

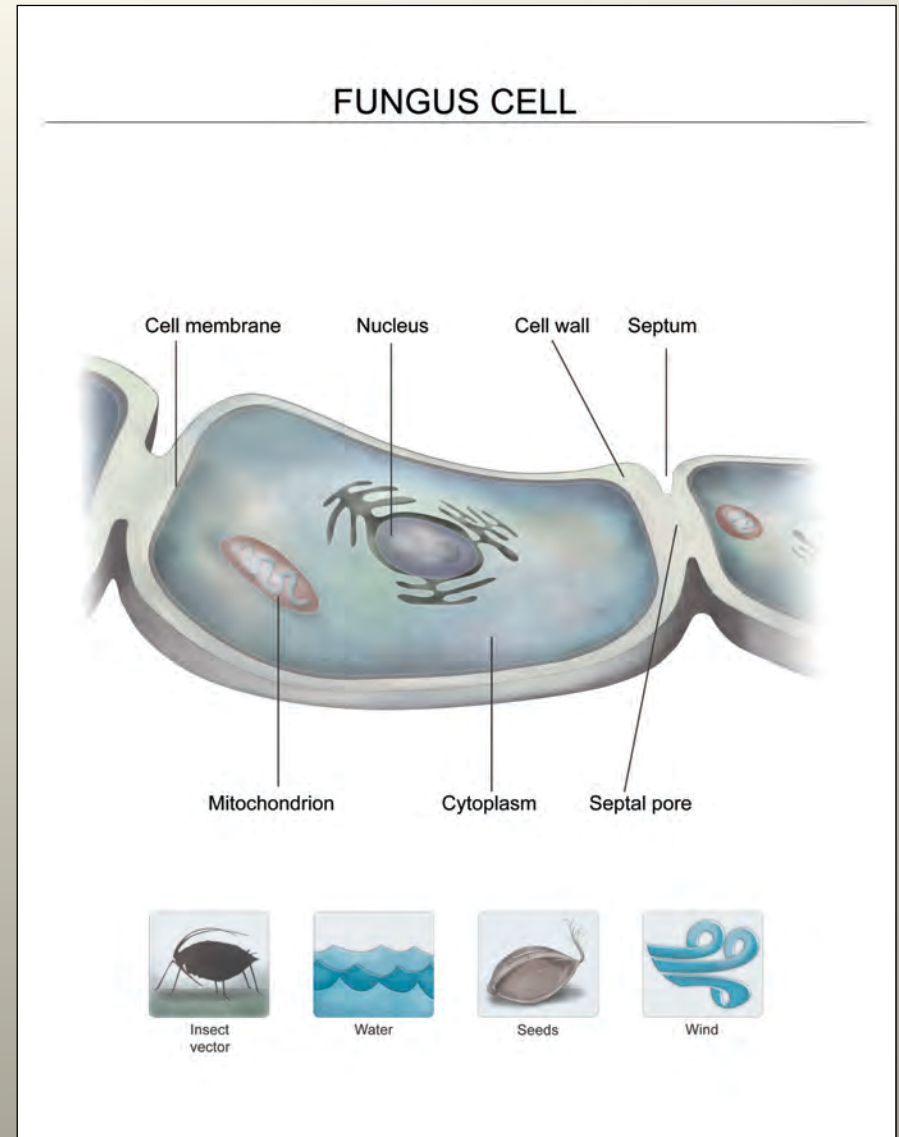
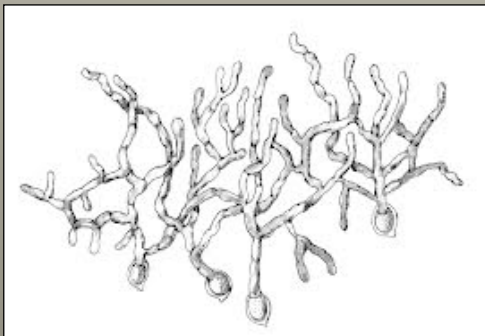
Examples of Bacterial Diseases

- Fireblight of pear
- Crown gall on woody plants
- Citrus greening of citrus (huanglongbing)
- Pierce's disease of grape
- Soft rots (many herbaceous plants)



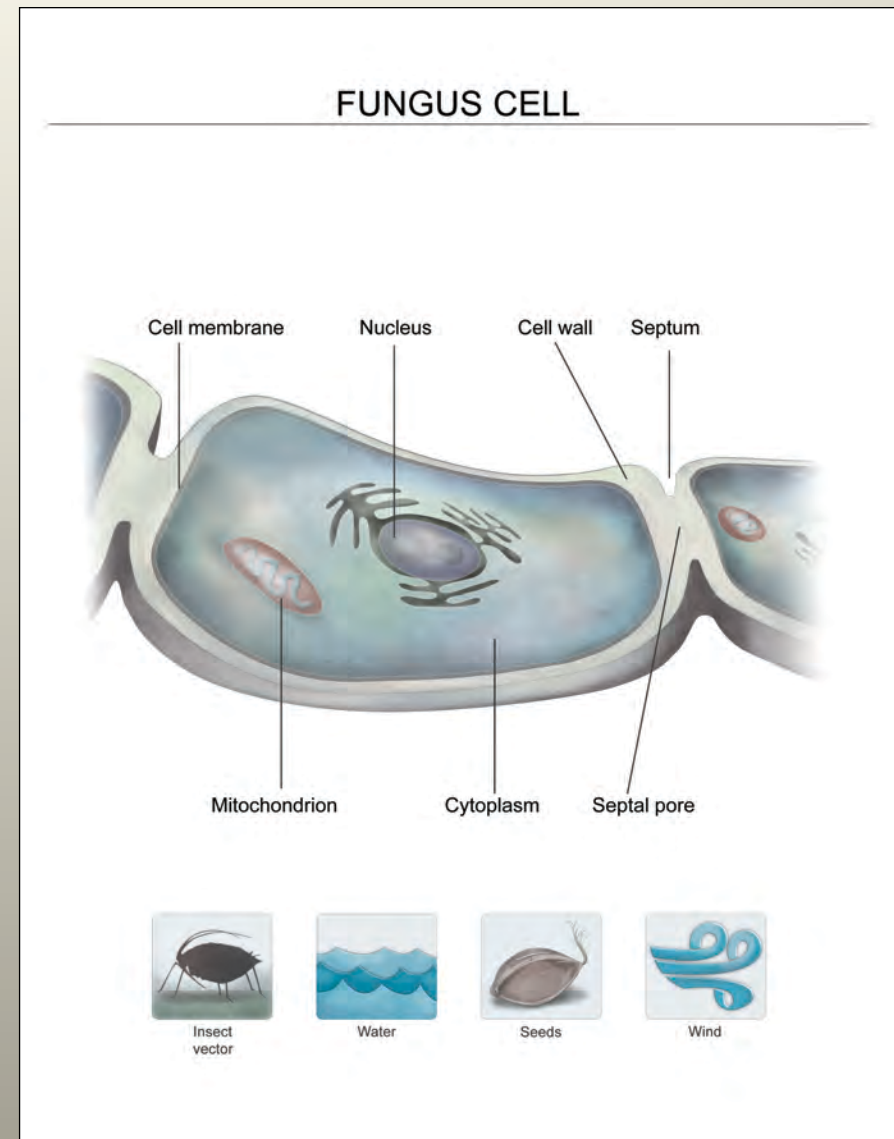
2. Fungi

- Connected cells
- Nuclei, Multiple chromosomes
- Mitochondria and Chitin
- Overall size unlimited
- No vascular system = poor connection/communication among segments = fragmentation
- Differentiated structures: mushrooms, spores
- Most are saprophytic



2. Fungi (cont'd)

- Cause: Rot, blight, leaf spots, wilts
- Fairly sensitive to light and dry conditions when growing
- Very resistant structures to survive
- Spread by wind, water, seed, insect vectors



Examples of Fungal Diseases

- Apple scab
- Powdery mildew
- Peach leaf curl



3. OOMYCETES

- Similar to fungi/different evolutionary history
- Zoospores
- Oospores
- Found mostly in water or soil, favored by free water
- Spread by wind, water, seed, vectors

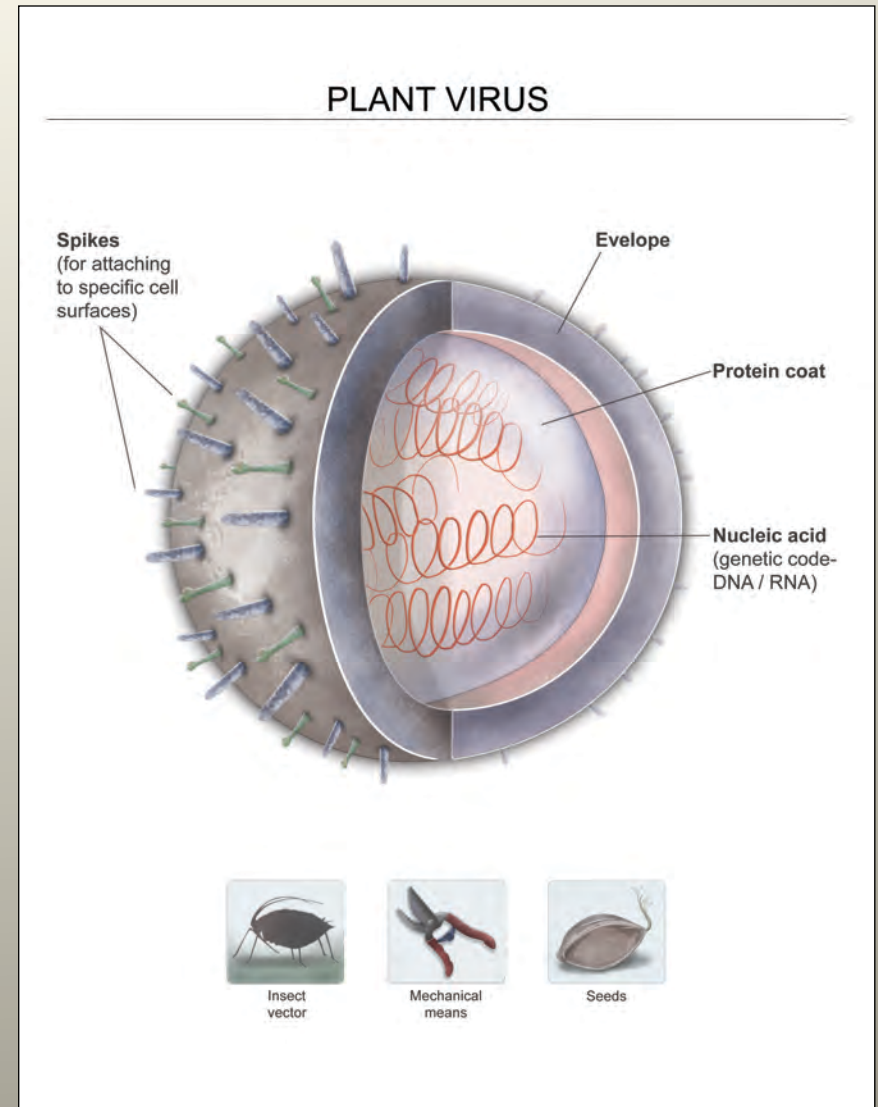
Examples of diseases caused by Oomycetes

- Downy mildew
- Pythium (damping off)
- Phytophthora root rots and blights

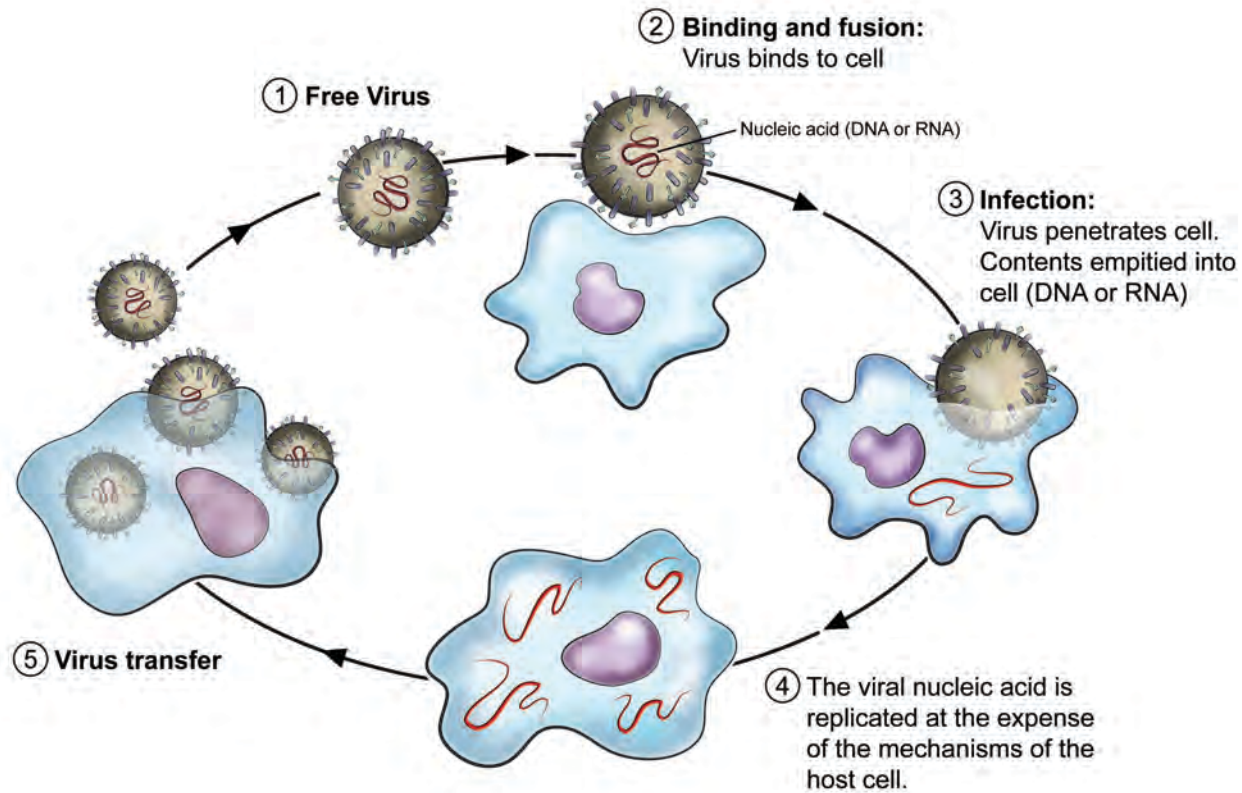


4. VIRUSES

- Pieces of nucleic acid inside a protective coating
- Always a parasite, not necessarily a pathogen
- Nucleic acid codes for a few proteins: replication & movement
- Molecular parasites: take over cells and make virus proteins
- Symptoms mimic genetic abnormalities and nutritional deficiencies: mosaics, yellows, distortions, death
- Spread by mechanical means, seed, vectors
- Most cause disease on more than one species



Replication of a Virus



* The diagram is not to scale: the virus is far smaller than depicted (around 30nm) in comparison with the typical size of a leaf mesophyll cell (about 50000 nm)

Examples of Virus Diseases

- Tobacco mosaic
- Cucumber mosaic
- Tomato spotted wilt
- Western beet yellows
- Cassava brown streak



5. Nematodes

- Microscopic “worms”
- Stylet
- Ecto and Endo- nematodes
- Sedentary or migratory
- Saliva injection upsets plant metabolism
- Symptoms: tumors, death
- Spread slowly unless carried by water or humans
- Most often in sandy soils



Examples of Nematode Diseases

- Rootknot nematode
- Beet cyst nematode



6. Phytoplasmas

- “Bacteria without cell walls”
- Obligate pathogens
- Survive only in host vascular system
- Spread by grafting and insect vectors



Examples of Phytoplasma diseases

- Pear decline
- Aster yellows



7. Parasitic higher plants

- Rely on host for water and minerals (green colored) and carbohydrates (non-green colored)
- Symptoms usually from hormonal upset not nutrient or water loss



Examples of Parasitic higher plant diseases

- Mistletoe on trees
- Dodders on annual plants



7. Abiotic

Nutrient toxicities and deficiencies

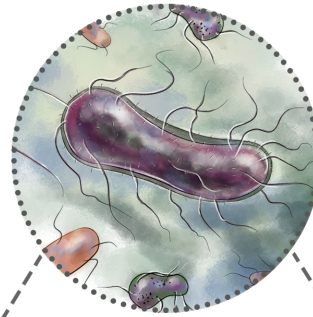
- Rock from which soil formed
- Poor management

Air pollution

- Lead, NO₂, CO, HF, Ozone, SO₂

G. Ecological Disease Management





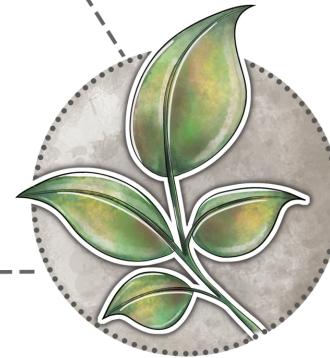
PATHOGEN
A fungus, virus
or bacteria

THE DISEASE TRIANGLE

Pathogen such as a fungus,
bacterium or virus.
Eliminating just one of
them prevents disease.



ENVIRONMENT
Conditions favorable
to a particular disease



HOST
A plant that
can get sick

Pesticide-Based vs Ecological Disease Management

Pesticide-based

- Reduce disease with pesticides after it is first seen
- Apply pesticides on a spray schedule
- Calendar forecaster using environmental conditions

Ecological

- Avoid conditions for disease

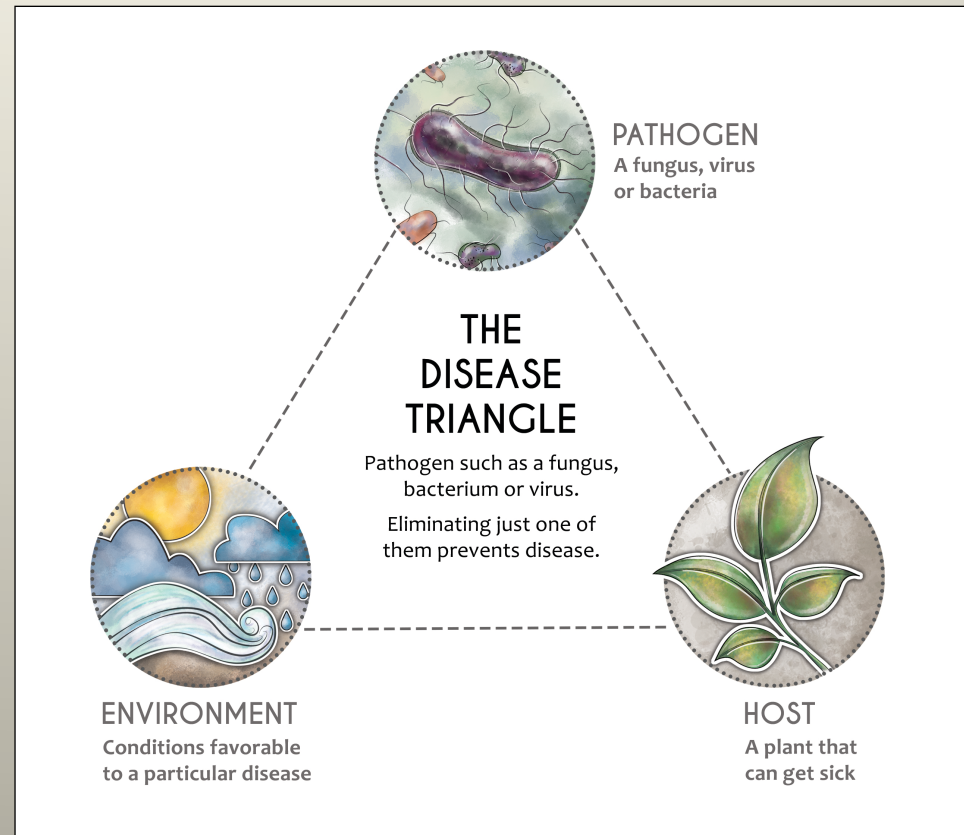
Disease management *is different* from Arthropod management

Avoiding Disease

Manipulate the disease triangle

Environment examples —

- Increase plant spacing
- Regulate irrigation, drainage
- Choose where crop is grown

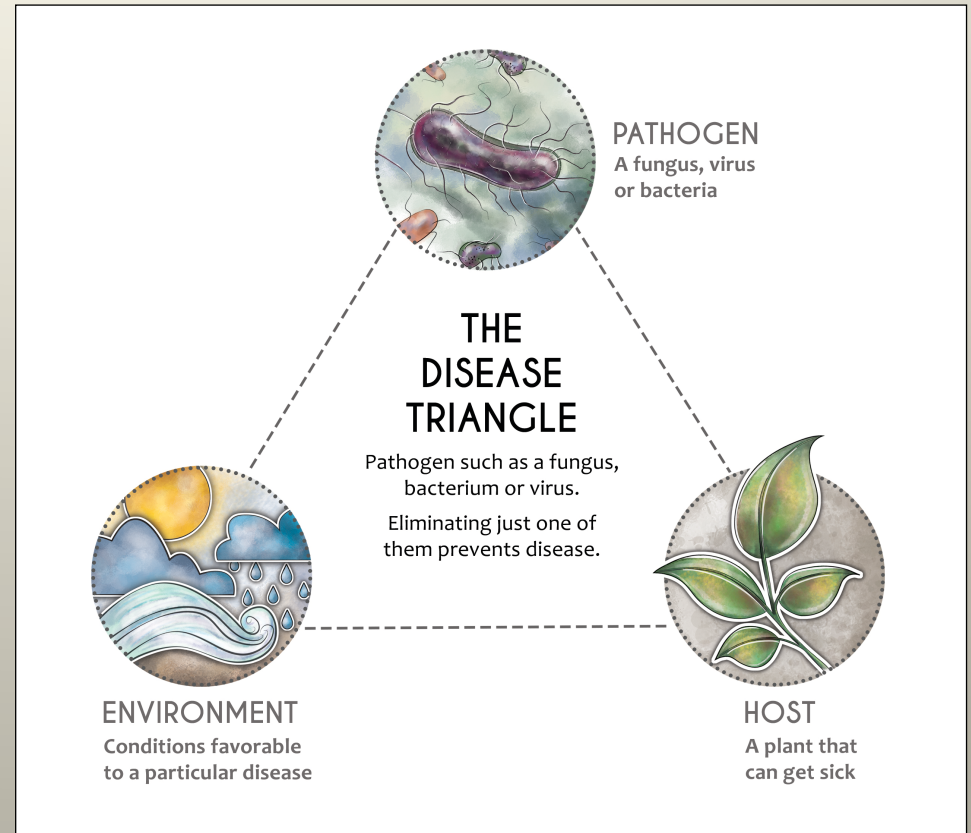


Avoiding Disease

Manipulate the disease triangle

Host examples (Less control than with the environment because we choose host)

- Resistant cultivars
- Pathogen-free planting materials
- Crop rotation (temporal and spacial)

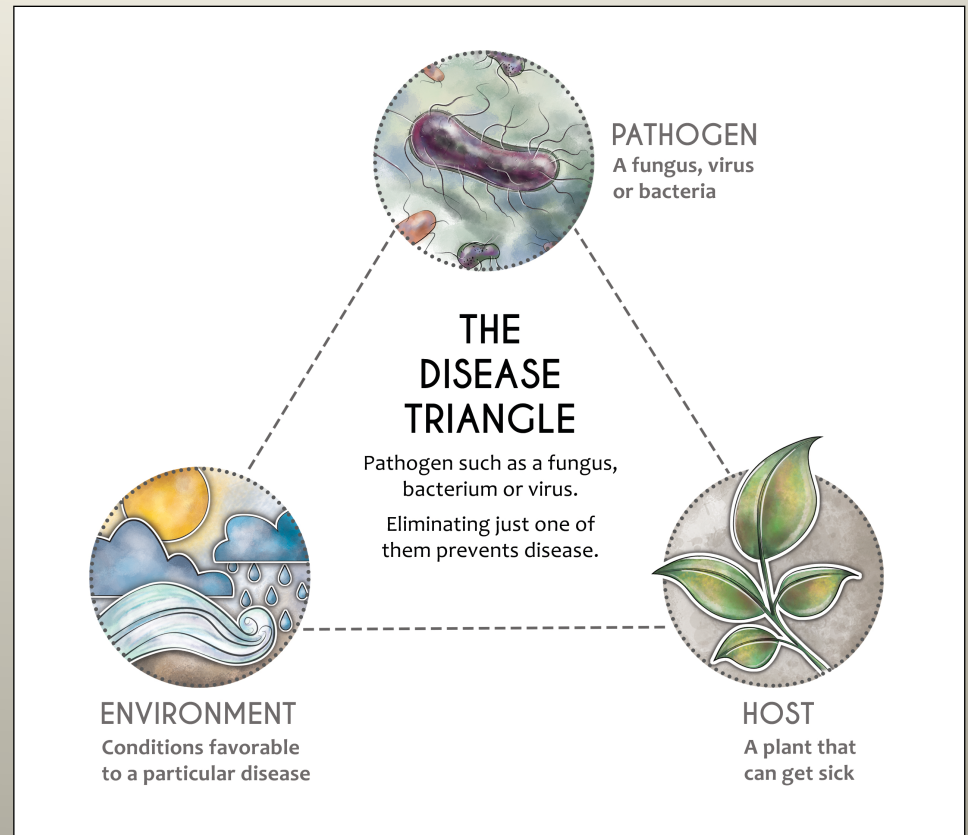


Avoiding Disease

Manipulate the disease triangle

Pathogen examples

- Keep pathogen out
- Get rid of it (manually, chemically)
- Commercial use of non-pathogenic microbes (?)



Climate and Weather

- Most pathogens like wet, warm weather + free moisture
- Weather that is too hot or cold for plant = susceptibility
- Rain, or Wind, or Rain and Wind

INSURE COMPATIBILITY OF CROP WITH REGIONAL CLIMATE!