Tomato Variety Trial Results 2019

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2019 University of Tomato Variety Trial

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Introduction

The 2019 Tomato Variety Trial included 28 varieties from 5 participating companies. The purpose of this trial was to evaluate tomato varieties for yield and quality under summer heat conditions.

Materials and Methods

Trial Design

The trial was a Randomized Complete Block with 3 replications. Plots were 10' in length.

Location and Soil Type

Field 6 C, University of Delaware Thurman Adams Research Farm, Carvel Research and Education Center, Georgetown, Delaware. The soil type was a Rosedale Loamy Sand.

Cultural Practices

The field was fertilized and limed according to soil test results. Preplant fertilizer was 50-0-160-72 (N-P_2O_5-K_2O-S). Black plastic mulch and trickle irrigation were laid on 6' centers. Additional nitrogen fertilizer was applied by fertigation during fruiting in four applications three weeks apart (40, 40, 30, 30 lbs/a N).

Trial entries are listed in Table 1. Entries were seeded in the greenhouse on April 26, 2019. Plants were transplanted to the field on May 31, 2019. Field plots were one row (6 ft) wide and 10 ft long. Plots were arranged in a randomized complete block design with three replications. In-row spacing for plants was 1.5 ft with 6 plants per plot.

Herbicides applied with a shielded sprayer to row middles on 5-28-19 were Gramoxone 2 qt/A, Reflex 12 oz/A, Dual 1.5 pt/A, and Prowl 2 pt/A.

A comprehensive disease, insect and mite control program was used for the trial as follows:

6/7/19 Bravo 2 pt/A
6/17/19 Bravo 3 pt/A, Gladiator 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Wrangler 10 oz/A, Regalia, 1 qt/A, and Actigard 0.75 oz/A.
6/26/19 Manzate 2 qt/A, Gladiator 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Actigard 0.75 oz/A.
7/3/19 Manzate 2 qt/A, Gladiator 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Actigard 0.75 oz/A, Regalia 1 qt/A, Orondis Ultra 8 oz/A, Tactic 1 pt/A.
7/11/19 Bravo 3 pt/A, Gladiator 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Tactic 1 pt/A.

7/16/19 Bravo 3 pt/A, Hero 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Coragen 2 oz/A.
7/24/19 Bravo 3 pt/A, Hero 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Coragen 2 oz/A.
8/2/19 Manzate 2 qt/A, Hero 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Coragen 2 oz/A.
8/13/19 Bravo 3 pt/A, Reaper 10 oz/A, Hero 10 oz/A, Master Cop 1 pt/A, Tanos 8 oz/A, Coragen 2 oz/A.
8/28/19 Mancozeb 2 qt/A, Kocide 1 lb/A, Tanos 8 oz/A, Sniper 10 oz/A, Coragen 2 oz/A.
9/12/19 Kocide 1 lb/A, Mancozeb 2 qt/A
9/23/19 Tanos 8 oz/A. Bravo 3 pt/A, MasterCop 1 pt/A

Irrigation was applied regularly as determined by experiment station farm staff.

The summer growing season was hot with 27 days over 90 F. Rainfall for the growing season was 11.91 inches with no rainfall over 1.0 inch in 24 hours. Disease pressure was moderate and yields were moderate to high.

Harvest
Fruit were harvested five times. The first harvest was on August 8, the second harvest was on August 20, the third harvest was on September 4, the fourth harvest was on September 16, and the final harvest was on September 28. Fruits were graded into Extra Large (XL), Large (L), Medium (M), Small (S) sizes, Seconds (2nd) and Culls. Five large tomatoes in each plot were cut and evaluated for the appearance of white tissue. On the second harvest, tomatoes were also given a white tissue rating (0-10) and tested for soluble solids.

Results

Yields by marketable weight and total weight per plant are given in Table 2. The top group in terms of marketable yield were Grand Marshall, XTM 2256, Red Snapper, STM 2255, Red Mountain, Red Bounty, and FTM 6281 and ranged from 19.6 to 15.5 lbs./plant. Yields in lbs./plant/harvest are also presented in Table 2. Most varieties had peak yield on harvest 2. Varieties that had peak yields on the first harvest were Red Mountain and FTM 6163. Varieties with peak yields on harvest 3 were Red Snapper, FTM 6281, Jamestown, Myrtle, and Saybrook. Varieties showing extended harvest (over 4 lbs./plant in harvests 4 +5) were Grand Marshall and XTM 2256.

Yields by marketable number and total number per plant are given in Table 3. Grand Marshall and XTM 2256 had significantly higher numbers of tomatoes per plant compared to all varieties except Mountain Fresh, STM 2255, and Jamestown. Grand Marshall and XTM 2255 also had much higher numbers in harvests 4 and 5 than other varieties.

White tissue incidence is presented in Table 4. Varieties with low mean incidence of white tissue (less than 1.5) were Jamestown, FTM 6298, Primo Red, and Red Bounty. Varieties with incidence of white tissue over 3 were Camaro, FTM 6163, Mountain Merit, and Mountain Fresh. Varieties with all tomatoes sampled showing white tissue on harvest 1 were FTM 6163, Camaro, and Red Snapper. All samples of Mountain Fresh and FTM 6163 had white tissue in harvest 2. White tissue incidence decreased as temperatures decrease across all varieties; however, Grand

Marshall, Mountain Merit, and Myrtle had more than 2.5 tomatoes showing white tissue in harvest date 4 and Mountain Fresh was still showing 40% white tissue in harvest date 5.

Tomato fruit quality measurements on harvest 2 are shown in Table 5. XTM 2256, FTM 6281, Bella Rosa, and FTM 8011 had soluble solids 4.5 or greater. Camaro, Red Snapper, FTM 5187 Dixie Red, BHN 602, Mountain Fresh, Saybrook, Mountain Merit, Red Deuce, and FTM 6163 had white tissue severity ratings of 4 or greater. This corresponds to white tissue covering 40% or greater of the fruit. Camaro had a white tissue severity rating of 8.3. STM 2255, Roadster, and FTM 8011 had white tissue ratings under 2.

Tomato yields in lbs./plant by grade are given in Table 6. FTM 6281 had over 4 lbs./plant in the XL category. Red Snapper, Grand Marshall, Red Bounty, XTM 2256, SV 7101, STM 2255, FTM 6281, Red Mountain, and FTM 6298 yielded over 5 lbs./plant of Large tomatoes. Red Mountain, Grand Marshall, XTM 2256, and Red Snapper had over 5 lbs./plant of medium tomatoes. Red Mountain had 3.4 lbs./plant of Small tomatoes. Seconds which comprised mostly of tomatoes with some cracking were 2.8 lbs./plant in Primo Red. Varieties with over 2 lbs./plant in the Cull (misshapen) category were Biltmore, Red Deuce, Camaro, Roadster, and Mountain Merit.

Table 7 and 8 show tomato yields by grade in numbers and percent. Mountain Majesty, Camaro, and Red Deuce had 7 or more fruits per plant in the cull category. Varieties with less than 5 % culls were Grand Marshall, Jamestown, and Mountain Fresh.

Photos of varieties are shown in Appendix A.

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Participating Companies.

Table 1. Entries in the 2019 University of Delaware Tomato Variety Trial, Georgetown, Delaware, 2019.

Variety	Source
Mountain Merit	Bejo
BHN 589	BHN
BHN 602	BHN
Mountain Fresh	HMClause
Mountain Majesty	HMClause
Primo Red	HMClause
Red Bounty	HMClause
Red Deuce	HMClause
Red Mountain	HMClause
Scarlet Red	HMClause
Bella Rosa	Sakata
Camaro	Sakata
FTM 5187	Sakata
FTM 6163	Sakata
FTM 6281	Sakata
FTM 6298	Sakata
FTM 8011	Sakata
Grand Marshall	Sakata
Red Snapper	Sakata
Roadster	Sakata
STM 2255	Sakata
XTM 2256	Sakata
Biltmore	Seminis
Dixie Red	Seminis
Jamestown	Seminis
Myrtle	Seminis
Saybrook	Seminis
SV 7101	Seminis

Table 2. 2019 Tomato Variety Trial. Varieties by Marketable Yield, Total Yield, and Yield by Harvest by Weight, Georgetown, Delaware, 2019.

Variety	Yields and Harvest Distribution								
					Lbs./plant/harvest				
	Marketable lbs./plant		Total lbs./plant		1	2	3	4	5
Grand Marshall	19.6	a	20.2	a	2.9	6.4	6.1	2.2	2.0
XTM 2256	18.5	ab	20.1	a	2.4	6.9	4.9	2.2	2.2
Red Snapper	17.9	abc	19.0	ab	4.2	3.5	8.0	1.2	0.9
STM 2255	17.7	abcd	19.0	ab	4.6	5.6	4.6	1.5	1.5
Red Mountain	17.4	abcde	18.6	abc	9.1	5.0	2.5	0.2	0.5
Red Bounty	16.0	abcdef	17.2	abcd	4.4	6.6	3.9	0.3	0.7
FTM 6281	15.5	abcdefg	16.0	abcdefg	2.4	5.2	5.3	1.6	1.0
BHN 589	14.8	bcdefgh	16.7	abcdef	2.7	6.8	2.7	0.9	1.6
FTM 6298	14.8	bcdefgh	15.2	bcdefg	3.3	5.7	4.9	0.3	0.5
Bella Rosa	14.3	bcdefghi	15.2	bcdefg	2.5	7.2	3.5	0.2	0.9
Biltmore	14.2	bcdefghi	16.9	abcde	3.9	7.0	2.1	0.5	0.7
SV 7101	14.2	bcdefghi	15.3	bcdefg	5.1	5.3	3.2	0.2	0.4
Red Deuce	13.7	cdefghi	16.0	abcdefg	3.3	6.3	3.2	0.2	0.6
Mountain Fresh	13.3	cdefghi	13.8	defg	1.3	5.3	4.8	0.9	1.0
FTM 5187	13.1	defghi	14.2	cdefg	1.7	5.6	3.6	1.1	1.2
Mountain Majesty	13.0	efghi	14.9	bcdefg	2.4	4.3	4.2	1.2	0.9
Primo Red	12.9	efghi	14.2	cdefg	3.3	7.0	2.1	0.2	0.3
Jamestown	12.8	efghi	13.2	defg	1.8	4.5	5.2	1.1	0.2
Scarlet Red	12.7	efghi	13.6	defg	2.3	6.0	3.3	0.5	0.6
Roadster	12.4	fghi	14.4	bcdefg	3.4	6.2	2.0	0.6	0.3
Dixie Red	12.3	fghi	13.7	defg	2.5	5.2	3.6	0.4	0.6
FTM 6163	12.2	fghi	13.4	defg	4.0	2.6	3.5	0.7	1.5
Mountain Merit	12.0	fghi	14.0	cdefg	1.3	5.6	3.2	0.9	1.0
BHN 602	11.5	fghi	12.1	fg	1.7	5.5	3.3	0.4	0.6
Myrtle	11.0	ghi	11.9	g	1.5	3.2	4.9	0.8	0.6
Saybrook	10.8	hi	11.6	g	1.3	2.1	5.1	1.3	1.0
FTM 8011	10.6	hi	12.4	efg	2.2	4.9	2.6	0.3	0.5
Camaro	9.6	i	11.7	g	1.2	3.9	3.6	0.5	0.4
p-value	**0.0033**		**0.0026**						
$LSD_{0.05}$	**4.8**		**4.7**						

Table 3. 2019 Tomato Variety Trial. Varieties by Marketable Yield, Total Yield, and Yield by Harvest by Number, Georgetown, Delaware, 2019.

Variety	Yields and Harvest Distribution								
					No./plant/harvest				
	Marketable no./plant		Total no./plant		1	2	3	4	5
Grand Marshall	47.2	a	49.2	a	4.5	12.2	16.6	6.8	7.2
XTM 2256	42.9	ab	48.0	ab	3.9	12.3	12.2	7.4	7.1
Mountain Fresh	39.1	bc	40.6	bc	2.8	12.1	17.9	3.1	3.2
STM 2255	36.8	bcd	39.8	cd	4.2	10.6	11.7	4.9	5.4
Jamestown	35.3	bcde	36.4	cdefg	3.1	9.7	18.6	3.1	0.8
FTM 6281	34.9	cde	37.6	cdef	4.0	8.3	14.9	4.4	3.2
FTM 6298	34.8	cde	36.7	cdefg	4.4	13.3	12.7	2.8	1.7
Red Mountain	33.7	cdef	38.2	cdef	12.2	12.6	6.2	0.8	1.9
Scarlet Red	33.6	cdef	36.4	cdefg	4.3	12.7	12.9	1.6	2.1
Mountain Merit	33.6	cdef	39.1	cde	2.8	11.7	12.0	3.3	3.8
BHN 589	33.4	cdef	37.7	cdef	4.8	13.1	7.4	2.8	5.3
Red Snapper	33.0	cdefg	36.5	cdefg	3.8	7.6	14.9	3.4	3.2
FTM 5187	32.6	cdefgh	36.0	cdefgh	2.9	10.5	11.2	3.6	4.4
Red Bounty	31.1	defghi	34.9	cdefghi	5.0	14.1	8.8	1.0	2.2
Bella Rosa	31.0	defghi	34.7	cdefghi	4.4	14.0	9.2	0.7	2.8
Mountain Majesty	30.8	defghi	37.8	cdef	4.1	8.2	11.7	3.8	3.0
Myrtle	30.5	defghi	32.9	defghi	3.0	6.7	16.8	2.4	1.6
BHN 602	30.0	defghi	32.2	defghi	3.4	12.0	11.3	1.4	1.9
SV 7101	29.3	defghi	32.2	efghi	5.7	12.2	9.5	0.6	1.4
Primo Red	28.3	efghi	32.1	efghi	6.6	14.5	5.3	0.8	1.1
Saybrook	26.9	fghi	29.8	ghi	2.3	3.9	15.1	2.9	2.7
Biltmore	26.2	fghi	32.7	defghi	3.5	13.6	4.9	1.5	2.7
Dixie Red	25.5	ghi	28.7	hi	4.6	9.1	8.9	0.9	2.0
Red deuce	25.0	hi	31.9	efghi	5.3	10.1	7.1	0.8	1.8
FTM 6163	24.8	hi	27.8	i	6.1	4.0	8.3	1.9	4.5
FTM 8011	24.4	i	28.6	hi	4.3	9.0	8.0	1.3	1.8
Camaro	24.4	i	31.4	fghi	1.8	7.3	12.7	1.3	1.3
Roadster	23.3	i	29.9	ghi	3.6	12.8	4.9	1.3	0.8
p-value	**<0.0001**		**<0.0001**						
$LSD_{0.05}$	**8.0**		**8.1**						

Table 4. Mean White Tissue Incidence Per 5 Tomatoes Sampled Overall and By Harvest, Georgetown, Delaware, 2019.

Variety	Mean White Tissue		White Tissue by Harvest				
			1	2	3	4	5
Mountain Fresh	3.50	a	4.7	5.0	NT	2.3	2.0
Mountain Merit	3.26	ab	4.3	4.7	NT	3.7	0.3
FTM 6163	3.09	abc	5.0	5.0	NT	1.7	0.7
Camaro	3.09	abc	5.0	4.7	NT	2.0	0.7
Grand Marshall	2.75	abcd	3.7	3.7	NT	3.0	0.7
FTM 5187	2.67	abcde	3.7	4.7	NT	1.7	0.7
Saybrook	2.59	abcdef	4.7	4.0	NT	1.3	0.3
Bella Rosa	2.59	abcdef	3.7	4.7	NT	1.0	1.0
Myrtle	2.59	abcdef	3.7	2.7	NT	2.7	1.3
Red Snapper	2.42	bcdefg	5.0	3.0	NT	1.3	0.3
Dixie Red	2.42	bcdefg	4.7	3.3	NT	1.3	0.3
Biltmore	2.26	cdefgh	3.7	3.7	NT	1.3	0.3
Red Mountain	2.17	cdefghi	4.3	4.0	NT	0.3	0.0
STM 2255	2.17	cdefghi	4.0	4.0	NT	0.7	0.0
FTM 6281	2.09	defghij	4.3	2.3	NT	1.7	0.0
BHN 602	2.09	defghij	3.7	3.3	NT	0.7	0.7
Mountain Majesty	2.03	defghij	2.3	3.0	NT	1.7	1.0
Roadster	1.84	defghij	3.7	3.3	NT	0.3	0.0
Scarlet Red	1.84	defghij	2.3	2.7	NT	1.0	1.3
SV 7101	1.76	efghij	3.7	3.0	NT	0.3	0.0
Red Duece	1.67	fghij	3.7	1.3	NT	0.3	1.3
FTM 8011	1.59	ghij	2.3	2.3	NT	1.3	0.3
XTM 2256	1.53	ghij	2.7	3.0	NT	0.7	0.0
BHN 589	1.50	ghij	3.3	2.0	NT	0.0	0.7
Jamestown	1.48	hij	3.3	2.0	NT	0.0	0.3
FTM 6298	1.42	hij	2.7	1.7	NT	1.3	0.0
Primo Red	1.25	ij	3.0	2.0	NT	0.0	0.0
Red Bounty	1.17	j	2.3	2.0	NT	0.0	0.3
p-value	**<0.0001**						
LSD 0.05	**1.05**						
NT = Not Taken							

Table 5. 2019 Tomato Variety Trial Quality Measurements on Harvest 2, Georgetown, Delaware 2019.

Variety	Soluble Solids %	White Tissue Rating (1-10)	White Tissue Incidence (5)
XTM 2256	5.0 a	3.0 cdefg	3.3 ab
FTM 6281	4.7 ab	3.0 cdefg	3.7 ab
Bella Rosa	4.7 ab	3.0 cdefg	3.3 ab
FTM 8011	4.5 abc	1.3 g	2.7 b
Biltmore	4.3 abcd	3.3 cdefg	4.3 ab
Mountain Majesty	4.3 abcd	2.0 efg	3.0 ab
Red Bounty	4.3 abcd	2.8 cdefg	3.0 ab
Red deuce	4.3 abcd	4.0 bcde	4.3 ab
Red Snapper	4.3 abcd	5.7 b	5.0 a
Scarlett Red	4.3 abcd	3.7 bcdef	3.7 ab
BHN 589	4.2 abcd	2.0 efg	2.7 b
FTM 5187	4.2 abcd	4.7 bc	4.0 ab
FTM 6163	4.2 abcd	4.0 bcde	4.3 ab
Jamestown	4.2 abcd	2.3 defg	3.0 ab
Myrtle	4.2 abcd	3.0 cdefg	3.3 ab
Red Mountain	4.2 abcd	3.0 cdefg	4.0 ab
STM 2255	4.2 abcd	1.7 fg	3.3 ab
FTM 6298	4.0 bcde	2.2 defg	3.3 ab
Mountain Fresh	4.0 bcde	4.3 bcd	4.7 ab
Roadster	3.8 bcde	1.7 fg	2.7 b
Saybrook	3.8 bcde	4.3 bcd	4.7 ab
BHN 602	3.8 bcde	4.4 bcd	4.4 ab
Camaro	3.7 cde	8.3 a	5.0 a
Dixie Red	3.7 cde	4.7 bc	4.3 ab
Primo Red	3.7 cde	2.7 cdefg	2.7 b
Mountain Merit	3.5 de	4.3 bcd	4.0 ab
SV 7101	3.5 de	2.7 cdefg	3.3 ab
Grand Marshall	3.1 e	3.1 cdefg	3.4 ab
p-value	**0.0373**	**0.0001**	**NS**
LSD 0.05	**1.0**	**2.3**	**2.2**

Table 6. Tomato Variety Trial Yield in Lbs./Plant by Grade, Georgetown, Delaware, 2019.

Variety	Ounces/ Fruit	Yield in Lbs./Plant by Grade					
		XL	L	M	S	2nd	Cull
Bella Rosa	7.01	2.7	4.2	3.3	2.0	2.0	0.9
BHN 589	7.09	1.8	3.2	4.8	2.8	2.3	1.9
BHN 602	6.02	1.2	3.5	3.4	1.6	1.7	0.7
Biltmore	8.27	3.1	4.4	3.0	1.4	1.6	2.5
Camaro	5.93	2.1	3.4	2.3	0.8	1.1	2.1
Dixie Red	7.63	2.3	4.0	2.7	1.5	1.9	1.3
FTM 5187	6.29	2.2	4.0	3.6	2.1	1.3	1.1
FTM 6163	7.72	2.6	3.7	1.7	1.4	2.2	1.1
FTM 6281	6.82	4.0	5.2	3.4	1.5	1.4	0.5
FTM 6298	6.64	3.1	5.0	4.2	1.1	1.3	0.5
FTM 8011	6.93	1.5	3.5	2.7	1.1	1.8	1.8
Grand Marshall	6.58	3.2	6.7	5.7	3.3	0.8	0.6
Jamestown	5.79	1.5	3.9	4.2	2.2	1.0	0.4
Mountain Fresh	5.43	1.2	3.2	4.8	2.8	1.1	0.4
Mountain Majesty	6.30	2.3	3.2	3.6	1.8	2.1	1.9
Mountain Merit	5.73	0.7	3.3	3.8	2.6	1.7	2.0
Myrtle	5.77	0.6	3.8	3.8	1.9	0.9	0.9
Primo Red	7.08	1.4	3.2	2.8	1.7	2.8	1.2
Red Bounty	7.87	2.3	5.5	4.1	2.1	1.3	1.2
Red Deuce	8.00	3.9	4.2	2.4	1.1	2.0	2.3
Red Mountain	7.77	0.9	5.0	6.7	3.4	1.4	1.2
Red Snapper	8.33	1.7	7.1	5.4	2.4	1.3	1.1
Roadster	7.70	1.9	3.5	3.2	1.6	2.2	2.0
Saybrook	6.21	1.1	4.6	3.1	0.7	1.3	0.8
Scarlet Red	5.97	2.3	3.4	4.0	1.9	1.2	0.9
STM 2255	7.62	3.9	5.3	3.8	2.8	1.8	1.3
SV 7101	7.61	1.5	5.4	4.4	1.9	1.1	1.1
XTM 2256	6.72	2.8	5.4	5.6	2.9	1.4	1.5
p-value		**<0.0001**	**0.049**	**<0.0001**	**<0.0001**	**NS**	**<0.0001**
LSD 0.05		**1.4**	**3.1**	**1.9**	**0.9**		**1.0**

Table 7. Tomato Variety Trial Yield in No. per Plant by Grade, Georgetown, Del., 2019.

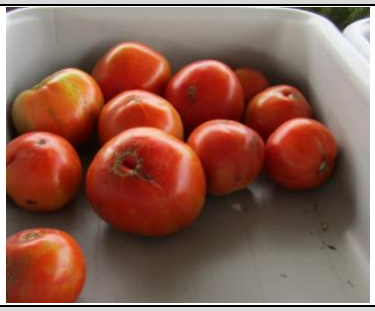
Variety	Yield in Number/Plant by Grade					
	XL	L	M	S	2nd	Cull
Bella Rosa	3.6	7.5	8.4	7.5	4.0	3.6
BHN 589	2.1	5.4	11.5	10.8	3.7	4.3
BHN 602	1.6	6.6	9.0	7.5	5.4	2.3
Biltmore	3.3	5.8	6.8	5.8	3.7	6.0
Camaro	2.6	6.6	6.8	4.7	3.7	7.1
Dixie Red	2.8	7.0	7.1	5.5	3.2	3.2
FTM 5187	2.6	7.8	9.6	8.8	3.7	3.5
FTM 6163	2.9	6.8	4.6	4.8	4.4	3.0
FTM 6281	4.7	9.5	9.6	7.2	4.0	2.7
FTM 6298	5.7	8.6	10.0	6.8	3.7	1.8
FTM 8011	1.9	5.8	6.8	5.3	4.3	4.2
Grand Marshall	4.0	11.8	15.2	14.2	2.0	2.0
Jamestown	2.0	7.9	12.4	10.1	3.0	1.1
Mountain Fresh	1.6	6.1	14.0	13.7	3.2	1.3
Mountain Majesty	2.8	6.0	9.4	7.8	4.9	7.0
Mountain Merit	0.8	6.4	10.5	11.8	4.1	5.6
Myrtle	0.8	7.2	10.5	9.0	3.0	2.4
Primo Red	1.8	5.6	6.0	6.1	7.0	3.6
Red Bounty	3.1	8.1	8.5	7.8	2.7	3.8
Red Deuce	4.7	6.7	5.7	4.2	3.7	7.0
Red Mountain	1.3	5.6	12.3	11.3	3.3	4.5
Red Snapper	1.7	9.3	11.0	8.4	2.7	3.5
Roadster	2.4	5.1	6.4	5.5	4.0	6.6
Saybrook	1.5	7.8	8.3	4.8	4.5	2.8
Scarlet Red	3.1	6.2	11.5	9.8	3.1	2.8
STM 2255	3.8	8.7	9.1	12.0	3.3	3.1
SV 7101	1.7	7.3	9.2	8.5	2.7	2.8
XTM 2256	3.5	8.7	13.6	12.1	3.9	4.6
p-value	<0.0002	0.015	<0.0001	<0.0001	NS	<0.0025
LSD 0.05	1.9	3.6	3.5	5.4		3.1

Table 8. Tomato Variety Trial Yield in Percent by Grade, Georgetown, Delaware, 2019

Variety	Percent Yield Per Plant by Grade					
	XL	L	M	S	2nd	Cull
Bella Rosa	10.5	21.6	24.4	21.6	11.5	11.7
BHN 589	5.5	14.3	30.4	28.8	9.7	12.8
BHN 602	4.8	20.3	27.9	23.1	16.7	7.6
Biltmore	10.6	18.6	21.6	18.6	11.7	23.6
Camaro	8.3	20.8	21.6	15.0	11.8	28.9
Dixie Red	9.9	24.4	24.6	19.0	11.0	12.4
FTM 5187	7.3	21.8	26.7	24.4	10.3	10.6
FTM 6163	10.9	25.7	17.3	18.3	16.6	12.6
FTM 6281	12.6	25.1	25.4	19.1	10.5	7.8
FTM 6298	15.6	23.5	27.3	18.6	10.0	5.3
FTM 8011	6.7	20.5	24.0	18.9	15.2	17.3
Grand Marshall	8.1	24.1	30.8	28.9	4.1	4.1
Jamestown	5.5	21.6	34.0	27.7	8.1	3.1
Mountain Fresh	3.9	15.2	35.1	34.4	7.9	3.5
Mountain Majesty	7.4	15.7	24.9	20.7	12.9	22.5
Mountain Merit	2.1	16.3	26.8	30.1	10.4	16.6
Myrtle	2.5	22.0	31.9	27.2	9.1	7.8
Primo Red	6.1	18.5	20.0	20.2	23.1	13.7
Red Bounty	9.0	23.8	25.0	23.0	8.0	12.7
Red Deuce	14.8	21.1	17.8	13.1	11.5	27.8
Red Mountain	3.3	14.7	32.1	29.5	8.6	13.3
Red Snapper	4.6	25.6	30.0	23.0	7.3	10.6
Roadster	8.0	17.1	21.3	18.4	13.2	28.3
Saybrook	4.9	26.3	28.1	16.1	15.0	10.6
Scarlet Red	8.5	16.9	31.4	26.8	8.5	8.4
STM 2255	9.5	21.9	22.7	30.0	8.2	8.3
SV 7101	5.4	22.6	28.7	26.3	8.3	9.7
XTM 2256	7.5	18.8	29.3	26.1	8.4	11.1
p-value	**<0.0001**	**0.049**	**<0.0001**	**<0.0001**	**NS**	**<0.0001**

Appendix A.

Selected Photos from the 2019 Tomato Variety Trial

		
Primo Red	**Grand Marshall**	**Mountain Majesty**
		
Dixie Red	**Red Bounty**	**Red Mountain**
		
Red Deuce	**Bella Rosa**	**Mountain Merit**
		
Scarlet Red	**Camaro**	**Biltmore**

		
Mountain Spring	**BHN 602**	**BHN 589**

APPENDIX B:
Weather Summary for the 2019 Tomato Trial, Georgetown, Delaware
June – September

Appendix B1. Weather data for the Georgetown REC site June 2019.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	72.8	80.3	66.4	23.4	77.9	100	48.5	20.1	4.2	0	0.17	76.7	80.1	73.4
2	74.7	85.8	62.7	24.2	72.4	99.2	44.6	24.3	7.8	0.06	0.23	76.3	81.3	72
3	67.5	75.5	53.9	14.7	58.5	95.1	25.3	28.5	7.1	0	0.23	75.2	79.4	71.6
4	63.1	74.6	48.9	11.8	57.7	94.3	27	29.7	5.4	0	0.22	72.9	79.1	67.1
5	72.3	85.3	62.1	23.7	81.9	99	61.2	18.4	10.8	0.34	0.18	73.5	77.4	70
6	78	86.8	71.4	29.1	81.3	98.4	54.1	23.5	7	0.1	0.22	76.6	82.2	72.4
7	73.4	79.3	66.6	23	81.3	98.3	63.7	17.6	4.2	0	0.15	76.8	80.1	74
8	68.3	75.5	62.8	19.1	78.9	98.7	45.2	21.5	6.1	0	0.18	74.7	78.1	71.8
9	68.2	72.4	65	18.7	87.7	99	76.9	8.2	7.4	0.13	0.08	72.4	74	71
10	74.4	84.6	66.1	25.3	93	100	71.8	15	6.1	0.74	0.14	73.8	77.9	70.4
11	70.7	77.5	60.2	18.9	73.5	100	40.1	26.8	9.4	0.28	0.23	75	78.1	72.7
12	66.9	73.9	57.3	15.6	71.3	98.3	51.7	24.9	5.2	0	0.18	72.4	76.1	68.7
13	68.6	76.8	62	19.4	87.8	99.6	71.6	14.6	7.8	0.71	0.12	72.9	76	70
14	65.6	73.6	58	15.8	67.8	99.3	37.2	27.3	9.2	0.04	0.22	71.6	74.2	68.9
15	70	81.3	55.1	18.2	63.8	95.8	29.8	29	8.7	0	0.26	70.9	75.5	66.5
16	77.1	85.9	66.5	26.2	71.4	88.3	55.5	25.1	11	0	0.24	73.5	77.7	69.7
17	80	90.9	70.2	30.5	73.1	99.1	46.8	24.3	5.4	0.26	0.23	77.6	82.9	73.2
18	77.1	87.1	69.8	28.5	84.7	99.7	59.2	20.9	5.5	0.62	0.19	78.4	82.3	75.1
19	77.8	86.3	71.3	28.8	87	99.9	64.7	21	5.7	0.04	0.18	79	82.8	75.9
20	79.8	88.9	70.4	29.6	82.4	99.2	54	24.6	9.3	0.54	0.24	80.2	83.7	77
21	73.5	79.9	68.4	24.2	75.2	99.4	42.8	21.7	9.8	0.31	0.21	77.7	79.6	76.3
22	71.1	80.1	60.9	20.5	64.2	93	32.3	28.7	6.4	0	0.24	76.6	80.9	72.8
23	70.4	82.2	56.7	19.5	65	96.8	36.1	29.6	4	0	0.23	76.1	81.3	71.3
24	75.7	87.8	63.3	25.6	73.7	96.5	48.5	25.6	6	0	0.23	77.1	81.7	72.4
25	79.2	86.8	72.9	29.9	78.6	97.1	52.1	20.3	6.6	0	0.2	78.9	81.9	76.4
26	78.9	89	68.1	28.5	67.7	97.7	40.4	27.4	4.8	0	0.25	79.3	83.7	75.2
27	81	91.8	68.2	30	66.2	99.1	38.2	28.3	3.9	0	0.25	80.4	85	76
28	80.3	93.2	68.2	30.7	73.1	97.1	44.6	23.8	3.5	0	0.22	81	84.7	77.4
29	79.4	92.4	71.7	32.1	79.7	98.7	47.2	23.8	5.4	0.05	0.23	81.6	86.3	78
30	79.1	89.2	70.2	29.7	68.5	97.8	37.6	26.8	7.6	0	0.27	81	84.4	78

A	Day					
B	Avg Temp	(°F)		I	Avg Solar	(MJ.m^{-2}.day^{-1})
C	Max Temp	(°F)		J	Avg Wind Speed	(mph)
D	Min Temp	(°F)		K	Rainfall	(in)
E	GDD	(base 50 °F)		L	Ref ET	(in day^{-1})
F	Avg RH	(%)		M	Avg Soil Temp	(°F)
G	Max RH	(%)		N	Max Soil Temp	(°F)
H	Min RH	(%)		O	Min Soil Temp	(°F)

Appendix B2. Weather data for the Georgetown REC site July 2019.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	73.2	83.7	60.7	22.2	68	93.1	44.9	26.9	4	0	0.22	79.3	83	75.3
2	78	89.7	63.5	26.6	72	99.8	44.5	27.3	6.3	0	0.25	79.7	84.5	75
3	81.3	91.4	69.3	30.4	75.1	98.4	49.6	26.3	4.2	0	0.23	81.5	85.7	77.5
4	80.3	90.8	71.9	31.4	84.3	99.5	57.7	20.2	3.1	0	0.18	82	85.3	78.9
5	81.6	90.5	75	32.8	85.5	100	60.5	20.2	4.3	0.06	0.19	82.4	85.7	79.6
6	81.6	90.3	74.4	32.3	84.6	99.4	62.1	23.5	6.6	0.04	0.21	83	87.2	79.5
7	77.8	84.6	72.6	28.6	87.6	99.7	69	16.8	3.7	0	0.15	81.9	83.7	79.8
8	73.4	78.5	66.7	22.6	87.6	98.4	58.8	10.2	4.9	0.25	0.11	79.3	81.2	77.3
9	73.6	85.9	61.7	23.8	79.5	99.4	50.9	24.6	3.4	0	0.2	78.2	82.9	73.6
10	75.6	87.3	63.4	25.3	73.3	97	51.2	25.2	4.1	0	0.21	79.1	83.4	74.9
11	79	91	65.4	28.2	83.7	99.9	57.1	21.3	7	0.46	0.21	79.8	83.8	76.5
12	79.2	88.5	72.4	30.5	82.9	100	53.6	24.3	6	0	0.22	81.6	85.9	78.1
13	78.6	87.8	69.5	28.7	70.9	99.1	39.6	28	4.6	0	0.24	81.6	86	77.5
14	82.2	92.7	71.5	32.1	73.6	99.6	47.2	26.1	4.9	0	0.24	81.8	86.2	77.7
15	78.8	89	68.1	28.5	67.5	96.4	39.4	28	3.9	0	0.24	81.7	85.6	77.9
16	81.8	93.3	69.8	31.5	75.8	99.5	50.1	25.5	4.4	0	0.23	82	86.5	78.1
17	84.1	95.3	73.8	34.5	75.6	98.3	47	25.1	7.4	0.07	0.26	83.8	87.8	80.5
18	82.5	91	74.8	32.9	83.8	98.7	62.4	23.8	7.5	0.01	0.22	84.2	88	80.8
19	85.2	94.8	74.7	34.8	74.8	99.9	45.4	24.6	5.1	0	0.24	84.7	88.3	81.1
20	87.5	97	79.7	38.3	74.6	97.6	49.3	25.4	5.9	0	0.26	85.7	89.8	82.1
21	88.1	98.2	78.8	38.5	73.2	99.1	43.5	24.5	6.3	0	0.27	86.3	90.3	82.8
22	85.6	94.4	74.3	34.4	73	98.1	53.6	24.7	8.3	0.01	0.25	86.1	89.7	82.6
23	71.3	80.8	67.3	24	93.5	99.5	68.5	7.7	5.5	0.83	0.09	82.1	85.9	79
24	73	82	65.7	23.9	79.6	100	53.1	24.7	5.6	0.09	0.2	80.2	84.1	77.2
25	73.2	84.8	61.7	23.3	76.8	99.7	44.3	19.7	2.4	0	0.16	79.2	82.1	75.8
26	74.4	86.2	61.2	23.7	74	99.8	39.4	25.1	2.6	0	0.2	78.7	82.7	74.7
27	75.2	87.3	62.6	25	76	99.8	46.9	22.9	3.2	0	0.19	79.1	83.1	75.3
28	78.5	91.1	65.9	28.5	69.3	95.3	43.7	25.4	6.1	0	0.24	80	84.5	75.9
29	81.1	93.6	70.1	31.9	65.4	88.6	36	24.7	5.6	0	0.26	81.3	85.5	77.6
30	81.4	93.3	70.7	32	67.1	93.2	40	25.9	6.6	0	0.27	82.4	87	78.4
31	78	90.8	68	29.4	83.7	99.6	48.4	20.1	4.6	0.22	0.2	82.3	86.3	78.8

A	Day					
B	Avg Temp	(°F)		I	Avg Solar	(MJ.m^{-2}.day^{-1})
C	Max Temp	(°F)		J	Avg Wind Speed	(mph)
D	Min Temp	(°F)		K	Rainfall	(in)
E	GDD	(base 50 °F)		L	Ref ET	(in day^{-1})
F	Avg RH	(%)		M	Avg Soil Temp	(°F)
G	Max RH	(%)		N	Max Soil Temp	(°F)
H	Min RH	(%)		O	Min Soil Temp	(°F)

Appendix B3. Weather data for the Georgetown REC site August 2019.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	76	89	65.9	27.5	86	99.9	51.8	21.2	3.5	0.72	0.19	81.6	86.2	78.6
2	73.8	81.8	69.2	25.5	94.1	100	69.7	10.9	2.3	0.6	0.1	78.9	81.1	77.5
3	77.1	86.1	68.4	27.3	84.6	100	60.3	23.8	2.8	0	0.19	79.9	83.9	76.4
4	77.7	87.4	69.2	28.3	86	100	59.4	20.4	3.7	0	0.18	80.9	84	78
5	77.1	87.6	71.4	29.5	87.6	99.9	53.4	15.4	2.3	0.02	0.14	80.8	83.2	78.6
6	77.3	87.3	71.4	29.3	84.9	99.8	58.1	20.4	4.1	0	0.18	81	83.8	78.6
7	78.1	89.2	69.9	29.6	86.6	99.5	60.4	20.1	7.6	0.29	0.19	81.1	84.3	78.8
8	77.7	88.3	67.3	27.8	79	100	46.3	22.2	4.4	0	0.2	80.4	84.1	77.1
9	77.3	87.9	69.9	28.9	78.5	99	47.2	19.5	3.3	0	0.18	80.5	83.5	77.8
10	73.5	81.7	63.2	22.5	68.5	97.1	42.7	19.8	4.7	0	0.18	78.6	80.7	76.2
11	73.2	84	61	22.5	68.2	97.6	37.6	24.9	3.1	0	0.2	77.6	81.4	74.1
12	74.4	86.8	59.2	23	74.6	99.8	49.1	21.4	4.4	0	0.19	77.2	80.7	73.4
13	77.1	84.3	71.1	27.7	88.7	99.4	70.4	10.2	6.4	0.61	0.11	77.9	79.5	76.2
14	78.7	88.3	72.3	30.3	90.4	100	67.6	16.8	4.7	0	0.15	79.8	82.8	77.4
15	74.6	81.6	69.5	25.5	90.4	100	72.3	14.9	4	0	0.12	79.3	81.5	77.2
16	77.1	86.4	69.4	27.9	89.3	100	68.4	17.8	4	0	0.15	79.6	82.8	77
17	78.8	89.5	72.9	31.2	89.6	100	66.1	16.9	3.2	0.46	0.15	80.5	83.2	78.1
18	80.6	89.7	74.4	32	85.7	100	58	18.1	4	0	0.17	81.2	84.5	78.7
19	80	95.3	73.7	34.5	88.8	100	48.9	17.4	4.4	0.57	0.19	81.6	85.2	79.3
20	78.7	89.5	72.8	31.2	87.8	100	52.3	12.9	2.7	0	0.13	81.1	83.2	79.2
21	78.8	89.1	71.4	30.3	85.3	98.2	55.7	18.9	7.2	0.02	0.19	80.9	83.6	78.7
22	80.8	91.2	70.9	31	78.8	100	48.2	20.8	5.7	0.18	0.21	81.5	84.7	78.6
23	71.6	80.4	64.3	22.4	90.2	99.8	72.8	9.1	5.7	0.62	0.09	79.7	82.1	77
24	68.4	76.3	62.3	19.3	79.1	98.9	50.1	16.2	5.1	0	0.14	76.6	78.6	75
25	66.7	75.7	56.6	16.1	82.5	98.2	56.7	18.4	8.5	0.06	0.15	74.4	77.1	71.8
26	68.6	73.6	62.7	18.1	82.9	97.3	66.2	11.9	7.9	0	0.11	74.6	76.1	73.3
27	69.1	76.4	60.1	18.3	89	99.5	72.7	12.1	4	0	0.1	73.9	76	71.6
28	75.2	82.7	68.6	25.7	84.9	99.6	62.2	12.7	4.7	0	0.12	75.9	78.2	73.9
29	72	82.7	61.5	22.1	72.9	98.7	35.4	22.5	6.5	0	0.21	76.2	79.1	73.8
30	73.2	87.5	58.4	22.9	69.5	99.3	34.5	21.6	4.9	0	0.2	74.6	78.1	71.2
31	73.8	85.6	64.7	25.1	82.1	98.5	58.5	20	4	0	0.16	75.6	79.1	72.5

A	Day					
B	Avg Temp	(°F)		I	Avg Solar	(MJ.m^{-2}.day^{-1})
C	Max Temp	(°F)		J	Avg Wind Speed	(mph)
D	Min Temp	(°F)		K	Rainfall	(in)
E	GDD	(base 50 °F)		L	Ref ET	(in day^{-1})
F	Avg RH	(%)		M	Avg Soil Temp	(°F)
G	Max RH	(%)		N	Max Soil Temp	(°F)
H	Min RH	(%)		O	Min Soil Temp	(°F)

Appendix B4. Weather data for the Georgetown REC site September 2019.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	72.9	80.4	65.6	23	82.9	98.9	62.7	19.5	4.8	0	0.15	75.8	78.7	73.1
2	77	88.8	66.3	27.6	78.9	100	42.4	19.8	5.2	0	0.19	76.5	80	73.4
3	74	83.6	66.6	25.1	84.2	100	53.3	20.1	4.5	0	0.17	77.5	80.6	74.9
4	78	88.5	66.9	27.7	82.9	100	58.9	18.6	7	0	0.18	77.4	80.5	74.7
5	73.3	77.4	70.4	23.9	85.1	98.5	70.5	8.5	7.1	0	0.09	77.2	78.5	76.2
6	67.1	70.8	61.7	16.2	93.9	98.9	87.6	1.4	13.6	N/A	0.04	74.1	76.2	72.1
7	67.2	79.6	55.8	17.7	80.2	98.7	47.2	19.7	4.5	N/A	0.15	72.7	76.4	69.4
8	70	83	59.1	21	80	100	46.3	16.8	2.7	N/A	0.14	73	76.2	69.8
9	72	83.6	62.7	23.1	83.1	99.6	52	15.9	3.3	N/A	0.13	74.1	77.3	71.5
10	71.8	83	60.8	21.9	81.6	99.9	50.5	19	4.2	N/A	0.15	74	77.1	71.1
11	76.2	88.8	64	26.4	81.4	99.9	56.1	19.1	6.2	N/A	0.18	74.8	78.3	71.7
12	80.3	93.6	71.3	32.5	78.3	99.9	44.5	17.2	6.1	N/A	0.19	77.3	80.6	74.7
13	69.1	72.5	60.5	16.5	75.7	92.3	62.6	9.8	7.2	N/A	0.1	75.9	78.1	73.7
14	70.5	82.5	57.8	20.2	83.1	98.4	59.2	12.7	4.6	N/A	0.12	73.4	76	70.9
15	74.4	82.3	65.2	23.7	91.1	100	73.6	8.9	3.4	N/A	0.08	75.1	77.1	73.7
16	73.2	87.3	62	24.7	79.8	100	41.4	16.2	2.3	0	0.14	74.8	77.9	72.1
17	69.1	78.4	55.3	16.9	75.3	99.1	46.2	17	4.5	0.05	0.14	74.7	76.6	72.6
18	61.9	71.9	51.7	11.8	73.8	95.9	50.2	17.6	5.1	0	0.13	71.2	73.6	68.6
19	58.8	69.4	48.6	9	70.5	95.8	45.6	17.5	4.7	0	0.12	69.8	72.7	67.3
20	59.9	76.7	41.2	8.9	71.2	98.4	35.1	22.5	3.4	0	0.15	68.8	73.5	64.5
21	68.1	85.5	50.8	18.1	74.8	99.4	36.2	21.8	3.6	0	0.17	70.3	75.4	65.8
22	74.2	88.6	61.9	25.3	74	99	40.9	20.2	5.4	0	0.19	72.8	77.4	68.9
23	77.6	88.9	68.5	28.7	68.7	90.7	39.5	20	9	0	0.23	74.9	78.4	71.9
24	72.3	79.9	56.9	18.4	62.7	88.3	36.6	20.8	6.3	0	0.18	75.2	77.8	73
25	65.5	80.5	52.8	16.7	65.6	94.9	30.7	20.7	2.9	0	0.14	72.6	76.7	68.8
26	73.8	87.6	61.2	24.4	70.6	94.2	38.2	18.4	7.3	0	0.2	73.2	77.2	69.9
27	68.2	79.2	56.3	17.8	73.2	97.4	47.5	15.7	4.1	0	0.13	73.3	75.9	70.4
28	73.2	84.7	60.8	22.8	82.1	97.2	63.1	13.4	5.4	0	0.12	73	76.3	70.1
29	73.5	82.1	65.8	23.9	80.1	99.2	52.7	18.2	5.4	0	0.15	74.7	77.9	72.3
30	68.1	73.8	63.1	18.5	75.7	95.9	54.1	8.2	4.2	0	0.09	73	74.5	71.8

A	Day					
B	Avg Temp	(°F)		I	Avg Solar	(MJ.m^{-2}.day^{-1})
C	Max Temp	(°F)		J	Avg Wind Speed	(mph)
D	Min Temp	(°F)		K	Rainfall	(in)
E	GDD	(base 50 °F)		L	Ref ET	(in day^{-1})
F	Avg RH	(%)		M	Avg Soil Temp	(°F)
G	Max RH	(%)		N	Max Soil Temp	(°F)
H	Min RH	(%)		O	Min Soil Temp	(°F)