Citrus leprosis

Field Detection Guide

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Credit: Ron Brlansky, UF

Credit: Erbe, Pooley: USDA, ARS, EMU

Citrus leprosis: history & distribution

- Leprosis is a vector-transmitted quarantine pest reported in the Americas
  - first reported from FL in early 1900's
  - presence reported in North America (2), Central America and Caribbean (7), South America (8)

Credit: https://www.cabi.org/isc/datasheet/13449

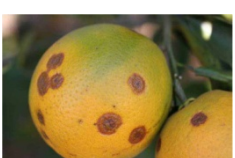
Citrus leprosis in the U.S.

- First recorded in Florida around 1926
  - serious negative impact on production
  - limited prevalence by 1960's
  - currently absent
  - Limited incidence in
- Currently absent (formerly present) in Mississippi

Photo credit: http://idtools.org/id/citrus/diseases/factsheet.php?name=leprosis

Disease status in TX

- In 1999/2000, grapefruit and sweet orange samples from TX suspected for leprosis based on symptoms
  - leprosis virus particles not detected by TEM
- Sequence of leprosis virus detected recently in a single suspect tree in the Corpus Christi area using NGS
  - sample negative using standard assays
  - no other suspect trees detected



Disease symptoms

- Round to elliptical lesions on leaf and fruit

Foliar symptoms of citrus leprosis

leaf and twig lesions may become flat or slightly raised necrotic areas

Fruit symptoms of citrus leprosis

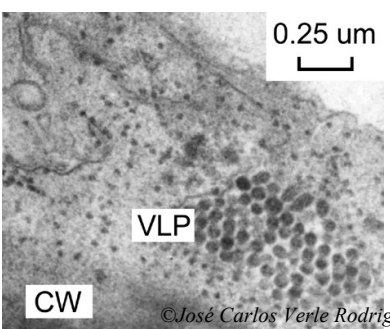
- Fruit lesions become flat or depressed with concentric patterns and gumming as the disease advances

Chronic disease due to citrus leprosis

- Chronic infection may cause fruit and leaf drop

Causative agent

- Citrus leprosis is caused by:
  - Citrus leprosis virus cytoplasmic type [CiLV-C]
  - CiLV nuclear type
    - CiLV-C more widespread



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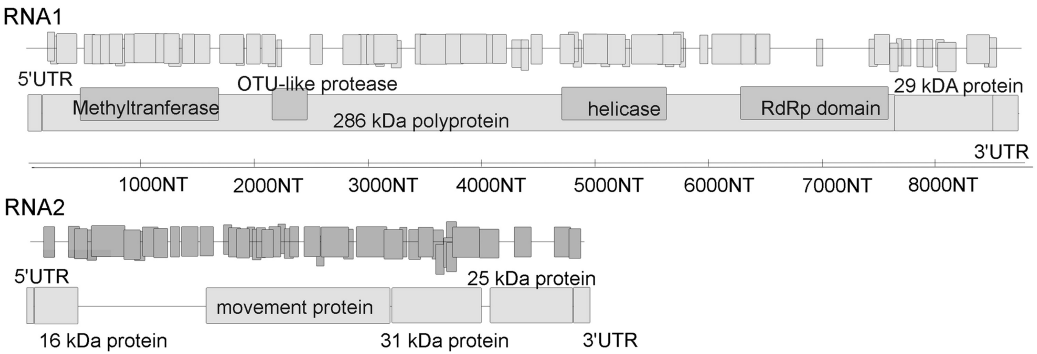
Credit: Hilda Gomez, USDA

Genome organization



- Two single stranded (+)RNA genome segments
  - RNA 1 encodes gene for virus replication
  - RNA 2 encodes gene for virus movement

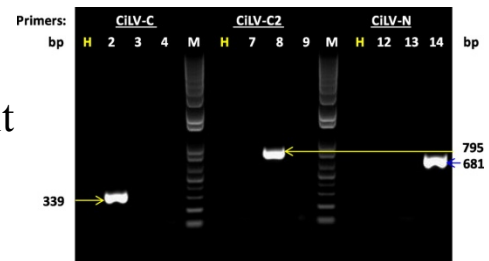
Virus transmission and spread

- Citrus leprosis is vectored by false spider mite:
  - genus *Brevipalpus*
  - false spider mite species present in TX
  - Very wide host range
- Graft-transmissible
- long distance spread via
  - movement of virus-infected or mite-infested plants materials

***Brevipalpus yothersi* (syn. *B. phoenicis*)**

Virus diagnosis

- Symptoms-based diagnosis inconclusive:
  - nutrient deficiencies, fruit canker, pesticide injury, etc. may confound symptoms
- Serological assays
- Transmission electron microscopy
- Molecular detection



Source: Roy et al., 2015; Phytopathology 105:564-575.

- Specific RT-PCR assays developed for detection and differentiation of known CiLVs

Economic impact

- Figures on economic impact of citrus leprosis currently unavailable
- Disease impact more severe for fresh fruit production due to
  - unmarketable crop and fruit drop
  - trade restrictions
- 21% increase in production cost due to 12 extra acaricide sprays per yr estimated
  - ~$75-100 million is spent on controlling the mites in Brazil (35% chemical costs)
- Cost of quarantine enforcement

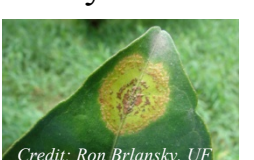

Credit: Ron Brlansky, UF

Disease management

- Disease exclusion
  - clean plants
- Quarantine regulations
  - federal and state
- Outreach/Education
  - All citrus industry stakeholders and the public
- Eradication
  - disease surveillance and timely reporting
  - destruction of confirmed infected trees
- Chemical control of mites

Take-home message

- Citrus leprosis is a devastating disease of quarantine importance
  - fresh fruit industry of TX is at greater risk
- Mite vector present in all citrus-producing states of the US but virus currently absent
- Incursion of leprosis into the US likely to be via human activity
  - virus-infected or mite-infested plant parts
- Awareness and compliance with Federal and State regulations key to prosperity of TX citrus industry
  - outreach & education critical



Useful resources

- https://www.cabi.org/isc/datasheet/13449
- http://idtools.org/id/citrus/diseases/factsheet.php?name=leprosis
- http://www.crec.ifas.ufl.edu/extension/trade_journals/2015/2015_August_leprosis.pdf