

## Greenhouse Horticulture in The Netherlands: trends and developments

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## Introduction


- The Netherlands
- Population 16 million
- 34.000 km<sup>2</sup> (0.4% of Australia)
- Population density: 400/km<sup>2</sup> (Australia: 2.7/km<sup>2</sup>)
- 51° NL

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## Agriculture in The Netherlands: production value



|                               | 2000 | 2008 |
|-------------------------------|------|------|
| Total (Billion Euro)          | 17,1 | 19,7 |
| Horticulture (70% greenhouse) | 6,7  | 7,7  |
| Arable farming                | 2,0  | 2,5  |
| Livestock (milk)              | 4,3  | 5,2  |
| Animal production             | 4,2  | 5,2  |
| % horticulture                | 39%  | 39%  |



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## Greenhouse area 10000 ha, ± 45% in Westland-Oostland

Investments/ replacement:  
 500-600 ha per year: 5%

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## Horticulture in The Netherlands: Area in ha




|                    | 2000   | 2009   |
|--------------------|--------|--------|
| Greenhouse         | 10500  | 10325  |
| Open field         | 126000 | 138675 |
| Total Horticulture | 136500 | 149000 |
| % protected        | 8%     | 7%     |



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## Horticulture: Production, Import and Export

|                                  | 2008 |
|----------------------------------|------|
| Production (Billion)             | 7,7  |
| Import                           | 8,3  |
| Export                           | 15,6 |
| Total export The Netherlands     | 371  |
| % Horticulture                   | 4%   |
| Trade balance NL (export-import) | 35   |
| % Horticulture                   | 21%  |

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| Horticulture: Labour        |        |
|-----------------------------|--------|
|                             | 2008   |
| Total (3,7%)                | 287050 |
| Production                  | 120550 |
| Greenhouse Vegetables       | 21000  |
| Greenhouse Flowers          | 32200  |
| Bulbs                       | 16200  |
| Supply/ trade/ supermarkets | 166500 |
| Trade organisations         | 70000  |
| Supply industry             | 10000  |



| Greenhouse Horticulture in The Netherlands |       |       |
|--|-------|-------|
|  | 2000  | 2009  |
| Total area (ha)                            | 10500 | 10325 |
| Floriculture                               | 6300  | 5435  |
| Cut flowers                                | 3730  | 2690  |
| Potted plants                              | 1270  | 1460  |
| Other (eg. garden plants)                  | 1300  | 1285  |
| Food                                       | 4200  | 4890  |
| Vegetables                                 | 4000  | 4560  |
| Fruit (strawberry, blackberry)             | 200   | 330   |



### Current high priority issues in Dutch Horticulture



- Economic feasibility:
  - Production efficiency
  - Energy costs
  - Labour costs and availability
- Sustainability:
  - Emission free (chemicals, nutrients, CO<sub>2</sub>)

### Developments

- Increase production scale/ efficiency
- Energy saving/ energy production
- Automation/ reduction labour costs
- Emission free (chemicals, nutrients)
- Controlled environment greenhouses
- Added value (private labels)




### Greenhouse Horticulture: Vegetables



### Energy use Dutch greenhouses

|   | 2000                | 2008                |
|---|---------------------|---------------------|
| Gas use m <sup>3</sup> (1m <sup>3</sup> =31.5 MJ)<br>equals 10% of national use | 3,6 10 <sup>9</sup> | 4,0 10 <sup>9</sup> |
| For crop production   | 3,4 10 <sup>9</sup> | 2,9 10 <sup>9</sup> |
| Net Electricity production (kWh)  | 1,3 10 <sup>9</sup> | 4,8 10 <sup>9</sup> |
| Energy efficiency (1980 =100%)<br>Energy/ unit product                          | 45                  | 30                  |

**Ambition: Greenhouses from 2020 onwards fossil fuel free**

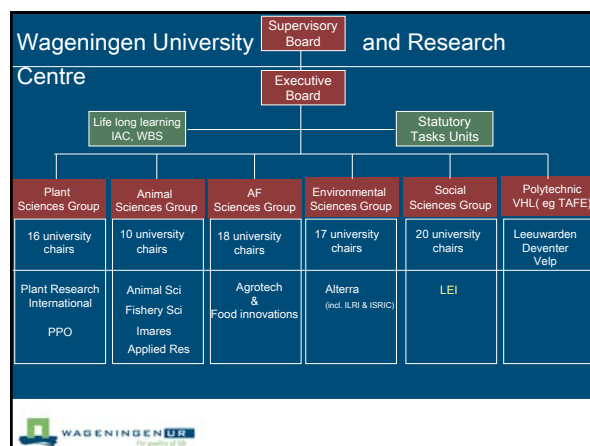


## Wageningen University and Research, Unit Greenhouse Horticulture

- Mission: Initiate and stimulate innovations for a sustainable greenhouse sector
- Focus: primary production and integral production system design




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## Plant Sciences Group

Wageningen University, Plant Sciences

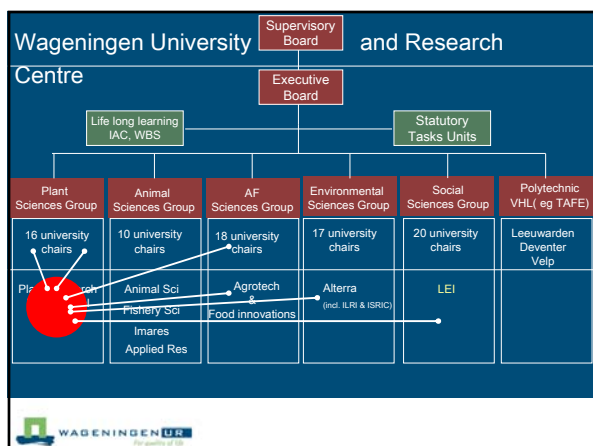
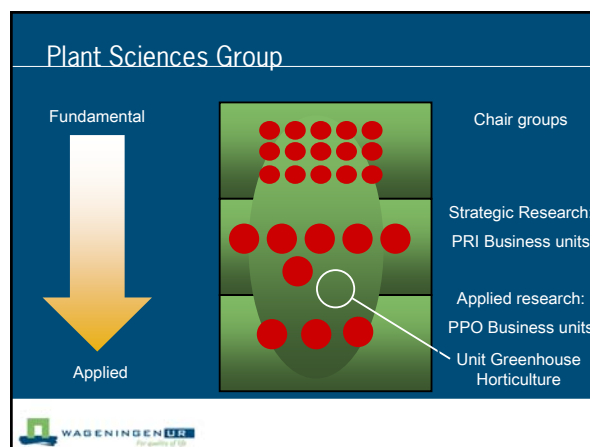
Plant Research International

Applied Research

**Fundamental** **Applied**

- 411 fte
- Turnover 55.2M€
- 298 fte
- Turnover 41M€
- 284 fte
- Turnover 50.1M€

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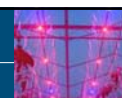
## Location Wageningen

- Specific laboratories (e.g. robotics, light measurements)
- 2 Experimental greenhouses



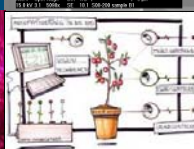
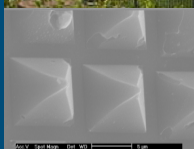
## Research themes/ project examples:

- Climate and energy
- Sustainable crop protection
- Water and emission
- Advanced cropping systems
- Quality of crop and product
- International



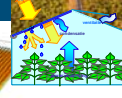
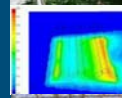
## Climate and energy

- Energy producing greenhouses
- Energy efficient cropping strategies
- High transparent covering materials (AR, Micro V)
- (Crop)model based control
- Light (eg. LED)



## Greenhouse climate

- Dehumidification / cooling systems
- Physical modelling and CFD
- Wireless sensors/Smart dust
- Climate monitoring commercial greenhouses



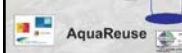
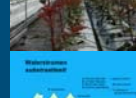
## Sustainable crop protection

- Integrated pest management
- Disease suppressive soils (biological horticulture)
- Resistance against white spider using white fly
- Effect wavelengths on botrytis
- Fungi against insects



## Water, nutrients & emission

- Zero discharge of recirculation water
- Emission free greenhouses
- Emission reduction soil grown crops
- EU Flow-Aid: DSS for irrigation in semi-arid area's (sensor development)
- Watersaving greenhouses Gulf Region
- Aqua Re-Use: water treatment for regions



## International project examples



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



## Cooperation International Research Institutes and Universities



## Publicity/ knowledge transfer

- Web site: [www.glastuinbouw.wur.nl](http://www.glastuinbouw.wur.nl)
- Publications:
  - In 2009 > 580
  - Thematic days
  - Excursions
  - 3000 visitors (2009)

