

## Medicinal plants in Latvia: traditional knowledge and future perspectives

**Inga Sile**<sup>1,2</sup>, **Valerija Krizhanovska**<sup>1,2</sup>, **Arta Kronberga**<sup>3</sup>, **Ilva Nakurte**<sup>4</sup>,  
**Ieva Mezaka**<sup>4</sup>, **Osvalds Pugovics**<sup>1</sup>, **Solveiga Grinberga**<sup>1</sup>, **Maija Dambrova**<sup>1,2</sup>

<sup>1</sup> Latvian Institute of Organic Synthesis, Riga, Latvia  
inga.sile@farm.osi.lv (I.S.), valerija@osi.lv (V.K.), osvalds@osi.lv (O.P.),  
solveiga@osi.lv (S.G.), maija.dambrova@farm.osi.lv (M.D)

<sup>2</sup> Riga Stradins University, Latvia

<sup>3</sup> Field and Forest, SIA, Cēsis County, Latvia

arta.kronberga@fieldandforest.lv (A.K.)

<sup>4</sup> Institute for Environmental Solutions, Cēsis County, Latvia

ilva.nakurte@vri.lv (I.N.), ieva.mezaka@vri.lv (I.M.)

In recent years, interest in natural bioactive compounds has increased considerably, especially in the food, cosmetic, and pharmaceutical industries. Documentation of historical knowledge on the use of medicinal plants inspires new ideas for the practical applications. Our aim was to analyze traditional knowledge on the past use of medicinal plants and to evaluate the potential for the domestication of nine species of medicinal and aromatic plants (MAP): *Primula veris*, *Galium odoratum*, *Daphne mezereum*, *Tussilago farfara*, *Pulsatilla pratensis*, *Convallaria majalis*, *Glechoma hederacea*, *Chaledonium majus* and *Alchemilla* spp.

Data on plant species and their applications were collected from the records of Latvian folk medicine, the Archives of Latvian Folklore. Phytochemical analysis of selected plant extracts was carried out using liquid chromatography-mass spectrometry techniques to compare the chemical composition between populations growing in the wild and cultivated conditions. The impact of growing conditions on the biological activity of plant material was assessed using various *in vitro* and *ex vivo* methods.

In folklore materials, 211 plant taxa were identified. The selected MAP species were mainly mentioned to treat pain and cough, while *C. majus* was mentioned as a treatment for various skin diseases. Changes in the chemical composition of selected MAP species were observed between wild and cultivated samples. For example, the total content of alkaloids in extracts prepared from cultivated *C. majus* was significantly higher than that of wild samples. The composition of cultivated *G. hederacea* extracts was found to depend on the stage of plant development; however, the main factor that affected the chemical composition and biological activity was the accession rather than the place of growth. The extracts of *C. majus* and *D. mezereum* possess selective toxicity to different types of cancer cells.

As a result, the data obtained allow us to make decisions about potential of commercial growing and select the most promising populations for domestication.

### Acknowledgements

This work was supported by the European Regional Development Fund project Nr. 1.1.1.1/18/A/043.

# Polyphenolic compounds, antibacterial and antioxidant properties of flower and leaf extracts of *Tanacetum vulgare*

**Renāte Šukele<sup>1,2</sup>, Ingus Skadiņš<sup>1,3</sup>, Inga Sīle<sup>1,4</sup>, Rudīte Koka<sup>1</sup>, Dace Bandere<sup>1,3</sup>**

<sup>1</sup> Riga Stradins university Latvia

ingus.skadins@rsu.lv, rudite.koka@rsu.lv, dace.bandere@rsu.lv

<sup>2</sup> Red Cross Medical college of Riga Stradins university, Latvia

renate.sukele@rcmc.lv

<sup>3</sup> Baltic Biomaterials Centre of Excellence, Riga Technical University, Latvia

<sup>4</sup> Latvian Institute of Organic Synthesis, Riga, Latvia

inga.sile@farm.osi.lv

*Tanacetum vulgare* or Tansy is aromatic medicinal plant. Its aerial parts are rich in essential oil, polyphenolic compounds and phenolic acids.<sup>1,2</sup> Aim of this study was to assess antibacterial and antioxidant properties of ethanol and acetone extracts of *T. vulgare* flower (FE) and leaf (LE).

Aqueous ethanol and aqueous acetone (30, 50, 70%) extracts from flowers and leaves of *T. vulgare* growing in Riga district, Latvia were analysed. Antibacterial tests performed were agar disc diffusion test, minimum inhibitory concentration (MIC) and minimal bactericidal concentration (MBC). Six clinical isolates of bovine mastitis and two reference bacterial cultures were used. Antiradical activity was measured using the DPPH assay, total phenolic content (TPC) was tested using the Folin–Ciocalteu method and total flavonoid content (TFC) was determined using the AlCl<sub>3</sub> colorimetric method.

The MIC and MBC of FE were lower for *S. aureus* (range 3.4–6.4 mg/ml) than *E. coli* and *Strept. agalactiae* (53.9–107.8 mg/ml). None of the FE were effective against *Strep. uberis* and *Serratia liquefaciens*. The 70% ethanol of LE had effects against all bacteria except *E. coli* strains, and MIC and MBC ranged 7.8–125.9 mg/ml. The 50% acetone lyophilized LE and showed a better results than 50% ethanol FE, LE: TPC ranged 154–255 mg GAE/g of extract, TFC ranged 25–54 mg QE/g, and the IC<sub>50</sub> value of DPPH radical scavenging activity was 147–194 µg/ml.

Our study showed that *T. vulgare* aqueous acetone and aqueous ethanol extracts of both flower and leaves have potential antibacterial and antioxidant properties.

## Acknowledgements

This project has received funding from the European Union's Horizon 2020 research and innovation program under the grant agreement No 857287.

## References

1. Ivănescu, B.; Tuchiluş, C.; Corciovă, A.; Lungu, C.; Mihai, C. T.; Gheldiu, A. M.; Vlase, L. *Farmacia* **2018**, *66*(2), 282.
2. Muresan, M.; Benedec, D.; Vlase, L.; Oprean, R.; Toiu, A.; Oniga, I. *Studia Universitatis Babeş-Bolyai. Chemia* **2015**, *60*(1), 127.