

Good irrigation water on propagation companies to avoid emission

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Objective

Develop sustainable water management and technology for propagation companies in order to reduce the emission of nutrients and crop protection agents and to meet the EU Water Framework Directive demands.

Methods

- setting up a quantified water flow chart for a propagation company
- description of the quality standards of irrigation water
- selection of potentially harmful factors
- test the critical limits with measurement series with bio assay (Fytotoxkit)
- test the degradation of the agents by advanced oxidation (AOX)

Results

Bio assay

- Sodium hypochlorite (NaOCl) as a disinfectant inhibited growth from 45 mg/l on.
- Alar (daminozide) as a growth control agent reduced growth of seedlings from 45 mg/l on.
- two organic compounds (POW-humic and fulvo acids and coir chips) did not lead to growth inhibition.
- surfactant as used in rockwool substrate did not lead to growth inhibition.

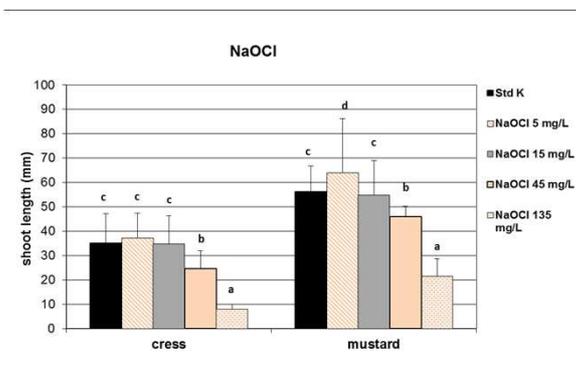


Figure 1. Results bio-assay with sodium hypochlorite solution.

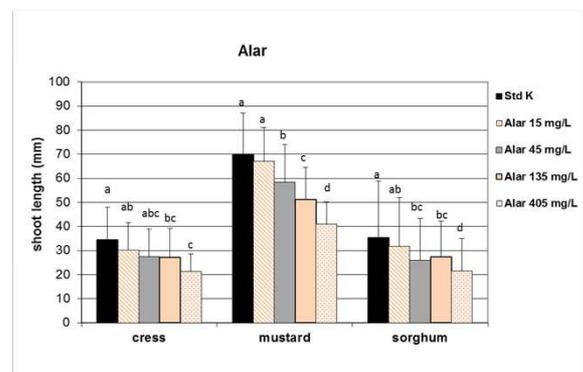


Figure 2. Results bio-assay with Alar (daminozide) solution.

AOX

Table 1. Overview of the agent concentrations after AOX treatments.

Concentrations after AOX	Entity	NaOCl	Cocos TOC	Alar	Surfactant
Without oxidizor	mg/L	100	23	43	100%
Per30/ UV240	%	100	96	97	55
Per15/ UV240	%	100	113	89	73
Cl 20/ UV240	%	100	91	88	99
Cl 10/ UV240	%	110	100	89	100
Cl 10/UV120	%	-	104	87	100

H2O2 and NaOCl in mg/L; UVC in mJ/cm²; concentrations are relative to the concentration without oxidizor

Only the surfactant showed substantial degradation by the treatments of peroxide/UV.

Water flows

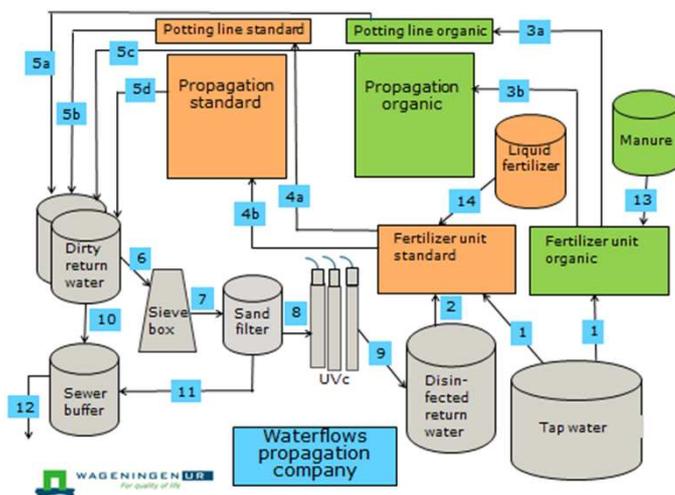


Figure 3. Water flow chart of a propagation company

Conclusions

- The water flow chart combined with a spread sheet for quantitative calculations showed to be a useful tool.
- The tested disinfectant and the growth control agents showed to be harmful to plant growth.
- The organic compounds were not harmful, but may reduce the effect of the UV-installation at high concentrations, because of a low transmission.
- The tested surfactant showed to be a safe additive in rockwool.
- AOX didn't work very well on the tested agents. The doses used were based on practical applications. Higher concentrations will probably show a better effect.

