

PLP 3002
Bacterial Diseases

- Rod shaped
- Not spore formers
- Many have flagella
- Require
 - Injuries
 - Natural openings
 - Hydathodes
 - Stomates
 - Flower nectaries

Examples

- Binomials *sensu* Agrios

Tobacco wildfire

- *Pseudomonas syringae pv. tabaci*
- Leaf blight pathogen
- Toxin producer
- “tabtoxin”
- Wounds, stomates, no vector

Controlling tobacco wildfire

- Sanitation
- Crop rotation
- Copper “fungicides”
- Antibiotics (streptomycin)

Bacterial wilt

- *Pseudomonas solanacearum*
- Southern wilt of Solanaceae
- Moko disease of banana
- Infect vascular tissue (wilt disease)
- Diagnosed by vascular streaming

The *Erwinia* Gang (3)

1. *Erwinia carotovora*

- Soft rot
- Wide host range
- Wound pathogen
- Pectolytic enzyme producer
 - Dissolves middle lamellae
- Soft rot symptoms, “melt”

2. *Erwinia amylovora*

- Fire blight
- Mostly restricted to apples and pears
- Primarily a flower, twig blighter
- Insect vectors
- Primary cycles (ooze in twigs)
- Ants, similar insects
- Secondary cycles
- Bees
- Should you spray for bees?

3. *Erwinia tracheiphila*

- Cucumber wilt
- Restricted to cucurbits
- Wilt only obvious symptom
- Diagnosis by vascular ooze
- Insect vectors
- Chrysomelid beetles
- Serious problem in mild winters

3. *Erwinia tracheiphila* (continued)

- Beetles survive in adult beetles
- Disease forecasting
- If a mild winter, spray for beetles

The “*Xanthomonas campestris*” Gang

1. *Xanthomonas campestris* pv. *vesicatoria* (tomatoes, peppers)
2. *Xanthomonas campestris* pv. *phaseoli* (beans)
3. *Xanthomonas campestris* pv. *citri* (citrus)

- Xanthos means “yellow”
- Symptoms
- Signs
- Leaf and fruit pathogens
- Narrow host ranges
- Some are seed transmitted (pv. *phaseoli*)
- Wounds
- Stomates, hydathodes

Citrus canker

pv. citri

- Originated from Asia (“Asian strain”)
- Causes raised lesions (diagnosis)
- Controlled in Florida by successful eradication campaign
- Early to mid 1900s - eradicated
- Reappeared in 1980 - 1990s

Citrus canker

pv. citri

- West Florida (Bradenton)
- South Florida (Miami/Homestead)
- Current eradication actions debated

The “nursery strain story” *pv. citrumelo*

- Also infects citrus
- No raised lesions, though
- Thousands of nursery trees eradicated in mid-Florida
- Eradication orders rescinded

Why is citrus canker
(*pv. citri*) so feared
in Florida?

- Common elsewhere in citrus
 - e.g. Taiwan, South America
- Some yield loss, but not a killer
- Fruit blemished, but only rind affected, not fruit

Considerations

- Florida has a wet climate
- Citrus monoculture
- Citrus has leaves, fruit year-round
- Fresh fruit far more valuable than juice production

Agrobacterium tumefaciens

- Crown gall
- Wide host range among dicots
- Famous research tool (Ti plasmid)
- Forms galls only
- Primarily soil pathogen
- Chrysanthemum cutting story

Rhizobium

- Nitrogen fixing bacterium (beneficial)
- Infect legumes
- Nodules can be distinguished from root knot
- Question:
 - Is *Rhizobium* a parasite?
 - Is *Rhizobium* a pathogen?

Fastidious Bacteria

- Confused with viruses until 1960s
- Viruslike symptoms
- Yellowing
- Dwarfing
- Witches' broom
- Transmitted by leafhoppers
 - Circulative/persistent

Xylem limited fastidious bacteria

- *Xylella* (Pierce's disease of grapes)
- Wide host range
- Transmitted by sharpshooter leafhoppers
- Serious problem on Old World grapes
- New World grapes tolerant
- Sharpshooters recently introduced into California vineyards

Phloem limited fastidious bacteria

- Two groups
 - Phytoplasmas
 - Spiroplasmas
- Carried by specific phloem feeding leafhoppers

Examples:

1. Aster yellows (phytoplasma)
 - Wide host range, but not common in Florida, why?
 - Transmitted by *Macrostoteles fascifrons*

Examples:

2. Sweet potato witches' broom (phytoplasma)
 - Restricted to sweet potato alliance
 - Transmitted by *Orosius lotophagorus ryukyuensis*
 - Common on Guadalcanal, Solomon Islands
 - Rare on nearby Malaita, Solomon Islands
 - Why?

Examples:

3. Corn stunt (spiroplasma)
 - Confined to maize (corn)
 - Transmitted by
 - *Dalbulus maidis* (efficient)
 - *Graminella nigrifrons* (less efficient)
 - Rare in Florida, why?

Coconut lethal yellows (phytoplasma)

- The coconut lethal yellowing story
- Confined to Palmaceae
- Transmitted by a fulgoroid
- Jamaica Tall hypersensitive
- Introduced into Key West
- Successfully eradicated
- Introduced into Coral Gables
- Now established

Control

- Eradication?
- Substitute Malaysian Dwarf
- Tetracycline antibiotics?
 - Symptom remission
