# Water-efficient zero-emission greenhouse cultivation

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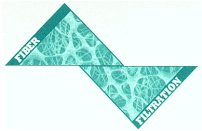


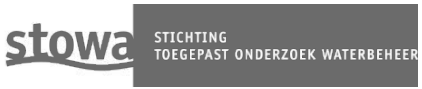





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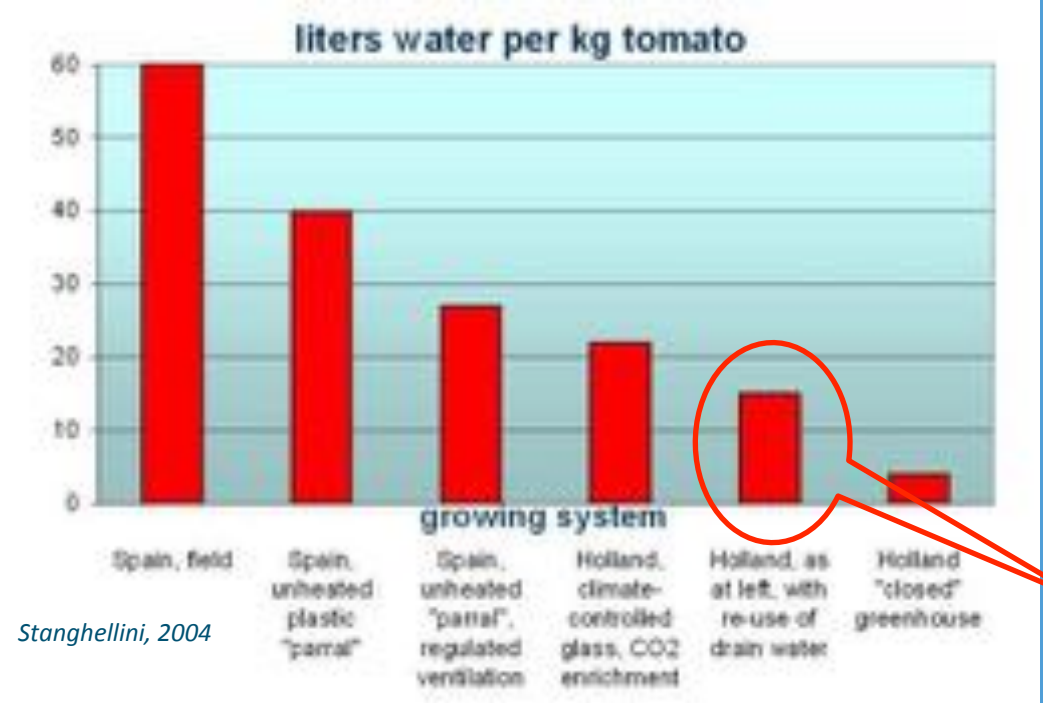
# Global challenges

Water scarcity

water quality issues

→ Resource use efficiency
More crop per drop

# Greenhouse cultivation a solution?




*Stanghellini, 2004*

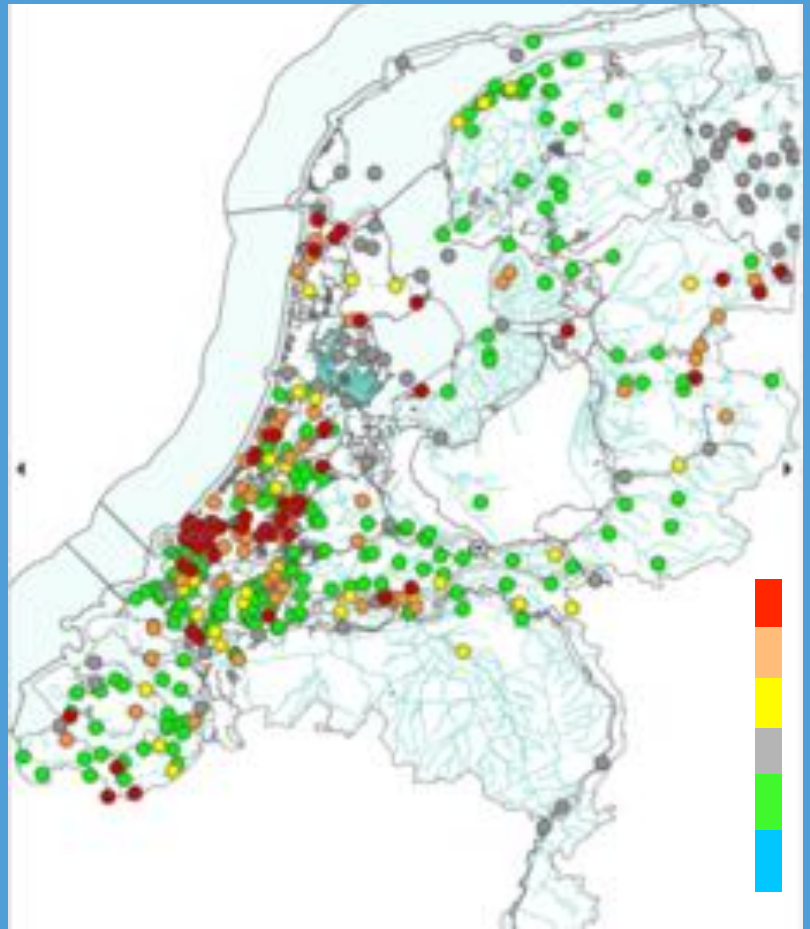
**Water (& nutrient) use efficiency increase:**

- Soil → substrate
- Open field → protected
- Free drainage → reuse

but regular discharges still causes water quality problems!

# Pesticides in greenhouse area surface waters

similar problems
with N and P

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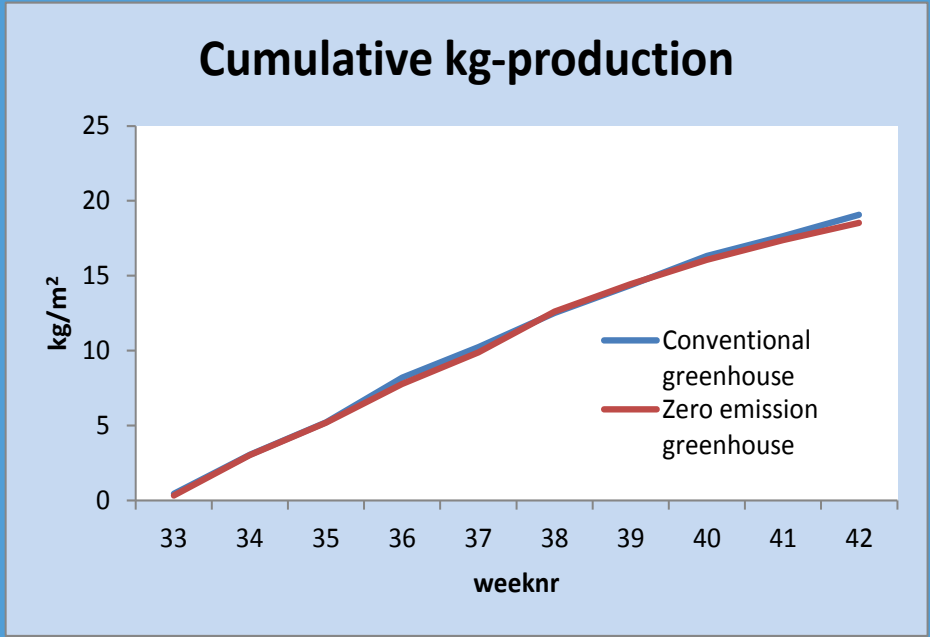
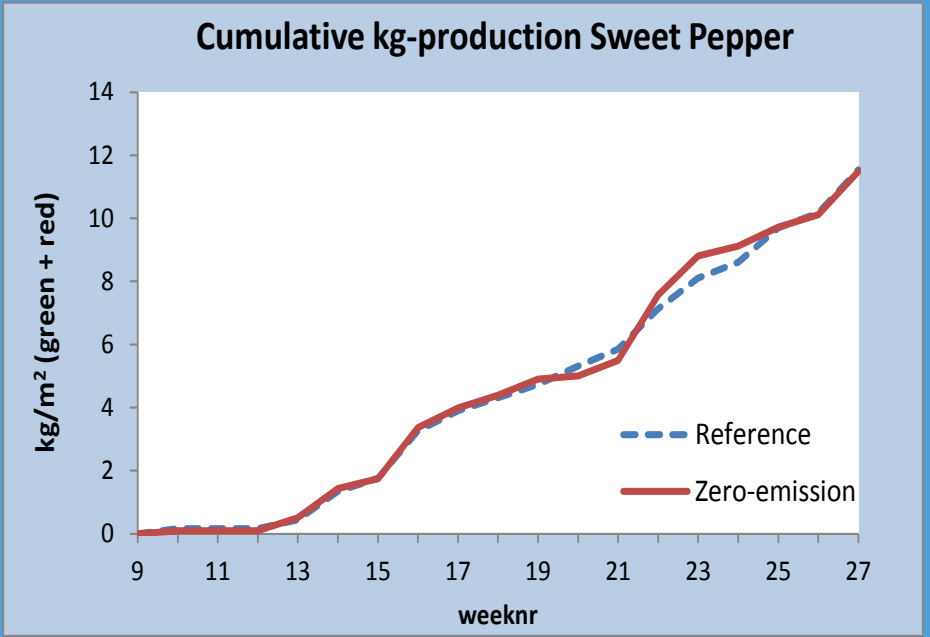
# Is a zero-discharge cultivation possible?

without loss of production or quality ? **YES !**

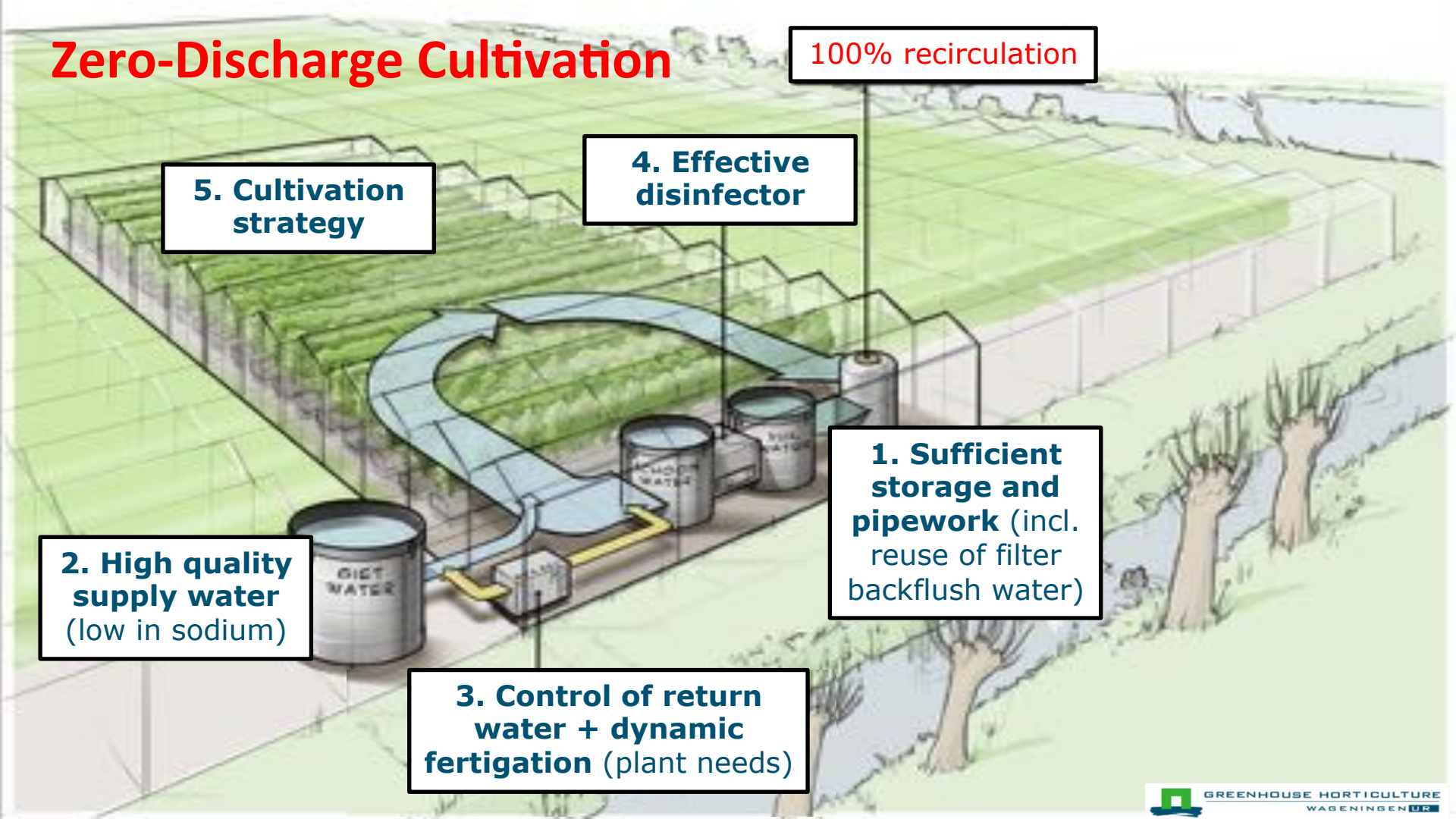


# Zero-discharge cultivation - How?

1. Determine reasons for (regular) discharge
2. Cultivation strategy and technical solutions
3. Tools to increase grower's confidence in water quality

# Zero-Discharge Cultivation



# Zero-discharge: Start of cultivation

- Stonewool
  - first flush & drain first months is safe to use
- Coco peat vs. stonewool (trial 2016)
  - Washed + buffered coco ($Na^+$ replaced by $Ca^{2+}$)

  → $[Na^+]$ in drain at start: coco 3 mmol/L
  stonewool 1 mmol/L
- Trial 2017: buffered vs. unbuffered coco peat
  - Discharge due to buffering: 8 kg N/ha
  - Is zero-discharge possible?

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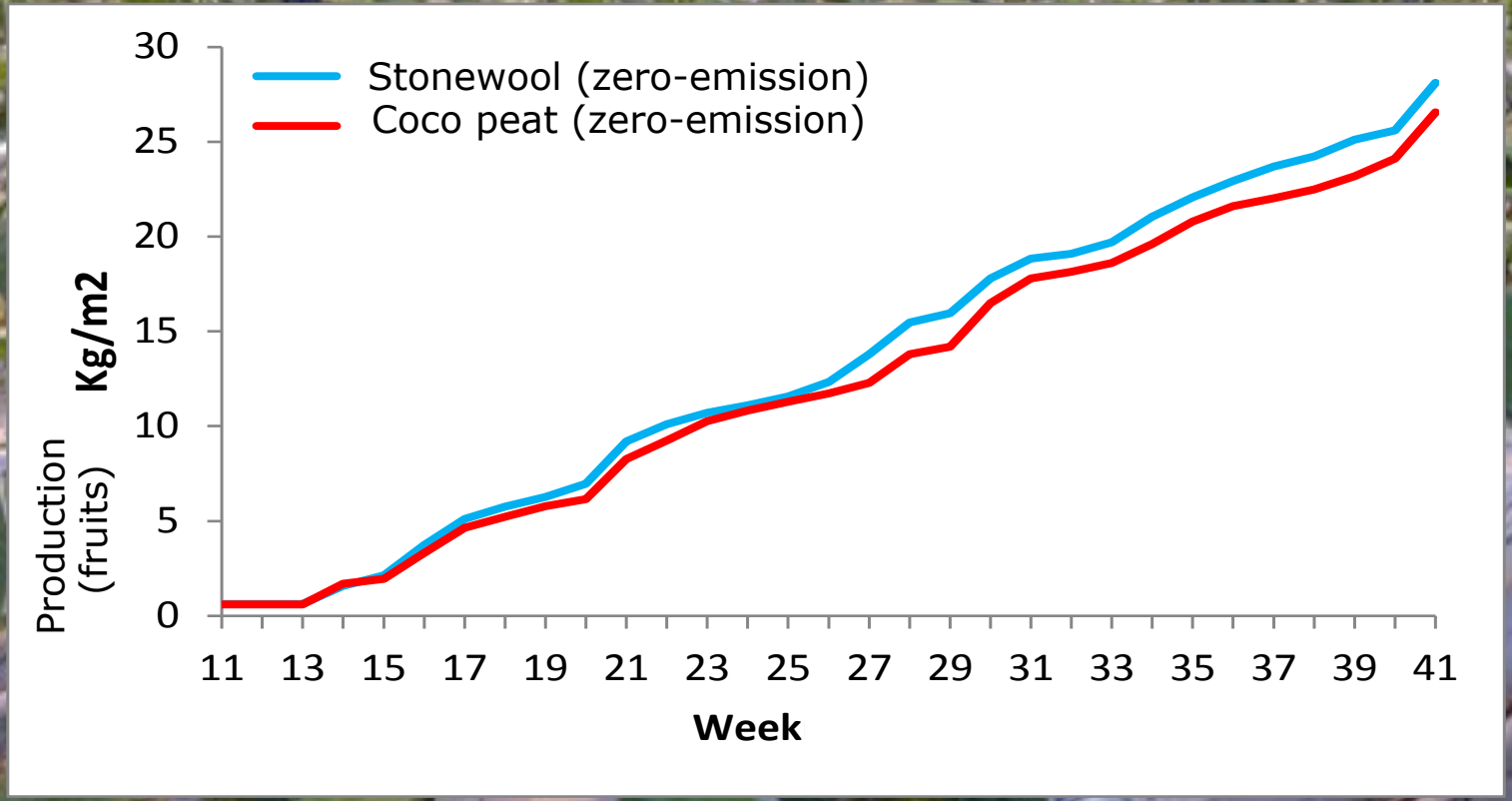
# Zero-discharge: end of cultivation

- Strategy aims at:
  - Minimal drain remaining after termination cultivation
  - No N and P left in remaining drain
- Gradual decline of amount water & nutrients applied
- Adjustments in composition nutrition:
  - less nitrate and phosphate, more chlorine
  - lower pH
  (keep phosphate and spores available

# Sweet Pepper Trial 2016



# Questions?

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