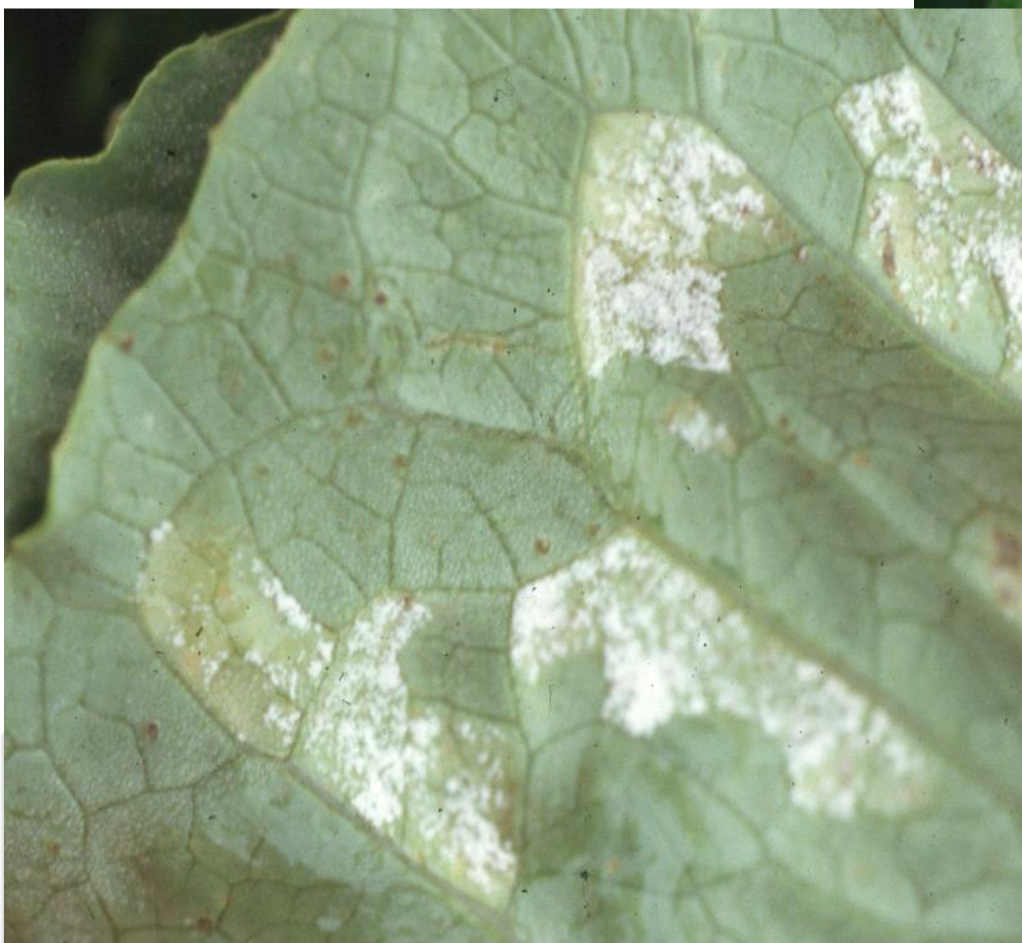
Important Lettuce Diseases and Their Management

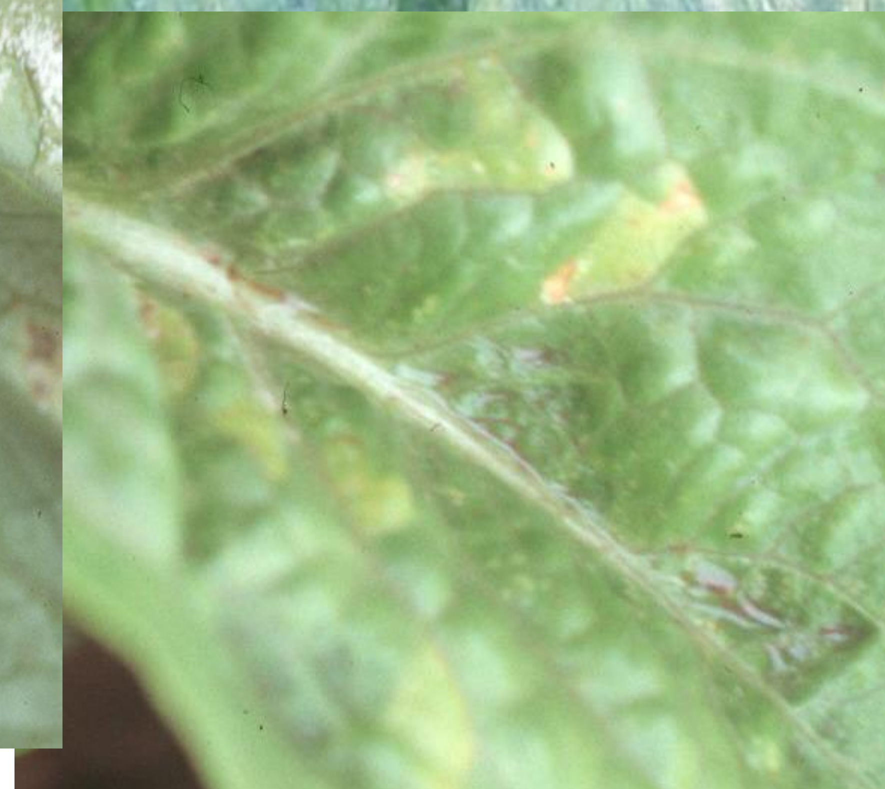
Tom Turini
University of California
Agriculture and Natural Resources
Vegetable Crops Advisor, Fresno

Diseases Discussed

- Downy mildew
- Powdery mildew
- Drop
- Gray mold
- Fusarium wilt
- Corky root
- Lettuce dieback
- *Tospovirus diseases*

Lettuce Downy Mildew - *Bremia lactucae*





Biology

- Favored by cool wet conditions: 65^o - 77^{o}F and leaf wetness for at least 3-4 hours
- Spores are air-borne
- There are many races, which complicates use of resistant varieties

Management

- Plant resistant varieties: resistance is available but not for all areas or seasons
- Preventative fungicide applications (Aliette or Phosphorus acid pesticides, Revus, Presidio, mancozeb, Tanos, Reason, Forum)
- Irrigation to minimize leaf wettness:
  - Use sub-surface drip.
  - If sprinklers are used, irrigate to avoid extending the natural leaf wetness period that occurs.

Powdery Mildew of Lettuce – *Golovinomyces cichoracearum (Ersiphe cichoracearum)*


Biology

- Typically present under warm conditions. Optimum conditions are 65 - 77 °F and 85 - 98.3 % relative humidity.

- Initial inoculum is airborne from other hosts or from resting structures

- Due to the warm, relatively dry conditions favoring this disease it is rarely a production issue in coastal production areas

Management

- Fungicides - sulfur and Quadris
- Timely harvest

Identification of Mildews

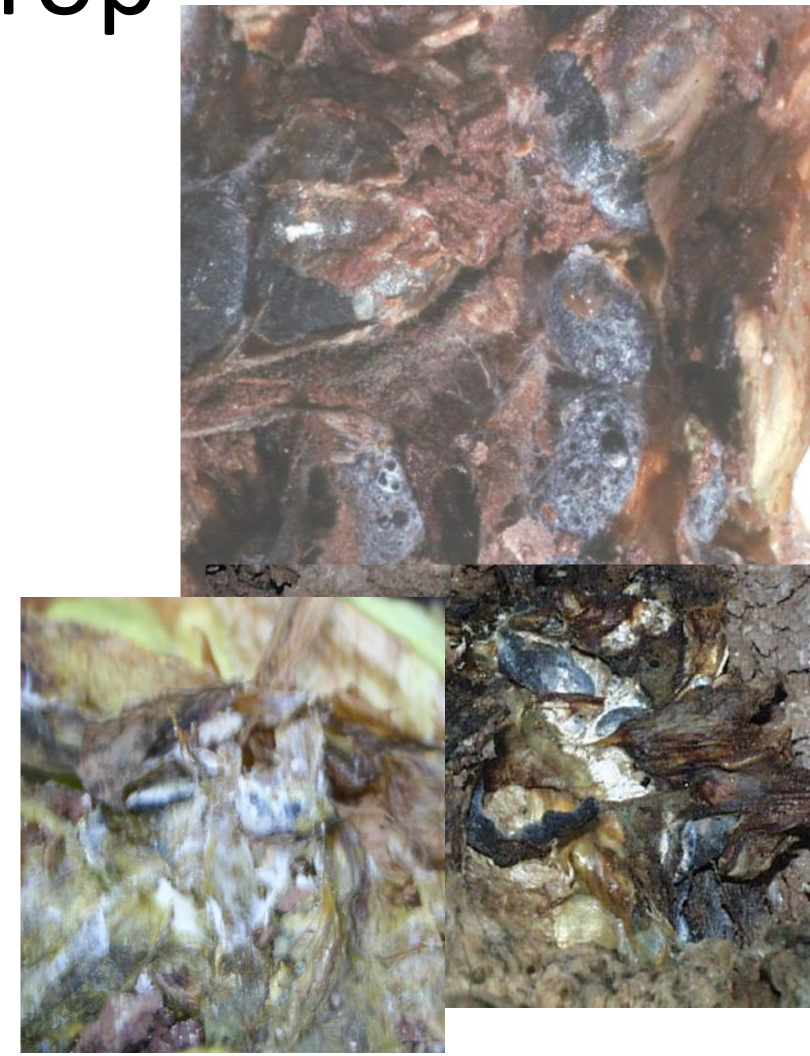
Powdery

Downy

Lettuce Drop: *Slerotinia minor* and *S. sclerotiorum*

Lettuce Drop

Sclerotinia minor



S. sclerotiorum

S. sclerotiorum apothecia and airborne spores

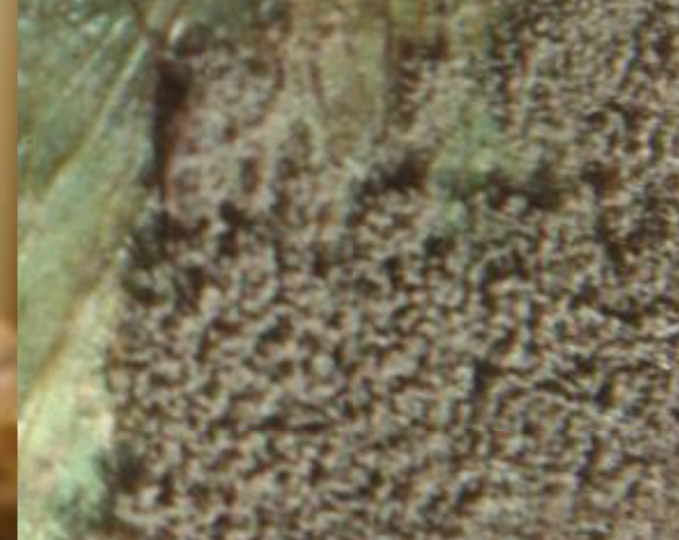
From H. R. Dillard, 2004.

Drop Control

- Cultural Control (not effective for airborne spores)
  - rotations (2-3 years)
  - avoid overly wet soils
  - collect and remove infected plants

- Biological Control
- Chemical Control (Rovral, Endura)
  - After thinning (4-6 leaf)
  - Rosette stage when conditions favor disease development.

Gray Mold
Botrytis cinerea



Biology

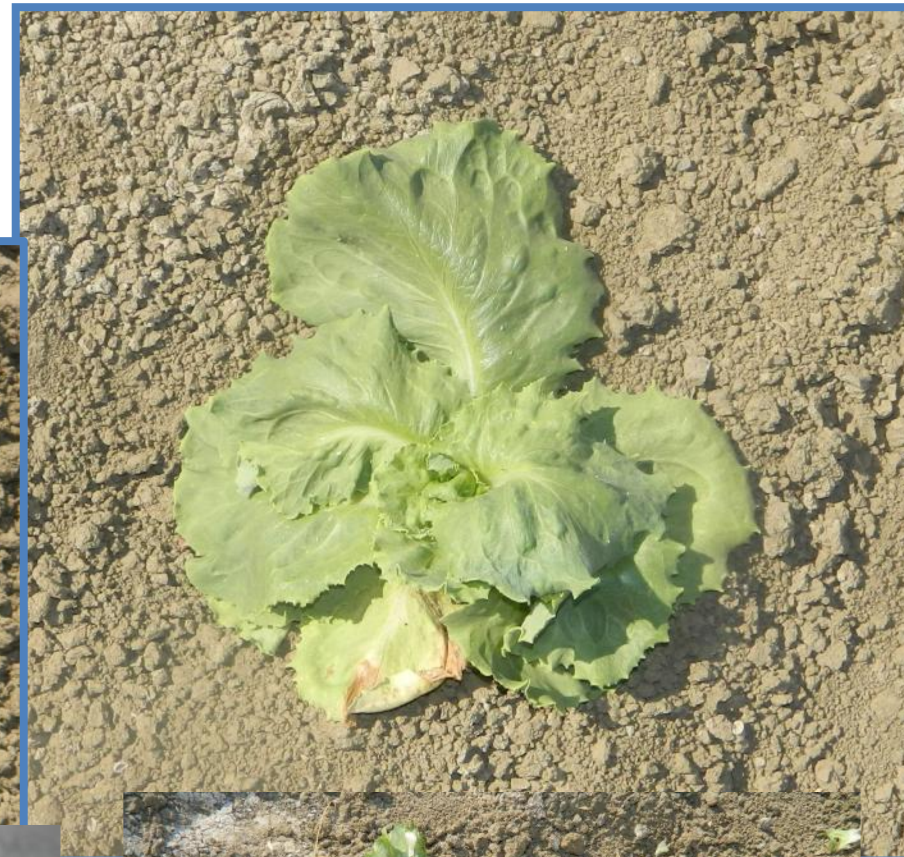
- Temperature: 69-75°F optimum, infection can occur from 32-96°F; Moisture is required for sporulation and infection.
- The fungus survives on many plants, on dead tissue and produces a resting structure.
- Gray mold is favored by crop injury (environmental extremes, farming operations, or other pathogens)

Control

- Schedule soil preparation and crop rotation to minimize excessive crop residues at planting
- Reduce the duration of leaf wetness
- Control other diseases/insects and limit plant injury as much as possible
- Fungicides to protect plants from gray mold

Fusarium Wilt

Fusarium oxysporum f. sp. *lactucum*



Biology

- Temperature: 46^{o} - 90^{o}F (optimum: 82^{o}F)
- Lettuce is only affected by *F. oxysporum* f. sp. *lactucum* and this pathogen does not cause disease in other plants.
- Survives on surfaces of roots of other plants and in resting structures.
- Soil inoculum levels decline substantially over 5 years

Management

- Avoid planting lettuce in fields with a history of this disease.
- Sanitation: Avoid moving soil from an infested field to a clean field.
- Susceptibility of lettuce varieties to *F. oxysporum* f. sp. *lactucum* differs

Response of lettuce varieties to *F. o.* f. sp. *lactucum*, Coalinga, 2012

Corky Root
Rhizomonas suberifaciens

Biology

- Favored by warm soil conditions (between 50 and 87^{o}F, bacterial growth increases with temperature) Favored by water-logged soil conditions.
- Host range includes endive prickly lettuce and sowthistle
- More severe when lettuce is continually cropped on the same field.
- More severe when nitrogen fertilizers are over-applied.

Control

- Crop rotations.
- Fertility management.

Lettuce Dieback Disease

Lettuce Necrotic Stunt Virus (LNSV)

Biology

- No known vector
  - Mechanically transmitted
  - Soil- and water-borne enters through the roots

- In lettuce, the disease commonly occurs in the flood plains of rivers.

- Romaine, butter, red leaf and green leaf lettuce types are susceptible to LNSV, but is very rare in iceberg.

- Symptoms worsen as soil salinity increases.

Control

- Arrange crop schedule crops to avoid planting infested fields with Romaine and other sensitive cultivars.

- Disease occurrence in infested fields can be erratic.

Tospoviruses:

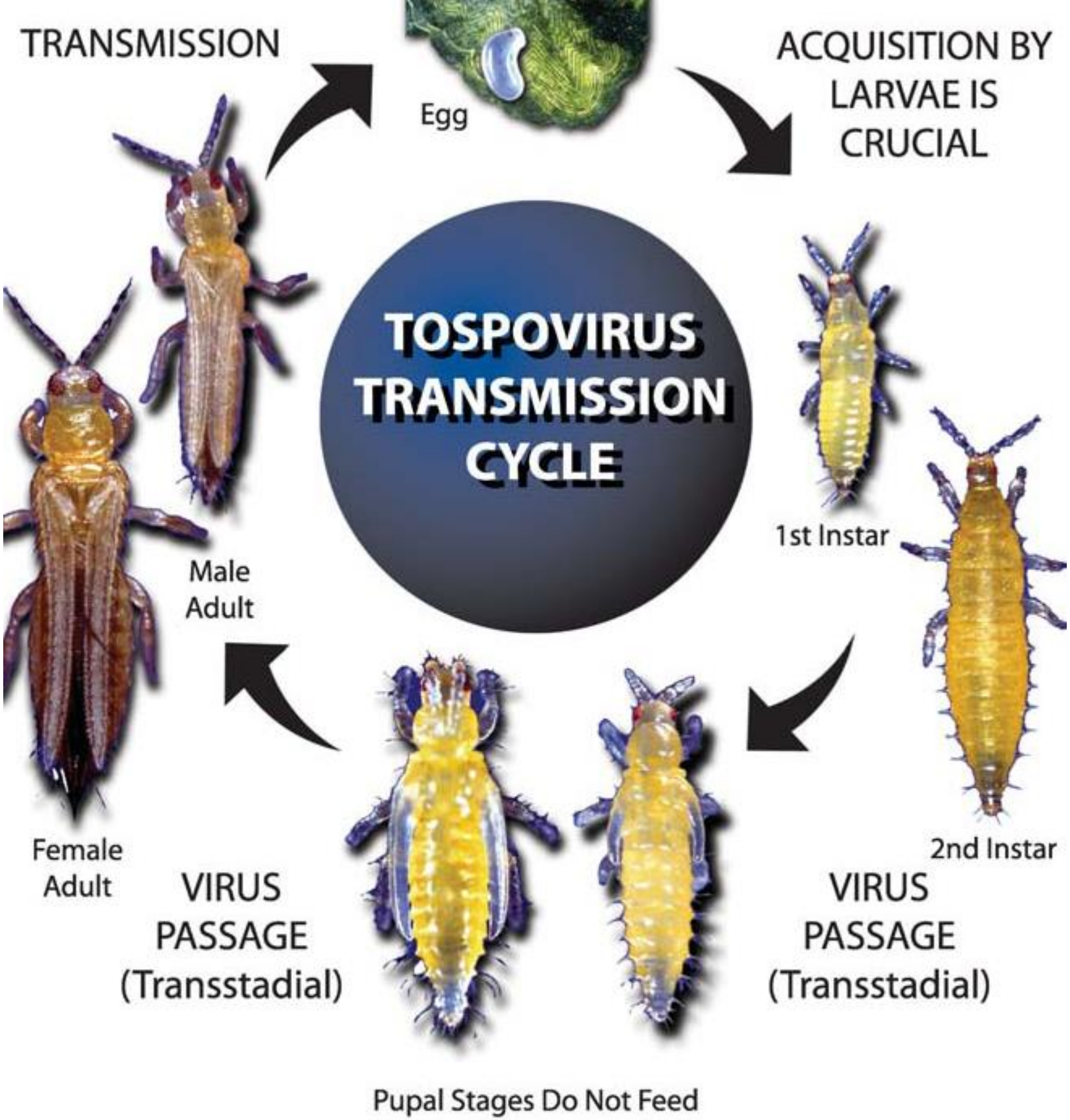
Impatience necrotic spot and Tomato spotted wilt virus

Biology

- *Tomato spotted wilt virus* has over 800 plant hosts: including tomatoes, peppers, radicchio, as well as many weeds.

- *Impatiens necrotic spot virus* has a smaller host range, though this virus still infects a large number of ornamental plants and a few vegetable crops.

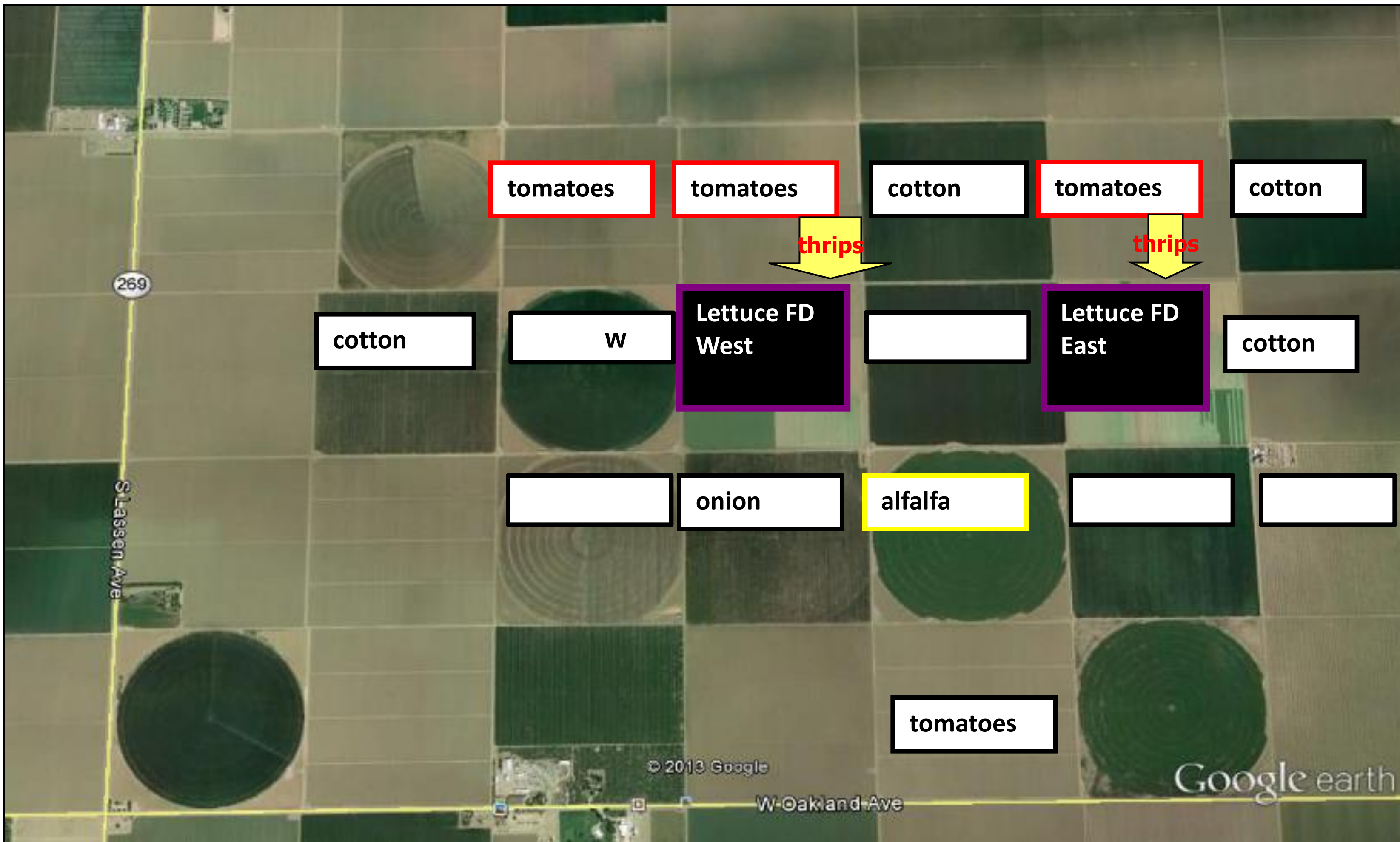
- For both viruses, the thrips must acquire the virus as nymphs to transmit as adults.



A. E.Whitfield, D. E. Ullman, and
T L. German. 2005.
TOSPOVIRUS-THRIPS INTERACTIONS. Annu. Rev. Phytopathol. 2005. 43:459–89

Planting Near TSWV-Source Increases Risk of Loss

Tomato, among the other crops, is one of sources of thrips for lettuce, especially when lettuce fields are established down-wind.



Management

Before planting

- evaluate planting location and time
- implement weed management
- use virus- and thrips-free transplants

During the season

- monitor fields for thrips
- manage thrips
- rotate insecticides
- monitor fields for tospovirus and remove infected plants
- implement weed management

After harvest

- promptly remove and destroy plants after harvest
- control weeds/volunteers

From: Gilbertson/Batuman Mar 2014

Tospovirus disease vs. Lettuce dieback disease symptoms

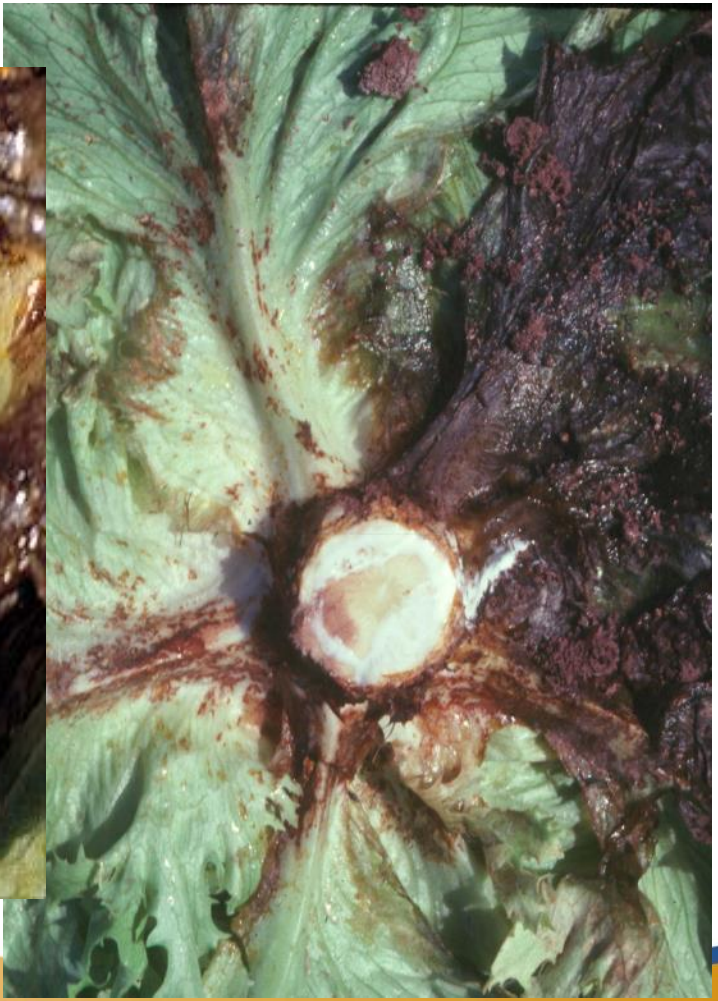
Tospovirus	Lettuce dieback
All lettuce types affected	Primarily romaine and leaf types
Yellowing and dead patches on younger leaves	Younger leaves appear healthy but may be thickened
Older leaves are only symptomatic if infection occurred at very early stages of plant development	Yellowing and dead patches on older leaves


Thank you.
QUESTIONS?

Bacterial Leaf Spot
Xanthomonas campestris pv. *vitians*

Pythium Root Rot in Lettuce
Pythium uncinulatum

Bottom rot
Rhizoctonia solani



Lettuce Big Vein
Mirafiori lettuce big-vein virus (MLBVV)
Letttuce big-vein associated virus (LBVaV)

Lettuce chlorosis virus:
Bemesia tabaci B-transmitted

Wind Injury

Ammonia toxicity