**O IRR 3**

**Potential of electrolytic disinfection of nutrient solution to hamper dispersal of plant pathogens**

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**Introduction:** Closed irrigation systems conserve resources and minimize production costs, but they increase the risk of root diseases owing to the dispersal of waterborne plant pathogens by recirculation of the nutrient solution. A considerable number of pathogens is of significant concern as those are stable, difficult to combat and cause economic losses. Different physical and chemical techniques have been described to decontaminate irrigation water and nutrient solution. Beside cost effectiveness and ecological concerns none is suitable to inactivate the multitude of relevante plant pathogens, in particular viruses.
**Objective:** The potential of a sensor based disinfection procedure to inactivate fungual, bacterial or viral plant pathogens in hydroponic systems in greenhouse production was determined and evaluated.
**Materials and methods:** An electrolytic disinfector (newtec Umwelttechnik GmbH, Germany), especially developed for disinfection of irrigation water in greenhouses was used. It produces low concentrated potassium hypochlorite (0.6-0.8%) by electrolysing a potassium chloride solution. The efficacy of the disinfectant to inactivate selected plant pathogens was tested *in vitro* according to the standard (OEPP/EPPO, 2008). First trials under practical conditions were initiated focusing on the potential of the disinfection procedure to prevent the spread of PepMV by recirculating nutrient solution in tomato.
**Results:** Dose-effect relations were calculated for different plant pathogens. As expected, contact time and dose required to eradicate pathogens varies with pathogen species and life stage. A sensor based disinfection procedure was sucsessfully established in tomato cultivated in NFT (nutrient film technique). Although the dispersal of plant viruses was hampered in all experimental approaches plants showed a phytotoxic reaction to chlorid dependant on injection intervals.
**Conclusion:** The sensor based injection of a disinfectant gained by electrolytic oxidation has shown its potential to suppress the dispersal of plant viruses by recirculating nutrient solution in diverse experimental set-ups. It´s efficiency and suitability has to be tested and verified in large scale horticultural production sites.
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**O IRR 4**

**Water disinfestants interacting with nutrient solutions and substrates**

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Chemical disinfestants are commonly used in greenhouse operations to control plant pathogens in irrigation. The effective dose to target plant pathogens in water is typically determined with clean water and under controlled environmental conditions. However, in commercial operations irrigation water can contain chemical and physical variables which may interact with disinfestants. With increasing recirculation of water, it is fundamental to understand how water disinfestants interact with other water quality parameters. The objectives of this research were to quantify the persistence of chlorine, chlorine dioxide, activated peroxide, copper, and quaternary ammonium chloride in the presence of peat; quantify the persistence of free and total chlorine in the presence of water soluble fertilizers; and evaluate the efficacy of chlorine to control *Phytophthora nicotianae* in the presence of peat and nitrogen in the water. The persistence of chemical disinfestants in the presence of peat was evaluated by preparing solutions with 50 $mg{\cdot}L^{-1}$ peat and then measuring the concentration of active ingredients after 2 and 10 min contact time. The persistence of chlorine in the presence of fertilizers was evaluated by preparing solutions with 200 $mg{\cdot}L^{-1}$ nitrogen with 11 commercial fertilizers and then measuring free and total chlorine after 2 and 60 min contact time. Efficacy of chlorine to control *P. nicotianae* in the presence of peat or nitrogen was evaluated by mixing five solutions with peat from 0 to 80 $mg{\cdot}L^{-1}$ or 50 $mg{\cdot}L^{-1}$ nitrogen and then combining with 0, 2, or 4 $mg{\cdot}L^{-1}$ chlorine. Zoospore mortality and infectivity were measured after 10 min and 24 h contact time. Peat in the solution resulted in a rapid decline of chlorine and chlorine dioxide, whereas less effect was observed on copper, activated peroxygen and quaternary ammonium. Free chlorine decreased rapidly in the presence of fertilizers containing any concentration of ammonium-N. Efficacy of chlorine to control *P. nicotianae* was sustained despite the presence of peat or nitrogen in the solution. The concentration of some chemical disinfestants in solutions may significantly and rapidly decrease with common water contaminants. Therefore, a multiple barrier approach should be implemented to reduce the risk of waterborne pathogens in irrigation.