Evaluation of Bioactive Compounds from Flowers and Fruits of Black Elder (*Sambucus Nigra* L.)

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ABSTRACT

Historically *Sambucus nigra* L., known as black elder, has been used medicinally by many indigenous cultures for its antiviral and anti-inflammatory actions. Elder medicinal potential comes from its antioxidant activity, a property shared by numerous phytochemicals. The purpose of this research was to run a comparative study on the content of bioactive compounds (polyphenols, flavonoids, vitamin C) and antioxidant capacity of berries and flowers of wild *Sambucus nigra* L. species. Total content of polyphenols, flavonoids, respectively antioxidant activity was determined by the spectrophotometric methods, while the quantification of vitamin C was carried out titrimetrically. The obtained results confirmed that both elder flowers and fruits could serve as a good source of bioactive compounds in human diet, having, at the same time, a potential use in the development of many innovative nutritional supplement formulations.

Keywords: *Sambucus nigra*, black elder, polyphenols, antioxidant activity, flavonoids.

INTRODUCTION

Many herbal and plant infusions frequently used in traditional medicine have antioxidant and pharmacological properties connected with the presence of phenolic compounds and vitamins (Dawidowicz *et al*., 2006). Results from various sources have shown that both elderberry and flower are rich in phytochemicals with high medicinal potential. Elderberry has been used for generations as a remedy for colds, sinusitis and also for the laxative effect. Infusions of flowers are known to have diaphoretic, anti-catarrhal, expectorant, diuretic, and anti-inflammatory actions (Wightman, 2004; Cejpek *et al*., 2009). This gives it a great importance placing it among the most used herbs and medicinal plants, with many applications in the food and pharmaceutical industry (Dulf *et al*., 2015).

AIM AND OBJECTIVES

The purpose of this research was to run a comparative study on the content of bioactive compounds (polyphenols, flavonoids, vitamin C) and antioxidant capacity of berries and flowers of *Sambucus nigra* L. species.

MATERIAL AND METHOD

In order to accomplish the proposed goal, four different samples were analysed and evaluated: fresh and dried elderflowers, respectively fresh and dried elder fruits. The flowers and berries of *Sambucus nigra* L. wild plants, grown in Cluj-Napoca (Romania) area, were collected at optimum maturity and immediately air-dried or frozen at −18°C. The standard compounds (gallic acid, quercetin) and reagents: 2,2-diphenyl-1-picrylhydrazyl, Folin-Ciocalteu, methanol, aluminium chloride, sodium carbonate, sodium nitrite and sodium hydroxide were purchased from Sigma Aldrich or Merck (Darmstadt, Germany).

Total phenolics compounds were determined spectrophotometrically using a modified Folin-Ciocalteu method (Singleton *et al*., 1999). Flavonoids quantifications was accomplish using a chromogenic system of NaNO₂–Al(NO₃)₃–NaOH, according to the method described by Zhu *et al*,
The antioxidant capacity was assessed using DPPH method (Odriozola-Serrano et al., 2008) and vitamin C was carried out titrimetrically. All spectrophotometric measurements were performed using a Shimadzu UV-1700 PharmaSpec spectrophotometer.

**RESULTS AND DISCUSSION**

The content in total phenols, flavonoids, vitamin C and overall antioxidant capacity of the analysed samples is presented in table 1.

The highest concentration in phenolic compounds was determined for the fresh flowers (1441 mg GAE/100g dw) followed by fresh berries (735.25 mg GAE/100g dw), while for the dried samples these values are significantly reduced. Also, the highest flavonoid content was identified in fresh flowers (1143 mg QE/100g dw), while the fresh berries are richer in vitamin C (573.06 mg/100g dw). The antioxidant capacity ranged from 24.93% to 52.54% of DPPH inhibition. Both fresh flowers and fresh elderberries contain significant amounts of antioxidants and implicitly exert stronger antioxidant activity compared to the dried samples.

**CONCLUSION**

The highest values for the total phenolic, flavonoids and vitamin C content were obtained for the fresh flowers and berries (results expressed as mg/100g dw), while in the case of samples processed by drying a decrease in the above mentioned bioactive compounds was registered. Nevertheless, the obtained results confirmed that both elder flowers and fruits can serve as a good source of bioactive compounds in human diet or as functional ingredients in different foods.

**REFERENCES**


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**Tab.1.** The content of polyphenols, flavonoids, vitamin C and antioxidant activity of elder samples

<table>
<thead>
<tr>
<th></th>
<th>Fresh flowers</th>
<th>Dried flowers</th>
<th>Fresh berries</th>
<th>Dried berries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total polyphenols (mg GAE/100g dw)</td>
<td>1441.19</td>
<td>543.91</td>
<td>735.25</td>
<td>506.08</td>
</tr>
<tr>
<td>Flavonoids (mg QE/100g dw)</td>
<td>1143.01</td>
<td>431.58</td>
<td>290.44</td>
<td>242.87</td>
</tr>
<tr>
<td>Vitamin C (mg/100g dw)</td>
<td>458.91</td>
<td>141.88</td>
<td>573.06</td>
<td>401.83</td>
</tr>
<tr>
<td>Antioxidant activity (%)</td>
<td>52.54</td>
<td>28.4</td>
<td>34.66</td>
<td>24.93</td>
</tr>
</tbody>
</table>