INTRODUCTION
The plants from Crassulaceae family have been the scientists’ point of interest for a number of years. Sedum is closely related to Sempervivum. Species from Jovibarba Opiz were previously included in the Sempervivum L. genus, and research studies on J. sobolifera have been stimulated by the biological activity of plants from the Sempervivum L. genus2.
The phytochemical constituents of Sedum species have been extensively reported and some Sedum plants have been documented as either vegetables or folk medicines for treatment of many diseases3. These plants have been used for a long time in traditional medicine as an anti-inflammatory, keratolytic and analgesic agent, due to its beneficial effect on treating tooth pain or tonsillitis4.
Sempervivum species are well known plants in folk medicine for the treatment of ear inflammation5. Drinking tea prepared from leaves of S. tectorum is recommended for ulcer treatment6. Fresh juice squeezed from the leaves of some species of Sempervivum L. has been used as folk medicine in many countries almost exclusively for external purposes. It can be spread as a pack on wounds, burns, and abscesses and on painful areas attacked by gout as a refrigerant and astringent.
Studied activity
The amount of total phenolics was estimated by the colorimetric method using the Folin – Ciocalteu’s reagent, adapted from Singleton & Rossi7. The amount of total phenolics was calculated as gallic acid equivalents (GAE) in milligrams per milliliter of sample.
Free radical scavenging activity was measured according to Brand – Williams method8, based on the reduction of a methanolic solution of the colored free radical 1.1-diphenyl-2-picryl-hydrazyl (DPPH). The antioxidant activity was determined as the degree of inhibition on the hemoglobin-catalyzed peroxidation of linoleic acid according to Kuo, et al.9. The ferrous metal chelating power was determined by the method of Guo, et al.10.
Each of the measurement described above was performed in three replicate experiments. Comparison of means was analyzed by the Student’s t-test. All statistical tests were carried out at significance level of α = 0.05. The linear correlation coefficients to determine the relationship between the concentrations of polyphenols and antioxidant activity and between different antioxidant activities were also evaluated. IC50 values were calculated from the concentration – effect linear regression curve.
RESULT AND DISCUSSION
All results were presented in Table 1.
The examined plants are rich in phenolic compounds, particularly in flavonoids14,15,16. Evaluation of the total phenolic content revealed that the extracts were quite rich in phenols. The highest level of GAE (gallic acid equivalents) was observed in the flowers of Sedum maximum (96.68 µg/g). The total phenolic content decreases in the following order:
S. maximum (flowers) > J. sobolifera (flowers) > S. acre (leaves) > S. maximum (leaves) > S. acre (roots) > J. sobolifera (roots) > J. sobolifera (leaves)
The antioxidant capacities of the plant extracts largely depend on the composition of the extracts and conditions of the test system. These capacities are influenced by many factors, which cannot be fully described with one single method. Therefore, it is necessary to perform more than one type of antioxidant capacity measurement to take into account the various mechanisms of antioxidant action14,15,16. The extracts from flowers of S. maximum (IP=94.2%) and J. sobolifera (IP=92%) were characterized as a strong antiradical activities. The scavenging ability of the methanolic extracts on the DPPH radical decreases in the following order:
S. maximum (flowers) > J. sobolifera (flowers) > S. acre (leaves) > S. acre (fresh leaves) > S. maximum (leaves) > J. sobolifera (roots) > J. sobolifera (leaves) > S. sobolifera (fresh leaves)
The chelating of ferrous ions by the methanolic extracts from examined plants was estimated using the method of Guo et al.11. In this assay, all examined extracts interfered with the formation of ferrous ferrozine complex, suggesting that they have chelating activity and are able to capture ferrous ion in competition with ferrozine. The metal scavenging effect of methanolic extracts decreases in the following order:
J. sobolifera (leaves) > J. sobolifera (fresh leaves) > S. maximum (leaves) > J. sobolifera (roots) > S. maximum (flowers) > S. acre (roots) > S. acre (fresh leaves) > J. sobolifera (flowers) > S. acre (leaves)
The ability to inhibit lipid peroxidation was the highest in the methanolic extract from roots of S. acre.

References
Table 1: The total phenolic content, free radical scavenging capacity, ability to lipid peroxidation inhibition and metal chelating activity of the S. acre, S. maximum and J. sobolifera extracts

<table>
<thead>
<tr>
<th>Species</th>
<th>Part of plant</th>
<th>Total phenolics (µg GAE/g of dry plant material)</th>
<th>IC₅₀ (mg/mL) in DPPH system</th>
<th>Inhibition (%) in hemoglobin-linoleic acid system</th>
<th>Inhibition (%) in Ferrozine-Fe²⁺ system</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. sobolifera</td>
<td>Leaves</td>
<td>17.58±0.14</td>
<td>163.28</td>
<td>58.28±0.7</td>
<td>91.76±0.69</td>
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<td>Fresh leaves</td>
<td>NT</td>
<td>262.05</td>
<td>51.97±0.69</td>
<td>91.11±0.72</td>
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<td>Radix</td>
<td>22.63±0.43</td>
<td>92.58</td>
<td>79.59±1.25</td>
<td>64.86±0.40</td>
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<tr>
<td>S. acre</td>
<td>Leaves</td>
<td>41.12±0.58</td>
<td>19.66</td>
<td>53.53±0.33</td>
<td>58.79±0.24</td>
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<td>Fresh leaves</td>
<td>NT</td>
<td>21.47</td>
<td>93.88±0.37</td>
<td>63.12±0.44</td>
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<td>Radix</td>
<td>25.87±0.25</td>
<td>33.41</td>
<td>100.00</td>
<td>63.56±0.25</td>
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<tr>
<td>S. maximum</td>
<td>Leaves</td>
<td>28.19±0.38</td>
<td>17.29</td>
<td>83.47±0.60</td>
<td>60.52±0.36</td>
</tr>
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<td></td>
<td>flowers</td>
<td>96.68±1.44</td>
<td>8</td>
<td>67.26±0.56</td>
<td>86.98±0.22</td>
</tr>
</tbody>
</table>

*Values expressed are means±S.D.; NT- not tested

REFERENCES