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° - 77°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 wetness:
  • 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: *Sclerotinia minor* and *S. sclerotiorum*
Lettuce Drop

*Sclerotinia minor*  
*S. sclerotiorum*
S. sclerotiorum apothecia and airborne spores

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° - 90°F (optimum: 82°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 87ºF, 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.
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
Tospovirus disease vs. Lettuce dieback disease symptoms

<table>
<thead>
<tr>
<th>Tospovirus</th>
<th>Lettuce dieback</th>
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<tbody>
<tr>
<td>All lettuce types affected</td>
<td>Primarily romaine and leaf types</td>
</tr>
<tr>
<td>Yellowing and dead patches on younger leaves</td>
<td>Younger leaves appear healthy but may be thickened</td>
</tr>
<tr>
<td>Older leaves are only symptomatic if infection occurred at very early stages of plant development</td>
<td>Yellowing and dead patches on older leaves</td>
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</tbody>
</table>
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)
Lettuce big-vein associated virus (LBVaV)
Lettuce chlorosis virus: 
*Bemesia tabaci* B-transmitted
Wind Injury
Ammonia toxicity