



***SPECIALIST IN PROBIOTIC HYGIENE
AND INFECTION CONTROL***



Est. 1989, Belgium

***Cleaning, hygiene
and personal care
products***

***Pure, with respect to
man and nature***



Chrisal



Animal housing



Industry



Food industry



Healthcare



Chrisal

Automotive



Personal care



Homecare



Offices



Probiotics are good bacteria that provide health benefits to humans and animals.



Benefits of probiotics in cleaning and personal care products:

- 1. Microscopic deep cleaning**
- 2. Prevention and elimination of odours**
- 3. Healthy microflora in the environment**
- 4. Reduced risk of infections**
- 5. Lowers allergens**
- 6. Promotes the environment (100% sustainable)**
- 7. Cost saving**

What about plants ?



Plant growth/health – focus points:

1. Nutrition

- Soil / Water / Sunlight / CO₂

2. Environment

- Root ecosystem / Climate

3. Plant health

- Diseases / Fysical damage

4. Handling

- Equipment / Harvesting / Processing / Storage

Benefits of probiotics for plants

1. Growth promotion

- Use probiotic bacteria to stimulate the growth of plants

2. Infection control

- Use probiotic bacteria to lower infection risks

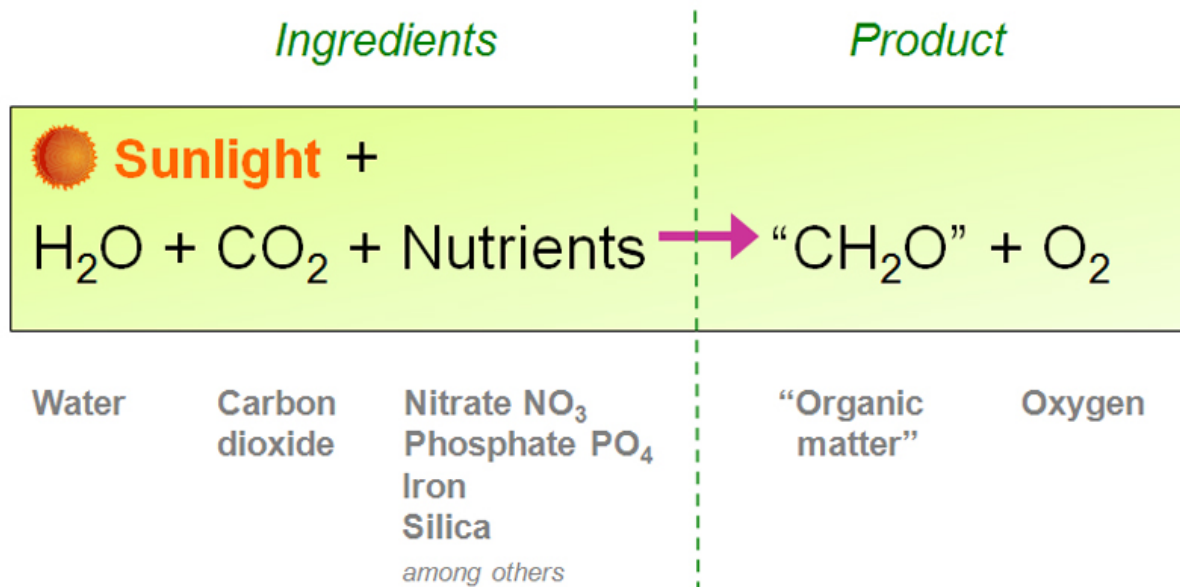
3. Storage and handling

- Use probiotic bacteria to improve storage

Growth promotion – biostimulant

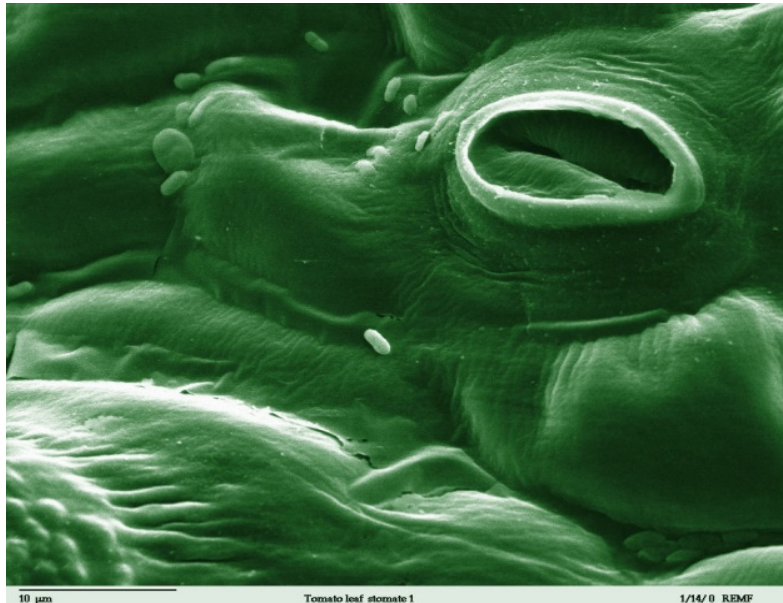
By improving the natural growth process of plants, probiotic bacteria can increase crop yield.

Photosynthesis



Growth promotion – biostimulant

1. Cleaning the plant leaves
 - Consumption of organic dirt
 - Improve sunlight penetration
2. Feeding CO₂ to the leaves

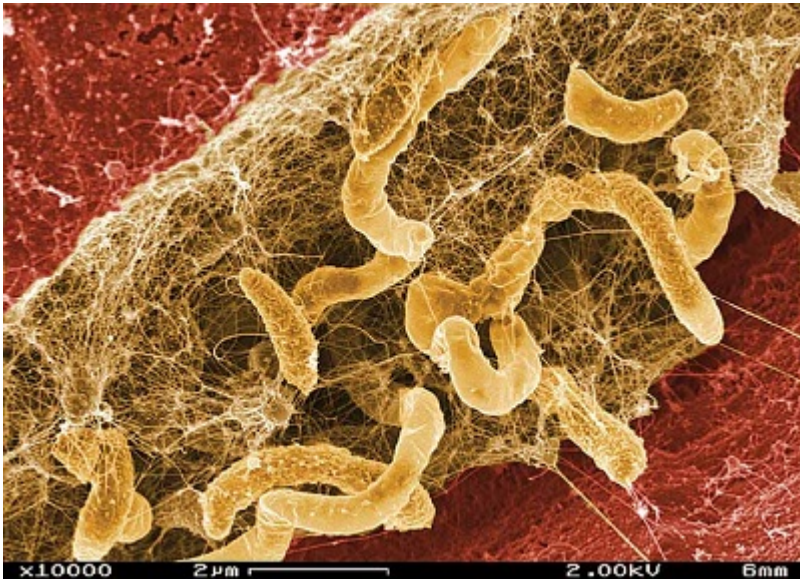


Growth promotion – biostimulant

3. Improving root bacterial ecosystem

Warning:

Using the wrong type of bacteria can have severe negative effects !!!



Infection control

(Sprout) crops can be subject to infection by:

- Fungus (mildew, fusarium, stem rot...)
- Insects (flea beetle, cabbageworm, cabbage looper...)
- Bacteria (black rot)

Specific probiotic/bacterial strains are known as registered biocides. They always have a specific activity!

E.g. *Bacillus thuringiensis*, *Bacillus subtilis*...

Storage and handling

1. Storage

Some probiotic bacteria can be used to wash or spray freshly harvested crops in order to prolonge their storage time at non-freezing temperatures

2. Handling

Equipment and personal hygiene are often sources of crop contamination. A probiotic maintenance and hygiene greatly helps lowering the risk of contamination

Bacterial products for plant treatment

Legal situation in EU

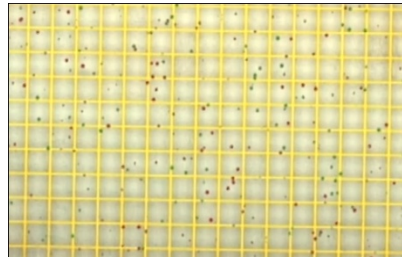
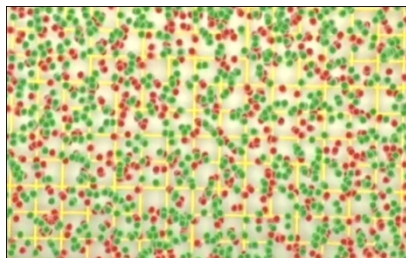
In Europe, products for use on plants are divided in 4 categories:

- Biocides
- Pesticides
- Fertilisers
- Biostimulants

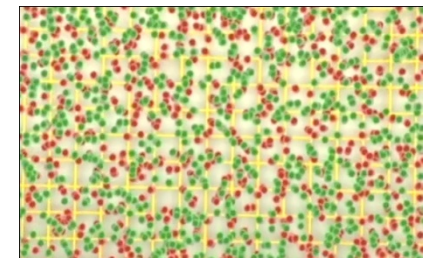
Bacterial cultures can belong to any of these 4 categories, based on their mode of action and claims.

Probiotic vs biocide

biocide



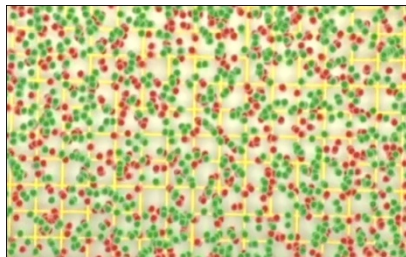
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● Good bacteria

● Bad germs

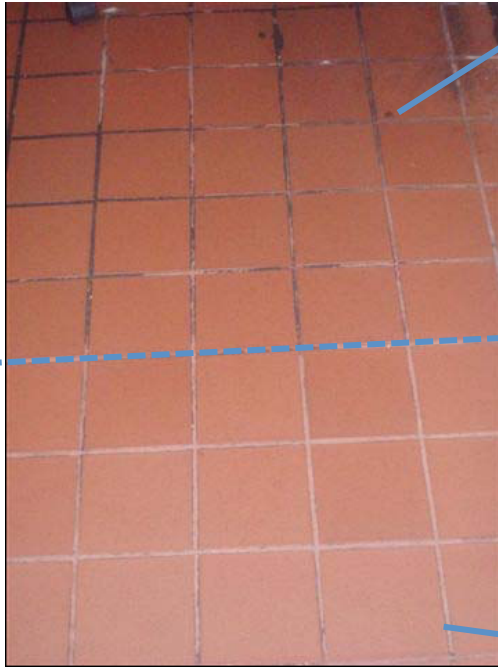
Probiotic



Stability!

Removal of organic dirt

Chemical
cleaning



Probiotic
cleaning

Hard Surface Biocontrol in Hospitals Using Microbial-Based Cleaning Products

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Abstract

Background: Healthcare-Associated Infections (HAIs) are one of the most frequent complications occurring in healthcare facilities. Contaminated environmental surfaces provide an important potential source for transmission of many healthcare-associated pathogens, thus indicating the need for new and sustainable strategies.

Aim: This study aims to evaluate the effect of a novel cleaning procedure based on the mechanism of biocontrol, on the presence and survival of several microorganisms responsible for HAIs (i.e. coliforms, *Staphylococcus aureus*, *Clostridium difficile*, and *Candida albicans*) on hard surfaces in a hospital setting.

Methods: The effect of microbial cleaning, containing spores of food grade *Bacillus subtilis*, *Bacillus pumilus* and *Bacillus megaterium*, in comparison with conventional cleaning protocols, was evaluated for 24 weeks in three independent hospitals (one in Belgium and two in Italy) and approximately 20000 microbial surface samples were collected.

Results: Microbial cleaning, as part of the daily cleaning protocol, resulted in a reduction of HAI-related pathogens by 50 to 89%. This effect was achieved after 3–4 weeks and the reduction in the pathogen load was stable over time. Moreover, by using microbial or conventional cleaning alternatively, we found that this effect was directly related to the new procedure, as indicated by the raise in CFU/m² when microbial cleaning was replaced by the conventional procedure. Although many questions remain regarding the actual mechanisms involved, this study demonstrates that microbial cleaning is a more effective and sustainable alternative to chemical cleaning and non-specific disinfection in healthcare facilities.

Conclusions: This study indicates microbial cleaning as an effective strategy in continuously lowering the number of HAI-related microorganisms on surfaces. The first indications on the actual level of HAIs in the trial hospitals monitored on a continuous basis are very promising, and may pave the way for a novel and cost-effective strategy to counteract or (bio)control healthcare-associated pathogens.

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Data Availability: The authors confirm that all data underlying the findings are fully available without restriction. All relevant data are within the paper and its Supporting Information files.

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Competing Interests: The authors declare that they received funding from the Copma srl commercial company, and that Dr. Robin Temmerman is affiliated to a commercial funder of this study (Chrisal, Lommel, Belgium). This does not alter the authors' adherence to PLOS ONE policies on sharing data and materials.

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Introduction

Healthcare-Associated Infections (HAIs) are one of the most frequent complications occurring in healthcare facilities and represent a problematic concern regarding the safety and quality of healthcare worldwide [1], as also stated in a recent report by the World Health Organization estimating hospital-wide prevalence in high-income countries at 8% [2]. The European Center for Disease Control point prevalence study confirmed that healthcare-associated infections are a major public health problem in Europe

with a prevalence of 5.7% (4.5–7.4%) which means 81.089 (64.624–105.895) patients with one HAI for each day in European acute care hospitals [3]. In particular, this European survey reported a similar estimation of nosocomial infections for Italy and Belgium, where the percentage of patients with HAIs has been calculated as 6.3% (5.4–7.4%) and 7.1% (6.1–8.3%), respectively [1]. Based on this study, the estimated total annual number of patients with an HAI in European acute care hospitals in 2011–2012 was 3.2 million, albeit with a wide confidence interval from



Chrisal is the only manufacturer of probiotic cleaning products in the world that has an **official scientific publication** to prove the effect of its product line!

Vandini et al. 2014
PLOS ONE

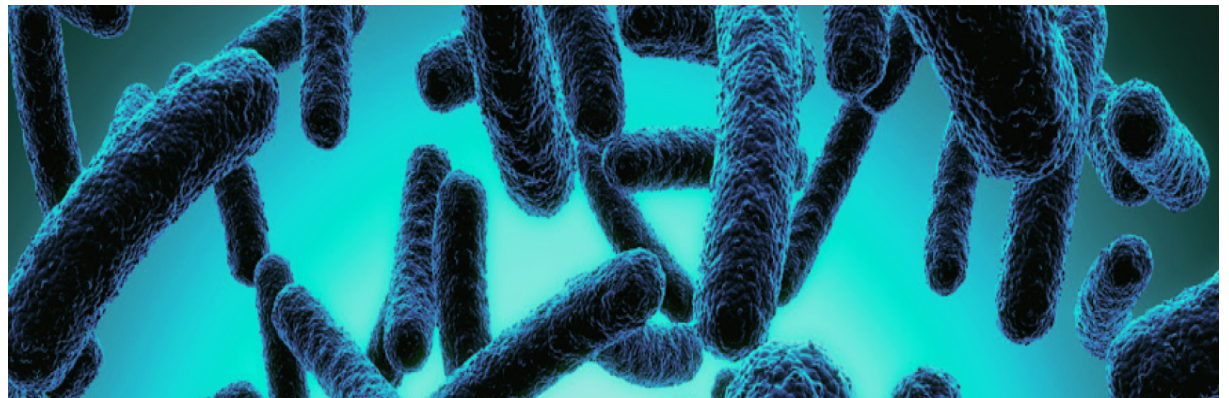


Criteria for Probiotics

Type of probiotics in the products

A lot of different species of probiotic bacteria exist, but only a few are suitable to be applied on surfaces for cleaning. When the wrong type of probiotic is used, no benefits in terms of cleaning and hygiene shall exist. After many years of research Chrisal has selected the best performing probiotics for cleaning applications.

Each probiotic product from Chrisal contains at least **5 different *Bacillus* species** for optimal effect in many different environmental conditions.



Criteria for Probiotics

QUANTITY AND STABILITY

Besides the correct type of probiotics, a good probiotic cleaning product should also contain a high enough quantity of probiotics. Furthermore, this minimum number of probiotics should remain present in the product for the entire shelf-life of the product.

All PIP Healthcare products contain a minimum of **50 million probiotics per ml** and have a **shelf-life of 24 months!**





Sustainability

EU Ecolabel

The detergents used in the probiotic PIP Healthcare products are compatible with EU-Ecolabel. This guarantees that our probiotic products are green. As of 2016, EU Ecolabel also allows probiotics as ingredient in cleaning products.

The probiotic products from Chrisal are not just environment friendly, they are promoting the environment!

Green Seal

In October 2014, the PIP Healthcare products also obtained the Green Seal in the USA.

www.greenseal.org



