Objectives:

1. To learn about Citrus Canker
   A. Identifying citrus canker leaf suspects.
   B. Identifying citrus canker fruit suspects.

2. To compare Citrus Canker with other Citrus Diseases
PART I.- CITRUS CANKER

Photo by Dan Robl, USDA
Citrus canker

- Citrus and citrus canker are originally from southeast Asia.

- Caused by *Xanthomonas axonopodis pv. citri* (Xac), a bacterium
  - Most plant diseases are caused by fungi

- The Asiatic form, or A-strain, is the most widespread and severe form.
  - A-strain found in Florida.
History of Citrus Canker in Florida

- 1910 – Canker identified in Florida for first time.
- 1933 – Canker eradicated.
- 1986 – New detection in Manatee County 53 years later.
- 1994 – Eradication declared.
- 1995 – Canker detected for a third time near Miami International Airport.
Plant Pathogenic Bacteria

- One-celled organisms, mostly rod shaped.
- Human hair ~100μ wide, bacteria ~1-3μ.
- Reproduce by simple cell division.
  - One bacteria can become a million in as little as 10 hours!!!
- Not capable of direct penetration (fungi are.)
- Generally, not very durable in dry environs or direct sunlight.
Citrus Canker Bacteria
Xanthomonas axonopodis pv. citri

- Obligate aerobic, rod-shaped, with 1 flagella
- Is spread by

- Stomates and natural openings serves as the primary way for the bacterium to gain access to host tissue.
Citrus Canker Bacteria
Xanthomonas axonopodis pv. citri

- Obligate aerobic, rod-shaped, with 1 flagella
- Is spread by
  - Wind driven rain > 18mph
  - Moving diseased plants
  - Can enter wounded sites
  - Can be spread through casual contact
- Survives on inanimate surfaces for 24-48 hours.
Characteristics of Citrus Canker

Foliar Lesions

- Will be raised
- Will be on both sides of the leaf

SEM of erumpent citrus canker lesion

Citrus Canker: The Pathogen and Its Impact
Characteristics of Citrus Canker Foliar Lesions

- Will be raised
- Will be on both sides of the leaf
- Crater like appearance
- Concentric circles
Characteristics of Citrus Canker Foliar Lesions

- Will be raised
- Will be on both sides of the leaf
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- **Corky texture**
Characteristics of Citrus Canker Foliar Lesions

- Will be raised
- Will be on both sides of the leaf
- Crater like appearance
- Concentric circles
- Corky texture
- Water soaked margin

T. Riley/ USDA
Characteristics of Citrus Canker Foliar Lesions

- Will be raised
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- Concentric circles
- Corky texture
- Water soaked margin
- May have yellow halos
Characteristics of Citrus Canker Foliar Lesions

- Will be raised
- Will be on both sides of the leaf
- Crater like appearance
- Concentric circles
- Corky texture
- Wet margin
- May have yellow halos
- **May have shot holing**
Appearance Changes with Age

Chlorotic halos fade with age
Very Young Lesions

- Small lesions
- More noticeable on the underside of the leaf
- Often with very wet (looking) margin
3 – 6 month old lesions on Tahiti lime
6 - 9 month old lesions on Grapefruit
Older Canker Lesions
Sometime you may see saprophytic fungi (white fuzz) and fruiting bodies (black dots) growing on older lesions.
Lesion appearance also changes with variety

Photo by Dan Robl, USDA

GRAPEFRUIT
GRAPEFRUIT
KEY LIME
KEY LIME
SWEET ORANGE
TANGERINE
TANGERINE

Photo by Dan Robl, USDA
Looking for Canker leaf lesions in the grove

Backlit Lesions
Looking for Canker leaf lesions in the grove

Canker lesions may be found in leaf miner wounds
Looking for Canker leaf lesions in the grove

Other wounds
Looking for Canker leaf lesions in the grove

New Growth – but don’t ignore the Old growth.
Stem Lesions
Characteristics of Citrus Canker Fruit Lesions

- Raised
- Concentric circles and relatively circular in appearance

GRAPEFRUIT
Canker on Grapefruit

- Raised
- Concentric circles and relatively circular in appearance
- Cracking of lesion
- May have a wet margin

Close-up of lesion
Close-up of Canker lesion on Grapefruit

NOTICE cracking of lesion
- Always Raised
- Concentric circles and relatively circular in appearance
- Cracking of lesion
- May have a wet margin
- May have yellow halo
Canker on Sweet orange
Valencia Orange
Characteristics of Citrus Canker

Fruit Lesions

Photo by Dan Robl, USDA

TANGERINE
Characteristics of Citrus Canker
Fruit Lesions

KEY LIME
Collecting and Submitting Canker Specimens

Collection

- Collect 4-7 symptomatic leaves per tree.
- Place leaves inside labeled bag. Spray outside of bag with decontaminate.
- Place sample in second bag. Label the bag as CANKER.
- Keep bag in a cool place.
- Send the sample overnight to the Lab
  - (do not send samples on Friday)
PART II.- Other Diseases

Greasy Spot
Melanose

Scab

Key Lime Anthracnose
Citrus Scab
Elsinoe fawcetti
Citrus Scab vs Citrus Canker on Leaves

- SCAB
- CANKER

Photo by Dan Robl, USDA
Scab vs. Young Canker

Scab
Bottom of leaf

Young Canker
Note water-soaked margins

Top of leaf
Citrus Scab vs Citrus Canker on Fruit

- SCAB
- CANKER
Scab and canker on Grapefruit
Greasy Spot
*Mycosphaerella citri*
Greasy Spot vs Canker on leaves

Greasy Spot

Canker
Melanose

*Diaporthe citri*
Melanose vs Canker on leaves

Melanose

Canker
Melanose

*Diaporthe citri*
Melanose vs Canker on fruit

Melanose

Canker
Anthracnose

Colletotrichum gloeosporoides
Anthracnose vs citrus canker on leaves

Anthracnose

Canker
Anthracnose vs citrus canker on fruit

Anthracnose

Canker
Alternaria

*Alternaria alternata* pv. *citri*

Host-specific toxin translocates along veins from the lesion
Alternaria vs citrus canker on leaves

Alternaria

Canker
Alternaria on Honeybell Tangelo
Alternaria vs citrus canker on fruit

Alternaria

Canker
Alternaria vs citrus canker on fruit

Alternaria  Canker
Identification Flowchart for Common Foliar Diseases of Citrus

This flowchart will help identify the proper disease about 80% of the time. Sometimes symptoms are unclear or confusing, especially if more than one disease is present. When in doubt, a pathologist should be consulted to give a definitive diagnosis.
Other Fruit Disorders

Surface Blemish ----

Surface Blemish ----
Other Fruit Disorders

Mechanical Injury ----

Shallow Rind Injury ----
Other Fruit Disorders

Herbicide Overspray Injury ----

Bird Injury ----
THE END