Dagens program

- Hvilke skadegørere skal der renses for
- Løsninger til vandrensning
  - Klor, UV, Biofilter, Brintoverilte
  - Varmebehandling, kobber, andre muligheder
- Samspil mellem metoder – biologisk balance og vandrensning
- Kaffe og snak med leverandører
- Test af vand, hvordan?
- Rensning for salte
- Rensning for pesticider
  - Forsøg med aktivt kul ved Bo Lillegaard

Vandrensning, metoder og muligheder

Inge Ulsted Sørensen

Lidt klor kemi

Klorin eller frit klor består af 3 stoffer

Klorgas Cl_2

Hypoklorsyre HOCl

Hypoklorit OCl^-

Engelsk samlebetegnelse: free chlorine

Forvirring omkring tilgængeligt klor og aktivt klor

Definitioner

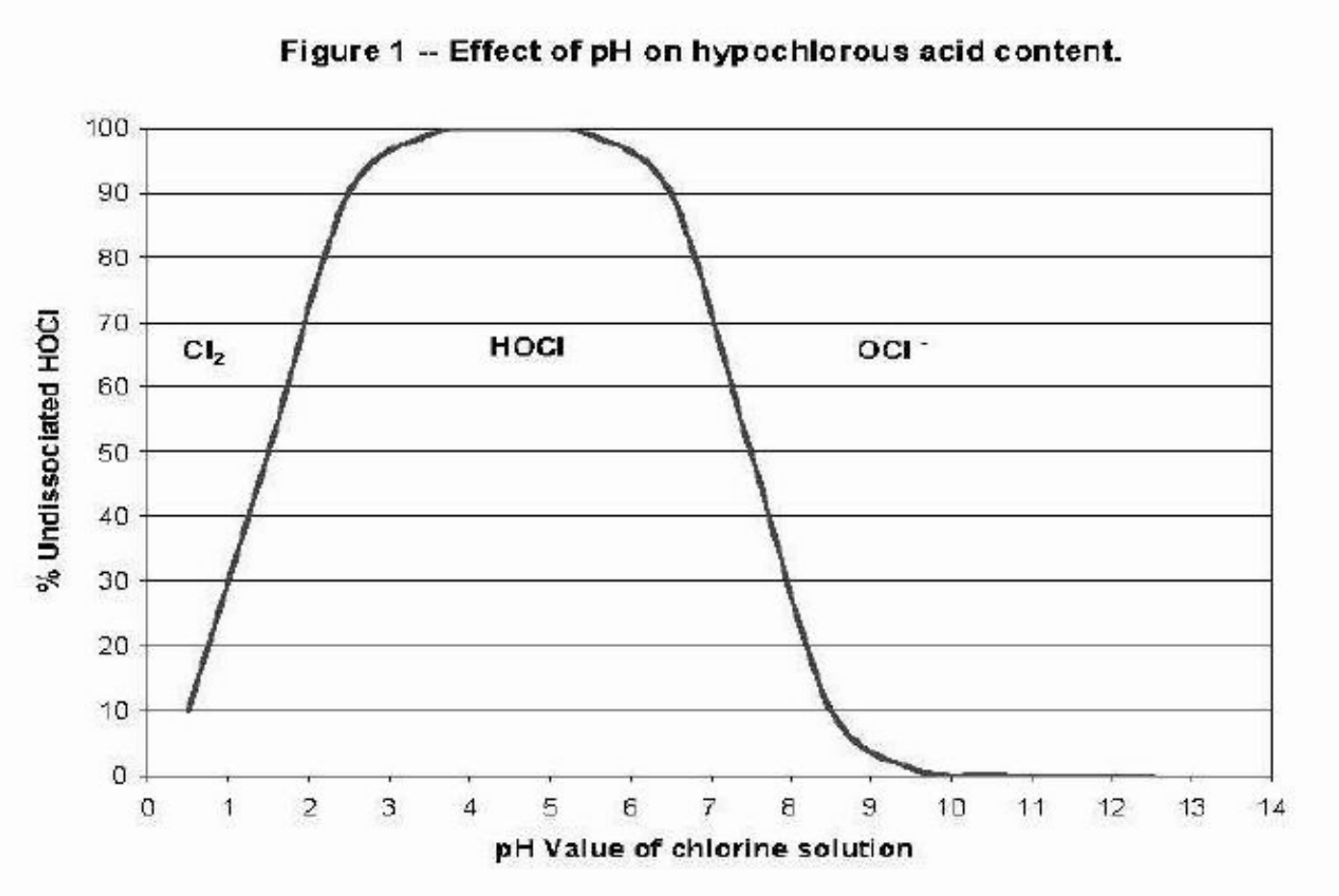
Tilgængeligt klor: kloratomer i det ufortyndede produkt[1,2,8]

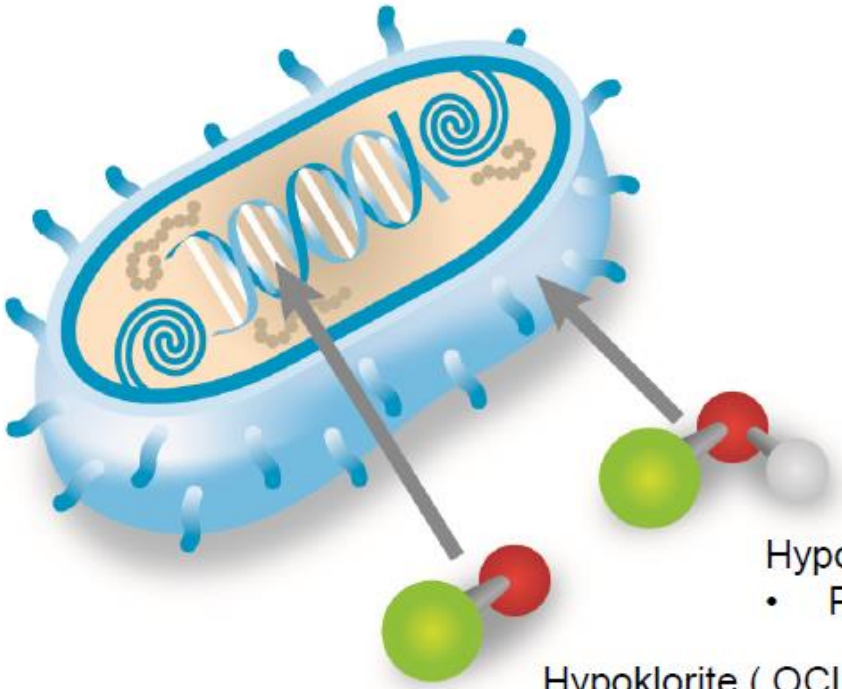
Frit klor: summen af klor, hypochlorit og hypochlorsyre i brugsopløsningen[1,2]

Aktivt klor: koncentrationen af den aktive hypochlorsyre i brugsopløsningen[1,2]

Inaktivt klor: koncentrationen af det næsten inaktive hypochlorit[1,2]

Ligevægten er pH afhængig





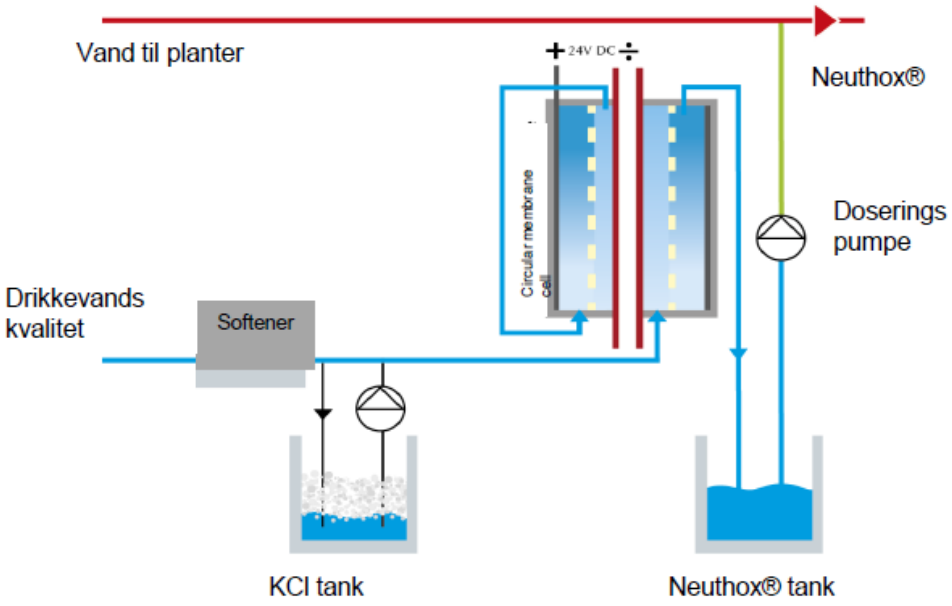
Hypoklor syre (HOCL)

- Penetrerer og ødelægger cellevæg

Hypoklorite (OCL^-)

- Skal bruge en ion kanal for at penetrere cellen og ødelægge DNA

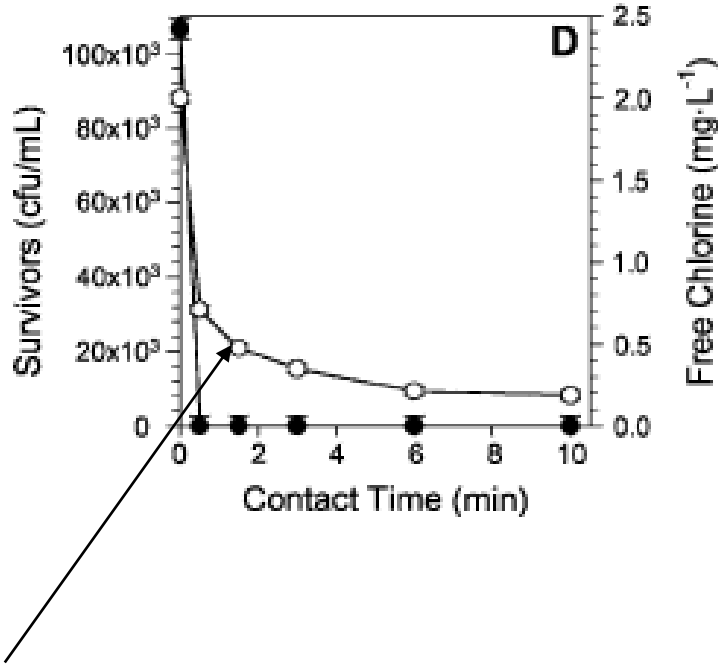
Fremstilling elektrolyse



- Kaliumklorid anvendes til fremstilling af Neuthox®
- Kalium Klorid anvendes samtidig som gødning.
- Neuthox® indeholder
  - Hypoklorsyre = HOCL
  - Hypoklorit = OCL^-

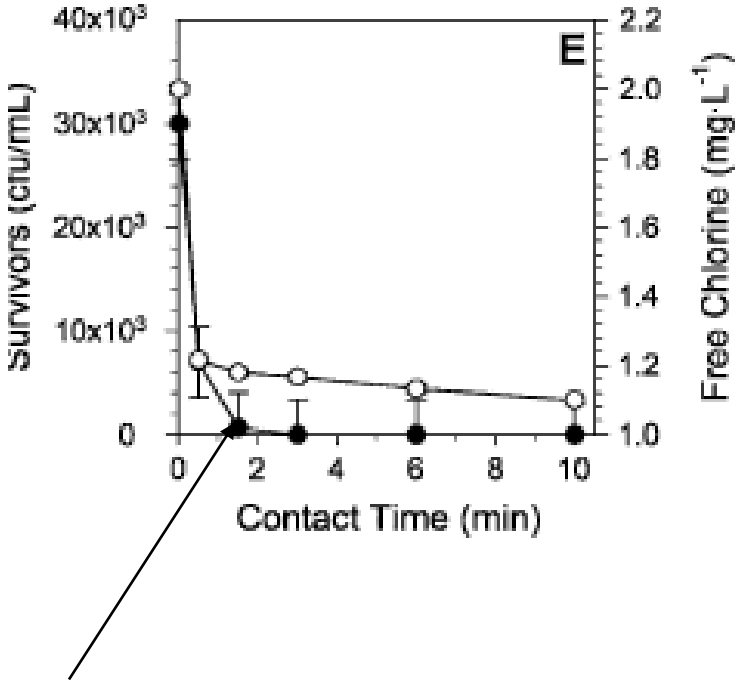
Klorin og patogener 1

Phytophthora infestans, 2 mg/l frit klor



Frit klor

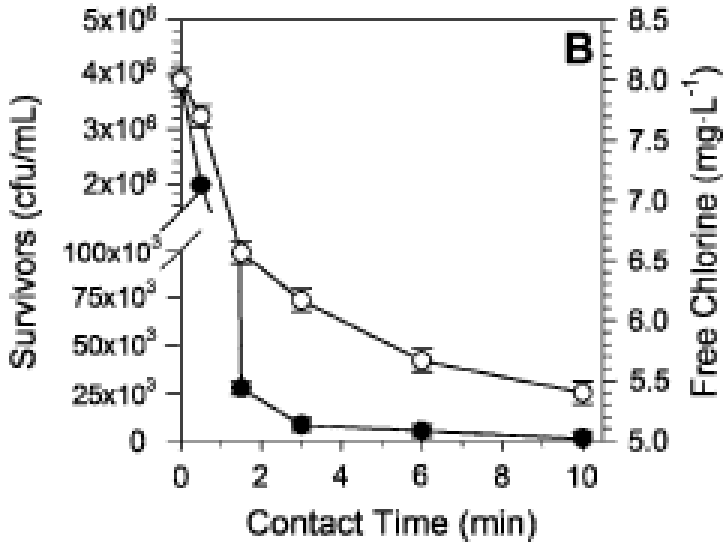
Pythium, 2 mg/l frit klor



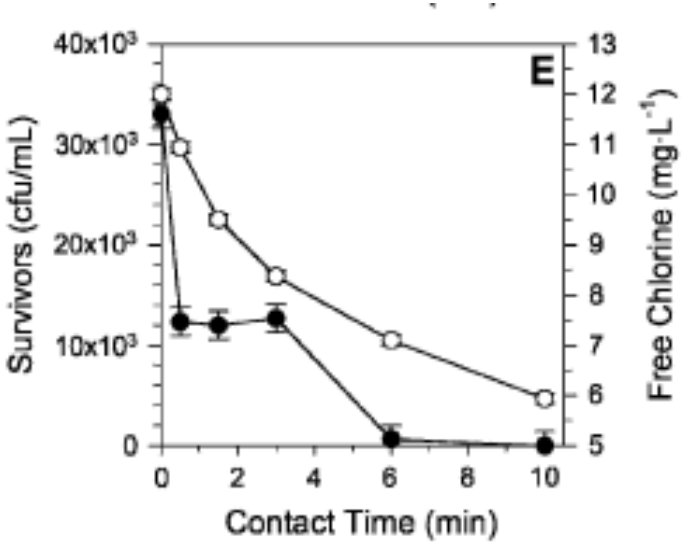
Svampesporer

Klorin og Patogener 2

Fusarium oxysporum, 8 mg/l frit klor



Rhizoctonia solani, 12 mg/l frit klor



Quick test af frit klorin og klorid

Ny vinkel vedr. Chlorine

Chlorate and Perchlorate Residues in Food of Plant Origin

Ingrid Kaufmann-Horlacher, Anne Benkenstein, Eric Eichhorn, Cristin Wildgrube, Ellen Scherbaum and Michelangelo Anastassiades

E-Mail: Ingrid.Kaufmann-Horlacher@cvuas.bwl.de

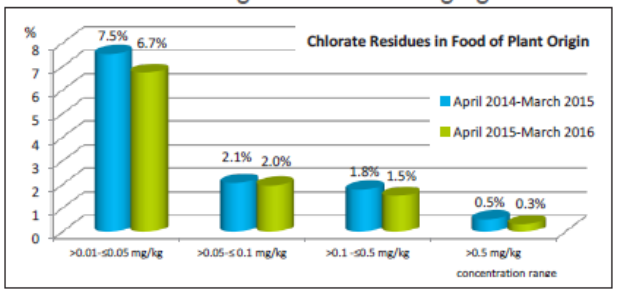
Chlorate

Introduction

Chlorates are strong oxidants with herbicidal and biocidal activity. Since 2008, chlorate is no longer authorized for use as a pesticide in the EU. Also, sodium chlorate may no longer be used in biocide products. Still, more than 10 % of the food samples tested showed chlorate residues higher than 0.01 mg/kg.

Throughout the food production process there is a multitude of different pa... with which food can be contaminated with ch... contributors is surely t...

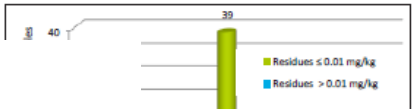
In 4/2014 – 3/2015 and 4/2015 – 3/2016 11.9 % and 10.5 %, of the samples respectively showed chlorate residues higher than 0.01 mg/kg.



The highest levels were found in leafy and fruiting ...

Commodity	Origin	Chlorate mg/kg
Chive frozen	unknown	3.8
Coriander leaf	Thailand	1.7
Aubergine	Netherlands	1.2
Chili pepper	Uganda	0.96
Asparagus green	Peru	0.91
Head lettuce	Germany	0.72

Highest Residues April 2015 – March 2016



Legal aspects

In accordance with Reg. 396/2005/EU, the current standard MRL for chlorate is 0.01 mg/kg. Nevertheless, the EU Commission and the EU member states have agreed to refrain from taking enforcement actions unless health concerns were identified.

Erfaringer med klor

Klor virker ud i hele vandingsystemet – efter 5 til 8 uger er rør, ventiler, render mm fri for biofilm.

Der er risiko for ophobning i dyrkningsmedie og dermed planteskader – niveau skal justeres og følges.

Hvis man skal ramme vanskelige skadegører, skal der bruges en høj koncentration = større risiko for skader på planter og risiko for at udrydde de gode svampe.

Kan bruges til dypning af stiklinger (bakteriose,virus mm).

Kan bruges til dypning af knive, rengøring af borde mm.

Problematik med Chlorat/perchlorat i spiselige afgrøder

UV – C

6.9.5.2. Working Principle of operation

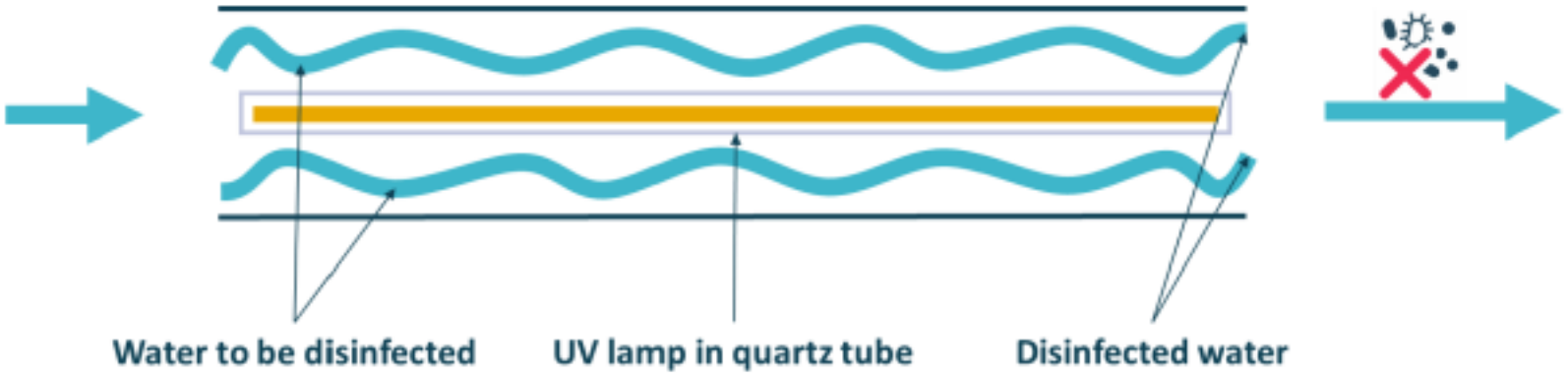
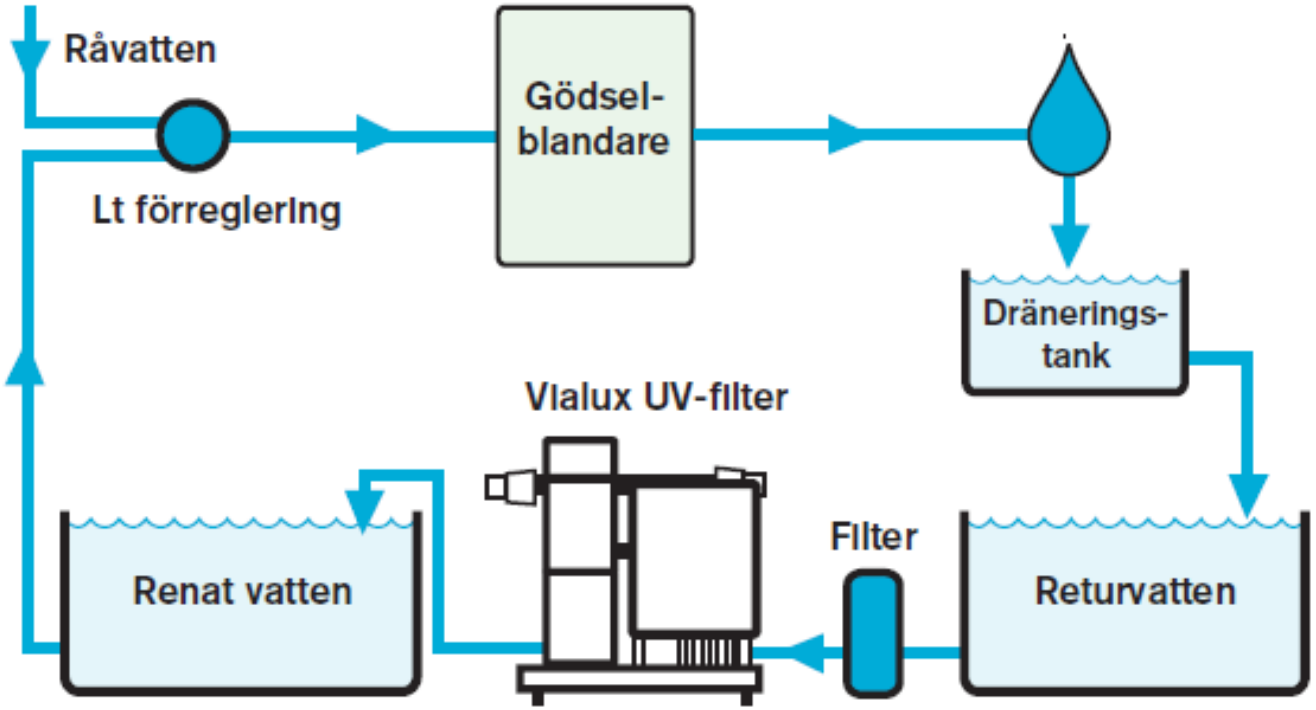


Figure 6-12. Scheme of a UV chamber

Vialux UV fra Priva

UV rensning

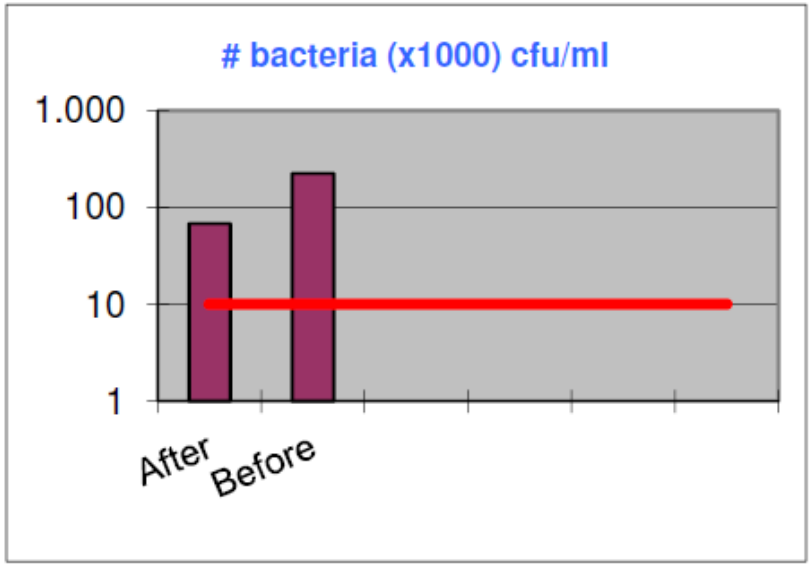


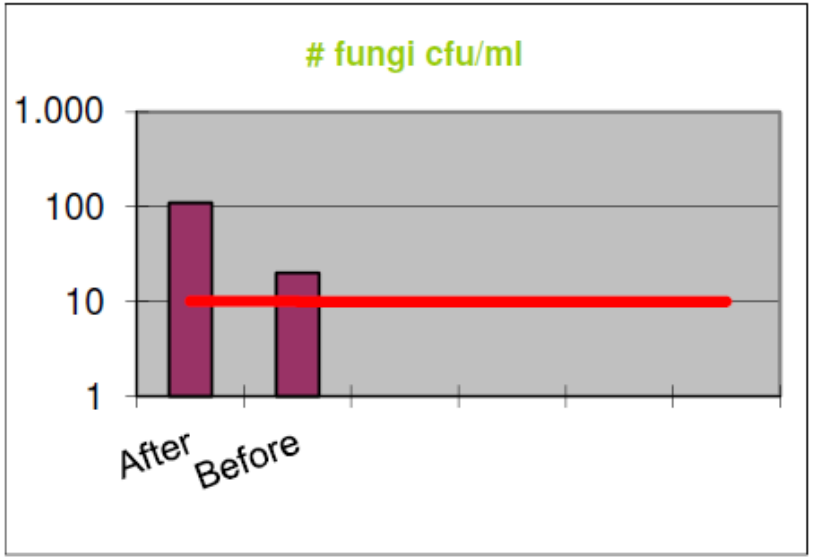
Principskiss Vialux

Defekt UV filter

Herewith we send you the results of the microbiological analyses of the samples.

Sample	I	II				
Charasteristic	After	Before				
#bacteria (x1000) cfu/ ml	68	223				
#fungi cfu/ml	110	20				
Transmission (%)	x	x				





DEFEKT UV filter

Vedrørende undersøgelse af vand for eventuel forekomst af plantepatologiske svampe, modtaget den 24. februar, 2017:

Før:

Der er *ikke* konstateret forekomst af zoosporer af Pythium ssp. eller Phytophthora ssp.

Der er konstateret kraftig forekomst af makrokonidier af Fusarium ssp.

Efter:

Der er *ikke* konstateret forekomst af zoosporer af Pythium ssp. eller Phytophthora ssp.

Der er konstateret kraftig forekomst af makrokonidier af Fusarium ssp.

Tjekke lampen ??

Tjekke rengøring – kan dyppes i syre.

Lysgennemgang vand

Gennemstrømningshastighed

Erfaringer med UV

Regelmæssig eftersyn er vigtig

Der kan være problemer med chelaterede mikronæringsstoffer.

Vandet skal være rimelig klart – det vil sige mekanisk filtrering inden UV filtret – Jernchelat og kokossubstrater kan være problematiske!

Virker ikke ud i systemet – kun på det vand, der passerer igennem

Skånsomt i forhold til Trichoderma mm

Sammenligning

Problem	UV	ECA (NEUTHOX)
BIOFILM CONTROL	Negative	HIGH
BACTERIAL COLONY CONTROL	Negative	HIGH
SPORES AND FUNGUS CONTROL	HIGH	Medium High
NEMATODES CONTROL	Medium	Medium High
VIRUS CONTROL	HIGH	Medium High
TYPICAL DISINFECTANT	Negative	HIGH
DANGER TO HUMAN	Negative	Negative

Biofiltrering

6.11.5.2. Working Principle of operation

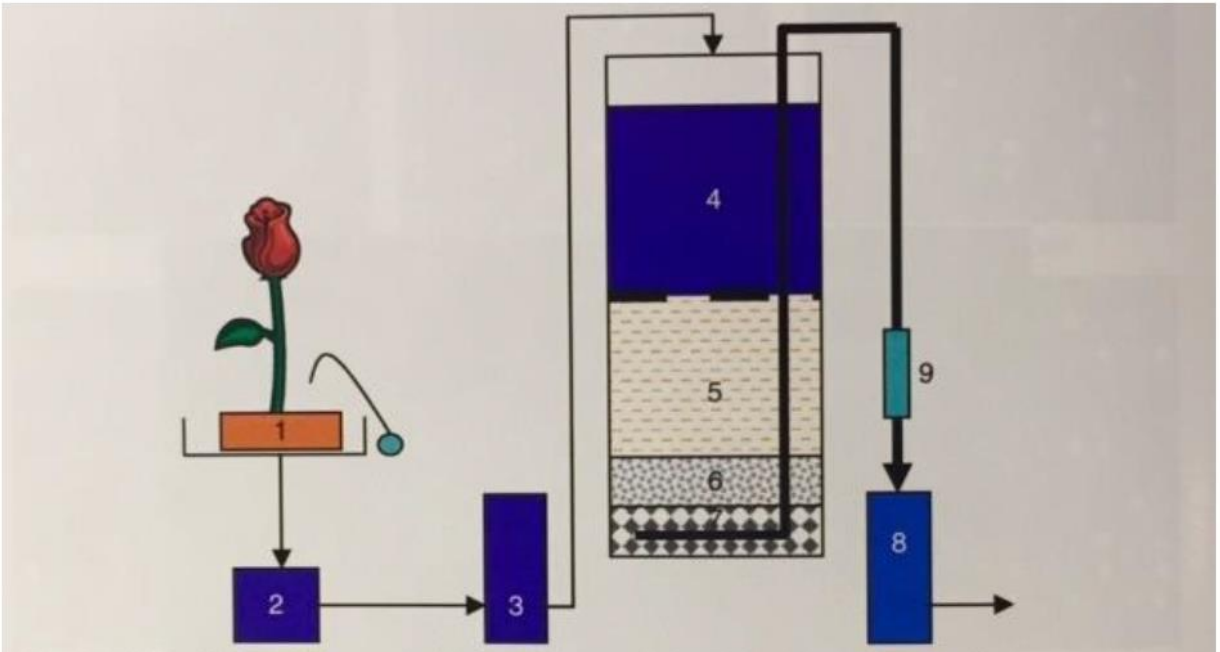
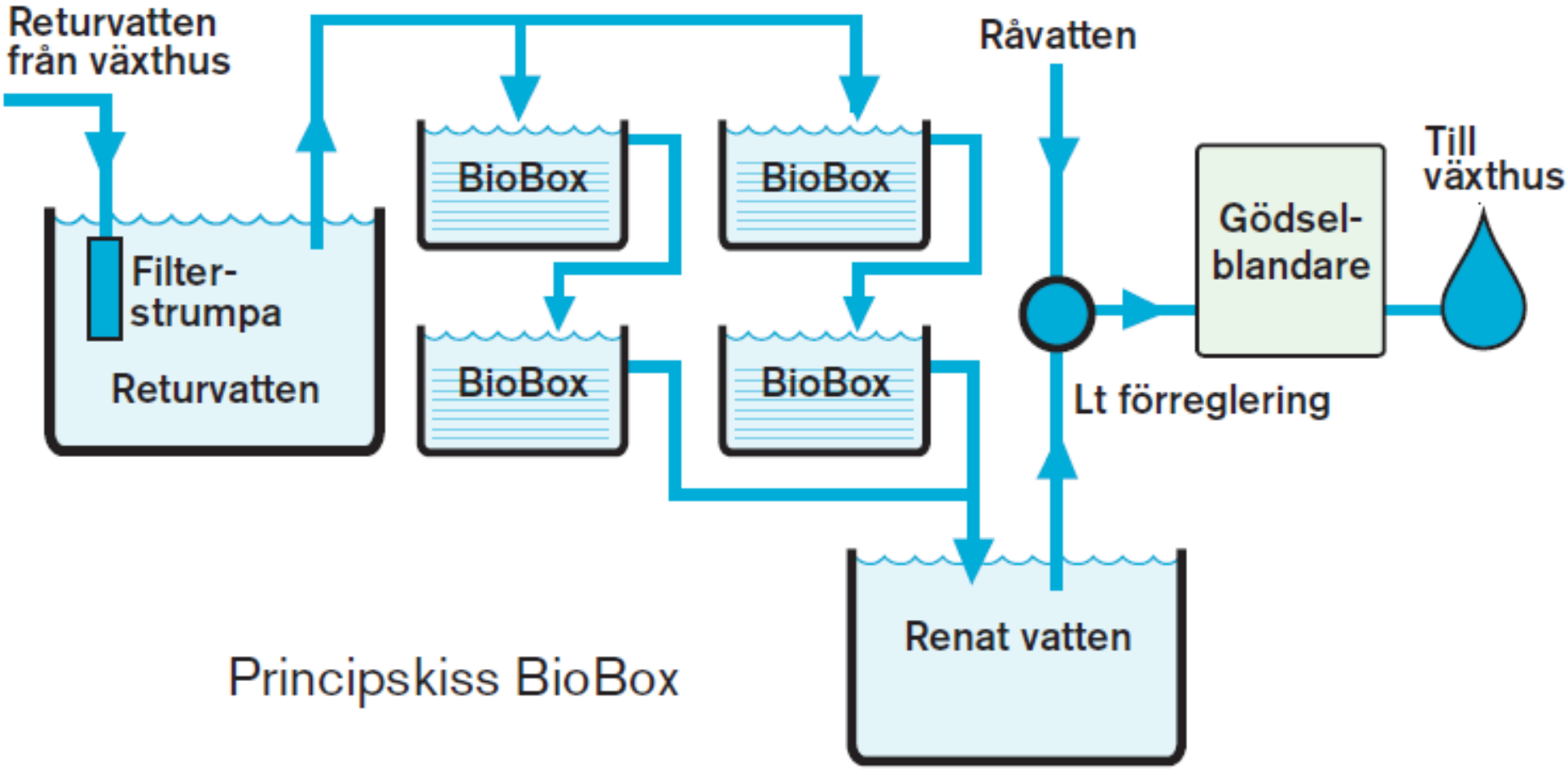


PLATE 24 Scheme of slow sand filtration. Nutrient solution drains from substrate (1) to the recatchment tank (2). From there it is pumped to the day storage tank (3) and into the top of a large container or metal silo (4), from which it drips into a sand layer of 1 m thickness (5). The layer between (4) and (5) is called the Schmutz-decke or filter skin. (6) and (7) are a 10 cm fine and a 15 cm coarse gravel layer, respectively. The filtrate is pumped out of the gravel layer to container (8). In a metal silo it is done via the top, in a synthetic filter it is possible to drain via the bottom of the filter. For initial filling of the filter water is pumped from (8) into the gravel layers (7) and (6) and to above the sand layer. Flow meter (9) controls the filtration rate. From container (8) the filtrate will be mixed with fresh water to a new nutrient solution for the plants (see also Figure 10.7, p. 445).

Biofiltrering



Principskiss BioBox

Biofiltre

Virker ved hjælp af mikroorganismer (ex. Trichoderma)

Grøn teknologi

Normalt god effekt overfor svampe

Ingen effekt mod nematoder og virus

Bakterier?? Effekt mod Clavibacter?

Skal også vedligeholdes/kontrolleres

Brintoverilte

- Hydrogenperoxid

- Findes i forskellige produkter
  PerAqua, Multicid, Deosan Flora
  (+ pereddikesyre)
  Ren Brintoverilte

- Nye formuleringer
  Huwasan, Delgosan

Kan doseres i returbassiner/returvand

Kan doseres direkte i vandingsvand efter gødningsblanderen

gartneri RÅDGIVNINGEN

Ny formulering brintoverilte

Huwa-San®
A sustainable way of disinfection

AGRICULTURE

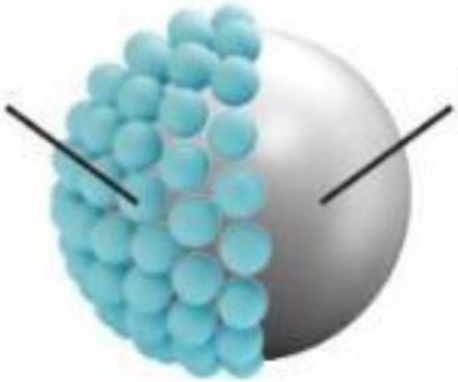
What is Huwa-San?

Roam Technology

Controlled effectiveness

Chlorine free

Hydrogen Peroxide molecules



Silver Ion

High effectiveness

Very Stable

gartneri RÅDGIVNINGEN

Huwa-San
A sustainable way of disinfection

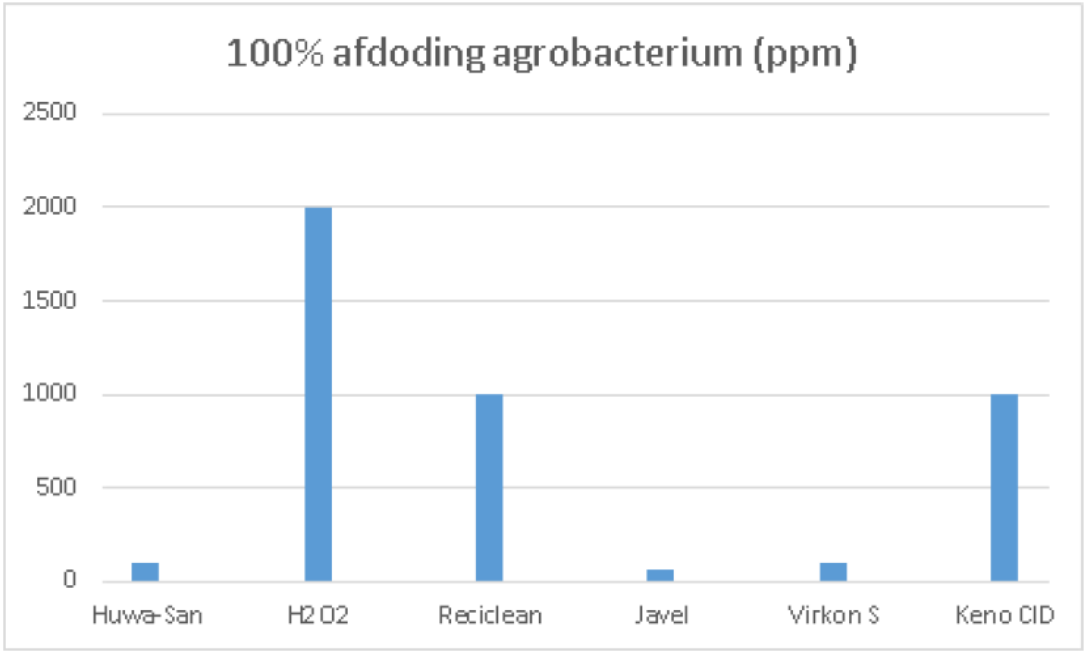
AGRICULTURE

Effect on "Agrobacterium" or "crazy roots" bacteria

Roam Technology

Full bacterial cell reduction (4-log) after a contact period of 5 min

Proefstation voor de Groenteteelt vzw



** Results of a test, executed by Proefstation 2014 in light of the "crazy roots" problems caused by Agrobacterium in tomato growth. On the left ppm concentration of the used product are mentioned (javel = liquid chlorine)*

IPM

Belgisk tomatgartner


SPI
SEM

Så er det Lene!!!

Samspil mellem metoder


LOGBOEK
VIALUX 1
Vialux

Leo Ammerlaan

Klorbehandling
rentvandstank

Samspil mellem metoder

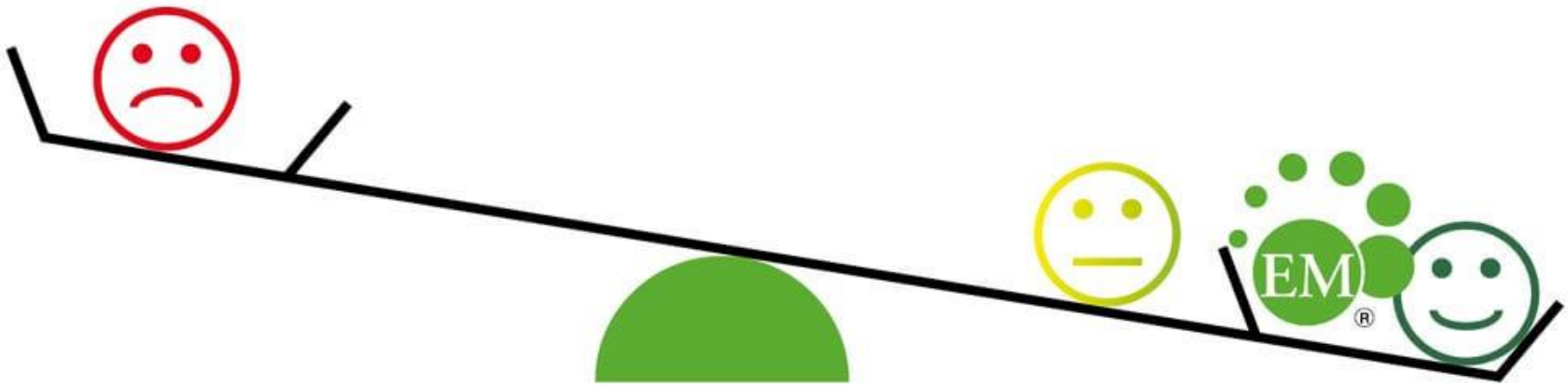
Vælg metode ud fra behov/risici

Obs på biologisk balance

- UV anlæg + biofilter er OK
- UV anlæg + kloranlæg er OK
- UV anlæg + kobber er OK
- UV anlæg + brintoverilte er OK

- Kobber + biofilter ???
- Kloranlæg + biofilter kan give problemer

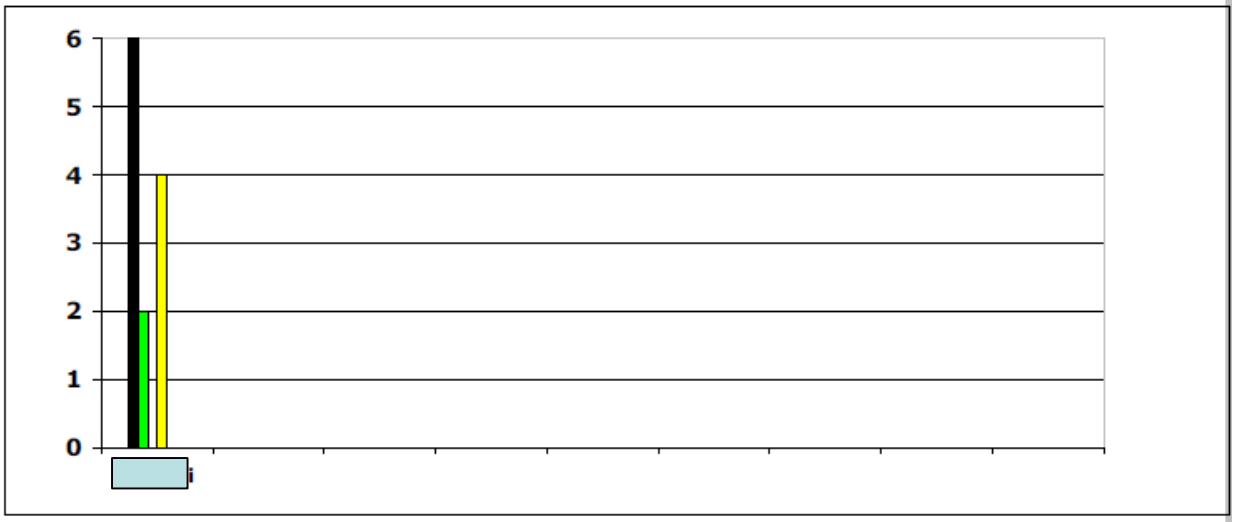
- Sæbe, Per Aqua, eller andre kombinationer


EM

Test af returvand

Here with we send you the results of the **DNA *Previ*scan®**.

	Fungi	I
1	*Cylindrocarpon destructans*	0
2	*Cylindrocladium spp.*	0
3	*Fusarium oxysporum*	6
4	*Fusarium solani*	2
5	*Phytophthora spp.*	0
6	*Pythium spp.*	4
7	*Rhizoctonia solani*	0
8	*Verticillium albo-atrum*	0
9	*Verticillium dahliae*	0
10	*Trichoderma spp.*	0



Presence:

0 Not
1 Very low
2 Low
3 Moderate
4 Moderate-high
5 High
6 Very high

Recommendation:

We detected several pathogens in your sample. *Fusarium oxysporum* can cause wilting. *Fusarium solani* and *Pythium* can cause root rot. The *Fusarium* species can infect healthy plants. *Pythium* can only infect stressed or very young plants.

Sincerely,

ir. M. van der Meer

gartneri RÅDGIVNINGEN

630-2018-00027295 Bassin Hus 6

Fungi	Results	1	2	3	4	5	6
Fusarium oxysporum	3						
Phytophthora spp.	2						

Detection: 1 = very low, 2 = low, 3 = moderate, 4 = moderate high, 5 = high, 6 = very high

Any fungi detected are specified separately above. If no identified fungi are displayed, then no measurable levels of the fungi being tested for were found in the specimen tested. The specimen was tested for the following fungi:

Cylindrocarpon destructans
Cylindrocladium spp.
Fusarium oxysporum
Fusarium solani
Phytophthora spp.
Pythium spp.
Rhizoctonia solani
Trichoderma spp.
Verticillium albo-atrum
Verticillium dahliae

gartneri RÅDGIVNINGEN

630-2018-00027296 Efter Rensing

Fungi	Results	1	2	3	4	5	6
Fusarium oxysporum	1						

Detection: 1 = very low, 2 = low, 3 = moderate, 4 = moderate high, 5 = high, 6 = very high

Any fungi detected are specified separately above. If no identified fungi are displayed, then no measurable levels of the fungi being tested for were found in the specimen tested. The specimen was tested for the following fungi:

Cylindrocarpon destructans
Cylindrocladium spp.
Fusarium oxysporum
Fusarium solani
Phytophthora spp.
Pythium spp.
Rhizoctonia solani
Trichoderma spp.
Verticillium albo-atrum
Verticillium dahliae

gartneri RÅDGIVNINGEN

630-2018-00037439/1. for UV filter OT

Fungi	Results	1	2	3	4	5	6
Pythium spp.	3						

Detection: 1 = very low, 2 = low, 3 = moderate, 4 = moderate high, 5 = high, 6 = very high

Any fungi detected are specified separately above. If no identified fungi are displayed, then no measurable levels of the fungi being tested for were found in the specimen tested. The specimen was tested for the following fungi:

Cylindrocarpon destructans
Cylindrocladium spp.
Fusarium oxysporum
Fusarium solani
Phytophthora spp.
Pythium spp.
Rhizoctonia solani
Trichoderma spp.
Verticillium albo-atrum
Verticillium dahliae

gartneri RÅDGIVNINGEN

630-2018-00037440/2. efter UV filter OT

Fungi	Results	1	2	3	4	5	6
Cylindrocarpon destructans	1	■					
Fusarium oxysporum	4	■	■	■	■		
Phytophthora spp.	6	■	■	■	■	■	■
Pythium spp.	6	■	■	■	■	■	■

Detection: 1 = very low, 2 = low, 3 = moderate, 4 = moderate high, 5 = high, 6 = very high

Any fungi detected are specified separately above. If no identified fungi are displayed, then no measurable levels of the fungi being tested for were found in the specimen tested. The specimen was tested for the following fungi:

Cylindrocarpon destructans
Cylindrocladium spp.
Fusarium oxysporum
Fusarium solani
Phytophthora spp.
Pythium spp.
Rhizoctonia solani
Trichoderma spp.
Verticillium albo-atrum
Verticillium dahliae

IPM

Regnvand i bassin i væksthus med opvarmning:

Fungi	Results	1	2	3	4	5	6
Fusarium oxysporum	2	■	■				
Phytophthora spp.	5	■	■	■	■	■	
Pythium spp.	4	■	■	■	■		

Detection: 1 = very low, 2 = low, 3 = moderate, 4 = moderate high, 5 = high, 6 = very high

Any fungi detected are specified separately above. If no identified fungi are displayed, then no measurable levels of the fungi being tested for were found in the specimen tested. The specimen was tested for the following fungi:

Cylindrocarpon destructans
Cylindrocladium spp.
Fusarium oxysporum
Fusarium solani
Phytophthora spp.
Pythium spp.
Rhizoctonia solani
Trichoderma spp.
Verticillium albo-atrum
Verticillium dahliae

Vedrørende undersøgelse af vand for eventuelle skadelige svampe, modtaget den 27. november, 2018:

De modtagne vandprøver er filtreret gennem et mikroporefilter, hvorefter selve filtret er lagt på selektive dyrkningsmedier og sat i varmeskab ved 24°C i 6 dage.

Regnvand inde:
Der er konstateret forekomst af zoosporer af Pythium ssp., niveau III.
Der er ikke konstateret forekomst af andre patogener i vandprøven.
Der er konstateret en svag forekomst af nyttesvampen Trichoderma ssp.

Regnvand ude:
Der er konstateret forekomst af zoosporer af Pythium ssp., niveau I.
Der er ikke konstateret forekomst af andre patogener.
Der er konstateret en svag forekomst af nyttesvampen Trichoderma ssp.