The new way of growing

Climate regulation with reduced energy input

Arie de Gelder

Grodan Green Expert Platform Naaldwijk 14-4-2010

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For quality of life

Agreement : Clean and Save Agroindustry

Convenant : Schone en Zuinige Agrosectoren

Kas als Energiebron

Aims for 2020

- 45 % reduction of CO_2 emission compared to 1990
- Increased energy efficiency 2 % per year
- 20 % sustainable energy

  &
- Climate neutral for new greenhouses
- Economically
- Supplier of heat and electricity

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Greenhouse as Energy source

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Innovation- and actionprogramme

- Coöperation between:
  - Growers : LTO Glaskracht Nederland
  - Productboard
  - Ministery of Agriculture LNV
- Finance research
  - Productboard and Ministery

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Road to a change

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The new way of growing

➔ HET NIEUWE TELEN

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The new way of growing : 7 quidelines

- **Humidity control by active ventilation**
- Insulation to reduce heat loss
- Grow with the season
- Controlled air movement
- Air humidification
- Cooling
- Heat storage in aquifer

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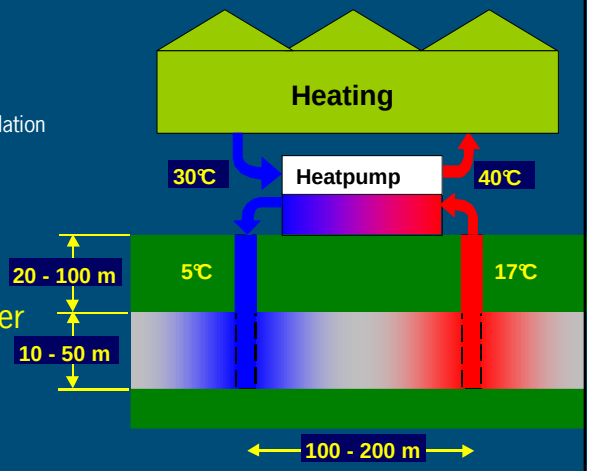

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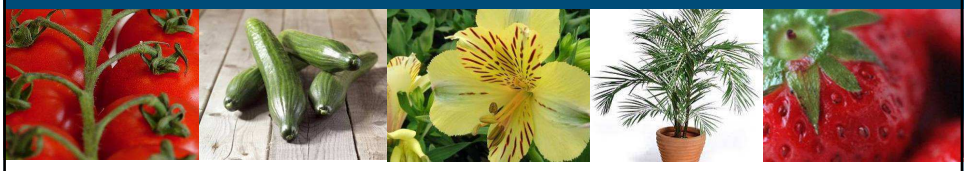
History						
2002-2007	Mechanical dehumidification			Closed and semi-closed Greenhouse		
2008	Report : Direction to the future Richting gevende toekomstbeelden					
	Saving Energy in biological tomato growing	NWG Tomato	NWG Cucumber	NWG Gerbera	*Other research*	*Practice*
2009					Strawberry	Themato
					Potplants	Steegh
2010			Sweet Pepper		Matricaria	Vereijken
					Gerbera	Marjoland



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Greenhouse equipment

Tomato – Cucumber –Sweet Pepper

- Double/Triple energyscreens
  - XLS 18 Firebreak (72 %)
  - XLS 10 Ultra Revolux (47 %)
  - December-February AC foil (EH foil removed to AC)
- Crop ventilation with outside-air to control humidity.
- High pressure mist system

Tomato

- Cooling equipment

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Gerbera

- 3 screens for :Insulation , day-length, shading
  - Obscura + XLS 14 F
  - XLS 10 ultra
- Crop ventilation
  - Dehumidification
  - Aircirculation
- High Pressure mist
- Assimilation light 30 + 70 µmol (2400 + 5300 lux)

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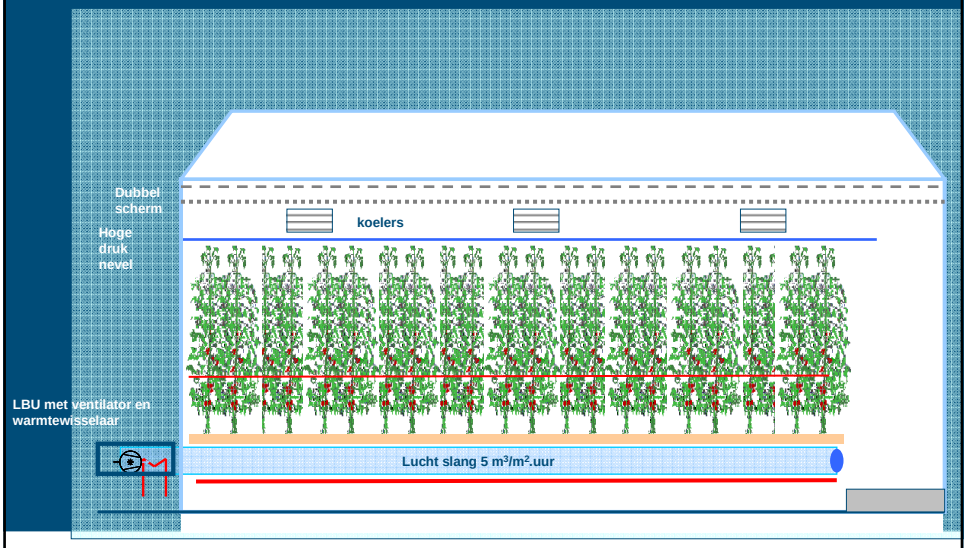
Greenhouse equipment



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Goals

- Production
  - Cucumber 80 kg/m² - 200 stuks
  - Tomato 60 kg/m²
  - Sweet Pepper 32 kg/m²
- Energy input
  - Tomato / Cucumber 25 m³ a.e.
  - Sweet Pepper 20 m³
- Growers learn to use The new way of growing

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Production of Cucumber

Crop	7.5 cm slab			10 cm slab		
	Kg/m²	#/m²	Fruit weight	Kg/m²	#/m²	Fruit weight
1	23.4	54.6	429	25.1	58.4	430
2	26.6	57.5	463	27.2	57.8	471
3	21.3	49.5	430	21.0	48.0	438
Total	71.3	161.6	441	73.3	164.2	446

23-09-09

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- Figuur energy tomaat 2009 Nog halen van N schijf

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Lessons learned 2009

- Plan energy – the first step is made in normal growing.
- Use the instrument for the right purpose
- Growers feeling isn't a sensor
- Saving energy at the start of a crop can cause loss of energy at the end

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Ervaring paprika tomaat

- Figuren energy paprika en tomaat 2010

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Tomato

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Gerbera

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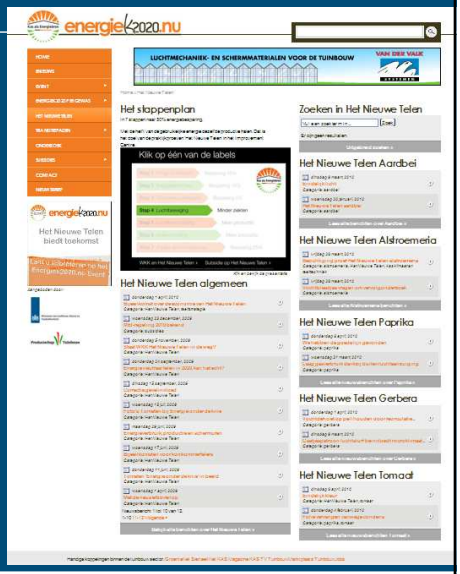
Experience

- Screens used intensively
- No use of minimum pipe
- Control of humidity
- Healthy crop
- Intensively information exchange
- Use AC-foil



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The new way of growing

The next step in energy saving

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