Sustainable Orchards

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12-15-09

All plant problems fall into three major categories:

1. Insects or mites
2. Infectious diseases
3. Cultural or environmental disorders

Recognizing Cultural and Environmental Problems

65-75% of all plant problems are the result of cultural or environmental factors

Typical cultural/environmental problems

soil, moisture, chemical application, physical damage, weather conditions

Nonpathogenic Disease

Improper choice of adapted plant material

- light availability
- soil characteristics
- environmental conditions

Tight rootball or girdling roots

- causes decline in plant vigor
- break-up rootball before planting

Diagnosing Infectious Plant Diseases

Primary plant part affected

- leaves
- flowers or fruits
- stems or roots
- whole plant

Multiple symptoms on plant

Recognizing Infectious Diseases

Check all plant parts and roots
symptoms are often similar
to those from other causes

Determine damage pattern
older or younger leaves?

Plant pathogens take time
plants seldom die overnight
from microorganisms

Planting Problems

Planting too deep can kill trees and shrubs

Where is the root crown?

- Not usually so clearly defined as here but generally where the root flare occurs.

No taper/buried root crown

- Often the extent of the burial is not seen immediately

Why plants die

- No Water
- Too Much Water
- Biological Reasons
  - Plant Pathogens
  - Physiological intolerance of anoxia
- Girdling roots

- Set the root ball just above grade
- Do not mix organic matter into the backfill
- Do not backfill with different textures of soil without installed drainage
- **Do not bury the rootball with native fill**

Planting Fruit Trees

- Check roots, prune if needed
- Hole size: Wide and deep if compacted
- Plant on mound to keep crown dry
- Plant high! – Reduces chances of crown & root rot
  - Upper roots just below ground, graft union well above soil
  - Allow for soil settling

What causes plant diseases?

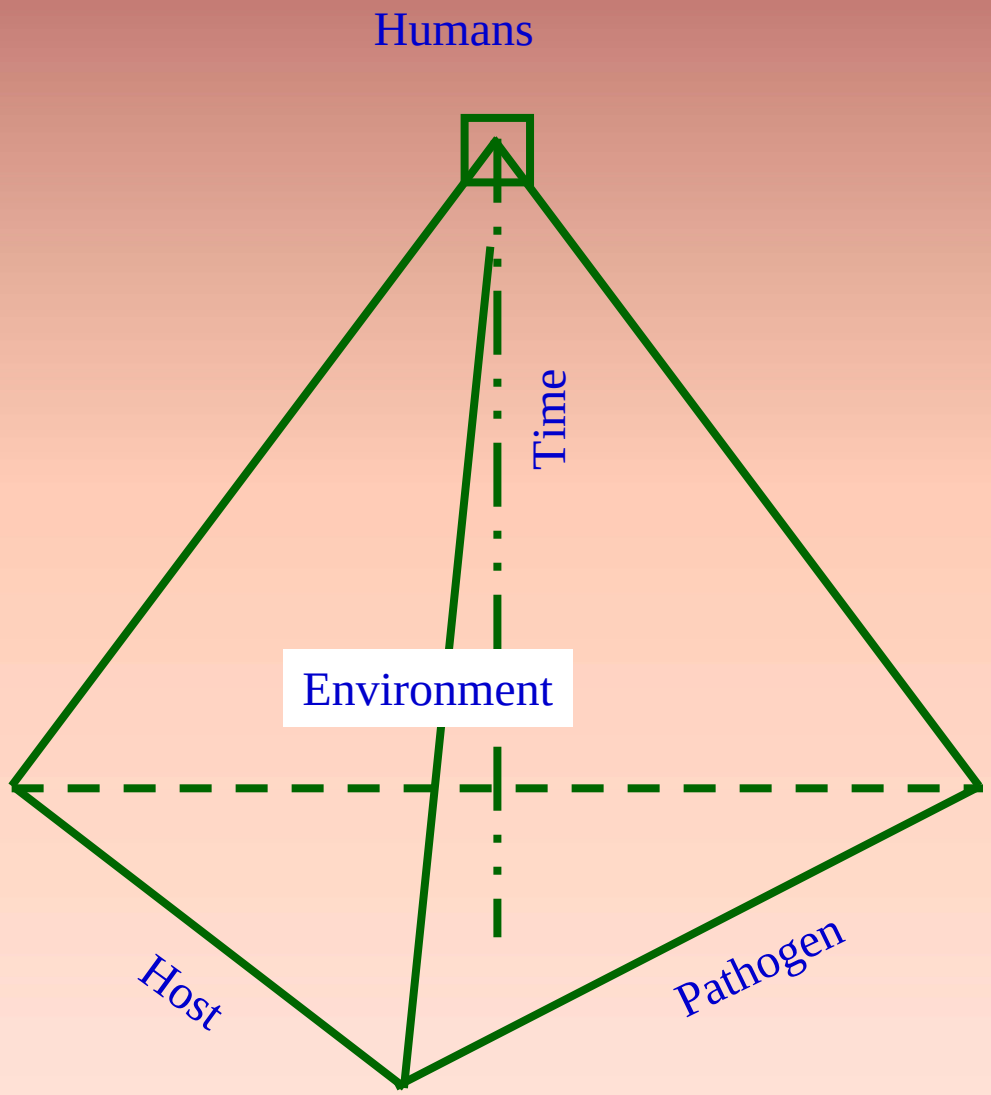
Abiotic factors

- drought
- nutrients
- water
- light
- wind
- hail
- heat

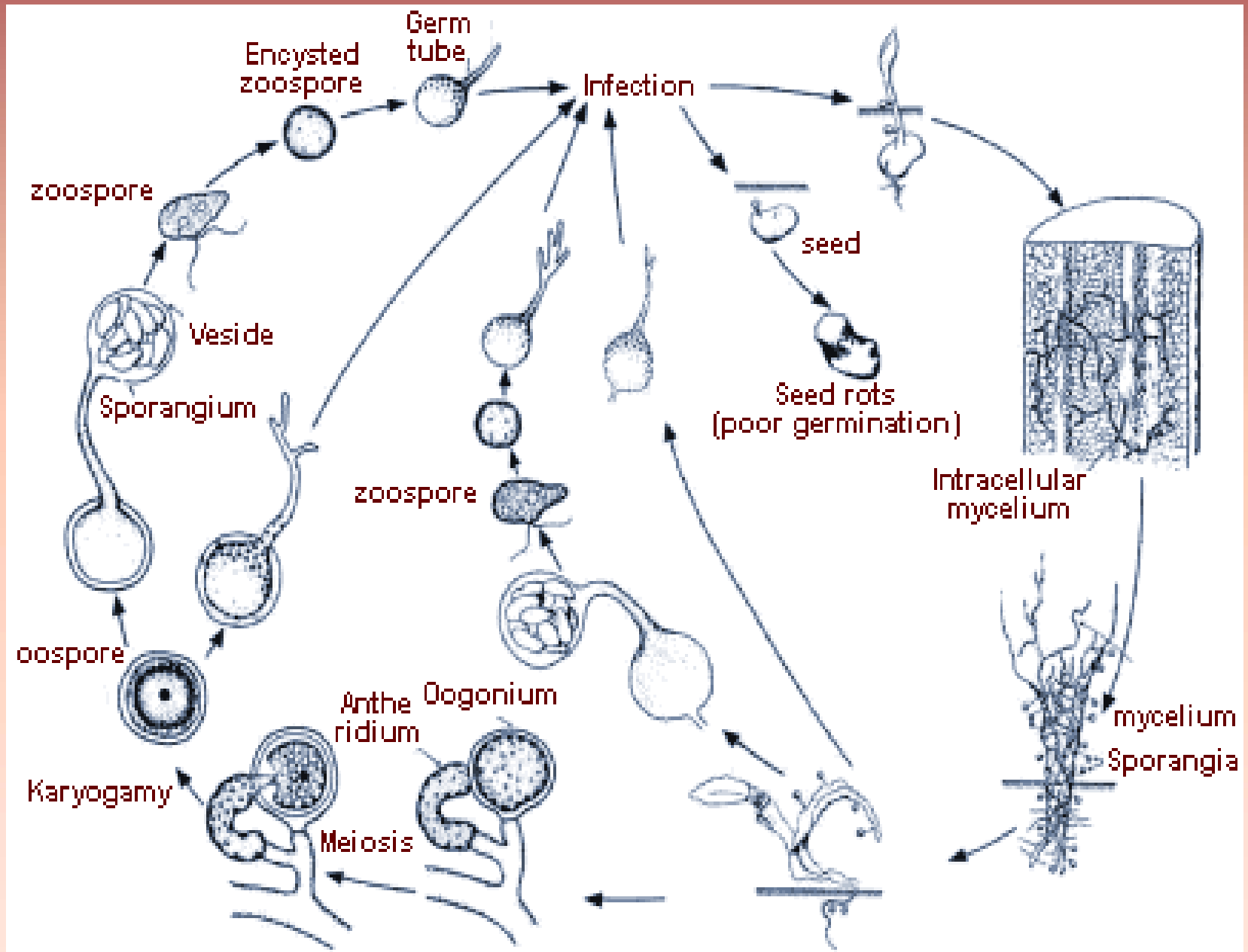
Biotic factors (pathogens)

- fungi
- bacteria
- nematodes
- viruses
- phytoplasmas

The disease tetrahedron

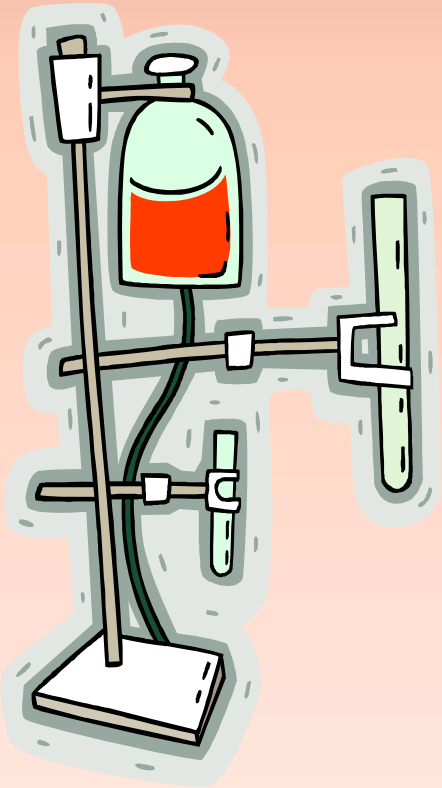


Life cycle of *Pythium* (and *Phytophthora*)



Treating plant diseases

- Sanitation and cultural practices
- Resistant varieties
- Monitoring
- Fungicides



What is IPM?

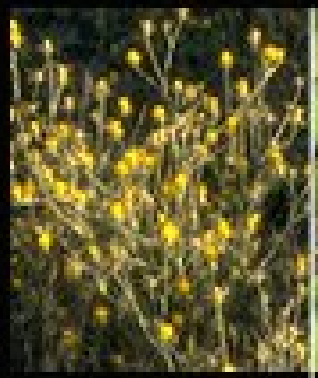
using a variety of management methods that are cost effective and cause the least damage to humans, non-target organisms, and the environment to prevent pathogens, insects, and weeds from causing economic crop losses

IPM strategies

- Biological control
- Habitat manipulation
- Modification of cultural practices
- Use of resistant varieties
- Pest monitoring for timing pesticide application
- Rational use of pesticides

UC IPM *Online*

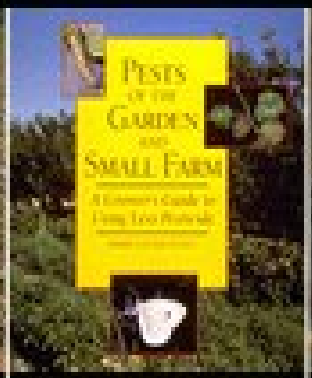
UNIVERSITY OF CALIFORNIA STATEWIDE INTEGRATED PEST MANAGEMENT PROJECT



ABOUT UC IPM

HOW TO MANAGE PESTS

PESTICIDES: EDUCATION & DATABASES



OTHER RESOURCES

UC IPM FUNDED PROJECTS

WHAT'S NEW?

http://ucipm.ucdavis.edu

A reason trees don't bear: Pollination

- Pollenizer: A tree of one variety used to provide pollen to a nearby tree of a different variety to produce fruit

- Pollinator: An insect (usually a bee) that carries pollen from one tree or flower to another

Pollenizer Varieties Required for Sweet Cherries

Variety	Pollenizer
Bing, Lambert	Black Tart., Van, Rainier
Rainier	Van, Lambert, Black Tart, Bing
Royal Ann	Van, Black Tart.
Bl. Tart., Van	All varieties
Lapins, Stella	Self-fruitful

Bacteria

FIRE BLIGHT

Erwinia amylovora

Single cell, one colony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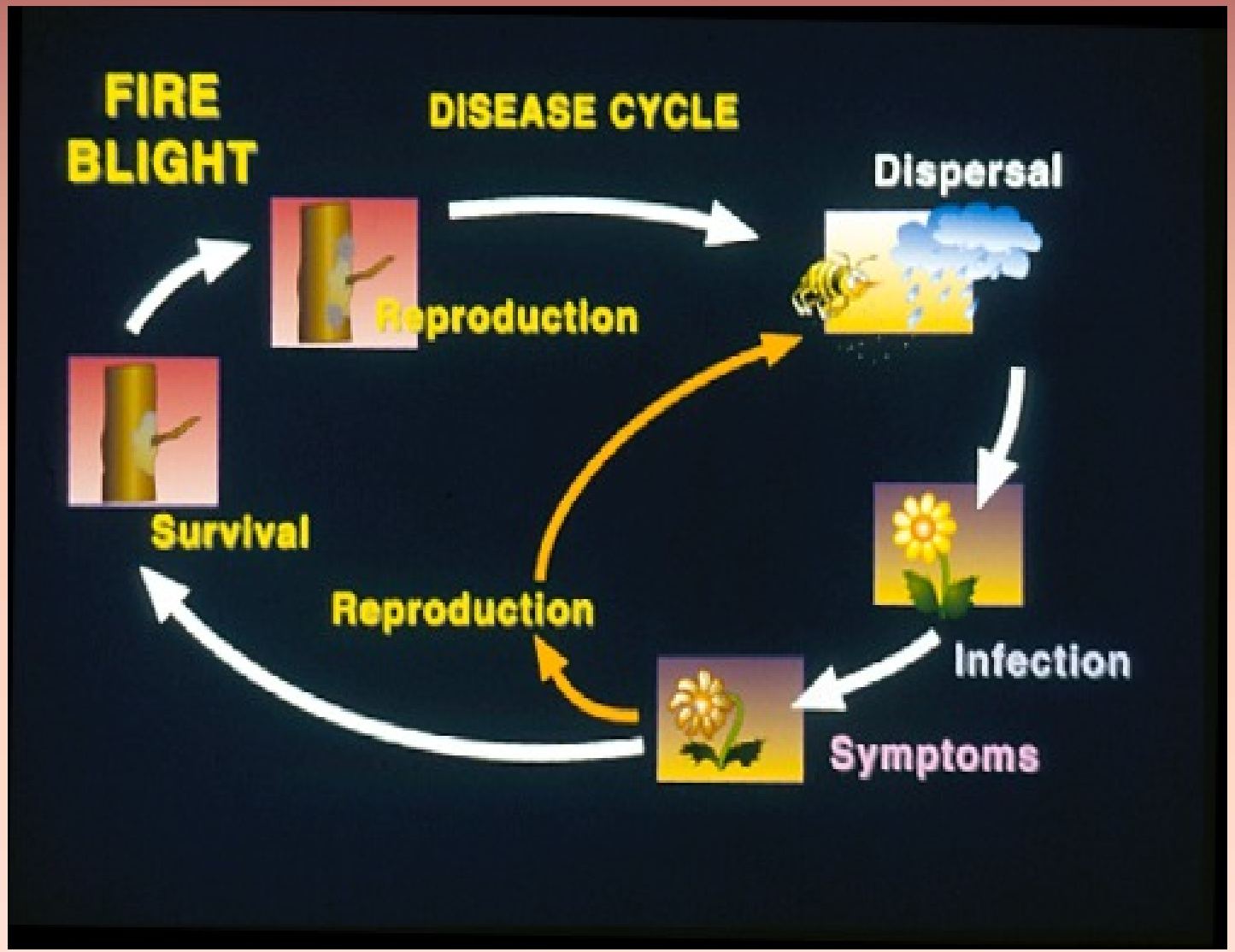
FIRE BLIGHT
DISEASE CYCLE
Dispersal
Reproduction
Survival
Reproduction
Infection
Symptoms

Fire Blight

Characteristics

- Bacteria – enters through flowers under warm, moist conditions
- Affects apple, pear (esp. Bartlett), Asian pear, flowering pear, quince, loquat, pyracantha, hawthorne

Fire Blight

Control Methods

- Cut shoot or branch 12 in. below infection zone
  - Sterilize shears between cuts (20% solution of bleach)
- Spray copper product twice during bloom

FIRE BLIGHT

Control

- Pruning
- Nitrogen
- Irrigation
- Bactericides

Shot Hole Disease


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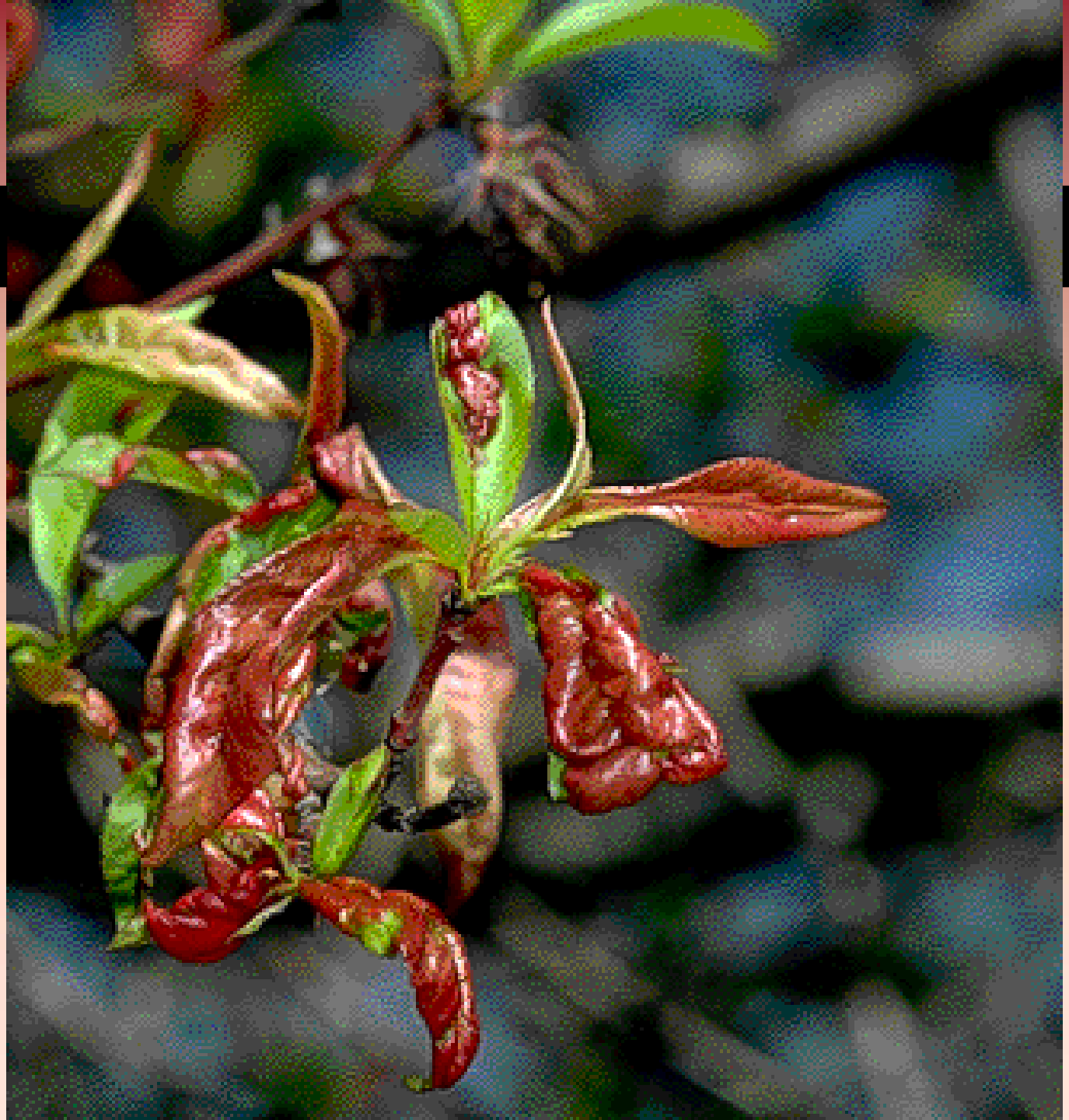
Peach Leaf Curl

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Shot Hole Disease and Peach Leaf Curl

- Shot hole affects peaches, nectarines, apricots (not plums!)
- Peach leaf curl affects peaches, nectarines
- Plum pocket affects plums
- Fungal diseases spread by rain, wind
- Spores overwinter in buds and twigs

Control of Shot Hole Disease and Peach Leaf Curl

- For both diseases:
  - Late Nov. copper spray

    (Fixed copper, basic copper sulfate, etc.)
- For peach leaf curl:
  - Also spray copper or lime sulfur in Feb. as flower buds begin to swell

BROWN ROT of Stone fruit

Monilinia laxa

Monilinia fructicola


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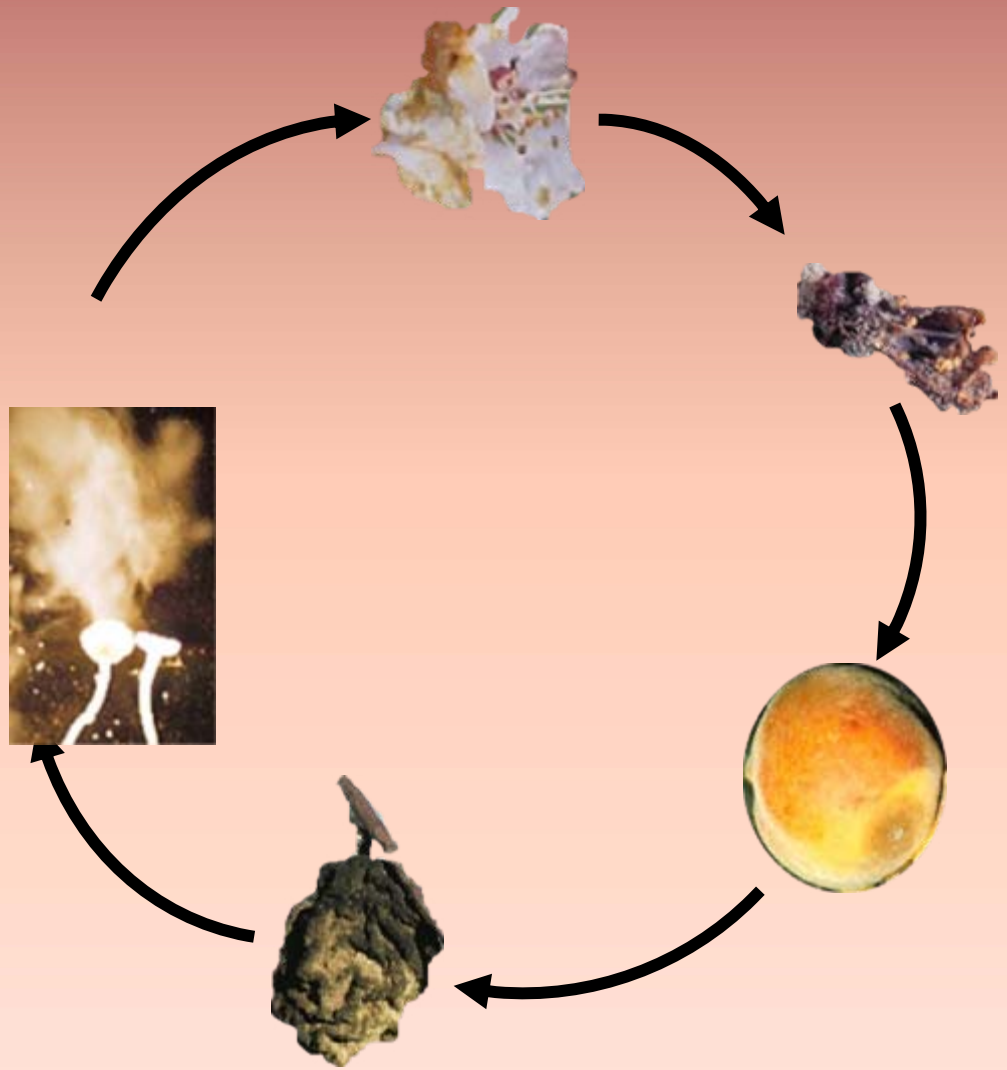
BROWN ROT DISEASE CYCLE



Brown Rot of Stone Fruits

- Fungal spores enter through flowers, kill spurs
- Attacks fruit during ripening
- Control not necessary in dry springs
- Remove mummies, thin fruit
- Copper spray at bud swell (P.L.C. too)
- 1-2 copper sprays during bloom

Apple Scab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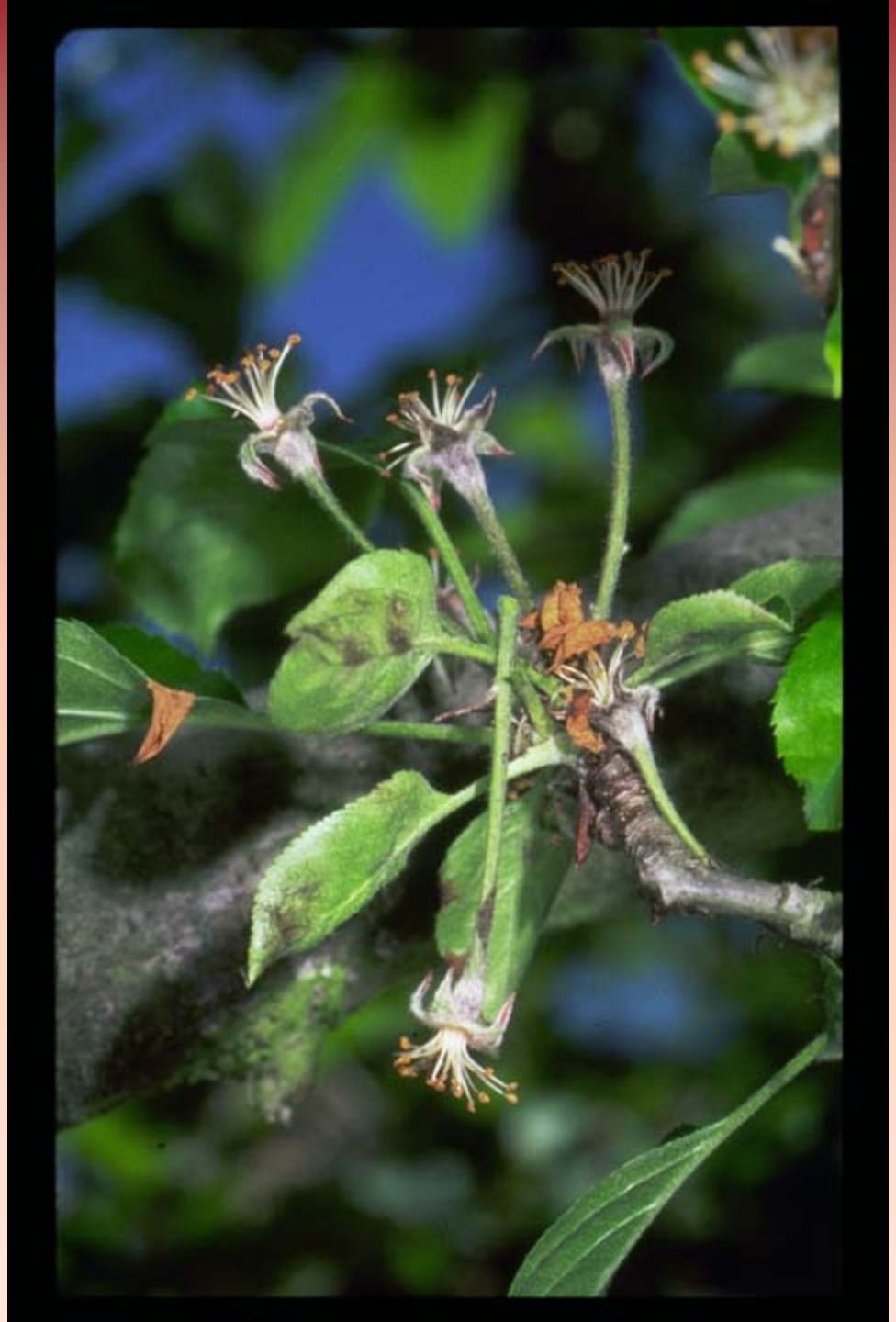


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Powdery Mildew


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Bacterial Blight


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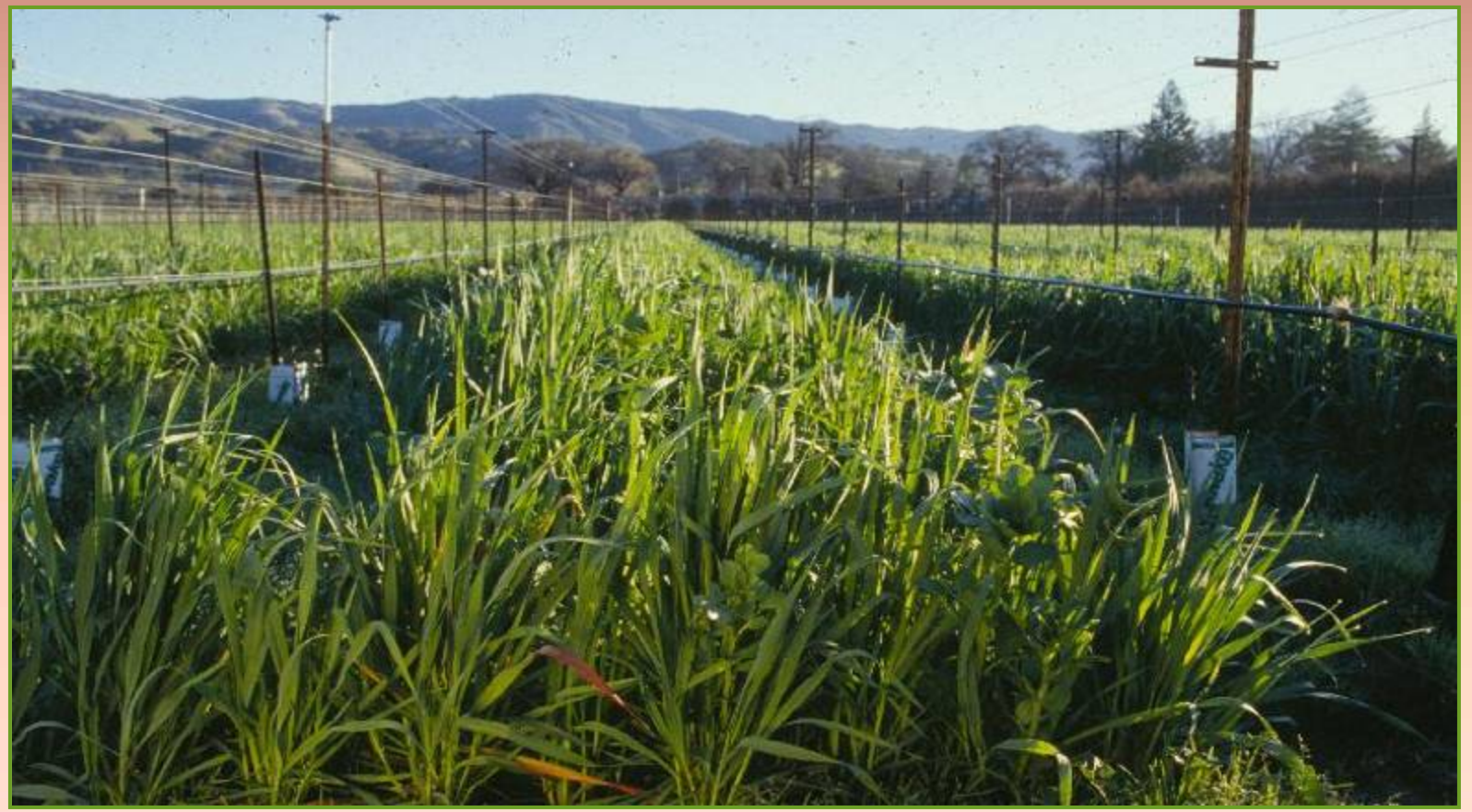
Poor nutrition weaken plants

Peas, Vetch, Bell Beans and Oats Cover Crop Mix



Disease Resistant Varieties

Apples	Pears	Plum	Peach
Enterprise	Arganche	Beauty	Frost
Liberty	Batjarka		brown rot
Prima	Brandy		bacteria blast
Pricilla	Erabasma		Mary Jane
	Muscat		Avalon Pride
	Orcas		Q-18
	Barnett Perry		
	Harrow Delight		
	Passe Crassane		
	Keiffer		
	Orient		

Other Fruits to Grow

Blueberry
Cane berries – Logan and Tay
Goumi = Elaegnus
Gooseberries
Asian pears ‘Hamese’, ‘Shinseiki’ and ‘Atago’.
Plums ‘Kuban Burgundy’, purple foliage, great fruit.
Fuyu Persimmon : we tend to recommend in warmer areas.
Meyer Lemon

Sustainable orchards are healthy orchards

PREVENTION OF DISEASE
IS THE KEY