

# BIOLOGICAL AND PHYTOCHEMICAL EVALUATION OF METHANOLIC EXTRACTS FROM PENNYROYAL AND LAVENDER SPECIES OF THE PORTUGUESE FLORA

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## Introduction

Medicinal and aromatic plants represent a healthier alternative to synthetic phenolic compounds, with a positive impact on therapeutic, aromatic and dietetic or gastronomic purposes. The *in vitro* biological activities of the phenolic compounds are an important parameter to select the most promising extracts for use in industrial applications. Thus, this study aimed to evaluate the *in vitro* antioxidant, antibacterial and cytotoxicity properties of 17 pennyroyal (*Mentha pulegium* L.) and 18 lavender (*Lavandula pedunculata* L.) accessions from the Portuguese flora, conserved in the Portuguese Genebank (BPGV), in order to select the accessions with the highest yield and high content of active ingredients for use in the different industrial sectors.

## Mat & Methods

Flowering aerial parts samples of seed progeny accessions conserved at Portuguese Genebank

17 Pennyroyal (*M. pulegium* L.) wild accessions

18 Lavender (*L. pedunculata* L.) wild accessions

- Pennyroyal collected in center and south regions of Portugal (Fig. 1)
- Lavender collected in north and center regions of Portugal (Fig. 1)

HPLC-PDA-MS to identify phenolic compounds.

Total phenolic compounds determined by Folin-Ciocalteu method

Antioxidant capacity obtained by:

- Ferric Reducing Antioxidant Power (FRAP)
- DPPH radical scavenging assay

## Results

### HPLC-PDA-MS profile

The Figure 2 shows the HPLC-PDA-MS phenolic profile of the pennyroyal (BPGV 08475) and lavender accessions (BPGV 12069). The lavender accessions revealed a prevalence of rosmarinic acid, while pennyroyal accessions were wealthier in quercetin-3-O-rutinoside.

### Phenolic compounds

The accession of pennyroyal BPGV 08465 presented the highest TPC, ranging from 35.29 and 20.07 mg GAE. g<sup>-1</sup> (Figure 3 a). The TPC of lavender varied from 114.84 and 36.63 mg GAE. g<sup>-1</sup> and the accession BPGV 12069 showed the highest TPC (Figure 3 c).

### Antioxidant properties

FRAP antioxidant power of pennyroyal varied from 289.68 to 51.03 μmol.g<sup>-1</sup> and showed a strong correlation with the TPC method (R<sup>2</sup> = 0.86), with sample BPGV 09893 presented the highest value (Figure 3 b). Regarding lavender FRAP varied from 261.58 to 110.77 μmol.g<sup>-1</sup> and accession BPGV 12069 presented the highest value (Figure 3 d).

DPPH scavenging method, expressed as EC<sub>50</sub>, for pennyroyal showed values ranging from 1.66 to 0.80 mg.mL<sup>-1</sup>, higher than ascorbic acid (EC<sub>50</sub>=0.04 mg. mL<sup>-1</sup>), with accession BPGV 08475 showing the highest antioxidant activity (Figure 3 b) and accession BPGV 12069 showed the highest value for lavender extracts (Figure 3 d).

### Antibacterial activity

In general, all the samples revealed antimicrobial activity in some of the tested strains (Figure 4), which can be related to their phenolic composition.

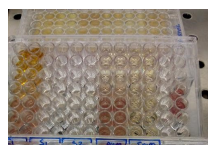


Fig. 4. Antimicrobial assay of the tested samples.

## Conclusions

The results showed that the methanolic extracts of *L. pedunculata* L., from the Portuguese flora, can be considered as good sources of natural antioxidants and the extracts of lavender and pennyroyal as sources of antimicrobial compounds that can be used for therapeutic, cosmetic or food purposes.

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Pennyroyal Lavender

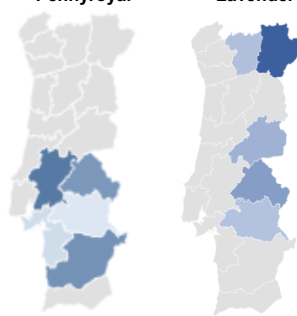


Fig. 1 Origin of accessions evaluated

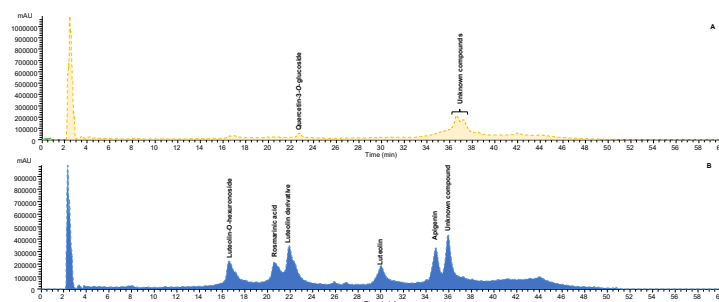


Fig. 2 Exemplificative phenolic profile, obtained by HPLC-DAD/ESI-MSn, of the methanolic extract from pennyroyal (A) and lavender accessions (B).

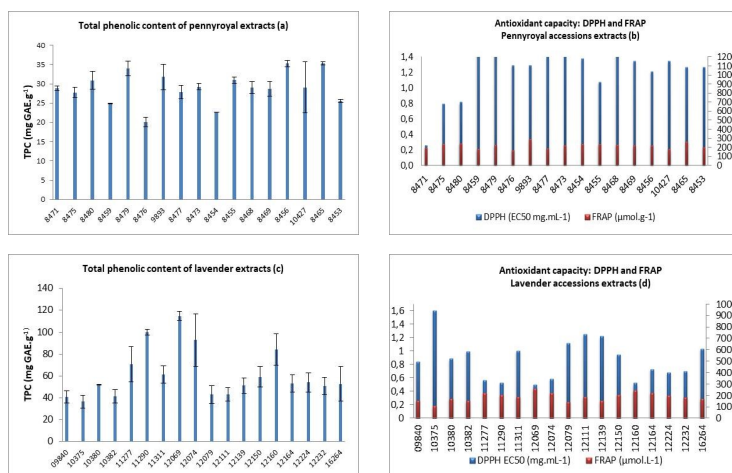


Fig. 3 Total phenolic content (a, c) and antioxidant capacity by FRAP and DPPH methods (b, d) of pennyroyal and lavender extracts.