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## Fresh Market Tomato Cultivar Evaluation for Northern Indiana, 1999

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Fresh market tomatoes were evaluated at the Pinney-Purdue Ag Center in Wanatah, Indiana. Fourteen cultivars were evaluated in a replicated trial, and 26 cultivars in an unreplicated observation trial. Half of the plants of each cultivar were pruned, and half were not, to evaluate pruning effects on yield and fruit quality. Details of cultural practices and data collection are listed below.

Experimental design: Replicated trial: split plot, 3 replications. Cultivar=main plot; Pruning=subplot.  
Observation trial: single plot per cultivar.

Main plot size: 1 row by 16 ft. Rows 5 ft apart, plants 2 ft apart in row.

Soil type: Tracy sandy loam, pH 6.1.

Fertilization: 120 lb N/A from Urea, 220 lb. K<sub>2</sub>O/A from 0-0-62, and 100 lb. P<sub>2</sub>O<sub>5</sub>/A from 0-45-0 applied and incorporated before planting. Transplant starter solution supplied 1.5 lb. N, 7 lb.P<sub>2</sub>O<sub>5</sub>, and 2.4 lb. K<sub>2</sub>O/A from 9-45-15 (1.5 lb. in 50 gal. water).

Planting and Staking: Seeded April 14 in 128-cell flats, transplanted May 27. Trained in a trellis-weave system. Four plants per plot pruned to leave 3 branches below the first mainstem cluster, and four plants left unpruned.

Weed control: 4-ft wide black plastic mulch, Lexone DF between plastic at 0.5 lb./A June 12, and hand-weeding.

Disease control: Quadris 2.08 EC, 5 oz./A July 16 and 30; Bravo 720, 3 pt./A July 23; Bravo C/M 2 lb./A August 20.

Irrigation: Drip irrigation beneath plastic mulch as needed.

Harvest: Weekly harvests of fruit at or beyond turning stage 8/5 through 9/9. Replicated trial: Graded into U.S. No. 1, No. 2, and culls. U.S. No. 1 sorted into USDA size classes: maximum large, extra large, large, medium+small. Observation trial: 7 cultivars harvested 8/5 through 9/9; remaining 19 harvested weekly 8/5 through 8/18. Graded into marketable (U.S. No. 1 and No. 2) and culls. Small-fruited types graded only on first two harvest dates.

Data collected: Weight and number of fruit in each category. For large-fruited types, number of culls due to catfacing, cracking, blossom end rot, and other reasons. Observations on fruit firmness and appearance. Small fruited types counted only on first two harvest dates.

Table 1 shows the results averaged across pruning treatments for cultivars in the replicated trial. U.S. No. 1 yield ranged from 7.9 to 18.9 lb. per plant (344 to 823 cwt./A). Floralina, Sunleaper, and Florida 47 were the highest yielding cultivars. Real (statistically significant) differences in yield were limited to comparisons between the few highest and lowest-yielding cultivars. The

earliest variety was SunShine, followed by SunChief. SunShine produced higher quality fruit than SunChief, largely due to excessive cracking in SunChief. Early yield of No. 1 fruit, in pounds per plant, was highest for SunShine, followed by Sunleaper, PS771297, Floralina, SunChief, Red Sun, and Emperador, which had similar early yields. Of these, Sunleaper and Floralina had the smallest percentage of culls. Late cultivars included Leila, Florida 91, Mt. Fresh, and Florida 47. Fruit quality was good in these varieties, with the exception of Leila which tended to crack. Florida 91, Red Sun, Emperador, and Carolina Gold produced the largest fruit (9.1 oz. or greater), and the highest percentages of maximum large fruit. Florida 47, Floralina, Leila, Mt. Fresh, Mt. Spring, PS 771297, SunChief, and SunShine produced fruit between 8 and 9 oz. FM 223 and Sunleaper had the smallest fruit (less than 7.5 oz.). This was a good year to evaluate cracking because we saw more cracking than usual. Varieties particularly prone to cracking included Carolina Gold, Emperador, Leila, SunChief, and Red Sun. We also saw more blossom end rot than usual. Red Sun and Carolina Gold tended to have more BER than average. Catfacing was relatively low this year. SunShine, Mt. Spring, and PS 771297 had the highest rates, between 4% and 10%. Based on this trial, recommended cultivars are: **SunShine** (very early), **Floralina** (high yield, good quality, main season), **Florida 47** (high yield, good quality, late main season), **Florida 91** (large fruit, good quality, late main season), **Mt. Fresh** (good quality, main season), **Sunleaper** (good yield, smaller fruit, good quality, early main season, heat-tolerant). **Carolina Gold** is of interest because of its golden yellow color and large fruit.

Pruning made a large difference in No. 1 yield, fruit size, and fruit quality (Tables 1 and 2). Averaged over all cultivars, pruning reduced yield of No. 1 fruit by 41%, increased fruit size by 19%, and increased percentage of cull fruit by one-third (Table 1). The increase in culls was due in large part to increased cracking of fruit from pruned plots: pruning more than doubled the percentage of cracked fruit. The effect of pruning on early yield (measured as pounds of No.1 fruit harvested in the first three harvests) depended on the cultivar. Early yield of Florida 91 was more than doubled by pruning (Table 2). Early yield of Sunleaper, SunChief, and Red Sun was decreased by 1/3 to 1/2 by pruning. Pruning removed branches which would produce yield later in the season, and so for all cultivars the percentage of total yield harvested early was higher for pruned plants. Based on these results, pruning would be advised only when larger fruit size is essential, and/or the harvest period will be short, i.e. three weeks rather than six weeks. For pruning to be profitable, the labor cost of pruning and the reduction in total yield must be offset by higher prices or other market advantage.

Results for the 26 cultivars in the observation trial are presented in Table 3. Seven of the cultivars were harvested for the full 6 weeks: three roma types and four large-fruited types. Of the roma types, BHN 411 was the earliest and had the best quality fruit and greatest marketable yield. Of the large-fruited types, BHN 543 and BHN 329 had the best quality fruit. BHN 543 was similar in earliness to Emperador, and BHN 329 was similar to Leila, based on percent of marketable yield in first three harvests. Effects of pruning were similar to the replicated trial.

The remaining 19 cultivars in the observation trial were harvested for a period of three weeks. These cultivars included home garden types, traditional commercial cultivars, newer commercial cultivars, and heirloom varieties. Eleven were medium to large-fruited. Fruit quality of Paragon, Ultra Sweet, and Voyager was reasonable and these varieties would be worth considering for local sales. Fantom and Red Rider fruit were attractive, but cull percentage was high for commercial use. Presto, Big Beef, and Rutgers produced large fruit (over 10 oz. on unpruned

plants), but percentage of culls was high. Beefsteak produced large fruit weighing nearly a pound, but nearly all were severely catfaced. Daniela is a very attractive, small-fruited, very firm, long-shelf-life type. Jet Star and Monte Verde produced attractive fruit, but were so late that the yield of three harvests didn't give an adequate picture of the varieties. The remaining seven cultivars were a mix of cherry, pear, and roma. The orange cherry Sun Gold was remarkable for its flavor, but cracked easily when ripe. Red and Yellow Pear would make a nice combination for specialty markets. Santa was a slightly oblong cherry; quite attractive with a tart flavor. Juliet is best described as a miniature roma in shape, rich red in color, shiny, and resistant to cracking making it very attractive. This variety was meaty and firm. Principe Borghese is an heirloom canning variety with small nearly spherical fruit which remained attached to the plant long after ripe. Pruning drastically reduced the yield of this variety, and both pruned and unpruned plants appeared especially susceptible to diseases. Banana Legs is an heirloom yellow long-fruited type: a pointed, asymmetrical roma. In general the effect of pruning on these varieties was similar to the replicated trial.

Table 1. Yield and fruit size of fourteen tomato varieties and effect of pruning on yield and fruit size, Pinney Purdue Ag Center, Wanatah, Indiana, 1999.

Cultivar	Co.	No. 1 Fruit										Total Fruit				Comments							
		Yield per Plant		Average Wt. per (lb.)	% Max. Large	% Ex. Large	% Med. Large	% +Small	Early Yield per Plant (8-5 to 8-18)		Yield per Plant	No. 1 No. 2		% Crack									
		Number	Weight (lb.)						Number	Weight (lb.)		Number	Weight (lb.)		Number		Weight (lb.)						
Carolina Gold	NV	21	11.4	0.57	45	44	10	0.8	5.0	3.3	34	41	23	48	13	39	1.6	a-d	2.8	19.4	c	vine. orangey-yellow. med.	
Emperador	PS	23	12.6	0.58	48	42	10	0.3	6.2	4.4	39	40	22	55	12	33	1.4	a-c	1.4	16.9	c-e	vine. smooth skin, med-ig	
Floralina	PS	36	18.4	0.53	35	54	10	0.9	8.6	5.0	30	53	27	69	10	21	2.5	b-d	1.6	5.0	a	vine. firm, attractive. med.	
Florida 47	AS	28	15.4	0.57	40	49	10	1.1	5.7	3.5	24	45	24	64	12	24	0.9	ab	1.0	7.2	ab	med. vine. firm, deep red color.	
Florida 91 (EX 10091)	AS	25	15.0	0.62	60	35	4	0.2	3.8	2.7	19	39	23	64	15	20	2.8	cd	1.2	6.7	ab	med. vine. firm, smooth, attractive.	
FM223	HM	35	15.0	0.44	18	54	25	3.1	7.9	4.1	29	57	24	62	11	27	0.9	a	0.0	11.2	b-d	vine. smooth, very firm, med.	
Leila	NV	21	11.3	0.55	37	55	8	0.4	2.6	1.5	16	41	22	51	14	36	2.4	b-d	0.6	17.9	de	vine. nice color, very firm, large vine.	
Mt. Fresh	HM	29	14.8	0.54	37	51	11	1.2	5.3	3.2	22	44	22	65	13	22	1.3	a-d	0.3	7.7	ab	vine. good color, firm, large	
Mt. Spring	NV	26	12.9	0.51	36	50	12	1.1	6.9	3.9	34	43	22	59	9	32	6.3	e	0.3	10.7	ac	vine. good color, smooth, firm, med. vine.	
PS 771297	PS	26	13.7	0.53	38	50	11	0.5	9.3	5.4	43	43	22	61	9	31	4.1	de	1.2	8.1	ab	vine. very firm, nice color, smooth, small vine.	
Red Sun	JS	21	12.2	0.61	55	40	5	0.3	6.7	4.6	40	40	23	51	12	37	2.3	a-d	5.1	19.2	de	vine. large vine.	
SunChief (EX 10081)	AS	15	7.9	0.55	35	56	8	0.3	8.5	4.9	67	34	18	42	8	50	0.6	a	1.3	32.7	f	vine. nice finish, firm. small	
Sunleaper	NV	34	15.5	0.47	26	55	17	1.7	10.3	5.5	36	52	23	65	10	25	2.7	cd	0.2	5.5	ab	vine. nice color, smooth, med.	
SunShine (XP 10074)	AS	19	9.4	0.50	28	54	17	1.1	16.5	8.2	88	39	19	50	14	36	10.5	f	0.3	5.0	a	vine. somewhat firm. smooth skin, firm. very	
Grand Mean		26	13.2	0.54	38	49	11	0.9	7.4	4.3	37	44	22	58	12	31	2.9		1.2	12.4		small vine.	
LSD .05#		7	3.1	0.05	11	8	6	1.2	2.1	1.2	11	7	3	10	ns	10	—		—	—	—	—	—

Prune Treatment

Pruned	17	9.8	0.59	46	46	8	0.5	6.6	4.1	45	33	18	52	12	36	2.5			1.5	17.0		
Unpruned	34	16.7	0.49	31	53	15	1.3	8.1	4.5	30	54	26	63	11	26	3.3			1.0	7.7		

Significance+

Pruned vs unpruned	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Cultivar X Prune	*	ns	ns	ns	ns	ns	ns	ns	*	ns	ns	ns	ns	**	ns	ns	*	ns	ns	ns	ns	ns

#Fisher's protected least significant difference, p=0.05. For %catface and %crack, means followed by same letter do not differ according to analysis of transformed data.

+ns, †, \*, \*\*, \*\*\*, and \*\*\*\* indicate non-significance, and p<.1, .05, .01, .001, .0001 respectively.

Table 2. Yield and fruit size of fourteen tomato varieties grown with (p) or without (u) pruning, Pinney Purdue Ag Center, Wanatah, Indiana, 1999.

Cultivar	Prune Trt.	No. 1 Fruit										Total Fruit									
		Yield per Plant		Average Wt. per (lb.)	% Max. Large	% Ex. Large	% Med. +Small	Early Yield per Plant (8-5 to 8-18)		Yield per Plant Number	Weight (lb.)	% No. 1	No. 2	Culls (% by wt.)	% Catface ---(% by number)---	% BER	% Crack				
		Number	Weight (lb.)					Number	Weight (lb.)									No. 1	No. 2		
Carolina Gold	p	13	7.9	0.61	54	37	9	0.9	5.5	3.9	50	32	19.6	41	14	46	1.1	2.1	26.4		
Carolina Gold	u	28	14.8	0.53	36	51	12	0.7	4.5	2.7	18	50	27.3	55	12	33	2.1	3.5	12.4		
Emperador	p	13	8.1	0.63	54	38	8	0.0	5.6	4.0	49	28	16.4	49	10	41	0.7	2.4	25.0		
Emperador	u	32	17.2	0.53	42	45	12	0.7	6.7	4.8	29	53	28.1	61	15	24	2.2	0.4	8.9		
Floralina	p	26	14.4	0.56	42	51	7	0.6	9.0	5.6	39	40	21.3	67	10	22	1.6	1.5	7.1		
Floralina	u	46	22.4	0.49	28	58	14	1.2	8.1	4.5	20	65	31.9	70	11	19	3.4	1.8	3.0		
Florida 47	p	18	10.9	0.62	46	45	8	1.0	4.6	3.0	28	32	19.1	57	16	27	0.5	1.9	10.2		
Florida 47	u	39	20.0	0.51	34	53	12	1.1	6.8	3.9	19	57	28.4	70	9	21	1.3	0.2	4.2		
Florida 91	p	18	12.7	0.71	76	22	1	0.0	4.9	3.7	29	31	21.2	59	17	24	4.1	1.2	10.3		
Florida 91	u	33	17.2	0.53	44	48	7	0.4	2.6	1.6	9	48	24.8	69	14	17	1.5	1.2	3.0		
FM 223	p	23	10.9	0.48	20	59	19	1.4	6.8	3.8	35	43	19.1	57	11	32	0.4	0.0	15.2		
FM 223	u	48	19.0	0.40	15	48	32	4.9	8.9	4.3	22	72	28.1	68	11	22	1.3	0.0	7.2		
Leila	p	13	7.9	0.61	49	47	4	0.3	2.7	1.7	22	29	17.4	45	12	43	1.4	0.9	26.2		
Leila	u	30	14.8	0.50	25	62	12	0.5	2.5	1.4	10	52	26.2	57	15	28	3.5	0.3	9.7		
Mt. Fresh	p	18	10.8	0.61	47	50	4	0.0	4.5	3.0	27	30	18.4	58	17	25	1.1	0.0	10.8		
Mt. Fresh	u	41	18.8	0.46	28	52	18	2.5	6.1	3.3	18	59	26.2	72	8	20	1.4	0.6	4.7		
Mt. Spring	p	21	10.8	0.55	47	42	10	1.6	7.1	4.4	45	36	19.6	54	9	37	5.1	0.5	16.8		
Mt. Spring	u	32	14.9	0.47	26	59	15	0.7	6.8	3.5	24	51	23.8	63	9	28	7.4	0.0	4.6		
PS 771297	p	17	9.6	0.57	45	46	9	0.2	8.7	5.4	56	32	17.0	57	7	37	4.0	1.7	11.8		
PS 771297	u	36	17.9	0.50	32	55	12	0.8	9.9	5.4	30	55	27.6	65	11	24	4.2	0.7	4.4		
Red Sun	p	12	8.0	0.67	61	37	2	0.3	4.5	3.3	41	30	18.3	44	16	40	1.5	7.2	23.5		
Red Sun	u	29	16.4	0.56	48	43	8	0.4	8.9	6.0	39	50	27.8	58	8	34	3.1	3.0	15.0		
SunChief	p	9	5.3	0.58	39	55	6	0.0	5.8	3.6	71	26	15.0	34	7	59	0.9	0.4	41.0		
SunChief	u	21	10.4	0.51	32	57	10	0.6	11.3	6.2	62	42	21.1	49	10	41	0.4	2.1	24.4		
Sunleaper	p	23	11.5	0.50	27	59	13	1.4	8.1	4.4	39	40	19.3	60	11	29	1.9	0.2	8.3		
Sunleaper	u	44	19.5	0.44	25	52	21	2.0	12.5	6.7	34	64	27.5	71	8	21	3.5	0.1	2.6		
SunShine	p	16	8.5	0.54	35	54	12	0.0	14.8	7.9	94	33	16.9	50	15	35	10.1	0.3	5.9		
SunShine	u	23	10.4	0.46	21	55	22	2.1	18.2	8.6	81	44	20.6	51	12	37	10.9	0.4	4.0		
LSD for effect of pruning within a cultivar.#		7	3.5	0.07	11	11	6	1.3	4.7	2.0	13	10	4.7	11	5	10	—	—	—		

#Fisher's protected least significant difference, p=0.05.

Table 3. Yield and fruit size of tomato varieties grown with (p) or without (u) pruning in an unreplicated trial, Wanatah, Indiana 1999.

Cultivar	Co.	Prune Trt.	Mkt. Fruit per Plant		Average	Total Fruit per Plant		Cull Fruit	Comments
			Number	Weight (lb.)	Mkt. Fruit (lb.)	Number	Weight (lb.)		
<i>Cultivars Harvested Aug. 5 - Sept. 9</i>									
BHN 255	BHN	p	13	7.7	0.59	38	22.4	66	cracking on pruned plants.
BHN 255	BHN	u	38	19.9	0.53	53	27.7	28	smooth skin, firm, large vine.
BHN 329	BHN	p	23	12.1	0.52	35	16.9	29	smooth skin, firm, small plant.
BHN 329	BHN	u	30	14.4	0.48	47	21.2	32	
BHN 404	BHN	p	31	7.1	0.23	47	10.4	32	tendency to rough fruit
BHN 404	BHN	u	61	12.8	0.21	84	16.4	22	and rain check.
BHN 410	BHN	p	51	11.3	0.22	63	13.5	16	tendency to roughness.
BHN 410	BHN	u	76	16.7	0.22	93	20.0	17	fruit length: 3"; width: 2".
BHN 411	BHN	p	63	15.0	0.24	77	17.8	16	small plants.
BHN 411	BHN	u	98	20.0	0.21	114	22.5	11	fruit length: 3.2"; width: 2".
BHN 444	BHN	p	14	8.0	0.59	34	18.2	56	cracking on pruned plants,
BHN 444	BHN	u	39	17.7	0.46	59	28.3	38	smooth skin, attractive, firm.
BHN 543 (C1075)	BHN	p	17	9.8	0.59	30	16.8	41	smooth, small blossom scar,
BHN 543 (C1075)	BHN	u	38	19.1	0.50	55	27.5	30	nice color, firm.
<i>Cultivars Harvested Aug. 5 - Aug. 18, medium or large fruit</i>									
Beefsteak	TT	p	0	0.2	0.92	8	5.7	96	open pollinated (op). vigorous
Beefsteak	TT	u	0	0.1	0.58	9	5.8	97	indeterminate. severe catfacing.
Big Beef	JS	p	5	3.7	0.77	10	7.8	53	much cracking, otherwise
Big Beef	JS	u	9	6.4	0.69	20	14.4	56	attractive fruit. indeterminate.
Daniela	JS	p	2	0.7	0.32	4	1.2	39	smooth, somewhat tough skin.
Daniela	JS	u	9	3.3	0.36	12	3.9	14	very vigorous indeterminate.
Fantom	TT	p	8	4.0	0.53	16	9.2	57	shiny, smooth skin.
Fantom	TT	u	10	4.8	0.50	16	7.5	36	
Jet Star	TT	p	2	0.8	0.55	2	1.0	17	indeterminate. very soft fruit.
Jet Star	TT	u	3	1.7	0.56	5	2.6	36	
Monte Verde	RU	p	1	0.4	0.29	4	1.8	79	indeterminate. op.
Monte Verde	RU	u	1	0.7	0.65	3	1.0	33	
Paragon	JS	p	5	2.9	0.55	8	4.2	30	smooth skin, nice color.
Paragon	JS	u	7	3.1	0.46	11	5.0	38	large determinate plant.
Presto	TT	p	3	1.8	0.74	5	3.9	52	vigorous determinate. nice color.
Presto	TT	u	9	5.9	0.65	13	8.7	32	soft fruit.
Red Rider	ST	p	7	4.2	0.60	10	5.8	28	small plants. nice color.
Red Rider	ST	u	4	1.8	0.42	12	3.9	54	firmness=fair.
Rutgers	TT	p	3	1.5	0.55	13	8.1	81	op.
Rutgers	TT	u	4	2.5	0.66	12	7.5	67	
Ultra Sweet	ST	p	14	7.9	0.57	19	10.2	22	indeterminate. firmness=fair.
Ultra Sweet	ST	u	19	9.9	0.52	24	12.4	20	
Voyager	JS	p	7	4.5	0.64	11	6.3	29	smooth skin.
Voyager	JS	u	11	5.5	0.52	15	7.5	27	
<i>Cultivars Harvested Aug. 5 to Aug. 18, cherry, pear, and roma types*</i>									
Banana Legs	RU	p	.	2.5	0.169	.	2.9	12	fruit length: 3.2"; width: 1.5". op.
Banana Legs	RU	u	.	3.2	0.168	.	3.4	6	
Juliet	JS	p	.	7.9	0.063	.	7.9	1	vigorous indeterminate.
Juliet	JS	u	.	10.7	0.055	.	11.0	4	fruit length: 1.7", width 1.2"
Principe Borghese	RU	p	.	1.3	0.040	.	1.3	16	determinate processing type. op.
Principe Borghese	RU	u	.	8.9	0.043	.	9.4	8	fruit length 1.3", width 1.2"
Red Pear	JS	p	.	1.2	0.028	.	1.3	5	cracking. vig. indeterminate.
Red Pear	JS	u	.	3.2	0.026	.	3.3	5	fruit length 1.4"; width 1".
Santa	JS	p	.	5.2	0.022	.	5.3	4	indeterminate.
Santa	JS	u	.	5.0	0.021	.	5.1	2	fruit length 1"; width .85"
Sun Gold	JS	p	.	5.1	0.019	.	5.5	13	great flavor. cracking. vig.ind.
Sun Gold	JS	u	.	7.7	0.016	.	8.5	13	fruit length .86", width .89".
Yellow Pear	JS	p	.	0.6	0.030	.	0.6	10	very vigorous indeterminate.
Yellow Pear	JS	u	.	0.8	0.028	.	0.8	5	fruit length 1.6"; width 1.0"

\*Average Fruit size and percent culls determined from first 2 harvests for cherry, pear, and roma tomatoes. Fruits not counted on 8/18.