Experimental design

- Classification of morphological data
- Harvest of test plots
- Evaluation with new score for defoliated beets
Agronomique information

- Plant population: 87 000 plants per ha (98379)
- Top height: 5.21 cm (4.16)
- Beet diameter: 11.35 cm (in direction of travel) (9.65)
- Single beet weight: ~1230 g (800g)

Seligenstadt 2006

- Top height distribution (Scheitelhöhe)
Yield calculation on basis of plant population

<table>
<thead>
<tr>
<th></th>
<th>Yield [t ha(^{-1})]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beet</td>
<td>94.4</td>
</tr>
<tr>
<td>Leaf mass</td>
<td>39.7</td>
</tr>
<tr>
<td>Leaf mass dry</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Defoliation: technology

- Technical process: leaf elimination by chopper with rubber flails upon the row and steal flails between rows for 6 six rows
- 2 counter rotating shafts: 1000 and 900 rpm
- Operation speed 6 km/h
- Power demand: 90 kW
- Tractor front mounted or connected with six row tanker replacing the topping device
Institut für Landtechnik
Systemtechnik in der Pflanzenproduktion

Arrangement of the Test Field

- Each plot with 36 rows
- topped
- repeat 1
- repeat 1
- repeat 2
- repeat 2
- defoliated
- repeat 3
- repeat 3
- adjustment rows
- repeat 4
- repeat 4

Yield Sugar Beet

<table>
<thead>
<tr>
<th></th>
<th>Yield mass</th>
<th>Area</th>
<th>Yield</th>
<th>relative</th>
<th>root losses considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>defoliated</td>
<td>133.6 t</td>
<td>1.595 ha</td>
<td>83.77 t ha⁻¹</td>
<td>103.4 %</td>
<td>104.2 %</td>
</tr>
<tr>
<td>topped</td>
<td>128.8 t</td>
<td>1.590 ha</td>
<td>81.00 t ha⁻¹</td>
<td>100.0 %</td>
<td>100.0 %</td>
</tr>
</tbody>
</table>
Quality of Defoliation, Scores Bonn 2009

Class 1: incomplete defoliated with explicit petioles
Class 2: incomplete defoliated with explicit petioles with lesions
Class 3: incorrect defoliated with minor foliates
Class 4: correctly defoliated without lesions
Class 5: correctly defoliated with lesions

Quality of Defoliated Beets

Relation of sugar beets in %

Class 4: correctly defoliated without lesions
Class 5: correctly defoliated with lesions
Class 3: incorrect defoliated with minor foliates
Class 1: incomplete defoliated with explicit petioles
Class 2: incomplete defoliated with explicit petioles with lesions
Quality of Topped Beets, Scores IIRB Standard

Relation of sugar beets in %

Klein-Altendorf
Seligenstadt 2006

petioles > 2 cm
petioles ≤ 2 cm
under topped with no Petioles
correctly topped
over topped
angled topped

Gravimetric determination of beet top by 10 mm slices
Mass loss of beet topp related to total beet mass in %

<table>
<thead>
<tr>
<th>Beet mass classes, g</th>
<th>Average beet mass, g</th>
<th>up to 1 cm cutting height</th>
<th>up to 2 cm cutting height</th>
<th>up to 3 cm topping height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1750 - 2600</td>
<td>1900</td>
<td>0,5</td>
<td>1,9</td>
<td>4,5</td>
</tr>
<tr>
<td>1500 - 1750</td>
<td>1620</td>
<td>0,6</td>
<td>2,5</td>
<td>5,8</td>
</tr>
<tr>
<td>1600 - 1500</td>
<td>1130</td>
<td>0,9</td>
<td>3,6</td>
<td>8,1</td>
</tr>
<tr>
<td>750 - 1000</td>
<td>835</td>
<td>1,3</td>
<td>5,0</td>
<td>11,3</td>
</tr>
<tr>
<td>500 - 750</td>
<td>550</td>
<td>2,0</td>
<td>7,6</td>
<td>16,4</td>
</tr>
</tbody>
</table>

Summary

- Increase in harvested mass when defoliation is applied: 4 %
- Grimme defoliator eliminated 90% of the beets entire leafs
- With conventional topping 95% of the beet plants were topped correctly (including over topped and angled topped), which means leafs have been eliminated fully
- Visual evaluation of the beets (scoring) is time consuming, but the only applicable method the time being