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The Principles of Cleaning & Sanitation

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Sydney, AUS

Presenter: John Fisher

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Importance of Cleaning and Sanitation

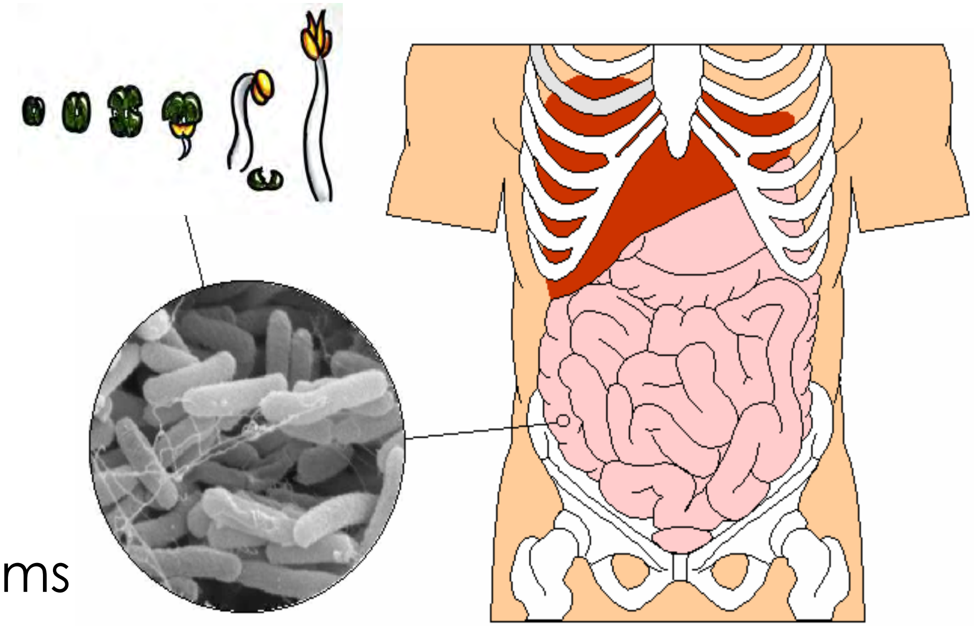
- Hygiene and Food Safety
  - Legal and moral responsibility to produce goods that are
    - Quality
    - Nutritionally sound
    - Safe

- Safety and Keeping Quality (Shelf Life)
  - Microbiological contamination
    - Food poisoning
    - Food spoilage
  - Chemical contamination
  - Contamination by foreign objects

Importance of Cleaning and Sanitation

Salmonella enteritidis – 1h old

Food poisoning E-Coli O157-H7



- Food Poisoning
  - Causes illness
    - Micro-organisms
    - Chemicals
    - Foreign Objects
  - Disease causing micro-organisms
    - Pathogens
    - Mostly bacteria
    - Ingesting sufficient live bacteria to cause disease or
    - By ingestion of the toxin produced by the live pathogen

Importance of Cleaning and Sanitation

- Food Spoilage
  - Deterioration
    - Quality, flavour, texture, aroma, appearance
    - Eg mouldy bread, slimy bean shoots, "off" milk
  - Importance to control level and rate of deterioration
    - Controlling level of micro-organisms
    - Implementing effective cleaning and sanitation programmes

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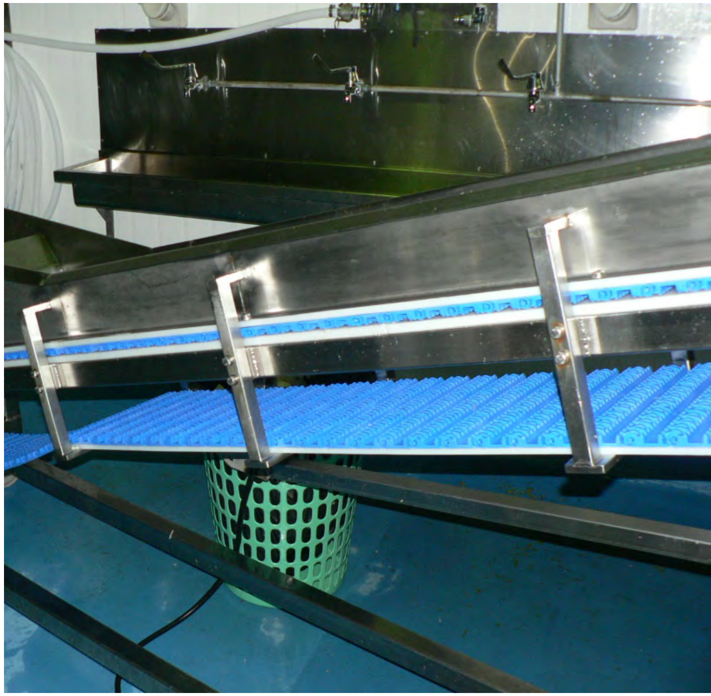
Aims of a Cleaning Programme

- Keep food contact equipment surfaces clean and safe
  - Physically clean
    - Free from soils
  - Microbiologically clean
    - Limit microbial activity to acceptable levels



- An effective cleaning programme will include
  - Correct and effective cleaning procedures Appropriate selection of suitable chemicals
  - Proper training of personnel
  - Ongoing assessment and management

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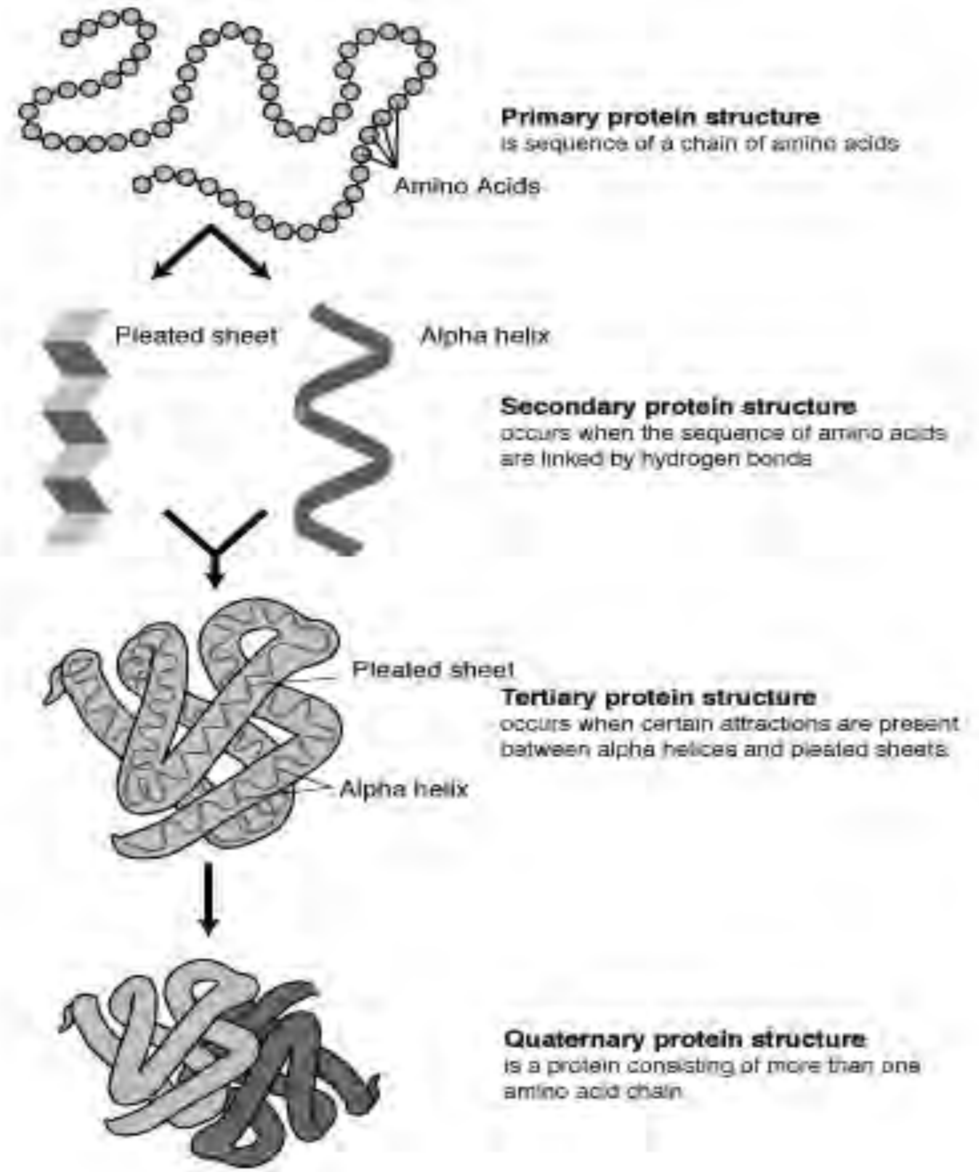
“Soil”

- Any unwanted residue
  - Protein
  - Fat and Oils
  - Carbohydrate
  - Carbon
  - Mineral scale

- If not removed can provide food source for spoilage and poisoning organisms to grow



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Cleaning

- Cleaning
  - Is the removal of soils
- Soil types
  - Protein
    - Usually removed with alkali or chlorinated alkali (high pH)
  - Fat and Oils
    - Usually removed with mildly alkaline emulsifying detergent or highly alkaline (caustic) saponifying detergent
  - Carbohydrate
    - Removed with aqueous cleaning solutions
  - Carbon
    - Usually removed with highly alkaline caustic detergents
  - Mineral scale
    - Usually removed with acidic detergents (low pH)
- Many soils contain a mixture of some or all of the above

Common Surfaces to be Cleaned

- Surface type will influence the selection of cleaning compounds
  - Stainless Steel
    - Affected by chlorides, and some chlorine solutions
  - Galvanised steel and aluminium
    - Affected by both highly alkaline (caustic) and acids
  - White cutting boards, tiles and conveyor belts
    - Safe with most detergents
  - Painted surfaces
    - Can be damaged by caustic solutions and solvents
  - Rubber
    - Damaged by hydrocarbon solvents and chlorine

Example: nutrition content

Mung Beans Sprouts Nutrition Facts

Serving Size: 3.5 ounces (100 grams), raw

	Amt. Per Serving		% Daily Value*
Calories	30		
Calories from Fat	2		
Total Fat	0 g		0%
Saturated Fat	0 g		0%
Trans Fat			
Cholesterol	0 mg		0%
Sodium	6 mg		0%
Total Carbohydrates	6 g		3%
Dietary Fiber	2 g		7%
Sugar	4 g		
Protein	3 g		
Vitamin A	0%	Vitamin C	22%
Calcium	1%	Iron	5%

**Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie*

Bean Shoots

Nutrition Facts

Serving Size: 100g (100 g)

	per serve
Kilojoules	79.99808 kj
Calories	19 kcal
Protein	2 g
Fat	0.5 g
Carbohydrate	1 g

Nutritional Summary:

Cals	Fat	Carbs	Prot
19	0.5g	1g	2g

There are **19 calories** in a 100g serving of Woolworths Bean Shoots.

Calorie Breakdown: **27% fat**, 24% carbs, 48% prot.

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Variable Factors affecting Cleaning

- Detergent concentration
  - Minimum effective concentration
    - Actives
    - Soil load
    - Water quality
    - Cleaning method
  - Always use higher levels than the minimum
    - Safety factor
  - Excessive concentrations
    - Excess foaming
    - Unwanted corrosion
    - OH&S issues

Variable Factors affecting Cleaning

- Temperature
  - Higher temperatures usually increase effectiveness
    - Decrease interfacial bond strength
    - Decrease in viscosity
    - Improves turbulent action
    - Increases solubility of soils
    - Increases chemical reaction rates
  - Some soils negatively effected by higher temperatures
    - Protein, eg: blood, egg, milk
  - Temperature selection
    - At least 2°C higher than fat residue melting point
    - Not higher than where remaining protein will be denatured
    - The surface may be damaged by a temperature that is too high
    - Refer to chemical specification for optimum operating temperature

Variable Factors affecting Cleaning

- Time
  - For any given situation and within limits cleaning effectiveness improves with increased contact time
    - Minimum effective cleaning time – below this unacceptable result
    - Maximum effective cleaning time – beyond this is wasted time
- Agitation (force or effort)
  - Effective agitation will always improve cleaning performance
- Application methods
  - Hand cleaning – “elbow grease”
  - Dishwasher
  - Machine scrub
  - Spray – low and high pressure
  - CIP (Cleaning In Place)
  - Soak
  - Foam

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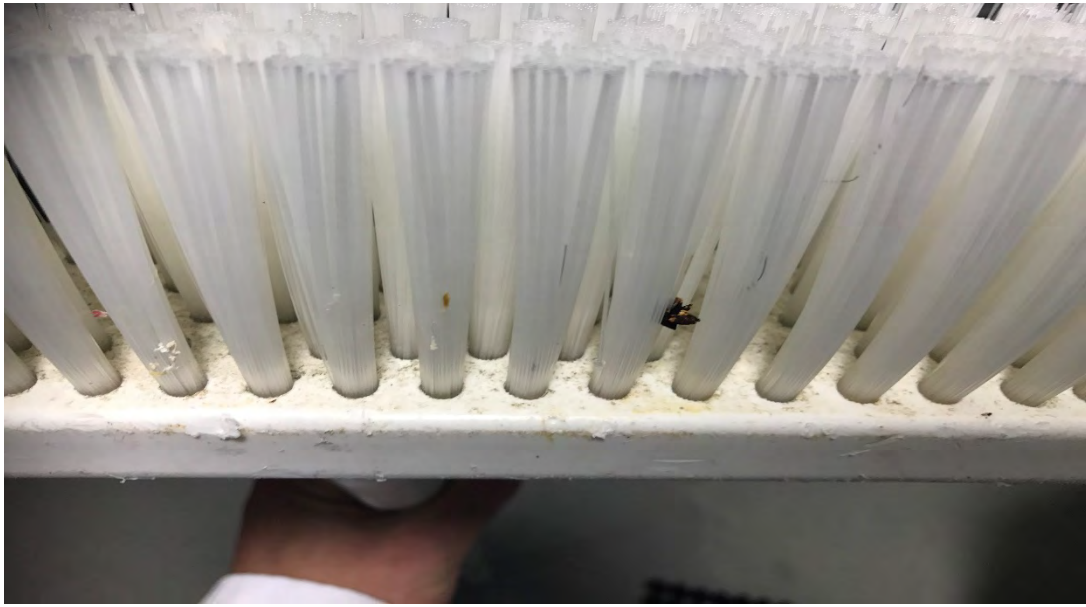
Cleaning a sprout farm

- Critical areas
  - Environmental cleaning

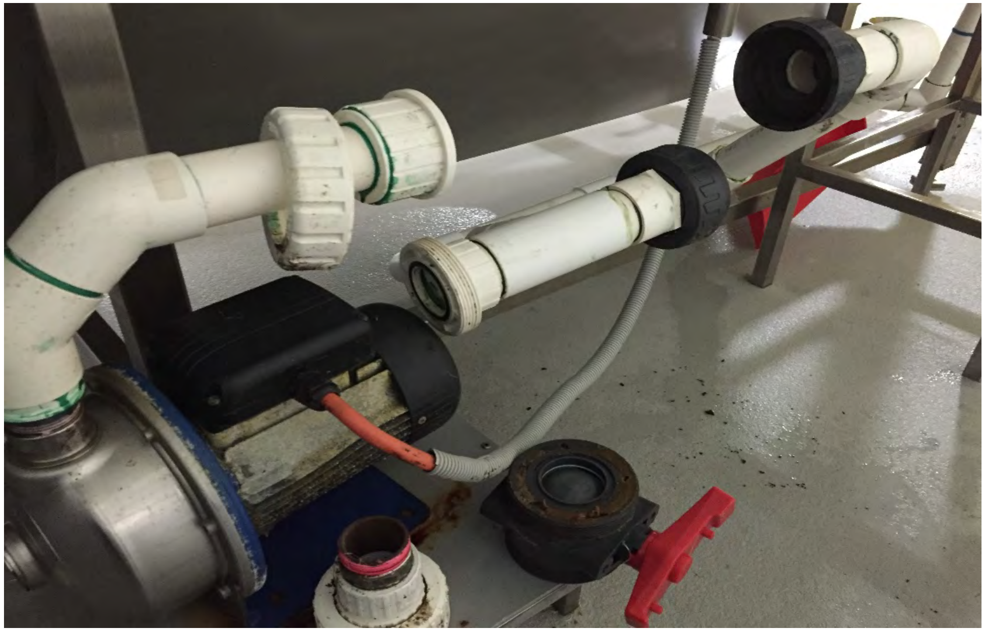


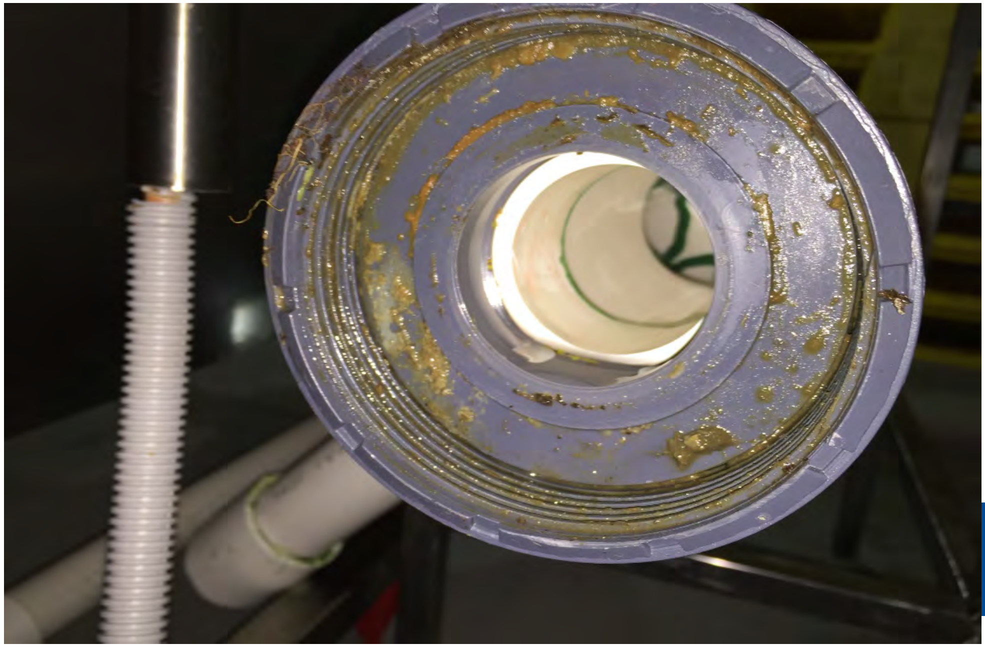
Cleaning a sprout farm

- Critical areas
  - Includes undersides of equipment

Cleaning a sprout farm

- Critical areas
  - CIP (valves and pumps)





Cleaning a sprout farm

- Critical areas
  - CIP (visually inspect piping)

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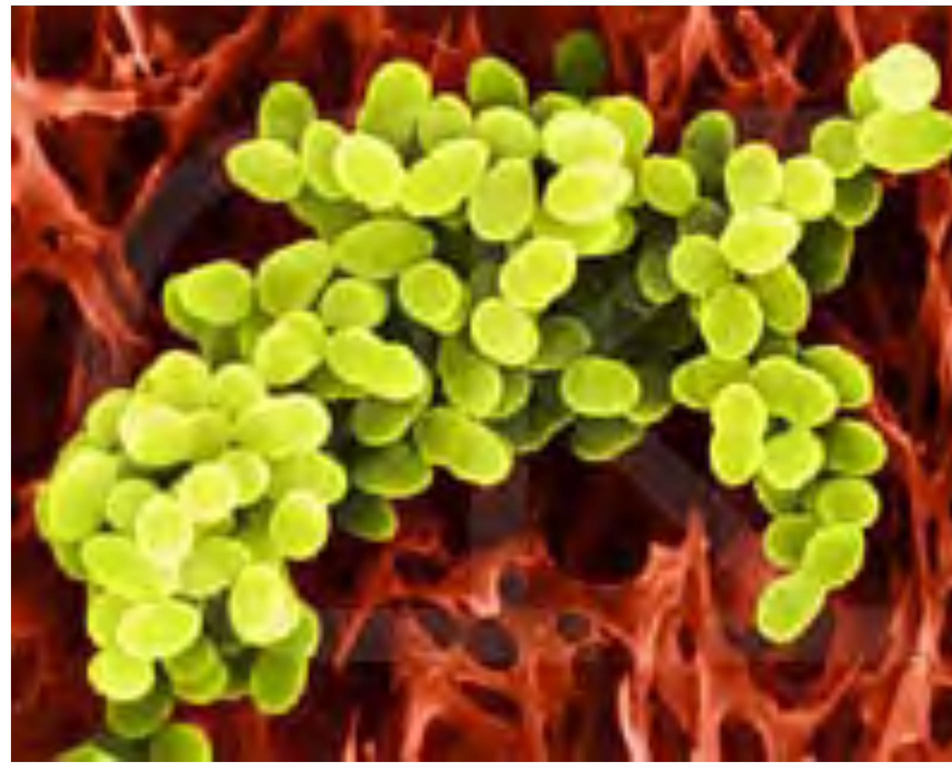
Chemical Sanitisers

- Sanitation – a definition (AS4709-2001)
  - A sanitiser is a chemical which reduces the number of micro-organisms in a food plant to a level at which they present a minimal risk to the health of the consumers or the quality of the product

- Other terms used
  - Disinfection
  - Sterilisation
  - Germicide
  - Antiseptic

Staphylococcus aureus (Golden Staph)



Variable Factors effecting Sanitation

- Soil load
  - Most sanitisers are rendered ineffective by high soil loads
    - Successful sanitation follows effective cleaning

- Concentration
  - Minimum level is critical to achieve satisfactory result
  - All use higher levels than the minimum
    - Safety factor
  - Excessive concentrations
    - Unwanted corrosion
    - OH&S issues

Variable Factors affecting Sanitation

- Temperature
  - Most sanitisers are used at ambient temperatures
    - No need to clean (the cleaning has already been done)
    - High temperatures can reduce stability, eg: chlorine
- Time
  - Minimum contact time is critical
- Range of microbial activity
  - Different sanitisers have different effective ranges on micro-organisms
- Accessibility
  - The sanitising solution must be able to contact the target organism

Variable Factors affecting Sanitation

- pH
  - Performance of sanitisers may be affected by changes in pH
    - Chlorine becomes unstable at low pH
    - Acid anionics don’t work at high pH
- Water hardness
- Incompatible agents
  - Residues of prior cleaning agents can nullify a sanitiser's effect
    - ➢An anionic surfactant (-) will react with a cationic sanitiser (+)

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Sanitising a Sprout farm

- All surfaces
  - Ensure solution contact
  - Verify sanitiser activity

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Sanitising a Sprout farm

- All surfaces
  - Sanispray sensitive equipment

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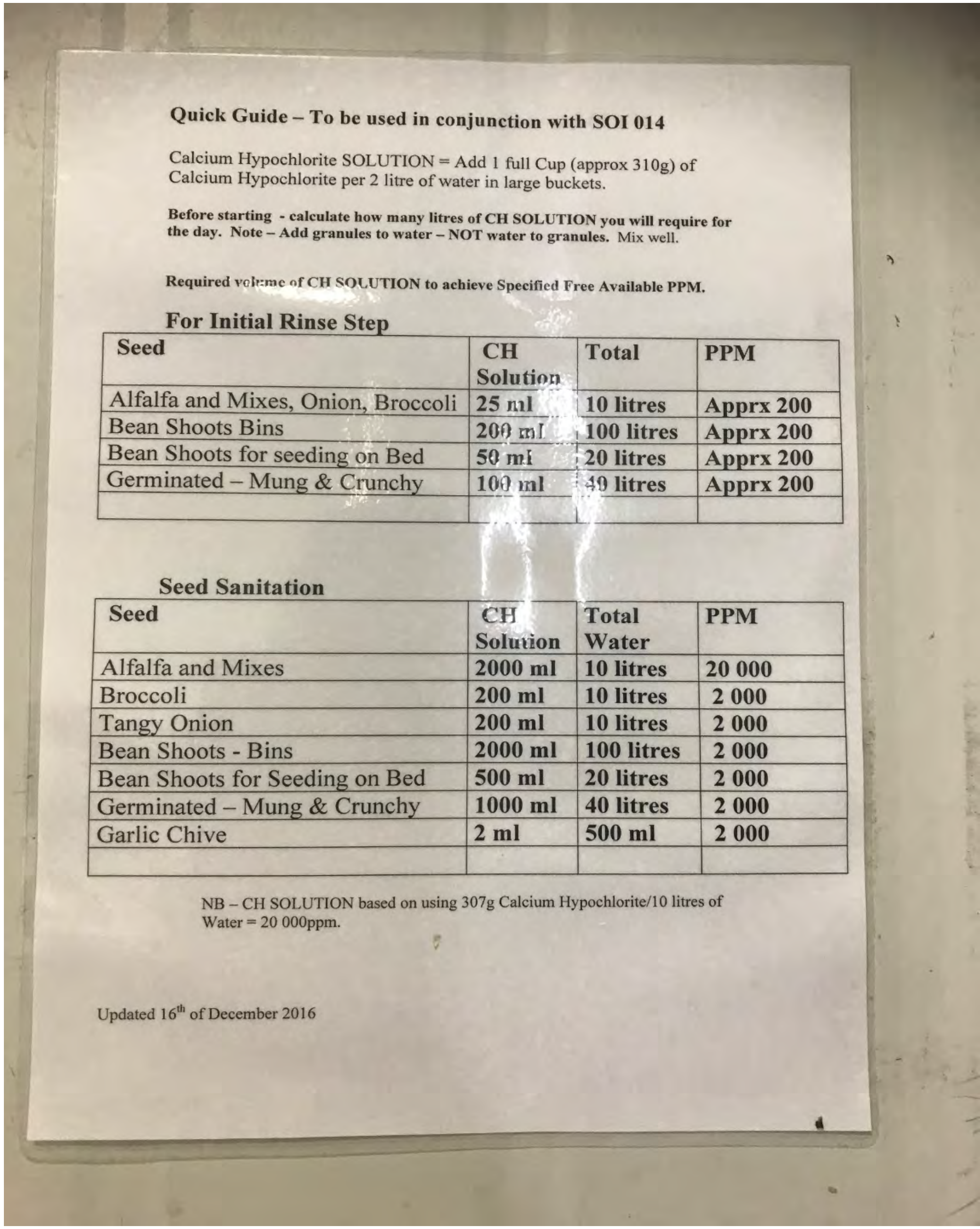
Sanitising a Sprout farm

- Seed sanitation
  - Verify sanitation guidelines
  - Correct hand hygiene



Quick Guide – To be used in conjunction with SOI 014

Calcium Hypochlorite SOLUTION = Add 1 full Cup (approx 310g) of Calcium Hypochlorite per 2 litre of water in large buckets.

Before starting - calculate how many litres of CH SOLUTION you will require for the day. Note – Add granules to water – NOT water to granules. Mix well.

Required volume of CH SOLUTION to achieve Specified Free Available PPM.

For Initial Rinse Step

Seed	CH Solution	Total	PPM
Alfalfa and Mixes, Onion, Broccoli	25 ml	10 litres	Apprx 200
Bean Shoots Bins	200 ml	100 litres	Apprx 200
Bean Shoots for seeding on Bed	50 ml	20 litres	Apprx 200
Germinated – Mung & Crunchy	100 ml	40 litres	Apprx 200

Seed Sanitation

Seed	CH Solution	Total Water	PPM
Alfalfa and Mixes	2000 ml	10 litres	20 000
Broccoli	200 ml	10 litres	2 000
Tangy Onion	200 ml	10 litres	2 000
Bean Shoots - Bins	2000 ml	100 litres	2 000
Bean Shoots for Seeding on Bed	500 ml	20 litres	2 000
Germinated – Mung & Crunchy	1000 ml	40 litres	2 000
Garlic Chive	2 ml	500 ml	2 000

NB – CH SOLUTION based on using 307g Calcium Hypochlorite/10 litres of Water = 20 000ppm.

Updated 16th of December 2016

Chemical equipment

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Cleaner sanitisers

- Not the best option
- Organic load will always reduce sanitising efficiency
- Some sanitisers may help with cleaning
  - Quats
  - Chlorine
- Use with caution

Processing aids

- Chlorine
  - Seed sanitation
  - Water chlorination
- Peracetic acid
  - Bean shoot bath
- Hydrogen peroxide
- Ozonated water

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Making Choices

- Cleaners
  - Surface type
  - Soil type
  - Equipment design
  - Application method
  - OH&S

- Sanitisers
  - Surface type
  - Equipment design
  - Application method
  - Compatibility
  - Rinse / no rinse
  - OH&S

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Designing a programme

- Every programme will be different and needs to be carefully designed taking all factors into account

- Basic process is common to nearly all situations
  - Pre-clean
    - Prepare the environment
    - Remove gross soil contamination
    - Dismantle equipment
  - Pre-rinse
    - Remove water soluble and loose particulate
    - Normally cold or warm water

Designing a programme

- Clean
  - Using an appropriate cleaner
  - At the correct concentration and temperature
  - With ideal application method and equipment
- Rinse
  - To remove solubilised soils and cleaner
- Sanitise
  - Using an appropriate sanitiser
  - At the correct concentration and temperature
  - With ideal application method and equipment
- Rinse
  - To remove sanitising solution
- Dry
  - Usually air dry

Regulatory Authorities

- FDA
  - Food and Drug Administration
    - Controls approval of products in USA
    - Often referenced in Australia
- Certified Organic
  - Chemical guidelines
- TGA
  - Therapeutic Goods Administration
    - Mainly interested in toxic effects of chemicals
- FSANZ
  - Food Standards Australia and New Zealand

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