Towards more sustainable potato production

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Introduction

• Welcome to this workshop

• Why focus on sustainable production
  • Human population is growing fast and needs more food
  • Society is more demanding
  • Society is concerned about adverse side effects
  • Natural resources are limited
  • Environmental protection should be improved
  • Jobs in rural area are needed
Sustainable agriculture

1. To enhance environmental quality and the natural resource base upon which the agricultural economy depends
2. To make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls
3. To sustain the economic viability of farm operations
4. To enhance the quality of life for farmers and society as a whole
Potato fields in China
Potato statistics Netherlands and China

<table>
<thead>
<tr>
<th></th>
<th>Netherlands</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato Area (M.ha)</td>
<td>0.16</td>
<td>5</td>
</tr>
<tr>
<td>Production (M.tons p.y.)</td>
<td>7-7.5</td>
<td>70-80</td>
</tr>
<tr>
<td>Yield (ware: ton/ha p.y.)</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Professional growers</td>
<td>&gt; 99 %</td>
<td></td>
</tr>
<tr>
<td>Consumption (kg p.p.p.y.)</td>
<td>75 - 85</td>
<td></td>
</tr>
</tbody>
</table>
## Potato production in different countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Area 1000 ha</th>
<th>Yield t/ha</th>
<th>Production Million t/y</th>
<th>Population million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>130</td>
<td>30</td>
<td>3.9</td>
<td>40.3</td>
</tr>
<tr>
<td>Argentina</td>
<td>70</td>
<td>28.8</td>
<td>2.0</td>
<td>43.8</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>451</td>
<td>18.9</td>
<td>8.5</td>
<td>162.9</td>
</tr>
<tr>
<td>China</td>
<td>5,770</td>
<td>15.4</td>
<td>89.4</td>
<td>1,382</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>70</td>
<td>11.0</td>
<td>0.77</td>
<td>101.8</td>
</tr>
<tr>
<td>India</td>
<td>1,990</td>
<td>22.8</td>
<td>45.0</td>
<td>1,326</td>
</tr>
<tr>
<td>Indonesia</td>
<td>62</td>
<td>16.4</td>
<td>1.02</td>
<td>260.6</td>
</tr>
<tr>
<td>Myanmar</td>
<td>40</td>
<td>15.9</td>
<td>0.60</td>
<td>53.4</td>
</tr>
<tr>
<td>Vietnam</td>
<td>40</td>
<td>11.0</td>
<td>0.44</td>
<td>94.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>156</td>
<td>45.2</td>
<td>7.05</td>
<td>17.0</td>
</tr>
</tbody>
</table>
## Dutch Potato production

<table>
<thead>
<tr>
<th></th>
<th>Area *1000 ha</th>
<th>Yield tons/ha</th>
<th>Production (mln tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed potatoes</td>
<td>38</td>
<td>35</td>
<td>1.3</td>
</tr>
<tr>
<td>Ware potatoes</td>
<td>73</td>
<td>52</td>
<td>3.8</td>
</tr>
<tr>
<td>Starch potatoes</td>
<td>49</td>
<td>43</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>160</strong></td>
<td></td>
<td><strong>7.2</strong></td>
</tr>
</tbody>
</table>
International seed potato trade
(avg ‘06-'09)
Where and how to improve sustainability?

• Analyse potato production and storage cycle

• Evaluate resource use and efficiency
  • Right genotype, management and environment?
  • Calculate land use efficiency, water use efficiency, etc.
  • Calculate carbon foot print

• Implement improvement / adaptation / innovation plan
Potato production and storage NL
Challenges for potato production in NL

• New varieties (higher yields, more resilience, specific qualities)
• Soil compaction and quality
• Less use of fertilizers and pesticides
  • Nitrogen and late blight control
• Less irrigation (only on sandy soils with low water table)
• Reduce energy during storage
• Further implementation of precision farming and data analytics
  • Monitoring, decision making, implementation
Site specific crop management in precision farming

Smart monitoring -> decision making -> implementation per grid
Mechanized potato production and storage China, Heilongjiang province

- Soil tillage Planting
- Preparation before planting
- Fertilizer
- Ridging
- Weed control
- Irrigation
- Spraying pesticides
- In store view
- Modern store
- Traditional pit store
- Harvest and hand picking
Challenges for potato production in China

- New varieties (higher yields, more resilience, specific qualities)
- Seed quality (certification and registration, virus management)
- Soil analyses
- Adapted crop rotation and soil tillage
- Less use of fertilizers and pesticides
  - Monitoring and decision support
- Less irrigation
- Reduce harvest and storage losses
- Reduce energy during storage
- Advanced farms can start implementation of precision farming
  - GIS-platform, data, decision support, Apps
Improve sustainability via Good Agricultural Practices (GAP)

- Analyse potato production and storage cycle
- Set objectives
  - E.g. for greenhouse gases: < 100 kg CO$_2$ equivalents per 1000 kg of potatoes
- Evaluate resource use and efficiencies with set objectives
  - Focus on largest inefficiencies and apply GAPs
- Implement improvement / adaptation / innovation plan
  - Check results on field and demonstration plots
Example of GAP demonstration Keshan 2016
Sustainability and the Sino-Dutch workshop

• Topics are in the program (field visit and scientific program)
  • Seed quality and propagation
  • Good agricultural practices
    • Soil tillage
    • Fertilizer use
    • Pest and disease control
    • Irrigation
    • Precision farming
  • Storage optimization
  • Yield gap analysis
Thank you for your attention