Defoliation of sugar beets:
Technique, costs and effects

Dirk Wollenweber
Zuckerrübenanbauerverband Südniedersachsen e.V.

Current Situation

to deep topping
= Mass loss
1 cm = 12% Mass loss

sloping/angling topping
= Mass loss

Money is missing
Sugar losses on woundings

- topping:
  - open wounding
  - faster spoilage
  - high sugar losses

Our aims

- Lower woundings/bruises due to lower sugar losses
  - Optimize harvest-system
- Better storability (because of campaign length)
- Yield increase
- Higher sugar-yield [t/ha]
- Higher proceeds for beetgrowers

Higher Competitiveness of Sugar Beet
“Defoliation”
or
“Whole beet harvesting”

Large scale trial 2009
Bachelor Thesis Daniel Töppe
(Fachhochschule Südwestfalen)

Steel tools
Rubber tools
View inside the machine
### Assessment of harvest quality

**6.400 examined beets**

<table>
<thead>
<tr>
<th>Topping</th>
<th>untopped with petioles &gt; 2 cm</th>
<th>untopped</th>
<th>under topped</th>
<th>correctly topped</th>
<th>over topped</th>
<th>angled topped</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean in %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Defoliation</th>
<th>undefoliated with petioles &gt; 2 cm</th>
<th>defoliated with small petioles</th>
<th>correctly defoliated</th>
<th>defoliated with damages</th>
</tr>
</thead>
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<tr>
<td>mean in %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Topping mean in %**

- untopped with petioles > 2 cm: 4.5
- under topped: 12.1
- correctly topped: 38.3
- over topped: 33.9
- angled topped: 5.5

**Defoliation mean in %**

- undefoliated with petioles > 2 cm: 3.6
- defoliated with small petioles: 16.2
- correctly defoliated: 66.8
- defoliated with damages: 13.4

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**Daniel Töppe**

[Fachhochschule Südwestfalen](http://www.fhs-suedwestfalen.de)

[Hochschule für Technik und Wirtschaft](http://www.htw-dresden.de)

[University of Applied Sciences](http://www.uas.tu-dresden.de)

[VTI](http://www.vti.de)

[GRIMME](http://www.grimme.de)

[DNZ](http://www.dnz.de)
Comparison of Defoliation and Topping on the field
(4 places with 4 repetitions)

relative values (topping = 100%)

<table>
<thead>
<tr>
<th></th>
<th>Topping</th>
<th>Defoliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>root yield</td>
<td>102.7</td>
<td>100</td>
</tr>
<tr>
<td>SD 5%</td>
<td>0.28</td>
<td>0.19</td>
</tr>
<tr>
<td>sugar content</td>
<td>100</td>
<td>99.9</td>
</tr>
<tr>
<td>SD 5%</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>sugar yield</td>
<td>100</td>
<td>102.5</td>
</tr>
</tbody>
</table>

Comparison of fuel consumption

* calibrated measuring in our field trial
** harvesting group „Uelzener Becken“, harvest season 2009

<table>
<thead>
<tr>
<th>fuel-consumption [l/ha]</th>
<th>Topper</th>
<th>Defoliator</th>
</tr>
</thead>
<tbody>
<tr>
<td>field trial*</td>
<td>42.5</td>
<td>36.7</td>
</tr>
<tr>
<td>from practice**</td>
<td>36.2</td>
<td>36.3</td>
</tr>
</tbody>
</table>
### Do we have different costs?

<table>
<thead>
<tr>
<th></th>
<th>€</th>
<th>€/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher price for defoliation system</td>
<td>3,900</td>
<td></td>
</tr>
<tr>
<td>Depreciation 5 years, 600 ha per year</td>
<td>975</td>
<td>1,30</td>
</tr>
<tr>
<td>Interest (5% of ½ acquisition value)</td>
<td>97,50</td>
<td>0,16</td>
</tr>
<tr>
<td>Higher fixed cost compared to topper</td>
<td>1,46</td>
<td></td>
</tr>
<tr>
<td>Higher variable costs in comparison to topping system</td>
<td>3,68</td>
<td></td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td><strong>5,14</strong></td>
<td></td>
</tr>
</tbody>
</table>

Still remains a higher margin of 30-60 €/ha

### Conclusion: Comparison of defoliation and topping

- higher root yield and sugar yield
- comparable sugar content
- slightly higher amino-N-content
- more money for the farmer
- comparable fuel consumption
- equal driving speed and area performance
- uniform beet material with less leaves/stalks
- better stability time of rubbersticks is required
What do we do in 2010

- Continue the comparison of defoliation and topping technology
- Add harvesters with micro-topping technology
- Storage-trials with beets from this harvestors

Thank you for your attention!