

# Soilless Cultivation of Outdoor Crops

*Clean, efficient and sustainable*



New opportunities for outdoor horticulture and society

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Soiless cropping is not new



# Green house horticulture, the Netherlands



# NGS system, Spain



# Content



Motivation



Sustainability



Cropping  
systems



California

# Outdoor horticulture in the NL



## Field vegetables



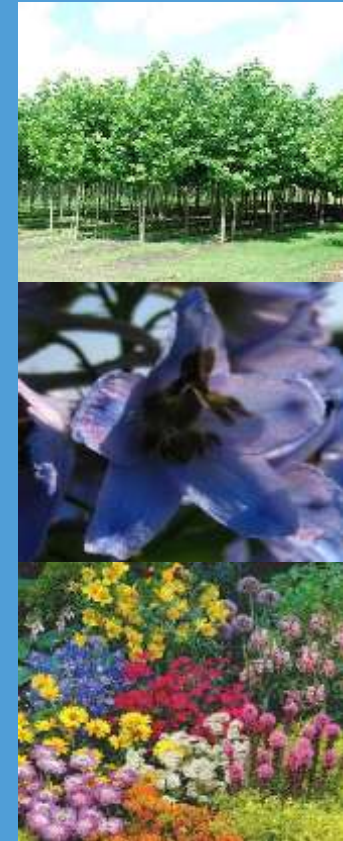
## Fruit orchards



## Flower bulbs



## Tree nursery crops & flowers



# Growers initiated research



# Growers Problems: Financial Return





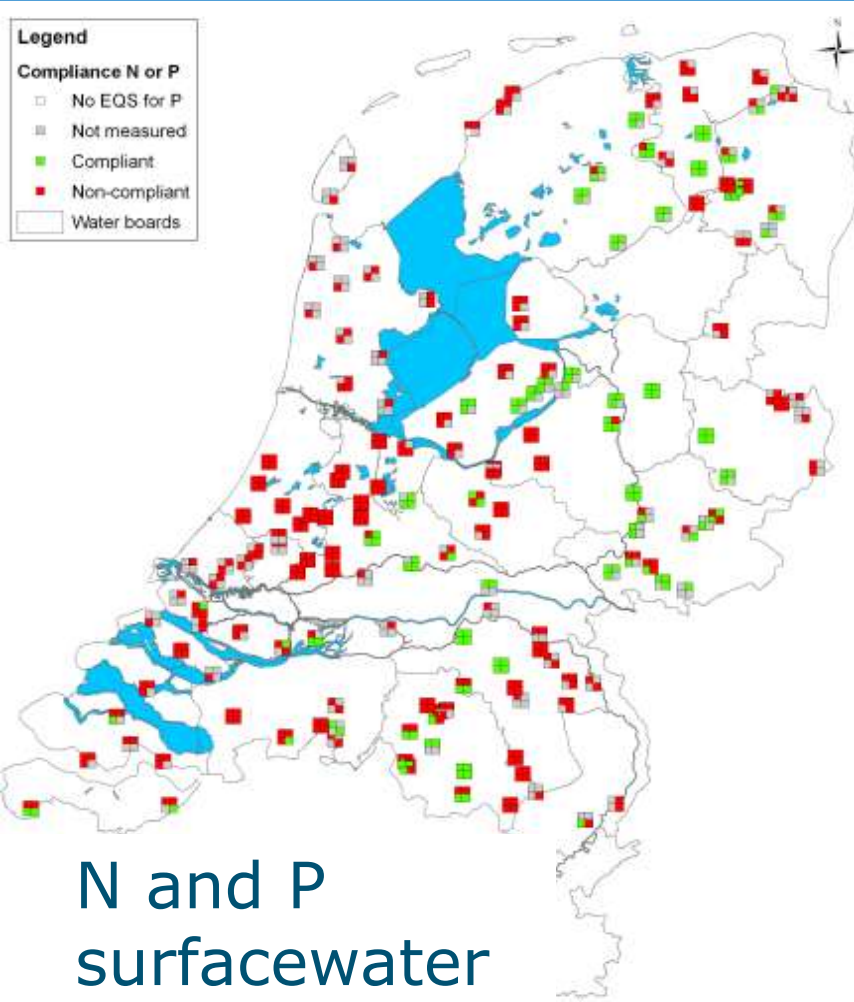
# Growers Problems: Labor



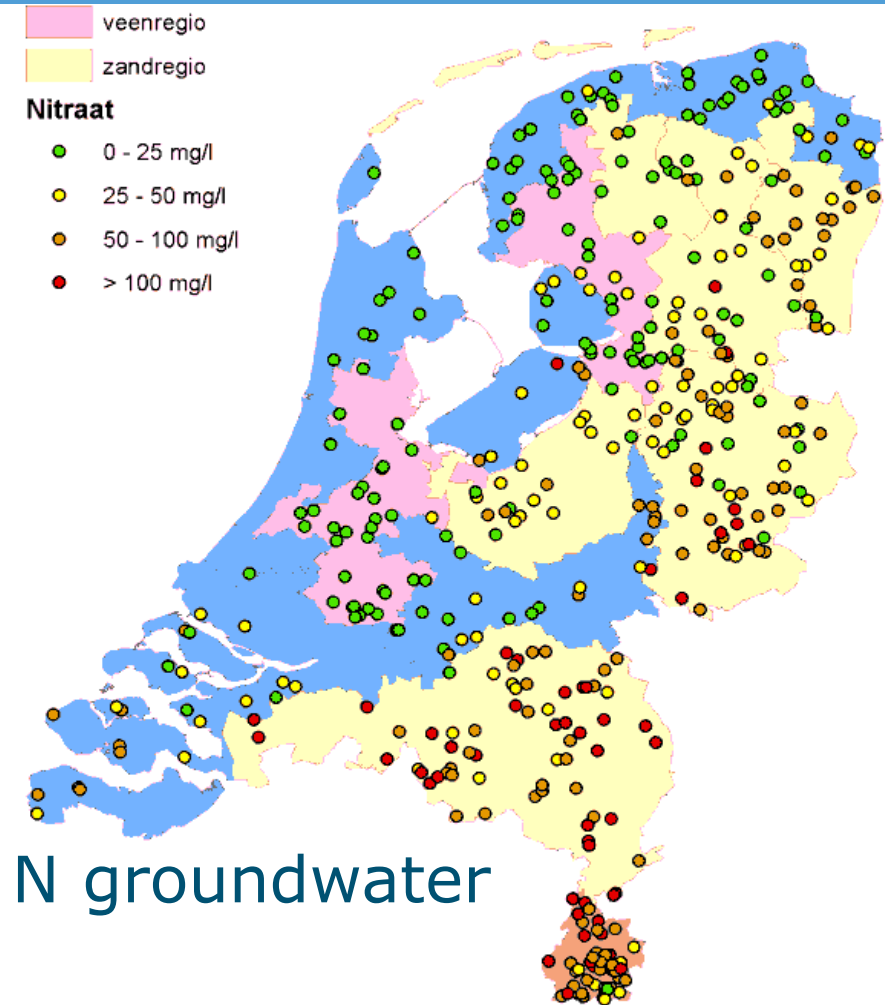
# Growers Problems: Soil Quality



# Societal Problems: Water Quality



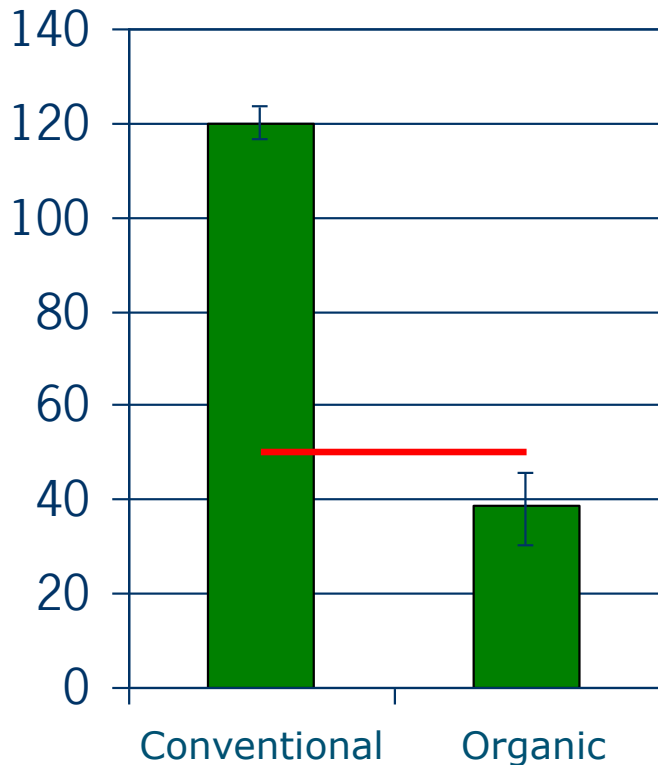
N and P  
surfacewater



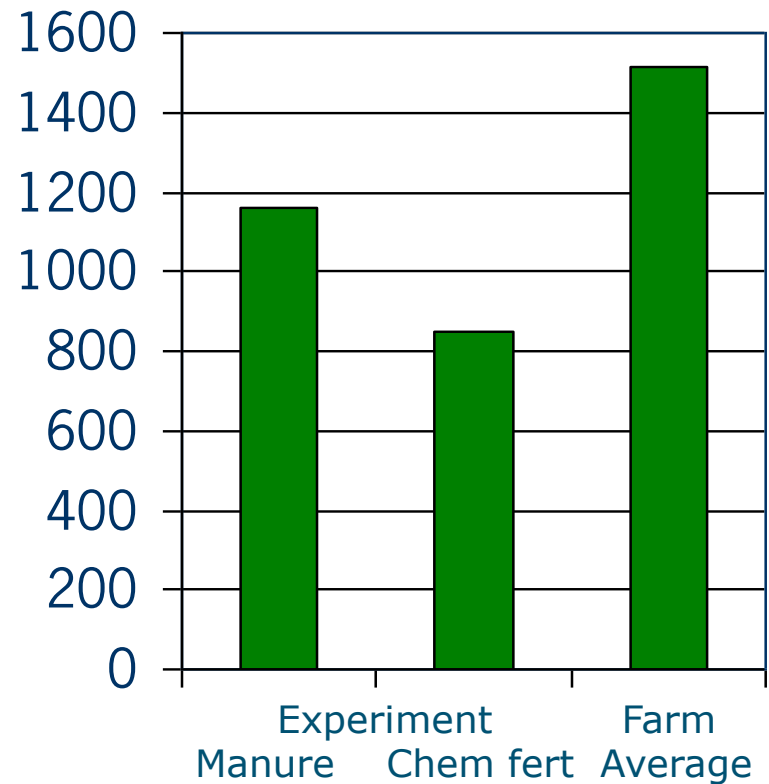
N groundwater

# Nitrate directive can not be realized within current cropping systems

**Nitrate concentration groundwater (mg/litre)**



**Balance (euro/ha)**



# Research program



## ■ Objective

*Develop and implement profitable new cropping systems that can comply with EU-regulations for water quality*

## ■ Outdoor horticulture

## ■ Duration: 2009-2013

## ■ Execution: Researchers, growers, advisors, suppliers

## ■ Financed by

- Government
- Product boards of growers
- Various other parties

# Overview type of cropping systems



Cropping on water	Deep flow system	
	Nutrient film technique	
Cropping on substrate	Pots on or in the ground	
	Gutters above the ground	
	Trenches/crates	

# Deep flow system: Lettuce



# Deep flow system: Leek





# Substrate in gullies: Tree nursery crops



# Substrate in pots: Blue berries



Substrate in trenches: Flower bulbs



# Watermanagement and emissions



Focus point	Solution
<ul style="list-style-type: none"><li>• Mismatch nutrients</li><li>• Na<sup>+</sup> accumulation</li></ul>	<ul style="list-style-type: none"><li>• Fertiliser choice</li><li>• Water management</li></ul>
<ul style="list-style-type: none"><li>• Pests and diseases</li></ul>	<ul style="list-style-type: none"><li>• 'Vital systems'</li></ul>
<ul style="list-style-type: none"><li>• Flooding of system</li></ul>	<ul style="list-style-type: none"><li>• Cover the system</li><li>• Water level management</li><li>• Flush the system</li></ul>

# Profitability: Example leek

in € cents per kg



	<b>Cropping in soil</b>	<b>Deep Flow System</b>
Selling price		47
Cost price	49	53
<i>Main differences</i>		
• Plants	11.1	12.4
• Fertilization	0.8	1.7
• Crop protection	1.5	0.1
• Energy	1.5	3.8
• Labor	11.2	8.5
• Land lease	1.6	0.2
• Capital goods	8.9	14.6

# Sustainability: Example lettuce



	Proved	Indication
<b>Better</b>	<ul style="list-style-type: none"><li>• Land use</li><li>• Labor conditions</li></ul>	<ul style="list-style-type: none"><li>• Nutrient &amp; pesticide emissions</li><li>• Adaptation to climate change</li><li>• Water use</li></ul>
<b>Comparable</b>		<ul style="list-style-type: none"><li>• Labor hours</li><li>• Profitability</li></ul>
<b>To improve / worse</b>		<ul style="list-style-type: none"><li>• Energy use and GHG-emissions</li><li>• Financial risks</li></ul>

# Attention to market and society



## ■ Market

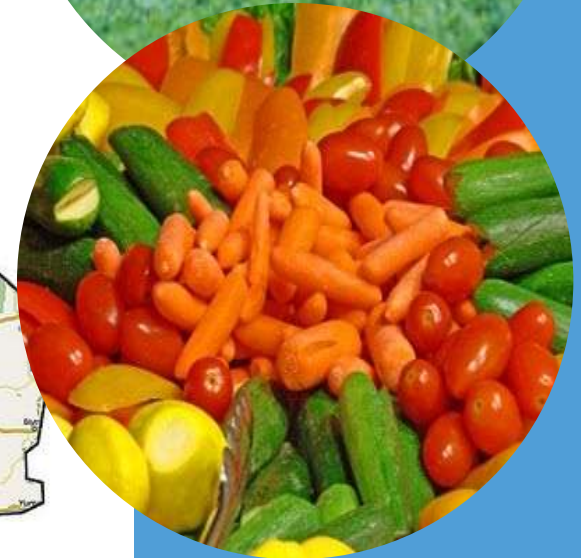
- Systems are giving new products with new USP's

## ■ Society

- Laws and regulations
  - Spatial planning
- Acceptability of production method
  - Natural look
- Solution for other problems
  - Urban agriculture



# What's in it for California





Thanks, we'd love to see you in Holland for the next  
Symposium on Growing Media and Soilless Culture



17-21 June 2013

Leiden,  
The Netherlands