Elemental compositions of *Echinacea purpurea*, *E. pallida* radix and herba cultivated in Turkey

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**INTRODUCTION**

*Echinacea* sp. (Asteraceae) are one of the most popular medicinal plants used in phytotherapy also known as American coneflowers. There are nine species of the plant included in the genus. Three of these are typically seen in herbal preparations: *Echinacea purpurea*, *Echinacea angustifolia*, and *Echinacea pallida* (1). *Echinacea* sp. are promoted primarily in oral dosage forms as an immune stimulant that helps increase resistance to colds, influenza and other infections; topical products for wounds and inflammatory skin conditions are also available (2,3). Trace element concentrations in plants vary widely with the soil type, pH, fertilizer and organic content, climate, species, drying conditions, etc (4).

In this present study, *E. purpurea* (L.) Moench and *E. pallida* (Nutt.) Nutt. were successfully cultivated under controlled conditions in experimental fields in Konya. Dried aerial parts and the roots of 36 cultivation samples were investigated for their macro (N, P, K) and micro (Ca, Mg, Na, Fe, Mn, Zn, Cu) trace elemental compositions.

**Experimental**

![E. purpurea (L.) Moench and E. pallida (Nutt.) Nutt.](image)

*Echinacea* sp. (Asteraceae) cultivated in Konya (2010) Medicinal and Aromatic Plants Farm of Agricultural Faculty Department in Selçuk University

**Cultivation of the plant material:**

Plants were fertilized with N (Nitrogen) ranging from 15 to 45 kg/da. Also, *E. purpurea* aerial parts-radix and *E. pallida* radix were dried under different drying conditions; sun-drying, shade-drying and oven-drying. Aerial parts and radix were dried under the sun for 48 h at average 28 °C, under the shade for 96 h at average 26 °C, in the oven for 72 h at 40 °C. When the amount of moisture in the plant reduced below 14%, drying process was ended.

**Analytical:**

The macro (N, P, K) and micro (Ca, Mg, Na, Fe, Mn, Zn, Cu) trace elemental compositions were determined by using various techniques. N was determined by the dry combustion method using elemental analysers, P was measured by a colorimetric method, whereas K and Na by flame photometry. Finally Ca, Mg, Fe, Cu, Zn and Mn was detected and quantified by atomic absorption spectroscopy (AAS). All experiments were performed qualitatively and quantitatively with statistical data comparison to a certified reference plant material, respectively.

**RESULTS**

![Table 1](image)

<table>
<thead>
<tr>
<th>Mineral Content (mg)</th>
<th>N (mg)</th>
<th>P (mg)</th>
<th>Ca (mg)</th>
<th>Mg (mg)</th>
<th>Na (mg)</th>
<th>Fe (mg)</th>
<th>Mn (mg)</th>
<th>Zn (mg)</th>
<th>Cu (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>0</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Shade</td>
<td>0</td>
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</tbody>
</table>

**Discussion**

All experiments were performed qualitatively and quantitatively with statistical data comparison to a certified reference plant material, respectively. The total dry matter content, including those of the aerial parts of the crops ranged 25-30%. The results of elemental analyses showed that N ranged 0.74-1.78%, P ranged 1.55-2.29 ppm and K ranged 12.47-31.27 ppm. To the best of our knowledge, this is the first report on micro and macro elements of cultivated Turkish *Echinacea* sp. As a conclusion, the elemental composition and the nutritional value *E. purpurea* and *E. pallida* are worthwhile to investigate with comparison to other *Echinacea* sp. used medicinally.

**References**