Biosecurity of Water Systems in Horticulture

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Biosecurity in Horticulture

- Protection of Substrate
- Protection of Seeds
- Disinfection of Green houses
- Plant Protection using Pesticides, and other chemicals
- Protection of harvested plants
- Disinfection of Storage sheds, equipment

WHAT ABOUT WATER ? ? ? ?

Wrong Assumptions

- **The Assumption**
- Water has already been disinfected so is microbiologically pure. – Chlorine is completely effective.

- **The Facts**

- We are allowed up too 100,000 cfu / litre in our drinking water.
- Chlorine does not remove all pathogens so we can have one or two pseudomonads or legionella in our supply.

Horticulture if not Unique

Pseudomonads in Healthcare

Legionella outbreaks
Spa baths and hot tubs
Dental chairs

High animal husbandry mortality

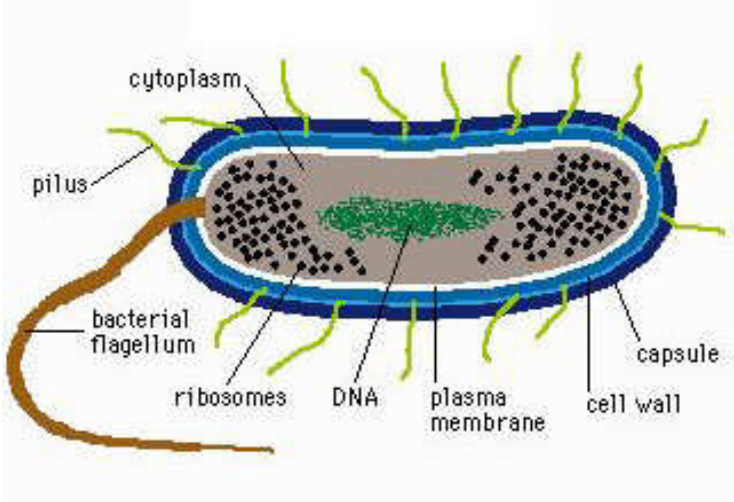
Diseased plants

Water Water Everywhere

From Good quality water (potable) to river water (poorer quality)

Two types of bacteria

- Planktonic
- Sessile



Biofilm is the Common Link

- 160 years since Pasteur discovered bacteria
- 1933 Sticking bacteria first identified
- 25 years ago(1990) Bill Characklis at MIT started to investigate Biofilm, Its composition and its effects.
- We are still learning but not fast enough.

Conditions which influence biofilm formation

- 1 Water quality – microbiological load and food source
- 2 The substrate - from glass to plastic.
- 3. Water temperature
- 4. Water flow

Development of Biofilm

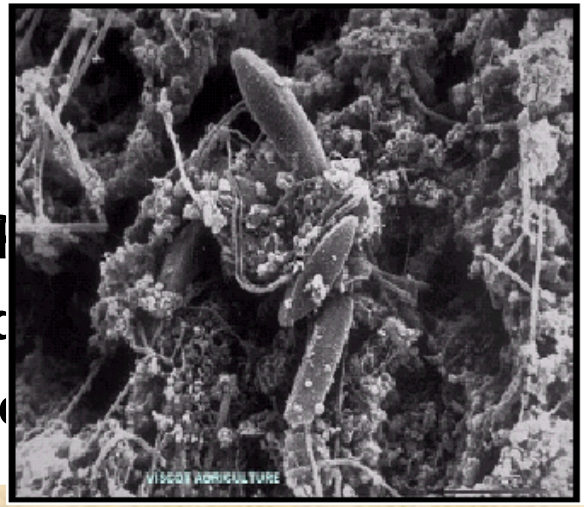
1. Base layer forms.
2. Polysaccharides secreted by bacteria
3. Surface layer develops in columns
4. Other organisms come to live in and live on the Biofilm
5. Parts of Biofilm slough off and try to form secondary biofilms

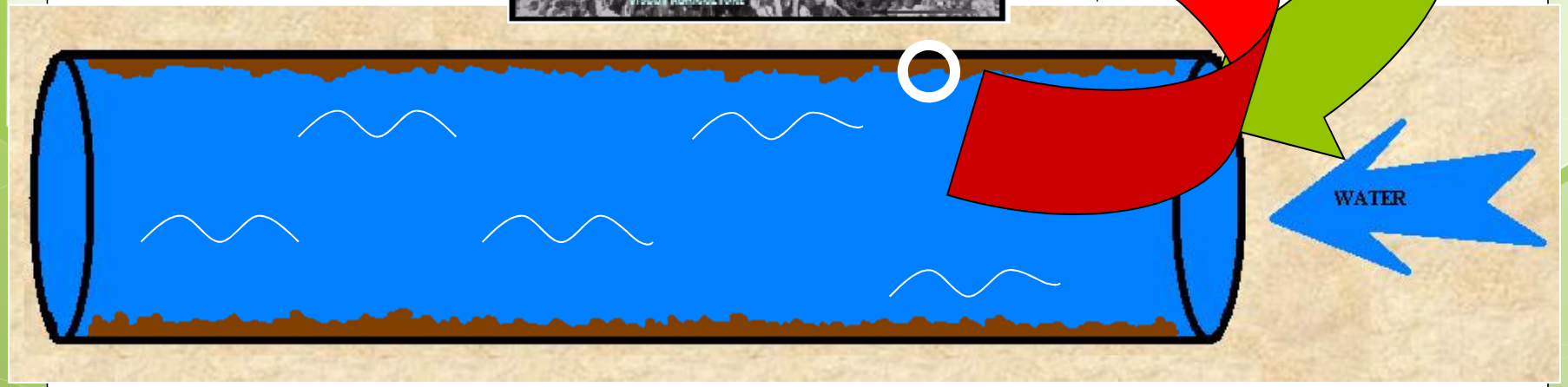
1. Clean water d

2. Attachment q

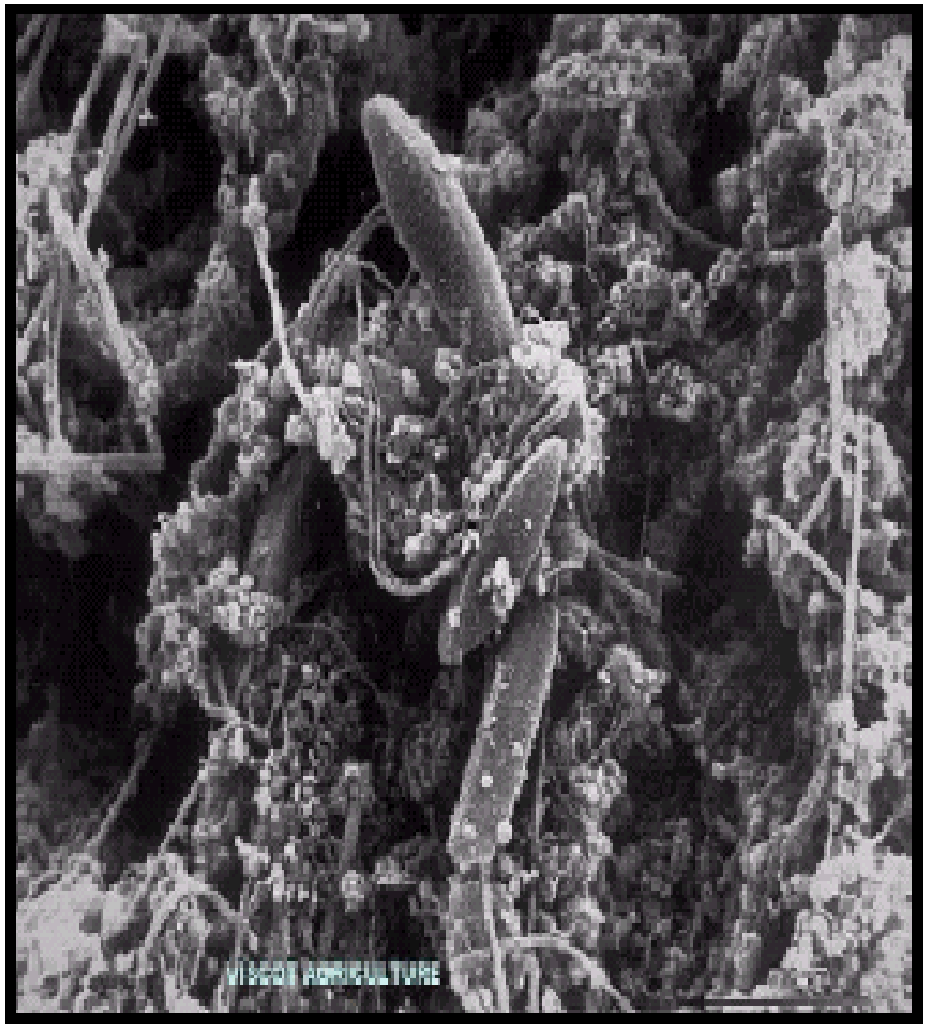
3. Growth and c
(hrs - days)

4. Expolymer productio (hr





Biofilm



Shelter from the Storm

- Biofilms are 90% water
- 9% polysaccharide
- 1% bacteria or other microorganisms

- Bacteria are well protected. If you do not remove the base layer. Biofilm will reform.

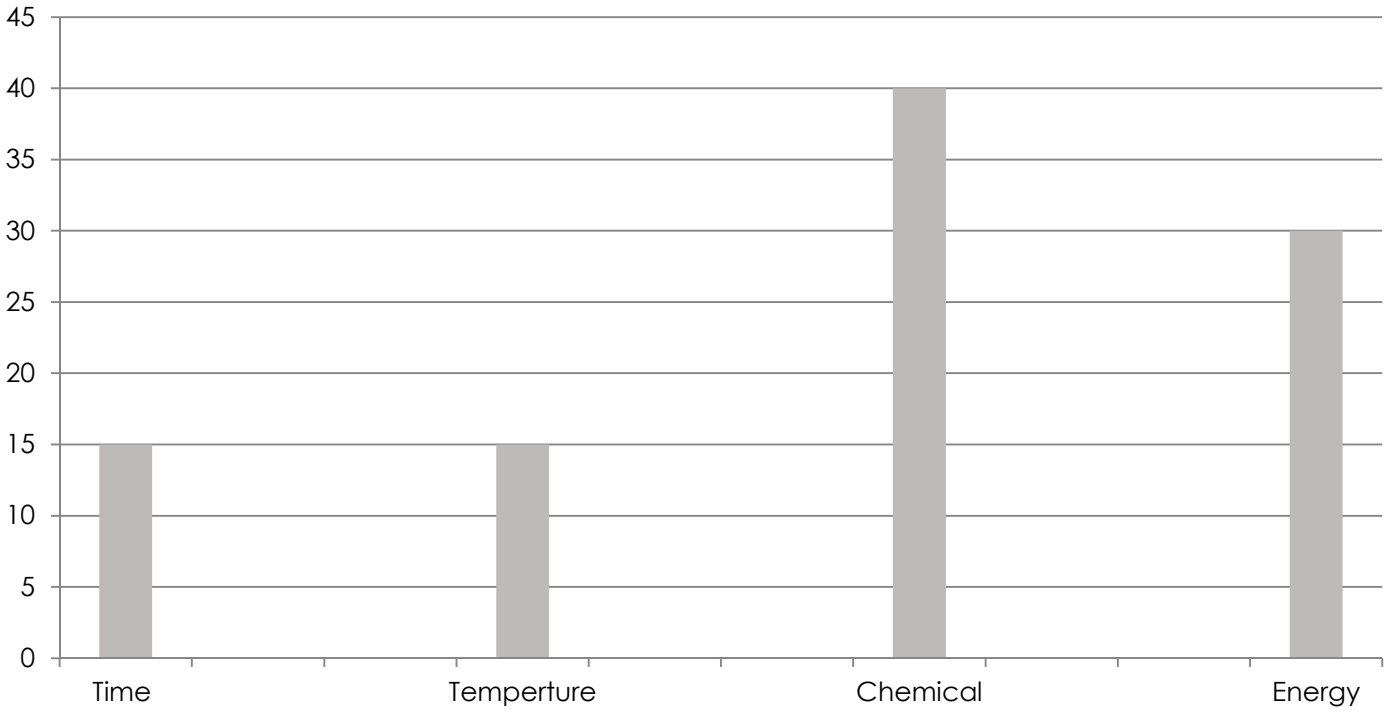
Problem Caused by biofilm

- Pathogens released from biofilms can cause plant disease
- Restricts heat transfer
- Sloughing of biofilm can cause water nozzle blockage.
- Water misting or spraying can have an adverse effect on health of employees (Legionnaires' Disease)

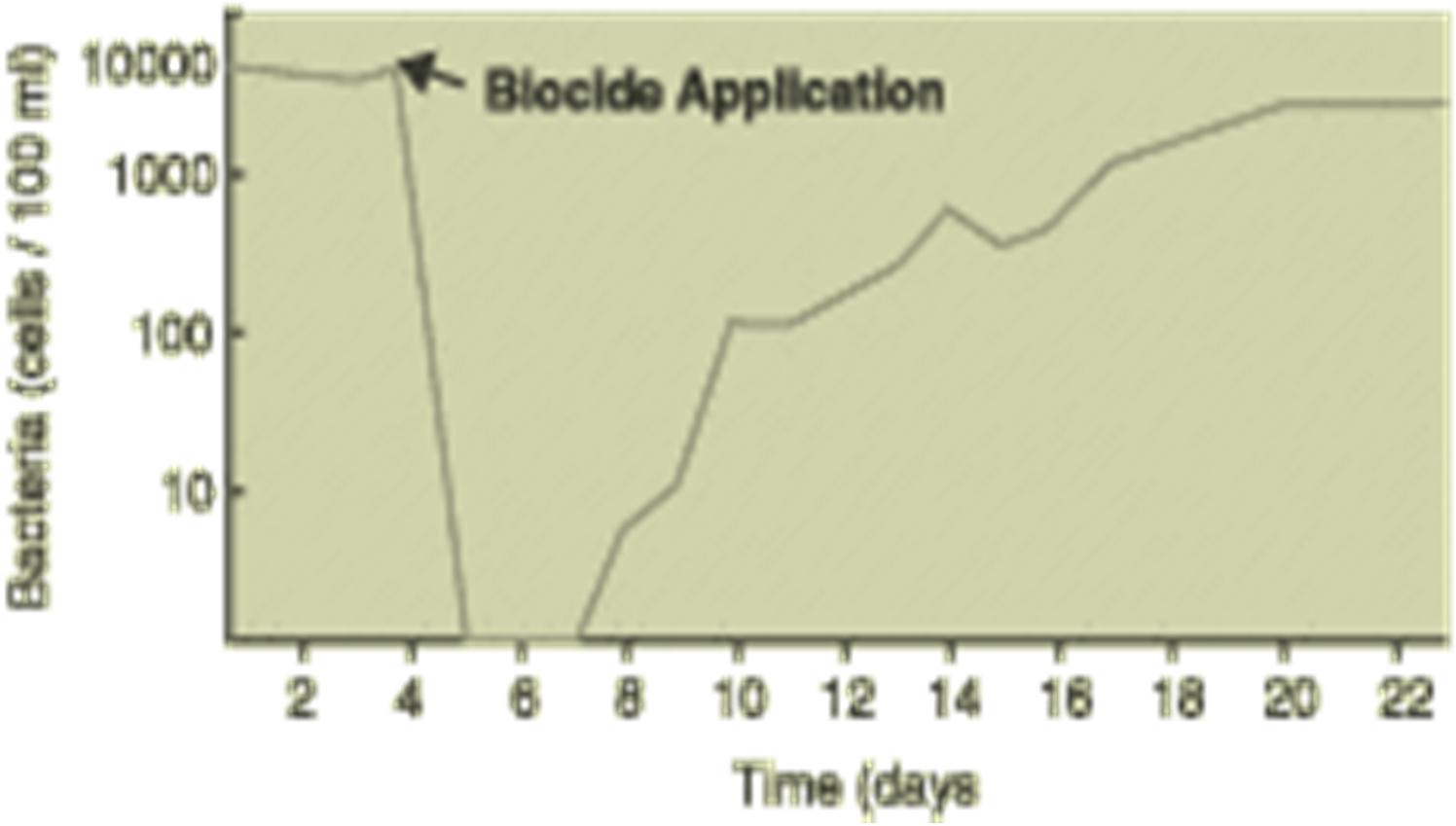
What can we do about it?

- Ultrasonic Treatment
- Ozone
- Biocide treatments

Biofilm Removal



Chlorine and Biofilms



Effective and Ineffective Biocides

- Chlorine, Peracetic acid, quats and other non – oxidising biocides do not completely remove biofilm

- Chlorine Dioxide, MYOX (mixed oxides including chlorine dioxide). And some silver catalysed hydrogen peroxides can completely remove biofilm.

Chlorine Dioxide

- Indiscriminate removal of biofilm – biofilm can be removed in large chunks.
- Expensive to dose safely
- Could have negative effect on plants
- Chlorine dioxide is a gas which must be produced on site. Available as a dilute solution (Abulox)

Endosan

- 50 % hydrogen peroxide + silver based stabiliser
- Most developed of the silver catalysed hydrogen peroxides.
- Non corrosive at use concentrations
- Easily dosed using conventional equipment
- Very stable peroxide – Excellent biofilm remover.
- Breaks down to water and oxygen

Kind to Plants

- I've applied it at 2.5 – 3.3 l/ha H2O2 (pure 35% FG) as a course spray in 400 to 500 l water / ha. It has been sprayed onto both moist and dry turf with no adverse reaction.

George Paterson

Courses Manager

Moray Golf Club

Cucumber Grown on Substrate - Drip Irrigation - Phomomysis

WEST-VLAANDEREN (BELGIUM) - *Field lettuce affected by midrib rot..*

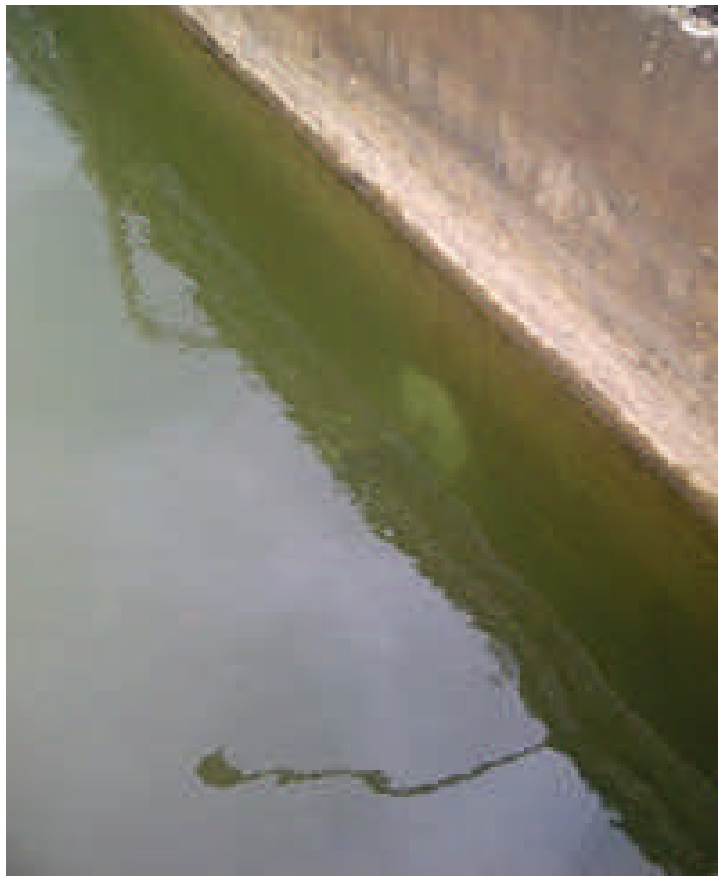
Low Crop Yield of Juvenile Tomato Plants - 2011

Before application of EndoSanTM , the loss of plants mounted up to 9000 trays, each containing 320 plants (loss of 1.6%)
Following the continuous addition of Endosan the loss of plants dropped to just 60 trays (loss of 0.011%).

The product pays for itself in a short space of time and allows for better profits , better crop yields and improved growth consistency each growth year.' Statement from Farm Manager.

Blockage Removal

Other Water Treatment Uses of Endosan – Algae control



Other Uses of Endosan

Water system disinfection and algae removal

Seed treatment and seed germination improvement

Equipment disinfection

Fogging of Greenhouses and store houses

No rinse disinfection of harvested crops

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Any Questions ?