



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:

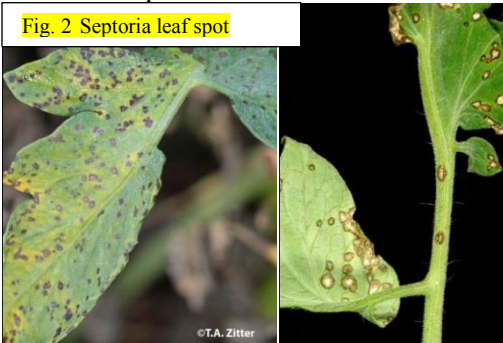
- 1.) Begin with an **Early Blight (EB, Fig. 1)** see “target” lesions or **Late Blight (LB, Fig. 4)** or **Septoria LS (SLS, Fig. 2)** resistant or tolerant variety if available. Current varieties with resistance included: **Iron Lady**^{Homo., Triple Res.}, **Mt. Merit**^{Homo Ph2,3}, **Defiant PhR**^{Het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

Fig. 1 Early blight *Alternaria tomatophila*



- 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.

Fig. 2 Septoria leaf spot



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

Fig. 3. Bacterial Speck



- 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**).

Fig.4 Late blight *Phytophthora infestans* 2009 Pandemic



- 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)**.

Fig. 5 Botrytis Gray mold



Fig. 6 Fulvia Leaf mold



- 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://vegetablemndonline.ppath.cornell.edu/DiagnosticKeys/TomKey.html>

Partial List of Tomato Fungicides Arranged for I. **Conventional** (1-3), II. **Organic** or III. **Home Garden** usage (Reg. NYS) Prepared by T.A. Zitter, Dept. Plant Pathology and P-MB, Cornell University, Ithaca NOV 2013.

I. Conventional grower fungicides (all rated "+" unless specified)									
Trade name	Common name	Grp	PHI days	LB	EB	SLS	Gry mld	Leaf mold	Bacteria (Spck, Spot, Canker)
A. Protectant Mode of Action (used alone or as Tank Mix [TM] partner)									
Bravo Weather Stik or OLP	<i>chlorothalonil</i>	M5	0	Yes	Yes	Yes	No	Yes	No
Dithane DF or OLP	<i>mancozeb (mz)</i>	M3	5	Yes	Yes	Yes	No	Yes	No, can be TM with copper
Coppers, many	<i>copper</i> , type varies	M1	0	Yes	Yes	Yes	No	Yes	Yes, consider TM with <i>mz</i>
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	<i>azoxystrobin + chlorothalonil</i>	11 + M5	0	Yes	Yes ++	Yes ++	No	No	No
Quadris Top	<i>azoxystrobin + difenoconazole</i>	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	<i>fluopicolide + ?</i>	43 + ?	2 or ?	Yes ++	Yes TM	Yes TM	No	No	No
Revus Top	<i>difenoconazole + mandipropamid</i>	3 + 40	1	Yes ++	Yes	Yes	No	No	No
Previcur Flex + TM	<i>propamocarb + ?</i>	28 + ?	5	Yes ++	Yes TM	Yes TM	No	No	No
Ranman + TM	<i>cyazofamid + ?</i>	21 + ?	0 or longer	Yes	Yes TM	Yes TM	No	No	No
Gavel	<i>zoxamide + mancozeb</i>	22 + M3	5	Yes	Yes	Yes TM	No	No	No
Ridomil Gold Bravo	<i>mefenoxam + chlorothalonil</i>	4 + M5	14	US22 US23 +++	Yes	Yes	No	No	No
II. Organic grower approved fungicides (all protectants)									
Champ WG or OLP	<i>copper hydroxide</i>	M1	0	Yes	Yes	Yes	No	No	Yes
III. Home Garden fungicides (all protectants)									
Bonide Copper fungicide or OLP	<i>basic copper sulfate</i>	M1	0	Yes	Yes	Yes	No	No	Yes
Bonide Fung-onil or OLP	<i>chlorothalonil</i>	M5	0	Yes ++	Yes ++	Yes ++	No	No	No

Abbrev. TM = tank mix; OLP = other labeled product; PHI = preharvest interval; Groups, if M before 1, 3 or 5 implies multisite activity; **Systemic*** = others **Curzate**, **Forum**, **phosphorous acids**, and **Tanos**.

Tomatoes - Best of the Best – Tomatoes classified into 8 Categories (by Shape and Size) with Outstanding Features for NE US Production.

Nov 2013 - T.A. Zitter, Department of Plant Pathology, Cornell University, Ithaca, NY 14850 (taz1@cornell.edu)

Yellow = Maturity, Distinct Features, Disease Res; Seed Sources: HM = High Mowing; Enza = Enza Zaden; HS = Harris Seed; JJS = Johnny's Selected Seed; Reimer; Rupp; Terr. = Territorial Seed Co; TGS = Tomato Growers Supply; TomF = TomatoFest website; TT = Totally Tomato; SOC = Seeds of Change; SSE = Seed Savers Exc; SW = Seedway; LB=Late Blt; EB=Early Blt; SLS= Septoria Leaf Spot.

<p>Flattened Globe/Round Very Early to Early</p>	<p>Cherry Early</p>	<p>Beefsteak, (mostly Heirlooms) Mid-Season</p>	<p>Plum</p>	<p>Oxheart</p>
<p>Her <u>Moskovich</u>, 4oz flattened Red, OP, Indet, 6ft, VE, Siberian history, JSS, SSE</p> <p>F1 <u>Orange Blossom</u> 6-7oz round Orange, Det, 3ft, E, JSS</p> <p>OP <u>Oregon Spring</u> 5oz round Red, Det, E, Terr., JSS</p> <p>F1 <u>Ultimate Opener</u> 8oz round Red, Indet, 6ft, VE, Reimer, TT</p> <p>Mid-Season</p> <p>F1 <u>BHN 876</u>, X Lrg, Orange, M-S, Rupp</p> <p>F1 <u>Carolina Gold</u> 10oz flattened globe Golden, M-S, Det 5ft, HS, TT</p> <p>F1 <u>Defiant PHR</u> 6-8oz, Red, M-S, Det, JSS, LBR=HeteroPh2&3, EBT=Het Tolerant, SLS=Sus</p> <p>F1 <u>Iron Lady</u> 5 oz, Red, M-S, Det, HM, LBR=Homozy Ph2&3, EB=Homo Tol, SLS=Het Res.</p> <p>F1 <u>Mountain Gold</u> 10oz flattened globe Golden, M-S, Det 4ft, Reimer</p> <p>F1 <u>Mountain Merit</u> 8-11oz, Red, Det, SW, JSS, LBR=Het Ph2&3, EBT=Het Tol, SLS=Sus</p> <p>Late</p> <p>Her <u>Black Zebra</u>, 4 oz, round Red/Blk Gr., Indet. 6ft, OP, L, TGS</p> <p>F1 <u>Mountain Fresh Plus</u> 10oz+ flattened globe Red, Det 4ft, L, JSS</p>	<p>F1 <u>Bing Cherry</u>, 1 in. Red, E, 65 days, HM</p> <p>Her <u>Brown Berry</u>, 0.6oz Blk, SSE</p> <p>F1 <u>Eletro</u>, 20gm Red, E, Enza</p> <p>Her <u>Jaune Flamme</u>, 3oz, Org., E, TGS</p> <p>F1 <u>Sun Gold</u> Indet, 0.35oz, Org., E, TGS, JSS</p> <p>F1 <u>Sun Sugar</u>, E, Reimer</p> <p>OP <u>Washington Cherry</u> 1-in. Red, E, Det, TomF., Reimer</p> <p>F1 <u>Yellow Mini</u> 1- to 1 1/4-in. Yel, E, Indet, JSS</p> <p>Mid-Season</p> <p>OP <u>Black Cherry</u> 0.6oz Blk, Indet, TGS, JSS</p> <p>Her <u>Black Velvet</u>, 4oz Blk, SW</p> <p>OP <u>Chadwick</u>, 1-1/2 oz Red, M-S, TomF.</p> <p>Her <u>Garden Peach</u>, 2oz Yel, M-S, TGS</p> <p>F1 <u>Jasper</u> 7-10g, Red, Indet, JSS; LBR Het 2&3; EB tolerant; SLS Heterozygous</p> <p>F1 <u>Zebra Cherry</u> 1-1/2 in. Bi-Color, M-S, TT</p> <p>Mid-Season to Late</p> <p>F1 <u>Mountain Magic</u> 2oz Red, Indet 6ft, MS-Late, JSS, TT; LBR=Hetero Ph2&3, EBT=Het Tolerance, SLS=Sus</p> <p>Her <u>Wapsipinicon Peach</u>, 1 1/2 to 2-in. Yel/Org., M-S, TomF.</p> <p>Grape Early</p> <p>F1 <u>Cabernet Grape</u> Red, E, Reimer</p> <p>F1 <u>Golden Sweet</u> 0.5 oz., Org., E, Reimer</p> <p>F1 <u>Juliet</u> Indet, 1-1/2-2oz cluster, Red, E, JSS</p> <p>Mid-Season</p> <p>F1 <u>Cupid</u> 0.5oz Red, Indet 5ft, Seminis</p> <p>F1 <u>Five Star Grape</u> 15-20gm Red, JSS</p> <p>F1 <u>Montesino</u> 15-20 gm Red, E, JSS</p> <p>F1 <u>Sakura Honey</u> 15gm Pink, E, JSS</p> <p>F1 <u>Solid Gold</u> 1/2oz Golden, M-S, JSS</p>	<p>Her <u>Beauty</u>, 14oz flattened globe Pink, M-S (78d), TomF.</p> <p>Her <u>Black Krim</u>, 10-12oz (3-4in) flattened globe Pur/Blk, M-S, TomF. (aka Black Crimson and Black Crim).</p> <p>F1 <u>Brandymaster</u>, 10oz, Pink, M-S, potato leaf, TT</p> <p>Her <u>Eva Purple Ball</u>, 8oz, Dp. Pink, M-S, TGS</p> <p>Her <u>Green Zebra</u>, 2-4oz, Green w Yel., M-S, JSS</p> <p>Her <u>Pruden's Purple</u>, 10-16oz, Dp. Pink, M-S, Earlier than Brandywine, potato leaf, TGS</p> <p>Her <u>Red Calabash</u>, 3-4oz, Red, Hi Ribbed, M-S, SOC</p> <p>Her <u>Striped German</u>, 2lb, Bi-color, M-S, JSS</p> <p>Late</p> <p>Her <u>Aunt Ruby's German Green</u>, 12oz, Green, L, TT</p> <p>Her <u>Brandywine</u>, Pink, 10-16oz, Pink, L, SSE</p> <p>(Her <u>Brandywine</u>, Sudduth Str., 2lb, Pink, L, SSE)</p> <p>Her <u>Brandywine</u>, Red, 8-12oz, Red, L, TomF.</p> <p>Her <u>Brandywine</u>, Yellow, 12oz, Yellow, L, potato leaf, SSE</p> <p>Her <u>Cherokee Purple</u>, 10oz, Dp. Pink, L, SSE</p> <p>Her <u>Marvel Striped</u>, 12oz, Bi-color, L, SSE</p> <p>Her <u>Wins All</u>, 1lb, Dp. Pink, L, TT</p>	<p>F1 <u>Golden San Marzano</u>, Det, 1-5in, Yel, L, Terr.</p> <p>F1 <u>La Roma III</u>, Det, 5-8oz, Red, M-S, TGS</p> <p>F1 <u>Plum Regal</u> 4oz, Det, Red, M-S, SW, LBR=only Homo Ph3, EBT=Homo Tolerance, SLS=Sus.</p> <p>Her <u>Pomodoro Pear</u>, 8-18oz Pink, Indet, Ribs, The Italian Gardener on web</p> <p>OP <u>Speckled Roman</u>, Indet, 7oz, 4-6in long, Org/Red, E, long pt, TomF.</p> <p>OP <u>Striped Roman</u>, Indet, Org, strips on Red, L, Terr.</p> <p>Pear</p> <p>Mid-Season</p> <p>Her <u>Red Pear</u>, Indet, 0.3oz, 1-3/4 to 2 in long, Red, M-S, TGS</p> <p>Her <u>Yellow Pear</u>, Indet, 3/4-1 oz, Yel, M-S, JSS</p> <p>Late</p> <p>Her <u>Japanese Black Truffle</u>, Indet, 8oz, Blk, L, potato leaf, TomF.</p>	<p>OP <u>Cuor di Bue</u>, 6-12oz, Dp. Pink, Terr.</p> <p>OP <u>Orange Russian 117</u>, 1-2lb, Red/Yel., TomF.</p> <p>Ribbed</p> <p>Her <u>Costoluto Genovese</u>, Indet, 5oz, Red deeply ribbed, M-S, TGS</p>