The quality of ‘Debreceni Bötermö’ cherries grown under organic or integrated conditions

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INTRODUCTION
Sour cherries are the stone fruits that are typically picked once at the peak maturity when have optimal taste and colour. However, the sour cherries may be stored for up to a few days in cold room to extend supply, storage could affect the quality and fruit composition. Other important issue is the effect of agricultural practices on fruit quality. Information about the changes in the chemical composition of cherries during maturity and postharvest storage is limited.

The influence of agricultural practice (organic or integrated fruit production) on quality of ‘Debreceni Bötermö’ sour cherries was investigated within the experiment.

MATERIALS AND METHODS

Sour cherries cv. ‘Debreceni Bötermö’ were harvested from two orchards with different agricultural practice. Fruits obtained from Experimental Orchard at Dąbrowice were grown according to integrated fruit production system (IFP); on the contrary orchard at Nowy Dwór was organically managed. Fruit were picked twice in July 2009. After harvest and after 4 days of cold storage (at 4.5 °C) fruit colour, total soluble solids content (TSS), titratable acidity (TA), dry matter (DM), total anthocyanins, total phenolics, simple sugars (glucose and fructose) and sorbitol content were determined.

Soluble solids were determined by indirect refractometric method using ATAGO PR-101 refractometer (ATAGO, Japan). Results were expressed in %. Titratable acidity was determined by standard titration methods with automatic titration unit DL 50 Graphit (Mettrit Toledo, Switzerland), by titration with 0.1N NaOH to the end point at pH=8.1. The results were expressed as a malic acid in %. Dry matter was determined by sample drying at temperature 70 °C in vacuum dryer at 30 mbar until constant weight. Results were expressed in %.

The quantification of anthocyanins in frozen sour cherries was made by the pH differential method (Wrolstad, 1976; Giusti and Wrolstad, 2001). The content of total anthocyanins was expressed as cyanidin 3-glucoside [mg/100 g of fruits]. A molar absorbency of 28000 was used for cyanidin 3-glucoside. Total phenolics of frozen sour cherries were measured by modified the spectrophotometric method (Taoa and Yang, 2003). Total phenolics were expressed as mg gallic acid equivalents in 100 g of fruits. Each extract was analyzed in at least two replications.

Simple sugars and sorbitol content were determined with modification of EN 12630 methods on Agilent HPLC model HP 1100 equipped with RI detector. Results were expressed in g/L.

RESULTS
Data presented in Table 1 show higher TSS and TA for fruits from organic orchard compared to IFP. The mean value (harvest date and time of analyses) are 13.2% and 1.27% versus 12.8% and 1.22% respectively. The fruit colour seems to be similar for both orchards and slightly changing during short storage.

Fruits from the second harvest always were characterized by a lower dry matter than fruits from the first harvest (Fig. 1). During fruit storage the anthocyanins and phenolics increased (except fruits from the first harvest in Dąbrowice) – Fig 2 & 3. Regardless of harvest date fruits from organic orchard had higher polyphenol content than those from integrated production. 396 mg/100g-1 and 357 mg/100g-1 respectively (Fig. 3). Moreover smaller variation between harvests in the phenolic of fruits from organic orchard can be observed. Data presented on Fig 4 shown that regardless of the cultivation system, harvest date and time of analyses the predominant simple sugar in sour cherries fruit was glucose - no saccharose was detected in sour cherries.

Table 1. Fruit colour (L* a* b*), titratable acidity and total soluble solids content in Debreceni Bötermö’ sour cherries grown in orchards at Dąbrowice and Nowy Dwór

<table>
<thead>
<tr>
<th></th>
<th>Dąbrowice (IFP)</th>
<th></th>
<th>Nowy Dwór (organic)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvest</td>
<td>Storage</td>
<td>Harvest</td>
<td>Storage</td>
<td>Harvest</td>
</tr>
<tr>
<td>L*</td>
<td>28.1</td>
<td>28.8</td>
<td>27.0</td>
<td>28.2</td>
</tr>
<tr>
<td>a*</td>
<td>4.2</td>
<td>3.8</td>
<td>3.9</td>
<td>3.2</td>
</tr>
<tr>
<td>b*</td>
<td>0.9</td>
<td>1.1</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Titratable acidity (%)</td>
<td>1.23</td>
<td>1.25</td>
<td>1.22</td>
<td>1.16</td>
</tr>
<tr>
<td>TSS (%)</td>
<td>12.9</td>
<td>12.8</td>
<td>12.8</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Fig. 1. Dry weight of sour cherries [%] in relation to cultivation technique, harvest and fruit storage

Fig. 2. Anthocyanins of sour cherries (mg/100g) in relation to cultivation technique, harvest and fruit storage

Fig. 3. Total phenolics of sour cherries (mg/100g) in relation to cultivation technique, harvest and fruit storage

Fig. 4. Simple sugars and sorbitol of sour cherries (g/100g) in relation to cultivation technique, harvest and fruit storage

CONCLUSIONS
The results of the experiment shown a higher quality of ‘Debreceni Bötermö’ grown in organic orchard. However further investigation are needed to prove the relationship, especially due to the seasonal effect.

ACKNOWLEDGEMENT
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Literature:
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