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PLANTS OF THE FAMILY ASTERACEAE: EVALUATION OF BIOLOGICAL PROPERTIES AND IDENTIFICATION OF PHENOLIC COMPOUNDS

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1. Introduction

- Medicinal plants have had a great relevance due to their beneficial healthy properties
- These biological properties→ antioxidant, antitumor, antimicrobial activities are related to different bioactive compounds, including phenolic compounds
- Various natural phenolic compounds are related to numerous bioactive properties, which have aroused the interest of the scientific community

The study focused on the analysis of five medicinal plants belonging to the Asteraceae family

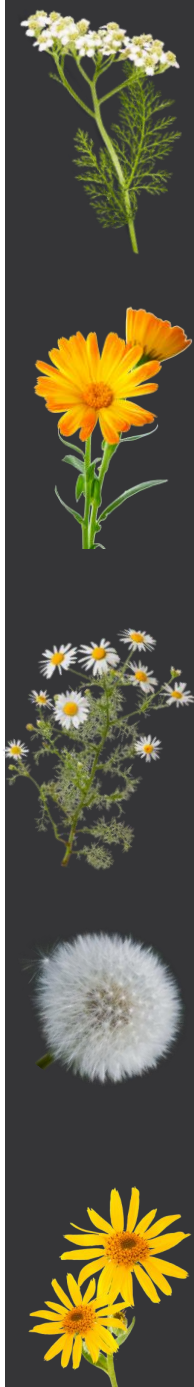
Achillea millefolium L.

Arnica montana L.

Calendula officinalis L.

Taraxacum officinalis F.H Wigg.

Chamaemelum nobile (L) All.



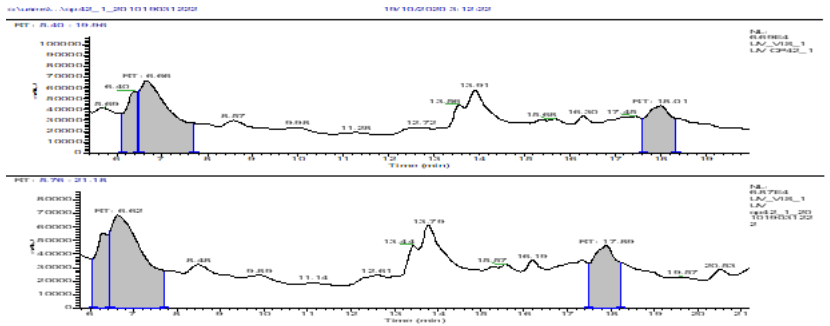
2. Materials and methods

Plant material

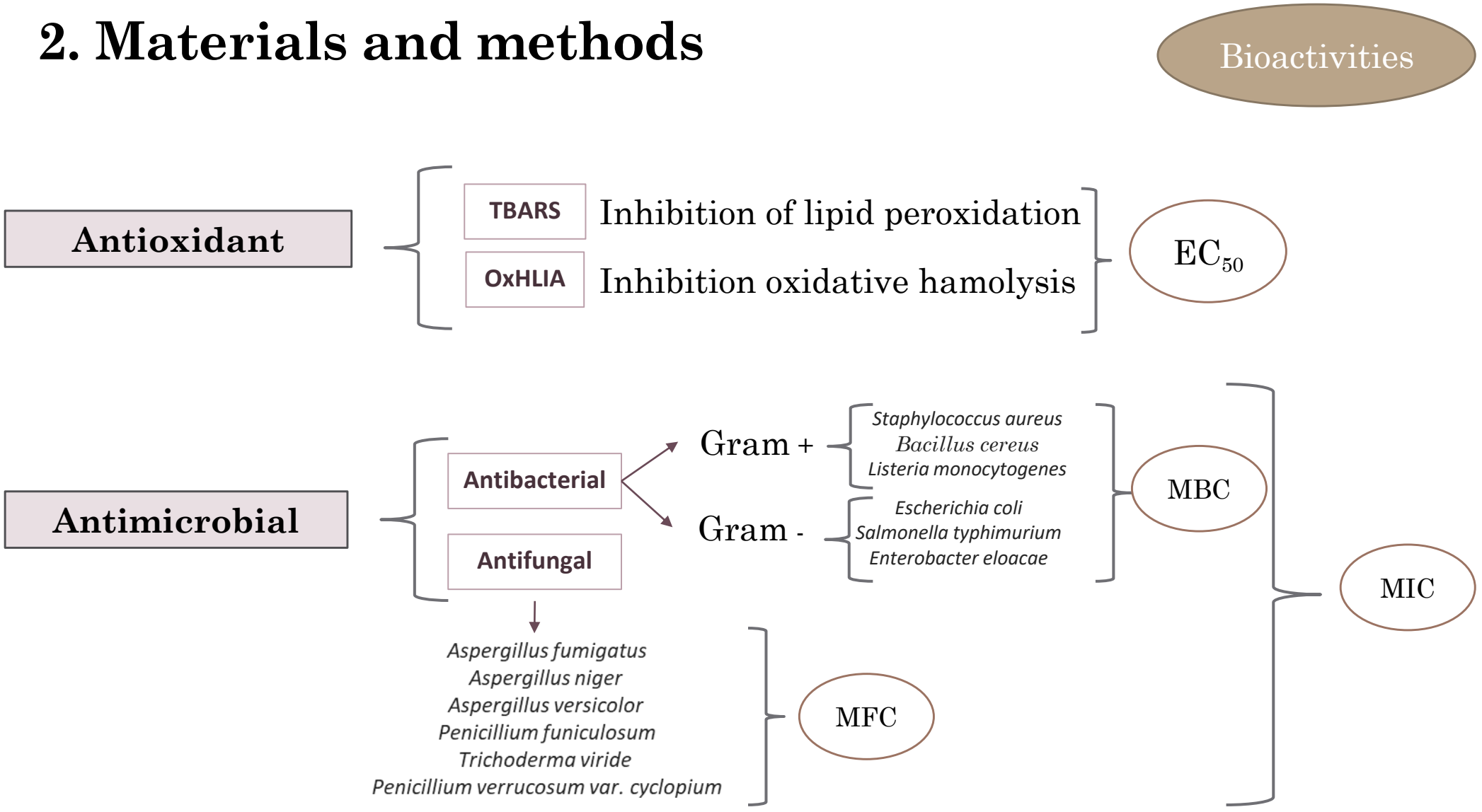
→ Drying → Crushing →

Sample extraction → 5 g + 100mL MeOH/H2O 60:40 45°C → Filtration → Rotary evaporator → Liophilization → Crude extract

Phenolic compounds identification → UPLC–DAD-ESI/MS

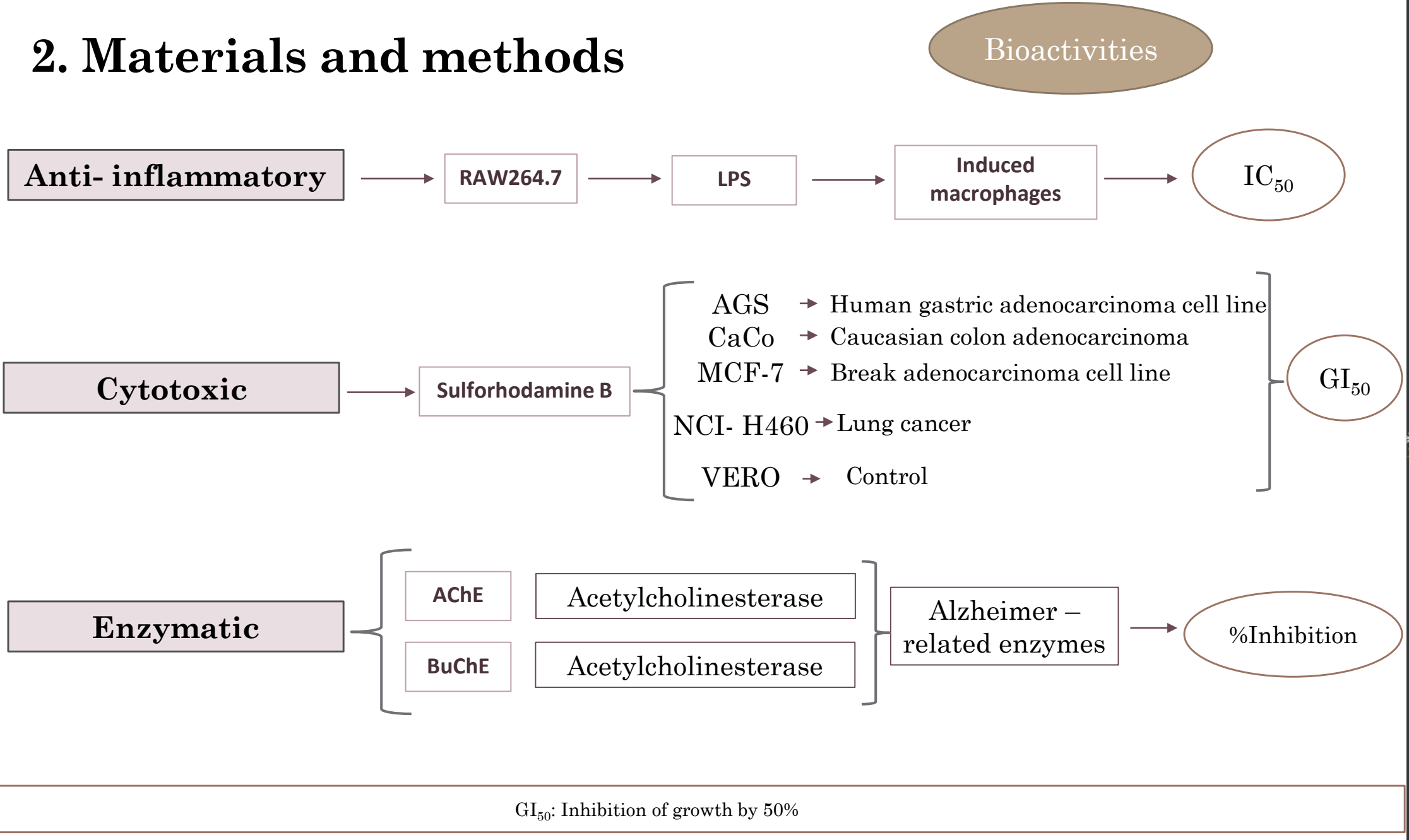


2. Materials and methods



EC_{50}: effective concentration 50, MBC: minimum bactericidal concentration, MFC: minimum fungicidal concentration and MIC: minimum inhibitory concentration

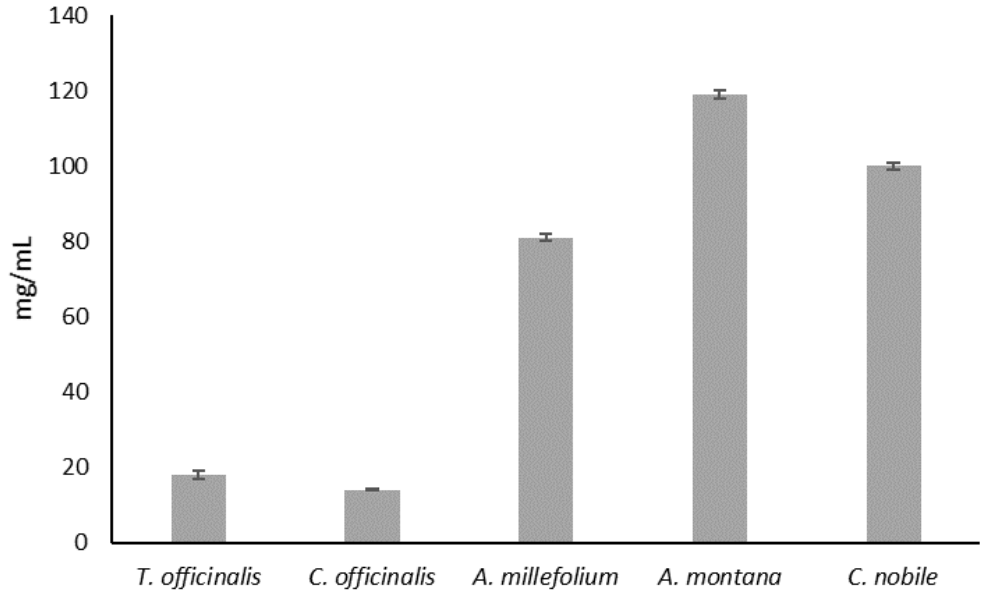
2. Materials and methods



GI_{50}: Inhibition of growth by 50%

3. Results

Total phenolic content

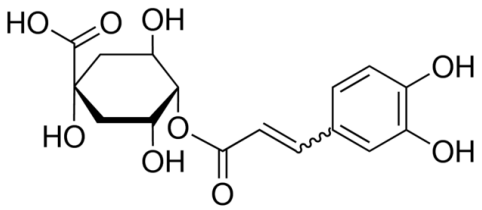


A. montana plant extracts showed the highest content of phenolic compounds (119 mg/mL), obtained by UPLC-DAD.

3. Results

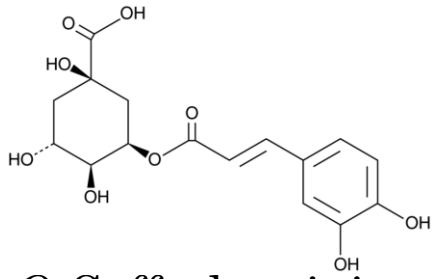
Most representative phenolic compounds

A. millefolium



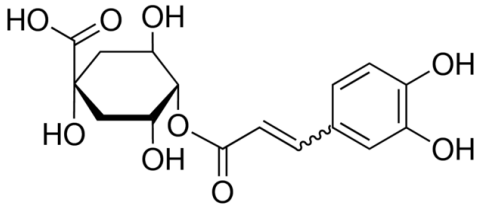
3-O-Caffeoylquinic acid

A.montana



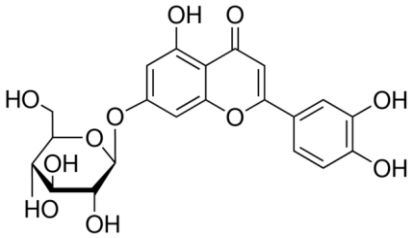
5-*O*-Caffeolyquinic acid

C. officinalis



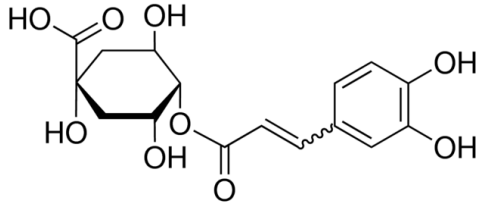
3-*O*-Caffeoylquinic acid

C. nobile

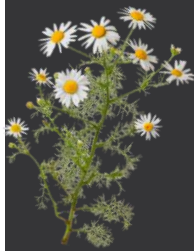


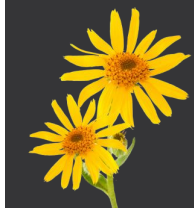
Luteolin-*O*-pentosylhexoside

T. officinale



3-*O*-Caffeoylquinic acid

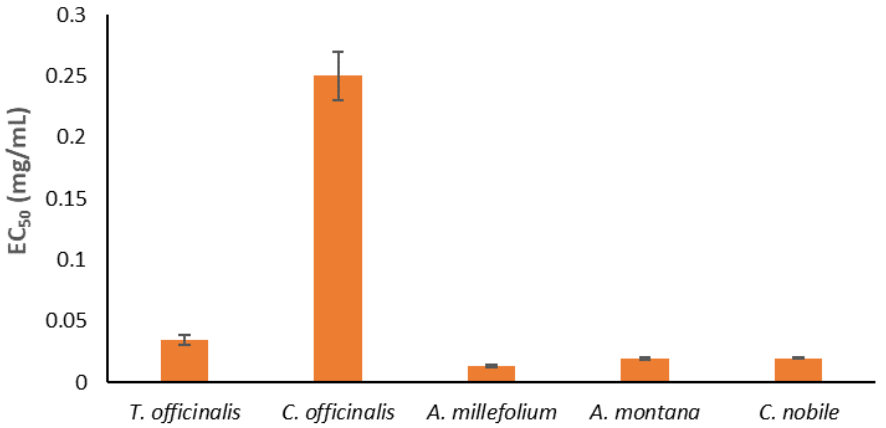




3. Results

Antioxidant activity

A. millefolium extracts presented an outstanding activity (0.013 mg/mL)

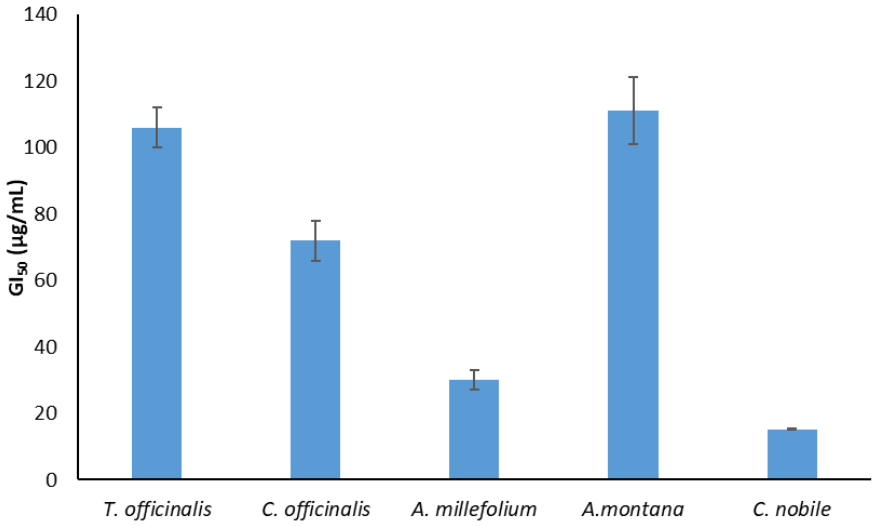


Antimicrobial and antifungal activity

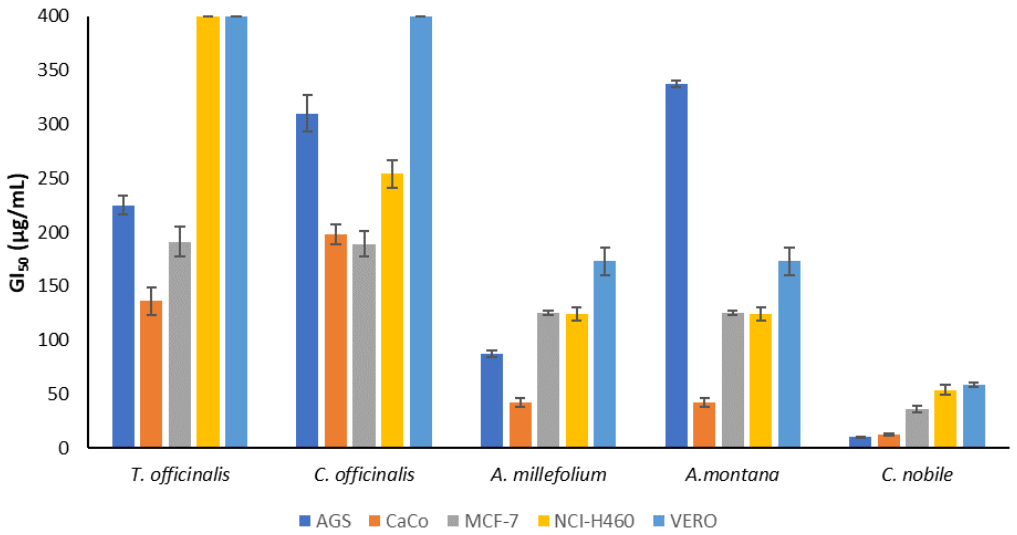
	T. officinalis		*C. officinalis*		*A. millefolium*		*A.montana*		*C. nobile*		Controls E211		Controls E224	
Antimicrobial activity	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**
Gram-negative bacteria														
Escherichia coli	0.5	1	0.25	0.5	0.5	1	0.5	1	0.5	1	1	2	0.5	1
Salmonella typhimurium	1	2	0.5	1	1	2	0.5	1	0.5	1	1	2	1	1
Enterobacter cloacae	0.5	1	0.5	1	1	2	0.5	1	0.5	1	2	4	0.5	0.5
Gram-positive bacteria														
Staphylococcus aureus	1	2	0.25	0.5	0.5	1	0.5	1	0.5	1	4	4	1	1
Bacillus cereus	0.25	0.5	0.25	0.5	0.25	0.5	0.25	0.5	0.25	0.5	0.5	0.5	2	4
Listeria monocytogenes	0.5	1	0.25	0.5	0.5	1	0.5	1	1	0.5	1	2	1	0.5
Yeasts	**MIC**	**MFC**	**MIC**	**MFC**	**MIC**	**MFC**	**MIC**	**MFC**	**MIC**	**MFC**	**MIC**	**MFC**	**MIC**	**MFC**
Aspergillus fumigatus	2	4	0.5	1	2	4	0.5	1	0.5	1	1	2	1	1
Aspergillus niger	2	4	0.5	1	2	4	1	2	0.5	1	1	2	1	1
Aspergillus versicolor	2	4	0.5	1	2	4	0.5	1	0.5	1	1	2	0.5	0.5
Penicillium funiculosum	2	4	0.5	1	2	4	0.5	1	0.5	1	1	2	0.5	0.5
Trichoderma viride	0.25	0.5	0.25	0.5	1	2	0.5	1	0.25	0.5	1	2	0.5	0.5
Penicillium verrucosum var. cyclopium	2	4	0.5	1	2	4	0.5	1	0.5	1	2	4	1	1

3. Results

Anti-inflammatory activity



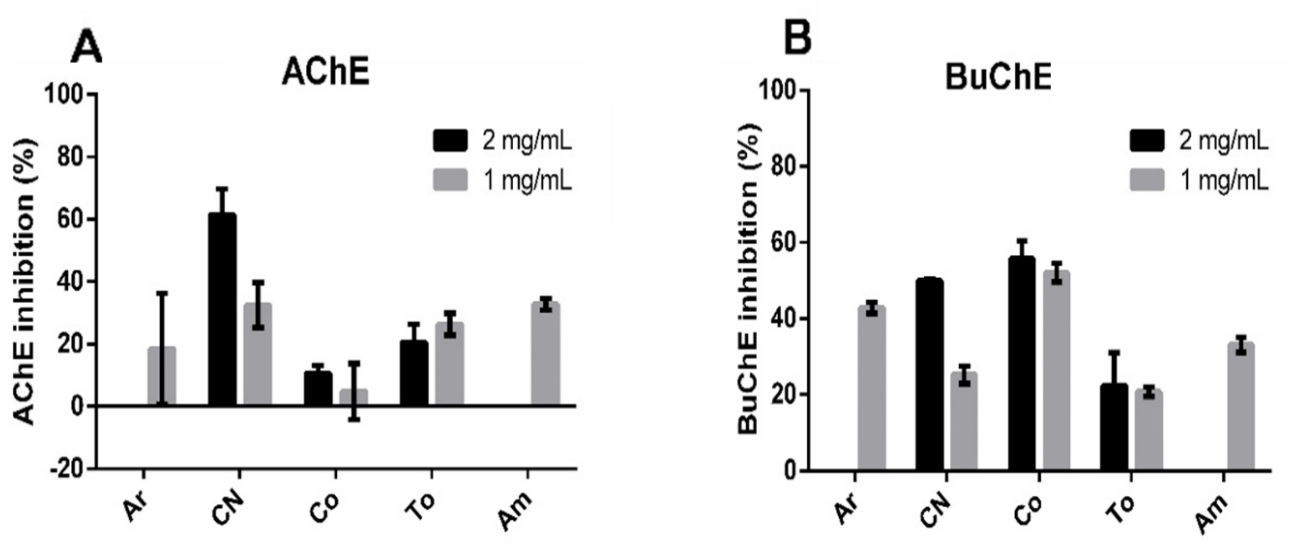
Cytotoxic activity



C. nobile extracts showed the greatest effect compared to the rest, with a growth inhibitory 50 concentrations (GI_{50}) values of 15.2±0.1 µg/mL for the anti-inflammatory activity, and GI_{50} values between 54 and 10.3 µg/mL, in the case of cytotoxic activity.

3. Results

Enzyme activity

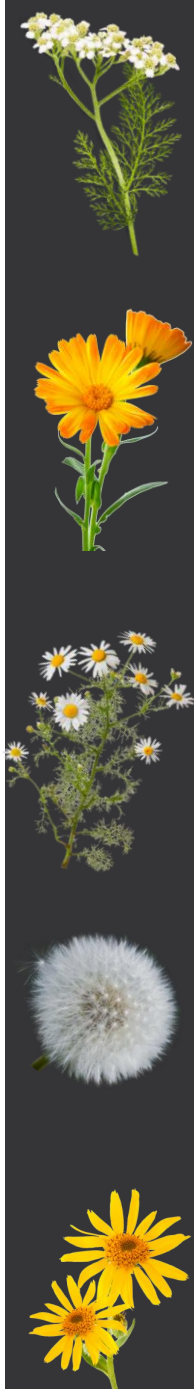


C. nobile and *C. officinalis* extracts showed the greatest inhibitory effects on two enzymes related to Alzheimer's disease, acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE)

4. Conclusion

- Each of the plants showed some activity:
  - ***A. millefolium*** showed high antioxidant activity.
  - ***C. officinalis*** had the highest rate of antimicrobial and antifungal activities.
  - In the case of anti-inflammatory and cytotoxic activities, the extracts of ***C. nobile*** showed the highest anti-inflammatory and cytotoxic activity.
  - Extracts of ***A. montana*** showed the highest content of phenolic compounds
  - In enzyme assays, both ***C. nobile*** and ***C. officinalis*** extracts showed the highest inhibitory effects.

- This study provides scientific evidence to the assessment of the potential of medicinal plant extracts for the development of new products.



ACKNOWLEDGEMENTS

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MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

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Thank you for your attention