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Fresh Market Tomato Cultivar Evaluation for Northern Indiana, 2004

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Twelve fresh market tomato varieties were evaluated in a replicated trial at the Pinney-Purdue Agricultural Center in Wanatah, Indiana. Six varieties were observed in unreplicated plots.

Materials and Methods. The trials were conducted on a Tracy Sandy Loam, fertilized in fall 2003 with 300 lb./A 8-32-16 and before planting in spring 2004 with 60 lb./A each N, P₂O₅ and K₂O from 19-19-19. The replicated trial was arranged in a randomized complete block design with 3 replications. A single plot consisted of 8 plants spaced 2 ft. apart. Rows were centered 5 ft. apart on top of 30-in. beds covered with black plastic mulch. The unreplicated plots were located in two rows bordering the replicated plots. Tomatoes were seeded on April 16 into trays with 72 square cells. Beginning on April 27 fertilizer was supplied to seedlings in irrigation water at a concentration of 75 ppm N from 20-10-20 (Peter's Professional Peat-Lite Special) or 15-5-15-5Ca-2Mg (Miracle-Grow Professional Excel). Seedlings were moved outside on May 21 and transplanted to the field on May 24 using a waterwheel transplanter. A 9-45-15 starter fertilizer mixed at a concentration of 12 oz./50 gal. water was applied at transplanting. Beginning mid-July an additional 50 lb./A N was applied through drip irrigation in five installments ending Aug. 23. Weeds were controlled with a row-middle application of Sencor 4F at 1 pt./A and hand weeding. Foliar diseases were controlled with applications of Bravo Weatherstik at 1.37 pt./A (7/23, 8/6, 8/22); Kocide 4.5 LF at 1.33 pt./A (7/16, 7/23, 7/31, 8/6, 8/22, 8/31) and Cabrio at 8 oz./A (7/16, 7/31, 8/13, 8/31). Tobacco hornworm and other caterpillars were controlled with Dipel 2X at 8 oz./A (7/23, 7/31, 8/6). Irrigation was applied as needed through drip irrigation beneath the plastic. Plants were supported using a stake and weave system.

Replicated plots were harvested on Aug. 21, 31, Sept. 9, and Sept. 23–24. Observation plots were harvested on Aug. 21, 31 and Sept. 24. Fruit at or beyond the pink stage was harvested except for the final harvest when all turning fruit were harvested. On the first two harvest dates, tomatoes were graded into U.S. No. 1, No. 2, and culls. U.S. No. 1 fruit were sorted into USDA size classes: maximum large, extra large, large, and medium+small. We recorded the weight and number of fruit in each category, the number of culls due to catfacing, cracking, blossom end rot, and other reasons. Bacterial spot infection was heavy, but fruit was not culled due to bacterial spot alone because we wanted to evaluate other quality factors. On Sept. 9 a subsample of approximately 100 fruit were graded and sorted into size classes, and the remainder weighed without grading. The subsample was used to estimate the number and weight of fruit in each grade and size category for all fruit harvested that day from that plot. On Sept. 23 and 24 all harvested fruit were weighed without grading. Observations of plant and fruit characteristics were recorded once during the harvest season. Yield data from replicated plots were subjected to analysis of variance followed by mean separation using Fisher's protected LSD.

Results and Discussion.

The growing season was unusually cool. Because of that, harvest was later than usual. In August rains saturated the soil and on more than one occasion some rows toppled over so that plants were lying on the ground. They were lifted up and restaked, but some fruit fell off prematurely and was recorded at the next harvest.

Total yield of marketable and cull fruit ranged from 29.3 lb. per plant for Florida 7514, significantly more than 7 other varieties, down to 15.8 lb. per plant for Debut, significantly less than all other varieties (Table 1). Yield of No. 1 fruit through Sept. 9 was also highest for Florida 7514, at 15.4 lb. per plant, but was not significantly higher than Amelia, Mountain Crest or Sunguard. Sebring had the lowest yield of No. 1 fruit through Sept. 9, at 9 lb. per plant, but it was not significantly lower than Soraya, Florida 91, Mountain Spring or Debut. For Sebring, Soraya, Florida 91, and Mountain Spring at least 49% of the total yield was harvested at the last harvest on Sept. 23/24. Their lower yield through Sept. 9 probably reflects the fact that many of the tomatoes to be produced by the plant were still developing. No other variety had more than 40% of the total yield picked at the last harvest. Debut demonstrated almost the opposite: over 22% of its total yield was harvested by Aug. 21, and over 90% of its total yield was harvested by Sept. 9. As is common with very early cultivars, total yield was relatively low.

Fruit size differed among the varieties. Biltmore and Red Sun had larger no. 1 fruit than other varieties, averaging 0.79 and 0.74 lb. per tomato, respectively. Maximum large fruit of these two varieties averaged 0.88 lb. for Biltmore and 0.87 lb. for Red Sun. Florida 7514 produced the smallest fruit at 0.47 lb. each for no. 1 fruit, but Debut and Sunguard were not significantly larger, at 0.49 lb., and 0.52 lb. respectively. Fruit size differences also show up in the yield of fruit in different size classes. Varieties with average fruit size less than about 0.59 lb. tended to produce greater yield of extra large fruit than of maximum large fruit.

Fruit quality was variable. Statistical analysis showed that Red Sun and Sebring produced a greater percentage of no. 2 fruit than most other varieties, over 20% in each case. Both were observed to have enough rain-checking that some otherwise no. 1 fruit were classified as no. 2's, although no quantitative data were taken. Other varieties noted to have rain-checking were Amelia and Soraya. The percentage of cull fruit was similar across varieties. The following comments are based on field notes, but there are no quantitative data to confirm them. Debut was noted to have very high levels of bacterial spot on fruit that would have been classified as culls in a commercial operation. Small fruit of Debut tended to be pointy at the blossom end. Blotchy ripening was more common than in many years, and was noted on Mt. Spring, Red Sun, Florida 7514, and Debut.

A number of these varieties were observed for the first time at this location in this trial. Biltmore EX1417977) is of interest because of the large size of the fruit. In this trial it had better quality fruit than Red Sun, the other variety with very large tomatoes. Both had vigorous vines about 4.5 ft. tall. Biltmore was rated as firmer and with more uniform fruit color. Debut was noteworthy because of its extreme earliness, but the relatively small vines and fruit were severely infected by bacterial disease and so fruit quality was not good. Fruit size was smaller than many markets demand. It would be interesting to see how the variety performs in a year without such disease problems. Florida 7514 produced the best yields, fruit were deep red and attractive, but fruit was the smallest in the trial and not very firm. Vines were about 4 ft. tall. Sunguard produced above-average yield of tomatoes slightly larger than Florida 7514. Vines were vigorous at 4 to 4.5 ft. tall. Soraya and Sebring produced similar yields of fruit close to the average size in this trial, firm, attractive, and with smooth skin. Sebring produced slightly larger fruit than Soraya. Plants of both varieties were about 4 ft. tall. Amelia (HMX 0800) produced firm, attractive, smooth-skinned fruit on vigorous vines that were 4.5 to 5 ft. tall. Tomatoes were about the same size as

Mt. Spring, and harvest was a little earlier. This is certainly a variety worth considering for shipping. Mt. Crest was also a little earlier than Mt. Spring with firm fruit about 15% smaller than Mt. Spring. Florida 91 produced larger than average fruit on vigorous vines about 4.5 ft. tall. Mountain Fresh produced smaller than average, attractive fruit on plants about 4.5 ft. tall.

Results for cultivars grown in unreplicated plots are shown in Table 2. These plots were not harvested as frequently, so results cannot be directly compared to the replicated trial. Royal Mountie and Sunstart were the earliest of these varieties. Florida 47, Fabulous and Empire had the largest tomatoes. Empire appeared to have lower quality than the other cultivars. Pink Beauty, unlike the others, is an indeterminate variety of a deep pink color.

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Table 1. Yield and fruit size of 12 tomato cultivars. Pinney Purdue Ag Center, Wanatah, Indiana, 2004.

Cultivar Amelia VR (HMX 0800)	Co. **	No. 1 Fruit Harvested Aug. 21 - Sept. 9										All Fruit Harvested Aug. 21 - Sept. 9			All Fruit Harvested Aug. 21 - Sept. 23							
		Yield per Plant* Number Weight (lb.)		Average Wt. per Fruit (lb.)		Max. Large lb./plant ave. wt. (lb.)		Ex. Large lb./plant		Large lb./plant		Med. and Small		Yield per Plant	% No. 1	% No. 2	% Culls	Yield per Plant	Percent by weight harvested:			
																			8/21	8/31	9/9	9/23
RI	RI	23	14.5	0.62	8.1	0.78	5.8	0.6	0.00				32	19.8	74	15	11	25.2	4	27	48	21
RI	SM	16	12.6	0.79	10.0	0.88	2.5	0.0	0.00				23	17.3	73	15	13	25.8	0	12	55	33
SM	SM	22	10.8	0.49	3.9	0.70	5.5	1.3	0.10				31	14.8	73	12	15	15.8	22	50	22	6
RU	RU	33	15.4	0.47	3.9	0.69	9.4	2.0	0.12				44	20.5	75	12	13	29.3	2	24	45	29
AS	AS	14	9.7	0.68	6.0	0.78	3.6	0.2	0.01				20	13.2	73	12	14	25.9	0	5	45	49
SS	SS	27	14.3	0.54	5.7	0.73	7.4	1.1	0.03				33	17.9	79	11	10	26.1	6	11	51	31
RI	RI	21	12.5	0.59	5.5	0.77	6.2	0.7	0.09				28	16.2	77	12	11	27.3	1	15	44	40
RI	RI	16	10.0	0.64	6.0	0.78	3.8	0.2	0.01				21	13.5	74	12	14	26.6	1	7	43	49
JS	JS	17	12.1	0.74	8.7	0.87	3.2	0.2	0.01				28	21.0	57	25	17	26.7	1	24	53	21
SY	SY	15	9.0	0.62	4.5	0.81	3.9	0.5	0.05				21	13.2	67	21	12	27.0	1	9	38	51
SY	SY	16	9.2	0.59	4.2	0.81	4.1	0.8	0.00				21	12.3	74	14	12	25.6	3	8	37	52
SM	SM	27	13.8	0.52	4.1	0.74	8.1	1.5	0.09				35	18.1	77	11	13	25.5	3	18	50	29
Grand Mean		20	12.0	0.61	5.9	0.78	5.3	0.8	0.04				28	17	73	14	13	25.6	4	17	44	34
LSD .05#		5	2.0	0.05	2.0	0.04	1.7	0.5	NS				16	3	NS	9	NS	2.8				

*Plant population was 4356 plants per acre.

**RI=Rispens, SM=Seminis, RU=Rupp, AS=Asgrow, SS=Sunseeds, JS=Johnny's Selected Seeds, SY=Syngenta.

#Fisher's protected least significant difference, p=.05. NS=cultivar effect not significant at p=.05.

Table 2. Yield and fruit size of 6 tomato cultivars in unreplicated plots, Pinney Purdue Ag Center, Wanatah, Indiana, 2004. *

Cultivar	Co. **	No. 1 Fruit Harvested Aug. 21 - Aug. 31							All Fruit Harvested Aug. 21 - Aug. 31				Mkt. Plus Cull		
		All Sizes		Average Wt. per Fruit	Max. Large	Ex. Large	Large	Med. and Small	Yield per Plant	%	%	%	Yield per Plant		
		Number	Weight (lb.)	(lb.)	lb./plant	ave. wt. (lb.)	-----lb./plant-----	Number	Weight (lb.)	-----(% by wt.)-----			(lb.)		
Empire	TT	4.38	2.70	0.62	1.60	0.85	0.88	0.16	0.05	7.50	6.56	41	28	31	32.2
Fabulous	SW	5.50	3.84	0.67	2.48	0.83	1.16	0.20	0.05	7.38	5.80	66	10	23	24.3
Florida 47	AS	2.00	1.35	0.68	0.93	0.82	0.34	0.09	0.00	3.00	2.36	57	18	25	20.7
Pink Beauty	JS	9.75	4.48	0.54	0.66	0.76	2.82	0.92	0.39	13.75	7.21	62	15	23	31.6
Royal Mountie	SW	16.62	8.90	0.46	4.08	0.76	3.88	0.72	0.08	21.38	14.12	63	15	22	29.7
Sunstart	AS	14.13	7.30	0.52	3.37	0.73	2.88	1.00	0.05	19.12	13.48	54	24	22	26.1

* Plant population was 4356 plants per acre.

**TT=Totally Tomatoes, SW=Seedway, AS=Asgrow, JS=Johnny's Selected Seeds.