Tomato Disease Management Strategies for 2014 - Plant Pathology 101

Tomatoes (fresh market, processing, and heirlooms) can be difficult to grow because they are susceptible to many diseases that can potentially destroy an entire field. Management strategies need to include the following:

1.) Begin with an Early Blight (EB, Fig. 1 see “target” lesions) or Late Blight (LB, Fig. 4) or Septoria LS (SLS, Fig. 2) resistant or tolerant variety if available. Current varieties with resistance included: Iron Lady Homo., Triple Res., Mt. Merit Homo Ph2,3, Defiant PhR Het Ph2,3 (lrg red); Mt. Magic Het Ph2,3 (Campari); Plum Regal HomoPh3 (plum); Jasper Triple Res (cherry)

2.) Crop rotation is critical to reduce overwintering inoculum for EB and Septoria leaf spot (SLS, Fig. 2, see beige centers). A minimum 2-3 year rotation out of all solanaceous crops, including weeds is helpful.

3.) Disease-free seed is critical to elimination of bacterial diseases (Bac. Spot, Speck [Fig.3] and Canker) and tomato mosaic virus (TomMV).

4) Disease-free transplants are a critical control measure for all diseases as diseased transplants were responsible for the pandemic spread of Late Blight in 2009 (Fig.4).

5) Good air circulation and low humidity are especially important in high tunnels to reduce Botrytis gray mold (Fig. 5) and Fulvia leaf mold (Fig. 6).

6.) If you choose to spray fungicides, then spray preventatively as determined by scouting for Early Blight, Septoria Leaf spot, bacterial diseases, and the others given. For Late Blight following the tracking maps at USAblight.org and spray preventatively.

7.) The accompanying sheet (opposite side) provides a listing of fungicides for conventional, organic and home garden use. For commercial use, be guided by selecting fungicides to be used for the entire season by making sure they have different Modes of Action (MOA), as indicated by the Group Nos. given. To prevent resistance from developing, follow the label to avoid making sequential applications before alternating to a fungicide with a different MOA. (Prepared by T.A. Zitter, Dept. Plant Path. Ithaca, NY 14850, NOV, 2013 taz1@cornell.edu). Additional Tomato Disease Resource at: http://vegetablemdonline.ppath.cornell.edu/DiagnosticKeys/TomKey.html

### I. Conventional grower fungicides (all rated “+” unless specified)

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Common name</th>
<th>Grp</th>
<th>PHI days</th>
<th>LB</th>
<th>EB</th>
<th>SLS</th>
<th>Gry mil</th>
<th>Leaf mold</th>
<th>Bacteria (Spck, Spot, Canker)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. <strong>Protectant Mode of Action</strong> (used alone or as Tank Mix [TM] partner)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bravo</td>
<td>chlorothalonil</td>
<td>M5</td>
<td>0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Weather Stik or OLP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dithane DF or OLP</td>
<td>mancozeb (mz)</td>
<td>M3</td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No, can be TM with copper</td>
<td></td>
</tr>
<tr>
<td>Coppers, many</td>
<td>copper, type varies</td>
<td>M1</td>
<td>0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes, consider TM with mz</td>
<td></td>
</tr>
</tbody>
</table>

#### B. **Translaminar Mode of Action** (mainly strobilurins like Quadris fungicide – must tank-mix all strobilurins with a protectant fungicide due to resistance to EB)

| Quadris Opti                | azoxystrobin + chlorothalonil | 11 + M5 | 0     | Yes| Yes ++ | Yes ++ | No | No | No |
| Quadris Top                 | azoxystrobin + difenoconazole | 11 + 3  | 0     | No  | Yes +++ | Yes ++ | No | Yes | No |
| Other Strobilurins, ie. Flint | varies + TM protectant         | 11 + M1, 3, or 5 | Can vary | Yes | Yes ++ | Yes TM | No | No | No |

#### C. Late Blight Specific Fungicides (Systemic* in bold; TM with protectant)

| Presidio + TM               | fluopicolide + ? | 43 + ? | 2 or ? | Yes | Yes | Yes TM | Yes TM | No | No | No |
| Revus Top                   | difenoconazole + mandipropamid | 3 + 40 | 1     | Yes | Yes TM | Yes | No | No | No |
| Previcur Flex + TM          | propamocarb + ? | 28 + ? | 5     | Yes | Yes TM | Yes TM | No | No | No |
| Ranman + TM                 | cyazofamid + ? | 21 + 5 | 0 or longer | Yes | Yes TM | Yes TM | No | No | No |
| Gavel                       | zoxamide + mancozeb | 22 + M3 | 5 | Yes | Yes TM | No | No | No | No |
| Ridomil Gold Bravo          | mefenoxam + chlorothalonil | 4 + M5 | 14 | US22 US23 +++ | Yes | No | No | No | No |

### II. Organic grower approved fungicides (all protectants)

| Champ WG or OLP             | copper hydroxide | M1  | 0     | Yes | Yes | Yes | No | No | Yes |

### III. Home Garden fungicides (all protectants)

| Bonide Copper fungicide or OLP | basic copper sulfate | M1  | 0     | Yes | Yes | Yes | No | No | Yes |
| Bonide Fungonil or OLP         | chlorothalonil | M5  | 0     | Yes ++ | Yes ++ | No | No | No | No |

Abbrev. TM = tank mix; OLP = other labeled product; PHI = preharvest interval; Groups, if M before I, 3 or 5 implies multisite activity; **Systemic** * = others Curzate, Forum, phosphorous acids, and Tanos.
### Flattened Globe/Round

**Very Early to Early**

- **Moskvich**, 4oz flattened Red, OP, Indet, 6ft, VE, Siberian history, JSS, SSE
- **Orange Blossom**, 6-7oz round Orange, Det, 3ft, E, JSS
- **Oregon Spring**, 5oz round Red, Det, E, Terr., JSS
- **Ultimate Opener**, 8oz round Red, Indet, 6ft, VE, Reimer, TT

**Mid-Season**

- **BHN 876**, X Lrg, Orange, M-S, Rupp
- **Carolina Gold**, 10oz flattened globe Golden, M-S, Det 50, HS, TT
- **Defiant PHR**, 6-8oz, Red, M-S, Det, JSS, **LB=Hetero Ph2 & 3**, **EBT=Heat Tolerant**, **SLS=Sus**
- **Iron Lady**, 5 oz, Red, M-S, Det, HM, **LB=Homocy Ph2 & 3**, **EB=Homo Tol**, **SLS=Hot Res.**
- **Mountain Gold**, 10oz flattened globe Golden, M-S, Det 4ft, Reimer
- **Mountain Merit**, 8-11oz, Red, Det, SW, JSS, **LB=Het Ph2 & 3**, **EBT=Heat Tol**, **SLS=Sus**

**Late**

- **Black Zebra**, 4 oz, round Red/Blk Gr., Indet, 6ft, OP, L, TGS
- **Mountain Fresh Plus**, 10oz+ flattened globe Red, Det 4ft, L, JSS

### Cherry

**Early**

- **Bing Cherry**, 1 in, Red, E, 65 days, HM
- **Brown Berry**, 0.6oz Blk, SSE
- **Eletro**, 20gm Red, E, Enza
- **Jaune Flamme**, 3oz, Org., E, TGS
- **Sun Gold Indet**, 0.35oz, Org., E, TGS, JSS
- **Sun Sugar**, E, Reimer
- **Washington Cherry**, 1-in, Red, E, Det, **TomF, Reimer**
- **Yellow Mini**, 1-to 1 1/4-in, Yel, E, Indet, JSS

**Mid-Season**

- **Black Cherry**, 0.6oz Blk, Indet, TGS, JSS
- **Black Velvet**, 4oz Blk, SW
- **Chadwick**, 1-1/2 oz Red, M-S, TomF.
- **Garden Peach**, 2oz Yel, M-S, TGS
- **Jasper**, 7-10g, Red, Indet, JSS, **LB=Het Hetero Ph2 & 3**, **EBT=Heat Tolerant**, **SLS=Hot Res.**
- **Zebra Cherry**, 1-1/2 in, Bi-Color, M-S, TT

**Mid-Season to Late**

- **Mountain Magic**, 2oz Red, Indet 6ft, MS-Late, JSS, TT, **LB=Hetero Ph2 & 3**, **EBT=Heat Tolerance**, **SLS=Sus**

**Late**

- **Wapsipicnjan Peach**, 1 1/2 to 2-in, Yel/Org., M-S, TomF.

### Grape

**Early**

- **Cabernet Grape**, Red, E, Reimer
- **Golden Sweet**, 0.5 oz., Org., E, Reimer
- **Juliet Indet**, 1-1/2-2oz cluster, Red, E, JSS

**Mid-Season**

- **Cupid**, 0.5oz Red, Indet 50, Seminis
- **Five Star Grape**, 15-20gm Red, JSS
- **Montesino**, 15-20 gm Red, E, JSS
- **Sakura Honey**, 15gm Pink, E, JSS
- **Solid Gold**, 1/2oz Golden, M-S, JSS

### Beefsteak, (mostly Heirlooms)

**Mid-Season**

- **Beauty**, 14oz flattened globe Pink, M-S (78d), **TomF**
- **Black Krim**, 10-12oz (3-4in) flattened globe Pur/Blk, M-S, **TomF**. (aka Black Crimson and Black Crim)
- **Brandymaster**, 10oz, Pink, M-S, potato leaf, TT
- **Eva Purple Ball**, 8oz, Dp, Pink, M-S, TGS
- **Green Zebra**, 2-4oz, Green w Yel, M-S, JSS
- **Pruden’s Purple**, 10-16oz, Dp, Pink, M-S, **Earlier than Brandywine, potato leaf, TGS**
- **Red Calabash**, 3-4oz, Red, Hi Ribbed, M-S, SOC
- **Striped German**, 2lb, Bi-color, M-S, JSS
- **Aunt Ruby’s German Green**, 12oz, Green, L, TT
- **Brandywine**, Pink, 10-16oz, Pink, L, L, SSE
- **Brandywine, Sudduth Str.**, 2lb, Pink, L, SSE
- **Cherokee Purple**, 10oz, Dp, Pink, L, SSE
- **Marvel Striped**, 12oz, Bi-color, L, SSE
- **Wina All**, 1lb, Dp, Pink, L, TT

### Plum

**Mid-Season**

- **Golden San Marzano**, Det, 1-5in, **Yel, L, Terr.**
- **La Roma III**, Det, 5-8oz, Red, M-S, TGS
- **Plum Regal**, 4oz, Det, Red, M-S, SW, **LB=only Homo Ph3**, **EBT=Homo Tolerance**, **SLS=Sus.**
- **Pomodoro Pear**, 8-18oz Pink, Indet, Ribs, **The Italian Gardener on web**
- **Speckled Roman**, Indet, 7oz, 4-6in long, Org/Red, E, long pt, TomF.
- **Striped Roman**, Indet, Org, strips on Red, L, **Terr.**

**Pear**

**Mid-Season**

- **Red Pear**, Indet, 0.3oz, 1-3/4 to 2 in long, Red, M-S, TGS
- **Yellow Pear**, Indet, 3/4-1 oz, Yel, M-S, JSS
- **Japanese Black Truffle**, Indet, 8oz, Blk, L, potato leaf, **TomF.**

### Oxheart

**OP Cuor di Bue**, 6-12oz, Dp, Pink, Terr.

**OP Orange**, Russian 117, 1-2lb, Red/Yel., TomF.

**Ribbed**

**Casteluto Genovese**, Indet, 5oz, Red deeply ribbed, M-S, TGS