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Antioxidant capacity of different *Fumaria officinalis* extracts

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INTRODUCTION & AIM

Polyphenols are a large group of plant secondary metabolites that can be employed as preservatives, antioxidants, and additives. There is a growing interest in extracting these metabolites from plant sources, to obtain a safe, natural, and low-cost alternative to synthetic compounds, out of which some possess toxic and mutagenic effects. *Fumaria officinalis* L. (fumitory, Fumariaceae family) is a scrambling annual plant and several studies have shown its antimicrobial, antioxidant, antispasmodic, laxative, anthelmintic, anticoagulant, cholagogue, cytotoxic, and sedative potential. The present research aimed to extract antioxidants from the fumitory aerial part by performing traditional and novel extraction procedures and determine the antioxidant capacity of the obtained extracts.

METHOD

- The extracts were prepared using maceration, and ultrasound- and microwave-assisted extractions, UAE and MAE, respectively
- The antioxidant capacity of the obtained extracts was determined using ABTS, DPPH, CUPRAC, and FRAP assays
- LC/MS method for qualitative analysis

RESULTS & DISCUSSION

- Fumitory macerate showed significantly lower ABTS radical scavenging activity expressed as a higher IC_{50} value (the concentration of extract required to neutralize 50% of radicals, 11.4±0.1 mg/mL) in comparison to the other two extracts whose IC_{50} values varied in a narrow range (8.6-9.5 mg/mL)
- In the DPPH assay, the trend was different: MAE (11.4±0.3 mg/mL) ≥ UAE (12.0±0.8 mg/mL) ≥ macerate (12.8±0.1 mg/mL)
- In the CUPRAC assay, the trend was as follows: UAE and MAE (17.84±0.85 and 18.05±0.71 µmol Trolox equivalent (TE)/g of plant material, respectively) > macerate (16.43±0.45 µmol TE/g of plant material)
- Regarding the results of the FRAP method, there was no statistically significant difference in the ferric ion reduction between the macerate, UAE, and MAE extracts (3.00-3.27 µmol Fe^{2+}/g of plant material)
- The fumitory extracts contain protopine, oxo-, methyl and/or acetyl protopine derivatives, cryptopine, fumariline and fumarophycine, as well as chlorogenic and caffeoylmalic acids were also identified, as well as quercetin trihexoside, rutin, methylquercetin pentoside hexoside, isoquercitrin, quercetin, and kaempferol deoxyhexosylhexoside

CONCLUSION

The presence or absence of significant differences among the fumitory extracts that show the highest antioxidant potential in various employed tests can be explained by the fact that different plant secondary metabolites, apart from polyphenol components, as well as their interactions, can significantly affect the overall antioxidant activity of fumitory extracts.

FUTURE WORK

- Determination of antimicrobial and anti-inflammatory potential of fumitory extracts
- Development of delivery systems or encapsulates for controlled or prolonged delivery of fumitory bioactives
- Physicochemical characterization of carriers with fumitory bioactives