

# EVALUATING TOMATO CULTIVARS FOR EARLY BLIGHT TOLERANCE IN MISSOURI

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Most vegetable cultivar trials focus on yield and quality attributes. However, disease tolerance is not routinely evaluated with other criteria. The objective of this research was to evaluate new and established tomato cultivars for yield, quality and tolerance to foliar pathogens. The most ubiquitous and devastating pathogen that infects tomatoes in the central Midwest is early blight (*Alternaria solani*). There are several cultural practices that can be implemented to manage this disease including rotation, mulching, spacing, fungicide applications, and tolerant cultivars.

## Materials and Methods:

Sixteen commercial tomato cultivars were planted in seedling flats on May 2, 2002, and transferred to 606 cell packs 2 weeks later. On June 5, the plants were planted in plots at the University of Missouri Bradford Research Center near Columbia, Missouri. The soil was tilled and plastic mulch and drip irrigation applied. The plants were spaced 2' between plants x 5' between beds. Each plot contained 5 plants, and there were 3 replications per cultivar. A "sprayed" and "non-sprayed" block was established. The sprayed block received a fungicide application commencing with flowering (2 weeks after transplanting) and continuing through harvest. Both Quadris and Bravo WS were alternated and applied according to rates recommended by *the Midwestern Vegetable Production Guide*. The non-sprayed block did not receive any spray application during the production and harvest period. Plants were staked and stringed. Irrigation was applied as needed with multiple fertigations of nitrogen. If rainfall was not received to equal 1" per week, a garden hose was used to wet the foliage of the non-sprayed plants to create a more favorable disease environment. Harvest commenced on August 25, 2002 and continued through September 30. Disease ratings were made in mid September by visually examining each plot from the non-sprayed block and assigning each cultivar a descending number based on the severity of early blight infection.

## Results & Discussion

In general, most cultivars had higher yields when sprayed every 10-14 days with an eradicant or protectant fungicide. Some cultivars seemed to possess very good tolerance to early blight. 'BHN 543', 'Florida 91', 'HMX 0800' and 'Mountain Fresh' produced significantly high yields even when they were not sprayed with fungicides (Table 1). 'Celebrity' only produced significant yields when it was routinely sprayed. However, 'Celebrity' fruit had significant radial and concentric cracking as well as green shoulder regardless of spray treatment making it one of the cultivars with the highest yield of cull fruit (data not shown). 'HMX 0800', a Harris Moran main season cultivar, possesses tolerance to tomato spotted wilt virus. This cultivar also seems to be relatively tolerant to early blight, producing excellent quality fruit on a vigorous vine (Table 2). 'Mountain Crest', a long shelf life cultivar released from North Carolina State University, produced a vigorous vine, but marketable yield was not significantly high. 'Mt Crest' had significant numbers of small, unmarketable fruit (data not shown). 'Florida 91' continues to be a reliable heat (hot) set tomato cultivar with good fruit and vine characteristics. Both 'Florida 91' and 'Mt. Fresh' developed little to no early blight when routinely sprayed with a fungicide.

'JTO 99197' a cultivar released by Johnny's Selected Seeds, is reported to have some early blight tolerance. However, we did not observe significant tolerance to early blight under the central Midwest growing environment. 'Floralina' is a medium-to-good yielding cultivar with excellent fruit quality (including taste).

The strategy to manage early blight in Missouri should be multi-pronged. Using mulch (organic or nonorganic), proper spacing, pruning, staking, drip irrigation, fungicides *and* a high yielding, tolerant cultivar will decrease the risk of early blight reducing tomato yields.

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**Table 1. Yield of selected tomato cultivars, Columbia, MO-2002.**

<b>Cultivar</b>	<b>Marketable yield</b>					
	<i>US # 1 yield/plant (lbs.)</i>	<i>US # 1 yield/ acre (boxes)<sup>z</sup></i>	<i>US # 2 yield/ plant (lbs.)</i>	<i>US # 2 yield/ acre (boxes)</i>	<i>Total marketable yield/ plant (lbs.)</i>	<i>Total Marketable yield/acre (boxes)</i>
<b>SPRAYED:</b>						
<b>BHN 543</b>	<b>5.0</b>	<b>871</b>	<b>2.3</b>	<b>400</b>	<b>7.3</b>	<b>1271</b>
BHN 444	2.8	488	0.4	70	3.2	558
<b>Celebrity</b>	<b>4.0</b>	<b>697</b>	<b>2.5</b>	<b>442</b>	<b>6.5</b>	<b>1139</b>
Floralina	3.0	523	2.9	498	5.9	1021
Florida 47	2.4	418	2.3	401	4.7	819
Florida 91	3.6	627	2.1	369	5.7	996
<b>HMX</b>	<b>5.4</b>	<b>941</b>	<b>2.0</b>	<b>345</b>	<b>7.4</b>	<b>1289</b>
<b>0800</b>						
JTO	2.8	488	1.6	279	4.4	767
99197						
Mt. Crest	3.4	592	1.9	324	5.3	923
<b>Mt. Fresh</b>	<b>6.2</b>	<b>1080</b>	<b>1.8</b>	<b>314</b>	<b>8.0</b>	<b>1394</b>
Mt. Spring	3.6	627	1.4	244	5.0	871
NC 96369	2.2	383	1.6	279	3.8	662
SunChief	2.0	349	0.8	139	2.8	488
<i>LSD</i>	<i>1.8</i>	<i>314</i>	<i>2.7</i>	<i>470</i>	<i>3.6</i>	<i>627</i>
<i>(0.05)<sup>y</sup></i>						
<b>NON-SPRAYED:</b>						
<b>BHN 543</b>	<b>6.2</b>	<b>1080</b>	<b>1.2</b>	<b>209</b>	<b>7.4</b>	<b>1289</b>
BHN 444	2.4	418	0.6	105	3.0	523
Celebrity	3.4	592	2.0	349	5.4	941
Floralina	4.2	732	2.2	383	6.4	1115
Florida 47	3.8	662	2.2	383	6.0	1045
<b>Florida</b>	<b>6.0</b>	<b>1045</b>	<b>1.2</b>	<b>209</b>	<b>7.2</b>	<b>1254</b>
<b>91</b>						
<b>HMX</b>	<b>5.4</b>	<b>941</b>	<b>1.0</b>	<b>174</b>	<b>6.4</b>	<b>1115</b>
<b>0800</b>						
JTO	3.0	523	1.2	209	4.2	732
99197						
Mt. Crest	2.6	453	0.8	139	3.4	592
<b>Mt. Fresh</b>	<b>7.2</b>	<b>1255</b>	<b>1.0</b>	<b>174</b>	<b>8.2</b>	<b>1429</b>
Mt. Spring	4.8	836	1.6	279	6.4	1115
NC 96369	4.4	767	1.4	244	5.8	1011
SunChief	2.6	453	0.2	35	2.8	488
Bobcat*	4.2	732	1.8	314	6.0	1045
<i>LSD</i>	<i>2.1</i>	<i>366</i>	<i>1.8</i>	<i>314</i>	<i>2.7</i>	<i>470</i>
<i>(0.05)</i>						

<sup>z</sup>Yield per acre is expressed as 25-lb. boxes/acre assuming a plant population of 4,356 plants per acre.

<sup>y</sup>Yields that do not differ by this amount are not significantly different (P=0.05).

\*Observation.

**Table 2. Disease tolerance ranking of selected tomato cultivars, Non-Sprayed Plots  
Columbia, MO-2002.**

<b>Cultivar</b>	<b>Disease tolerance<sup>z</sup></b>	<b>Vine growth<sup>y</sup></b>	<b>Comments</b>
BHN 543	4.5	4.0	Excellent shape and color.
BHN 444	1.8	2.0	Small plant; low marketable yields
Celebrity	3.3	4.3	Significant greenback and cracking
Floralina	3.3	3.0	Very good taste; color
Florida 47	3.2	3.2	Good yield and quality
Florida 91	4.7	3.7	Good yield and quality; Slightly more vigorous than FL 47.
HMX 0800	4.5	3.4	Excellent yields quality, and vine growth.
JTO 99197	3.2	3.0	Yields moderate. Did not seem to possess significant disease tolerance.
Mt. Crest	3.3	3.7	Vigorous plant; Fruit size smaller than expected.
Mt. Fresh	5.0	4.3	Excellent yields, quality and vine growth.
Mt. Spring	3.3	3.0	Very good extra large fruit
NC 96369	2.9	2.5	Fruit size was smaller than expected given the vine growth.
SunChief	2.8	2.2	Small plant; Maybe good for early harvest.
Bobcat*	2.6	2.5	Moderate yielding; detected internal discoloration during hot weather.
<i>LSD (0.05)</i>	<i>2.8</i>	<i>0.9</i>	

<sup>z</sup>Disease rating scale: 1-9; 1=No tolerance to early blight; Extreme early blight infection; 9= Excellent early blight tolerance

<sup>y</sup>Vine rating scale: 1-5; 1= Small vine growth; 5=Very vigorous vine growth.

\*Observation only.