Mission: Initiate and stimulate innovations for a sustainable greenhouse sector
- Strategic and applied research
- Staff: > 100 researchers
Agriculture in The Netherlands: production value

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (Billion Euro)</td>
<td>17.1</td>
<td>19.7</td>
</tr>
<tr>
<td>Horticulture (70% greenhouse)</td>
<td>6.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Arable farming</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Lifestock (milk)</td>
<td>4.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Animal production</td>
<td>4.2</td>
<td>5.2</td>
</tr>
<tr>
<td>% horticulture</td>
<td>39%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Greenhouse area: 10000 ha ± 45% in Westland-Oostland

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area (ha)</td>
<td>10325</td>
</tr>
<tr>
<td>Floriculture</td>
<td>5445</td>
</tr>
<tr>
<td>Cut flowers</td>
<td>2690</td>
</tr>
<tr>
<td>Potplants</td>
<td>1460</td>
</tr>
<tr>
<td>Other (eg. gardenplants)</td>
<td>1285</td>
</tr>
<tr>
<td>Food</td>
<td>4890</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4560</td>
</tr>
<tr>
<td>Fruit</td>
<td>330</td>
</tr>
</tbody>
</table>

Greenhouse Horticulture: Cut Flowers
Greenhouse Horticulture: Vegetables

Current high priority issues in Dutch Horticulture

- Sustainability
- Production efficiency
- Costs of energy
- Labour costs and availability
- Food safety
- Economic viability

Research funding (project based):
- Ministry of Economic Affairs, Agriculture and Innovation (50%)
- Horticultural Product board (30%)
- Other (20%):
  - European Community
  - Private companies
  - Local governments
  - ….
Location: Bleiswijk
- 90 greenhouse compartments
  - normal ventilation, cooling, complete arcs
  - artificial light
  - soil, substrates, tables
  - Insect breeding
- Crop protection laboratories
- Test facility taste of products
- Innovation and Demonstration Centre
- Greenhouse as Energy Source

Location Wageningen
- Specific laboratories (e.g. robotics, light measurements)
- 2 Experimental greenhouses
Research topics:
- Climate and energy
- Water and emission
- Advanced cropping systems
- Sustainable crop protection
- Quality of crop and product
- International (Adaptive greenhouse)

Climate and energy
- Energy producing greenhouses
- Energy efficient cropping strategies ("The new cropping")
- High transparent covering materials (Anti Reflex, Micro V)
- Crop model based control
- Light (e.g., LED)

Sustainable crop protection
- Integrated pest management
- Disease suppressive soils (biological horticulture)
- Induced resistance against pests
- Fungi against insects
- Reduced emission of pesticides
Water, nutrients & emission

- Emission free greenhouses: closed watercycle on farm level
- Emission reduction soil grown crops
- Decision Support System for irrigation semi-arid area's
- Watersaving greenhouses (Gulf Region)
- Possibilities of algae production
- Alternative substrates

Advanced cropping systems

- Vision applications:
  - Camera based system to measure plant size, phenotyping
  - Multiple Imaging: photosynthesis
  - Robotics
  - Mobile cropping systems
  - Combined greenhouse and livestock farming

Quality of crop and product

- Crop research: vegetables, cut flowers, fruits.
- Effects of environment, plant treatments, cropping systems
- Post harvest: flower life in relation cropping conditions and:
- Taste vegetables (model based and panels)
- Virtual (3-D) plant modeling
International project examples

- Sustainable greenhouse production (Mexico)
- Design of demonstration greenhouse (Turkey)
- Water efficient greenhouse (Saudi Arabia, UAE)
- Capacity building (Uganda)
- Integrated pest management (Ethiopia)
- Greenhouse design tropical low lands (Indonesia)
- Greenhouse horticulture (Malaysia)
- EU projects: Euphorus, Spicy, Flow-Aid, Crops

"Adaptive greenhouse": from current solutions to integral re-design

Networking: co-creation/ innovation

- Scientific
- Growers
- Supply industry
- Advisory
- Education
Scientific networks

IRTA
Nanjing University

Knowledge transfer and information

- Web site: [www.glastuinbouw.wur.nl](http://www.glastuinbouw.wur.nl)
- Publications:
  - In 2010 > 600
  - Thematic days (5)
  - Excursions
  - Ca 3000 visitors (2010)

Wageningen UR
For research and innovation

Vlierenweg 1 Bleiswijk
Bonnefonds Wageningen

10/18/2011