Specialty Tomato Variety Observation Trial for Indiana, 2002

Elizabeth T. Maynard
Northwest Commercial Horticulture Program, Purdue University North Central, Westville, IN 46391

The trial reported here is an extension of the specialty tomato trials conducted in Indiana in 2001. In that trial, 16 varieties were grown in replicated trials in two locations to evaluate their performance and suitability for the restaurant salad market. In this trial, the same 16 varieties plus an additional 17 varieties were grown in unreplicated plots for evaluation of yield and culinary quality.

Materials and Methods

Thirty-three varieties were grown representing a mix of red, yellow, orange, green and white fruit colors; beefsteak, globe, plum, roma, pear, grape and small round fruit types; and determinate and indeterminate growth habits (Table 1). All varieties were produced using conventional production practices and six were also grown in a smaller trial using organic production practices.

Trials were conducted at the Pinney-Purdue Agricultural Center in Wanatah, Indiana on a Tracy sandy loam soil. Table 2 lists soil characteristics, transplant growing media and fertilizer, and nutrient applications in the field. Transplants were seeded into 72-cell TLC square plug trays on April 11,

Table 2. Soil characteristics, transplant media and nutrient applications for conventional and organic plots, Wanatah, Indiana, 2002.

	Conventional	Organic
Soil organic matter (%)	1.7	2.4
pH	6.6	6.9
CEC	6.5	7.2
P, K, Ca, Mg (ppm)	131, 183, 600, 135	127, 156, 950, 225
Transplant growing medium	Scotts-Sierra Metro Mix 360 with coir	Johnny's 512 Organic Mix
Transplant fertilizer	75 to 100 ppm N from 15-5-15 or 20-10-20, applied every watering	500 ppm N from 3-2-2 fish emulsion, applied weekly in irrigation water
Preplant nutrient applied to field	120 lb./A N from urea, broadcast	20 T/A municipal yard waste compost applied to bed area, containing 0.017% inorganic N, 0.63% organic N, 0.1% P and 0.2% K.
Nutrient solution applied at transplanting	8 fl. oz. per plant of 338 ppm N solution from 9-45-15.	16 fl. oz. per plant of 500 ppm N solution from 3-2-2 fish emulsion.

2002, and transplanted to the field by hand on May 22 in the conventional plot and June 6 in the organic plot. The trials were planted on beds centered 7 ft. apart and covered with black plastic mulch in the conventional plots and green wavelength selective mulch in the organic plots. Eight (conventional) or 7 (organic) plants of each variety were spaced 2 ft. apart in the rows (3111 plants/A). Plants were supported using a trellis-weave system, except for two plants each of Florida 91 and Sweet Olive that were supported with cages or rings, and 4 plants each of Red Pear and Yellow Pear that were supported with cages. Irrigation was applied as needed through drip tape beneath the plastic mulch. Weeds were controlled by the plastic mulch, Sencor 4F applied between plastic at 1 pt./A May 31 in the conventional plots, and hand weeding. Diseases were managed in conventional plots with applications of Quadris, 5 oz./A on June 28, July 10 and 26 and Aug. 15 and Bravo Weather Stik, 1.37 pt./A, on July 19 and Aug. 9. Tomato fruitworms were managed by handpicking on July 17-18. Harvest began on July 19 in the conventional plot and July 26 in the organic plot and continued until Sept. 3 and Sept 13, respectively. Green fruit remaining on the plant and judged to be large enough to mature before frost were harvested on Sept. 6 in the conventional plot and Sept. 13 in the organic plot.

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Table 1. Fruit and plant characteristics of tomato varieties in trials at Wanatah, Indiana, 2002.

Cultivar	Co.*	Genetics**	Plant Type†	Fruit Type	Fruit color
Azafran	JS	F1	I	Small globe	Pale yellow
Banana Legs	TG	OP	D	Roma	Pale yellow, some green shoulders or pale green stripes before ripe
Big Beef	JS	F1	I	Beefsteak	Red
Carolina Gold	ST	F1	D	Beefsteak	Yellow-orange
Debarao	JS	OP	I	Plum	Red
Dorothy's Green	TG	OP	I	Beefsteak	Green turning gold
Elberta Peach	TG	OP	D	Globe/Plum	Red, Red with orange stripes
Florida 91	AS	F1	D	Beefsteak	Red
Gold Dust	JS	OP	D	Globe	Orange
Golden Girl	TG	F1	D	Globe	Orange
Goliath F1	TT	F1	I	Beefsteak	Red
Granny Smith	TT	F1	D	Beefsteak	Yellow-green
Great White	TG	OP	I	Beefsteak	Ivory to very pale yellow
Green Pineapple	TG	OP	I	Beefsteak	Green turning gold
Green Zebra	JS	OP	I	Globe	Light green with dark green stripes
Green Zebra	TG	OP	I	Globe	Light green with dark green stripes
Italian Gold	JS	F1	D	Roma	Yellow-orange
Lemon Boy	ST	F1	I	Globe	Pale yellow
Lime Green Salad	TG	OP	D	Small globe	Green turning gold
Old Ivory Egg	TG	OP	I	Pear	Ivory to very pale yellow
Orange Banana	TG	OP	I	Roma	Salmon-orange
Persimmon	TG	OP	I	Beefsteak	Salmon-orange
Principe Borghese	JS	OP	D	Small plum	Red
Red Pear	JS	OP	I	Small pear	Red
Super Marzano	TG	F1	I	Roma	Red, orange-red
Super Sarno	JS	F1	D	Roma	Red
Super Snow White	TG	OP	I	Small globe	Ivory to very pale yellow
Sweet Olive	JS	F1	D	Grape	Red
Tangella	TG	OP	I	Small globe	Orange
Taxi	JS	OP	D	Globe	Yellow
Vita-Gold	TG	F1	D	Plum	Orange
White Queen	TG	OP	I	Beefsteak	Ivory
Yellow Pear	JS	OP	I	Small pear	Yellow

*Seed Source: TT=Totally Tomatoes, JS=Johnny's Seclected Seeds, TG=Tomato Growers' supply, ST=Stokes Seeds, AS=Asgrow.
**F1=F1 Hybrid; OP=open pollinated.
†I=indeterminate; D=determinate.

Harvested fruit of most varieties were graded into marketable (U.S. No. 1, No. 2 and lower grades acceptable to restaurants) and cull fruit, and weight in each category and the number of marketable fruit were determined. For the small-fruited varieties Principe Borghese, Sweet Olive, Super Snow White, Red Pear and Yellow Pear, fruit were separated into marketable and cull and counted for the first two or three harvests only due to time constraints. In subsequent harvests, combined weight of marketable and cull fruit was recorded for these varieties.

Chefs from 5 restaurants and additional staff from one of the restaurants evaluated the harvested tomatoes. A total of fifteen to twenty pounds representing up to 10 different varieties were delivered to restaurants approximately once a week during the main harvest season. Evaluators performed evaluations at the time and under conditions of their choosing. They were asked to identify uses of tomatoes in their professional kitchen and specify for which use or uses each tomato variety was being evaluated. Each variety was then rated on a 9-point scale for appearance, color, firmness, sliceability, amount of jelly and pulp, flavor, and overall acceptability. In addition, evaluators were asked to indicate how much they would be willing to pay for the variety in comparison to a typical red beefsteak tomato available at this time of year. When multiple varieties of one color were evaluated in one week, evaluators were asked to indicate preference in pairwise comparisons between varieties of the same color, and to indicate which they considered the best variety of that color.

Results and Discussion

Yield, fruit size, yield distribution over the harvest period and cull percentage are reported in Table 3 for the conventional plot and Table 4 for the organic plot. Note that because organic and conventional plants were transplanted on different dates, grown using different types of plastic mulch, harvested on slightly different schedules, and because production systems were not replicated, any apparent differences between the two plots can not be attributed to the type of production system.

Marketable yield ranged from 5.9 lb. per plant for Lime Green Salad to 18.5 lb. per plant for Florida 91 in the conventional plot. Varieties yielding within 20% of Florida 91 included: Big Beef, Golden Girl, Carolina Gold, Banana Legs, White Queen, Lemon Boy, Italian Gold, Goliath F1 and Azafran. With the exception of Banana Legs and White Queen, these are all F1 hybrids. Big Beef, Banana Legs and Carolina Gold were also among the top yielding varieties in 2001 at this location, and Italian Gold and Lemon Boy were among the top producers in Nashville, Indiana in 2001. In the organic plot, marketable yields were within 20% of conventional plot yields for Green Zebra, Taxi and Big Beef, but were more than 20% lower for White Queen and more than 20% greater for Super Marzano and Tangella. For the 6 varieties grown in both plots, Big Beef was the highest and Green Zebra the lowest producer of marketable yield in both organic and conventional plots.

Total yield ranged from 11.9 lb. per plant for Lime Green Salad to 20.5 lb. per plant for Florida 91 in the conventional plot. Total yield in the organic plot was within 20% of conventional plot yield for the same varieties, except for Big Beef, which had 34% greater yield in organic plots, and Super Marzano, which had slightly over 20% greater yield in the organic plot.

Fruit quality varied among cultivars, as indicated by the percentage of total yield in the cull category. This percentage ranged from 6% to 60% in the conventional plot. The small-fruited cultivars had less than 10% culls by weight during the early harvests. Other varieties with 10% or smaller cull percentage included Big Beef, Debarao and Florida 91. Cull percentages over 50% were produced by Tangella and Great White, and percentages over 30% were produced by Orange Banana, Elberta Peach, Persimmon, Super Sarno, Super Marzano, Green Pineapple, Dorothy's Green, Green Zebra (from JS) and Granny Smith. Blossom end rot was the main problem on roma varieties Orange Banana, Super Sarno and Super Marzano, and was also a problem on Green Zebra. Catfacing and cracking were the main problems on large-fruited varieties including Great White, Green Pineapple, Dorothy's Green and Persimmon. Culls in Granny Smith were due to cracks and rain checking. Tangella and Green Zebra split easily, and Tangella also developed small breaks in the skin, especially in later harvests. Elberta Peach demonstrated a variety of surface disorders, including sunken spots, wavy cracks, and small

Table 3. Yield and fruit size of thirty-three green, yellow, white, red, and orange-fruited tomato varieties in an unreplicated trial at Wanatah, Indiana, 2002.*

			Marketable Fruit							Marketable and Cull Fruit		Green Fruit Harvested 6 Sept.
			Yield per Plant		Average Wt. per Fruit	Percent Harvested						
Cultivar	Co.**	GEN	Number	Wt. (lb.)	(lb.)	19 - 26 July	31 July - 7 Aug.	12 - 20 Aug.	26 Aug. - 3 Sept.	Wt. per Plant (lb.)	Cull % (by wt.)	Wt. per Plant (lb.)
Green												
Granny Smith	TT	F1	21	11.0	0.52	0	0	34	66	17.6	38	2.3
Green Zebra	JS	OP	38	9.8	0.26	0	0	25	75	14.9	34	3.5
Green Zebra	TG	OP	50	11.1	0.22	0	3	30	68	15.7	29	2.1
Dorothy's Green	TG	OP	23	10.6	0.46	0	5	29	66	17.8	40	4.4
Green Pineapple	TG	OP	23	9.2	0.41	0	2	17	81	14.0	34	3.5
Lime Green Salad	TG	OP	39	5.9	0.15	2	37	49	12	11.9	51	1.8
Yellow												
Lemon Boy	ST	F1	44	15.1	0.34	0	18	31	52	19.8	24	3.0
Taxi	JS	OP	54	12.2	0.23	10	48	41	1	16.3	25	0.8
Banana Legs	TG	OP	116	15.7	0.14	9	22	59	9	18.2	14	0.7
Azafran	JS	F1	126	14.8	0.12	1	13	52	34	16.0	8	8.7
Yellow Pear	JS	OP	no data	no data	0.03†	2††	19††	38††	40††	10.0	6†	no data
White												
White Queen	TG	OP	41	15.1	0.37	0	5	16	78	19.6	23	0.6
Great White	TG	OP	9	7.4	0.84	7	20	21	52	17.5	58	3.1
Old Ivory Egg	TG	OP	98	13.6	0.14	0	12	48	40	17.6	23	7.9
Super Snow White	TG	OP	no data	no data	0.05†	4††	24††	42††	30††	16.3	9†	6.3
Red												
Big Beef	JS	F1	36	16.5	0.46	0	21	44	36	17.7	7	5.1
Goliath F1	TT	F1	29	15.0	0.52	0	14	43	43	17.4	13	3.0
Florida 91	AS	F1	35	18.5	0.52	0	4	37	58	20.5	10	1.1
Super Marzano	TG	F1	51	9.9	0.19	1	11	39	50	17.7	44	4.7
Super Sarno	JS	F1	52	10.1	0.19	0	24	45	31	16.2	37	1.1
Debarao	JS	OP	no data	12.9	0.16†	0	13	45	42	14.3	10	2.3
Principe Borghese	JS	OP	no data	no data	0.03†	4††	53††	32††	10††	13.3	8†	2.7
Sweet Olive	JS	F1	no data	no data	0.02†	4††	55††	30††	10††	11.1	7†	0.5
Red Pear	JS	OP	no data	no data	0.03†	1††	26††	35††	38††	11.8	6†	no data
Orange												
Carolina Gold	ST	F1	32	15.9	0.49	0	7	47	46	19.3	17	1.5
Golden Girl	TG	F1	43	16.1	0.37	0	31	46	23	18.1	11	2.5
Vita-Gold	TG	F1	76	11.0	0.14	2	30	62	6	14.7	25	0.7
Gold Dust	JS	OP	49	11.2	0.23	3	43	49	5	12.7	12	0.5
Persimmon	TG	OP	15	11.3	0.75	0	5	14	81	17.4	35	2.2
Tangella	TG	OP	62	6.0	0.10	5	33	40	21	15.2	60	7.3
Italian Gold	JS	F1	80	15.1	0.19	0	12	53	35	17.6	14	2.1
Orange Banana	TG	OP	57	9.2	0.16	0	6	14	80	14.8	38	5.8
Other												
Elberta Peach	TG	OP	60	9.5	0.16	0	11	37	52	14.8	36	5.1

*Seedlings transplanted to raised beds covered with black plastic mulch on May 22; beds 7 ft. apart and plants 2 ft. apart in row; 3111 plants per acre.

**Seed Source: TT=Totally Tomatoes, JS=Johnny's Selected Seeds, TG=Tomato Growers' Supply, ST=Stokes, AS=Asgrow.

†Based on first 2 or 3 harvests only.

††Percent of total yield.

Table 4. Yield and fruit size of six tomato varieties grown using organic production practices in an unreplicated trial at Wanatah, Indiana, 2002.*

			Marketable Fruit							Marketable and Cull Fruit		Green Fruit Harvested 13 Sept.
			Yield per Plant		Average Wt. per Fruit	Percent Harvested						
Cultivar	Co.	GEN	Number	Wt. (lb.)	(lb.)	26 July - 2 Aug.	8 - 16 Aug.	29 Aug. - 6 Sept.	13 Sept.	Wt. per Plant (lb.)	Cull % (by wt.)	Wt. per Plant (lb.)
Green Zebra	JS	OP	43	9.8	0.23	0	1	59	40	13.5	28	7.3
Taxi	JS	OP	48	10.4	0.22	5	24	68	3	17.3	40	1.2
White Queen	TG	OP	25	11.0	0.43	1	1	50	49	15.7	30	3.9
Big Beef	JS	F1	33	17.7	0.54	0	7	79	13	23.8	25	3.7
Super Marzano	TG	OP	56	14.3	0.25	2	6	69	23	21.4	33	5.9
Tangella	TG	F1	104	11.0	0.11	3	21	59	18	18.1	39	3.9

*Seedlings transplanted to raised beds covered with green wavelength selective plastic mulch on June 6; beds 7 ft. apart and plants 2 ft. apart in row; 3111 plants per acre.

breaks in the skin. In the organic plot cull percentages ranged from 25% for Big Beef to 40% for Taxi. The cull percentages were higher than in the conventional plot for Big Beef, White Queen and Taxi, and lower for Tangella and Super Marzano. Although quantitative data were not collected, field observations indicated more culls due to insect feeding and fewer culls due to blossom end rot in the organic plot.

There was a great range of maturities among the varieties. In the conventional plot, Taxi, Banana Legs, Great White, and Tangella produced 5% or more of their total marketable yield in the first two weeks of harvest. Super Snow White, Principe Borghese, Sweet Olive, Gold Dust, Vita-Gold, Lime Green Salad, Yellow Pear and Red Pear produced between 0 and 5% of total marketable yield during that period, and the remaining cultivars had no marketable fruit during the first two weeks of harvest. Marketable fruit production dropped severely by the final two weeks of harvest for the determinate varieties Lime Green Salad, Taxi, Banana Legs, Vita-Gold and Gold Dust. In contrast, the indeterminate varieties Green Zebra (from JS), Green Pineapple, White Queen, Persimmon and Orange Banana produced more than 75% of their marketable fruit in the final two weeks of harvest. Several varieties also had more than 5 lb. per plant of green fruit likely to mature left on the plants after the final harvest: Azafran, Old Ivory Egg, Tangella, Big Beef, Orange Banana, and Elberta Peach. The relative maturity of varieties in the organic plot was similar to that in the conventional plot.

The number of cultivars evaluated at each restaurant varied from 5 to 29. In four cases one person evaluated all the varieties delivered to a given restaurant, in one case up to 9 different evaluators participated in judging the tomatoes, although no variety was judged by 9 different people from one restaurant. The limitations of this evaluation set-up are recognized, but results are presented because this is the first study in this region to collect information on chef preferences for these tomatoes, and the data provide a preliminary assessment of their relative acceptability.

All restaurants reported using tomatoes for salads, sauces and garnish; four used tomatoes for soup and entrée, three for grilling, and two for stuffing and other uses, including salsas and sandwiches (data not shown). Evaluators most commonly considered tomatoes for salad use when evaluating, but at least four varieties were also considered for each of the other uses mentioned (data not shown).

Four evaluators indicated they would not pay a premium for any of the varieties. Averaged across all varieties, the price each evaluator was willing to pay ranged from the same as to 1.43 times the per-pound price of a typical red beefsteak tomato. The highest price any evaluator indicated for a particular variety was twice the per-pound price of a typical red beefsteak tomato. No variety was consistently valued higher than the others, but values attributed by individual evaluators generally reinforced comments and ratings provided by that evaluator (data not shown).

Average ratings for tomato characteristics evaluated at restaurants are reported in Table 5. Because each evaluator judged a different subset of tomatoes, the averages presented are least squares means adjusted for evaluator effects. Upper and lower 95% confidence limits for the means are also presented. Average ratings for appearance and color and for flavor and overall acceptability were highly positively correlated ($r=.93$, $P<.0001$ for appearance/color and $r=.85$, $P<.0001$ for flavor/overall). The overall rating was also positively correlated with appearance ($r=.64$, $P=.0001$) and color ($r=.60$, $P=.0003$). Other correlations of lesser significance included positive correlations between firmness and sliceability, firmness and pulp to jelly ratio, flavor and color, flavor and appearance, and negative correlations between color and pulp to jelly ratio, appearance and pulp to jelly ratio, flavor and firmness, flavor and pulp to jelly, and overall and pulp to jelly ratio. The large confidence intervals make it difficult to establish differences between cultivars based on these means. However, when they are considered together with the pairwise comparisons among tomatoes of similar colors, and when relative rankings by different evaluators are compared, preferences for certain cultivars can be identified. These are mentioned below in the context of comparisons among tomatoes of similar color and type.

An important part of this project was to compare cultivars of similar fruit color and when possible, shape, to determine the best mix of cultivars to grow for a restaurant salad market, based on yield and

Table 5. Quality ratings for tomato varieties, with confidence intervals, based on evaluations by restaurant chefs and staff, Indiana, 2002

Variety	Color			Appearance			Firmness			Sliceability			Pulp /Jelly			Flavor			Overall		
	Mean	Lower95%	Upper95%	Mean	Lower95%	Upper95%	Mean	Lower95%	Upper95%	Mean	Lower95%	Upper95%	Mean	Lower95%	Upper95%	Mean	Lower95%	Upper95%	Mean	Lower95%	Upper95%
Azafran	**6.4**	5.3	7.4	**6.4**	5.5	7.3	**4.3**	3.4	5.1	**5.6**	4.6	6.7	**4.0**	3.2	4.8	**6.2**	4.8	7.6	**5.6**	4.3	6.9
Banana Legs	**7.4**	6.3	8.4	**6.6**	5.6	7.5	**5.2**	4.3	6.1	**6.2**	5.1	7.3	**4.9**	4.1	5.7	**6.3**	4.8	7.7	**6.4**	5.0	7.8
Big Beef	**7.0**	5.6	8.4	**7.0**	5.8	8.3	**5.4**	4.3	6.6	**5.9**	4.5	7.3	**5.0**	4.0	6.1	**6.4**	4.5	8.2	**6.6**	4.8	8.4
Carolina Gold	**7.5**	6.6	8.4	**7.7**	6.9	8.5	**5.7**	4.9	6.4	**6.7**	5.8	7.6	**5.2**	4.5	5.9	**5.4**	4.2	6.6	**5.8**	4.7	7.0
Debarao	**6.5**	5.1	7.9	**6.9**	5.7	8.1	**5.8**	4.7	6.9	**6.2**	4.8	7.6	**5.7**	4.6	6.7	**6.7**	4.9	8.5	**7.2**	5.4	9.0
Dorothy's Green	**6.0**	4.8	7.2	**6.3**	5.2	7.4	**5.4**	4.4	6.4	**6.8**	5.6	8.0	**5.6**	4.7	6.5	**5.9**	4.3	7.5	**5.5**	3.9	7.0
Elberta Peach	**9.1**	7.6	10.6	**8.1**	6.8	9.5	**3.4**	2.2	4.6	**2.8**	1.3	4.3	**5.0**	3.9	6.1	**7.3**	5.3	9.3	**7.4**	5.5	9.3
Florida 91	**6.7**	5.3	8.1	**6.9**	5.7	8.1	**5.8**	4.7	6.9	**6.2**	4.8	7.6	**5.0**	4.0	6.1	**7.4**	5.5	9.2	**7.9**	6.1	9.7
Gold Dust	**7.8**	6.8	8.7	**7.5**	6.7	8.4	**5.7**	4.9	6.5	**7.9**	6.9	8.9	**5.2**	4.5	5.9	**6.5**	5.2	7.8	**7.0**	5.7	8.2
Golden Girl	**7.3**	6.3	8.2	**7.0**	6.2	7.9	**4.7**	3.9	5.5	**6.9**	5.9	7.9	**5.2**	4.5	5.9	**7.0**	5.7	8.3	**7.3**	6.1	8.6
Goliath	**5.7**	4.3	7.1	**5.9**	4.7	7.1	**4.4**	3.3	5.6	**5.9**	4.5	7.3	**5.4**	4.3	6.4	**4.4**	2.5	6.2	**5.4**	3.6	7.2
Granny Smith	**4.4**	3.2	5.6	**4.3**	3.2	5.4	**7.1**	6.2	8.1	**6.8**	5.6	8.0	**5.3**	4.4	6.2	**4.4**	2.8	6.0	**5.0**	3.4	6.5
Great White	**4.3**	3.1	5.6	**3.5**	2.4	4.6	**5.2**	4.2	6.2	**4.3**	3.1	5.6	**6.6**	5.7	7.5	**4.2**	2.6	5.9	**4.2**	2.6	5.8
Green Pineapple	**7.2**	5.9	8.6	**7.0**	5.8	8.2	**5.3**	4.3	6.4	**6.7**	5.4	8.1	**4.9**	3.9	6.0	**4.8**	3.0	6.6	**6.5**	4.8	8.3
Green Zebra (JS)	**8.1**	6.9	9.3	**8.6**	7.5	9.6	**4.6**	3.7	5.6	**5.5**	4.3	6.7	**4.6**	3.7	5.5	**5.4**	3.8	7.0	**6.5**	4.9	8.0
Italian Gold	**6.8**	5.9	7.7	**7.0**	6.2	7.8	**5.2**	4.5	5.9	**7.3**	6.4	8.2	**5.9**	5.2	6.6	**5.4**	4.2	6.6	**5.7**	4.5	6.8
Lemon Boy	**6.3**	5.3	7.2	**6.2**	5.4	7.1	**4.8**	4.0	5.5	**6.4**	5.5	7.4	**5.0**	4.3	5.7	**6.0**	4.7	7.2	**5.5**	4.2	6.7
Lime Green Salad	**5.9**	4.7	7.1	**6.1**	5.0	7.1	**4.6**	3.7	5.6	**5.5**	4.3	6.7	**4.6**	3.7	5.5	**5.1**	3.6	6.7	**5.2**	3.7	6.7
Old Ivory Egg	**4.6**	3.4	5.8	**5.2**	4.2	6.3	**3.8**	2.8	4.7	**5.6**	4.5	6.8	**5.2**	4.3	6.0	**6.1**	4.6	7.7	**5.9**	4.4	7.5
Orange Banana	**6.4**	5.4	7.5	**6.7**	5.8	7.7	**5.0**	4.2	5.9	**6.6**	5.5	7.7	**5.0**	4.2	5.8	**6.5**	5.1	7.9	**6.2**	4.8	7.5
Persimmon	**7.0**	4.8	9.3	**6.9**	5.0	8.9	**5.5**	3.7	7.4	**5.1**	2.8	7.4	**5.3**	3.6	7.0	**6.0**	3.0	8.9	**6.6**	3.7	9.5
Principe Borghese	**7.3**	6.2	8.5	**7.5**	6.5	8.5	**5.3**	4.3	6.2	**5.6**	4.5	6.8	**4.8**	3.9	5.7	**7.4**	5.8	8.9	**7.2**	5.7	8.7
Super Marzano	**6.0**	4.6	7.4	**5.9**	4.7	7.1	**5.8**	4.7	6.9	**6.5**	5.1	7.9	**5.4**	4.3	6.4	**6.7**	4.9	8.5	**7.2**	5.4	9.0
Super Sarno	**6.4**	4.8	8.1	**7.2**	6.0	8.4	**6.9**	5.8	8.1	**6.9**	5.5	8.3	**6.7**	5.6	7.7	**3.4**	1.5	5.2	**4.6**	2.8	6.4
Super Snow White	**5.7**	4.5	6.9	**5.9**	4.8	6.9	**4.5**	3.6	5.5	**6.0**	4.7	7.4	**4.4**	3.5	5.3	**6.1**	4.6	7.7	**6.7**	5.2	8.2
Sweet Olive	**7.1**	5.9	8.3	**7.0**	6.0	8.0	**6.0**	5.1	7.0	**7.4**	6.0	8.7	**4.7**	3.8	5.5	**6.4**	4.8	7.9	**6.9**	5.4	8.5
Tangella	**7.3**	6.3	8.2	**7.2**	6.4	8.1	**4.9**	4.1	5.7	**6.9**	5.9	7.9	**4.1**	3.3	4.9	**5.8**	4.5	7.1	**6.0**	4.7	7.2
Taxi	**5.8**	4.7	6.8	**5.7**	4.8	6.6	**4.7**	3.8	5.5	**5.8**	4.8	6.9	**5.0**	4.2	5.8	**6.2**	4.8	7.6	**6.0**	4.7	7.3
Vita-Gold	**7.1**	6.1	8.2	**6.8**	5.9	7.7	**6.6**	5.7	7.4	**7.8**	6.7	8.9	**5.1**	4.3	5.9	**4.7**	3.3	6.1	**5.6**	4.2	6.9
White Queen	**4.6**	3.3	5.8	**4.1**	3.0	5.2	**6.7**	5.7	7.7	**4.8**	3.6	6.1	**6.3**	5.4	7.3	**3.5**	1.8	5.1	**3.4**	1.8	5.0
Yellow Pear	**6.2**	3.7	8.7	**5.5**	3.3	7.7	**4.2**	2.2	6.3	**5.5**	3.0	8.1	**5.3**	3.4	7.1	**4.9**	1.6	8.2	**3.9**	0.7	7.1

*All ratings on a 1 to 9 scale. For color, appearance, flavor and overall: 1=dislike extremely, 5=neither like nor dislike, 9=like extremely. For firmness, sliceability and jelly/pulp: 1=extremely too firm, extremely difficult to slice, or extremely too much jelly, 5=neither too soft nor too firm, neither easy nor hard to slice, neither too much jelly nor too much pulp, 9=extremely too firm, extremely easy to slice, or extremely too much pulp. Number of evaluators per variety ranged from 1 to 7.

quality considerations. A summary of these comparisons follows, with references to yield referring to the conventional plot.

The green-fruited cultivars all produced marketable yields within 20% of the highest (Green Zebra from TG), except for the very short determinate variety Lime Green Salad, which produced about 40% lower yield than the others. Evaluations by chefs indicated a preference for Green Zebra. The two chefs who picked a 'best green' variety chose it above the others, in 14 pairwise comparisons with other green varieties it was selected as the preferred variety 10 times ($P<.15$), and it was among the top two varieties for both appearance and color. Green Zebra has a green background that ripens to orange, overlaid by dark green stripes. The striping is unique among the green varieties tested. In 2001, Green Zebra was considered the most promising green variety for this restaurant market, and this year's data supports that judgement.

Five yellow tomatoes were tested: two globe types, one roma, one small globe and one small pear. Lemon Boy and Azafran both produced marketable yield within 20% of the highest yielding variety Banana Legs, Taxi was a little lower, and Yellow Pear was the lowest yielding. Taxi and Lemon Boy were similar round yellow tomatoes, but the determinate Taxi had smaller fruit (0.23 lb. vs. 0.34 lb.) and came into production earlier with a more concentrated set than the indeterminate Lemon Boy. Overall, chefs did not indicate a strong preference for either one, but one person remarked on the low acidity of Lemon Boy. Both of these cultivars could fit well into a mix of specialty tomatoes, depending on the preferred growth habit and desired harvest period. Banana Legs is a roma tomato. Although marketable yield was quite good, the quality of fruit was only fair. Overall, chef evaluations were slightly negative. Two evaluators commented on an unpleasant aftertaste or overtone, and the one evaluator who evaluated it in pairwise comparisons with all of the other yellow cultivars (except Yellow Pear) preferred other cultivars to Banana Legs. Azafran is a small, round, 2-oz. tomato with a pearly and somewhat rough and thick skin. Overall, chefs did not indicate a strong preference or dislike for it. The ratings for firmness and pulp to jelly ratio were low, indicating a soft tomato with a lot of jelly. Yellow Pear was evaluated by only one person. Due to its low yield and the high labor input required for picking, it would not be recommended unless there is a particular request for it.

White-fruited cultivars included the beefsteak types White Queen and Great White, the large pear type Old Ivory Egg, and the small round Super Snow White. The latter three were very pale yellow at their ripest. Marketable yield of White Queen and Old Ivory Egg were within 20% of each other and total yield of Super Snow White was similar, but Great White had about one-half the marketable yield due to catfacing and cracking. In 2001 Great White also had a higher percentage of culls and lower marketable yield than White Queen. Generally, chef responses were unfavorable to these cultivars. White Queen and Great White received among the lowest ratings for appearance, color, flavor and overall acceptability, and Old Ivory Egg was among the lowest for appearance and color. Comments for White Queen suggested that some evaluators might have evaluated samples that were not fully ripe. Super Snow White was rated as having more jelly than most other varieties, but otherwise did not stand out. This was surprising, because informal evaluations by field staff and others suggested that Super Snow White was tasty and attractive. None of these cultivars would be highly recommended based on the responses received from the chefs. However, if a beefsteak type is desired, White Queen would be recommended because of its higher marketable yield. Old Ivory Egg and Super Snow White might be suitable for markets where the unique pear shape of Old Ivory Egg is a selling point, or where the small size and flavor of Super Snow White are appreciated.

Three red beefsteak varieties were evaluated: Big Beef, Goliath F1 and Florida 91. Florida 91 is grown in the region as a fresh market tomato for shipping and can be considered a standard commercial beefsteak variety. Both Big Beef and Goliath produced marketable yield within 20% of Florida 91, which was the highest yielder in the entire trial. Chefs preferred Big Beef and Florida 91 to Goliath. In pairwise comparisons by 2 evaluators, Big Beef and Florida 91 were preferred over Goliath. Three out of three evaluators rated both Big Beef and Florida 91 among the top quarter of all varieties they tested for overall acceptability. Florida 91 received the second highest rating for flavor and the highest rating for overall acceptability. Goliath was rated as one of the least firm varieties and received a relatively low

rating for flavor. Based on these results, Big Beef or Florida 91 would be recommended. Florida 91 produces larger fruit than Big Beef (0.52 lb. vs. 0.46 lb. in this trial), has a slightly later and more concentrated set, and a determinate growth habit. Big Beef looked promising in 2001 trials, and Florida 91 has performed well in several previous trials in the Midwest.

Super Marzano and Super Sarno are red romas, with longer fruit than Debarao, which is a blocky-fruited red plum type. Marketable yield of Debarao was more than 20% higher than the other two, largely due to the high incidence of blossom end rot in Super Marzano and Super Sarno. Super Marzano and Debarao received among the highest ratings for flavor and overall acceptability, and all three varieties were among the highest for firmness. Super Sarno received the lowest rating for flavor. In pairwise comparisons by two evaluators, Debarao was preferred to the other two varieties. Among the three varieties, Debarao appeared to have the greatest acceptability to chefs, but Super Marzano also received favorable comments. Super Marzano was the only red roma grown in 2001, and performed well in that year. Either of the two would be recommended, depending on grower preference for growth habit, and customer preference for shape and size. Based on this information, Super Sarno would not be recommended unless an early-producing roma type were needed.

Three small-fruited red varieties included Principe Borghese, a small plum, Sweet Olive, a grape type, and Red Pear. Total yields for Sweet Olive and Red Pear were within 20% of Principe Borghese, the highest yielding of the three. Chefs indicated a preference for Principe Borghese over Sweet Olive. Two out of two evaluators preferred Principe Borghese to Sweet Olive. Principe Borghese received the highest rating for flavor. Based on this information, Principe Borghese would be recommended over Sweet Olive, unless the smaller fruit size of Sweet Olive were desired (1/3 oz. vs. 1/2 oz.). Red Pear was not evaluated by chefs. Due to its low yield and the high labor input required for picking, it would not be recommended unless there is a particular request for it.

Orange and golden-orange-fruited cultivars included Carolina Gold, Golden Girl, Gold Dust, Persimmon, Vita-Gold (blocky plum), Tangella (small globe), Italian Gold (blocky roma) and Orange Banana (roma). Carolina Gold and Italian Gold produced marketable yield within 20% of the highest yielding orange-fruited tomato, Golden Girl. Tangella produced the lowest marketable yield, due to high percentage of split fruit that were culled. Persimmon also had a high number of culls due to catfacing and cracking, and Orange Banana due to blossom end rot. Chefs rated Golden Girl and Gold Dust favorably: with 6 evaluators, Golden Girl was in the top quartile for the overall acceptability 5 times and Gold Dust 4 times. Golden Girl, Gold Dust, Tangella and Orange Banana each received one vote for 'best orange'. Tangella, Gold Dust, Golden Girl and Carolina Gold received ratings in the top half for appearance and color; Golden Girl was also in the top half for flavor and overall acceptability. Vita-Gold was among the firmest and easiest to slice, but was rated in the lower half for flavor, and received negative comments related to flavor. Persimmon was evaluated by only one chef and ratings were unremarkable. Field notes indicate that flavor was good. Among the orange beefsteak or globe types, Golden Girl was the most promising. Carolina Gold also looked good and had larger fruit; it also performed well in 2001 and previous years' trials. Gold Dust was also promising, with smaller fruit than Golden Girl and earlier and more concentrated set. Tangella may have a place with particular chefs, but loss of marketable fruit due to splitting and skin breaks is a problem.

Italian Gold was rated as among the pulpiest and easiest to slice of all the tomatoes. Two evaluators commented on its lack of flavor. Orange Banana was rated the best orange by one chef, but otherwise did not stand out. Of these two romas Italian Gold would be recommended for higher yield and earliness, but Orange Banana would be recommended for flavor. Similar results were obtained in 2001. If a roma is not required, one of the higher yielding round types is recommended for an orange variety.

Elberta Peach was a non-uniform variety including plants of varying sizes, with and without dense hairs on the leaves, producing fruit ranging in shape from round to blocky plum and in color from red to red with orange stripes, some with and some without fine hairs on the fruit skin. This variability was also observed in 2001. It produced a relatively low yield and had a relatively high percentage of culls due to cracking and surface blemishes. Chefs evaluated it very highly for appearance, color and overall

acceptability, and rated it the least firm and the most difficult to slice. The three evaluators consistently placed it in the top quartile for overall acceptability. A tough skin was mentioned by two evaluators. This variety and Green Zebra were the only two striped varieties in the trial, and both received high ratings for appearance and color. Because of the extreme variability in plant and fruit type, this variety would not be recommended, unless no other red and orange striped variety could be found.

This trial and the 2001 trials have identified a number of F1 hybrid and open pollinated tomato varieties in a range of colors that have potential for the restaurant market. Of those trialed, the most promising varieties were Green Zebra, Lemon Boy, Taxi, Big Beef, Florida 91, Debarao, Super Marzano, Principe Borghese, Golden Girl and Gold Dust.

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