'Ways to energy saving' in cucumber

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Cucumber event Iceland 05112009

Several initiatives in The Netherlands:

- Closed greenhouse
- Greenhouse as an energy source
- Ways to energy saving
  - Sustainability
  - Energy saving
  - Reduction of CO_2 emission

Ambitions of 'Ways to energy saving'

- Aim: 40 – 50 % reduction in energy use
- Cucumber: 40 → 25 m^3/m^2 gas
- The same yield and quality (80 kg/m^2)
- Important:
  - What needs the crop?
  - Growers adopt it easy

In several steps towards Energy saving (1)

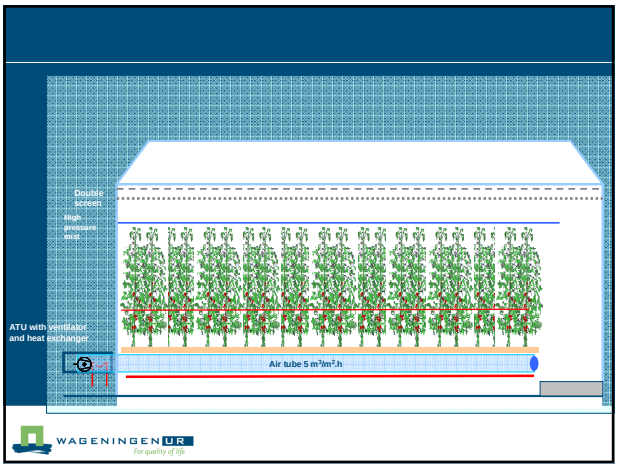
- Controlled dehumidifying → less ventilation → ↑CO_2 + lower heat input
- Isolating with several screens and during a longer time → lower heat input

In several steps towards Energy saving (2)

- Growing hand in hand with the natural conditions:
  - Start at a later planting date
  - Light levels: use heat of the sun!
  - Temperature integration
- Homogenous climate in greenhouse → tolerating a lower VD
- Humidifying of the air → cooling effect → less ventilation → ↑CO_2

Controlled dehumidifying

- Bringing air from outside via air treat units (ventilator and heat exchanger) and air tubes
  - More homogenous humidity => lower VD is possible
  - With completely closed screen
  - Lower humidity in the crop
- Use of minimum heating pipe when humidity is too high as a second instrument

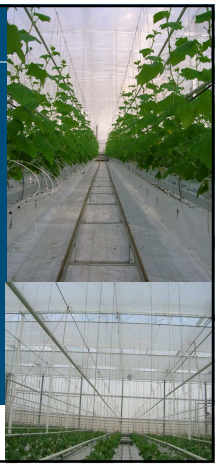


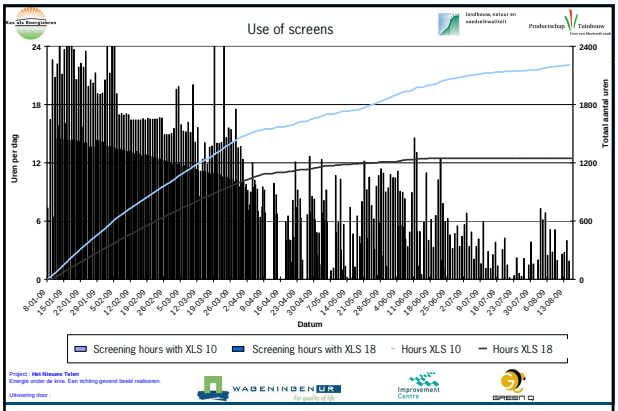
Experiment in 2009

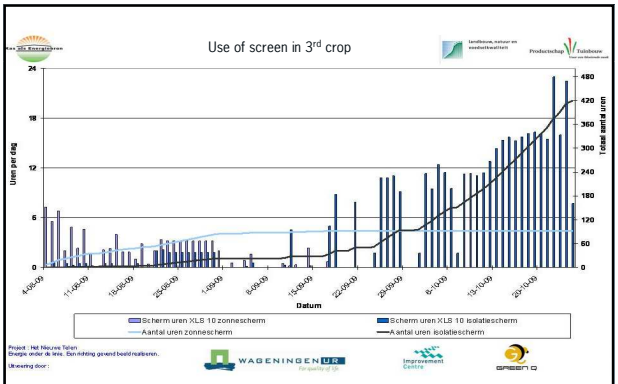
- 3 cucumber crops with traditional system
- Planting date and variety:
  - 6th January: Sacha (intermediate mildew resistent)
  - 5th May: Borgatta (intermediate mildew resistent)
  - 4th August: Sheila
- 1000 m²

Use of equipment: screens

- Plastic screen till 26th Feb (7 wks)
- Maximum use of 2 other screens:
  - XLS 18 Firebreak (72%)
  - XLS 10 Ultra Revolux (47%)







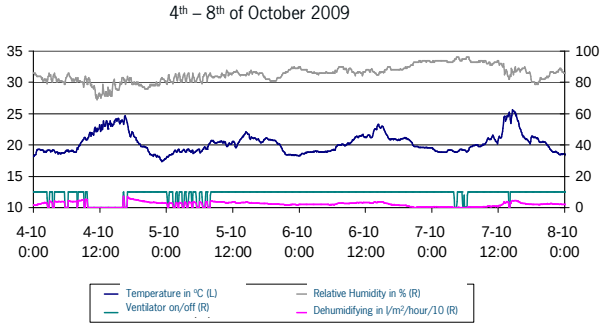
Humidity

- Dehumidifying the greenhouse air
- Small heating pipe in the crop is main heating system
- Humidifying especially during sunny, hot days

Dehumidifying:

- Day: below VD 2.5 - 3.5 g/m^3
- Night: below VD 1.7
- In 3rd crop stimulating transpiration by raising the VD
- In 1st crop ventilator of system works at varying speed, later on at 100%

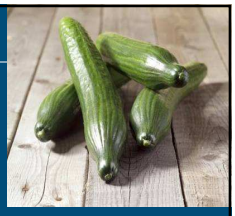
Example of dehumidifying in cucumber



Results

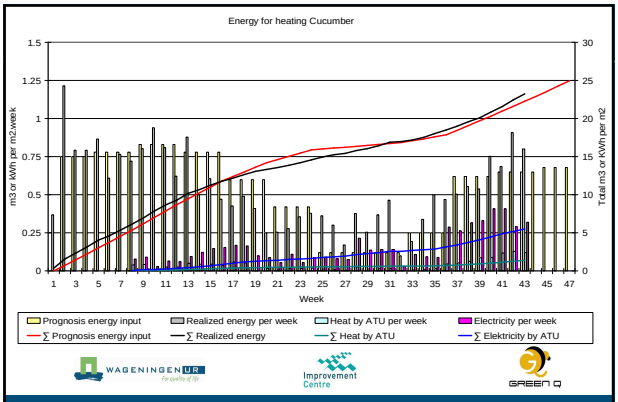
- 1st crop: slow start, without diseases, normal yield
- 2nd crop: some problems because of wrong use of tools, no balance in crop, too low yield
- 3rd crop: in good balance, healthy crop, normal yield

Yield per m^2 (class 1 fruit):



- 1st crop: 56 pieces and 24 kg
- 2nd crop: 58 pieces and 27 kg
- 3rd crop: 44 pieces and 20 kg (till week 43)

Upto week 43: 158 cues and 71 kg (aim is 80 kg)



Learning points:

- Combination of screening and dehumidifying
- Stable climate prevents problems (humidity)
- A minimum heating pipe is needed sometimes
- Positive effect of activating the crop by air tubes
- Control humid level (VD) between 1.5 and 7 g/m^3

Conclusions

- Growing cucumbers with 25 m^3/m^2 gas is possible!
- With the used equipment it's possible to keep a healthy crop and a good yield
- It's important to use the equipment in the right way

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