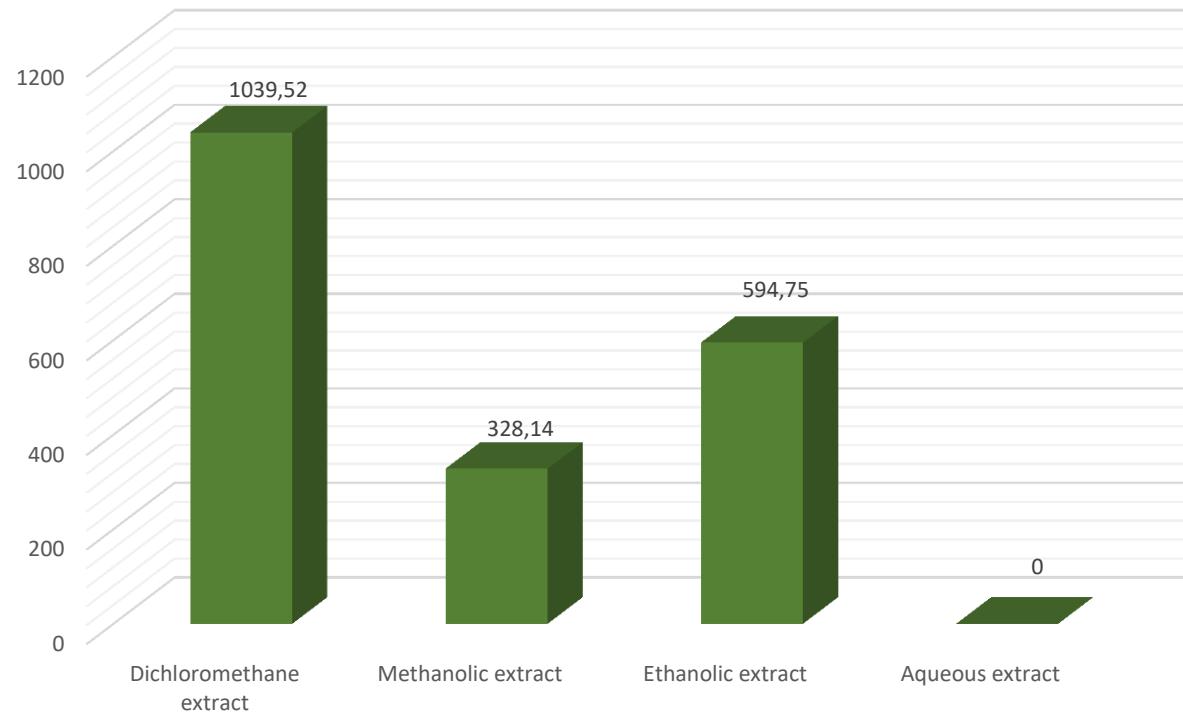
8-Oxogeranial



The dichloromethane extract had the highest content of 8-oxogeranial (476.80 µg/100g 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.

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