EVALUATION OF 1991 TOMATO CULTIVARS FOR PROCESSING

Kurt Wiese and Stan Berry

Introduction

Tomatoes in Ohio continue to be an important processing crop with Ohio ranking behind California in volume of processed tomatoes, tomato juice, and tomato products. This study evaluates new tomato cultivars for processing and improving the quality of the various type canned tomato products for the Ohio region of the United States.

Materials and Methods

The 1991 tomato processing included 25 cultivars grown in plots under acceptable commercial practices at the OARDC Vegetable Crops Branch near Fremont. Each cultivar was mechanically harvested using little or no sorting and transported to The Ohio State University Food Processing Pilot Plant at Columbus

Evaluation: Twenty field-run tomatoes were randomly selected and used for objective and subjective raw quality evaluation.

- o The tomatoes were classified as globe, pear, blocky, or ovate in *shape*.
- o *Size* was determined by weighing a 20-lb sample, counting the number of tomatoes, and then calculating the number per pound.
- o *Stem scar length* and *stylar scar length* were measured objectively be determining the average length in inches of each scar.
- o *Firmness* was determined subjectively and rated as soft, puffy, medium, and hard.
- o The sample was then quartered and extracted as follows:

a. A random 8.5 lb sample of tomatoes was washed, quartered and the stem removed from the fruits.

b. Place the sample in a blender and cover while pulling a vacuum (to 27") vacuum.

c. Stop blender, remove the container without breaking vacuum, turn upside down and shake. Return the container to the blender and blend for 1 minute.

d. Remove the blender lid, insert 14-mesh wire screen into container to collect juice. This juice, which is designated as the raw juice, will be evaluated for color, pH, titratable acidity, ascorbic acid, and soluble solids.

- o The *color* was evaluated with a Minolta handheld colorimeter, and the L, a, and b values were determined. The $\tan^{-1}$ (b/a) where 0 stands for a red sample and 90 represents a yellow sample.
- o *Percent soluble solids*: An Abbe refractometer with temperature compensation was used for direct determination of percent soluble solids.
- o *pH and total acidity*: The pH and total acidity were determined using the computer aided titrimeter (CAT) composed of the Fisher units of titration controller (model 450), titration burette (model 400), and titration stirrer (model 460) using 0.0863N sodium hydroxide.

- *Ascorbic acid*: Ten ml aliquots of tomato juice were diluted with 90 ml of 1% metaphosphoric acid and filtered. A 10 ml aliquot of the filtrate was titrated with 0.2% 2.6-dichloroindophenol indicator solution. Milligrams of vitamin C were determined by the following formula:

  Dye factor x ml of dye x 100 = mg vitamin C/100g

Preparation and processing of the tomato: All tomatoes were prepared for canning by washing, lye peeling (18% caustic soda at 190°F [88°C] for 20 seconds), filling, closing, and processing in a still retort as whole tomatoes. Each lot of whole tomatoes was filled to 10.0-10.5 oz in No 303 x 406 size fruit enamel tin cans with a 50-grain salt tablet containing 4?.5% NaCl, 15% $CaSO_4$, 37% citric acid, and 3.5% $NaHCO_3$, and covered with hot juice (190°F) [88°C] and steam flow closed.

Juice was made from each cultivar of tomato by washing, chopping, preheating to 190-200°F (88-90°C), extracting using a 0.023-inch screen, filling in 303 x 406 enamel cans, adding a 30-grain NaCl salt table, closing, processing for 20 minutes at 220°F, and cooling to 100°F.

TOMATO CULTIVAR EVALUATION 1991

RAW JUICE CHARACTERISTICS

VARIETY	pH	% ACIDITY	SOLIDS	VIT C mg/100g	COLOR L	COLOR A	COLOR B	ARCTAN (B/A)
OHIO 7814	3.640	0.35%	3.9	18.6	39.1	29.4	20.2	34.5
OHIO 7983	3.616	0.32%	4.3	26.2	43.8	33.3	23.6	35.3
HEINZ 7151	3.631	0.32%	3.8	16.6	38.6	33.4	21.8	33.1
OHIO 8245	3.340	0.38%	3.9	15.1	36.3	24.9	15.7	32.3
OHIO 8446	3.731	0.30%	4.5	19.8	40.7	33.0	21.2	32.7
OHIO 8550	3.756	0.32%	4.2	17.3	37.7	31.7	20.1	32.4
OHIO 8556	3.441	0.32%	4.0	15.7	40.1	36.3	23.3	32.7
O 8655	3.482	0.28%	4.6	16.4	38.4	30.6	19.7	32.7
O 8675	3.400	0.31%	4.4	18.2	40.9	30.8	21.6	35.0
O 8687	3.554	0.25%	3.6	18.2	42.3	32.4	20.6	32.4
O 8689	3.520	0.25%	4.0	20.1	44.3	30.2	19.9	33.4
O 86120	3.674	0.33%	4.0	21.7	41.1	36.1	22.0	31.3
O 87160	3.706	0.32%	3.9	24.9	39.7	33.8	23.6	34.9
O 87175	3.515	0.33%	5.1	20.1	39.9	32.0	19.3	31.1
O 88119	3.683	0.28%	3.7	18.6	43.4	35.8	23.3	33.1
PETO SEED 696	3.264	0.42%	4.5	17.1	40.4	30.5	19.0	31.8
PETO SEED 219	3.329	0.38%	3.8	18.8	39.1	37.1	24.4	33.3
OX1	3.345	0.45%	4.3	14.8	41.1	35.8	22.6	32.3
OX4	3.327	0.38%	4.0	15.4	37.3	32.6	22.1	34.1
OX6	3.531	0.37%	3.8	14.3	41.1	38.4	25.5	33.6
OX9	3.368	0.36%	4.0	19.4	38.5	32.9	20.8	32.3
OX38	3.399	0.29%	3.8	22.2	34.1	27.6	18.6	34.0
OX42	3.425	0.31%	3.5	19.4	37.6	30.2	20.4	34.0
O 8991	3.399	0.28%	3.8	18.9	41.0	28.0	20.6	36.3
AVERAGES	3.503	0.33%	4.0	18.7	39.8	32.3	21.2	33.3

TOMATO CULTIVAR EVALUATION 1991

HOT BREAK JUICE PRIOR TO EXTRACTION

VARIETY	pH	% TA CITRIC	ASSOLUBLE SOLIDS	VITAMIN C mg/100g	COLOR L	COLOR A	COLOR B	ARCTAN B/A
OHIO 7814	3.329	0.48%	4.6	18.6	33.3	27.5	21.5	38.0
OHIO 7983	3.326	0.46%	5.7	22.4	32.8	26.9	20.7	37.6
HEINZ 7151	3.299	0.46%	5.5	23.7	34.0	28.0	20.0	35.5
OHIO 8245	3.072	0.49%	5.1	17.6	28.3	24.1	19.5	39.0
OHIO 8446	3.365	0.44%	5.5	18.5	30.7	28.0	22.2	38.4
OHIO 8550	3.372	0.43%	4.6	16.0	24.3	17.3	14.6	40.2
OHIO 8556	3.186	0.44%	4.8	17.6	28.9	26.7	20.8	37.9
O 8655	3.140	0.42%	5.8	19.5	29.3	25.2	19.1	37.1
O 8675	3.144	0.42%	5.4	20.1	27.6	23.6	18.2	37.6
O 8687	3.204	0.43%	5.4	23.3	28.8	28.5	22.6	38.4
O 8689	3.126	0.40%	5.2	16.4	25.6	22.7	18.1	38.6
O 86120	3.385	0.45%	4.9	13.4	32.2	27.1	19.0	35.0
O 87160	3.226	0.47%	4.6	18.6	31.7	25.1	19.6	38.0
O 87175	3.254	0.42%	5.0	19.5	31.0	28.1	21.1	36.8
O 88119	3.245	0.43%	4.6	19.2	30.4	23.7	18.1	37.4
PETO SEED 696	3.076	0.51%	5.5	19.4	24.4	20.8	17.3	39.8
PETO SEED 219	3.088	0.50%	4.9	14.3	31.4	30.7	24.6	38.8
OX1	3.153	0.51%	4.9	18.8	27.3	24.0	19.2	38.7
OX4	3.054	0.53%	5.2	18.3	26.7	23.3	19.1	39.4
OX6	3.108	0.51%	4.9	13.1	32.8	30.5	24.1	38.3
OX9	3.126	0.49%	5.2	17.7	27.2	23.1	18.0	37.9
OX38	3.083	0.46%	4.8	18.8	27.2	23.7	19.6	39.6
OX42	3.061	0.45%	4.7	21.7	23.9	19.4	16.0	39.6
O 8991	3.179	0.41%	4.7	20.1	29.6	27.2	22.1	39.1
AVERAGES	3.194	0.46%	5.0	18.6	29.1	25.2	19.8	38.2

TOMATO CULTIVAR EVALUATION 1991

JUICE CHARACTERISTICS AFTER STERILIZATION AND STORAGE

VARIETY	pH	% TA CITRIC	ASSOLUBLE SOLIDS	VITAMIN C mg/100g	COLOR L	COLOR A	COLOR B	ARCTAN B/A
OHIO 7814	3.934	0.44%	4.5	6.9	33.3	19.3	25.3	52.7
OHIO 7983	3.886	0.42%	4.3	6.9	32.5	20.5	25.5	51.1
HEINZ 7151	3.974	0.40%	4.2	10.3	29.9	14.0	23.7	59.5
OHIO 8245	3.931	0.40%	4.2	9.7	31.4	20.5	26.3	52.1
OHIO 8446	3.901	0.40%	4.1	12.6	31.1	17.7	26.1	55.9
OHIO 8550	3.948	0.43%	3.9	11.5	28.7	17.3	22.5	52.5
OHIO 8556	3.987	0.37%	3.9	6.3	23.7	13.1	18.7	55.0
O 8655	3.992	0.40%	4.1	7.4	27.0	16.3	21.3	52.6
O 8675	4.053	0.39%	4.0	11.5	28.1	21.4	24.2	48.6
O 8687	3.943	0.39%	4.0	9.2	22.9	13.3	18.0	53.6
O 8689	4.041	0.38%	4.0	8.0	22.9	10.5	15.6	56.1
O 86120	4.001	0.40%	4.3	5.7	20.6	12.8	15.0	49.5
O 87160	4.021	0.42%	4.1	6.3	29.3	18.7	22.8	50.6
O 87175	3.983	0.36%	3.9	8.0	20.8	11.5	16.9	55.7
O 88119	4.059	0.37%	4.4	16.6	20.3	14.6	16.5	48.6
PETO SEED 696	3.965	0.35%	4.1	9.2	28.6	19.7	23.1	49.5
PETO SEED 219	3.951	0.42%	4.5	6.9	27.2	16.9	19.2	48.7
OX1	3.942	0.42%	4.5	10.9	30.9	20.1	23.0	48.9
OX4	3.934	0.42%	4.1	10.3	28.9	21.6	26.7	51.0
OX6	3.945	0.40%	4.1	12.0	25.1	12.8	20.0	57.3
OX9	3.974	0.38%	3.8	10.3	29.9	20.5	26.2	52.0
OX38	3.968	0.38%	3.8	9.2	25.3	15.5	21.1	53.6
OX42	4.038	0.36%	3.8	11.5	28.5	16.1	23.7	55.8
O 8991	3.995	0.38%	3.8	11.5	28.7	19.9	26.7	53.3
AVERAGES	3.973	0.40%	4.1	9.5	27.3	16.8	22.0	52.7