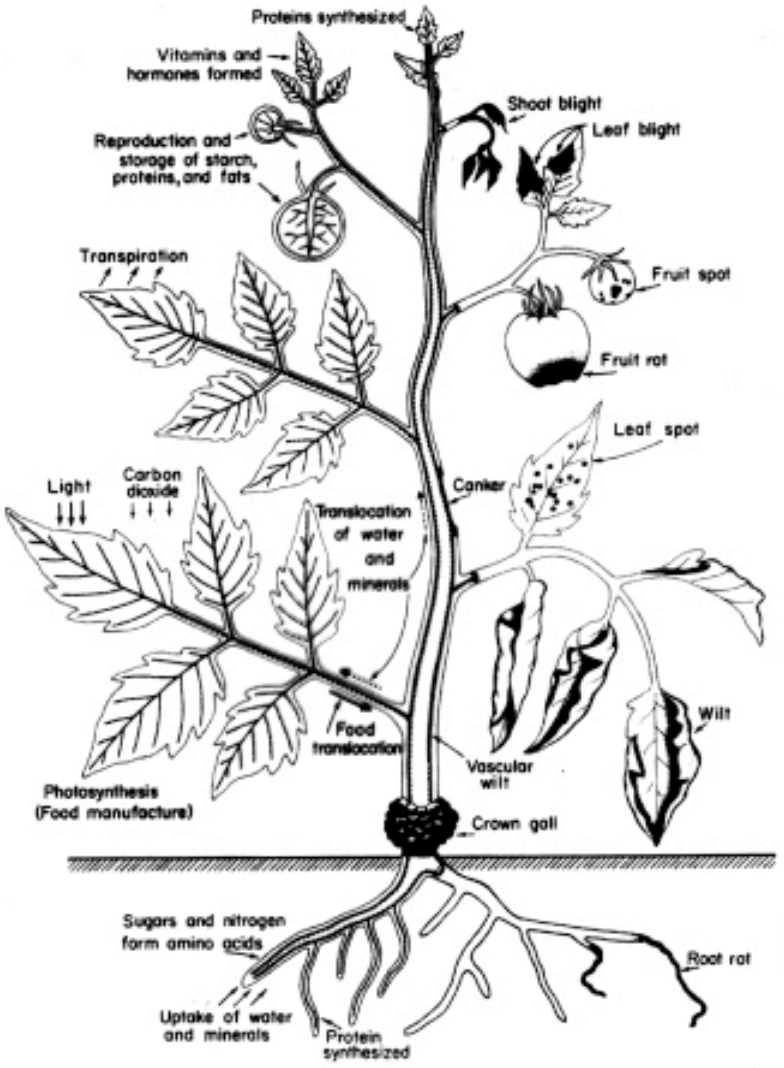
# AVONROD
PLANT PROTECTION c.c.

## SUPPLIER OF HORTICULTURAL CHEMICALS

*Robert Patterson*
*Tel: (011) 460 1901*
*Cell: 082 891 8399*


PEST CONTROL




Courtesy: G N Agrios

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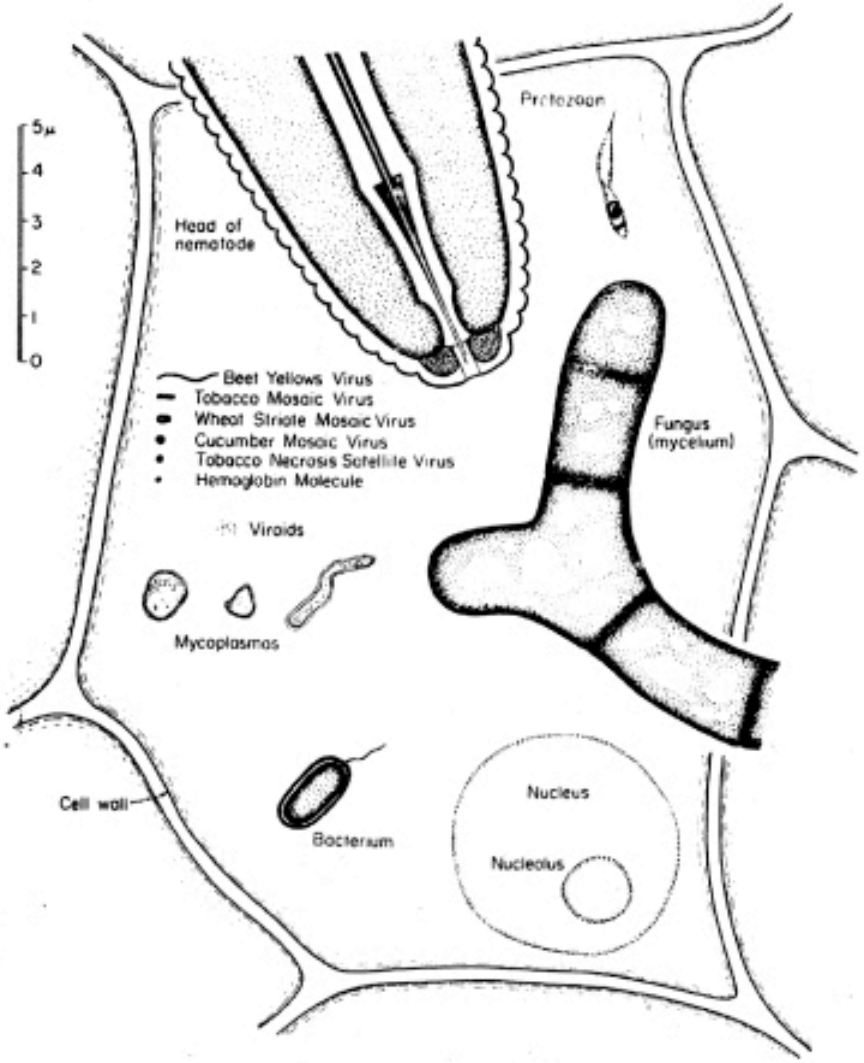


Schematic diagram of the shapes and sizes of certain plant pathogens in relation to a plant cell.

*Courtesy: G N Agrios*

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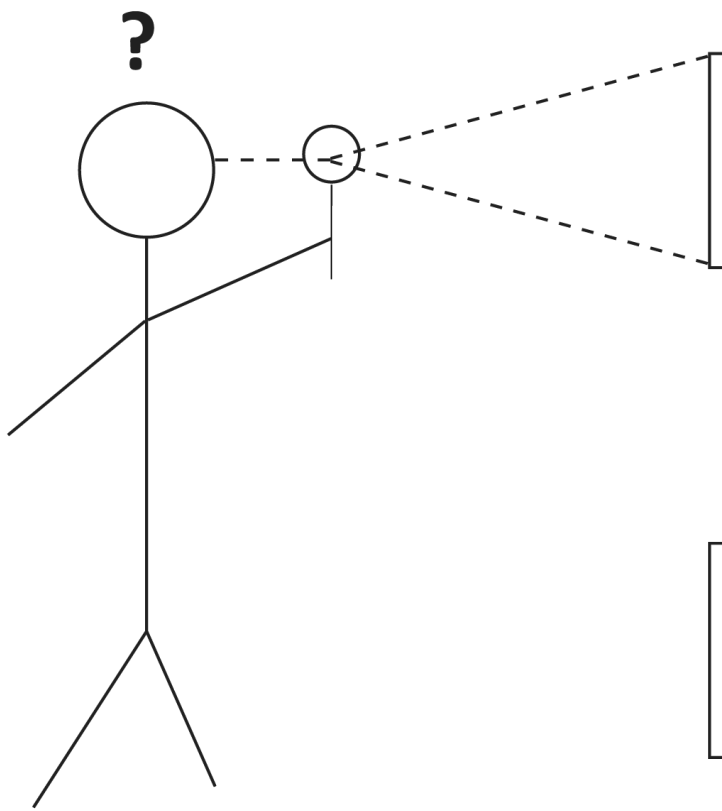
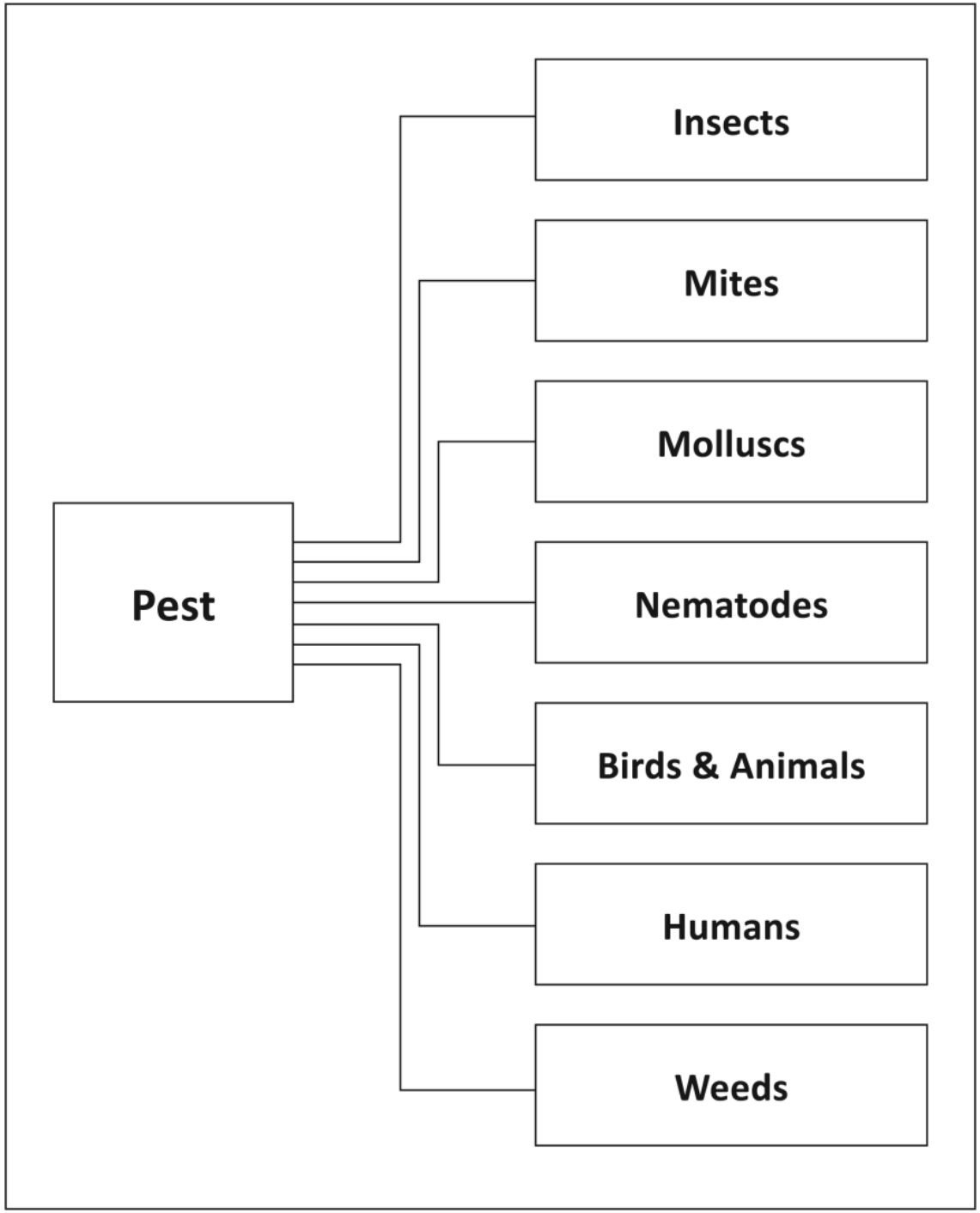
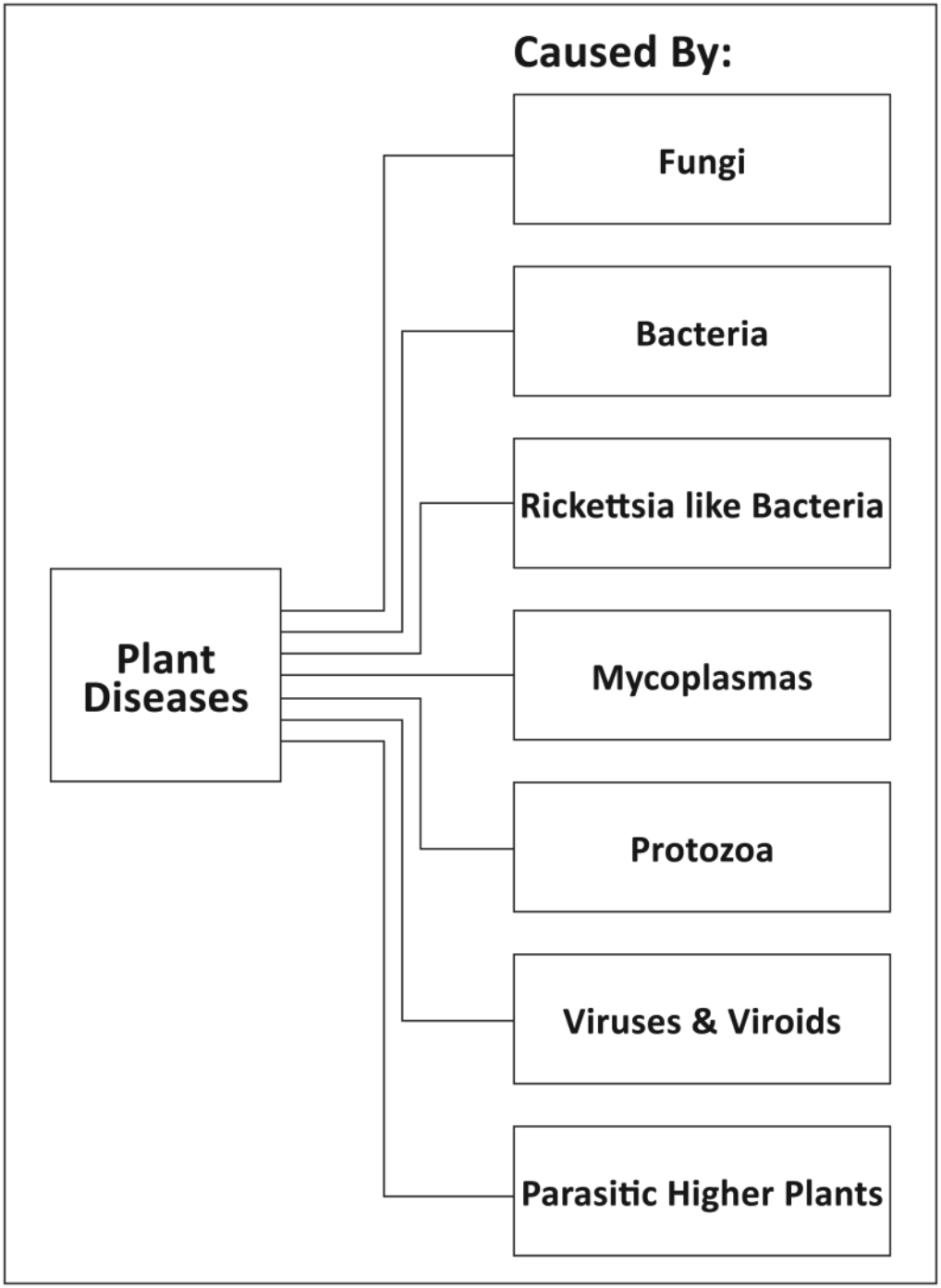



Pest

Plant Desease

Dissorder


Pest
Insects
Mites
Molluscs
Nematodes
Birds & Animals
Humans
Weeds


Caused By:
Fungi
Bacteria
Rickettsia like Bacteria
Plant Diseases
Mycoplasmas
Protozoa
Viruses & Viroids
Parasitic Higher Plants

**Infectious Plant Diseases**

Fungi
Bacteria
Mycoplasmas
protoza
Viruses & Viroids
Parasitic Higher plants
Nematodes

**Non infectious or Physiological Disorders**

Temperature
Moisture
Lack of Oxygen
Pollution
Nutrient Deficiencies / Toxicisities
Soil & water PH
phytotoxcisity (Pesticides)
Improper Agricultural Practices

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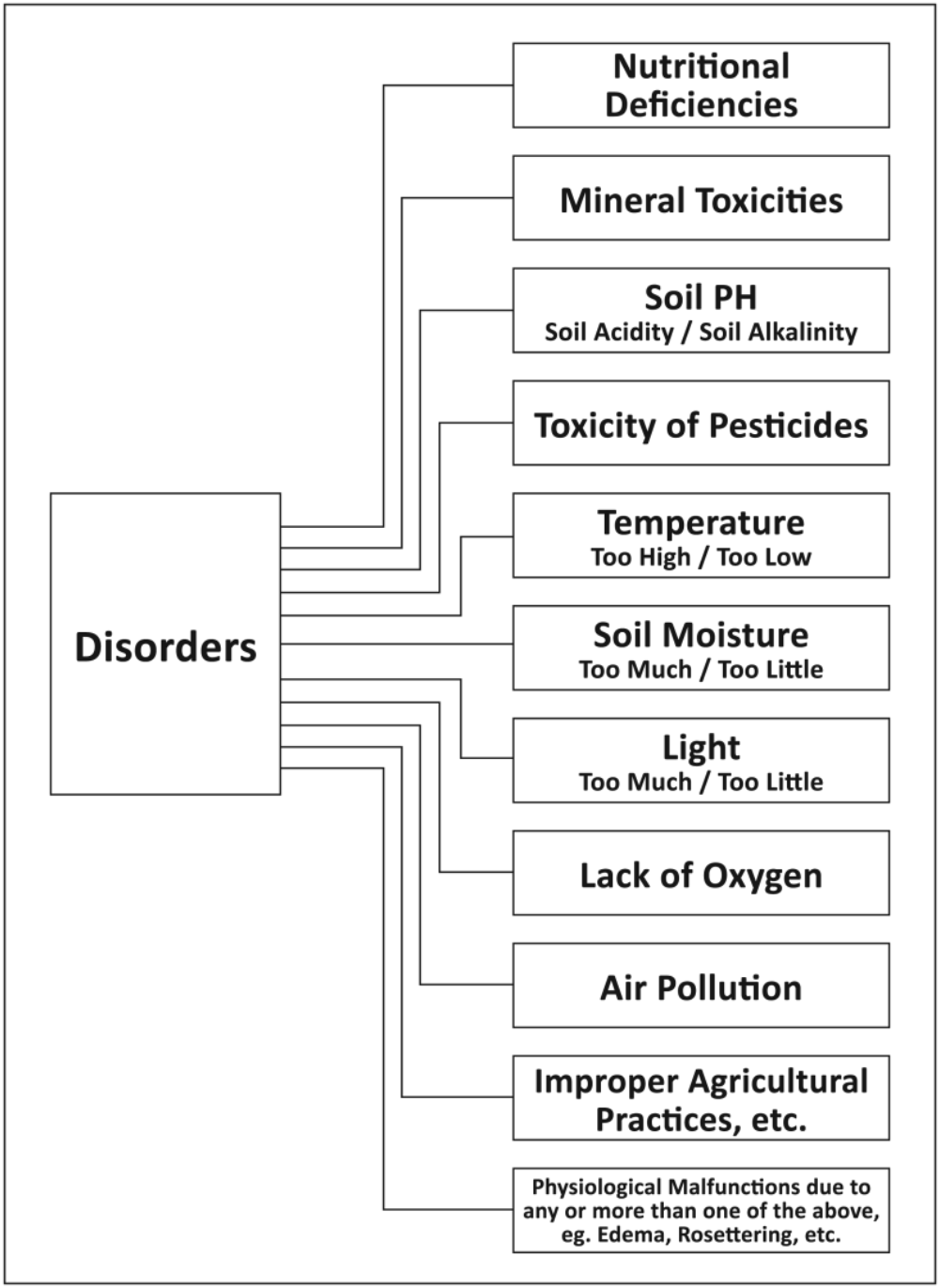
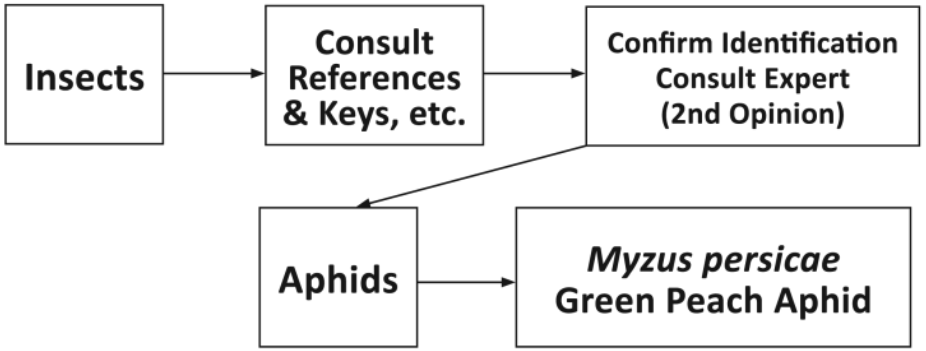
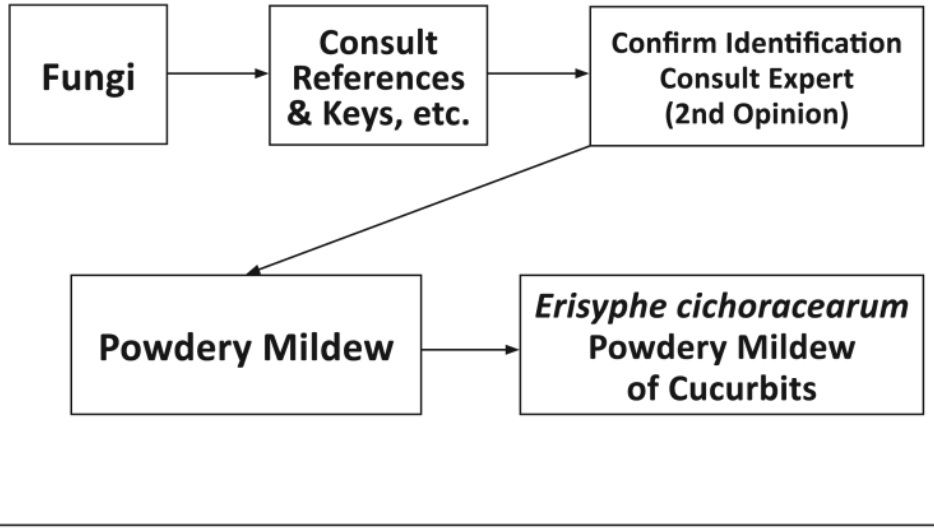
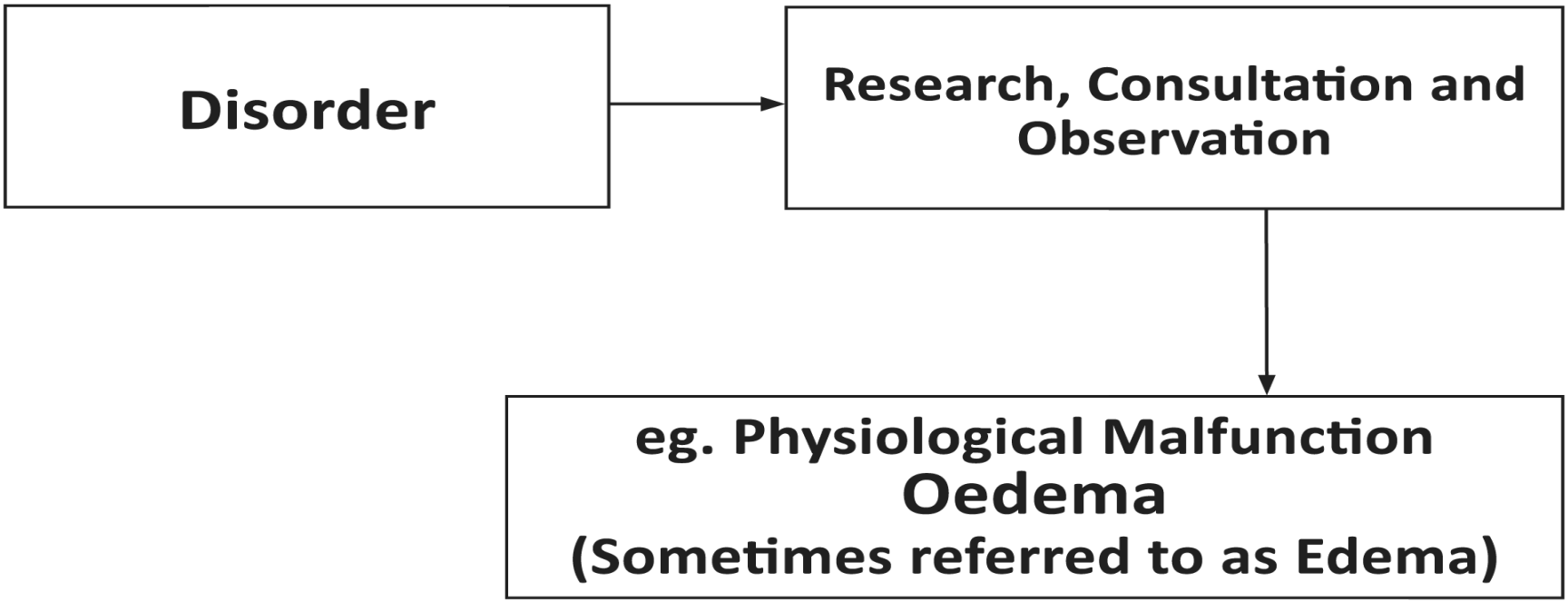

Disorders
Nutritional Deficiencies
Mineral Toxicities
Soil PH
Soil Acidity / Soil Alkalinity
Toxicity of Pesticides
Temperature
Too High / Too Low
Soil Moisture
Too Much / Too Little
Light
Too Much / Too Little
Lack of Oxygen
Air Pollution
Improper Agricultural Practices, etc.
Physiological Malfunctions due to any or more than one of the above, eg. Edema, Rosettering, etc.

## From there we can narrow it down further

## Some Examples:




Disorder
Research, Consultation and Observation
eg. Physiological Malfunction
Oedema
(Sometimes referred to as Edema)

# Spring Tails

# Mediterranean Fruit Fly

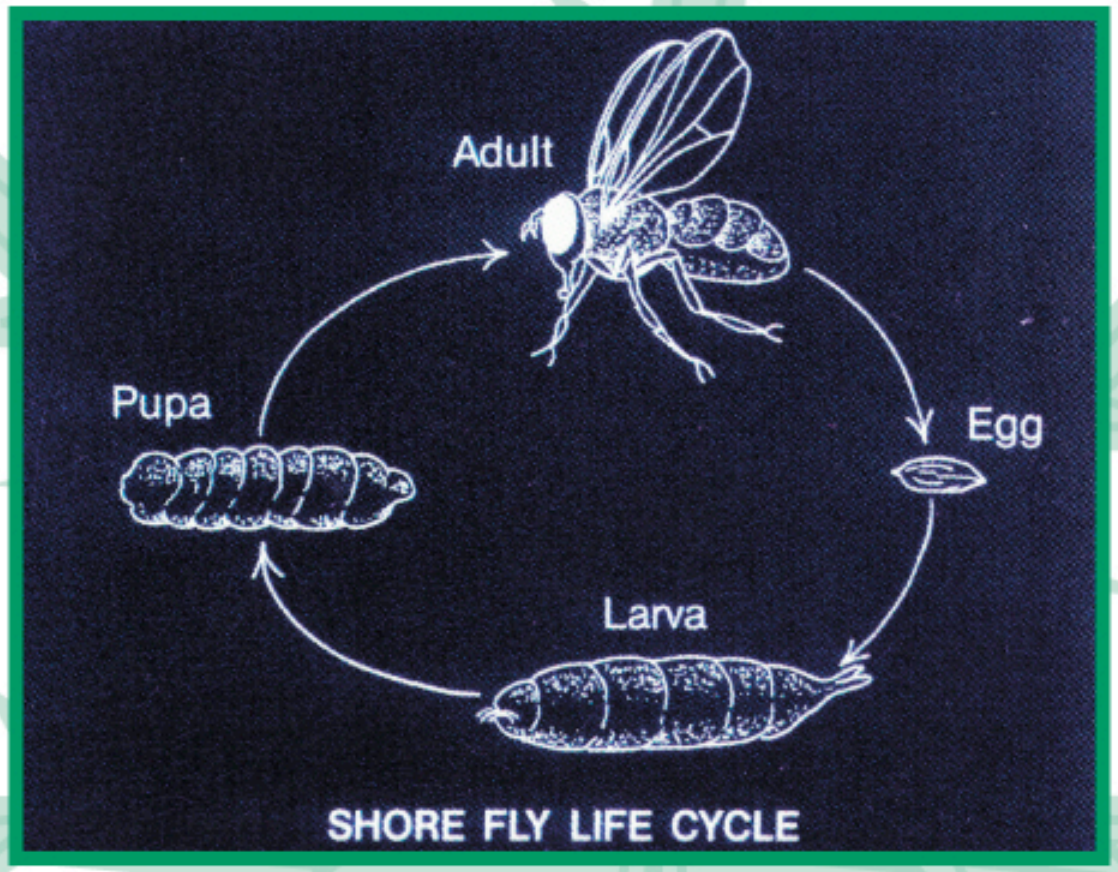
# Entomopathogenic fungi (House fly)

# Lace wing

# Lace Wing

# SHORE FLIES

*Order Diptera, Family Ephydridae*




***Shore fly life cycle***

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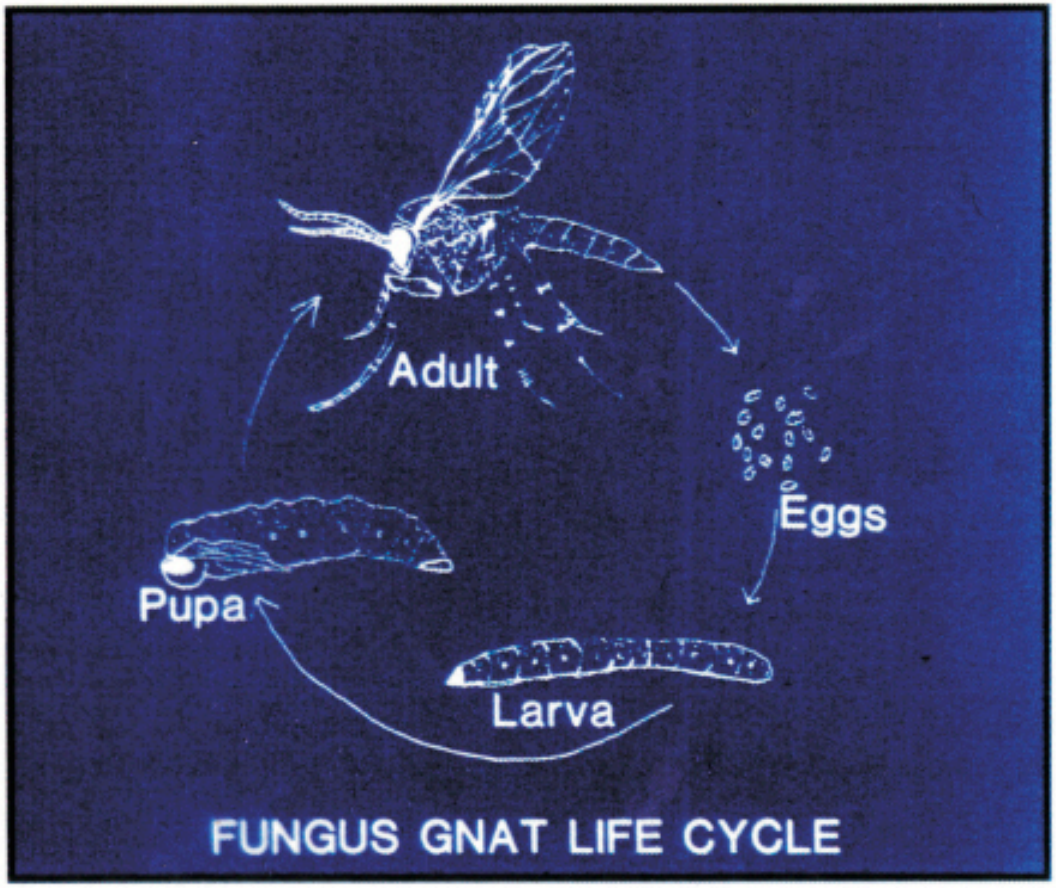
*Order Diptera, Family Sciaridae*

# FUNGUS GNATS

*Fungus gnat life cycle*

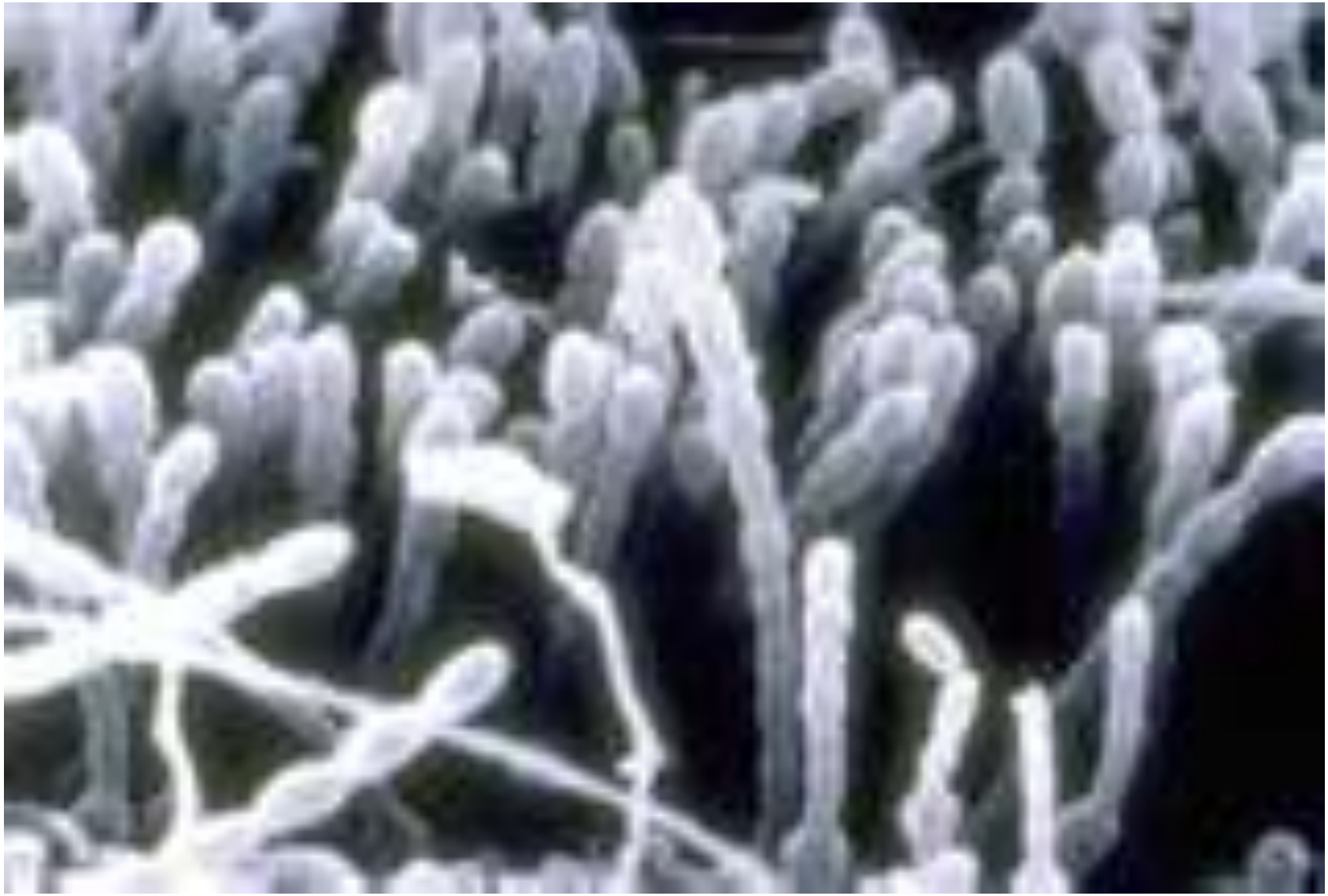



AVONROD PLANT PROTECTION cc

# Coffee Leaf Spot

- *Botrytis sp.*

- Powdery mildew *Oidium spp.*



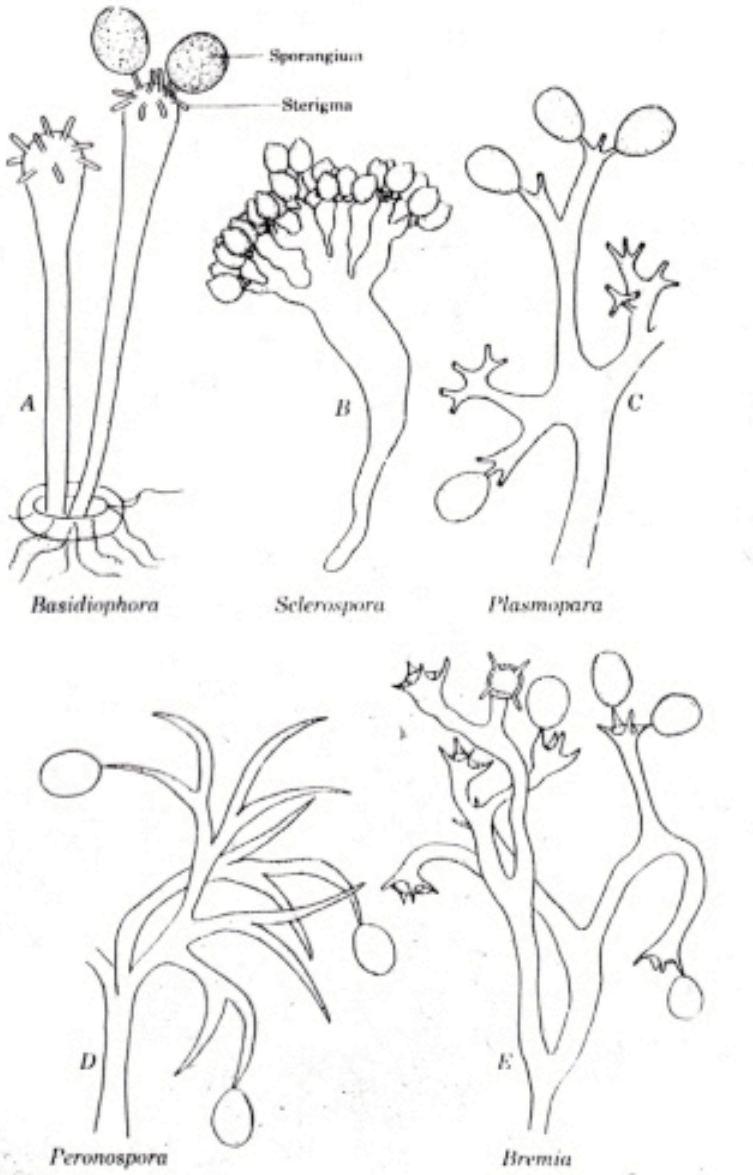



**Figure 23-26** Sporangiophores characteristic of five genera of **Peronosporaceae**. [(A) Redrawn from Corna, by permission, from the **Lower Fungi-Phycomycetes**, by H. M. Fitzpatrick (1930), McGraw-Hill Book Co. (B) Redrawn from Weston (1924), **J. Agr. Res.** 27:771–784.]

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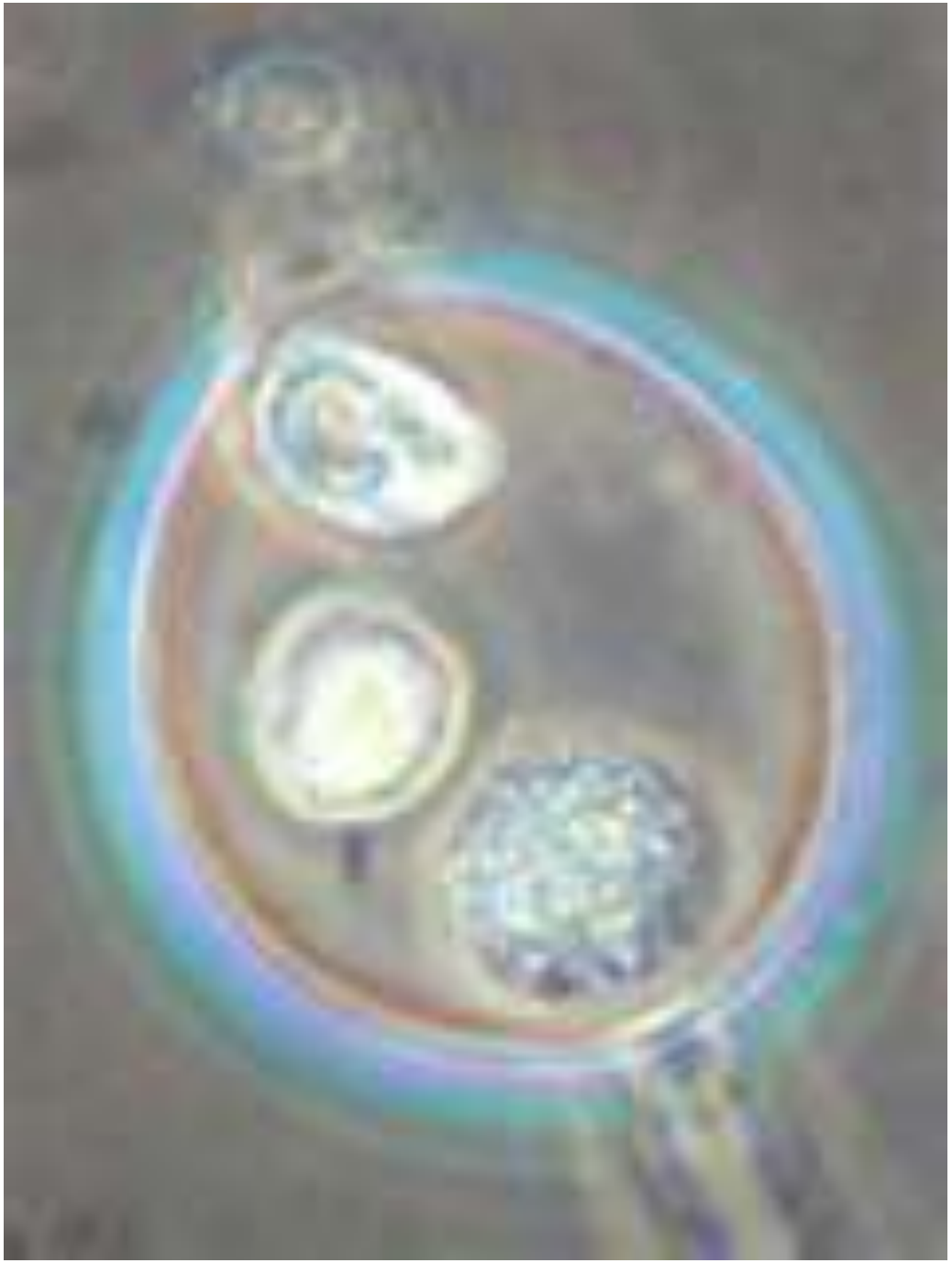
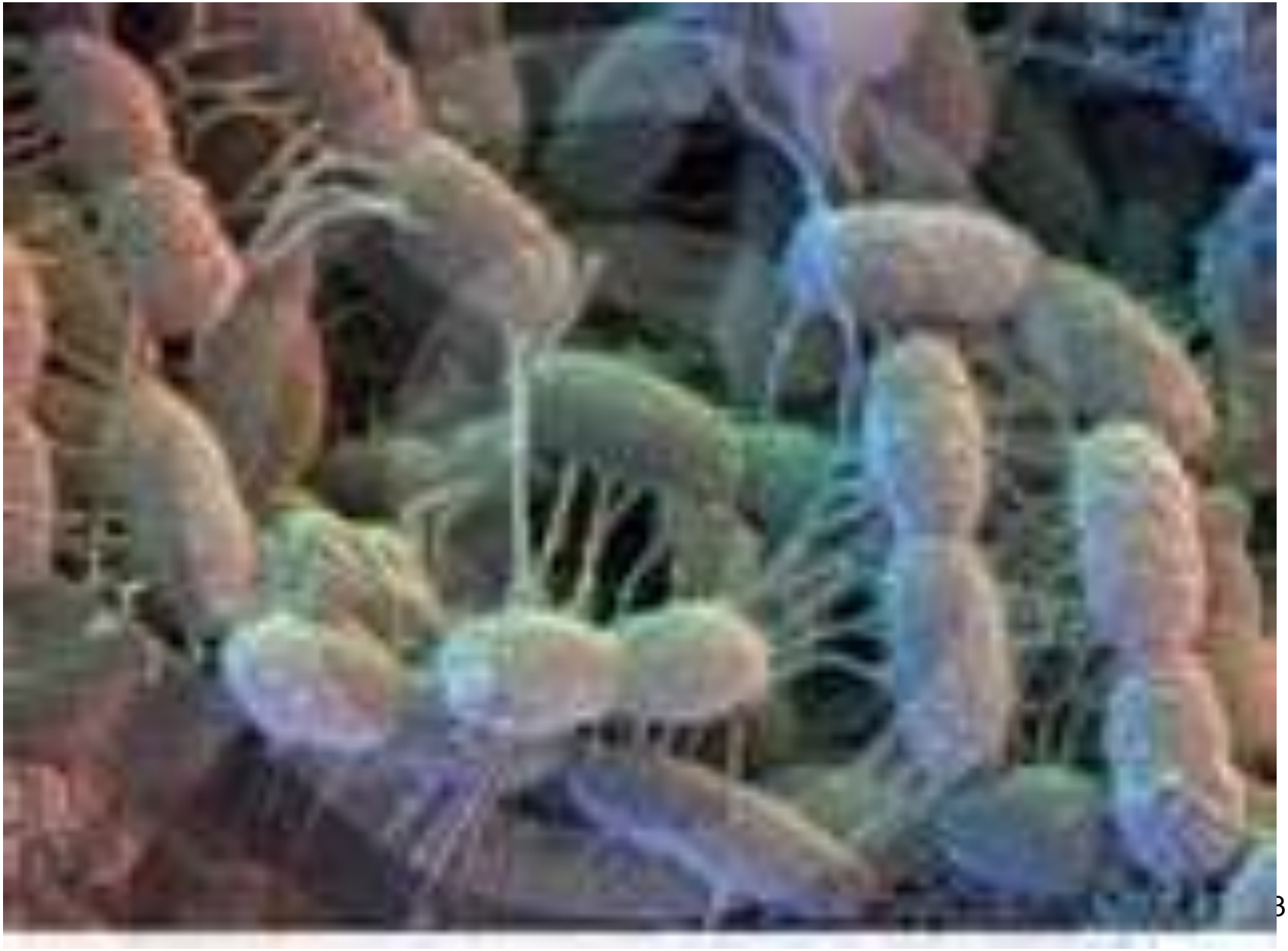
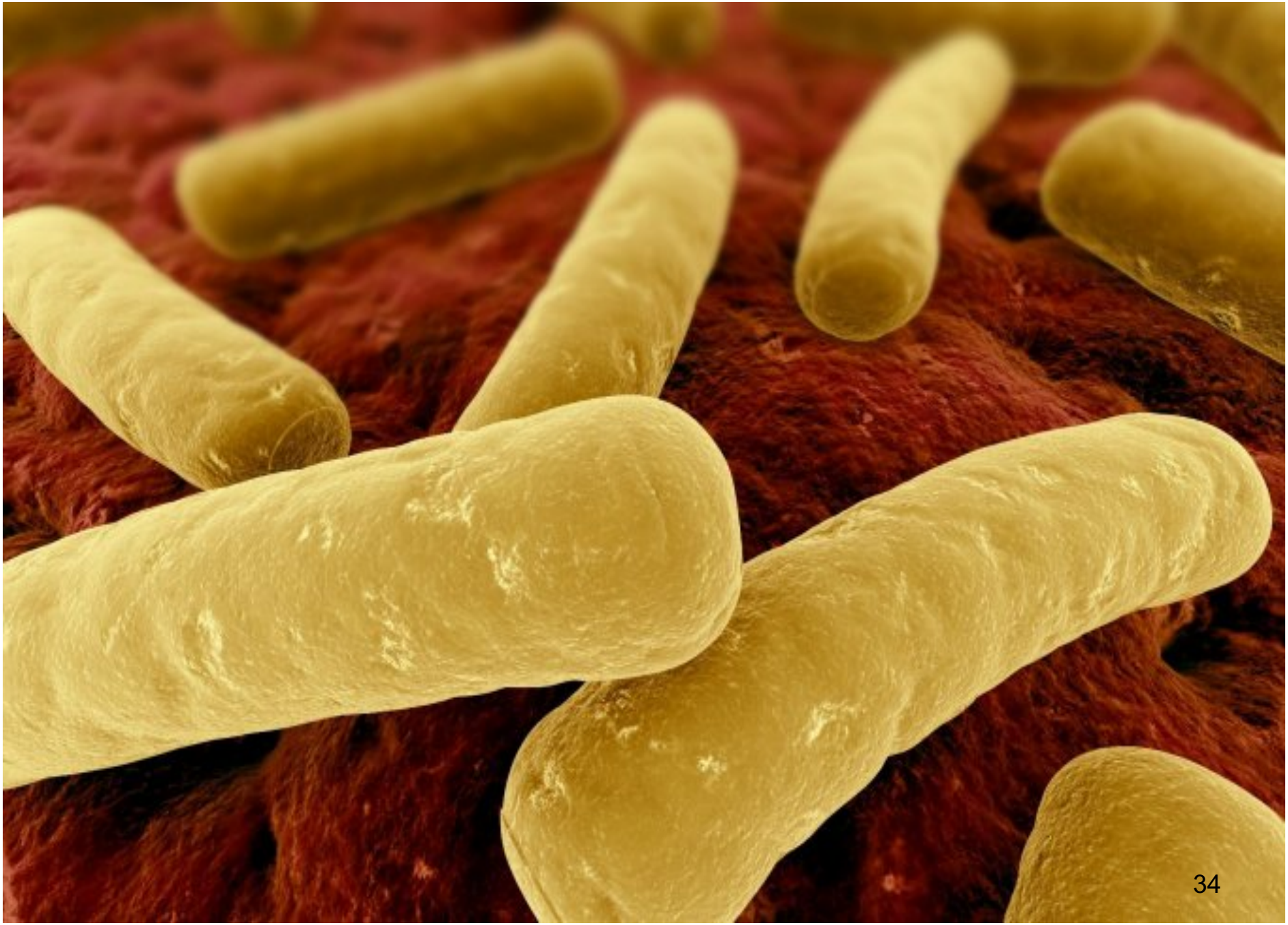
- Damping off

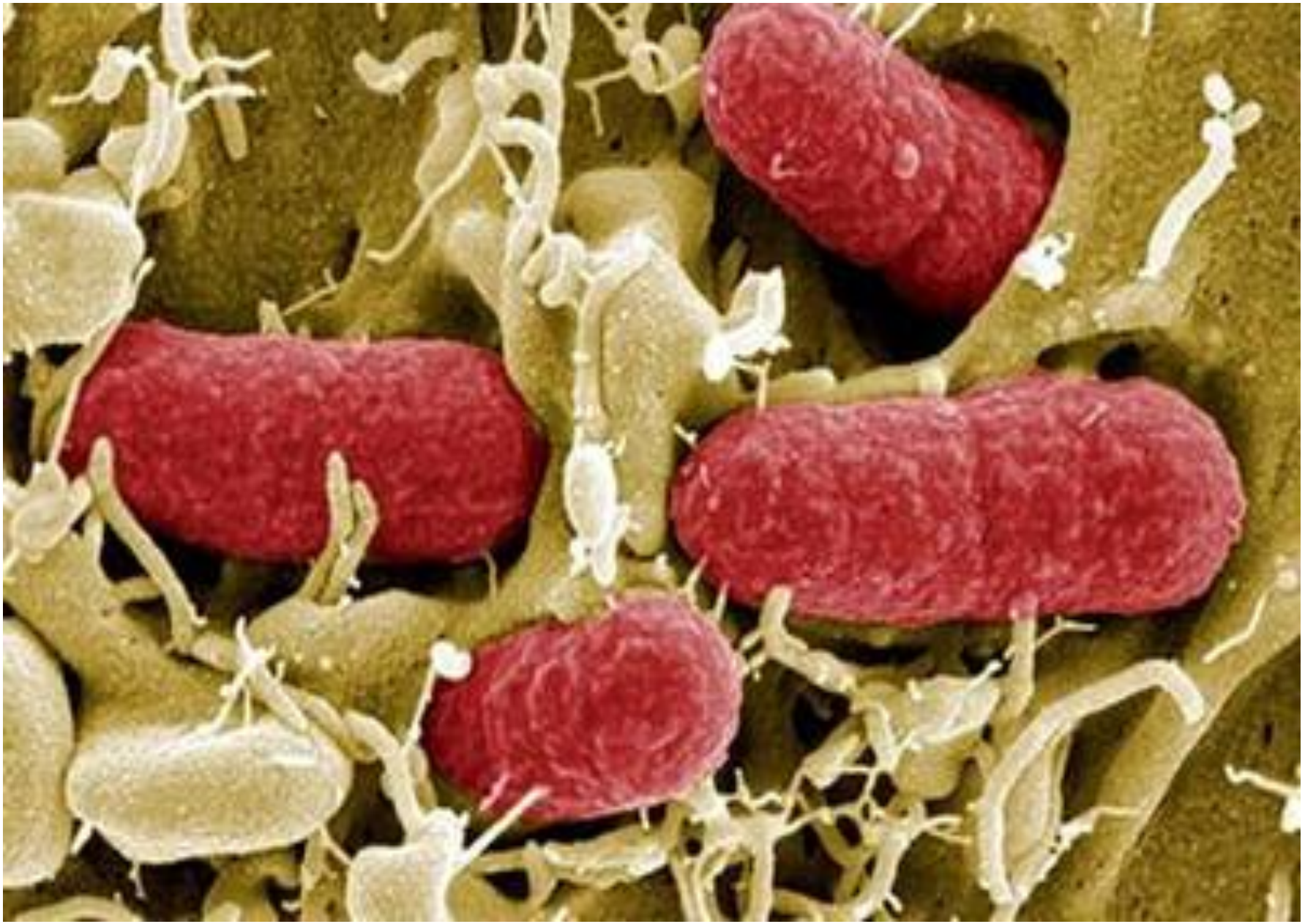
*Phytophtora spp.*



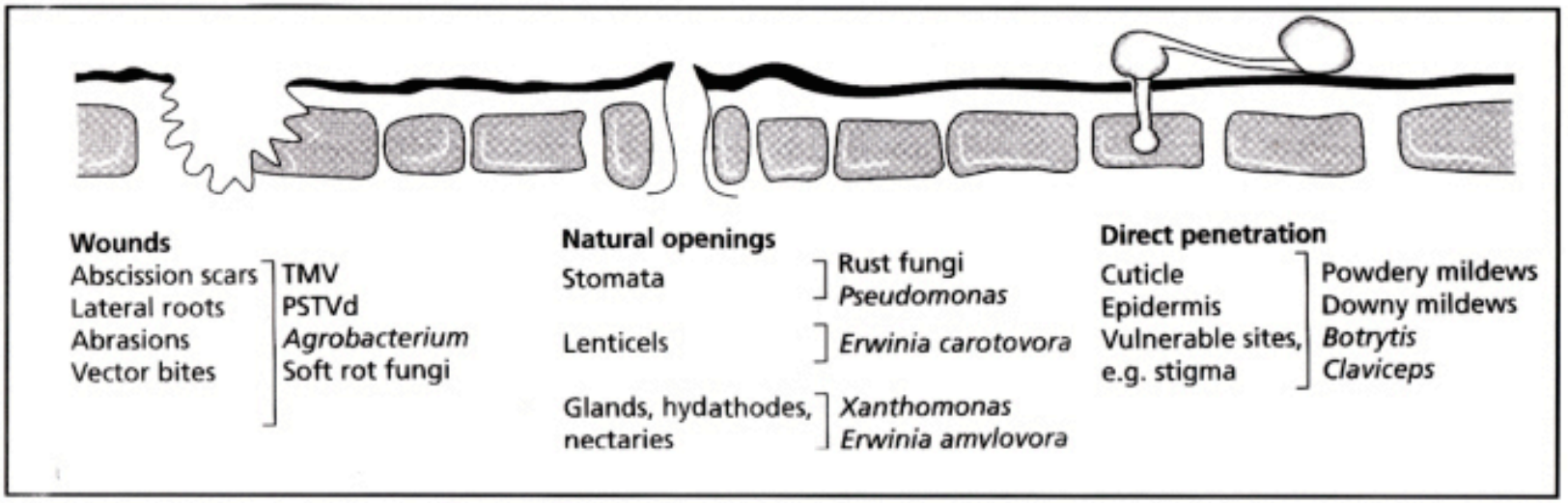
# Soil Bacteria







## Entry and Colonization of the Host




Some entry routes for plant pathogens. TMV, tobacco mosaic virus; PSTVd, potato spindle tuber viroid.

*Courtesy: John A Lucas*

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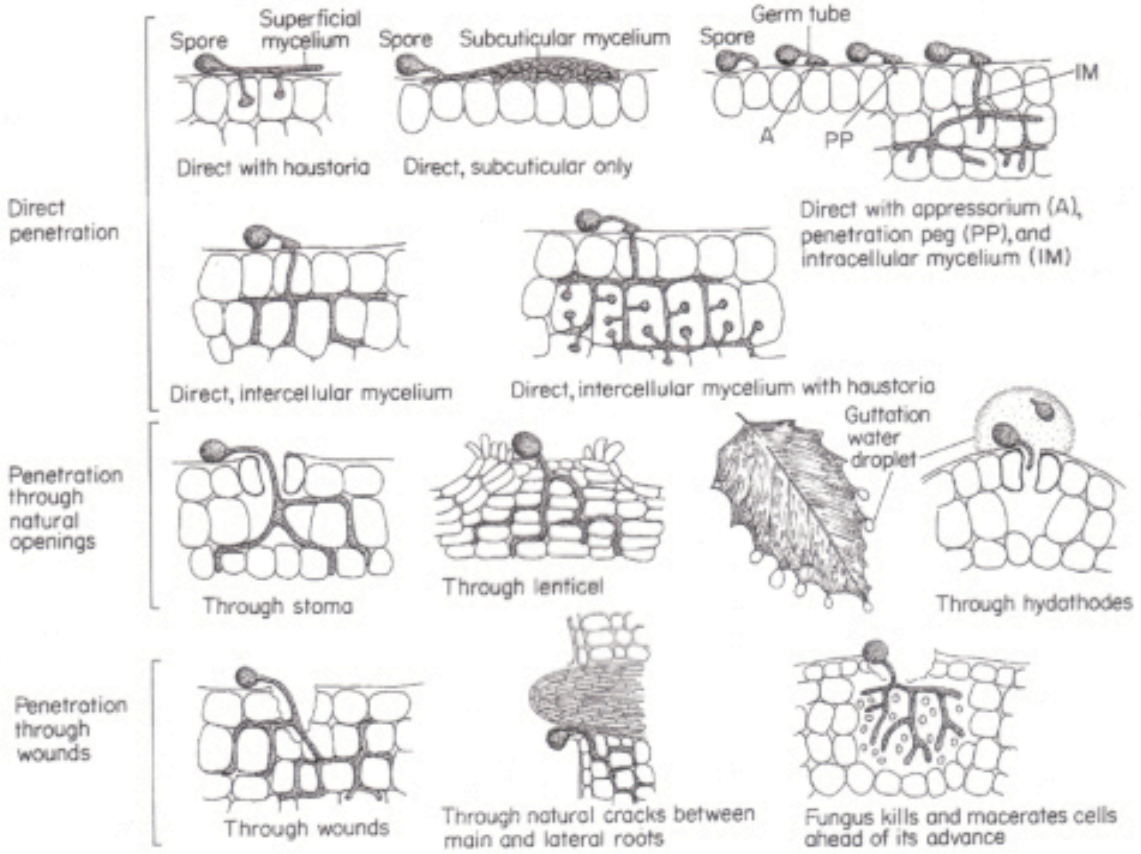


Methods of penetration and invasion by fungi.

Courtesy: G N Agrios

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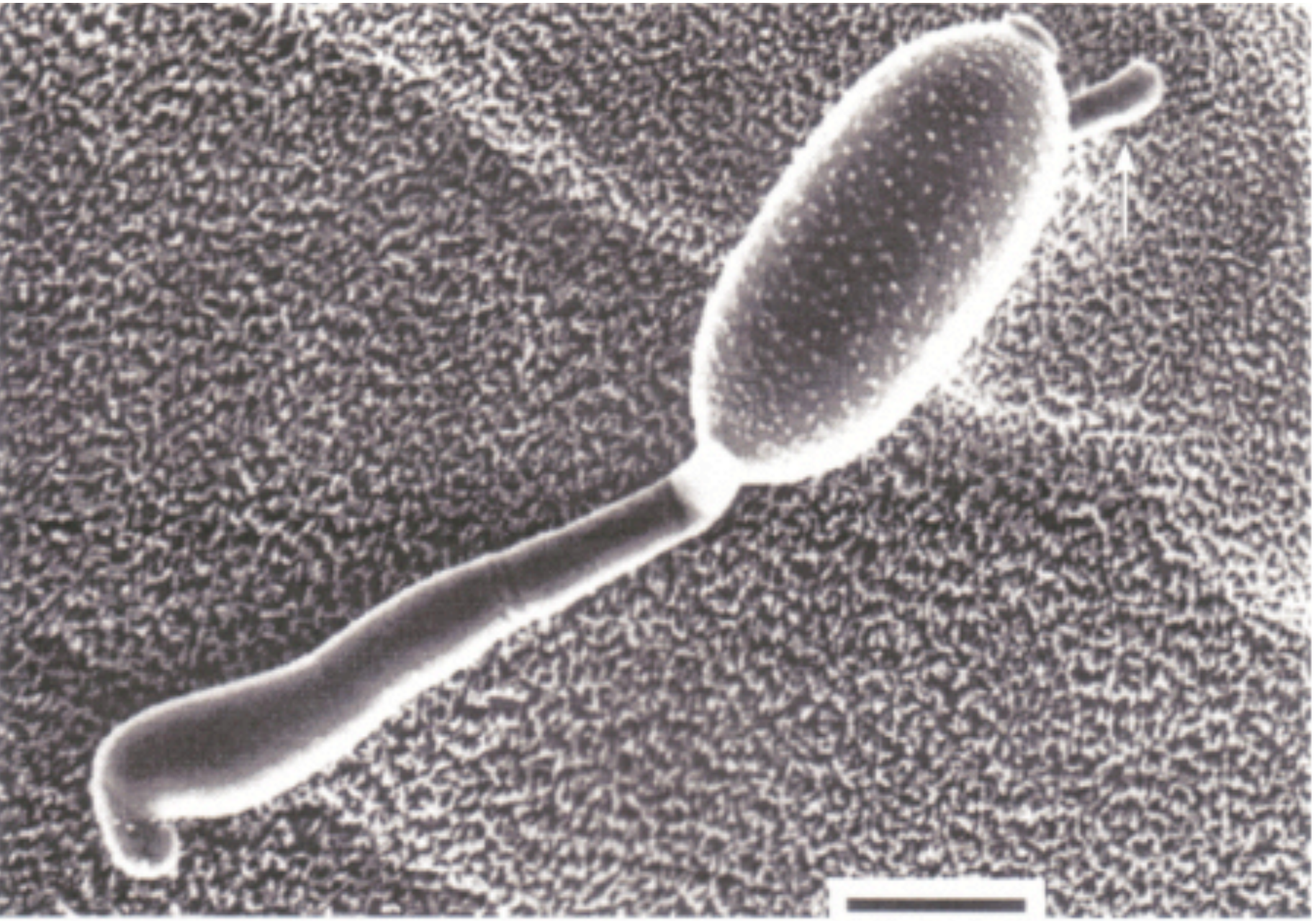
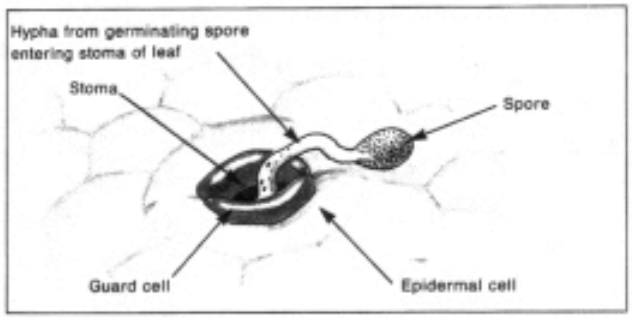
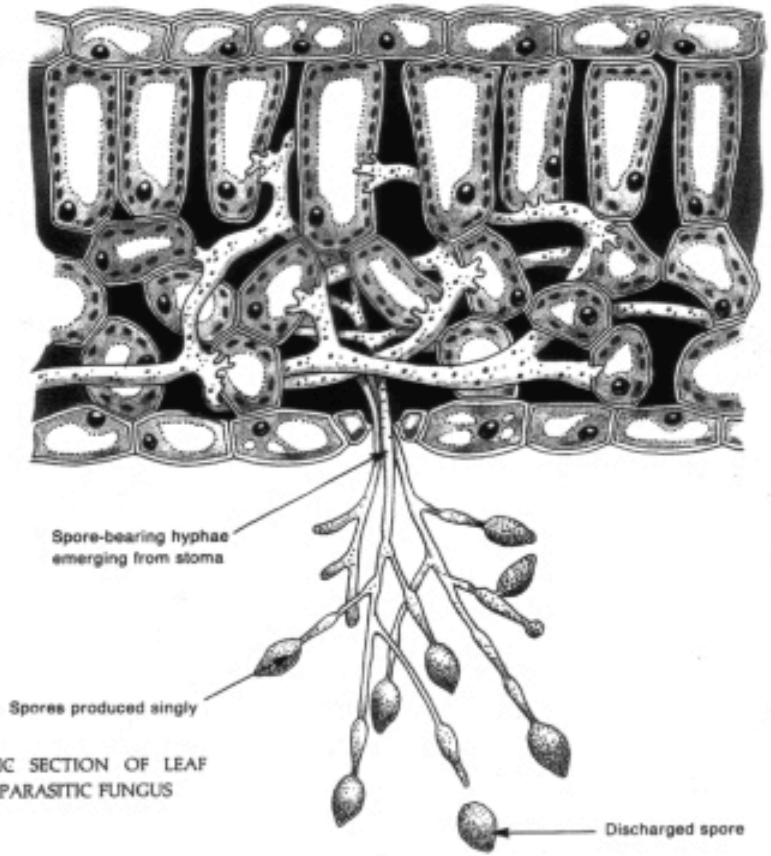

10μm




DIAGRAMMATIC SECTION OF LEAF ATTACKED BY PARASITIC FUNGUS

*Courtesy: Dekker and Fraser*

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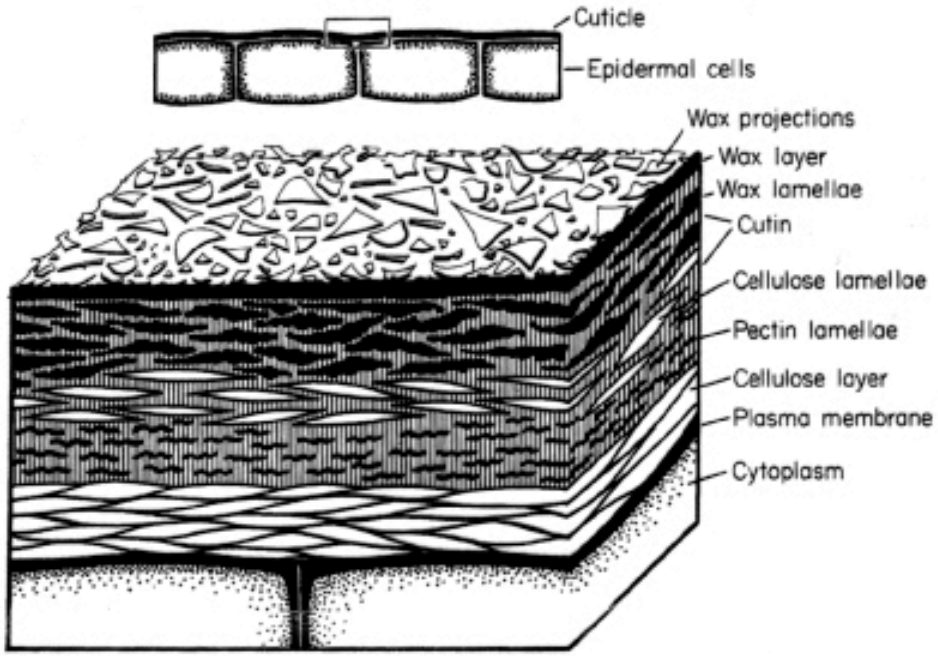


Schematic representation of the structure and composition of the cuticle and cell wall of foliar epidermal cells. [Adapted from Goodman, Király, and Zaitlin (1967). "The Biochemistry and Physiology of Infectious Plant Disease." Van Nostrand, Princeton, New Jersey.]

*Courtesy: G N Agrios*

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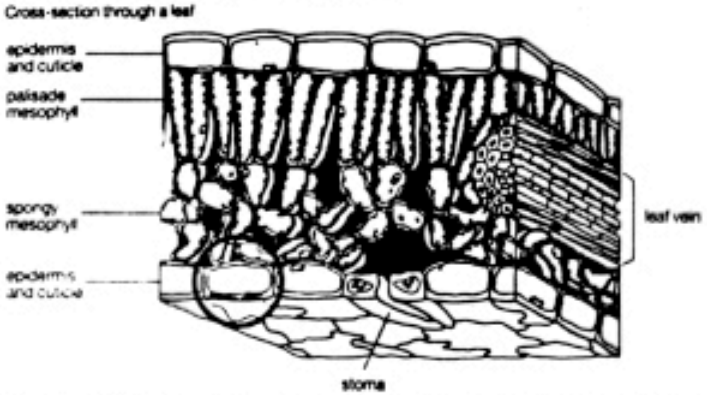
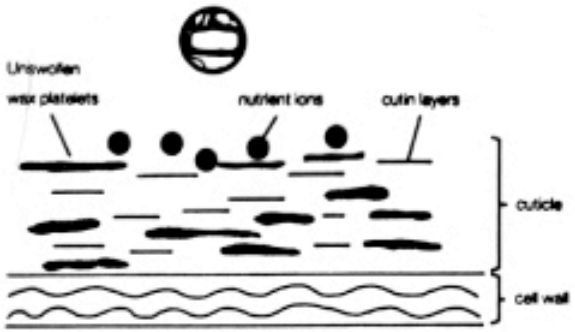
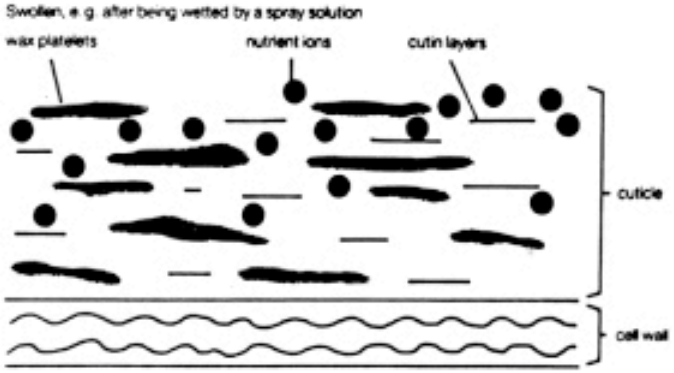
## How does foliar nutrient uptake work?




When it is swollen – after it has been wetted by a spray solution, for example – the cuticle, the outer layer of the leaf, expands. The nutrient ions can then penetrate the cuticle between the cutin layers and wax platelets, to reach the place where photosynthesis takes place via a process equivalent to nutrient uptake through the roots.

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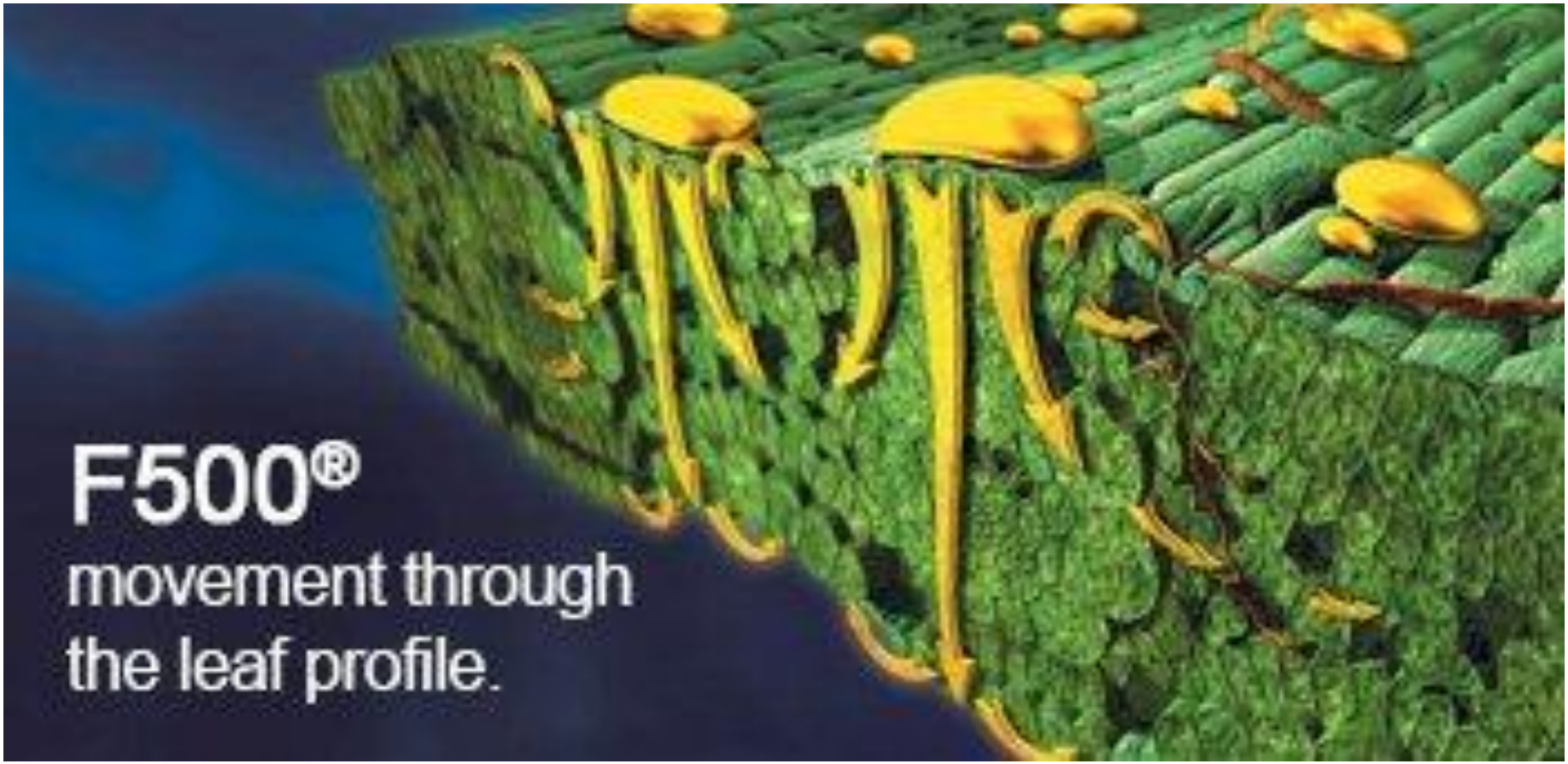
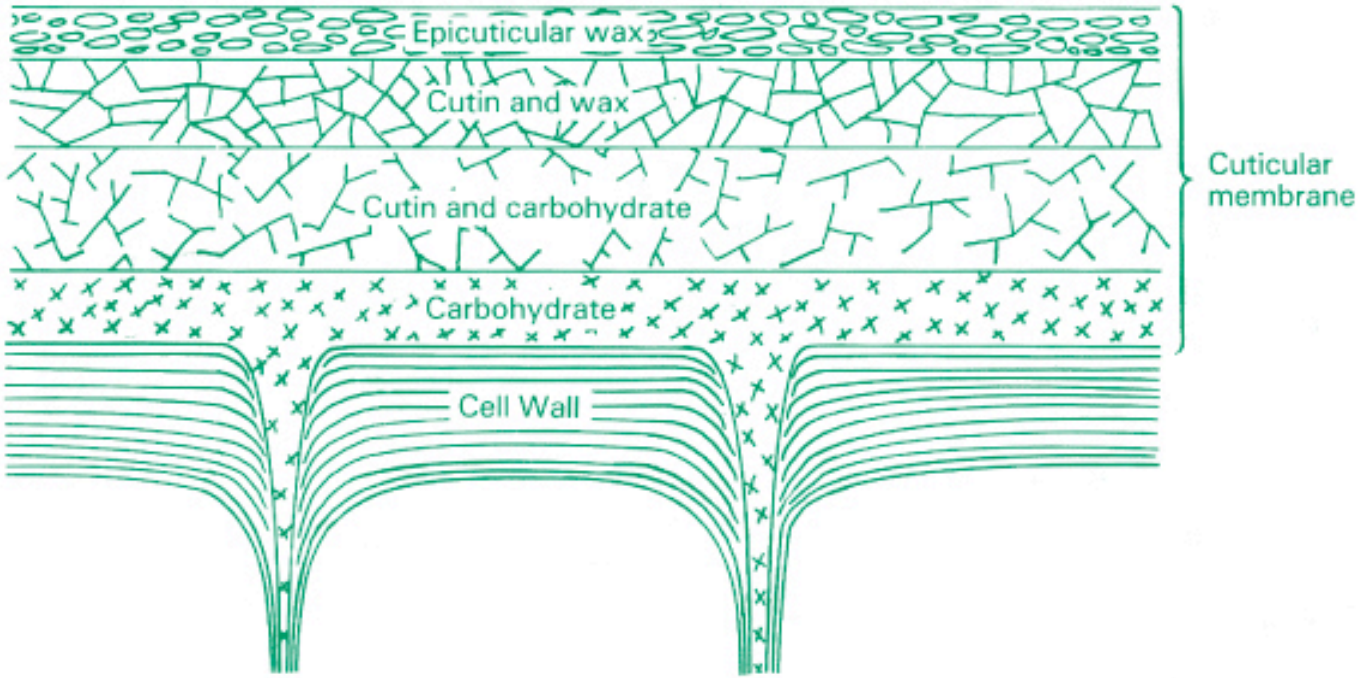

F500®
movement through
the leaf profile.




*Diagrammatic representation of the outer layers of an herbaceous plant*

Courtesy: D Gareth Jones

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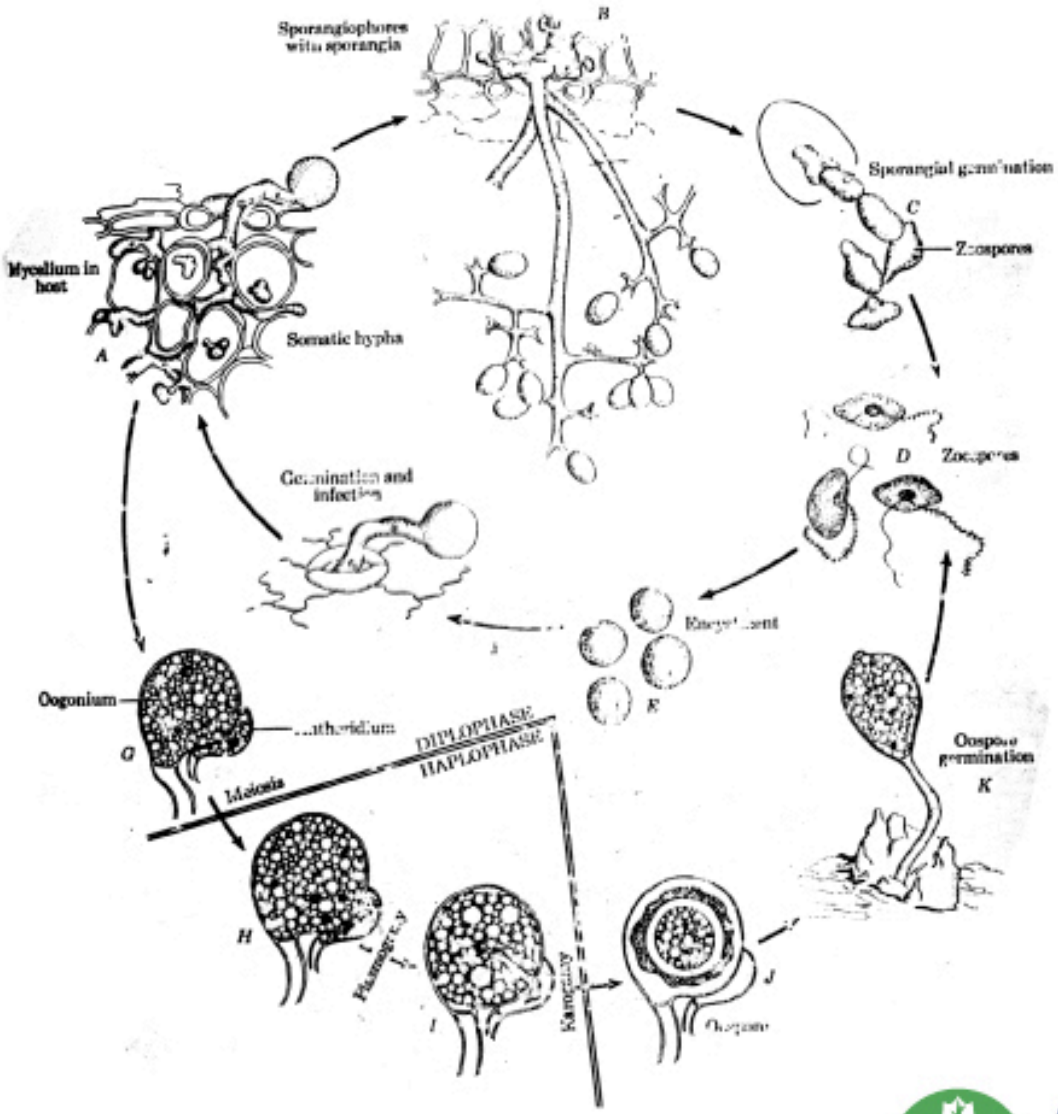


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**Stages in the Development of Plant Disease**

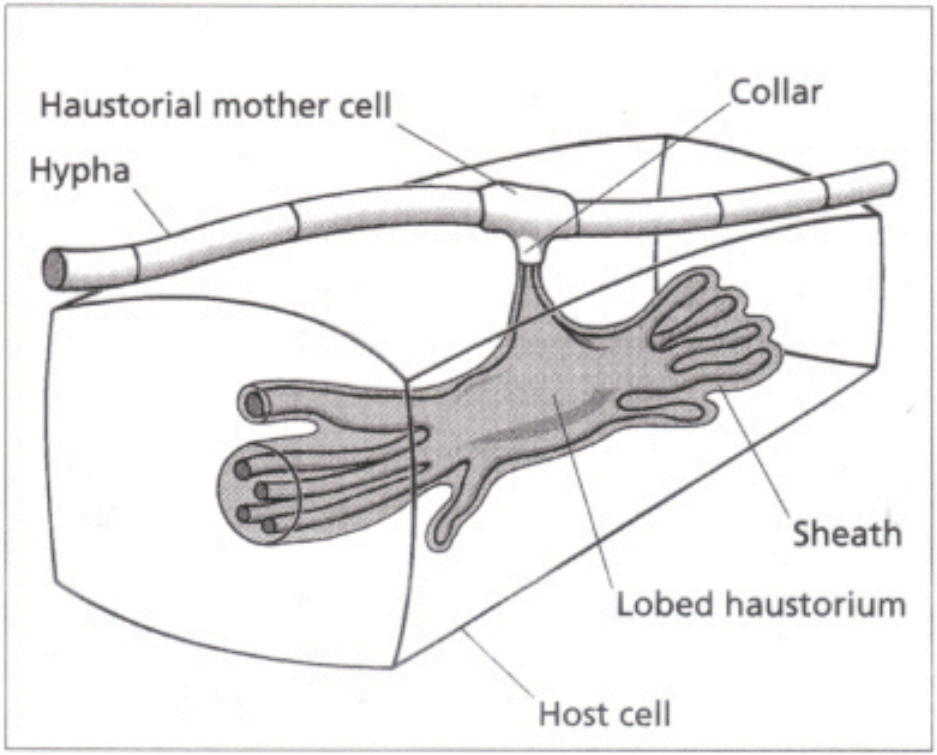
Inoculation

Penetration

infection/Invasion

Growth & Reproduction

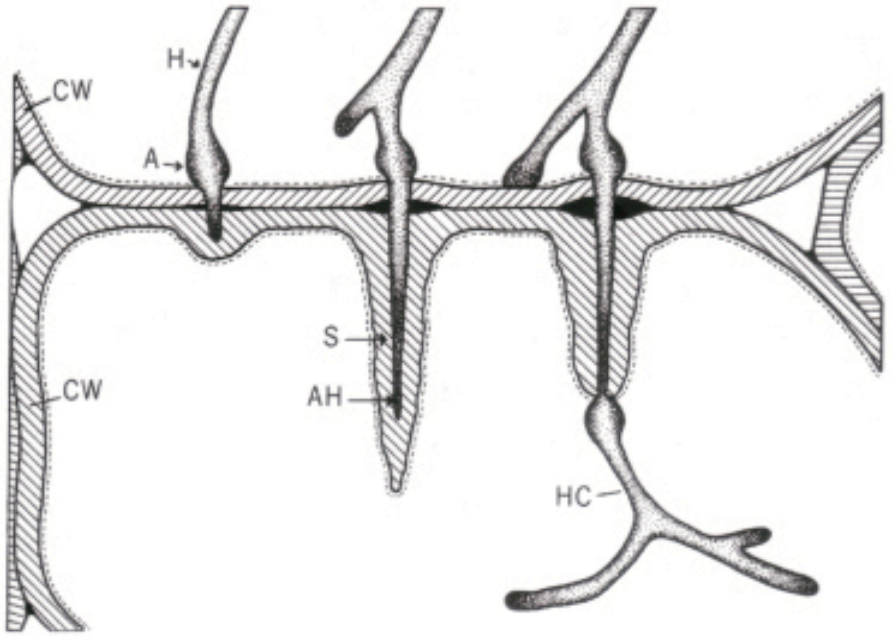
Dissemination




**Specialized parasitic structures, known as haustoria, formed by the powdery mildew fungus, *Erysiphe graminis*.**

Diagrammatic interpretation showing the fungal hypha on the leaf surface and a haustorium within the epidermal cell. (After Bracker 1968.)

*Courtesy: John A Lucas*




Formation of sheath around hypha penetrating a cell wall. CW = cell wall; H = hypha; A = appressorium; AH = advancing hypha still enclosed in sheath; HC = hypha in cytoplasm; S = sheath.

*Courtesy: G N Agrios*

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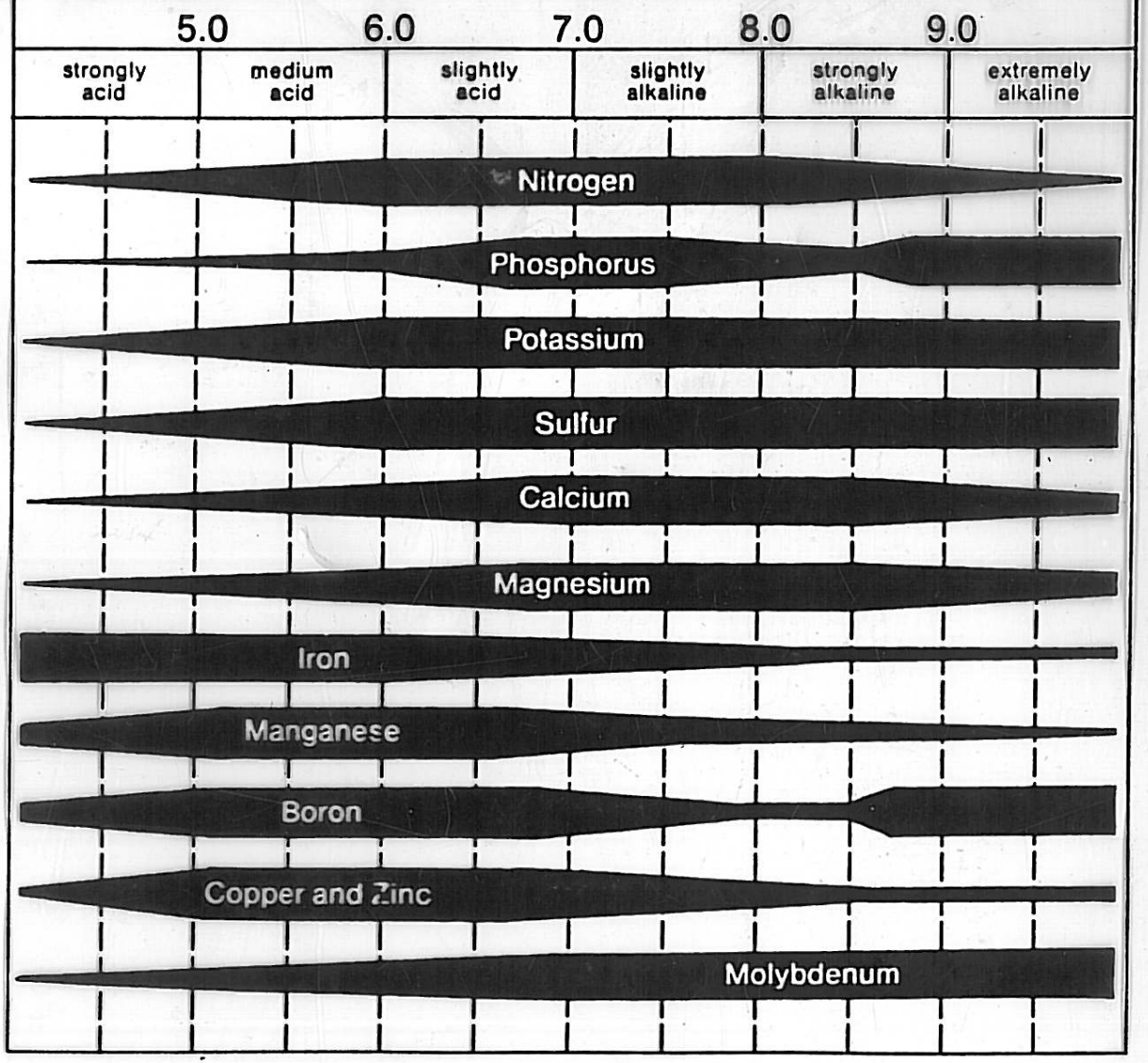
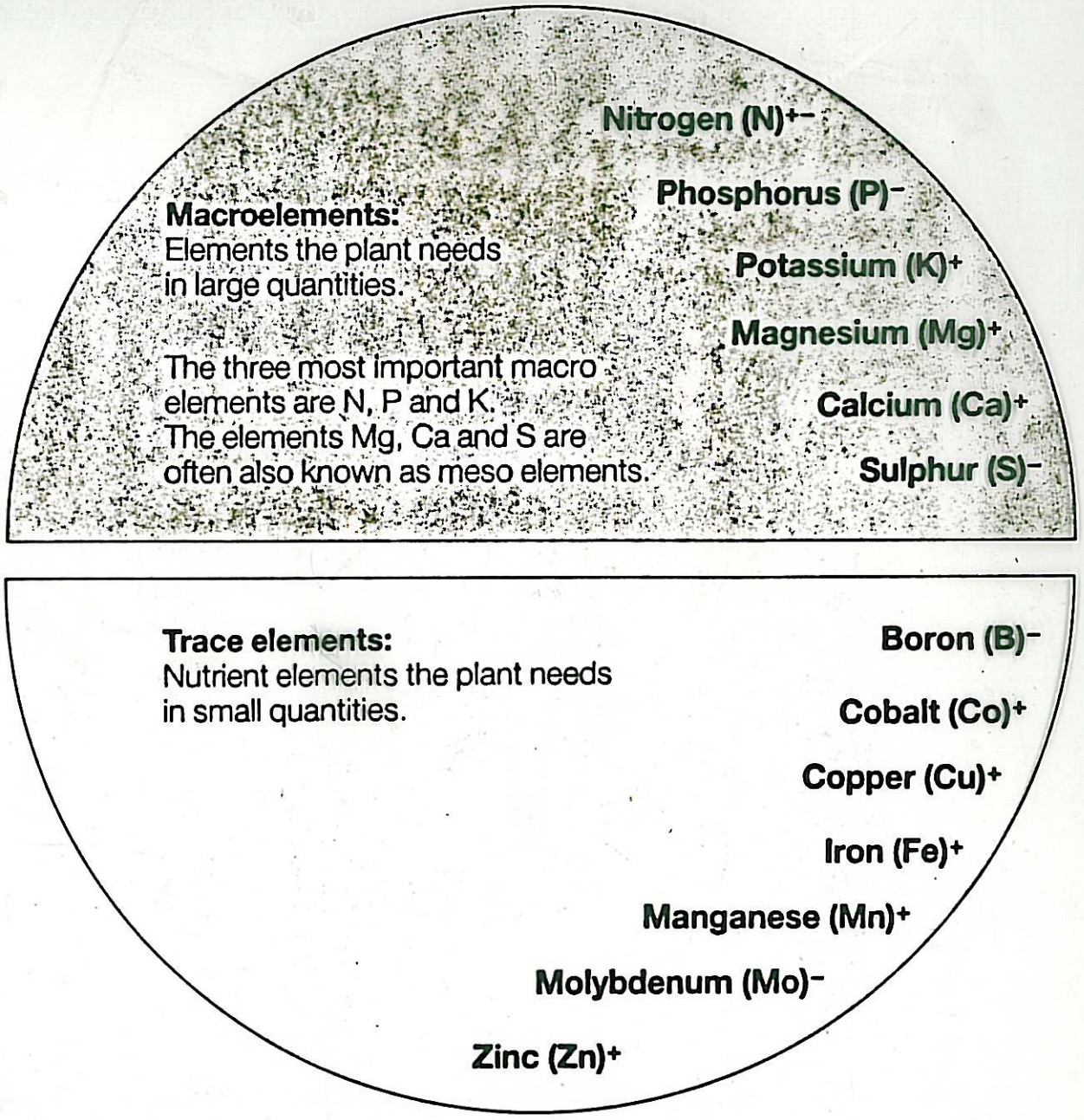
## How soil pH affects availability of plant nutrients

Effects of soil reaction on availability to plants of soil nutrients (after Truog). The width of the bar determines the relative availability of each element with a change in soil reaction




Source: National Plant Food Institute, USA


Nitrogen (N)+−
Phosphorus (P)−
Potassium (K)+
Magnesium (Mg)+
Calcium (Ca)+
Sulphur (S)−
Macroelements:
Elements the plant needs in large quantities.
The three most important macro elements are N, P and K.
The elements Mg, Ca and S are often also known as meso elements.
Trace elements:
Nutrient elements the plant needs in small quantities.
Boron (B)−
Cobalt (Co)+
Copper (Cu)+
Iron (Fe)+
Manganese (Mn)+
Molybdenum (Mo)−
Zinc (Zn)+

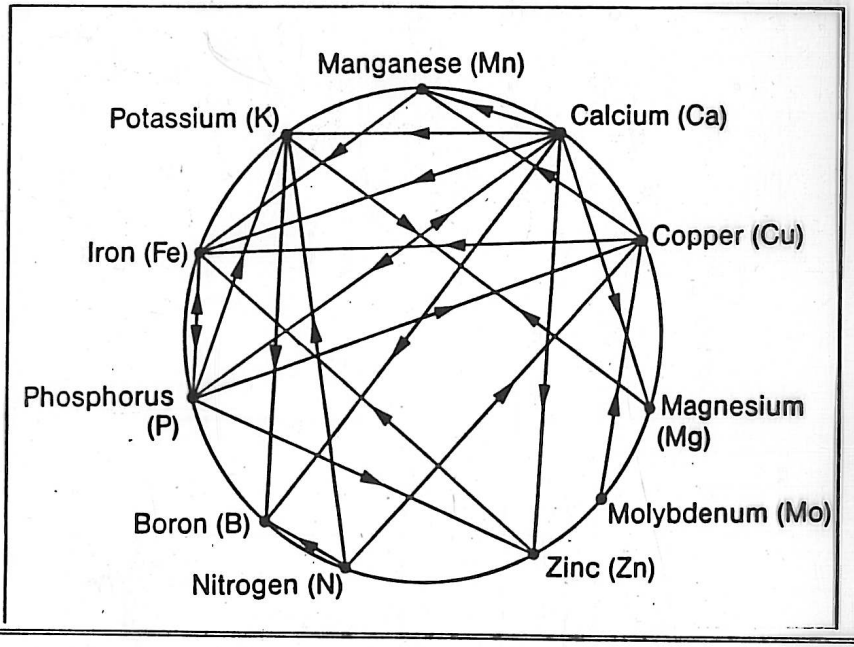
## Antagonism

The phenomenon whereby the effect of one nutrient ion reduces the effect of another is called antagonism. (The opposite is "synergism"). This mostly happens at the uptake stage when the plant absorbs certain elements by the same mechanism and one element supplants another. Antagonism can, however, also occur in plant metabolism, in the plant itself. The extent of this antagonistic effect can depend on the amounts of the various elements involved.

For example:

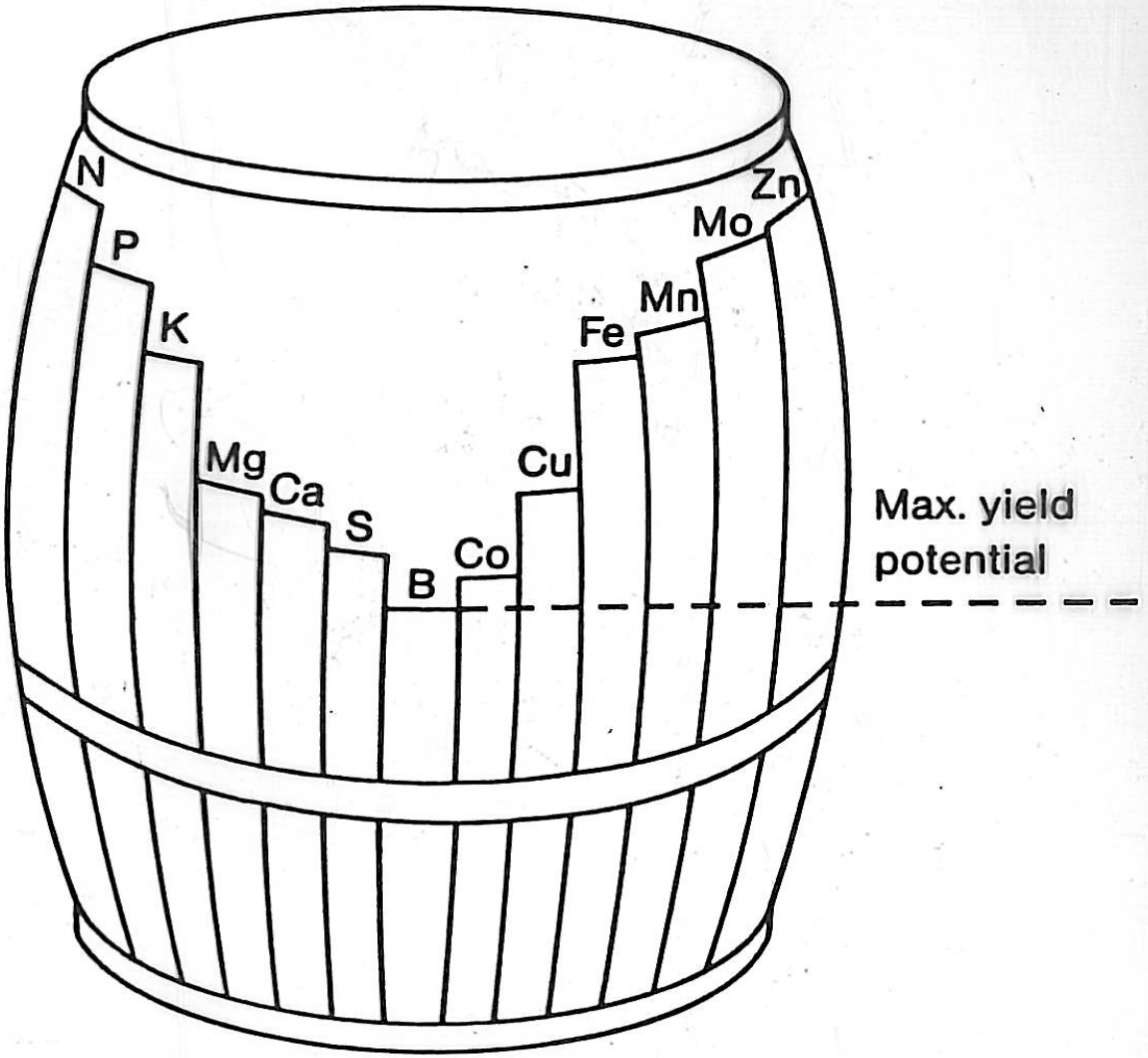
- a large amount of K can reduce the absorption of Mg, and of Ca also to a lesser extent
- a large amount of Ca can reduce the absorption of Mg and K
- a large amount of Mg can reduce the absorption of K, and of Ca also to a lesser extent.

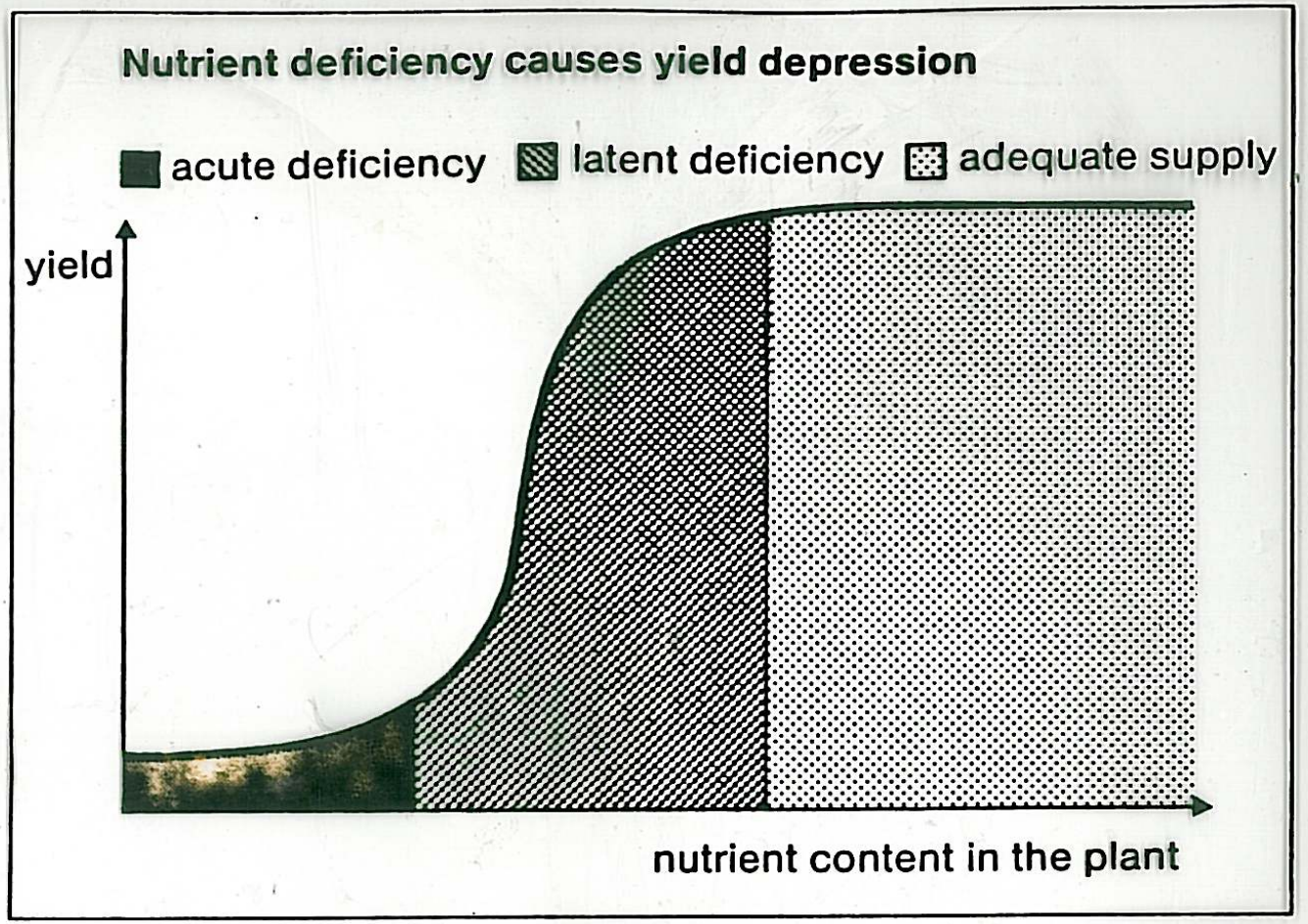
**Antagonistic relationships**



**"A crop's yield is restricted by the lack of one single element even though there may be sufficient quantities of all other essential nutrients."**

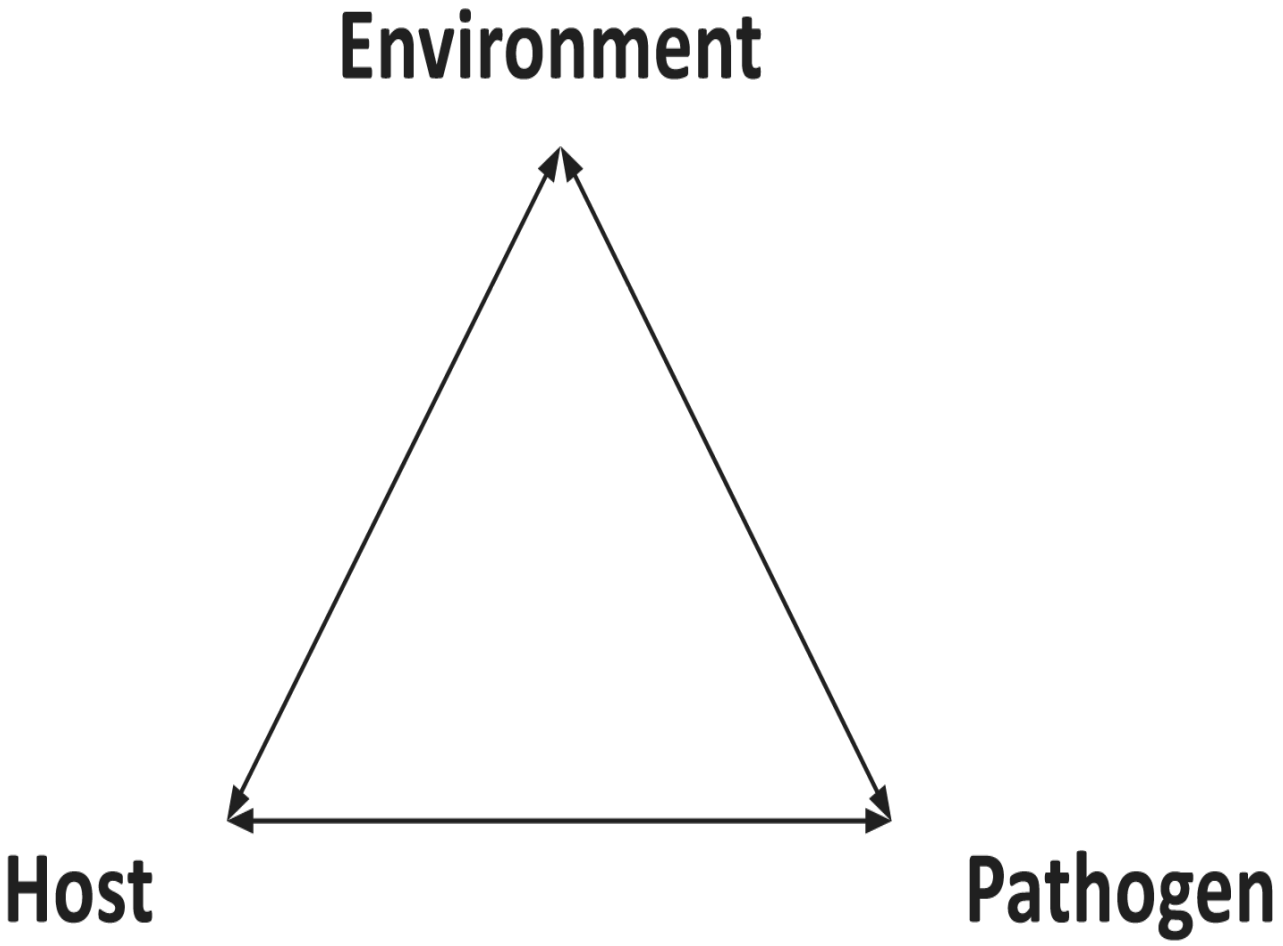
J. von Liebig





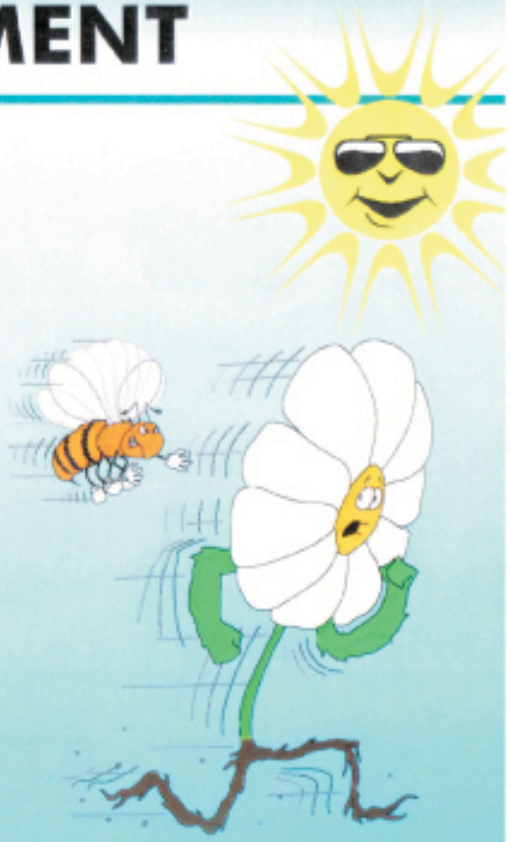

**Acute deficiency:**
Deficiency symptoms clearly visible and typical. Consequence: poor growth and greatly reduced yields.

**Latent deficiency:**
Deficiency symptoms concealed, not visible. Reduced growth not apparent but lower yields.


Environment
Host
Pathogen

# 3 FACTORS NECESSARY FOR DISEASE DEVELOPMENT

1. Susceptible host (the suscept)
2. Disease-producing agent (the pathogen)
3. Environment favourable to disease development



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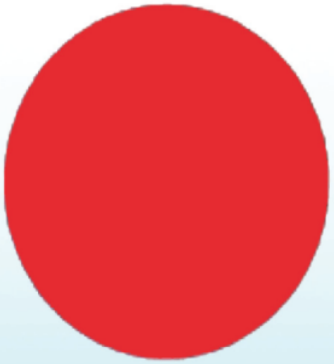
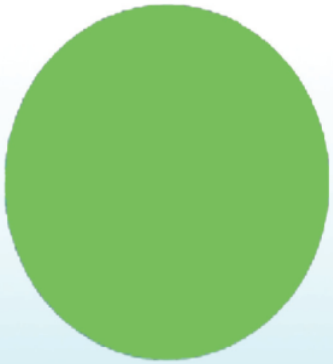
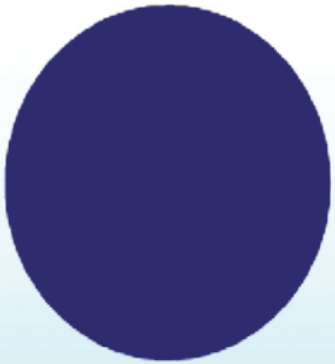


Pathogen

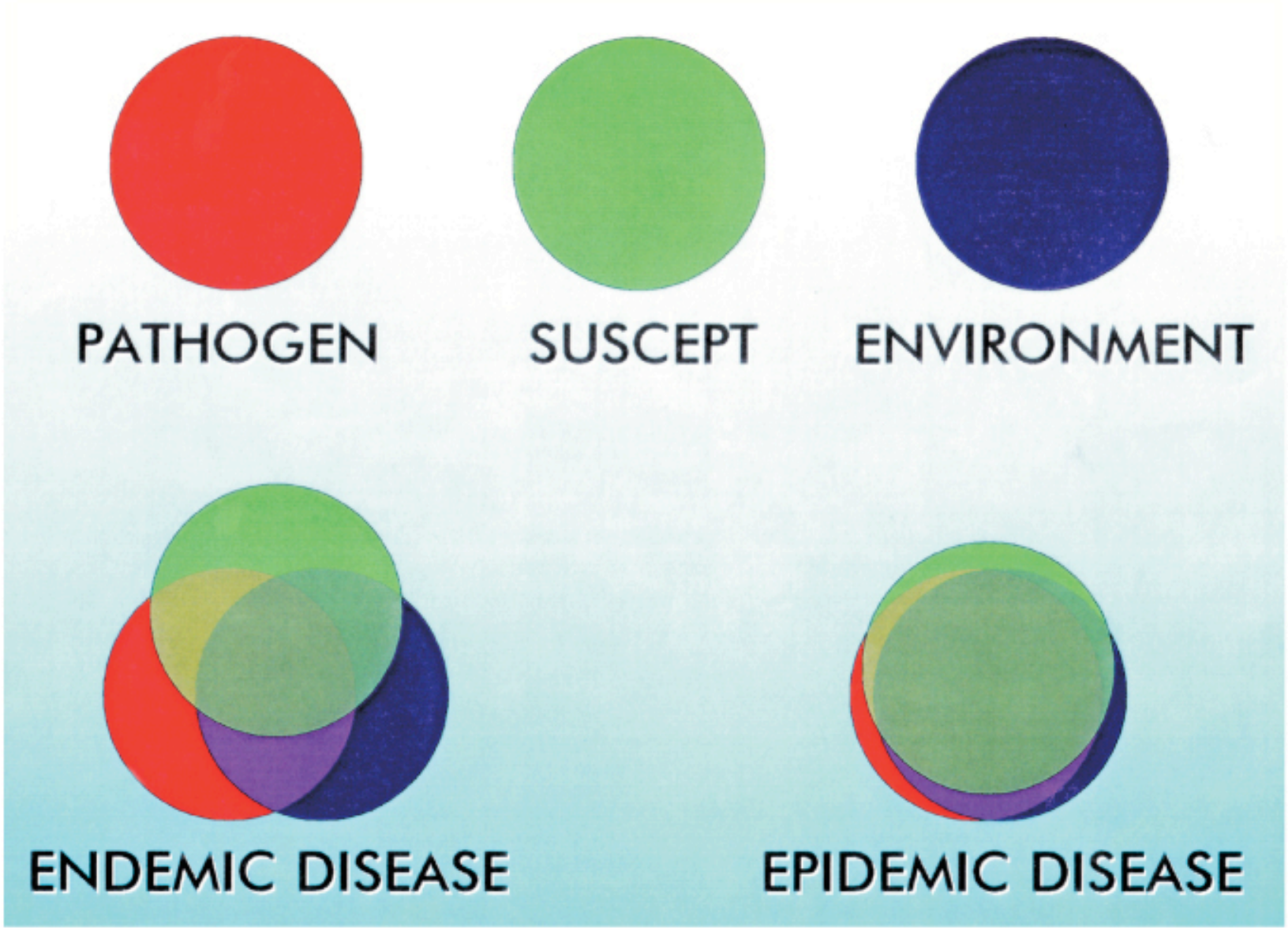


Susceptible Host

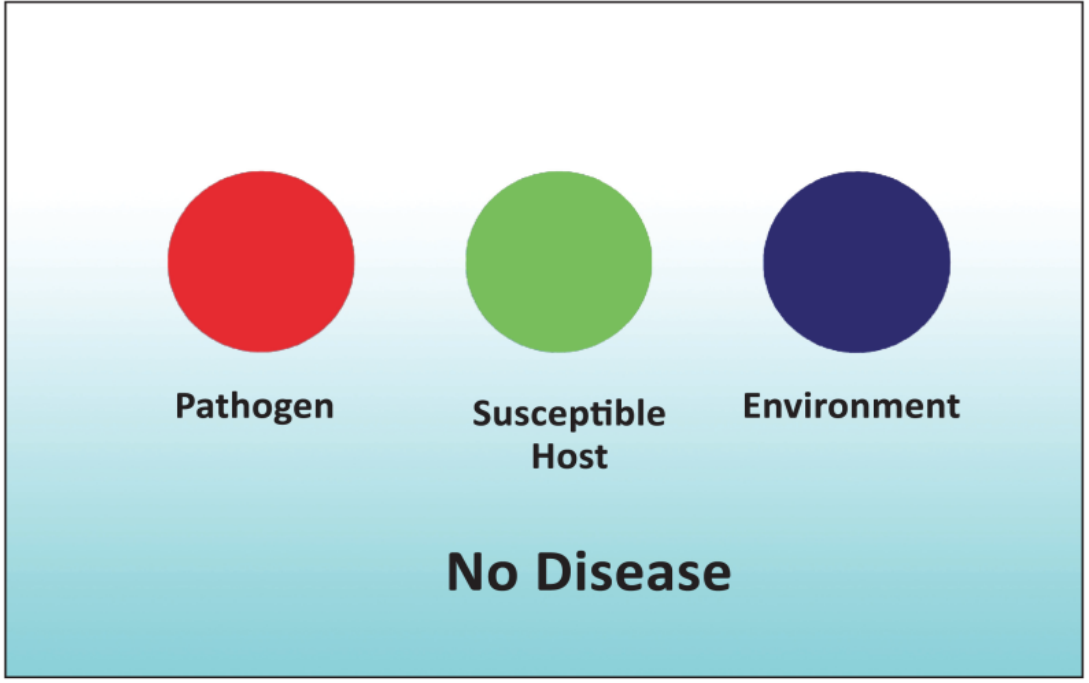


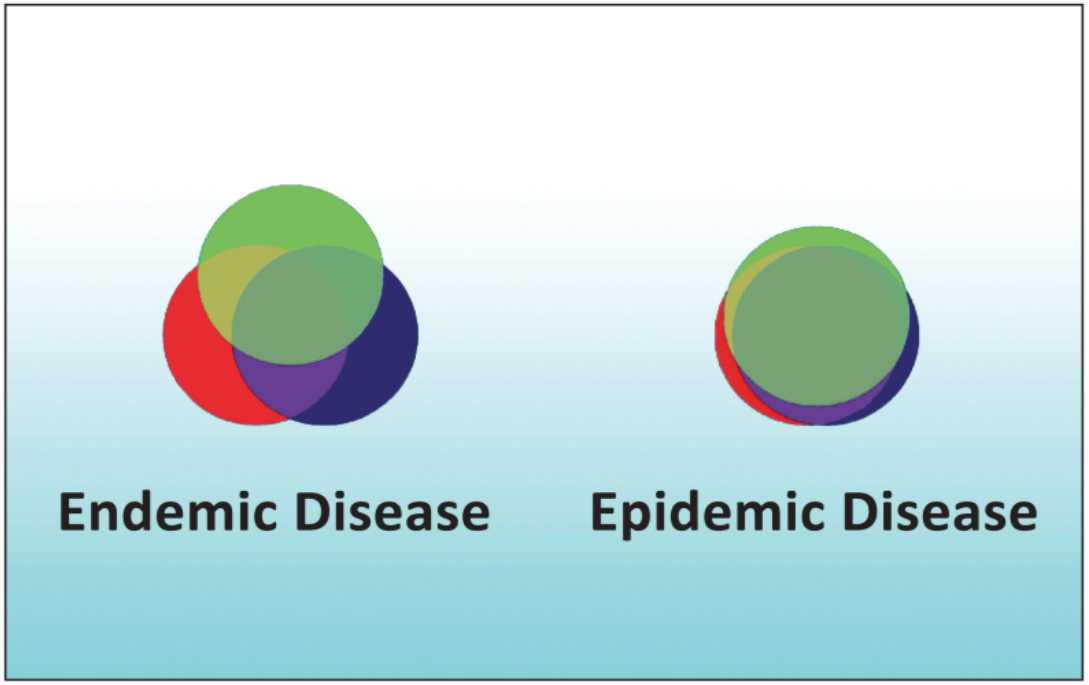
Environment

# No Disease




AVONROD PLANT PROTECTION c.c.


Pathogen
Susceptible Host
Environment
No Disease


Endemic Disease
Epidemic Disease

**Endemic Disease**

**Epidemic Disease**

# 8 STEPS TO PEST CONTROL

1. Detection
2. Identification
3. Biology and habits
4. Economic significance

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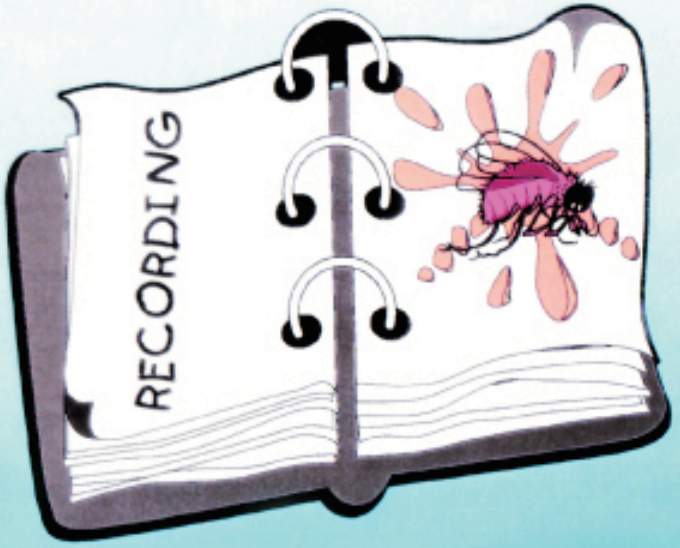
# 8 STEPS TO PEST CONTROL (cont.)

5 Selection of methods

6 Application

7 Evaluation

8 Recording




AVONROD PLANT PROTECTION CC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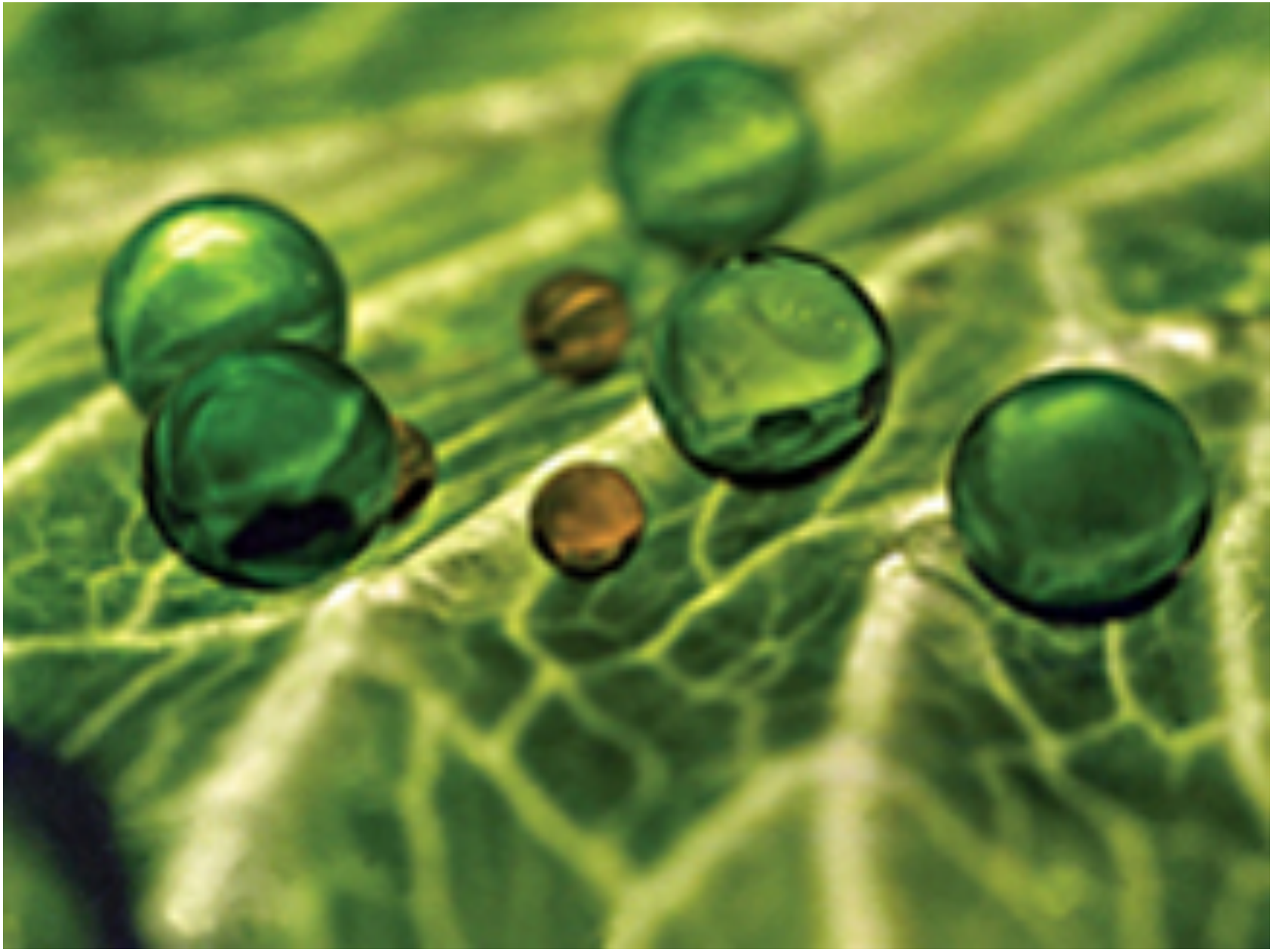
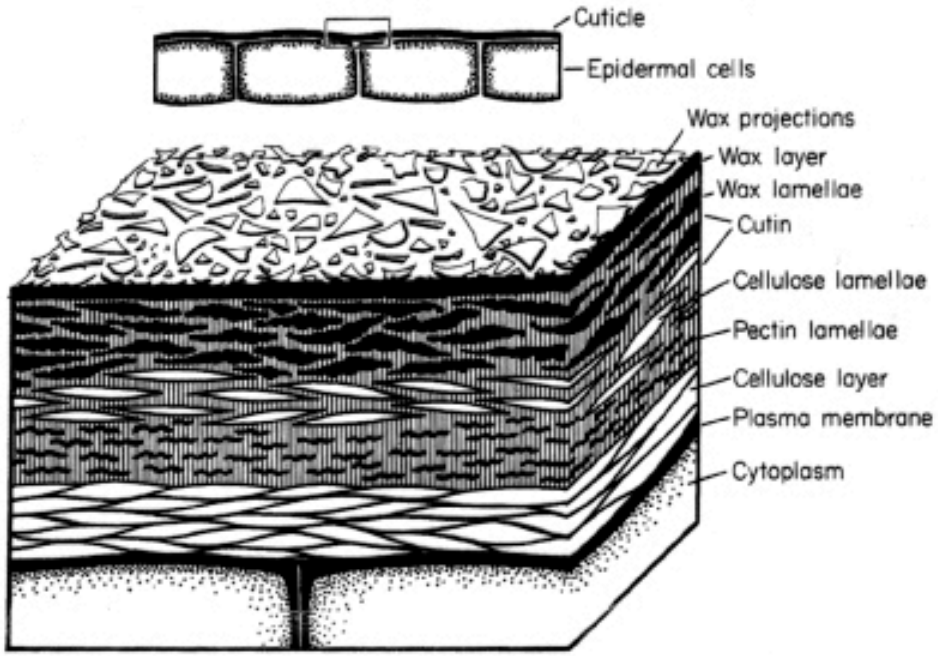
- Droplets

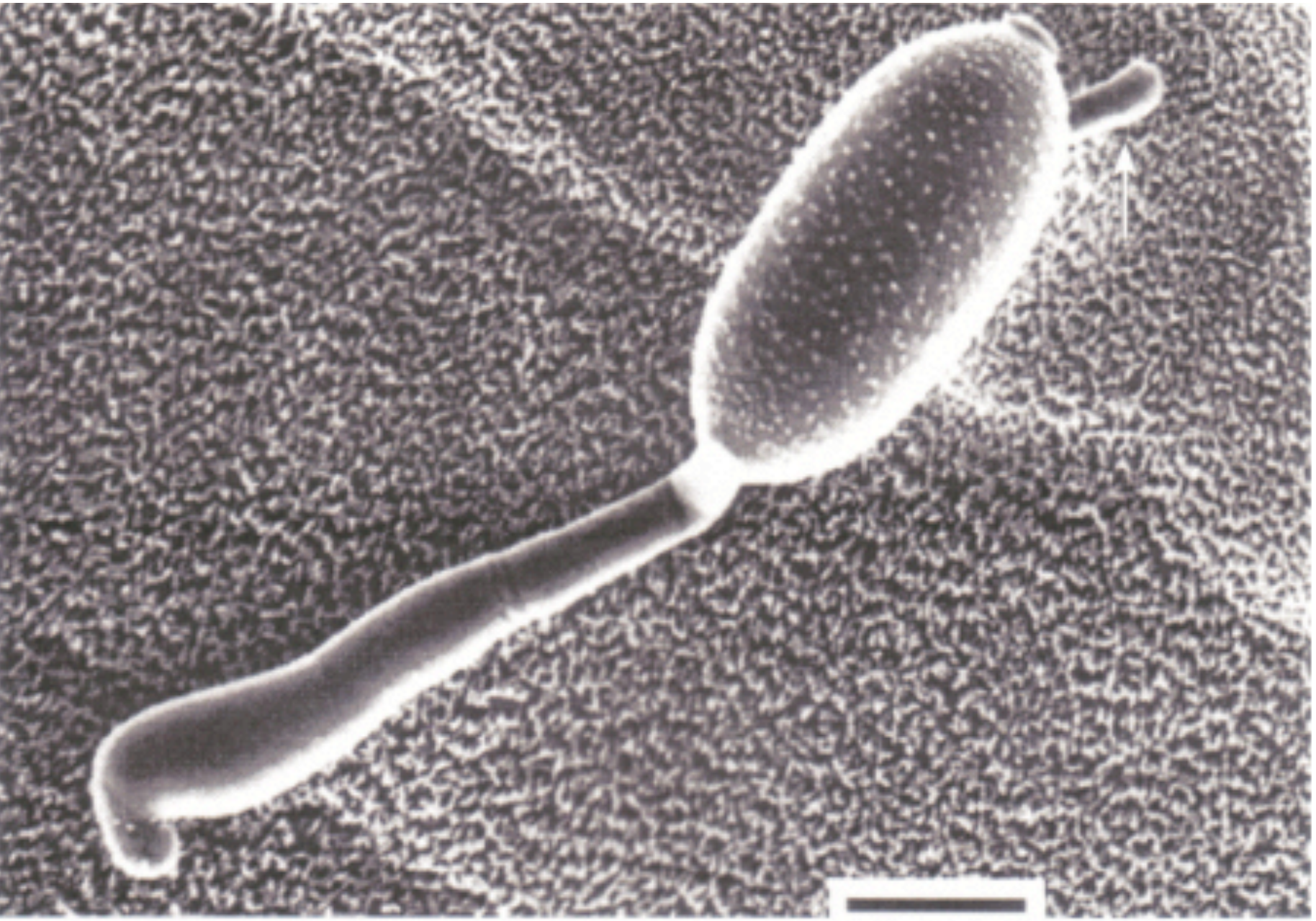




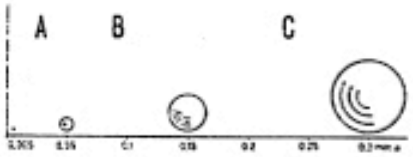

Schematic representation of the structure and composition of the cuticle and cell wall of foliar epidermal cells. [Adapted from Goodman, Király, and Zaitlin (1967). "The Biochemistry and Physiology of Infectious Plant Disease." Van Nostrand, Princeton, New Jersey.]

*Courtesy: G N Agrios*

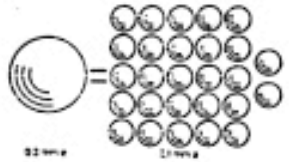
AVONROD PLANT PROTECTION C.C.


10μm

## Droplet size and Coverage



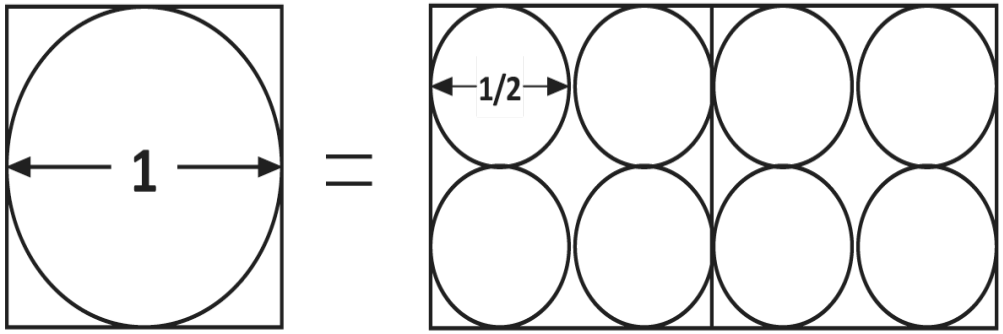

A = Aerosol, Fogging, Atomisation
B = Mistblowing
C = Spraying



Variation of droplet sizes and coverage with a given spray volume.

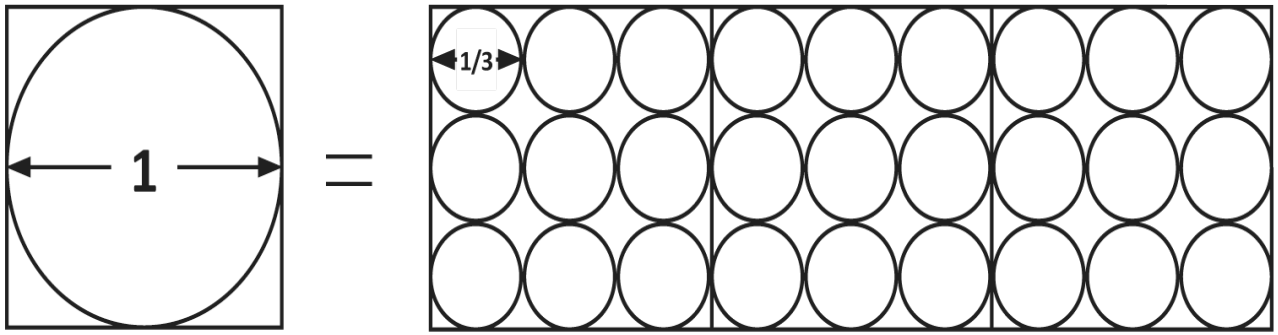
| Hoechst | Droplet size of different application systems | Dr.K/be<br>7-0678 |
|---|---|---|

AVONROD PLANT PROTECTION CC

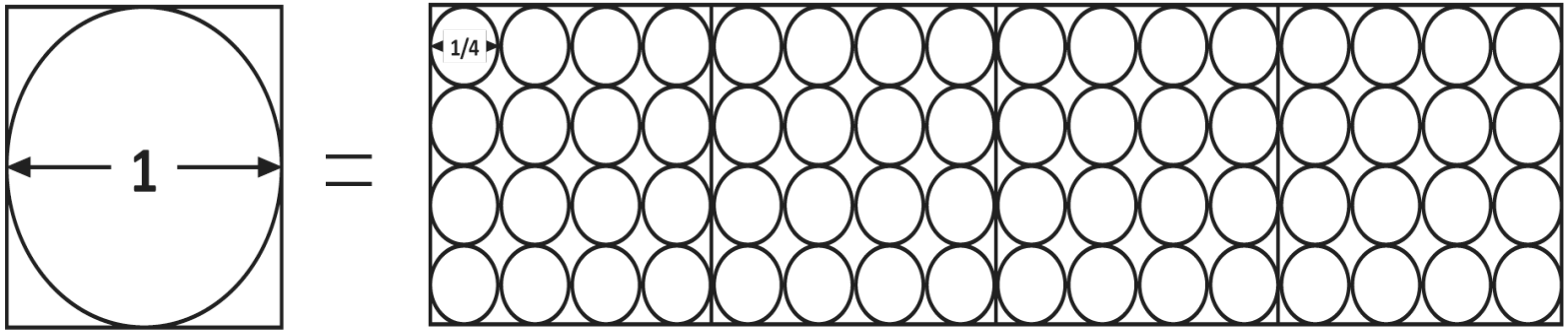



Coverage of different droplet sizes, using the same spray volume

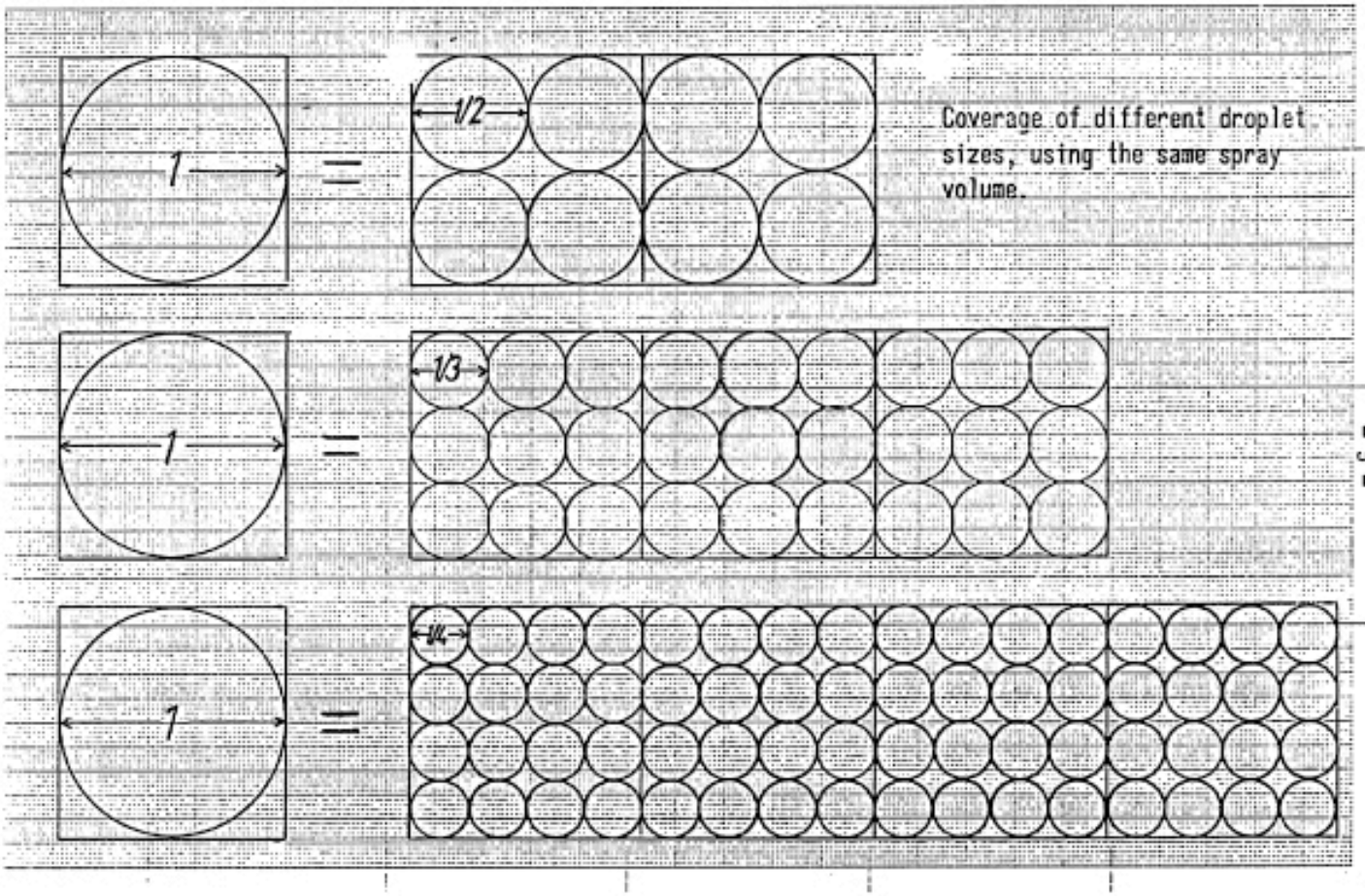
8




27




64




Coverage of different droplet sizes, using the same spray volume.

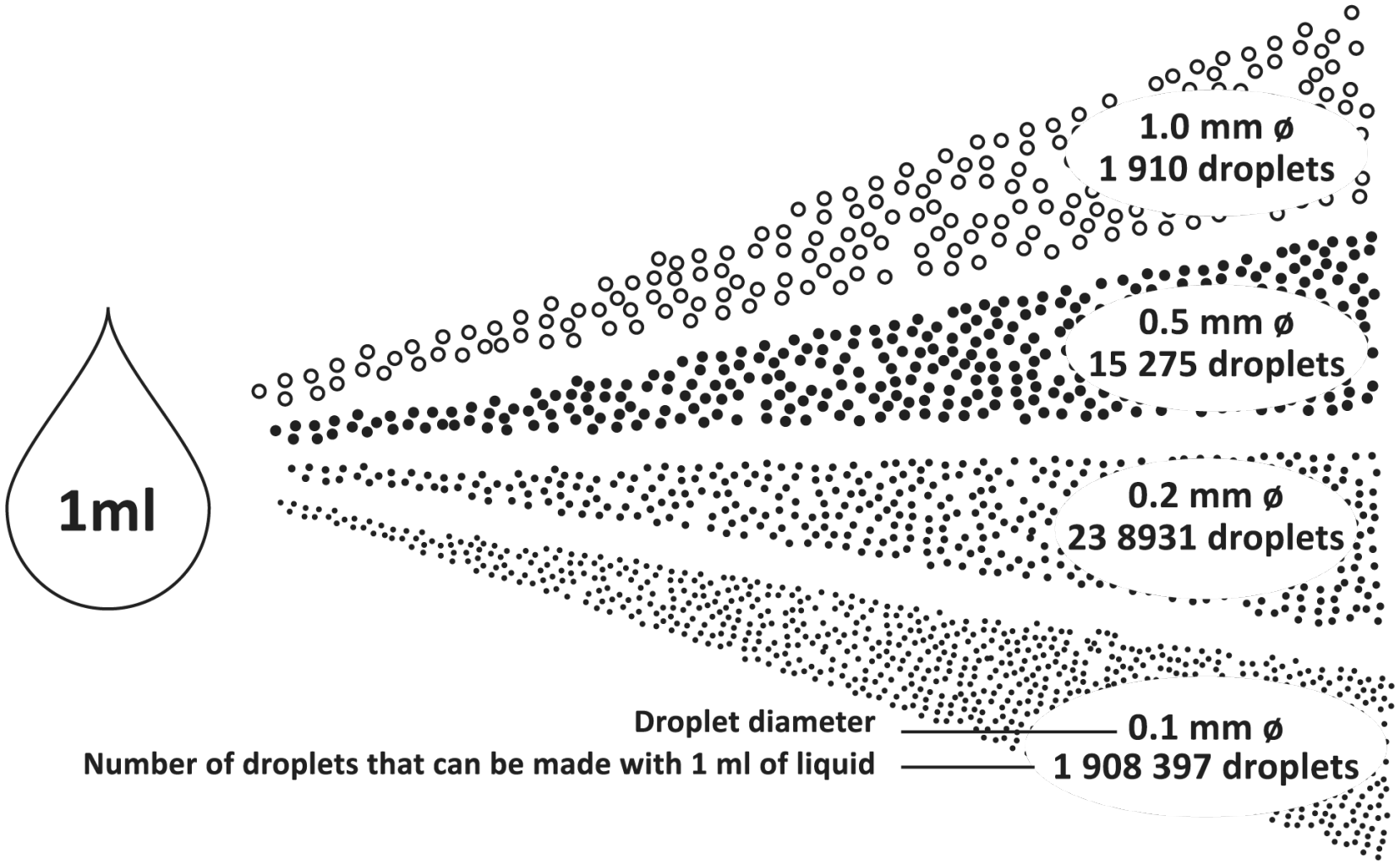
8

27

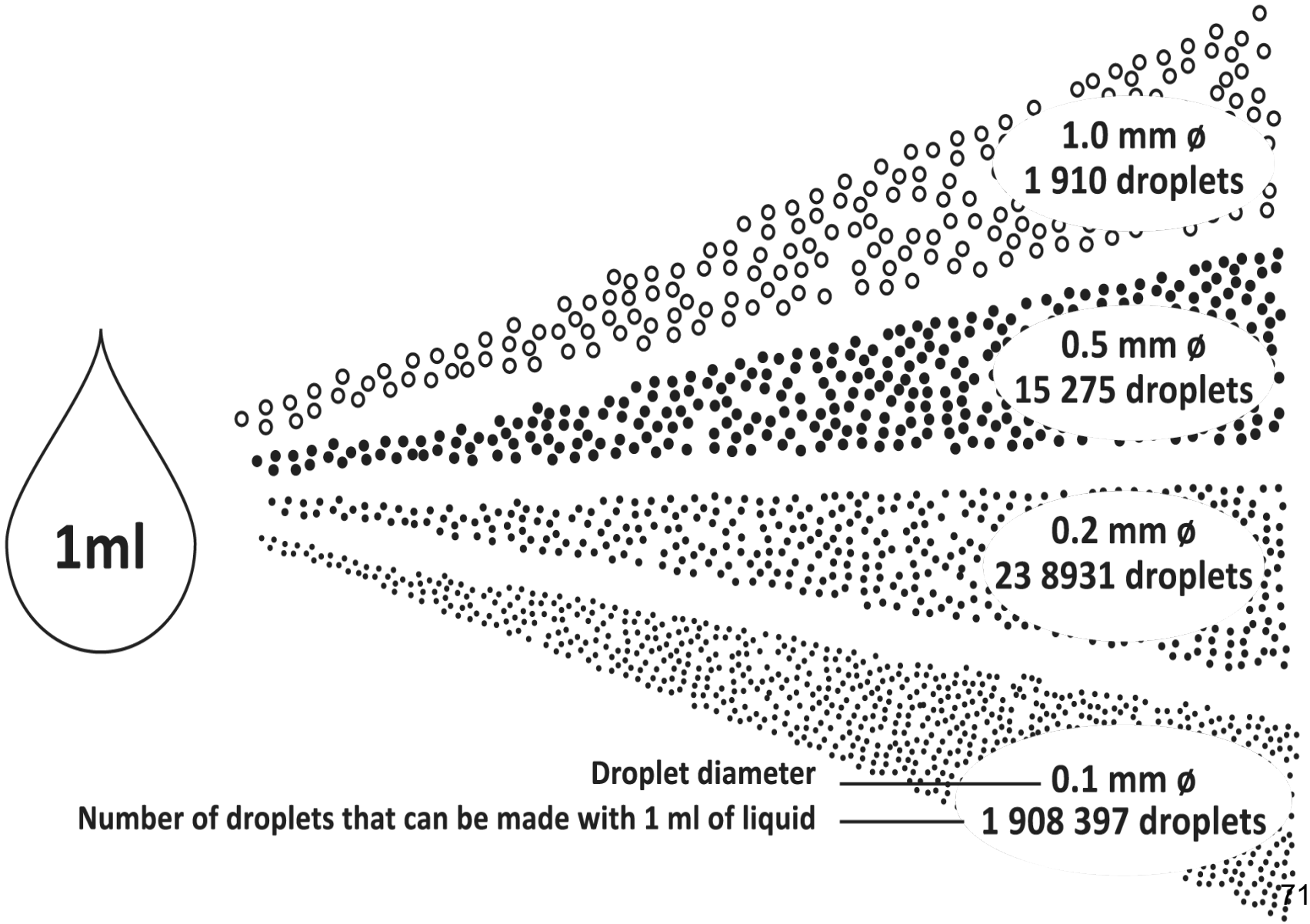
64

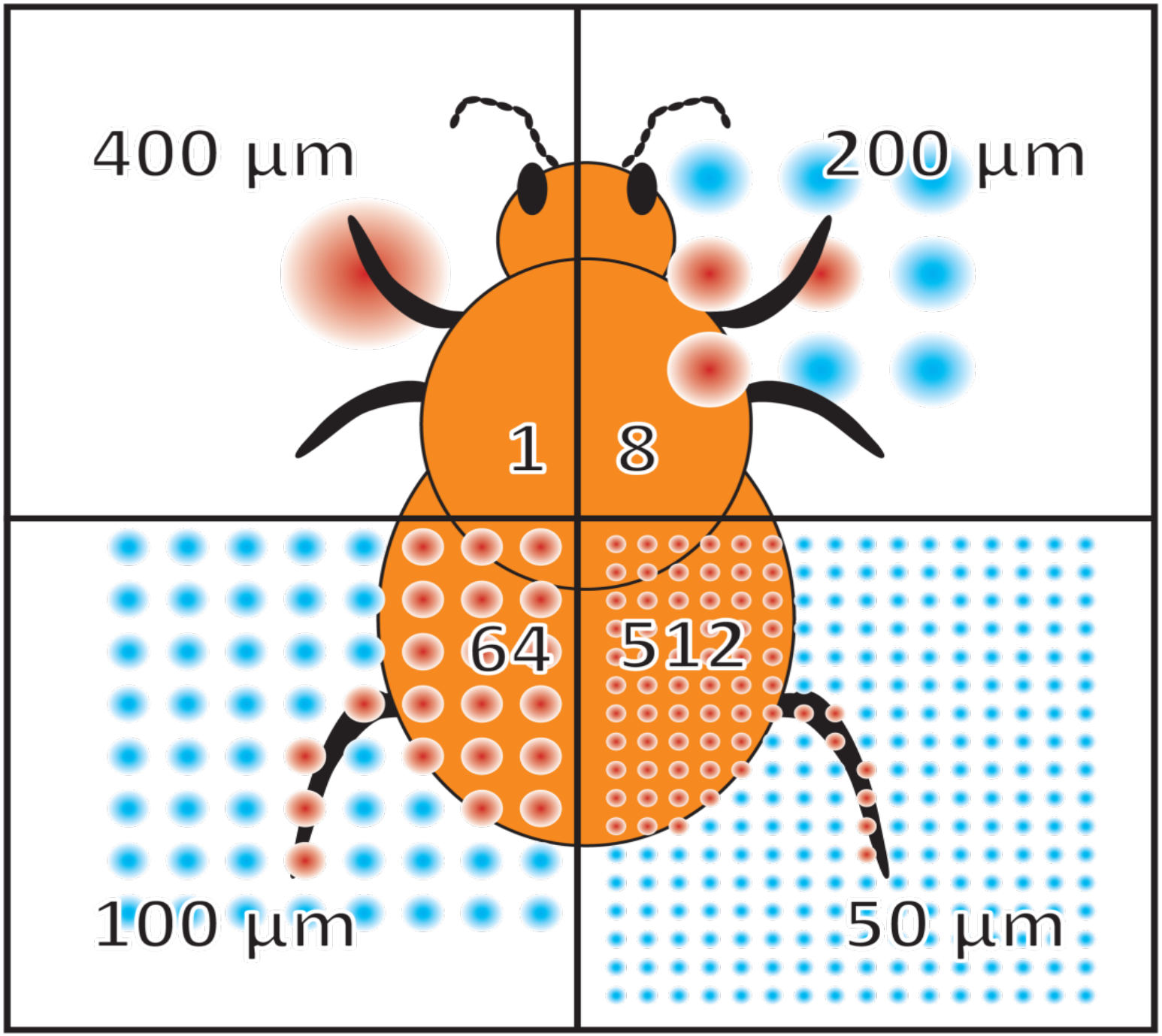
AVONROD
PLANT PROTECTION C.C.

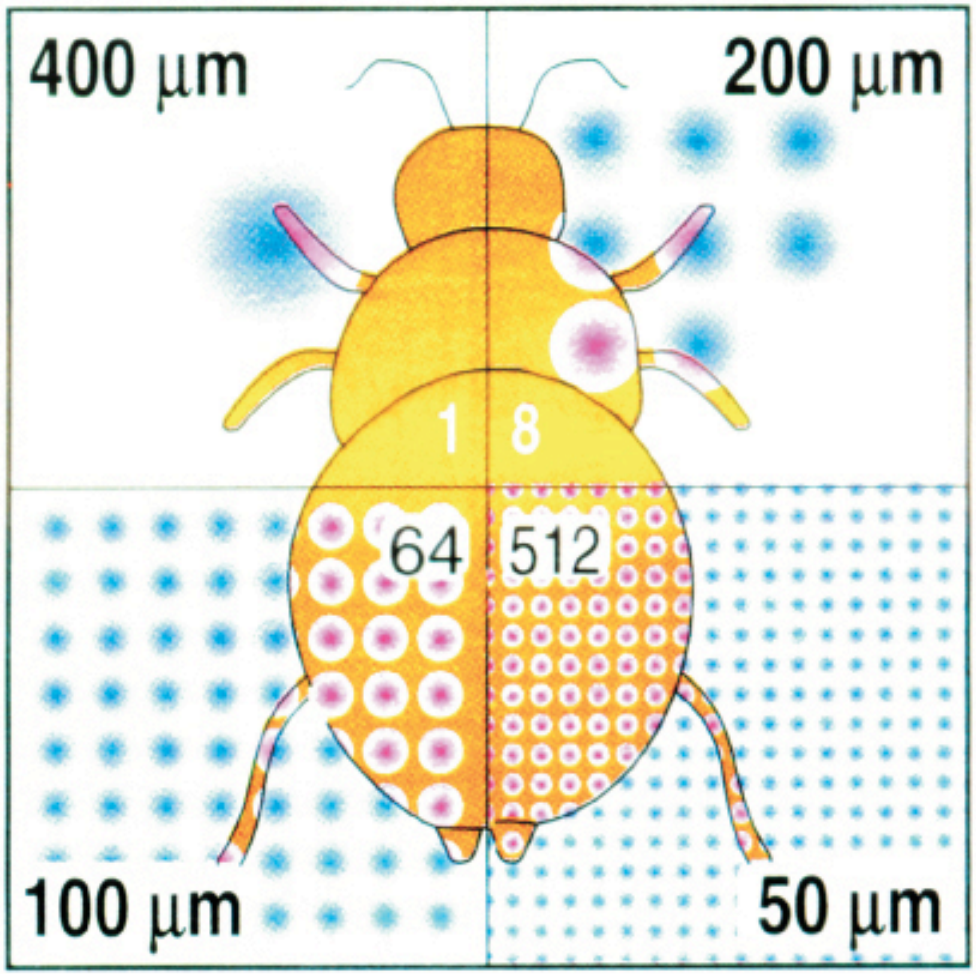
# Droplet size decides potential coverage



# Droplet size decides potential coverage

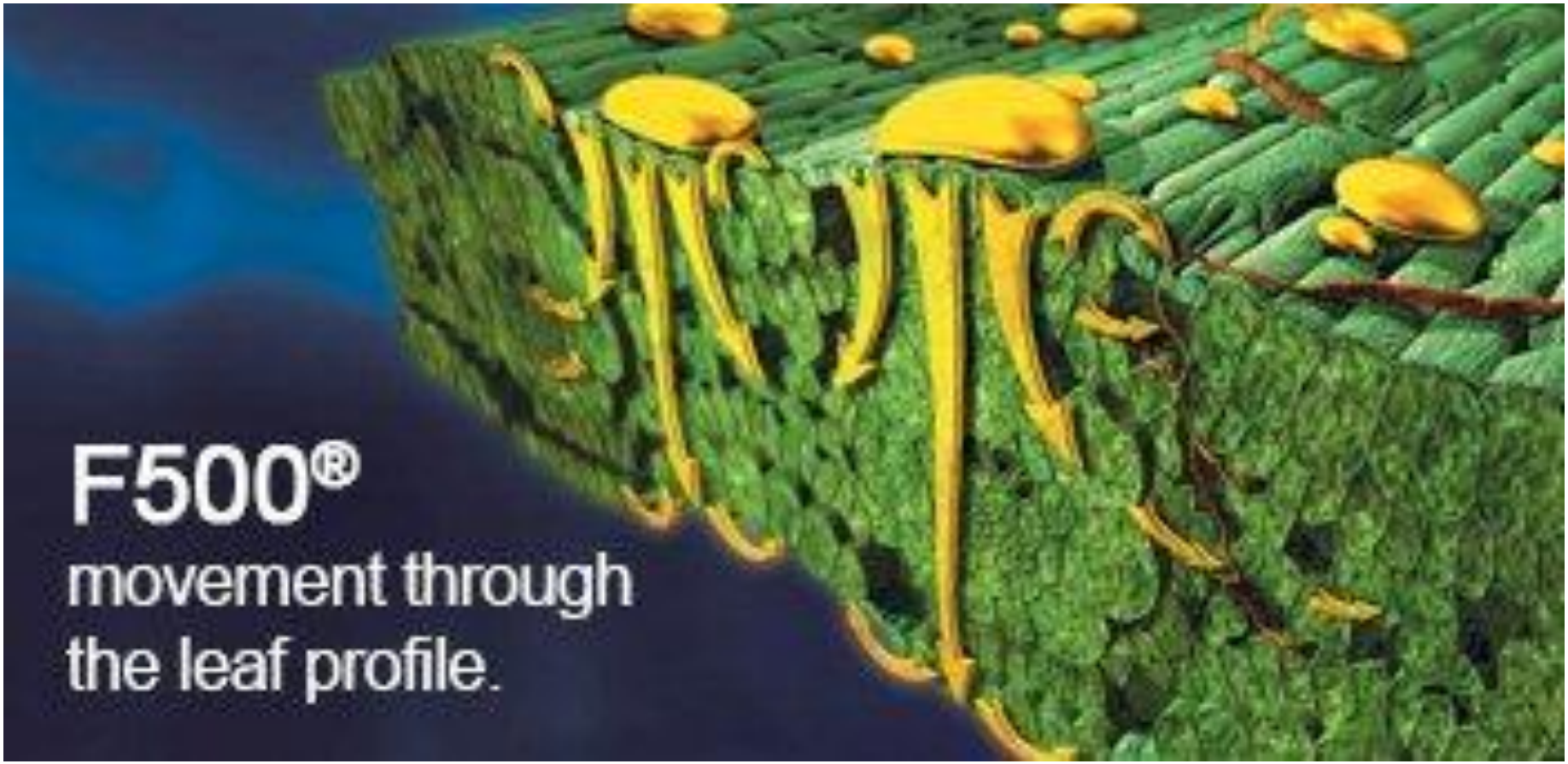



400 µm
200 µm
1
8
64
512
100 µm
50 µm

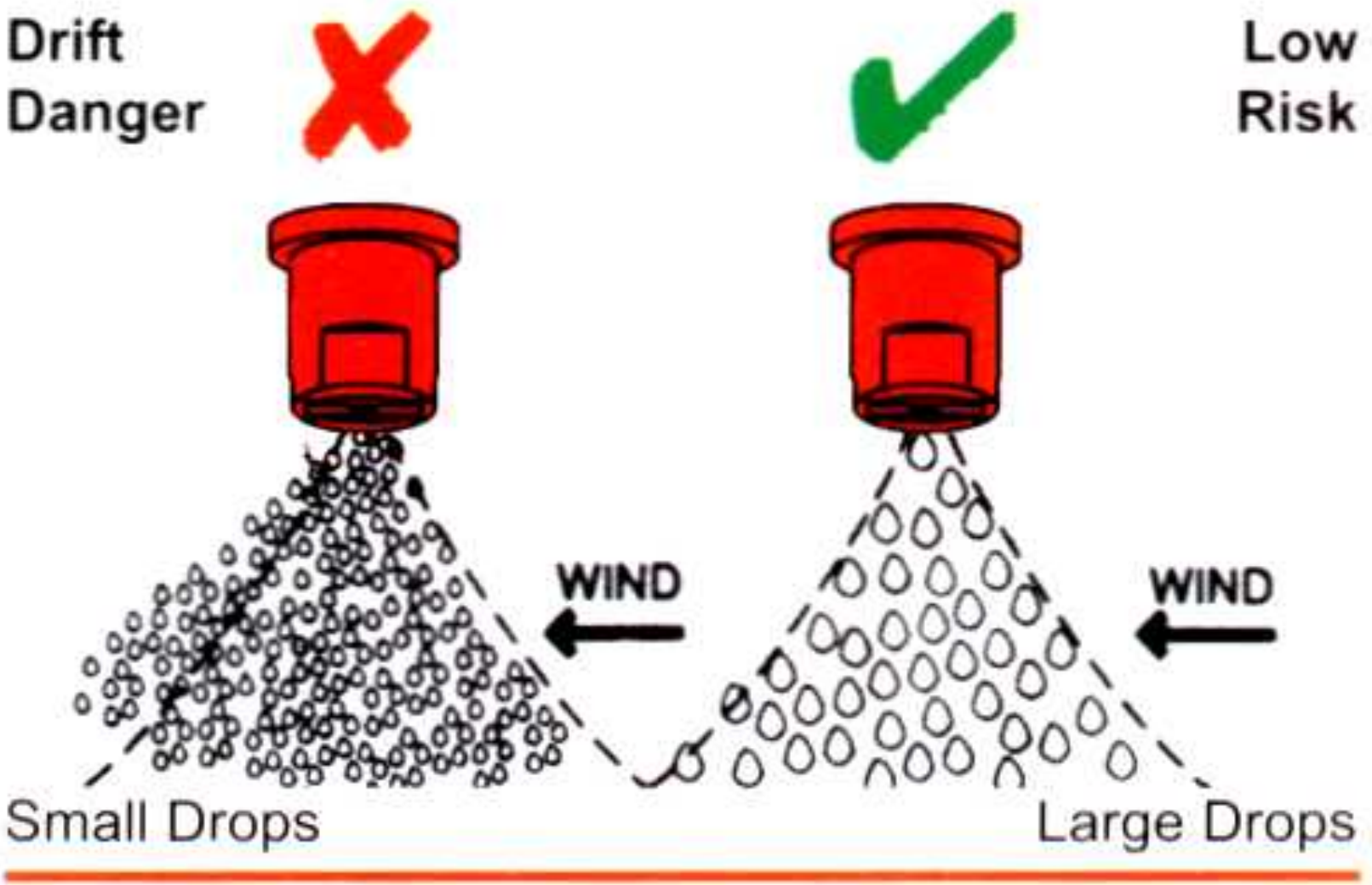



AVONROD
PLANT PROTECTION C.C.

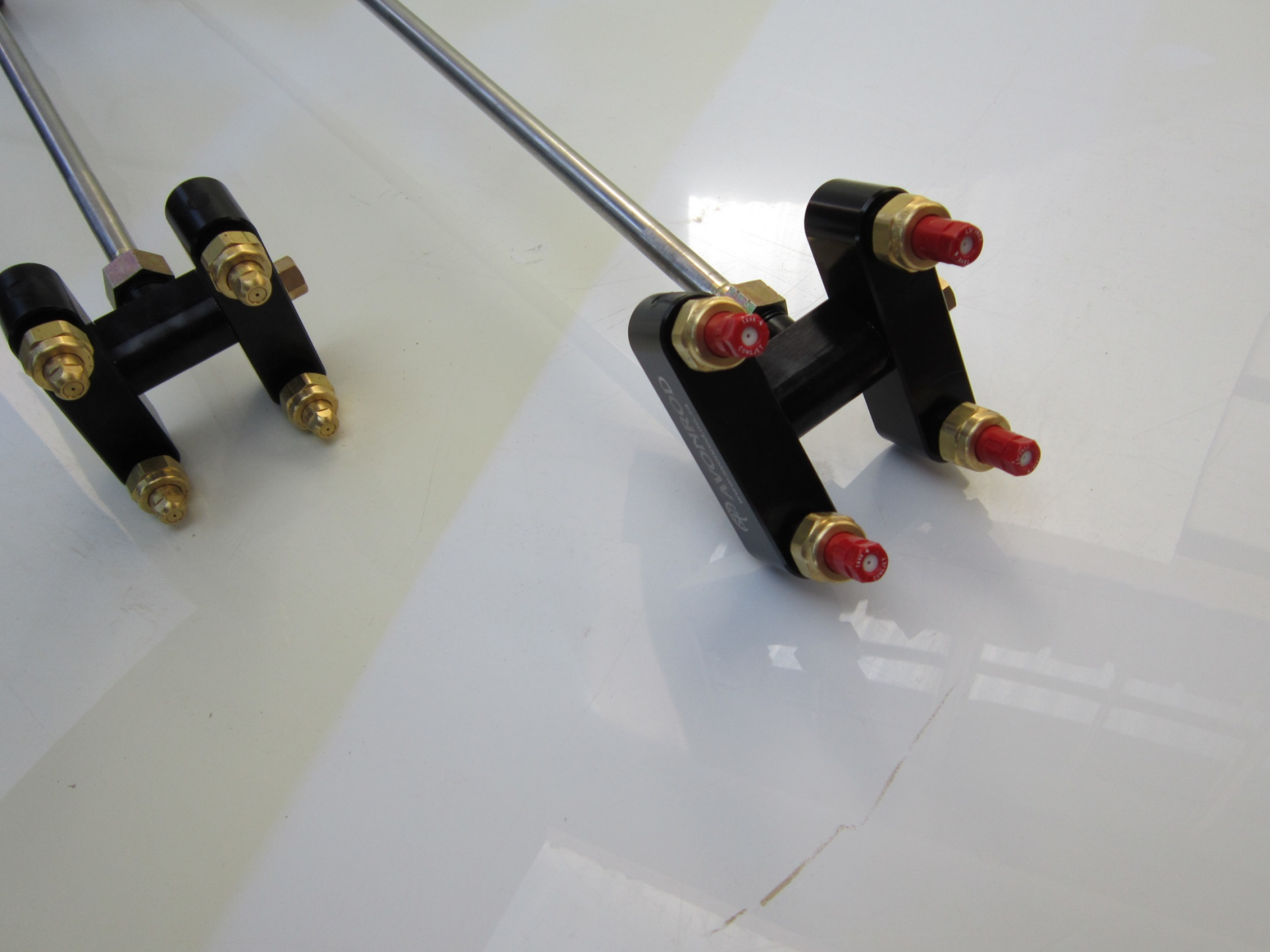
# Super Spreading Silicone Surfactant

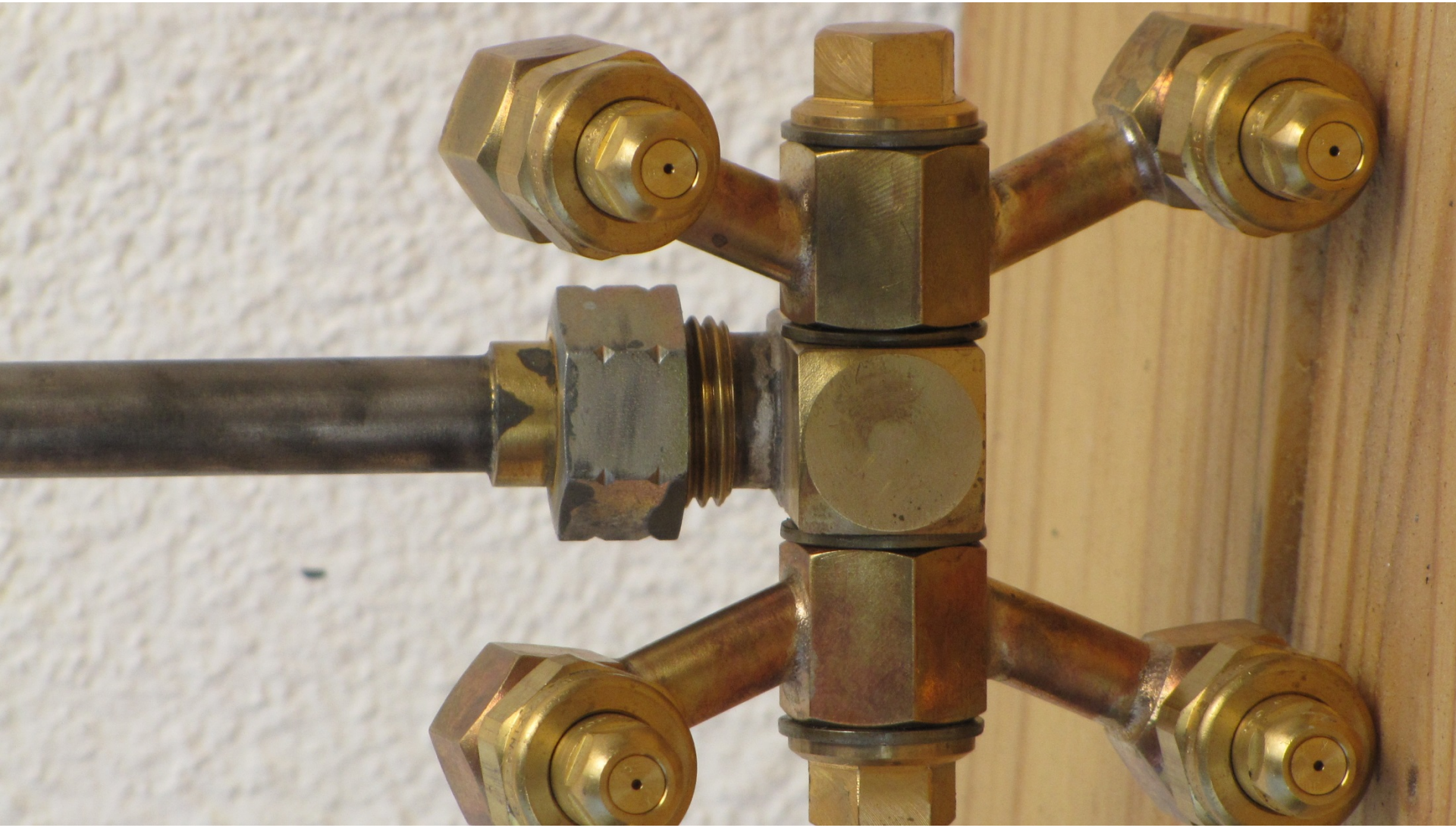

F500®
movement through
the leaf profile.


Hollow Cone
Spray
Solid Cone
Spray


Drift
Danger
Low
Risk
WIND
WIND
Small Drops
Large Drops


F



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DRAMM
DRAMM


SHRIMP

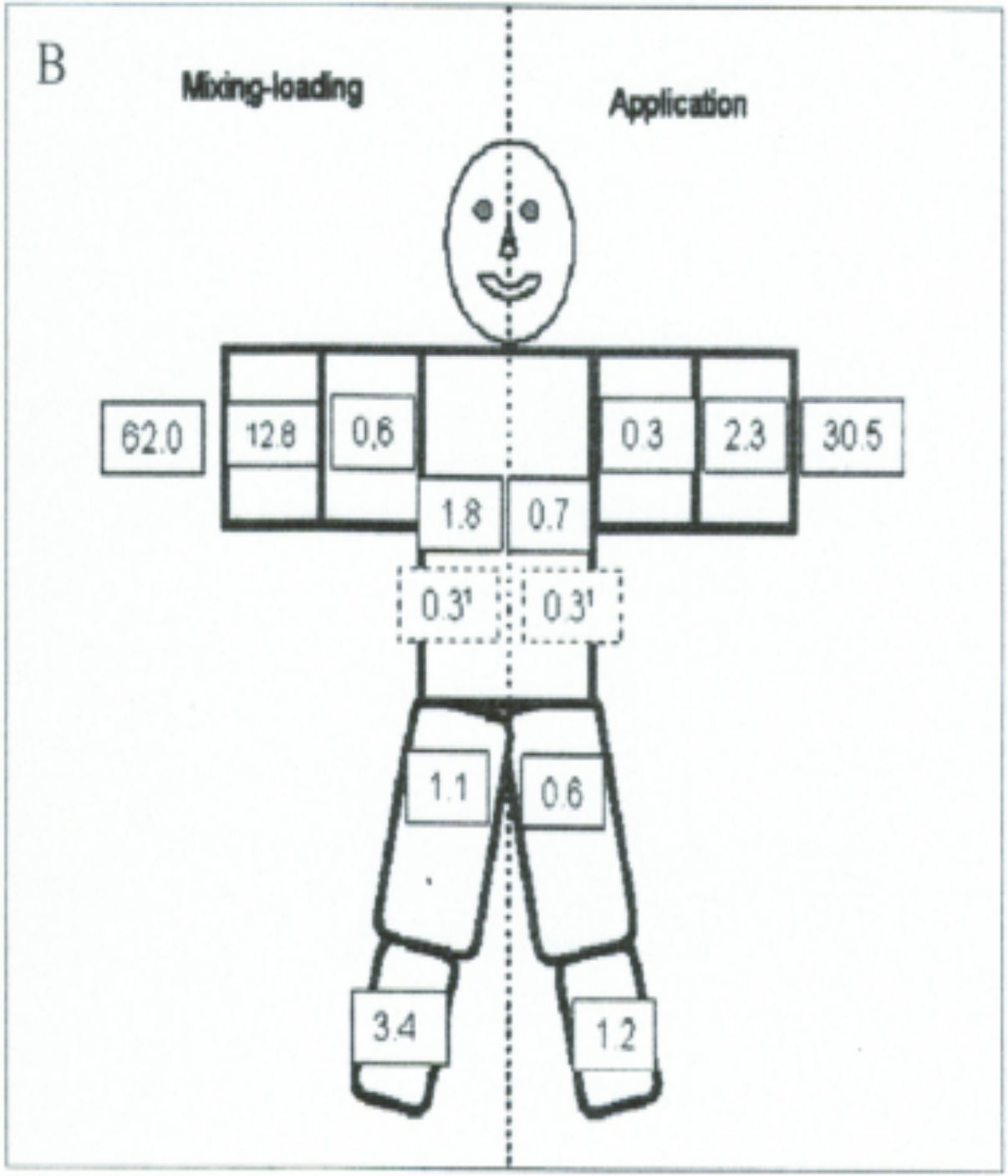

M&S
Finest Quality
& Flavour


USDA
ORGANIC
CERTIFIED ORGANIC


T+


ETICIDE
DANGER!


A
1
TRAINER
6/7
4
3
2
5
12
13
8
10
9
11


B
Mixing-loading
Application
62.0
12.8
0,6
0.3
2.3
30.5
1.8
0.7
0.3¹
0.3¹
1.1
0.6
3.4
1.2

# AVONROD

## BIG SYRINGE

## INDUSTRIAL
## HAND FLUID DISPENSING / SAMPLING SYRINGE

Made in South Africa
Patented

### Apparatus for:

- Safely Extracting (Sampling)
- Measuring
- Transferring
- Dispensing Fluids

Permits Safe, Precise Measurement
Prevents Environmental Contamination

**5ml – 600 ml**

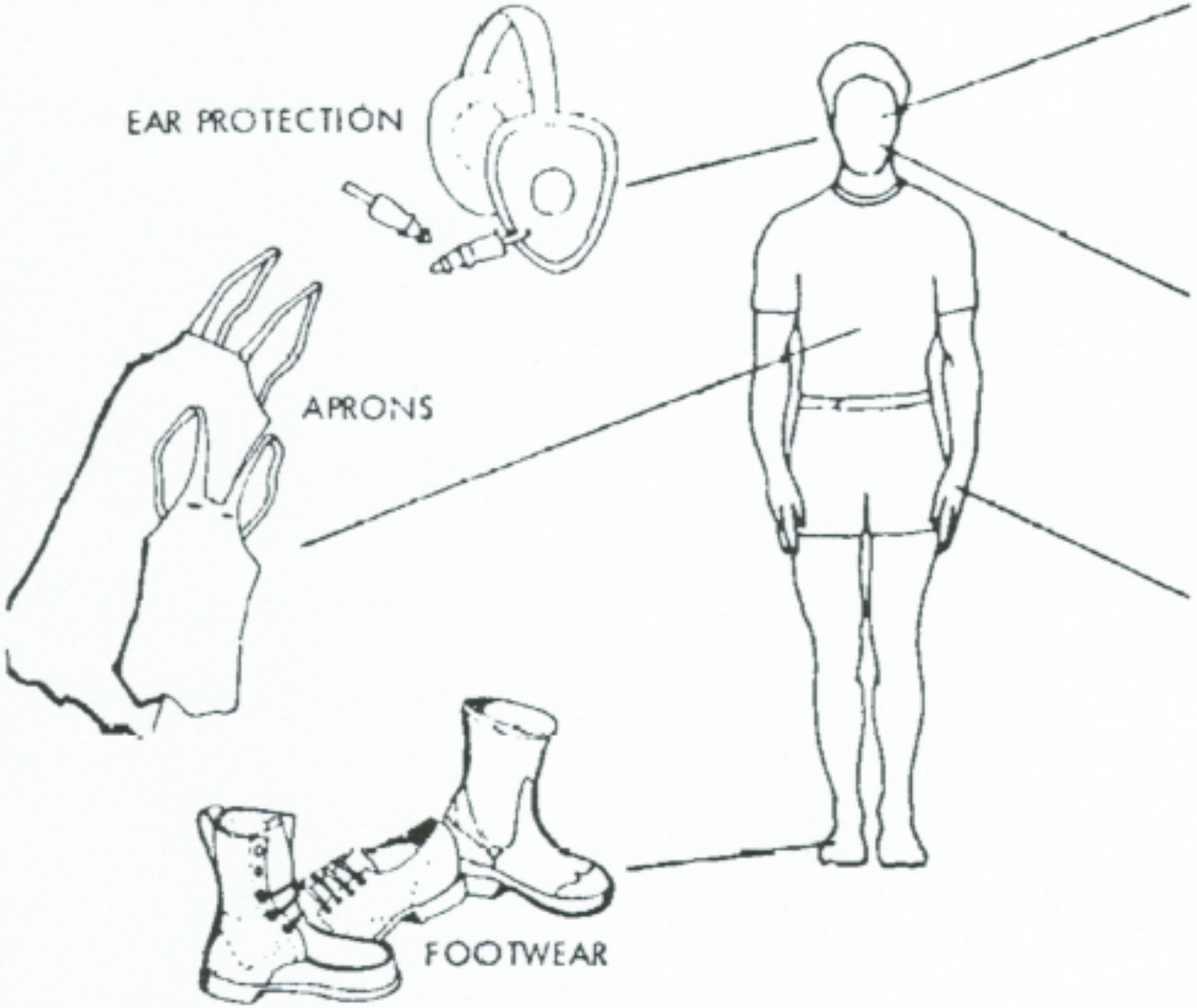
Chemical Resistant

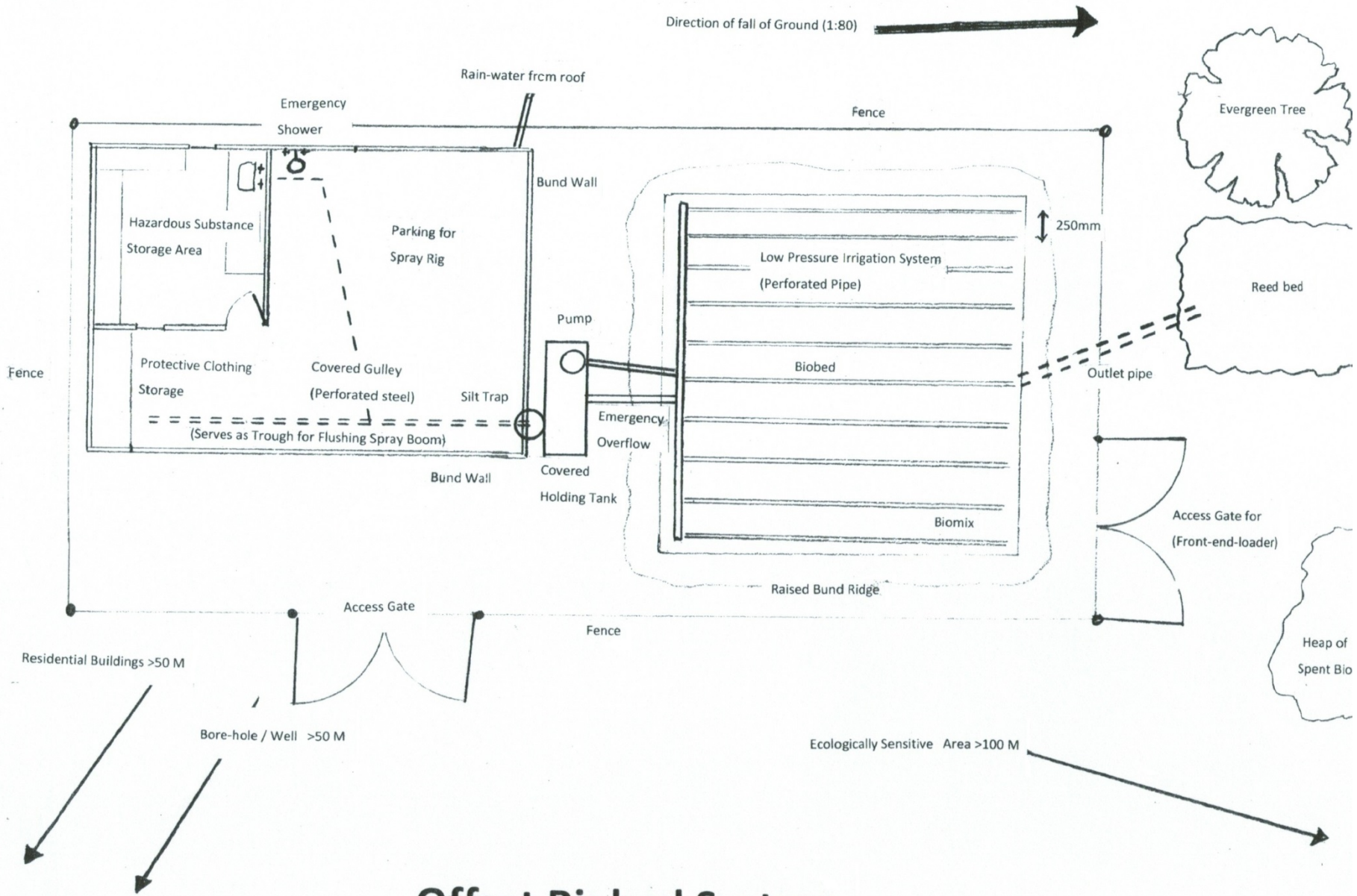
Food Safe – FDA Compliant Materials


**www.avonrod.co.za**

E-mail: avonrod@mweb.co.za
Tel: +27 11 460 1901 Mobile: +27 82 891 8399

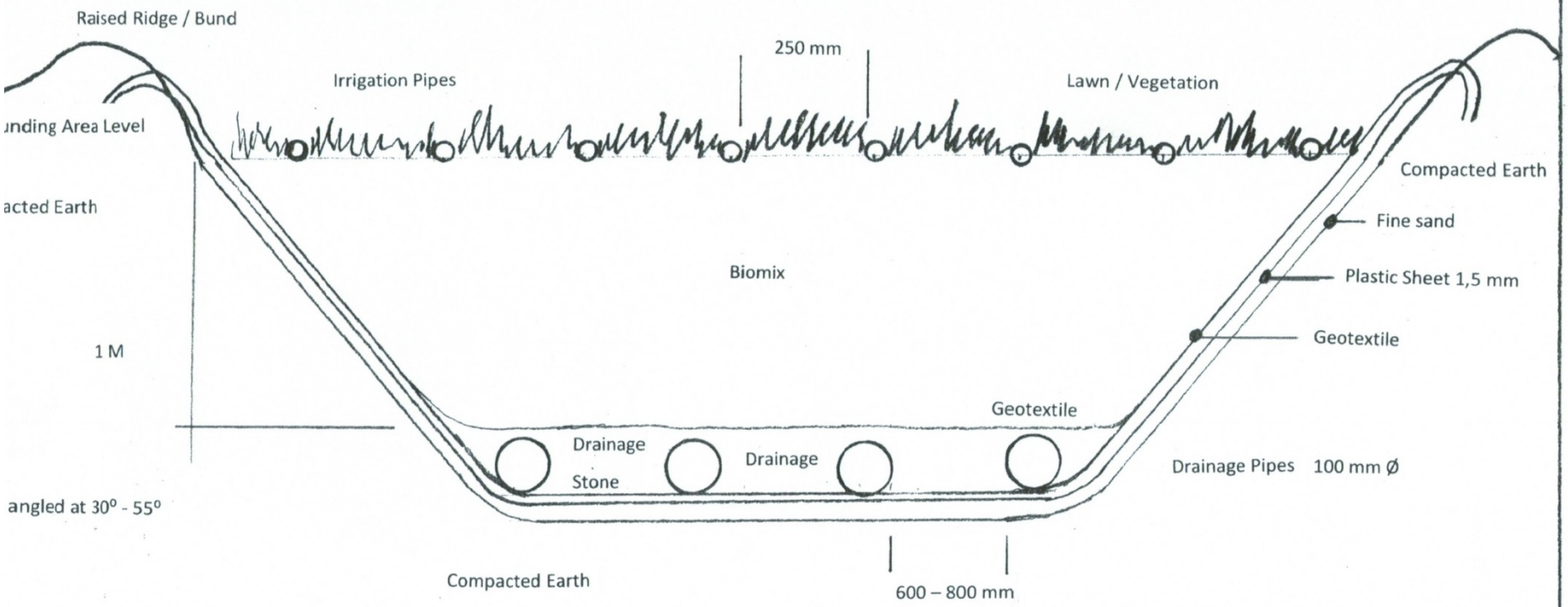
**USES:** • Dispensing Hazardous Chemicals • Food Processing
• Agriculture • Printing and Automotive Industries • Laboratories
... Unlimited Uses


EAR PROTECTION
APRONS
FOOTWEAR




# Offset Biobed System

# Cross-section of Biobed



# Pesticide Application Record

**Date :** **Time:**

**Area / Crop / Variety:**

**Weather conditions before & after:**

**Reason for application**
**(Target pests):**

# Pesticide Application Record

**Pesticide used & formulation:**

**Dosage used:**

**(AMOUNT OF CHEMICAL / MIXTURE USED / AREA)**

**Methods of application:**

**(SPRAY / DRENCH / FOG / DUST ETC)**

**Stage & condition of crop:**

# Pesticide Application Record

**Person responsible & spray team:**

**Effectiveness of treatment:**

(OBSERVATIONS POST-APPLICATION)

**Notes & Comments:**

(CONDITION OF EQUIPMENT / CHANGE OF FILTERS / NOZZLES ETC)

**USE THE BACK OF THIS SHEET TO SHOW ALL CALCULATIONS**

# Hazardous Substance Storage Area

- Pesticide Application Record (Spray Book)
- Inventory (List of Stock)
- File for Material Safety Data Sheets (MSDS)
- Almanac / Calendar / Year planner
- Calculator
- Scales
- Measuring Cylinders
- Tables of weights & measures

# Hazardous Substance Storage Area

- Work Surface
- Wash basin & soap etc
- Emergency shower and soap
- Fire Extinguisher
- Safety eye-wash bottle
- Skin barrier cream
- Signage (posters and information on walls / poison emergency Tel number)

# Hazardous Substance Storage Area

- Notice Board or Black Board
- Spray Nozzle Cleaning Brush
  (soft tooth brush)
- Tools for changing nozzles / opening drums etc
- Spare nozzles / filters / pump diagrams / fittings / hose / hose joiner
- Secure racking / shelving / plastic pallets
- Plank or broom-stick with nail
  – for puncturing empty
  “triple rinsed containers”

# Hazardous Substance Storage Area

- Drum to contain absorbent material – mopping skills
- Area for storage. And list of redundant chemical stock
- Separate area for spray masks & protective clothing
- Bund wall at entrance to contain spills or water in case of fire.
- Drainage to “French drain”. (Hard well drained area for filling spray rig.)
- A source of good quality water & spray mixtures

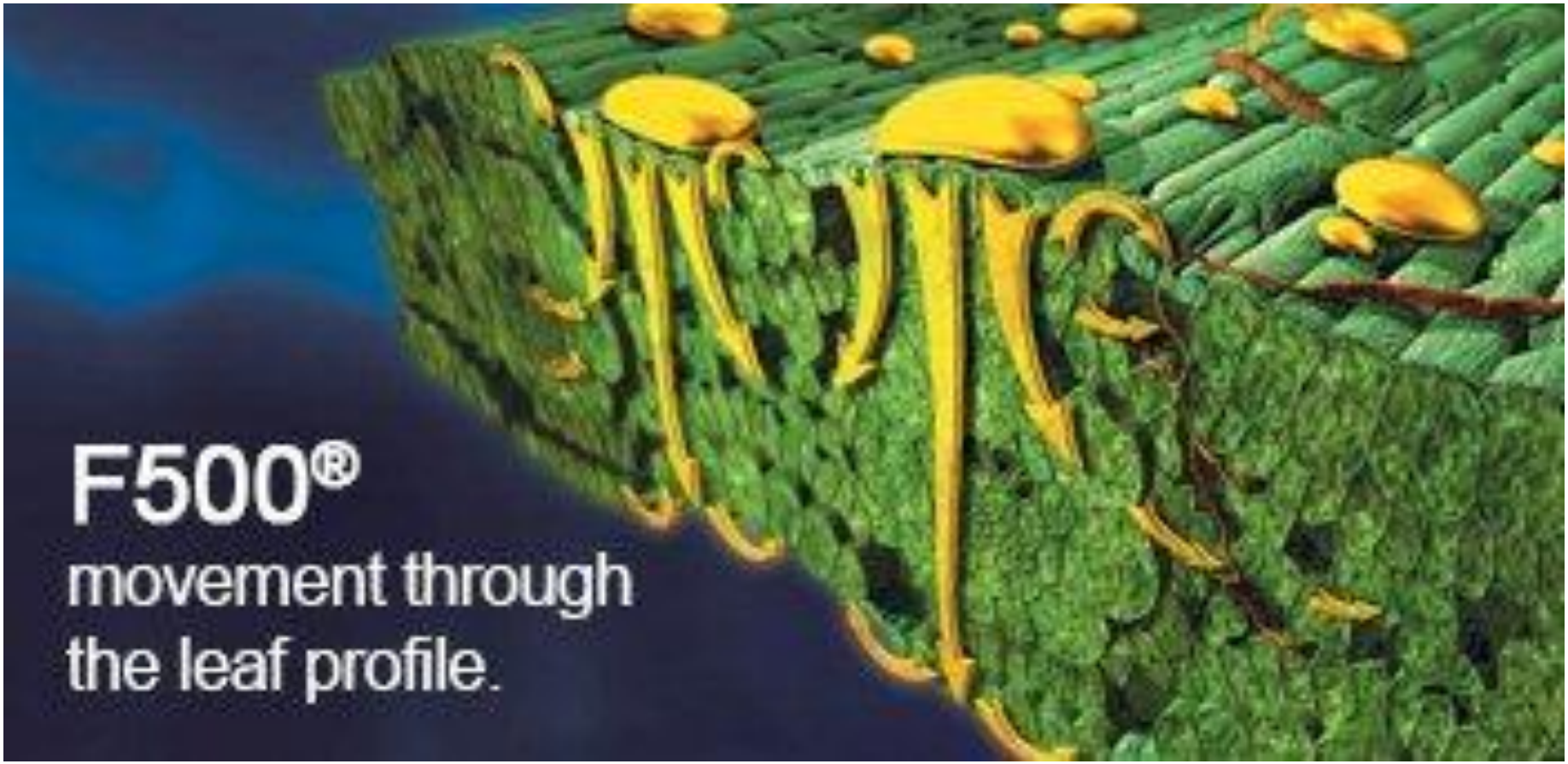
# Hazardous Substance Storage Area

## Building Must Be:

- Secure and locked
- Well ventilated. (Extractor Fan)
- Adequate Lighting
- Insulated from extreme temperatures
- Well demarcated by signs
- Isolated from dwellings, animals & public

# Protective Clothing

- Boots, Alternative overall or spray suit, Plastic apron, Gloves, safety spectacles
- Approved Spray mask & filters, spray cap or hat


F500®
movement through
the leaf profile.


SHRIMP