

**Evaluation of late blight-resistant tomato cultivars on Long Island, 2013.**

The experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead, NY, in a field with Haven loam soil that has been dedicated to research on organically-produced crops since 2001. Organic fertilizer at 105 lb/A N was spread over rows to be planted, then incorporated. Three products were used each at 700 lb/A: Pro-Grow 5-3-4, Cheep Cheep 4-3-3, and 6-0-6 Cottonseed blend. Drip tape was laid as the rows were covered with black plastic mulch. A living mulch was established by broadcasting a combination of annual ryegrass seed and clover seed with a hand-operated spreader between rows of plastic mulch, then lightly raking to incorporate. The living mulch plus weeds that grew were mowed routinely. Some weeds were removed by hand. Tomato seed were sown in an organic seeding mix in the greenhouse on 10 May. Seedlings were fertilized with BioLink 3-3-3 organic liquid fertilizer starting at the one-leaf stage. Seedlings were transplanted by hand on 17 Jun into holes opened in the plastic mulch by a waterwheel transplanter that also placed in the holes a starter fertilizer, Neptune's Harvest Benefits of Fish (2-4-1 N-P-K). A completely randomized block design with four replications was used. Plots consisted of 10 plants in a single row with 24-in. plant spacing and 68-in. row spacing. A yellow cherry-type tomato plant (cv. Sungold) separated plots within rows. The 13 plots in each replication were arranged in two adjacent rows. Following standard procedure for fresh-market tomato production on Long Island, plants were staked and trellised as they grew using the Florida weave trellising system with 4-ft stakes placed between plants. Water was provided as needed through drip tape laid beneath the plastic mulch. Thrips and tomato fruit worms were managed by applying Entrust (8 fl oz/A) on 16 and 23 Jul using a tractor-mounted boom sprayer equipped with twinjet (TJ60-11004VS) nozzles spaced 17 in. apart that delivered 68 gal/A at 65 psi and 2.3 mph. Leaves were examined for symptoms of any foliar disease nine times from 31 Jul to 10 Oct. Late blight and other diseases observed were assessed by estimating the percentage of leaves in each plot with symptoms (incidence) and the severity of symptoms on these affected leaves. Canopy severity was calculated by multiplying these values. Area Under Disease Progress Curve (AUDPC) was calculated for late blight severity from 6 Sep through 10 Oct for all entries. Ripe fruit were harvested on 21, and 30 Aug, 6, 13, 20, and 26 Sep and 10 Oct. Fruit quality attributes assessed included taste rated on a 1-5 scale with 5 being excellent. Average monthly high and low temperatures (°F) were 78/61 in Jun, 86/71 in Jul, 80/64 in Aug, 74/57 in Sep, and 67/51 in Oct. Rainfall (inches) was 9.92, 3.07, 2.43, 2.62, and 0.19 for these months, respectively.

Late blight was first observed on Long Island, NY, in 2013 on 25 Jul in a commercial tomato crop in Riverhead. At LIHREC the first symptoms were observed on 16 Aug in this experiment. US-23 was the only genotype of *P. infestans* found in the region in 2013, including at LIHREC. All entries with *Ph2* and *Ph3* major genes for resistance exhibited good suppression of late blight, confirming results obtained in a similar evaluation in 2012. This was most evident on 12 Sep. Iron Lady is the only cultivar with homozygous resistance (*Ph2* and *Ph3* genes from both parents); the other three are heterozygous. Four entries with unknown resistance also effectively suppressed late blight. These were included in the evaluation because they exhibited resistance in other evaluations. Mountain Magic and Matt's Wild Cherry were the most effective of all entries exhibiting resistance. The entry with just *Ph3*, Plum Regal (homozygous *Ph3*), was effective compared to Mountain Fresh Plus only based on the 6 Sep assessment. Both New Yorker and Legend OP were as severely affected by late blight as the susceptible cultivars, which suggests neither *Ph1* nor *Ph2* are effective against US-23, which was the most common genotype in the northeast in 2012 and 2013. Plum Regal and Legend OP provided some suppression in 2012 in an evaluation at this location; however, all plants in that experiment were sprayed five times with organic fungicides labeled for managing late blight.

Cultivar (late blight resistance; fruit type) <sup>y</sup>	Late blight canopy severity (%) <sup>z</sup>					
	6 Sep	12 Sep	17 Sep	2 Oct	10 Oct	AUDPC <sup>x</sup>
Mountain Fresh Plus (none; red slicer).....	78.9 a	71.8 abc	42.5 ab	31.0 a	21.8 ab	1058.1 a
New Yorker OP ( <i>Ph1</i> ; red slicer).....	96.0 a	86.0 ab	47.3 ab	26.3 a	11.9 abc	1285.0 a
West Virginia ( <i>Ph2</i> ; red slicer).....	97.3 a	ND	ND	ND	ND	ND
Legend OP ( <i>Ph2</i> ; red slicer).....	55.5 ab	42.5 bcd	43.8 ab	5.3 a	4.4 bc	728.3 abc
Plum Regal ( <i>Ph3</i> ; plum).....	25.0 bc	31.3 cd	42.5 ab	30.0 a	29.3 a	894.5 ab
Mountain Merit ( <i>Ph2</i> + <i>Ph3</i> ; red slicer).....	17.8 bc	3.1 d	17.3 ab	7.0 a	5.0 bc	220.9 bcd
Defiant PHR ( <i>Ph2</i> + <i>Ph3</i> ; red slicer).....	8.9 bc	2.3 d	19.9 ab	2.0 a	3.8 bc	137.2 cd
Mountain Magic ( <i>Ph2</i> + <i>Ph3</i> ; campari).....	0.6 c	1.3 d	9.0 ab	3.1 a	1.5 c	78.3 d
Iron Lady ( <i>Ph2</i> + <i>Ph3</i> ; red slicer).....	4.9 bc	1.6 d	15.3 ab	2.5 a	7.0 bc	125.2 cd
Mr Stripey (unknown; slicer).....	30.0 bc	11.9 d	5.1 ab	3.0 a	3.9 bc	203.6 bcd
Lemon Drop (unknown; cherry).....	2.4 c	6.0 d	4.3 ab	6.1 a	2.0 c	120.6 cd
Jasper (unknown; cherry).....	20.2 bc	8.6 d	0.0 b	0.5 a	1.8 bc	99.3 cd
Matt's Wild Cherry (unknown; cherry).....	0.3 c	0.0 d	1.9 b	0.8 a	3.8 bc	26.4 d
<i>P-value (treatment)</i>	<0.0001	<0.0001	0.0054	0.0106	0.0002	<0.0001

<sup>z</sup> Numbers in each column with a letter in common are not significantly different from each other (Tukey's HSD, P=0.05). ND=not determined because too few leaves remained in plots to assess.

<sup>y</sup> Entries are listed based on a combination of severity, resistance genes, and fruit type.

<sup>x</sup> AUDPC values were square root transformed before analysis. Table contains de-transformed values.