Plant Disease Developments in Coastal California

(Models for Problem Solving)

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Verticillium wilt
Spinach / Lettuce Connections?
Spinach / Lettuce Connections?

Growers blame seed
Seed industry blame soil
UCCE let’s do research
Tospovirus on Coastal Lettuce

- Prior to 2006: only TSWV occasionally found.
- 2006: outbreak of INSV on lettuce.
  - First report of INSV on CA lettuce.
  - One of few world reports of INSV on lettuce.
  - Salinas, Chualar, Gonzales, Soledad, Greenfield, Castroville, San Benito County
  - Incidence range: < 1% to > 50%
- Why such an outbreak: Virus strain? Vector change? Lettuce cultivar? Alternate hosts?
## Disease Incidence / Thrips

<table>
<thead>
<tr>
<th>Site</th>
<th>incidence</th>
<th>INSV</th>
<th>mean # thrips/5 plants</th>
<th>% juv</th>
</tr>
</thead>
<tbody>
<tr>
<td>S10 grnlf</td>
<td>0</td>
<td>0</td>
<td>68 214 282 76</td>
<td></td>
</tr>
<tr>
<td>(June, Gonzales)</td>
<td>0.5%</td>
<td></td>
<td>20 191 211 90</td>
<td>90</td>
</tr>
<tr>
<td>D7A rom</td>
<td>0</td>
<td>0</td>
<td>328 42 370 11</td>
<td></td>
</tr>
<tr>
<td>(July, Soledad)</td>
<td>27.0%</td>
<td></td>
<td>559 52 611 9</td>
<td></td>
</tr>
<tr>
<td>CGD rom</td>
<td>0</td>
<td>0</td>
<td>(still being processed)</td>
<td></td>
</tr>
<tr>
<td>(Aug., Soledad)</td>
<td>14.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For adults to be able to transmit virus, they must acquire it as juveniles.
<table>
<thead>
<tr>
<th>Field</th>
<th>west. flower</th>
<th>onion</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>S7N rom</td>
<td>89%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>D7N rom</td>
<td>99%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>SpEB rom</td>
<td>94%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>ShR rom</td>
<td>99%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>S10 grnlf</td>
<td>93%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>CDG rom</td>
<td>(identification pending)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Thrips australis, Frankliniella insularis, F. minuta, Ankothrips sp., Chirothrips sp., Aeolothrips sp.
RT-PCR Tests for INSV in Thrips Vectors

Kuo and Gilbertson
2 adult + 2 juvenile thrips per alyssum flower cluster
Kuo and Gilbertson
Field diagnosis of virus diseases: not recommended
Field diagnosis of virus diseases: not recommended
Apium Virus Y on Celery

- Occurred in 2007 and 2008 (Mont. & S. Clara).
- Leaf symptoms: variable yellow mottling, mosaic, streaking.
- Petiole symptoms: tan to brown necrotic streaks on some cultivars.
- Aphid vectored.
- Other hosts: poison hemlock, cilantro, parsley.
- Found in Australia, New Zealand, Florida.
- First report on celery in North America.
Field parsley: infected with ApVY, but showing no symptoms.
Downy mildew of corn salad
Fusarium wilt of cilantro
History of Spinach DM in CA

- (Race 1: 1824 USA)
- Race 2: 1958
- Race 3: 1978
- Race 4: 1990
- Race 5: 1997
- Race 6: 1998
- Races 7, 9, 10: 2004
- (Race 11?): 2008
Salinas Vly: Why so many new races recently?

R2 R3 R4 R5 R6 R7 R9 R10 “R11”

1990 2008
Salinas Vly: Why so many new races recently?

1989
Steve Koike joins UCCE Monterey Co.

1990
Koike farm advisor career

2008

“R11”

1990
2008
Models for Problem Solving

• Research resolves dilemmas (spinach Vert.).
• New diseases occur (INSV, ApVY, DM races).
• Accurate diagnoses required (lett. viruses).
• Consider the context (alyssum non-host, parsley as symptom-less host).
• Don’t forget the minor crops.
• Collaborations are key:
  – Spinach Verticillium: Subbarao, Koike, du Toit
  – INSV: Koike, Smith, Turini, Gilbertson, Kuo
  – ApVY: Koike, Liu, Tian
  – Spinach DM: Koike, Correll, Mou