The analysis of essential oils from aerial parts of *Tanacetum vulgare* L. growing wild in Romania

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**Abstract.** The purpose of this research was to analyze comparatively, the essential oils obtained from four samples of leaves of wild *Tanacetum vulgare*, collected in 2 habitats (Sibiu and Alba) from Transylvania/Romania in two consecutive years (2010, 2011). The essential oils were obtained by water steam distillation and then analyzed by using gas- chromatography with mass spectrometry detection (GC-MS). The major compounds were represented by the sesquiterpene, cysanthrenyl acetate (Sibiu: 37.13%, 38.96% and Alba: 27.88%, 15.02%) and the two monoterpene, alpha- (Sibiu: 26.08% in 2010, 12.34% in 2011 and Alba: 18.18% in 2010 and 9.49% in 2011) and beta-thujone (Sibiu: 13.95% in 2010, 4.21% in 2011 and Alba:16.61% in 2010, 2.45% in 2011).

**Key words:** *Tanacetum vulgare* L., essential oil, gas-chromatography.

*T. vulgare* (Asteraceae) or common tansy, also called *Chrysanthemum vulgare* L., a perennial herbaceous flowering plant, is well-known for the antihelminthic action.

Within the tansy species, the essential oil composition differs significantly, depending on the geographical origins, different regions of the plant and developmental stages (von Rudloff et al. 1965). The review showed that commercial oils of tansy are mostly of the thujone type. Thujone has medicinal properties, but at high concentrations it exhibits toxicity, characterized especially by neurological effects (Farhat et al. 2001, Judzentiene et al. 2004, Pelkonen et al. 2013). Studies on the essential oils of tansy were made mostly in the Western and Northern European countries, in Lithuania and Moldavia representing the eastern countries and in South America (von Rudloff et al. 1965, Judzentiene et al. 2004, Acha de la Cruz et al. 2004, Holetz et al. 2002, Keskitalo et al. 2001, Sacchetti et al. 2005). The dominant constituents of the essential oils of tansy plants were beta-thujone, alpha-thujone, camphor, trans-chrysanthenyl acetate, sabinene, umbellulone, borneol, myrtenol, 1,8-cineole, with the quantities and proportions of each varying seasonally and from plant to plant (Judzentiene et al. 2004, Acha de la Cruz 2008, Brudea et al. 2012, Falcao et al. 2008, Godinho et al. 2014, Holetz et al. 2002, Keskitalo et al. 2001, Sacchetti et al. 2005). In Romania, *T. vulgare* is widespread, but there are few published studies on the morphological, histological and phytochemical features.

Therefore, in this study, the essential oils were obtained from leaves of *T. vulgare* harvested from two habitats in Transylvania/Romania (Sibiu and Alba) in 2010 and 2011, in order to establish the chemical composition, especially the major components. A special regard will be on the toxicological-thujone type. The results may represent a base for the development of therapeutical products containing *T. vulgare*.

The aerial parts (up to ~ 50 cm) of the wild plants were collected from 2 localities in August 2010 and 2011 at full flowering stage. Voucher specimens were deposited in the Herbarium of the Faculty of Pharmacy, Cluj-Napoca, Romania. The Voucher specimen number are: 26 for the sample from Sibiu, 27 for the sample from Alba. The plants were dried at room temperature (20-25°C) and the flowers were separated from the stems and leaves before air-drying. The 4 samples were as follows:

<table>
<thead>
<tr>
<th>Part of the plant</th>
<th>Habitat of the harvesting (mL/100g natural product)</th>
<th>Essential oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1- aerial parts (100 mg) of <em>T. vulgare</em> harvested in Sibiu in 2010</td>
<td>Sibiu</td>
<td>0.9±0.03</td>
</tr>
<tr>
<td>P2- aerial parts (100 mg) of <em>T. vulgare</em> harvested in Alba in 2010</td>
<td>Alba</td>
<td>1.0±0.03</td>
</tr>
<tr>
<td>P3- aerial parts (100 mg) of <em>T. vulgare</em> harvested in Sibiu in 2011</td>
<td>Sibiu</td>
<td>1.4±0.03</td>
</tr>
<tr>
<td>P4- aerial parts (100 mg) of <em>T. vulgare</em> harvested in Alba in 2011</td>
<td>Alba</td>
<td>1.1±0.03</td>
</tr>
</tbody>
</table>

The essential oils levels (v/m) were determined by hydrodistillation, for all 4 samples, aerial parts, harvested in 2010 and 2011 (Table 1).

In the literature, the reported levels of essential oil in *T. vulgare* are between 0.1%- 1,1% (Von Rudloff 1965, Keskitalo 2001). Our results showed concentrations between 0.96% - 1.40%. The results obtained represent the mean of three determinations. The isolated oils were analyzed by GC-MS and between 85 (in the oil of the aerial parts of *T. vulgare* collected from Alba) and 104 compounds (in the oil of the aerial collected from Sibiu) were identified. The constituents given in Table 2 represent the most important one with a concentration over 0.50%.

The basic essential oil components from all samples of *T. vulgare* collected in 2010 and 2011 were, cysanthrenylacetat, a sesquiterpene ester, in concentrations between 15.02%-38.96% and the two monoterpene ketones, alpha-thujone (9.49%- 26.08%) and beta-thujone (2.45%- 16.61%). The highest concentration of the major components was in the sam-
The samples harvested from Alba, have shown the best results, regarding the level of the essential oil (1.02-1.16%). However, the sample from Sibiu showed the highest concentration of the major compounds, crysanthemyl acetate (37.13%, 38.96%), alpha-thujone (12.34%, 26.08%) and beta-thujone (4.21% - 13.95%). Therefore, the sample of *T. vulgare* from Sibiu represent an special interest for therapeutic use.

**References**


