Disinfection

Disinfection in Horticulture

Hygiene in all cropping systems

- Disinfectant for horticulture with the required GBM approval
- Kills bacteria, fungi, viruses and viroid
- Also effective against resting spores
- Stabile solution
- Long effectiveness
- Measurable effectiveness
- Harmless for materials
- Neutral odour
- Environmentally friendly
- Long shelf life

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Product characteristics

Product characteristics:

Active ingredient:	benzoic acid (90 g/l)
Formulation:	soluble concentrate
Mode of action:	contact
Application method:	(foam) spraying, pouring, dipping, brushing

Packaging units::

MENNO® florades are available in packs of 10, 200 and 1.000 litres.

Background information Benzoic acid:

Benzoic acid is a naturally occurring component in many fruits and vegetables. It is being used as a food additive to prevent the growth of yeasts, bacteria and fungi. (for example, in jam, beer, dessert sauce, fruit juice, peanut butter, syrup, mustard, mayonnaise etc.) Benzoic acid is also part of cosmetics and medicinal crèmes.

Hygiene management
Disinfection is becoming more and more important in every cropping system. Because less curative crop protection products are approved we must look at other means of keeping crops free of disease. Besides clean crops, food safety, certification and product liability also play an important role. MENNO® Florades is a multi-purposely usable product, as a result all aspects of a high-quality hygiene management program are covered.

Hygiene management

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Application: effective disinfection of

With MENNO® florades effective disinfection can be carried out:

- empty glasshouses and warehouses
- plant containers
- pots, trays, crates
- concrete floors
- plant nursery boxes
- transport and harvest trolleys (incl. wheels)
- machines
- tools, knives
- cultivation tables
- gloves
- shoes (hygiene stations & disinfection mats)
- irrigation mats
- irrigation systems (exterior)
- Virus-free preparation of cuttings

Approval

MENNO® Florades is approved as a crop protection product and therefore the only disinfectant effective against all bacteria, fungi (incl. resting spores), viruses and viroid. The active ingredient is Benzoic acid.

Dosage

The effectiveness of a disinfectant is dependent on the dosage in combination with exposure time.
Assuming the surface is clean, a concentration of 2-4% is advised.

Exposure time

The dosage and exposure time are inextricably linked. The higher the concentration, the shorter the exposure time required. At a maximum concentration of 4% this is for the most persistent pathogens maximum one hour. Some fungi are already killed after a few minutes, but more time is needed for more persistent diseases. Because disinfection is not a selective, the goal must always be to kill all pathogens effectively. Therefore, we always recommend that you keep the contact time as long as possible. The longer the surface is wet, the better all organisms are killed. Especially the killing of

remaining traces and viruses takes a lot of time. Resting spores are the generative form of fungi and often very persistent. They can still lead to an outbreak of a disease after years.
MENNO® florades offers the possibility of foaming. This to achieve a longer exposure time and gives a good visual check of which parts have been treated.

Stability

One of the most important properties of MENNO® florades is the stability of both the product and the solution. Unlike other disinfection products, benzoic acid is stable over a long period of time, which enables control of even the most resistant resting spores. This has been demonstrated in various research projects.

Amount of water

Water is a carrier, it enables the active ingredient to be in contact with the infectious agent. That's why it is recommended to always use a high-volume spray technique when applying disinfectant products.

An indication of the amount of water that should be used with different applications

cultivation tables (ebb-/flow)	: 0.2 L/m^2
cultivation tables with irrigation mats	: 2 L/m^2
glasshouse structures, machinery	: 0.6 - 0.8 L/m^2
empty greenhouses, glasshouses	: 2500-3000 L/ha

Measurable effectiveness

The effectiveness of the product can easily be measured based on the pH value of the solution. At a pH value between 3.0 - 4.5 the solution is active. This can easily be checked with pH indicator paper or a pH meter. The pH automatically reaches the correct level (depending on the water quality) when preparing the solution. If the pH value is higher than 4.5 when the solution is reused several times, it can be lowered by adding MENNO® Florades. If the solution is soiled with large amounts of organic material, it is advisable to prepare a new solution.

Operator protection

Because the MENNO® Florades can be irritating to the eyes, always wear suitable protective clothing and face protection when applying the product.

Tank mixes

There is a wetting agent in the formulation of MENNO® Florades therefore additional wetter are not required. It is not recommended to mix the product with crop protection products or biocides. Adding other acids to acidify the working solution is not necessary since the proper pH will set automatically when preparing the MENNO® Florades solution.

General warning

After disinfection of the greenhouse with MENNO® florades, it must dry thoroughly before plants enter the greenhouse. To rule out any risks, after heating up the greenhouse, always ventilate it well just before planting out. This is especially important in cucumber crops. (see also advice on the label). Avoid direct contact with the crop.

Advice & information

Use crop protection products safely. Read the label and product information before use.

For further information, please contact your advisor or the helpdesk of Royal Brinkman.
Phone: +31 (0)174 - 44 61 00 or
E-mail: info@royalbrinkman.com

Research and MENNO® Florades

Effectiveness:

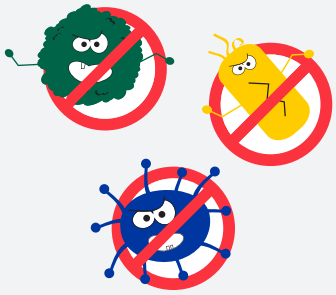
MENNO® Florades has proven its effect against most of the bacteria, fungi, viruses and viroid's causing problems in horticulture in various research projects. In many cases fungi contain generative and vegetative spores. The vegetative spores are in general relatively easy to control. MENNO® Florades is also able to inactivate the generative spores (resting spores) due to its stability resulting in a long exposure time. By the inactivation of viruses, the strength of MENNO® Florades is hidden in the fact that both viruses with and without an outer shield are controlled.

Bacteria

Acidovorax avenae ssp. cattleyae*1
Agrobacteriuma) rhizogenes *20
Agrobacteriuma) tumefaciens*1
Clavibacter michiganensis ssp. michiganensis*1/*17
Clavibacter michiganensis ssp. sepedonicus*1
Curtobacterium flaccumfaciens*21
Dickeya solani*19
Enterococcus faecium*13
Erwinia amylovora*3/*14
Erwiniab) carotovora ssp. atroseptica*1
Erwiniab) carotovora ssp. carotovora*1/*10
Escherichia coli*13
Pectobacterium carotovorum ssp. atroseptica*1
Pectobacterium carotovorum ssp. carotovorum*1/*10
Proteus mirabilis*13
Pseudomonas aeruginosa*13
Pseudomonas fluorescens marginaeis*16
Pseudomonas lachrymans
Pseudomonas putida
Pseudomonas solanacearum* 1

Pseudomonas syringae
Ralstonia solanacearum*1
Rhizobium rhizogenes*20
Staphylococcus aureus* 13
Xanth. camp. pv. begoniae* 1
Xanthomonas campestris pv. campestris* 1

Xanthomonas campestris pv. pelargonii*1



Fungi
(including their duration forms)

Alternaria alternata*10
Alternaria solani*10
Alternaria sp.*1
Aspergillus sp.*6
Botrytis cinerea*1/*17
Candida albicans*13

Cercospora beticola*10
Chalara elegans*8
Cladosporium fulvum*21
Colletotrichum coccodes*10
Colletotrichum sp.*1
Cylindrocladium scoparium*1
Cylindrocladium spathiphylli*1
Dactylium dendroides*1

Didymella bryoniae*17
Erysiphe cichoracearum*17
Fusarium spp.*17
Fusarium oxysporum f.sp. cyclaminis*1/*12

Fusarium oxysporum (Stamm Elatiorbegonien)*1
Fusarium solani var. coeruleum*1

Helminthosporium solani *1/*10/*11

Mucor sp.* 6
Ophiostoma quercus*1
Peronospora tabacina*8
Phytium aphanidermatum*17
Pythium sp.*6
Phytium ultimum*10
Phytophthora cinnamomi*1
Phytophthora cryptogea*1
Phytophthora infestans*10/*11

Ramularia beticola*10

Rhizoctonia solani*10
Rhizopus sp.*6
Streptomyces scabies*1
Taphrina deformans*15
Thielaviopsis basicola*1
Trichoderma harzianum*9

Trichoderma viride*1
Verticillium fungicola*1/*9

Viruses/Viroids

ArMV*2 / 22 (arabis mosaic nepovirus)
BePMV*7 (bell pepper mottle virus)
CarMoV*4 (carnation mottle carmovirus)
CGMMV*18 (cucumber green mottle mosaic virus)
CMV*4 (cucumber mosaic virus)
CSVd*7 (chrysanthemum stunt viroid)

CyMV*5 / 22 (cymbidium mosaic virus)

MNSV*7 (melon necrotic spot virus)
ORSV*5 / 22 (odontoglossum ringspot virus)
PepMV*7/*17 / 22 (pepino mosaic v.)
PFBV*2 / 22 (pelargonium flower break virus)
PLCV*2 / 22 (pelargonium leaf curl tombusvirus)
PLPV*2 / 22 (pelargonium line pattern virus)

PMMoV*7 (pepper mild mottle virus)
PSTVd*7 (potato spindle tuber viroid)
PVX*4 (potato virus X)
PVY*4 (potato virus Y)
RMV*4 (ribgrass mosaic tobamovir.)
TBRV*2 (tomato blackring nepovirus)
TMV*2 / 22 (tabacco mosaic virus)
ToBRV *22 (tomato blackring nepovirus)
ToBRFV*23 (tomato brown rugose fruit virus)

ToMV*17 (tomato mosaic virus)
TSWV*2 / 22 (tomato spotted wilt tospov.)
ZyMV*7 (zucchini yellow mosaic virus)

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*2 University Hamburg, Institute for applied Botany, D-2000 Hamburg 36, Germany
*3 Eidgenössische Forschungsanstalt für Obst-, Wein- und Gartenbau, CH-8820 Wädenswil, Schwitzerland
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*8 Landesanstalt für Pflanzenbau Forchheim, Dr. N. Billenkamp, Germany
*9 Horticultural Research International, Dr. H. Grogan, Wellesbourne, Warwick, England
*10 Institut für Pflanzenpathologie und Pflanzenschutz der Universität Göttingen, Dr. M. Benker, D-37077 Göttingen, Germany
*11 Institut PPO Wagening, Applied Plant Research BV, NL-8200 AK Lelystad, Dr. H.T.A.M. Schepers, Dr. A. Veerman, The Netherlands
*12 Institut PPO Wagening, Applied Plant Research BV, NL-1431 JV Aalsmer, Dr. A. Hazendonk, Dr. J.P. Wubben, The Netherlands
*13 Technische Mikrobiologie Dr. J. Höffler GmbH, D-22045 Hamburg, Germany
*14 Institut für Pflanzenschutzmittelprüfung, Österreichische Agentur für Gesundheit und Ernährungs., Wien, Dr. M. Keck, Dr. P. Fida, Austria
*15 Dienstleistungszentrum Ländlicher Raum, Rheinhessen-Nahe-Huns rück, A. Thomas, Dr. G. Albert, Germanya) Agrobacterium = Rhizobium
*16 Bretagne Biotechnologie Végétal (BBV), E. Pajot, F-29250 St. Pol de Léon, France b) Erwinia = Pectobacterium
*17 Crop Diversification Centre South, Alberta Agriculture, Food and Rural Development, Dr. M.W. Harding, Dr. R.J. Howard, Canada
*18 Wageningen UR Glastuinbouw, (tested MENNO CLEAN equivalent to M.F.) I. Stijger, R. Hamelink, Wageningen, The Netherlands
*19 Wageningen, Plant Research International, R. Czajkowski &W. J. de Boer & J. M. van der Wolf, published online 25.01.2013, Eur J Plant Pathol, Springer
*20 Hochschule Geisenheim University, Institut für Phytomedizin, Von-Lade-Str 1, D-65366 Geisenheim, Dr. Ada Linkies, H. Fehres, Germany
*21 Hochschule Geisenheim University, Institut für Phytomedizin, Von-Lade-Str 1, D-65366 Geisenheim, Prof. Dr. Beate Berkelmann-Löhnertz, Germany
*22 ELIMINATION OFT PLANT VIRUSES BY HORTICULTURAL DISINFECTANT, C. Büttner, M. Bandte, Med. Fac. Landbouww. Univ Gent, 65/2b, 2000, page 703 – 708
*23 Groen Agro Control, Laboratoriumonderzoek & Advis, Adriaan Vermunt, Petra Hollander, NL-2645 EG Delfgauw,, The Netherlands, 25.10.2019

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