Yield and Quality of Defoliated and Topped Sugar Beets

Objectives

I. Theoretical changes in yield and quality of defoliated beets
   (2 locations, 8 varieties, 2009; data from: Hoffmann und Wulkow, 2010)

II. Yield and quality of defoliated and topped sugar beets harvested according to common practice on commercial fields
   (10 locations, 2009; data from: Wulkow et al., 2010)

III. Storage losses of defoliated and topped sugar beets
   (1 location, 2009; data from: Wulkow and Hoffmann 2010)
I. Theoretical changes in yield and quality of defoliated beets

<table>
<thead>
<tr>
<th>Randomized field experiments</th>
<th>Paired comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correctly topped</td>
<td>Defoliated</td>
</tr>
<tr>
<td>Root yield (t ha⁻¹)</td>
<td>94,8 b</td>
</tr>
<tr>
<td>Sugar content (%)</td>
<td>18,5 a</td>
</tr>
<tr>
<td>Sugar yield (t ha⁻¹)</td>
<td>17,4 b</td>
</tr>
<tr>
<td>Potassium (mmol kg⁻¹FM)</td>
<td>31,7 b</td>
</tr>
<tr>
<td>Sodium (mmol kg⁻¹FM)</td>
<td>2,4 b</td>
</tr>
<tr>
<td>Amino-N (mmol kg⁻¹FM)</td>
<td>8,9 b</td>
</tr>
</tbody>
</table>

a, b different letters indicate significant differences on average of the varieties used in randomized field experiments and on average of the locations used for paired comparison.

II. Yield and quality of defoliated and topped sugar beets harvested according to common practice on commercial fields

Harvest quality of topped sugar beets
(10 locations, 2009, n=2000)

topped

- single leaves
- leaves > 1cm
- angled topped
- over topped

Wulkow und Hoffmann (2010)
Harvest quality of topped and defoliated sugar beets
(10 locations, 2009, n = 2000)

**topped**
- single leaves
  - leaves > 1 cm: 10%
  - angled topped: 30%
  - over topped: 50%

**defoliated**
- correctly topped
  - abrasions: 7%
  - leaves > 1 cm: 11%

Surfacing of damage and cracks of correctly topped and defoliated beets
1 location, n = 2725

- Defoliated
  - a: Surface of damage
  - B: Crack / beet

- Under topped
  - a: Surface of damage
  - B: Crack / beet

- Correctly topped
  - a: Surface of damage

Legend:
- a, b different letters indicate significant differences
III. Changes during storage in yield and sugar content of defoliated and topped sugar beets

Relative Changes in root weight (%) 
(root weight after harvest was set to 0)

Sugar content (% FW)

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>0°C</th>
<th>20°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage x Temp x Treatment ***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary

- Defoliation decreased harvest losses/ increased root yield because angled topped and over topped beets were avoided.
- Defoliated beets have inferior quality compared to correctly topped beets > lower sugar content and higher content of impurities.
- Differences induced by defoliation depend on the topping quality of beets used for the comparison.
- Defoliated and topped sugar beets did not differ in storage losses.
Thank you for your attention!