

Managing Nutrient Solutions for longer life

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Why re-use of nutrient solutions?

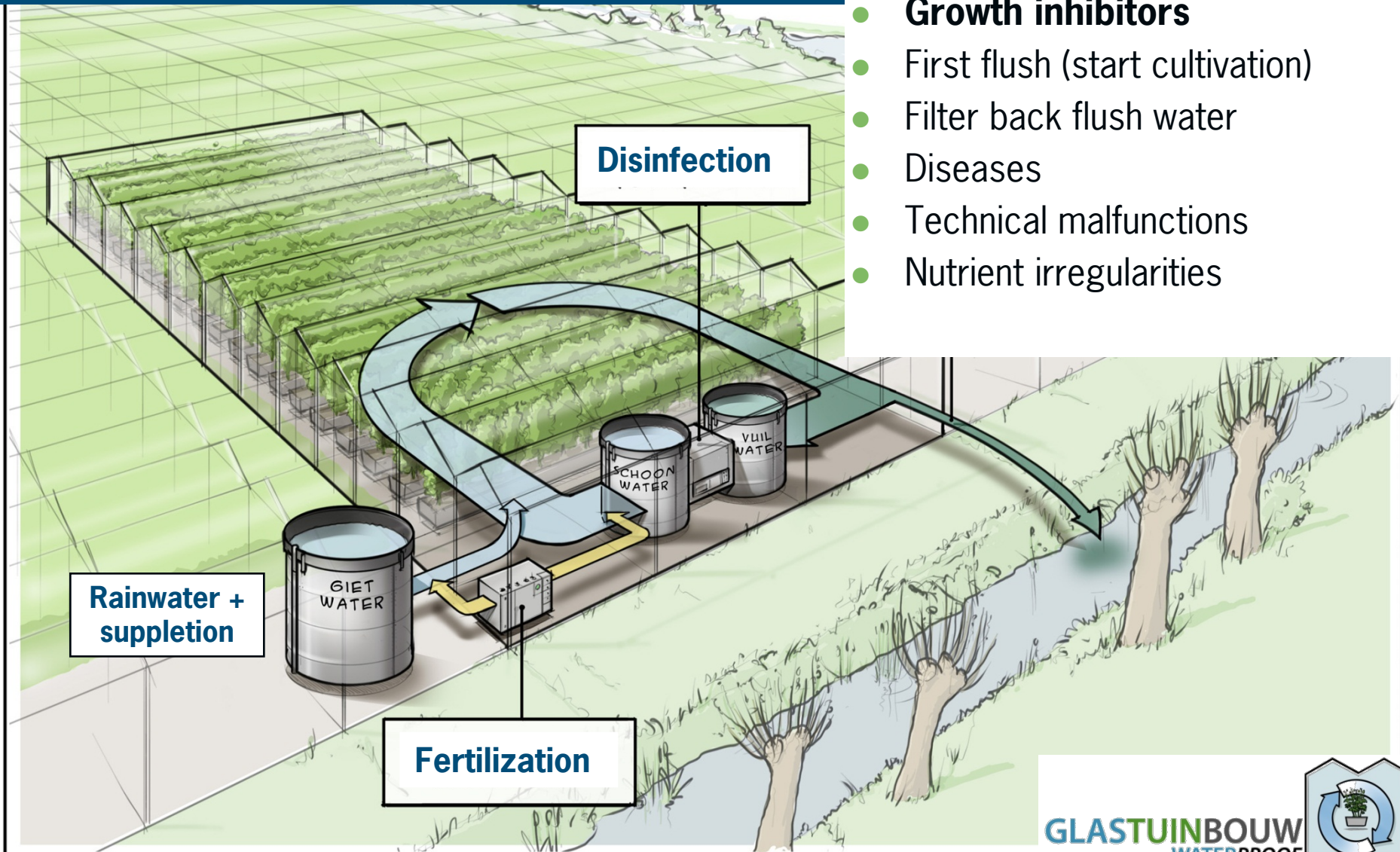


- EU legislation “Water Framework directive” (KRW):
 - “Good chemical and ecological quality of surface water and groundwater by 2015 (or 2027)”
- Levels of plant protection products above norms
 - Consequences for registration (NL/EU) to be expected from 2013
- From 2012: agreement between government and grower’s organisation LTO
 - (Almost) Zero discharge of N and P in **2027**

Re-use and discharge

Reasons for discharge:

- Sodium accumulation
- **Growth inhibitors**
- First flush (start cultivation)
- Filter back flush water
- Diseases
- Technical malfunctions
- Nutrient irregularities



Growth inhibition in rose – real or ‘only feeling’?

- Bioassay (Fytotoxkit) proves:
unknown factor in drainwater rose causes growth inhibition
- Advanced Oxidation (UV+H₂O₂)
can eliminate growth inhibition



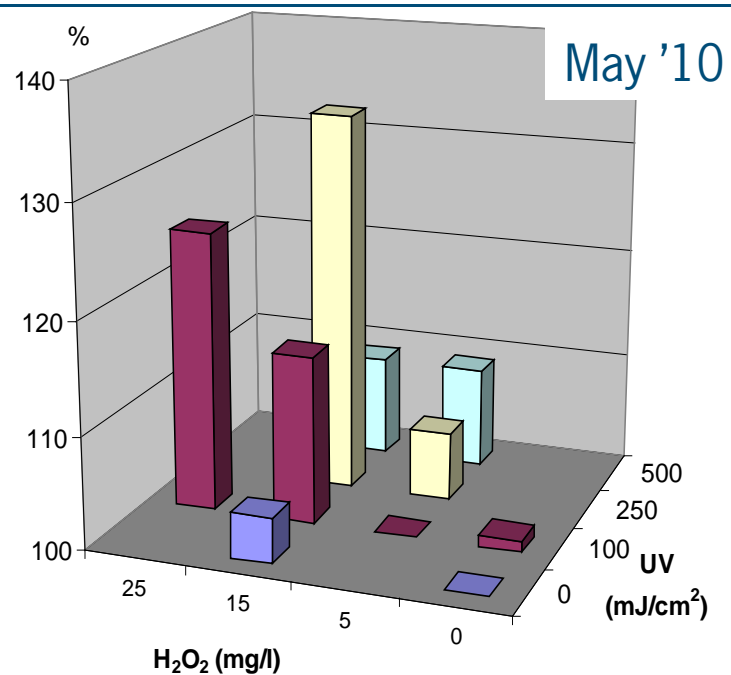
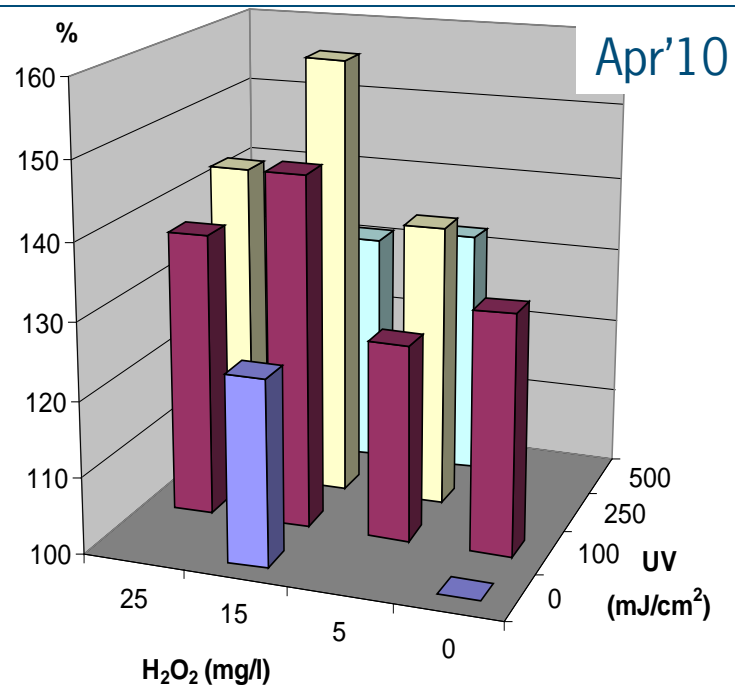
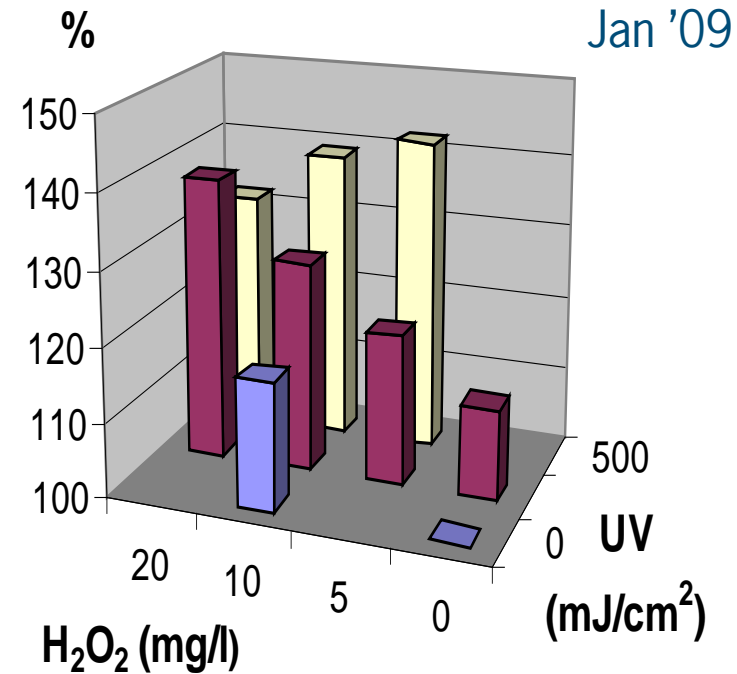
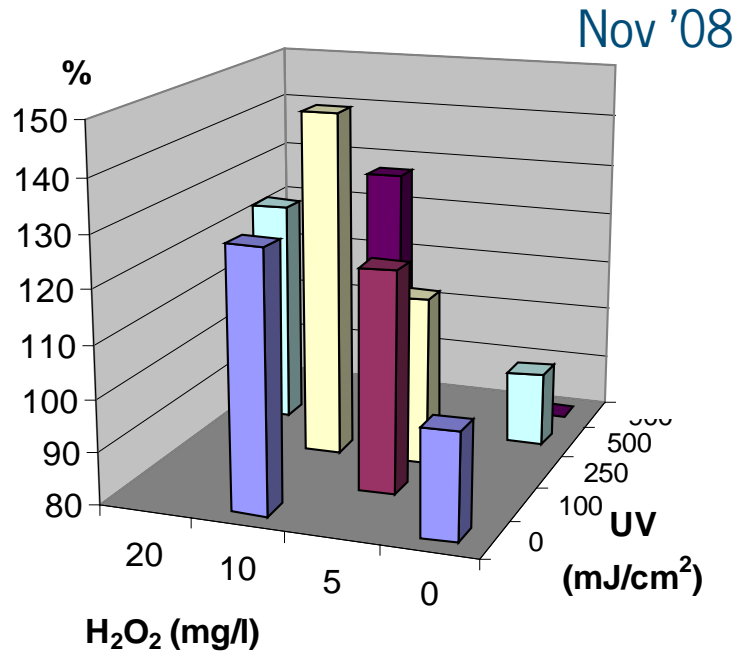
Trial at commercial rose grower (1)

- UV (200-280 nm) disinfection equipment present
 - Additional H_2O_2 dosing prior to UV (\rightarrow advanced oxidation)
- Different doses
 - UV: 0 – 500 mJ/cm²
 - H_2O_2 : 0 – 25 mg/l
- Tests
 - Growth inhibition (Fytotoxkit)
 - Pathogens, nutrients, pH, EC



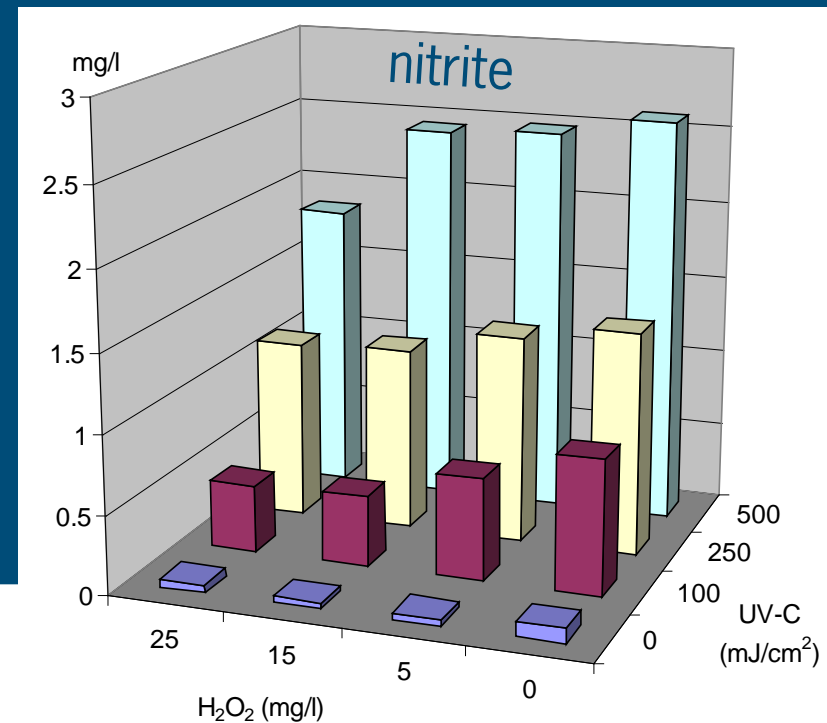
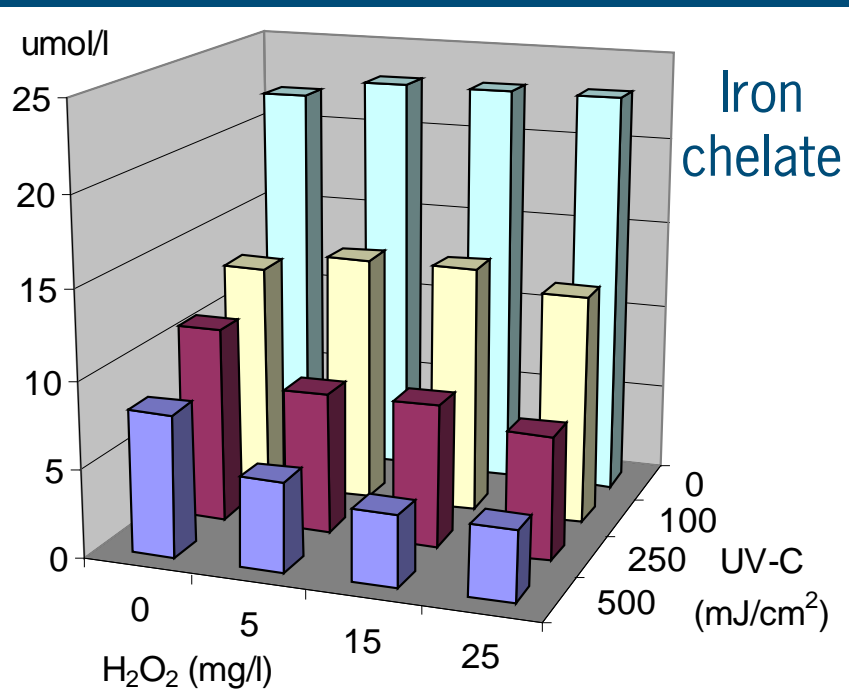
Results:
positive
effect on
growth
inhibition

(Fytotoxkit)

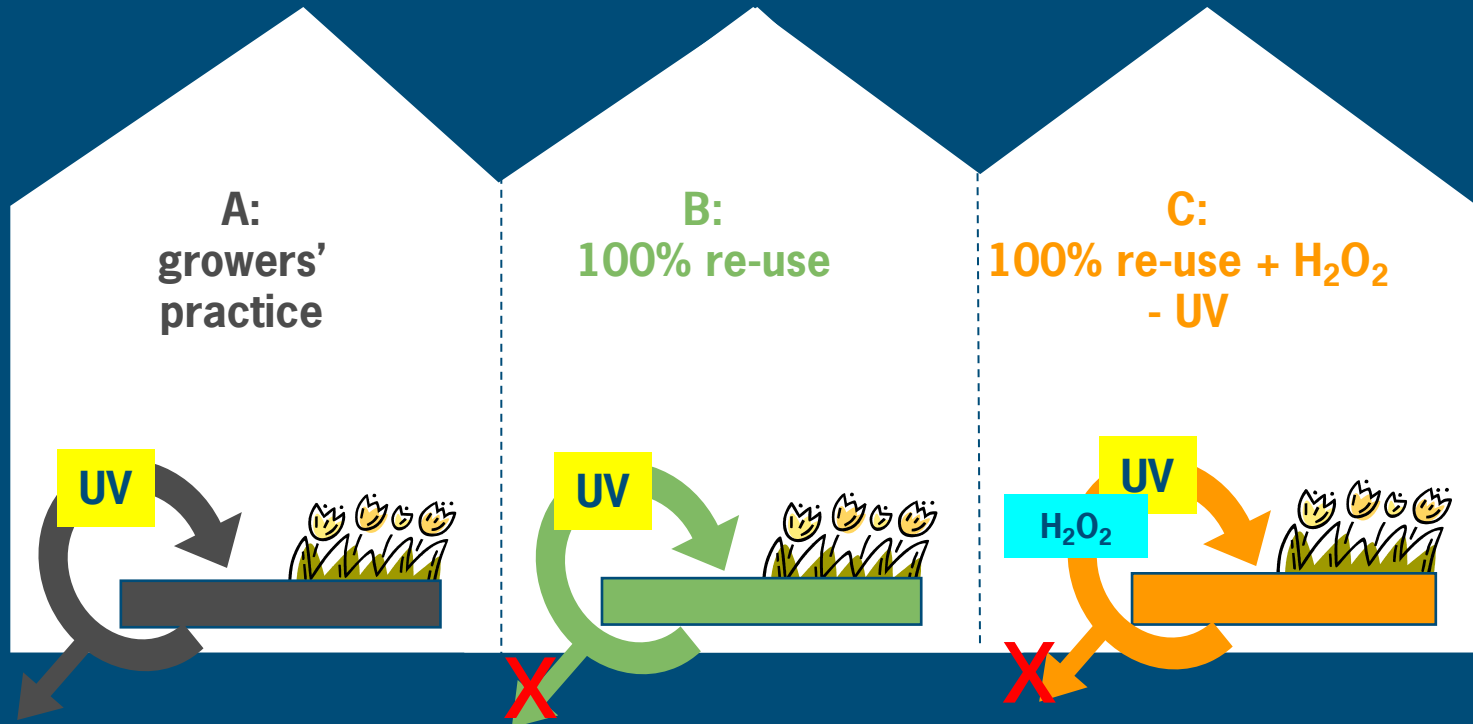


Results: nutrients and micro-organisms

- No differences, except for iron chelate
- Additional nitrite (NO_2) build up - *but no harmful effects!*
- EC, pH, oxygen: stable
- Turbidity decreased; transmission increased
- Micro-organisms all eliminated



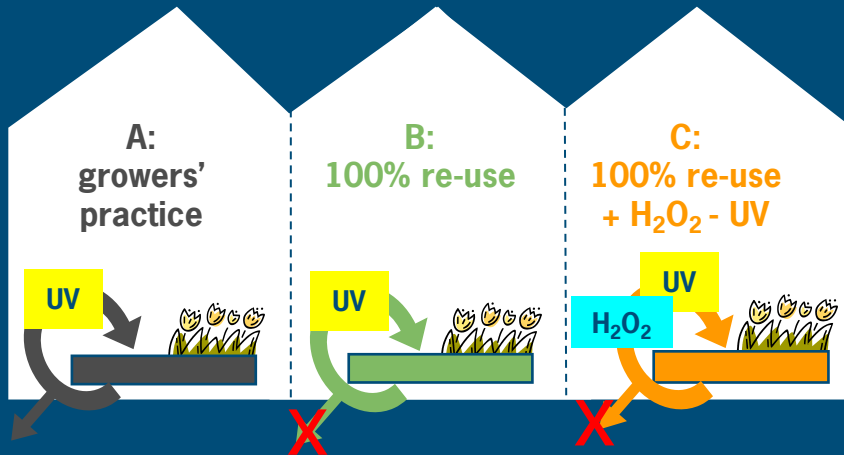
Growth inhibition in rose: long term trial (2)



■ Long term trial: March 2010 →

- UV: 100 mJ/cm²
- H₂O₂: 15 mg/l

Growth inhibition in rose: long term trial



■ Since 1 ½ year:

- no differences in production between A, B and C
- In winter 2011 growth inhibition in drain water (Fytotoxkit), not in crop

→ Longer re-use in rose seems possible

Growth inhibition: Other crops (3)

- Also in other crops discharge because of growth inhibition
- 12 commercial glasshouses: Rose, Gerbera, Tomato, Cucumber, Sweet pepper
 - UV (MD or LD) disinfection equipment present
 - H₂O₂-pump installed
 - Follow for one year



→ Aim:

more drainwater re-use with no negative effects for crop

Advanced oxidation & PPP

■ Advanced oxidation breaks down plant protection products (PPP)

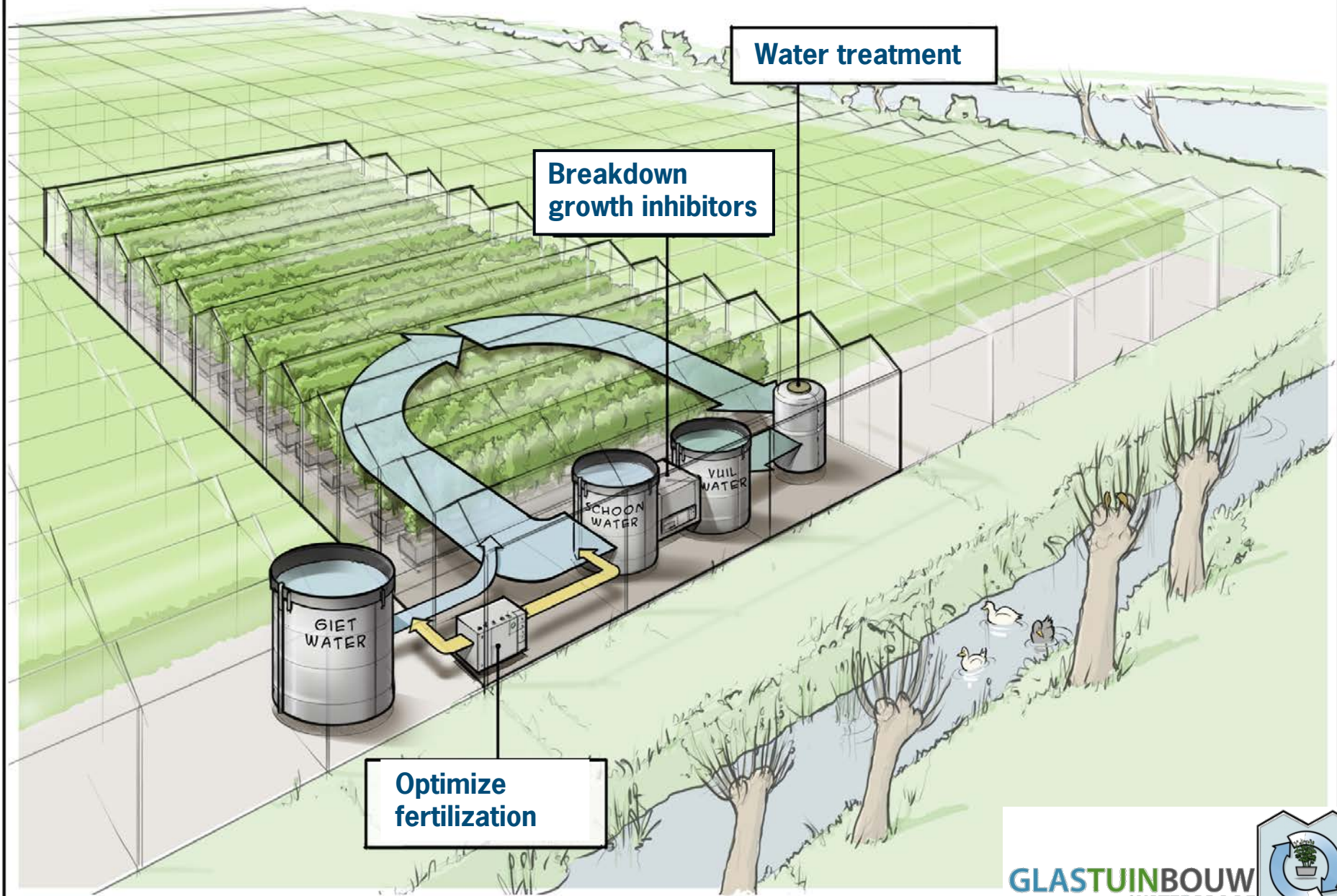
- Higher doses of UV and H_2O_2
- PPP differ in sensitivity



■ Use

- Breakdown of growth inhibition caused by PPP
- Purification of discharge water

Towards a zero-emission in substrate crops



Thank you for your attention!

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