

# High-Tunnel Yields Differ Among 20 Tomato Cultivars

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## **Objective**

The objective of this trial was to determine if a better cultivar(s) could be identified for high-tunnel production among the twenty tomato cultivars (14 fresh market and 6 saladette-types) evaluated. Special attention was paid to differences in yield and fruit quality traits, especially gray wall.

## **Summary**

Statistical differences were found in tomato fruit yield and quality in a high-tunnel environment. Total yield of fresh market fruit ranged from 2629 ('Indy') to 1806 (FL 7514) cartons/acre. Saladette-types ranged from 2787 ('Plum Crimson') to 2054 ('Plum Dandy'). Yield of No. 1 large fresh market fruit ranged from 642 ('Paragon') to 217 ('Red Delight') cartons per acre and saladette No. 1 fruit yield ranged from 2096 ('Plum Crimson') to 977 ('Miroma'). Average No. 1 fruit weight from fresh market fruit ranged from 280 ('Linda') to 226 (FL 7514) grams/ fruit. Saladette No. 1 fruit weight ranged from 142 ('Mireina') to 84 ('Plum Dandy') grams/fruit. No. 1 fruit yield was generally low due to the heavy emphasis placed on gray wall symptoms. Of the 20 cultivars evaluated, 'Mt. Spring,' 'Mt. Crest,' and 'Crista' appear best for fresh market types, and 'Plum Crimson' and 'Marianna' appear best for saladette types for production in high tunnel systems.

## **Methods**

### ***Fertilizer***

Prior to planting 0-0-60, sulfur, solubor, and Cal-Fortified were broadcast and incorporated at 200, 20, 20, and 100 lbs./A, respectively. One ton/A of agricultural lime was also applied and incorporated. After planting, fertilizer was applied through the drip system as 4-0-8-2Ca at a rate of 1/3 pound of nitrogen per acre per day. Fertigation began June 11, 2007, and ended August 20.

### ***Fumigation/Weed Control***

Beds were fumigated with 300 lbs./A 67%/33% methyl bromide/chloropicrin at bed shaping and plastic laying on May 2, 2007. Between row weeds were controlled through cultivation and hand hoeing.

### ***Planting***

Seed was started in a greenhouse on April 11, 2007 and planted to the field on May 23. Beds were 6 inches high and spaced on 5.5-foot centers with in row spacing of 1.5 feet (5,280 plants per acre). The trial was planted and analyzed as a completely randomized design. There were eight plants per plot and four replications. Plots were separated by a single guard plant. Fresh market and saladette tomatoes were placed in separate plantings and analyzed separately.

## **Plant Care**

Plots were irrigated daily and pests controlled using standard commercial practices.

## **Harvest and Data Collection**

Harvest was conducted five times beginning on July 30, 2007 and ending on August 29. Fruit was graded and weighed for each category. Special emphasis was placed on grading for gray wall symptoms.

## **Results**

Gray wall (a physiological disorder where portions of the fruit wall stay hard and yellow) is a poorly understood condition experienced by many Michigan tomato growers. Factors thought to contribute to gray wall include nitrogen fertilization, nitrogen to potassium ratios, temperature, light levels, genetics, and others. A significant amount of fruit (50%+) can be discarded at certain harvests due to gray wall. Previous experience in trials at the Southwest Michigan Research and Extension Center has found significant levels of fruit expressing gray wall symptoms when grown under high tunnels. The purpose of this trial was to investigate if there are specific genotypes that might be better adapted under high tunnels and see if they exhibited lower levels of gray wall. To determine this, 20 cultivars were grown under a high-tunnel situation for evaluation.

Statistical differences were found in all traits measured except for yield of No. 2 fruit for the saladette types (Tables 1 and 2). For fresh market types, 'Indy' had the highest total yield at 2,629 cartons/acre (carton = 25 pounds). Nine other entries had statistically similar total yields (Table 1). At 2,787 cartons/acre 'Plum Crimson' had the highest yield among the saladette types (Table 2). Only 'Plum Dandy' had significantly lower total yields.

The more important measurements are No. 1 large and cull fruit. No. 1 large fruit yields were lower due to significant amounts of fruit culled because of gray wall and blossom end rot. This, in turn, resulted in elevated numbers in the cull yield column. For fresh market types, 'Paragon' had the highest No. 1 large yield at 642 cartons/acre. For saladettes, 'Plum Crimson' had highest No. 1 yield at 2,096 cartons/acre. Seven other fresh market cultivars had similar yields to 'Paragon.' In the saladettes, only 'Marianna' had similar yields to 'Plum Crimson' (Table 2). 'Soraya' had the highest yield of cull fruit for the fresh market types at 1,828 cartons/acre (82% of the fruit). Highest cull fruit for the saladettes occurred in 'Mireina' (1,333 cartons/acre). In general, more cull fruit was found in the fresh market types than in the saladette.

Considering all traits measured, three fresh market cultivars appear better than the others; 'Mt. Spring,' 'Mt. Crest,' and 'Crista.' All three were leaders in No. 1 large yield and fruit weight, and they had a lower number of culls. 'Marianna' and 'Plum Crimson' were the best saladette cultivars.

Plant growth and appearance, and fruit quality of the trial were much poorer than in previous high-tunnel trials. Plants and fruit were generally smaller, blossom end rot (BER) was a serious problem, which had not occurred in the past, and gray wall incidence appeared greater than in previous years. A number of factors may have contributed to this. Temperatures during June and July were significantly above normal, which could have contributed to BER expression. Due to high temperatures and light levels plants may have required higher nutrient levels than what they

were given. The 1/3 pound per acre per day level was used due to previous trials finding field rates of nutrients too high for tunnels production. Trials indicated levels between 1/2 and 1/4 pound per acre per day were adequate, but this may not have been the case in a high light, high temperature year. Another factor could be that this was the third year of use on the overhead plastic and as the plastic ages it becomes less transparent, producing lower light levels. It may be important to fertilize tomatoes under tunnels according to weather conditions that year.

**Table 1.** Yield in 25-pound cartons per acre of 14 fresh market tomatoes grown under high tunnels at the Southwest Michigan Research and Extension Center, Benton Harbor, Michigan in 2007. Fruit weight is in grams.

Variety	Seed Source	Total Yield	Yield No. 1 Large	Avg. Fruit Weight	Yield No.1 Small	Yield No. 2	Yield Cull
Indy	SY/RG	2,629	600	262	277	218	1,533
Paragon	JS	2,602	642	250	251	128	1,581
ACR 2012	AC	2,478	583	246	444	75	1,376
Mt. Spring	SY/RG	2,473	611	277	222	234	1,405
Mt. Crest	NU	2,427	618	256	230	217	1,362
Linda	SK	2,417	616	280	93	110	1,598
Soraya	SY/RG	2,237	304	270	69	36	1,828
Crista	RI	2,168	613	278	104	99	1,352
NRT 6785	NU	2,144	357	279	115	86	1,587
Red Delight	SK	2,125	217	278	78	149	1,682
Big Shot	RI	1,997	328	255	102	93	1,474
Sebring	SY/RG	1,966	234	232	60	42	1,630
Florida 47	RI	1,857	304	247	137	82	1,333
FL 7514	RU	1,806	421	226	281	68	1,037
<b>Lsd = .05</b>		<b>569</b>	<b>256</b>	<b>26</b>	<b>83</b>	<b>93</b>	<b>404</b>

**Table 2.** Yield in 25-pound cartons per acre of six saladette tomatoes grown under high tunnels at the Southwest Michigan Research and Extension Center, Benton Harbor, Michigan in 2007. Fruit weight is in grams.

Variety	SS	Total Yield	Yield No. 1	No. 1 Fruit Wt.	Yield No. 2	Yield Cull
Plum Crimson	RI	2,787	2096	103	0	691
ACR 8625	AC	2,388	1319	122	0	1,069
Marianna	SK	2,383	1751	125	0	632
Mireina	SY/RG	2,325	986	142	6	1,333
Miroma	SY/RG	2,234	977	125	7	1,250
Plum Dandy	HM	2,054	1216	84	6	832
<b>Lsd=.05</b>		<b>575</b>	<b>458</b>	<b>9</b>	<b>ns</b>	<b>229</b>