

100% Chemical-free Water Treatment:

Reference Applications in  
**Agriculture**

[www.NECON.de](http://www.NECON.de)

## 100% Chemical-free Water Treatment...



...in Fruit-growing –  
Positive results include  
prevention of fireblight

... in Wine-growing – Successes  
against *Plasmopara viticola*,  
*Botryotinia* und other fungi





## 100% Chemical-free Water Treatment...



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Positive results include  
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... in Wine-growing – Successes  
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*Botryotinia* und other fungi



## You too can benefit from...

- ✓ Plant fortification and disinfection of germs by copper-silver ions
- ✓ Improved root growth, for more robust, healthy plants
- ✓ Efficient against fungi, bacteria, viruses and germs
- ✓ Overhead sprinkling without legionellae hazard
- ✓ Germ-free and soft sprinkling water
- ✓ Deposit effect throughout water circulation system

**And if this is not enough...**



## You can also benefit from...

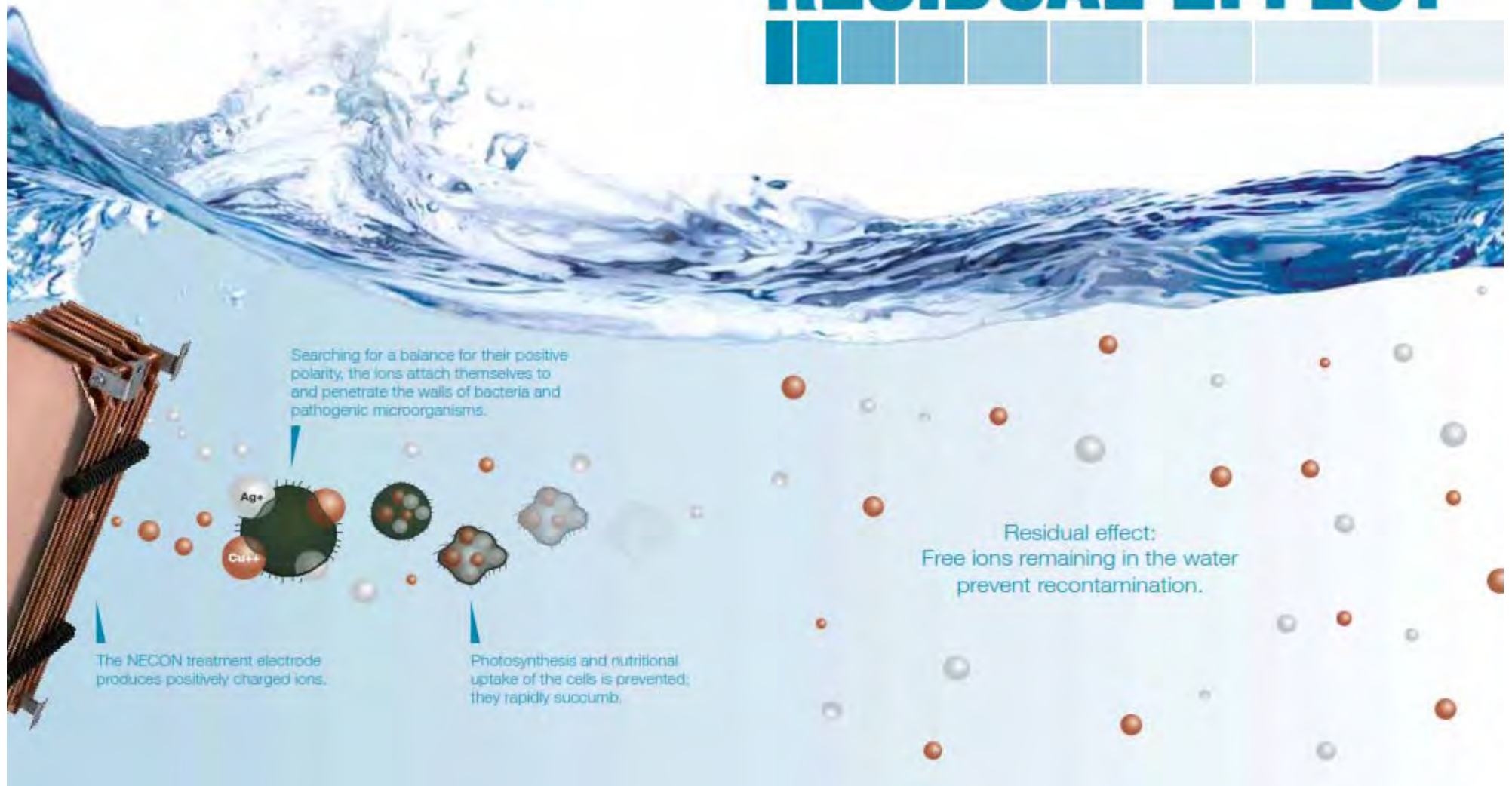
- ✓ **Reduction down to entire abandonment of fungicides**
- ✓ **Thus cost saving and environmentally friendly**
- ✓ **Minimal maintenance and straightforward handling**
- ✓ **Modest running expenses and lifecycle cost**
- ✓ **30 years global application in varying waters**
- ✓ **Efficiency proven by Geisenheim Research Center, Germany**



# Functional principle



## LONG-LASTING RESIDUAL EFFECT



# Banana farming: Dealing with waste water

## BANANICA SAC

RUC: 20526173326

Lima, 18 de julio del 2017

Señores

Sirva mediante la presente para hacer llegar mis saludos en representación de la empresa agrícola Bananica S.A.C, con operaciones de siembra, cosecha y exportación de banano orgánico.

Asimismo manifestamos que en nuestra operación de lavado de banano para exportación estamos utilizando el sistema de desinfección de ionización  $\text{Cu}^{++}$  -  $\text{Ag}^+$  de NECON desde hace unos meses con excelentes resultados que se han traducido en sustanciales mejoras en nuestras operaciones.

Siendo así recomendamos el uso del sistema de desinfección que proveen la empresa NECON.

Sin otro particular, me despido.

**BANANICA S.A.C.**  
RUC: 20526173326  
*Miguel-Angel Popolizio Bardales*  
GERENTE GENERAL

Avenida La Encalada 1388 Oficina 902, Edificio Polo Hunt 1, Santiago de Surco, Lima,



I hereby send my greetings on behalf of agriculture company Bananica S.A.C, with operations of planting, harvesting and export of organic bananas.

We also testify that in our operation of washing bananas for export, we are using the ionization disinfection system  $\text{Cu}^{++}$  -  $\text{Ag}^+$  of NECON since some months with excellent results that have resulted in substantial improvements in our operations.

Therefore, we recommend the use of the disinfection system provided by company NECON.

Miguel-Angel Popolizio-Bardales, General manager, company Bananica S.A.C., Peru

Depicted left, Prof.Dr. Gebhardt, President of NECON GmbH, discusses water treatment options at a plantation's banana washing and packing operation, with Sr. Popolizio, General manager, company Bananica S.A.C., Peru.

In between them visible one of the main issues, the sludge sediments quickly formed by the bananas' sap that is emitted when the banana clusters after being harvested from the trees are cut to smaller, readily packable and marketable bunches.

*Photo credit: Carlos Zárate E. Dipl.-Ing. M.Sc, Zárate-Consult.de Germany*



# Banana farming: Dealing with waste water

## Conclusions (conference excerpt):

- During the time that we have worked with the equipment, we observed an efficiency in the treatment of organic banana washing using water treated with the Necon system at an adequate concentration of mg/L [2-3] of Cu present in the washing water
- It helped us to save water consumption, up to 435 m3 per month and contributes to the use of the same in the field of cultivation.

Verónica Namuche, Quality supervisor,  
company Bananica S.A.C., Peru



## CONCLUSIONES

- Durante el tiempo que hemos trabajado con el equipo hemos observado una eficiencia en el tratamiento de lavado de banano orgánico utilizando agua tratada con el equipo Necon a una concentración adecuada de mg/L de Cu presente en el agua de lavado
- Nos ayudado al ahorro del consumo agua , se puede ahorrar hasta 435 m3 mensuales y contribuye al aprovechamiento de la misma en el campo de cultivo

Von: Miguel Popolizio

14.07.2017 19:15

An: necon@necon.de

Hola, buen día

Adjuntamos reporte del área de control de calidad de packing de banano. Ahí podrán notar que hemos tenido algunos reclamos con los tratamientos solo de cobre.  
Los embarques tratados con cobre + plata aún no llegan a destino. Los mantendremos al tanto de los resultados.

Por ahora las ventajas son:

- Aspecto organoléptico del agua, mucho mejor.
- Carga de E.coli casi nula.
- Ahorro de agua 30%.
- Segunda utilización del agua ionizada en algunos lotes de siembra de banano.

Saludos cordiales.

MAP



Attached report of the quality control area of banana packing. There you will notice that we have had some claims with copper treatments only.

Shipments treated with copper + silver have not yet reached their destination. We will keep you informed of the results.

So far, the advantages are:

- Organoleptic aspect of the water is much better.
- Almost no E.coli load.
- Water saving 30%.
- Second use of ionized water in some banana planting lots.

Miguel-Angel Popolizio-Bardales,  
General manager, company Bananica S.A.C., Peru



# Banana farming: Reducing containers rejections



## RESUMEN EN EXPORTACIONES

AÑO	BANANICA LA OBRILLA			BANANICA SAUSALITO		
	FCL EXPORTADOS	FCL RECHAZADOS	USO DE FUNGICIDA	FCL EXPORTADOS	FCL RECHAZADOS	USO DE FUNGICIDA
2015	89	10	BC1000	92	15	BC1000
2016	119	18	BC1000	100	21	BC1000
2017	164	8 (OBS.1: 0 tras la adición de NECON)	DESFAN + NECON desde abril	155	20 (OBS.2: (0 tras la adición de NECON)	DESFAN + NECON desde septiembre
2018	191	0	NECON + Citrosafe cobre	170	0	Citrosafe cobre

### A summary of exports:

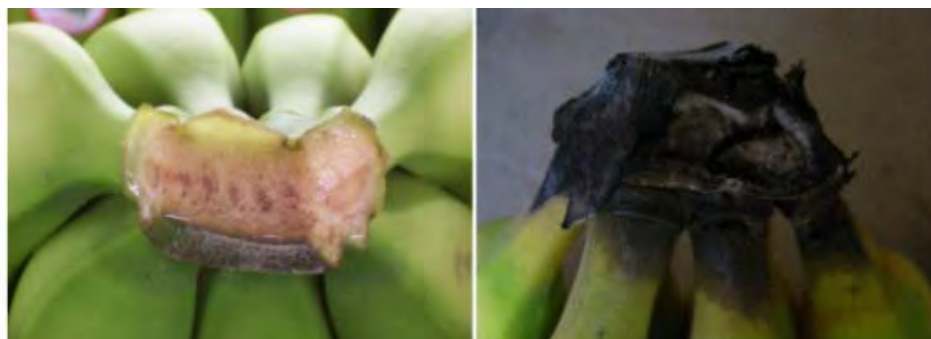
The statistics, covering two different plantations named "Obrilla" and "Sausalito", show

- total quantities of exported banana FCLs (full container loads) per year, and
- number of rejections ("rechazados") by clients (2015: 25 of total 181; 2016: 39 of total 219, = ca. 14% / 18%).

In 2017, rejections were down to ca 9%, with "Obrilla" even down to 5% since this operation started earlier with NECON water treatment than "Sausalito".

### 2018: 0 rejections

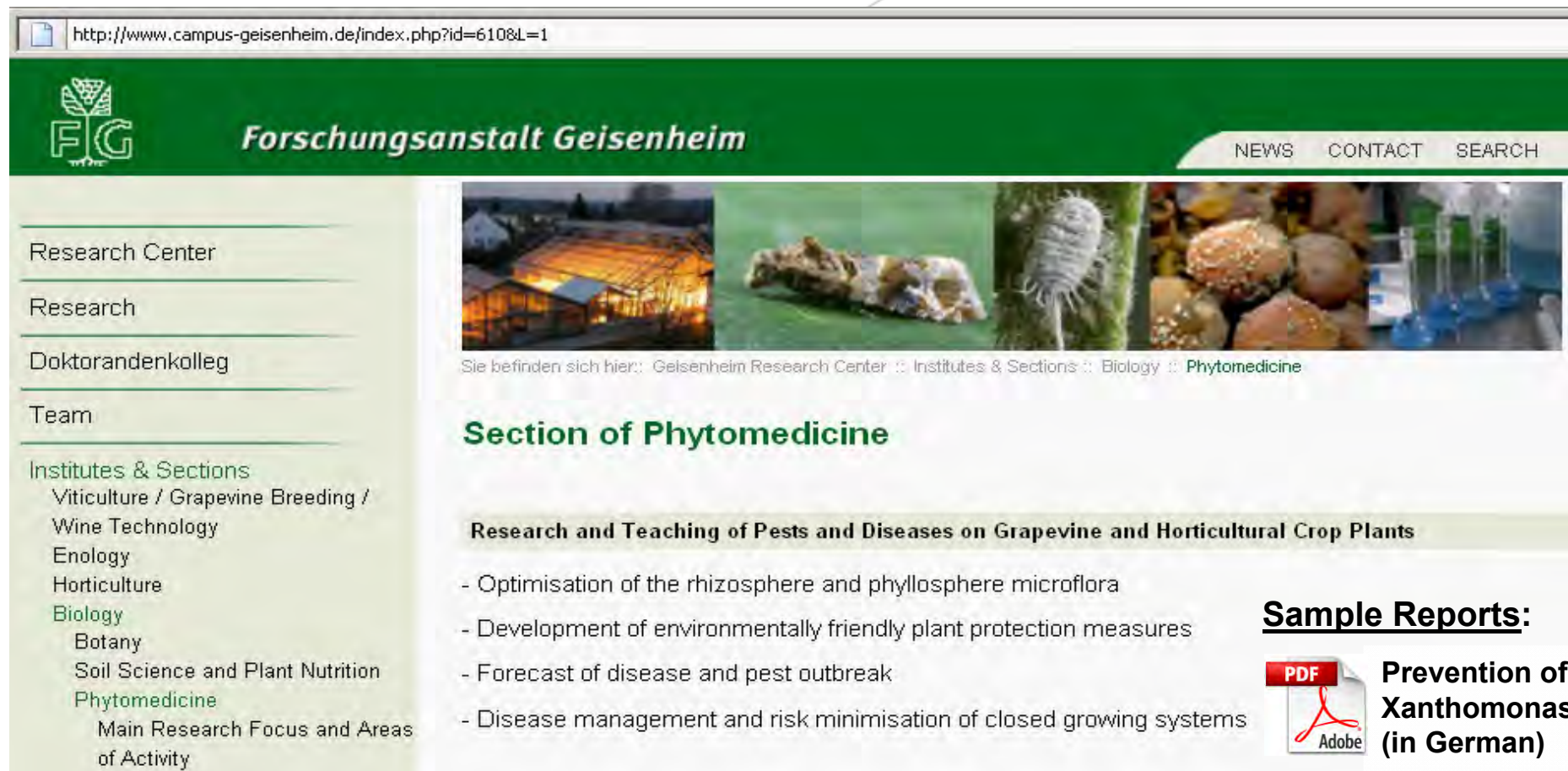
Source: Verónica Namuche, Quality supervisor, company Bananica S.A.C., Peru; slide taken of specialist fruit farming presentation held at Machala, Oct 2019



A common reason for clients rejecting container shipments is that banana stems, while looking flawless when loaded as shown on the left, may arrive at destination with rotten stems as a result of originally invisible fungal contamination.

Photo source: internal research paper "[Lavado de banano con Agua Ionizada con Cobre](#)" [Washing of bananas using Water ionized with copper], by [Laboratorio de Ingeniería Sanitaria de la Universidad de Piura \(UDEP\)](#) [Laboratory of hygiene engineering science at University of Piura, Peru]

## Efficiency proven by [Geisenheim Research Center](http://www.campus-geisenheim.de/index.php?id=610&L=1), Germany



The screenshot shows the website of the Geisenheim Research Center. The browser address bar displays <http://www.campus-geisenheim.de/index.php?id=610&L=1>. The website has a green header with the logo 'FG' and the text 'Forschungsanstalt Geisenheim'. Navigation links include 'NEWS', 'CONTACT', and 'SEARCH'. A left sidebar lists various sections: 'Research Center', 'Research', 'Doktorandenkolleg', 'Team', 'Institutes & Sections' (with sub-items: 'Viticulture / Grapevine Breeding / Wine Technology', 'Enology', 'Horticulture', 'Biology' (with sub-items: 'Botany', 'Soil Science and Plant Nutrition'), and 'Phytomedicine' (with sub-item: 'Main Research Focus and Areas of Activity')). The main content area features a banner with four images: a greenhouse, a plant with a white growth, a magnifying glass over a plant, and laboratory glassware. Below the banner is a breadcrumb trail: 'Sie befinden sich hier: Geisenheim Research Center :: Institutes & Sections :: Biology :: Phytomedicine'. The section is titled 'Section of Phytomedicine' and 'Research and Teaching of Pests and Diseases on Grapevine and Horticultural Crop Plants'. A list of research topics includes: 'Optimisation of the rhizosphere and phyllosphere microflora', 'Development of environmentally friendly plant protection measures', 'Forecast of disease and pest outbreak', and 'Disease management and risk minimisation of closed growing systems'. On the right, there are two 'Sample Reports' listed with PDF icons: 'Prevention of Xanthomonas (in German)' and 'Prevention of Erwinia amylovora (in German)'.

http://www.campus-geisenheim.de/index.php?id=610&L=1

**FG** Forschungsanstalt Geisenheim

NEWS CONTACT SEARCH

Research Center  
Research  
Doktorandenkolleg  
Team

Institutes & Sections  
Viticulture / Grapevine Breeding /  
Wine Technology  
Enology  
Horticulture  
Biology  
Botany  
Soil Science and Plant Nutrition  
Phytomedicine  
Main Research Focus and Areas  
of Activity

Sie befinden sich hier: Geisenheim Research Center :: Institutes & Sections :: Biology :: Phytomedicine

### Section of Phytomedicine

#### Research and Teaching of Pests and Diseases on Grapevine and Horticultural Crop Plants

- Optimisation of the rhizosphere and phyllosphere microflora
- Development of environmentally friendly plant protection measures
- Forecast of disease and pest outbreak
- Disease management and risk minimisation of closed growing systems

#### Sample Reports:

**PDF** Prevention of *Xanthomonas* (in German)

**PDF** Prevention of *Erwinia amylovora* (in German)





Automatic spraying system for vineyards and plantations



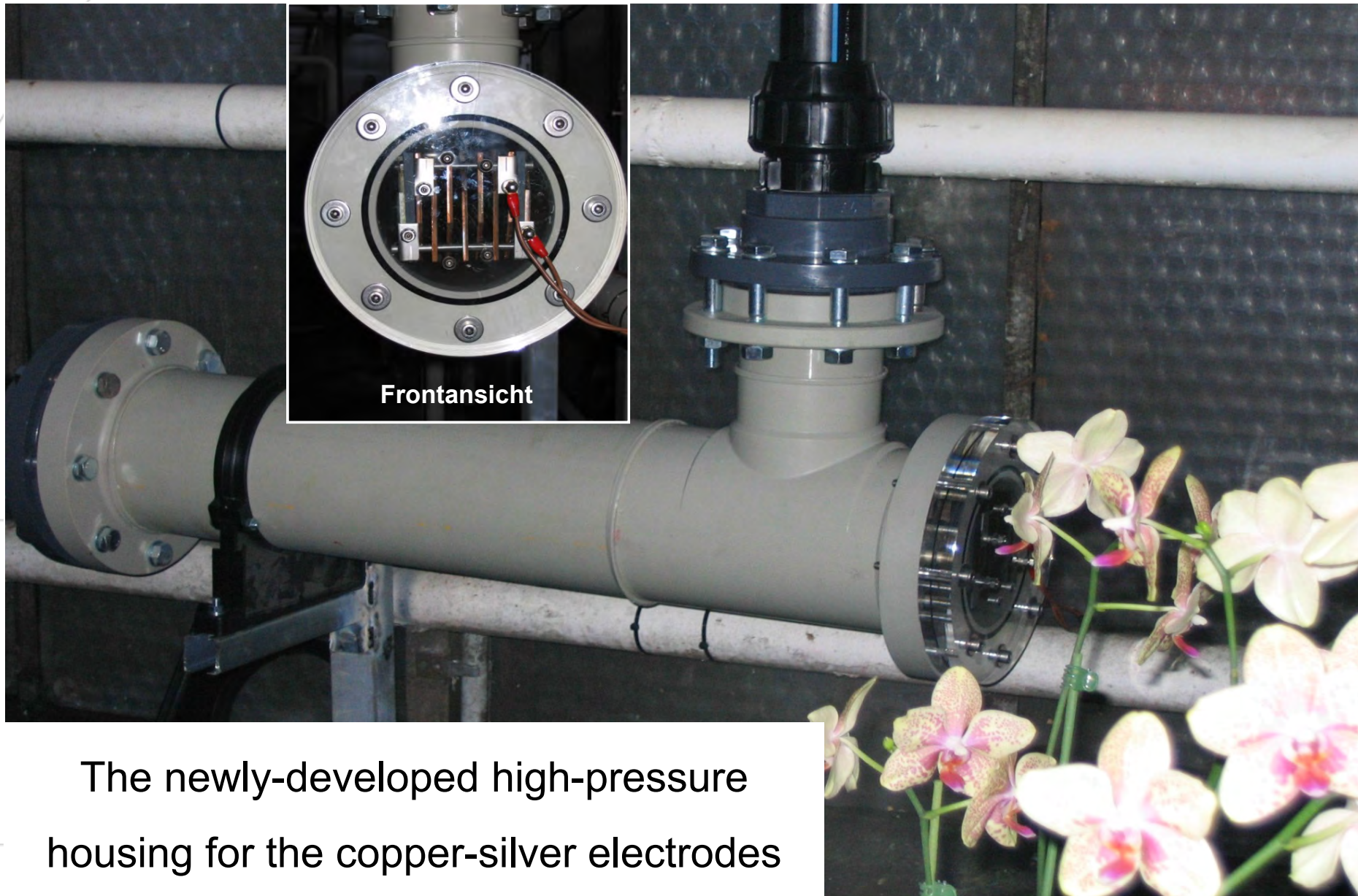
## Orchid cultivation farm Bock in Bremen



No more loss of revenue, by prevention of water-carried fungi



## Orchid cultivation farm Bock in Bremen



The newly-developed high-pressure housing for the copper-silver electrodes



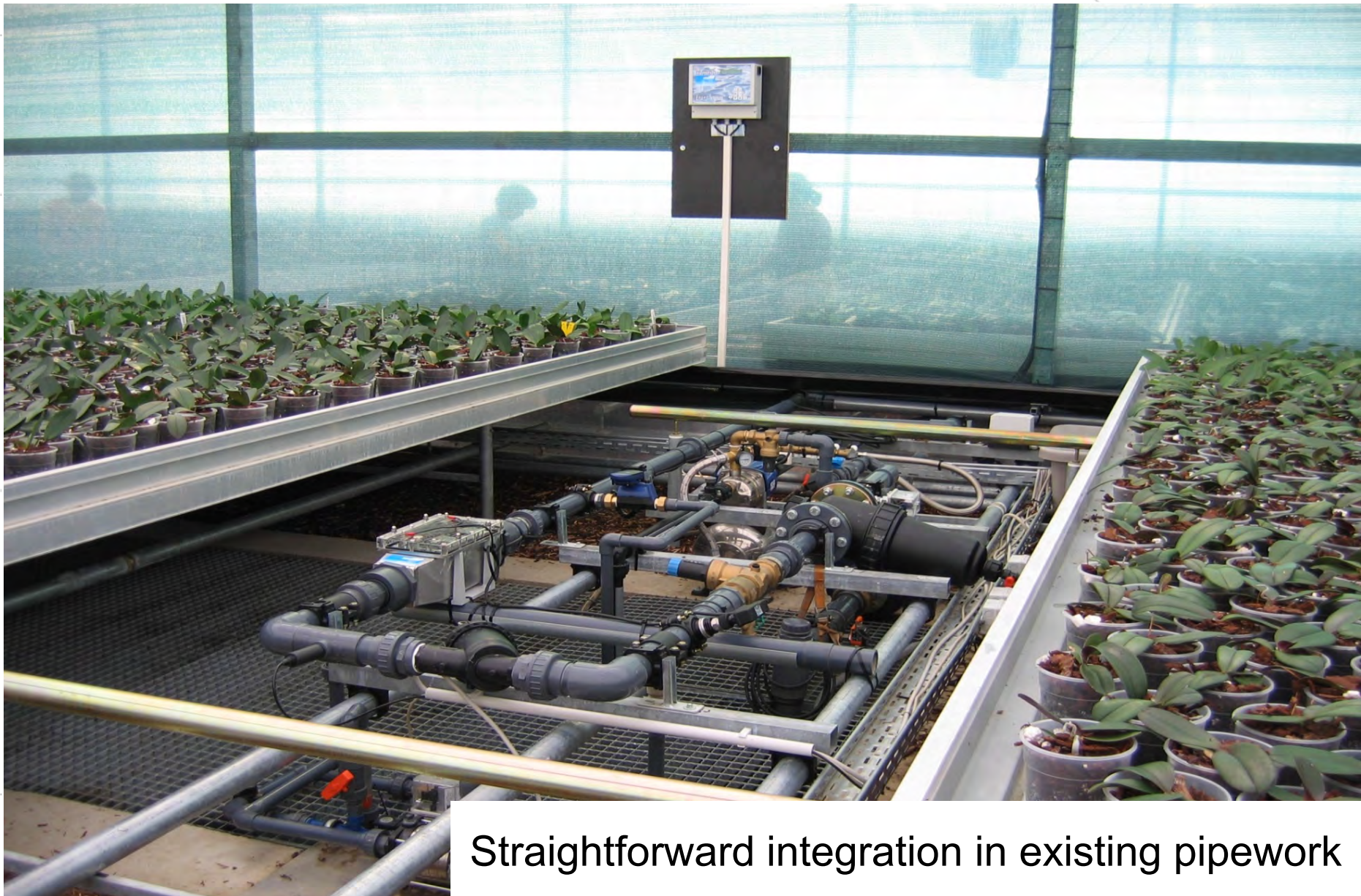
## Horticultural farm – Seidl GbR



Overhead sprinkling involving high air humidity  
without legionellae inhalation hazard



## Horticultural farm – Seidl GbR



Straightforward integration in existing pipework

## Horticultural farm – Seidl GbR

gartenbau  
**Seidl** GbR

Verwaltung:  
Geisgries 15  
85104 Pförring  
Telefon 08403/276  
Telefax 08403/1600

Betrieb Rain:  
Neuhofweg 17  
86641 Rain/Lech  
Telefon 09090/9229653  
Telefax 09090/9229656

Inhaber: Josef und Josef jun. Seidl · 85104 Pförring · Geisgries 15

Fa. Inutec Wasseraufbereitung  
Rohrweg 3

79271 St. Peter

Rain / Lech, 01.08.08

Gießwasserdesinfektion

Sehr geehrter Hr. Löffler,

gerne bestätigen wir, dass wir seit Sommer 2007 unser Gießwasser für die Phalaenopsiskultur vorbeugend mit Ihrer Desinfektionsanlage auf Basis von Cu- und Ag-Ionen behandeln. Seither treten praktisch keine Neuinfektionen mit *Fusarium* sp., *Erwinia* sp. und *Pseudomonas* sp. mehr im Bestand auf. Bestehende Infektionen breiten sich nicht weiter aus und haben keine wirtschaftliche Bedeutung mehr. Wir fahren die Anlage bei einer Cu-Konzentration von 1,5 – 3 mg / l

m.f.G

  
(Arno Mayr, Fa. Seidl GbR)

Re: Disinfection of Irrigation Water

To whom it may concern:

We are pleased to confirm that starting summer 2007 we treat the irrigation water for our Phalaenopsis crop with the disinfection system producing copper and silver ions as a preventive measure.

Since that time virtually no new infections of *Fusarium* sp., *Erwinia* sp. and *Pseudomonas* sp. have occurred on that crop. Already existing infections do not spread and have no commercial relevance.

We have set the system to produce a copper concentration of 1.5 - 3.0 mg/liter

BR,

(Arno Mayr [master in horticulture] Seidl GbR)

Reference letter by satisfied orchid grower





ubs/Gemüsing • Dr. Klaus G. Scholten • Hauptstr. 12d • D-35500 Rhodten

Necon GmbH  
Mr. Dr. Klaus Gebhardt  
General Manager  
Elzstr. 26  
D-79312 Emmendingen

Dr. Schö/AS  
October 30th, 2010

Water Treatment System NeconX

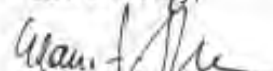
Dear Dr. Gebhardt,

Dated January 05, 2010 we got a Water Treatment System NeconX.2 A2000.2 for the disinfection of our irrigation water.

We are pleased to confirm that starting spring 2010 we treat the irrigation water for our garden cultivation on regular basis. Until now the unit does work to our full satisfaction with high efficiency and reliability. More than 40.000 liters of water have been treated by using the initial electrode.

In the area of "roses" we had about 10 sprinkle-sessions using copper-silver ions as a preventive measure. Over the whole growing period virtually no infections of *sphaerotheca pannosa var. rosae*, *actinonema rosae* and *botrytis cinerea* have occurred. We even could not detect any leaf-louses. The growing was rather powerful. The bud and blossoms as well as the leaves were of high quality and resistance. The green of the garden was irrigated many times during the hot season (June/ July 2010). The lawn grew up more intensively and did lose parts of its moss.

Yours sincerely,

  
Dr. Klaus G. Scholten

...using copper-silver ions as a preventive measure... virtually no infections of *sphaerotheca pannosa var. rosae*, *actinonema rosae* and *botrytis cinerea* have occurred. We even could not detect any leaf-louses.

**Reference letter by a satisfied rose-gardener**



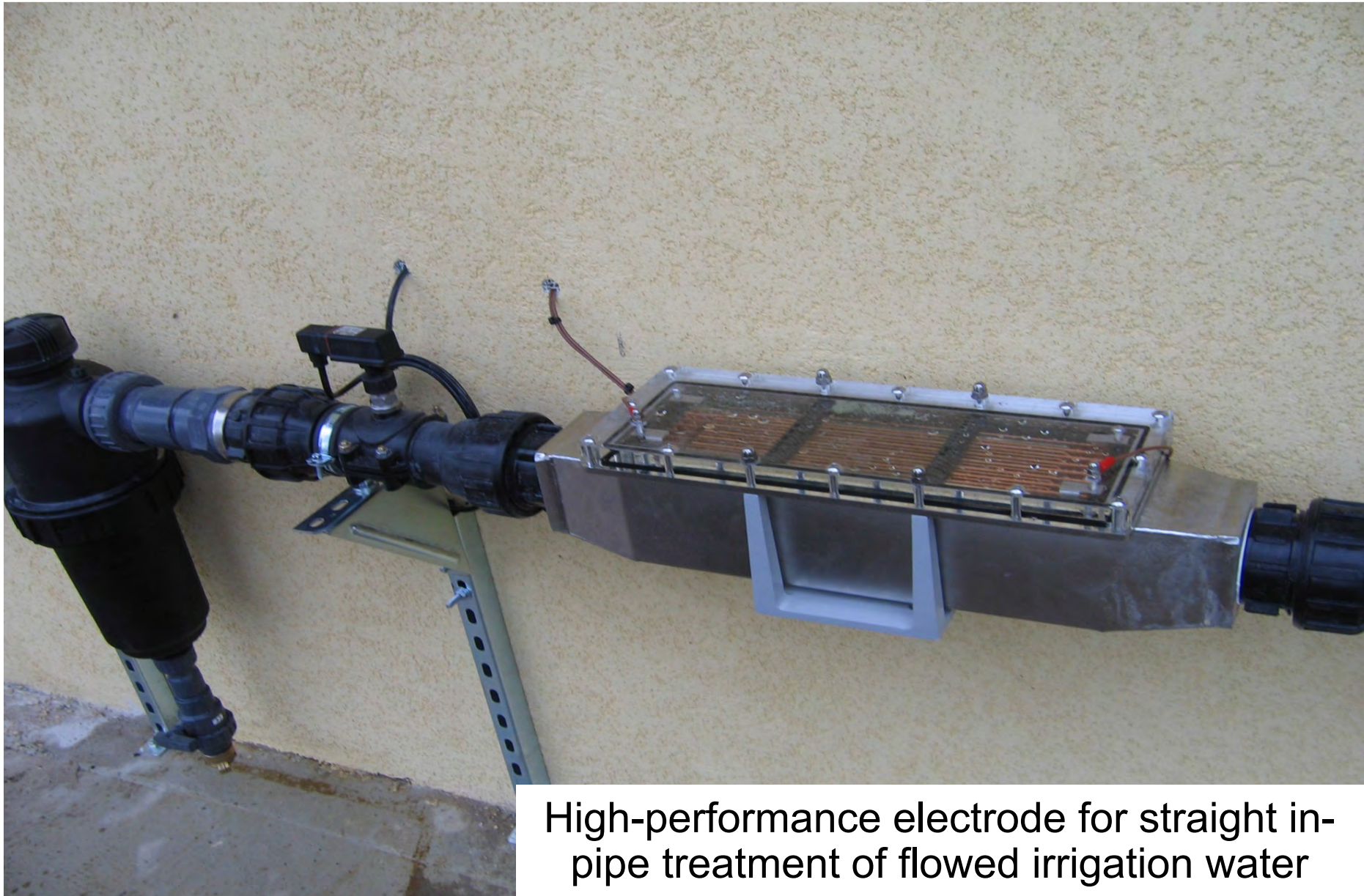
## Plant- and fruit-growing farm – Steiner



Healthy and robust plants due to sprinkling  
with water treated by copper-silver ions



## Plant- and fruit-growing farm – Steiner



High-performance electrode for straight in-pipe treatment of flowed irrigation water

Lookwatering 62  
2635 EA Den Hoorn  
HOLLAND  
Telefoon: 015-7502590  
Telefax: 015-2147594

Postadres: Postbus 38  
2290 AA WATERINGEN  
K.v.K. nr. 27226202  
Email: [info@denhaan.nl](mailto:info@denhaan.nl)

Datum : 19-07-2007  
 Angehend : **DNA Multiscan®**  
 Kundennummer : 40192  
 Identifikation : I 0707192008  
 Kennzeichen : I WASSER



Baumschule Steiner  
.  
.  
DUITSLAND



Sehr geehrter Herr ,

Anbei schicke wir Sie der Resultaten von dem **DNA Multiscan®**

Anbei schicke wir Sie der Resultaten von dem <b>DNA Multiscan</b>				
Pilz	1	2	3	4
<i>Athelia (Sclerotium) rolfsii</i>	0	0	0	0
<i>Alternaria spp.</i>	0	0	0	0
<i>Botrytis cinerea</i>	0	0	0	0
<i>Colletotrichum spp.</i>	0	0	0	0
<i>Colletotrichum acutatum</i>	0	0	0	0
<i>Colletotrichum coccodes</i>	0	0	0	0
<i>Colletotrichum gleosporioides</i>	0	0	0	0
<i>Colletotrichum fragariae</i>	0	0	0	0
<i>Coniothyrium fuckelii</i>	0	0	0	0
<i>Cylindrocarpum destructans</i>	0	0	0	0
<i>Cylindrocladium spp.</i>	0	0	0	0
<i>Didymella spp.</i>	0	0	0	0
<i>Fusarium spp.</i>	0	0	0	0
<i>Fusarium culmorum</i>	0	0	0	0
<i>Fusarium oxysporum</i>	0	0	0	0
<i>Fusarium oxysporum f.sp. lycopersici</i>	0	0	0	0
<i>Fusarium sacchari</i>	0	0	0	0
<i>Fusarium solani</i>	0	0	0	0
<i>Myrothecium roridum</i>	0	0	0	0
<i>Penicillium spp.</i>	0	0	0	0
<i>Phoma destructiva</i>	0	0	0	0
<i>Phomopsis sclerotoides</i>	0	0	0	0
<i>Phytophthora spp.</i>	0	0	0	0
<i>Phytophthora cactorum</i>	0	0	0	0
<i>Phytophthora capsici</i>	0	0	0	0
<i>Phytophthora cinnamomi</i>	0	0	0	0
<i>Phytophthora citricola</i>	0	0	0	0
<i>Phytophthora cryptogea</i>	0	0	0	0
<i>Phytophthora drechsleri</i>	0	0	0	0
<i>Phytophthora fragariae</i>	0	0	0	0
<i>Phytophthora infestans</i>	0	0	0	0
<i>Phytophthora nicotianae</i>	0	0	0	0
<i>Phytophthora ramorum</i>	0	0	0	0
<i>Pythium spp.</i>	0	0	0	0
<i>Pythium aphanidermatum</i>	0	0	0	0
<i>Pythium dissotocum</i>	0	0	0	0
<i>Pythium irregulare</i>	0	0	0	0
<i>Pythium polynasium</i>	0	0	0	0
<i>Pythium sylvaticum</i>	0	0	0	0
<i>Pythium ultimum</i>	0	0	0	0
<i>Pyrenochaeta lycopersici</i>	0	0	0	0
<i>Rhizoctonia solani</i>	0	0	0	0
<i>Sclerotinia spp.</i>	0	0	0	0
<i>Sclerotinia minor</i>	0	0	0	0
<i>Sclerotinia sclerotiorum</i>	0	0	0	0
<i>Sclerotinia trifolorum</i>	0	0	0	0
<i>Thielaviopsis basicola</i>	0	0	0	0
<i>Trichoderma spp.</i>	0	0	0	0
<i>Trichoderma asperellum</i>	0	0	0	0
<i>Trichoderma hamatum</i>	0	0	0	0
<i>Trichoderma harzianum</i>	0	0	0	0
<i>Verticillium spp.</i>	0	0	0	0
<i>Verticillium albo-atrum</i>	0	0	0	0
<i>Verticillium dahliae</i>	0	0	0	0

**Klasseneinteilung**  
0 Nicht detektiert  
1 Anfangende Infektion  
2 Leichte Infektion  
3 Maßige Infektion  
4 Infektiert  
5 Schwer Infektiert  
6 Sehr schwer Infektiert

**Beratung:**  
In dieser Probe I haben wir keine Signalen detektiert von pathogenen Pilzen.  
  
Mit freundliche Grüßen,  
  
Ir. M. van der Meer

DNA analysis of Cu-Ag-treated irrigation water showed a single trace of any of the 54 tested germs

DNA analysis of Cu-Ag-treated irrigation water – not a single trace of any of the 54 tested germs (all “0”)



## Plant- and fruit-growing farm – Steiner

### Wasser – Desinfektion mit Kupfer und Silber

100 % chemikalienfrei: Eine neue Errungenschaft in der Baumschule ist die Anlage zur Wasserdesinfektion, die auf Kupfer- und Silberionen basiert. Der größte Vorteil der Kupfer- und Silberionen ist, dass sie im Wasser bleiben und weiteren Schutz bieten, indem sie das Wasser auf lange Sicht ohne Giftstoffe reinigen, so Steiner. Das System ist leicht zu bedienen und braucht minimale Wartung. Die Kupfer- und Silberionen haben bewiesenermaßen die Erreger Kryptosporidium, E-Coli, Choliforme und Pseudomonaden, Legionellen und viele weitere Arten von Bakterien und Viren abgetötet, so der Hersteller. Diese Art Wasserdesinfektion lässt sich praktisch auch überall dort anwenden, wo es gilt, nachhaltig Bakterien, Viren und Algen zu vernichten. Das System findet auch Einsatz in vielen Schwimmbädern.

• Sabine Müller, Braunschweig

PDF



Neue Wege in der Wasserdesinfektion, hier die Silber und Kupferplatten.

### Water - Disinfection with Copper and Silver

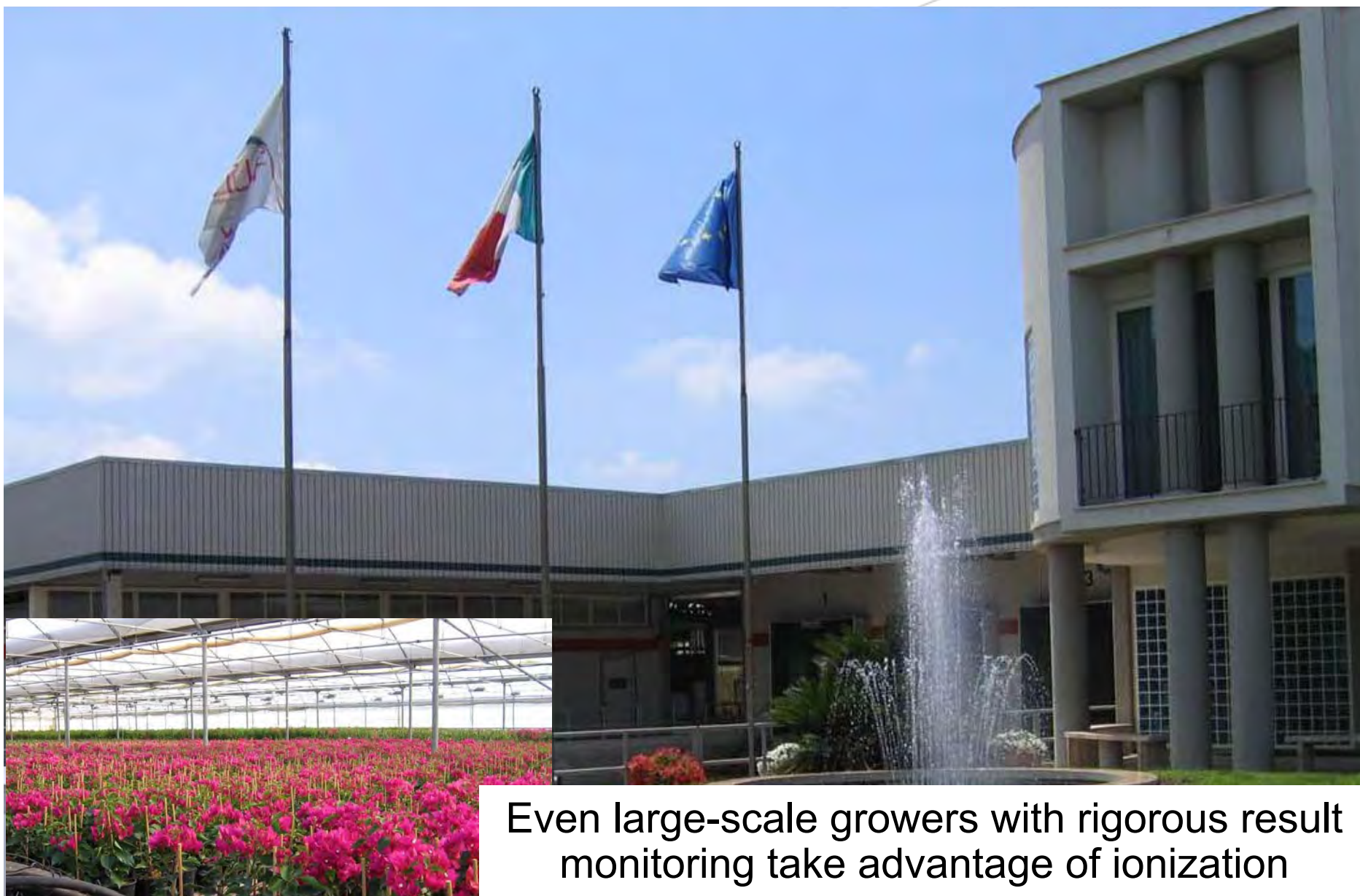
100% chemical-free: One of the latest acquisitions at the arboretum is a system for water disinfection that works based on copper and silver ions. The biggest advantage of copper and silver ions is that they remain in the water providing continuous protection by keeping the water clean for a long time without toxic aids, says Steiner. The system is easy to handle and needs only minimal maintenance. Copper and silver ions have demonstrably killed Cryptosporidium, E. coli, coliforms, pseudomonas and legionellae as well as many other species of bacteria and germs, according to the manufacturer. This type of water disinfection can be applied wherever rigorous elimination of bacteria, viruses, and algae is required. The system is also widely used in swimming pools.

Article in trade journal „Deutsche Baumschule“ (German Arboretum) reporting on benefits when disinfecting irrigation water with copper-silver ions (full version [see PDF](#), in German)



Scalable high-performance systems can be adjusted to any water volumes





Even large-scale growers with rigorous result monitoring take advantage of ionization



## Chicken farm – Biolandhof Breitsameter



Measurably improved animal health due to lower bacterial contamination in the watering supply



## Chicken farm – Biolandhof Breitsameter



This system provides germ-free water for 12.000 laying hens – as well as for the farmer's household

# NECON GmbH

## A company combining expertise with responsibility

Founded in 1981 by Dr.-Ing. Klaus Gebhardt as an engineering company for automation technology and metal design, NECON GmbH is today a leading supplier worldwide in the area of chemical-free water disinfection and innovative swimming pool equipment.

Dedicated to providing a safe, ecofriendly and cost-effective alternative to chemical water treatment, NECON GmbH has conducted intensive research for many years, in cooperation with renowned scientists and laboratories.

With the "NECON System", a centuries-old principle of electrophysical water treatment has been finally redefined, engineered to production-maturity and patented. NECON GmbH offers both private and public clients a broad range of products for numerous applications, including whirlpools and swimming pools, cooling water systems, plant fortification and farm animals liquid feeding systems, as well as treatment of water in cisterns and other storage tanks for fresh water, e.g. in mobile homes and on boats and ships.



*Dr. Klaus Gebhardt*  
Managing Director NECON GmbH



Made in  Germany



NECON

Necon GmbH  
Zeppelinstr. 2  
79331 Teningen  
Germany

Tel +49 . 7641 . 91234-0  
Fax +49 . 7641 . 91234-5  
Web [www.necon.de](http://www.necon.de)  
Email [necon@necon.de](mailto:necon@necon.de)