Effect of sowing date on quantity and quality of yield of chervil (*Anthriscus cerefolium* L. (Hoffm.) ssp. *sativum*) grown for a bunch harvest

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Summary

The aim of the studies carried out in 2004–2006 was the estimation of quantity and quality of chervil yield according to the sowing date: 10 April, 25 April and 10 May. On the base of obtained results it was said that the sowing date had a significant influence on the chervil yield, which was higher when the earliest date of sowing was used. However, there was no significant effect of sowing dates on the leaf blade mass and leafstalk mass in the mass of a single bunch. Participation of leaf blades in a bunch mass amounted from 63.4% for the latest sowing date to 55.5% when seeds were sown on 10 April. Moreover, the chervil yield was characterized by a quite high mineral compounds content, especially iron, manganese, zinc and copper. However, significant differences were found only in the content of calcium. The highest amount of this macroelement was noted in the second year of the experiment.

Key words: *Anthriscus cerefolium* L. (Hoffm.) ssp. *sativum*, sowing date, yield, macro- and microelements
INTRODUCTION

Spice herbs are very important components of our food. They improve its taste and give characteristic aroma. They are used in food industry, fruit and vegetable processing, alcohol industry and in the household. Main chemical compounds of spice herbs and medicinal plants are essential oils, alkaloids, tannins, glycosides, phytocides, saccharides (main component of dry matter), organic acids, vitamins and minerals [1]. Spice herbs containing phytocides has antimicrobial and immuno-stimulatory properties (onion, garlic, pepper, horseradish). Herbs can also reduce stress and anxiety (lemon balm, basil), work as antiseptics (marjoram), lower blood pressure (lemon balm), and stimulate the secretion of gastric juice and make easier digestion and assimilation of food [2]. Fresh herbs are more valuable than dried because they contain vitamins and high quantities of oil. The newest method of herb storage is freeze-storage [3-5].

One of the species recommended for use as a fresh herb is chervil (Anthriscus cerefolium L. (Hoffm.) ssp. sativum). It is an annual plant that reaches a height of 70 cm and displays small white flowers [6]. Its lacy leaves resemble parsley but are a lighter shade of green and have anise flavour [7]. Chervil herb is also characterized by a high content of vitamin C, total ash, total sugars [5, 8], and very high antioxidant activity [6].

The aim of the conducted experiment was to estimate the effect of sowing seeds date on the quantity and quality of chervil yield.

MATERIAL AND METHODS

The experiment was carried out in 2004–2006 at the Department of Vegetable Crops of the Agricultural University in Szczecin. Three dates of sowing were examined: 10 April, 25 April and 10 May. Sowing rate was 6 kg ha⁻¹. The experiment was established in randomized blocks with four replications. Chervil was cultivated on black earth soil of 3rd class of the soil valuation. The field was prepared according to agrotechnique proper for this species. Mineral fertilization was quantified according to the results of chemical analysis of the soil. Nitrogen (60 kg N per ha) and potassium (80 kg K per ha) were supplied as preplant fertilization. During growing season, the crop management was carried out. It included mainly irrigation, weeding and soil cultivation. The chervil herb harvest was done when the leaves formed a full rosette. Plants from the first sowing date were harvested on 22nd, 27th, 29th of June – respectively for the following years of study, from the second sowing date – on 3rd, 5th, 6th July and from the last sowing date – on 8th, 12th, 13th July. The leaves were tied in bunches with a mass of about 150 g. The quantity of the yield was assessed. Moreover, measurements of the quality features were taken: leaf blade and leafstalk mass, and the participation of leaf blades in the bunch mass. In 2004 and 2005 the laboratory part of the
experiment was conducted. It based on the representative sample consisting of
the samples of all sowing dates. Dry matter content was assessed by drying the
samples at 105°C to a constant weight. Total nitrogen was determined according
to Kjeldahl's method, phosphorus by colorimetric method, potassium, calcium
and sodium by flame photometry and copper, zinc, manganese, iron and magne-
sium using the method of atomic absorption spectrophotometry (AAS) [9]. The
obtained results were statistically evaluated by the analysis of variance. Signifi-
cance of the differences was tested by Tuckey's test at p=0.05.

RESULTS AND DISCUSSION

Results of chervil yielding are presented in table 1. Statistical analysis showed
a significant effect of the sowing dates on the quantity of the yield. In the first two
years of the study significantly higher chervil yield (108.4 kg/100 m², respectivly) was obtained from the earliest sowing date in comparison with the
yield obtained from the next two dates of sowing. In the last year of the experi-
ment the yield obtained as a result of sowing on 25 April was significantly lower
(55.6 kg per 100 m²) in comparison with the yield obtained from the earliest and
the latest sowing date.

<table>
<thead>
<tr>
<th>Sowing date</th>
<th>Yield [kg/100 m²]</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2004-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.04</td>
<td></td>
<td>108.4</td>
<td>122.3</td>
<td>88.3</td>
<td>103.7</td>
</tr>
<tr>
<td>25.04</td>
<td></td>
<td>65.7</td>
<td>67.5</td>
<td>55.6</td>
<td>62.9</td>
</tr>
<tr>
<td>10.05</td>
<td></td>
<td>61.2</td>
<td>59.9</td>
<td>86.3</td>
<td>69.1</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>78.4</td>
<td>83.2</td>
<td>74.1</td>
<td>78.6</td>
</tr>
<tr>
<td>LSDα=0.05</td>
<td></td>
<td>25.4</td>
<td>31.15</td>
<td>21.31</td>
<td>20.35</td>
</tr>
</tbody>
</table>

Mean results obtained from all years of the study proved that, similarly to
the first two years of the experiment, significantly higher yield (103.7 kg per
100 m²) was assessed for the sowing date of 10 April. Jadcza [10] had also pro-
ved a significant effect of sowing date on the yield of summer savory grown for
a bunch harvest. In this case the highest yield was obtained when seeds were
sown on 25 April. Similar results were obtained by Jadcza and Grzeszcuk [11].
In their experiment the effect of sowing date on the tarragon yield was estima-
ted — the yield was increasing along with the delay of sowing date. However, in
the study concerning growing basil for a bunch harvest it was found that the
date of sowing had no significant effect on the quantity of marketable yield of
basil herb [12].
Independently of used in the experiment dates of sowing, mean yield obtained in the second year of the study was by 6.1% higher in comparison with the yield obtained in year 2004, and by 12.2% – with the yield obtained in 2006.

Sowing dates used in the experiment had no significant influence on the biometrical characteristics of chervil plants (tab. 2). Only the leaf blade mass and the participation of leaf blades in a bunch mass were a bit higher when the date of sowing was the latest. Usually, herbs are accessible on the Polish market as a dried product. In general, its value is much lower in comparison with fresh herb [13]. The reason is location of essential oils on the leaf surface and also changes in the content of vitamins, mineral compounds, enzymes, colors and other biological active compounds content. One of the main factors deciding on the raw material quality is percent participation of leaf mass in the herb mass. Suchorska-Orłowska et al. [14] found significantly higher amounts of microelements in the leaves of herbs than in their shoots.

<table>
<thead>
<tr>
<th>sowing date</th>
<th>bunch mass (g)</th>
<th>leaf blade mass (g)</th>
<th>leafstalk mass (cm)</th>
<th>participation of leaf blades in a bunch mass (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.04</td>
<td>149.9</td>
<td>83.2</td>
<td>66.7</td>
<td>55.5</td>
</tr>
<tr>
<td>25.04</td>
<td>155.4</td>
<td>88.9</td>
<td>66.5</td>
<td>57.2</td>
</tr>
<tr>
<td>10.05</td>
<td>151.6</td>
<td>96.1</td>
<td>55.5</td>
<td>63.4</td>
</tr>
<tr>
<td>mean</td>
<td>152.3</td>
<td>89.4</td>
<td>62.9</td>
<td>58.7</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;α=0.05&lt;/sub&gt;</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

Macro- and microelements level in the yield of chervil was similar in all years of the research (tab. 3). Only the content of calcium was significantly higher, in comparison with the other mineral compounds, in the yield of chervil obtained in year 2005. Determined in the experiment amounts of microelements were close to data given by Suchorska-Orłowska et al. [14] – for different spice herbs, and by Jadczyk and Grzeszczuk [11] – for tarragon.

<table>
<thead>
<tr>
<th>year of the study</th>
<th>dry matter (%)</th>
<th>macroelements [g·kg⁻¹·d.m.]</th>
<th>microelements [mg·kg⁻¹·d.m.]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>P</td>
<td>K</td>
</tr>
<tr>
<td>2004</td>
<td>18.61</td>
<td>19.5</td>
<td>4.0</td>
</tr>
<tr>
<td>2005</td>
<td>20.63</td>
<td>26.0</td>
<td>2.0</td>
</tr>
<tr>
<td>mean</td>
<td>19.62</td>
<td>22.75</td>
<td>3.0</td>
</tr>
<tr>
<td>LSD&lt;sub&gt;α=0.05&lt;/sub&gt;</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>
CONCLUSIONS

1. The sowing dates analyzed in the experiment had a significant effect on the quantity of chervil yield. A significantly higher one was obtained when seeds were sown on 10 April.
2. There was no significant effect of sowing date on the biometrical characteristics of chervil plants. Only the leaf blade mass and its participation in a bunch mass were a bit higher when the latest sowing date was used.
3. The yield of chervil was characterized by a quite high content of mineral compounds. Their level was similar in all years of the study except calcium. The amount of this compound was significantly higher in the second year of the analyses.

REFERENCES

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Wpływ terminu siewu na wielkość i jakość plonu trybli ogrodowej (Anthriscus cerefolium L. Hoffm. ssp. sativum) uprawianej na zbiór pęczkowy

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Streszczenie

Celem przeprowadzonych w latach 2004–2006 badań była ocena wielkości i jakości plonu trybli ogrodowej w zależności od terminu siewu nasion: 10 i 25 kwietnia oraz 10 maja. Na podstawie uzyskanych średnich wyników z lat badań wykazano istotny wpływ terminu siewu na wielkość plonu trybli ogrodowej, który był większy w przypadku zastosowania najpóźniejszego z terminów siewu. Nie wykazano istotnego wpływu badanych w doświadczeniu terminów siewu na masę blaszek i ogonków liściowych w masie pojedynczych pęczków. Udział blaszek liściowych w masie pęczka wynosił od 63,4% przy najpóźniejszym terminie uprawy do 55,5% przy uprawie trybli z siewu nasion 10 kwietnia. W plonie trybli ogrodowej oznaczono dość wysoką zawartość składników mineralnych, zwłaszcza żelaza, manganu, cynku i miedzi. Istotne różnice stwierdzono jedynie w zawartości wapnia, którego więcej zawierała trybila uprawiana w 2005 roku.

Słowa kluczowe: Anthriscus cerefolium L. (Hoffm.) ssp. sativum, termin siewu, plon, makro- i mikroskładniki