

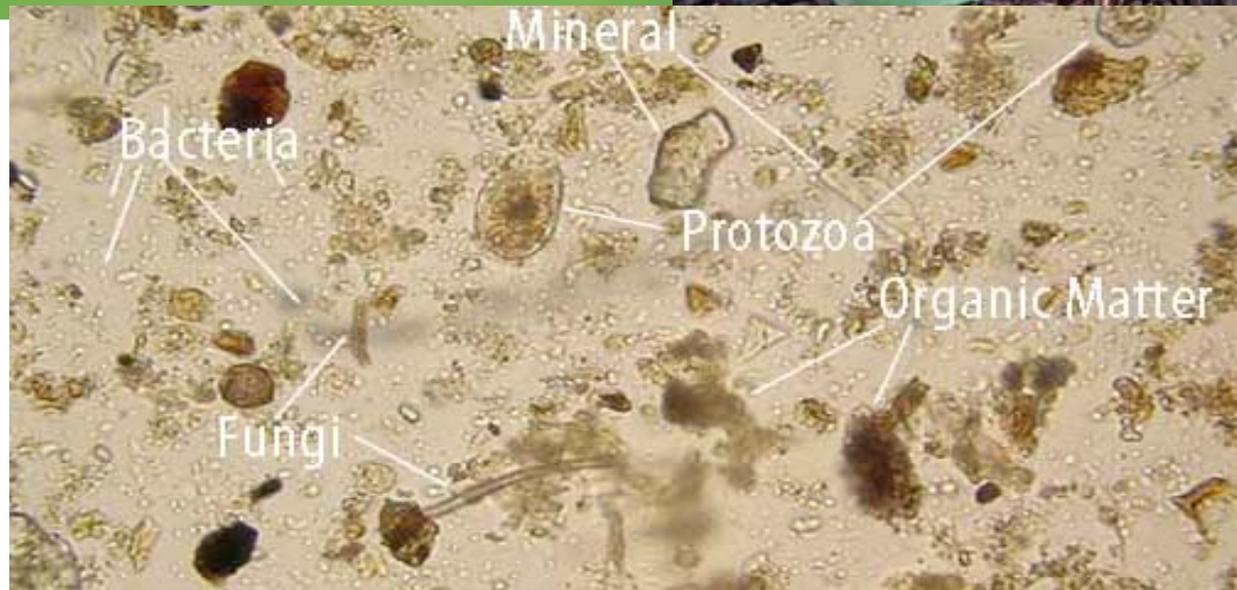
Disease Management in Organic Plantings

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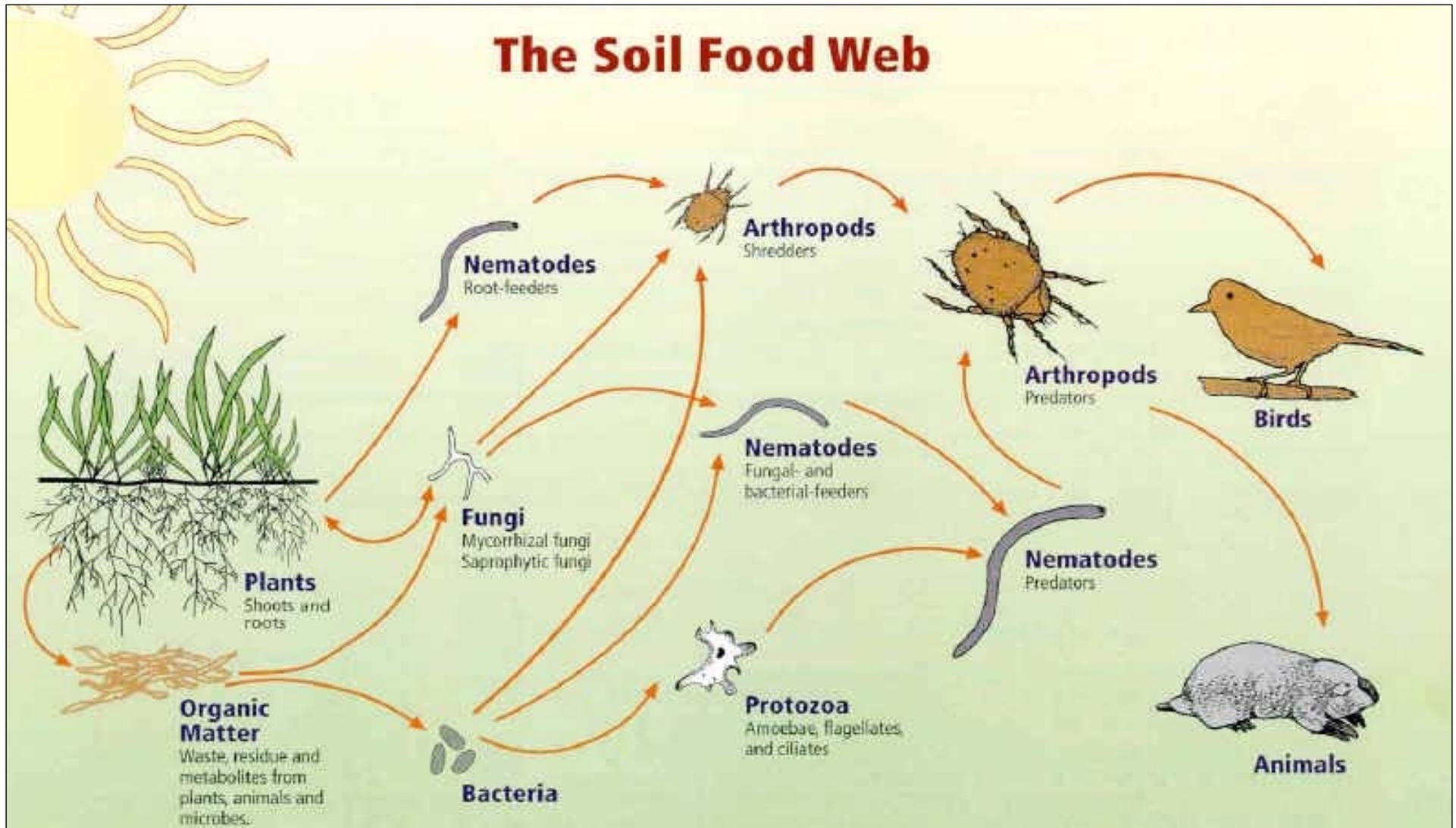
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Healthy soil, healthy plants?



The Soil Food Web



First trophic level:
Photosynthesizers

Second trophic level:
Decomposers
Mutualists
Pathogens, parasites
Root-feeders

Third trophic level:
Shredders
Predators
Grazers

Fourth trophic level:
Higher level predators

Fifth and higher trophic levels:
Higher level predators

Integrated disease management

- Involves the use of multiple disease control strategies
- Generally achieves better disease control than using a single method
- Reduces the need for emergency intervention strategies (e.g., fungicides)

Site selection and preparation

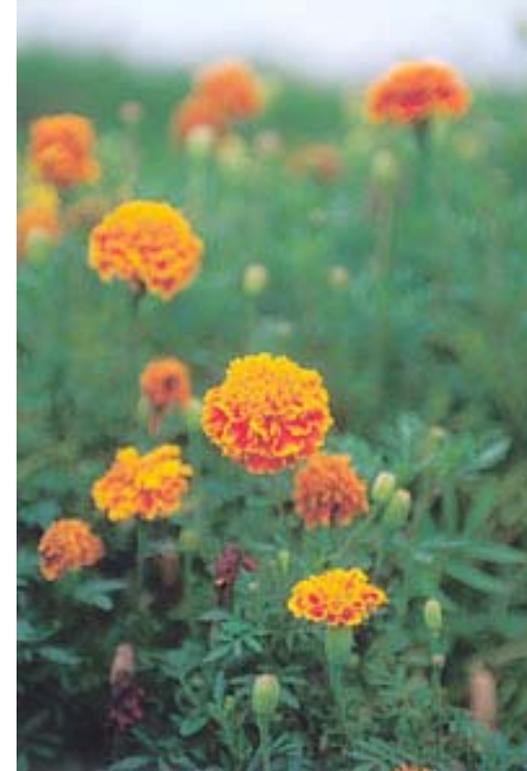


- Select site that is suitable for the crop
- Improve drainage to prevent soilborne diseases
- Have soil analysis done for nematodes and soilborne pathogens



- Remove wild hosts of pathogens in or near fields
- Consider airflow and shading that could affect

Crop rotation



- Rotate crops to break pathogen life cycle
- Grow nematode-suppressive crops
- Use legumes in the rotation to improve soil fertility
- Control weeds that host pathogens

Disease-resistant varieties



- Crop cultivars differ in disease susceptibility
- Under high disease pressure or if pathogen races are present, resistance may not hold up
- Difficult to find cultivars with resistance to multiple diseases

Use healthy plant material



- Buy certified virus-tested plants and disease-free seed
- When propagating, select only healthy-looking plants
- Rogue out diseased plants

Intercropping and cover crops



- Growing mixture of resistant and susceptible cultivars reduces severity of disease epidemics
- Growing multiple crops in the same field increases distance between susceptible plants

Environment modification



- Encourage airflow by increasing plant spacing and creating open canopy
- Plant rows in prevailing wind direction
- Reduce standing water by installing drain tile
- Use drip irrigation
- Reduce shading and tall weeds

Disease avoidance



- Use mulch to block inoculum
- Grow crops in raised beds to avoid soilborne pathogens
- Adjust planting time to avoid disease vectors

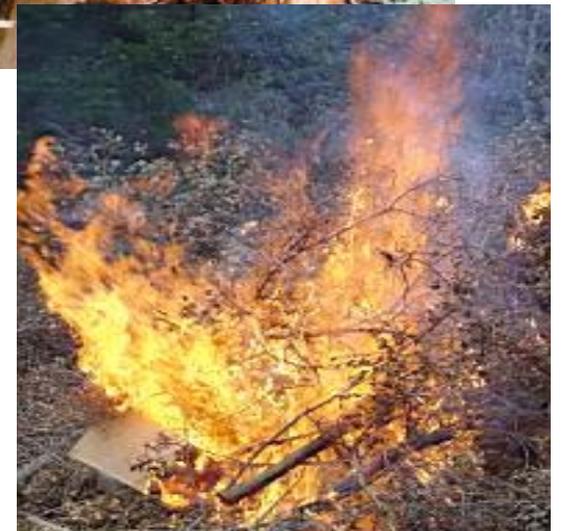
Scouting for diseases



- Scout fields regularly and know what to look for
- Correct disease diagnosis
- Understand disease biology to improve control



Sanitation



- Remove diseased plants/plant parts
- Burn or bury infested plant debris
- Soil solarization, flooding, or biofumigation
- Disinfest greenhouses, storage areas and containers

Reduce losses to diseases at harvest and post-harvest

- Timely harvest
- Rapid cooling or proper drying
- Clean harvesting and processing equipment
- Control insects that may create entry points for storage rots

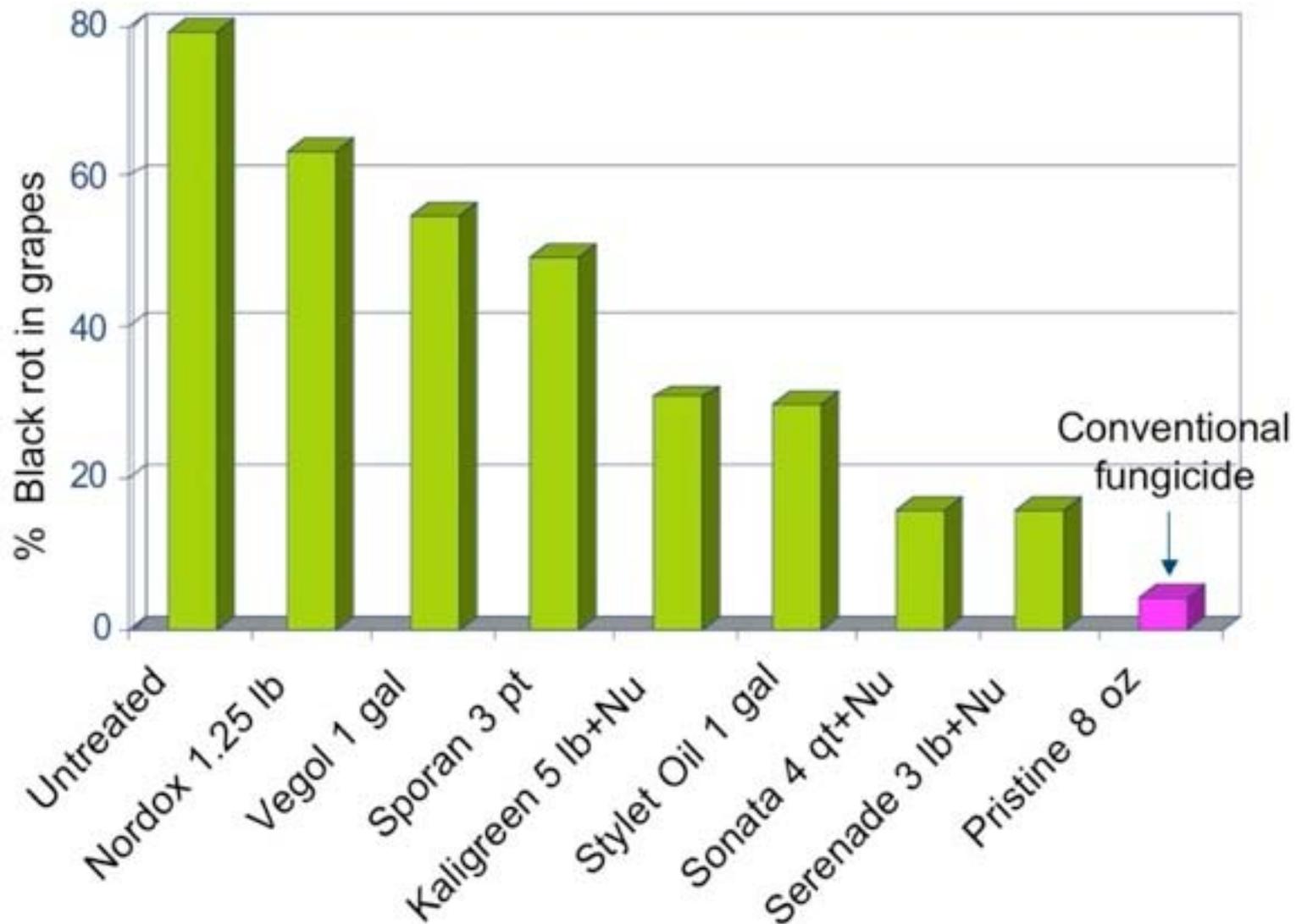


Chemical control



- Copper (various formulations)
- Sulfur (various formulations) – best for powdery mildews
- Lime sulfur – mainly for dormant sprays
- Salts (e.g., potassium bicarbonate)
- Horticultural oils (e.g., mineral oil, vegetable oil)
- Plant extracts (e.g., citrus extract, garlic extract, mint oil, giant knotweed extract, neem oil)

In general, organic fungicides are not as effective as conventional fungicides; adjuvants may help



Biological disease control

BioNem (*Bacillus firmus*)

DiTera (*Myrothecium verrucaria*)

Nematicides

Serenade, Kodiak (*Bacillus subtilis*)

Sonata, Yield Shield (*Bacillus pumilis*)

Contans (*Coniothyrium minitans*)

Mycostop Biofungicide (*Streptomyces griseoviridis*)

SoilGard (*Gliocladium virens*)

Blight Ban (*Pseudomonas fluorescens*)

PlantShield (*Trichoderma harzianum*)

Agri-Mycin (*Streptomycin*)

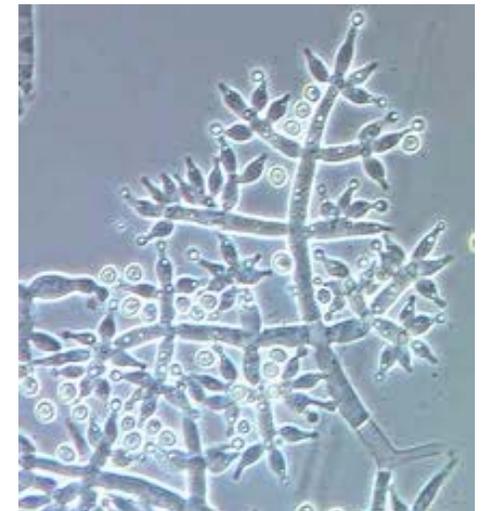
Firewall (*Streptomycin*)

Mycoshield (*Oxytetracycline*)

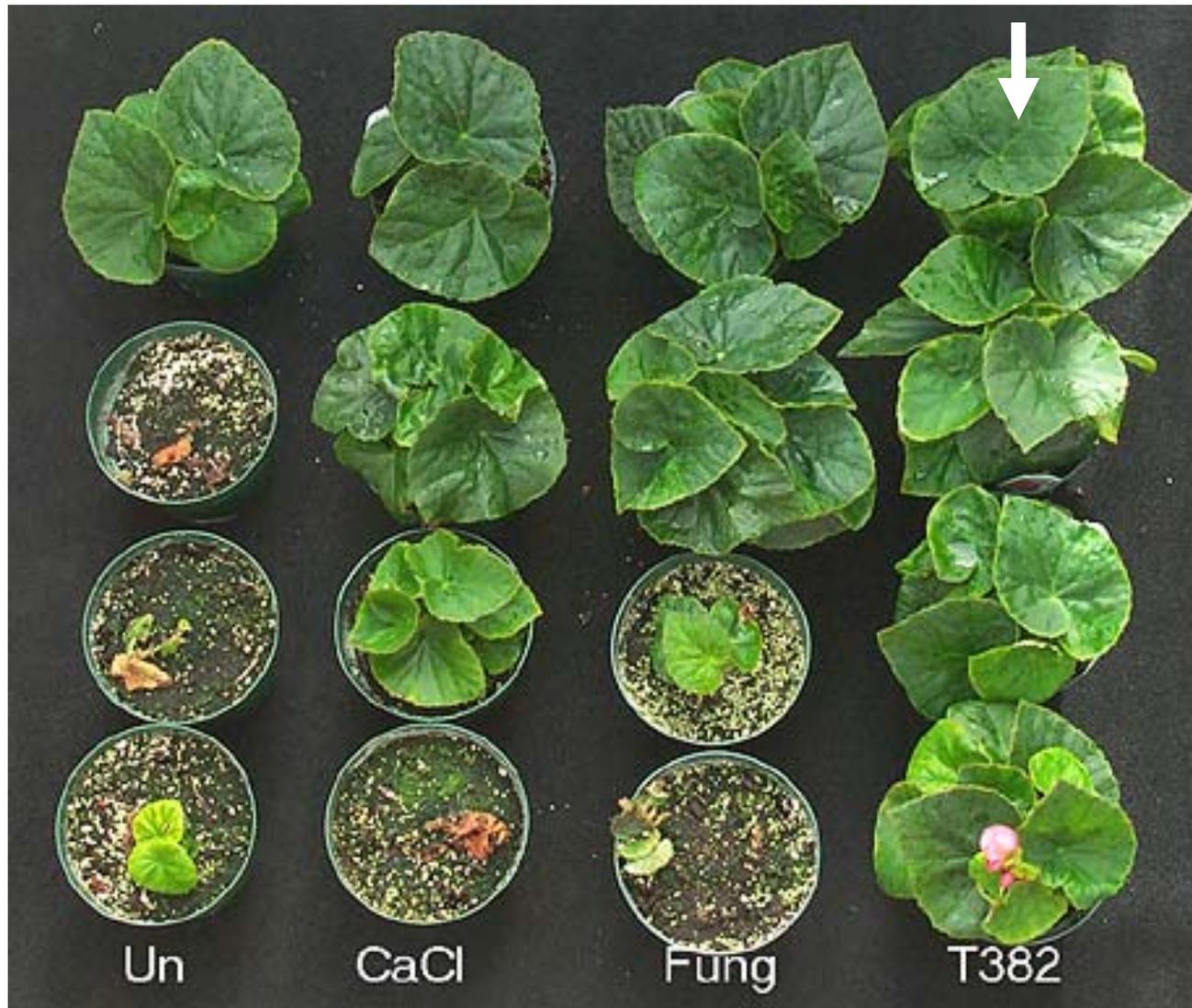
Antibiotics for
control of bacterial
diseases



Fungicides and
bactericides



Effect of *Trichoderma hamatum* (T382) in potting mix on *Botrytis* of begonias (un=untreated)



Compost tea

- Watery extract of compost (with or without additives)
- Aerated or non-aerated
- Brewed or soaked for 1 to 14 days
- Contains bacteria, fungi, protozoa, nutrients, etc.
- Applied to crops as foliar spray or soil drench
- Disease control variable; possible mechanisms
 - Competition for space/nutrients
 - Antibiosis
 - Induced resistance



List of products allowed for use in
organic crop production:

Organic Materials Review Institute

<http://www.omri.org>



...but local certifier ultimately decides
what may or may not be used

