Iris Yellow Spot Virus in Onions

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Iris yellow spot virus on onion

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Hanu Pappu
Iris yellow spot- symptoms on seed field Imperial Valley
Iris yellow spot - symptoms on leaves
Plant viruses
Plant viruses
Tomato spotted wilt virus
INSV symptoms on pepper and lettuce

Photo by Steve Koike
Molecular typing of IYSV isolates:

Genetic diversity studies of IYSV show that there are two major groups of populations

Slide provided by Hannu Papu
IYSV in onion

- Idaho 1993 (51)
- Brazil 1994 (97)
- Israel 1998 (43)
- Japan 1999 (63)
- Slovenia 2000 (70)
- Colorado 2002 (108)
- Arizona 2003 (82)
- California 2003 (82)
- Utah 2003 (1)
- Italy 2003 (19)
- Australia 2003 (21)
- New Mexico 2004 (24)
- Washington 2004 (33)
- Washington 2004 (33)
- Georgia 2004 (85)
- Tunisia 2005 (7)
- Spain 2005 (16)
- Oregon 2005 (25)
- Chile 2005 (105)
- India 2006 (99)
- Réunion Island 2006 (103)
- Peru 2006 (84)
- Texas 2006 (74)
- Guatemala 2006 (89)
- New York 2007
- Canada 2008
- France 2008
- Serbia 2008

Iris Yellow Spot Virus (IYSV)

1989 – Idaho

2006 – New York

From C. Hsu presentation at National Allium Meeting, Dec 2008
Increased incidence of IYSV in bulb and seed onion in northern CA in summer 2008. Found in several fields in Colusa, San Benito, Sutter, and Yolo counties (surveys by Dr. Mike Davis)
Sources of the virus

• Weeds

• Bulbs
  – IYSV detected in volunteer onion plants, originating from bulbs left in the field at harvest in the next season crops

• Detected in transplants moving into CO
  (Schwartz, National Allium Meeting, Dec 2008)
Onion Transplant Seedlings
2004 -2008 Surveys
(12 –26 sources annually from AZ, CA & TX)

• *Thrips tabaci* was recovered each year from all sources
• *Frankliniella ewartii, F. occidentalis & F. schultzei* 4 of 5 years
• IYSV: up to 5% of plants/source

H. F. Schwartz, K. Otto, S. Szostek, C. Boateng,
W. Cranshaw, M. Camper & L. Mahaffey
Colorado State University
Relative thrips susceptibility or tolerance among onion cultivars

• **Leaf color**
  – strong correlation between thrips population densities and onion leaf color.
  – blue hues versus green hues appear to be more attractive to *T. tabaci*

• **Varieties with glossy foliage tend to be more resistant to thrips**
  – Decrease in egg hatching or larval feeding
  – Differences in chemistry of leaf waxes

• **Plant Structure**
  – greater openness between the leaves increases thrips exposure to adverse environmental conditions and natural enemies
Relative IYSV susceptibility of varieties

- No lines immune to IYSV have been reported
- Highly significant differences in incidence of IYS-symptomatic plants are reported
- Varieties with lower incidence have higher yield and higher percentage of jumbo bulbs


Other factors influencing IYSV severity

• Greater plant stress appears to result in increased severity of IYS-symptoms
• Early maturing varieties may escape the thrips pressure experienced later in the season.
• Higher seed production losses reported in cultivars with long seed stalks
Control

- Elimination of volunteer onion and planting of transplants free of IYSV
- Insecticide control
- Use of less susceptible varieties
- Systemic acquired resistance materials-Actigard
  - Four applications decreased IYS-symptom incidence and increased number of jumbo grade bulbs (Gent et al: 2004)
Acknowledgements

• CGORAB
• Hanu Pappu - Washington
• Howard Schwartz – Colorado State University
• Michael Davis – UC Davis
Relative thrips susceptibility or tolerance among onion cultivars

Imperial County Experiments 2007
Effect of Insecticide Treatments and Actigard on Incidence and Severity of IYS-symptoms
Effect of Repeated Insecticide Applications (8 Feb to 14 May) on Thrips Densities and IYSV severity and incidence
<table>
<thead>
<tr>
<th>Treatment</th>
<th>IYSV incidence</th>
<th>IYSV severity</th>
<th>SM (thrips/5 plants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>19.50 b</td>
<td>1.25</td>
<td>28.1 a</td>
</tr>
<tr>
<td>Vydate L</td>
<td>8.00 cd</td>
<td>1.20</td>
<td>8.7 de</td>
</tr>
<tr>
<td>Lannate LV + Mustang 1.5EW</td>
<td>11.50 bcd</td>
<td>1.15</td>
<td>7.1 e</td>
</tr>
<tr>
<td>Lannate LV + Warrior</td>
<td>5.50 d</td>
<td>1.25</td>
<td>7.7 de</td>
</tr>
<tr>
<td>Success + Aza-Direct</td>
<td>15.75 bcd</td>
<td>1.30</td>
<td>11.1 cd</td>
</tr>
<tr>
<td>Radiant 120 SC</td>
<td>32.50 a</td>
<td>1.40</td>
<td>12.6 c</td>
</tr>
<tr>
<td>QRD 400</td>
<td>16.75 bc</td>
<td>1.10</td>
<td>17.4 b</td>
</tr>
<tr>
<td>QRD 400</td>
<td>16.00 bc</td>
<td>1.25</td>
<td>17.6 b</td>
</tr>
<tr>
<td>QRD 400 + Success</td>
<td>16.50 bc</td>
<td>1.30</td>
<td>13.2 c</td>
</tr>
<tr>
<td>QRD 400 + Lannate LV</td>
<td>11.75 bcd</td>
<td>1.10</td>
<td>10.0 cde</td>
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</table>
## 2007 Plant Activator

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Incidence</th>
<th>Severity</th>
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</thead>
<tbody>
<tr>
<td>Untreated control</td>
<td>8.25</td>
<td>1.40</td>
</tr>
<tr>
<td>Actigard 50W @ 0.76 oz/A + Latron B-1956 0.06 %</td>
<td>12.25</td>
<td>1.10</td>
</tr>
<tr>
<td>Bravo Weather Stik 6 SC 2 pts/A (1,3), Ridomil Gold Bravo 2.0 lbs/a (2)</td>
<td>11.00</td>
<td>1.12</td>
</tr>
<tr>
<td>Bravo Weather Stik 6 SC 2 pts/A (1,3), Reason 5.5 fl oz + Induce 0.25% (2)</td>
<td>8.00</td>
<td>1.35</td>
</tr>
<tr>
<td>Bravo Weather Stik 6 SC 2 pts/A (1,3), Forum 500SC 6.1 fl oz/A + Prev Am 0.4% (2)</td>
<td>11.25</td>
<td>1.56</td>
</tr>
<tr>
<td><strong>LSD</strong>&lt;sub&gt;0.05&lt;/sub&gt;</td>
<td>NS</td>
<td>0.41</td>
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