PROCESSING TOMATO CULTIVAR TRIALS

RESEARCH REPORT

1992

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Processing Tomato Cultivar Trial Research Report, 1992

Introduction:

This report summarizes the results of the processing tomato cultivar evaluation work for 1992. Most of the cultivars tested were identified as being suited for wholepack end use, however some entries that could be considered dual purpose, or specifically for paste were also evaluated.
The entries in the trial were evaluated for yield potential (Part A), peeling and canning suitability (Part B), and fruit quality (Part C). The conclusions are summarized at the end of the report (Part D).

Trial Entries:

Twenty seven entries were submitted for evaluation in the multilocation yield trials, peeling and canning trials, and fruit quality trials. Figure 1 shows the different cultivars in the trial, the type, and origin.

Part A. Multilocation Yield Trials

Locations:

Locations were chosen to represent the typical tomato growing soils and production areas of Southern Ontario. Six locations were selected initially however due to a number of problems beyond control only five of the sites were harvested.

Plot Establishment:

Location: Ridgetown - Brookston clay loam soil

Fertilizer: 350 kg/ha, 20-10-10, broadcast preplant
120 kg/ha 34-0-0 side dressed

Weed Control: Treflan (1 l/ha), Dual (2 l/ha), and Sencor 500 (0.5 l/ha) tank mixed and applied prior to planting.

Plants: Greenhouse grown in 288 cell plug trays, seeded April 23, 1992.

Transplanting: May 28, using two New Holland plug planter units on a tool bar. Starter fertilizer (6-24-6) at 1 litre diluted in 182 litres of water, continuous flow of solution.

Plot size and spacing: Plots were 4.5 m (15 ft.) long, plants were spaced 45 cm (18 in.) within rows and 45 cm (18 in.) between rows on 1.5 m (60 in.) centres. Replicated 3 times.

Figure 1. Processing Tomato Yield Trial Entries, 1992.

Name	Type	Origin
CC 164B	open-pollinated	Nabisco
CC 193A	open-pollinated	Nabisco
CC 195	open-pollinated	Nabisco
CC 218	open-pollinated	Nabisco
CC 329	open-pollinated	Nabisco
CC 390	open-pollinated	Nabisco
CC 71-22	F1 hybrid	Nabisco
HRS 9201	open-pollinated	Harrow Research Station
HRS 9202	open-pollinated	Harrow Research Station
HRS 9203	open-pollinated	Harrow Research Station
HRS 9204	open-pollinated	Harrow Research Station
HRS 2	open-pollinated	Harrow Research Station
HRS 3	open-pollinated	Harrow Research Station
Ohio 7983	open-pollinated	Ohio State
Ohio 8245	open-pollinated	Ohio State
Ohio 8550	open-pollinated	Ohio State
Ohio 8556	open-pollinated	Ohio State
OX1	F1 Hybrid	Ohio State
OX4	F1 Hybrid	Ohio State
Peto 696	F1 Hybrid	Petoseed
Peto 2196	F1 Hybrid	Petoseed
RCAT 9102	open-pollinated	Ridgetown College
RCAT 9201	F1 Hybrid	Ridgetown College
RCAT 9202	F1 Hybrid	Ridgetown College
RCAT 9210	open-pollinated	Ridgetown College
RCAT 9211	open-pollinated	Ridgetown College
S0 12	F1 Hybrid	TERRA International

Disease and Insect Control: Fungal diseases controlled according to TOM-CAST. Colorado Potato Beetle, 2 applications of Cymbush 250 EC at 140 ml/ha.

Location: Albuna - Berrien sand soil

Transplanting: May 26, using two New Holland plug planter units on a tool bar. Starter fertilizer (6-24-6) at 1 litre diluted in 182 litres of water, continuous flow of solution.

Plot size and spacing: Plots were 4.5 m (15 ft.) long, plants were spaced 45 cm (18 in.) within rows and 45 cm (18 in.) between rows on 1.5 m (60 in.) centres. Replicated 3 times.

Location: Chatham - Thames clay loam soil

Transplanting: May 29, using two New Holland plug planter units on a tool bar. Starter fertilizer (6-24-6) at 1 litre diluted in 182 litres of water, continuous flow of solution.

Plot size and spacing: Plots were 4.5 m (15 ft.) long, plants were spaced 45 cm (18 in.) within rows and 45 cm (18 in.) between rows on 1.7 m (66 in.) centres. Replicated 3 times.

Location: Bradley - Clyde loam soil

Transplanting: May 26, using two New Holland plug planter units on a tool bar. Starter fertilizer (6-24-6) at 1 litre diluted in 182 litres of water, continuous flow of solution.

Plot size and spacing: Plots were 4.5 m (15 ft.) long, plants were spaced 45 cm (18 in.) within rows and 45 cm (18 in.) between rows on 1.7 m (66 in.) centres. Replicated 3 times.

Harvest Procedure:

Plots were visited twice each week during the harvest season. All plots that had 80% or more ripe fruit were harvested. For each plot harvested 5 representative plants, with no adjacent plants missing, were cut off at the base. Fruit were shaken from the vines onto a plastic sheet on the ground. The fruit were then graded into 3 groups: (a) Rots/Green: any fruit with a rotten spot 2 cm in diameter or greater, or blossom end rot, or, green fruit or fruit with no red colour showing on the exterior, (b) Breakers: fruit with some red but that had too much yellow shoulder or paleness, (c) Red Ripe: fruit that had less than 5% visible yellowish exterior colour. The weight in kilograms was taken for each of these three groups for each plot harvested.

Results and Discussion:

Data were analysed separately for each location, except at Bradley where 1 replication was lost to water damage, as well as over all locations.

The results for Ohio 7983, Peto 696 and Ohio 8245 are in boldface type in each table in order to allow for easy comparison of the lines being tested with these three checks.

Yield potential includes all red ripe, breakers, and green and rotten fruit. It represents the total amount of fruit that a variety may produce under good conditions and will be higher than the usable yield. The results for yield potential, averaged over five locations, are shown in Tables 1a and 1b. Table 1b shows the same information as Table 1a, except that Table 1b is ranked according to relative maturity. This allows a more reasonable comparison of yield since early maturing cultivars are typically lower in yield.

Tables 2a and 2b show the breakdown of overall yield into red ripe, breakers, and greens and rots. Once again, Table 2b shows the same information as Table 2a, but ranked according to maturity.

Table 3 shows the results for yield at Harrow, Table 4 for Albuna, Table 5 for Bradley, Table 6 for Chatham, and Table 7 for Ridgetown.

Table 1a. Processing Tomato Cultivar Trial, 1992. Yield Potential (tons/acre), over 5 locations.

Name	Yield Potential (tons/acre)	
RCAT 9202	48.3	a
RCAT 9201	48.1	a
Peto 696	**48.1**	a
HRS 9203	46.0	ab
HRS 9201	46.0	ab
HRS 3	44.9	ab
Peto 2196	44.6	abc
HRS 2	44.1	abc
Ohio 8245	**43.9**	abc
SO-12	43.6	abc
HRS 9202	43.4	abc
Ohio 8556	43.3	abc
OX1	42.2	abc
RCAT 9210	42.0	abc
Ohio 8550	41.2	abc
CC 390	41.2	abc
HRS 9204	41.1	abc
OX4	40.6	abc
CC 193A	40.1	abc
CC 71-22	39.0	abc
RCAT 9211	38.7	abc
Ohio 7983	**38.3**	abc
CC 218	38.2	abc
CC 329	37.0	bc
RCAT 9102	36.8	bc
CC 164B	34.6	c
CC 195	34.3	c
Probability	0.02	
cv	15.9%	

Means followed by the same letter are not significantly different, DMRT. Means were ranked before rounding off.

Table 1b. Processing Tomato Cultivar Trial, 1992. Yield Potential (tons/acre), over 5 locations. Entries ranked according to average maturity over all test sites.

Name	Yield Potential (tons/acre)	
CC 195	34.3	c
CC 164B	34.6	c
RCAT 9201	48.1	a
CC 329	37.0	bc
CC 193A	40.1	abc
RCAT 9202	48.3	a
CC 71-22	39.0	abc
Ohio 8556	43.3	abc
Ohio 8550	41.2	abc
Ohio 7983	**38.3**	abc
HRS 3	44.9	ab
HRS 9202	43.4	abc
RCAT 9210	42.0	abc
OX1	42.2	abc
OX4	40.6	abc
Peto 2196	44.6	abc
HRS 9204	41.1	abc
HRS 9203	46.0	ab
CC 218	38.2	abc
Peto 696	**48.1**	a
HRS 9201	46.0	ab
HRS 2	44.1	abc
RCAT 9102	36.8	bc
RCAT 9211	38.7	abc
SO-12	43.6	abc
Ohio 8245	**43.9**	abc
CC 390	41.2	abc
Probability	0.02	
cv	15.9%	

Means followed by the same letter are not significantly different, DMRT.

Table 2a. Processing Tomato Cultivar Trial, 1992. Yield of red ripe, breakers, and rots&greens (tons/acre) over 5 locations.

Name	Red Ripe (tons/acre)		Breakers (tons/acre)	Rots&Greens (tons/acre)
RCAT 9201	32.8	a	10.1	6.4
Peto 696	**32.7**	a	**11.2**	**4.0**
HRS 9203	32.5	a	10.7	4.8
CC 193A	32.3	a	3.9	3.8
CC 390	31.9	a	6.1	3.1
Peto 2196	30.2	ab	9.8	4.4
Ohio 7983	**29.9**	abc	**7.5**	**5.9**
SO-12	29.6	abc	6.8	7.4
HRS 3	29.1	abc	10.4	5.4
Ohio 8245	**28.9**	abc	**12.1**	**2.9**
CC 329	28.9	abc	7.9	3.6
CC 71-22	28.2	abc	5.7	5.1
OX1	28.1	abc	7.4	6.8
Ohio 8556	28.1	abc	9.0	6.2
HRS 9204	28.0	abc	8.4	4.2
OX4	27.8	abc	8.1	5.1
RCAT 9202	26.8	abc	10.1	12.0
CC 218	26.7	abc	6.3	5.3
Ohio 8550	26.4	abc	7.6	7.1
RCAT 9210	26.1	abc	8.7	7.2
HRS 9202	24.9	abc	7.5	11.6
RCAT 9102	23.9	abc	5.7	7.3
CC 164B	23.9	abc	6.9	3.7
RCAT 9211	23.5	abc	10.0	5.5
HRS 2	22.0	bc	13.7	8.7
HRS 9201	21.9	bc	14.3	10.1
CC 195	20.4	c	11.4	2.7
Probability	0.07		0.002	0.0006
cv	22.8%		42.8%	58.7%

Means within columns followed by the same letter are not significantly different, DMRT.

Table 2b. Processing Tomato Cultivar Trial, 1992. Yield of red ripe, breakers, and rots&greens (tons/acre) over 5 locations. Entries ranked according to average maturity over all testing sites.

Name	Red Ripe (tons/acre)		Breakers (tons/acre)	Rots&Greens (tons/acre)
CC 195	20.4	c	11.4	2.7
CC 164B	23.9	abc	6.9	3.7
RCAT 9201	32.8	a	10.1	6.4
CC 329	28.9	abc	7.9	3.6
CC 193A	32.3	a	3.9	3.8
RCAT 9202	26.8	abc	10.1	12.0
CC 71-22	28.2	abc	5.7	5.1
Ohio 8556	28.1	abc	9.0	6.2
Ohio 8550	26.4	abc	7.6	7.1
Ohio 7983	**29.9**	abc	**7.5**	**5.9**
HRS 3	29.1	abc	10.4	5.4
HRS 9202	24.9	abc	7.5	11.6
RCAT 9210	26.1	abc	8.7	7.2
OX1	28.1	abc	7.4	6.8
OX4	27.8	abc	8.1	5.1
Peto 2196	30.2	ab	9.8	4.4
HRS 9204	28.0	abc	8.4	4.2
HRS 9203	32.5	a	10.7	4.8
CC 218	26.7	abc	6.3	5.3
Peto 696	**32.7**	a	**11.2**	**4.0**
HRS 9201	21.9	bc	14.3	10.1
HRS 2	22.0	bc	13.7	8.7
RCAT 9102	23.9	abc	5.7	7.3
RCAT 9211	23.5	abc	10.0	5.5
SO-12	29.6	abc	6.8	7.4
Ohio 8245	**28.9**	abc	**12.1**	**2.9**
CC 390	31.9	a	6.1	3.1
Probability	0.07		0.002	0.0006
cv	22.8%		42.8%	58.7%

Means within columns followed by the same letter are not significantly different, DMRT.

Table 3. Processing Tomato Yield Trial, 1992. Yield (tons/acre) from the Harrow site.

Name	Total Yield		Red Ripe	Breakers	Greens/Rots
CC 195	23.6	ef	18.9	4.4	1.0
CC 164B	22.8	f	13.8	5.8	3.2
RCAT 9201	35.7	abc	28.0	6.2	1.5
CC 329	24.4	def	18.4	4.5	1.6
CC 193A	26.6	bcdef	22.3	3.2	1.1
RCAT 9202	39.0	a	27.2	10.5	4.3
CC 71-22	28.8	abcdef	21.5	5.2	2.2
Ohio 8556	31.3	abcdef	22.8	6.5	2.2
Ohio 8550	29.3	abcdef	15.9	2.9	10.5
Ohio 7983	**35.1**	abcd	**23.8**	**8.6**	**2.7**
HRS 3	33.3	abcdef	23.1	8.1	2.1
HRS 9202	32.2	abcdef	21.8	4.3	6.2
RCAT 9210	32.3	abcdef	21.6	8.5	2.2
OX1	37.0	ab	23.9	9.7	3.5
OX4	29.5	abcdef	21.7	8.4	2.1
Peto 2196	31.9	abcdef	24.5	5.0	2.2
HRS 9204	29.8	abcdef	20.3	6.2	3.4
HRS 9203	31.7	abcdef	28.0	1.4	2.3
CC 218	32.4	abcdef	20.7	8.2	3.4
Peto 696	**34.4**	abcde	**28.5**	**3.5**	**1.2**
HRS 9201	34.5	abcd	24.2	3.8	6.5
HRS 2	32.9	abcdef	26.2	3.1	3.6
RCAT 9102	25.7	cdef	21.4	1.7	2.6
RCAT 9211	31.2	abcdef	25.8	3.2	2.2
SO 12	29.8	abcdef	25.0	1.9	3.2
Ohio 8245	**29.3**	abcdef	**23.2**	**4.1**	**1.9**
CC 390	32.1	abcdef	27.5	2.2	2.6
Probability	0.12		0.43	0.03	0.42
cv	14.2%		21.6%	48.4%	90.4%

Entries are ranked according to average maturity from all test sites. The sum of Red Ripe, Breakers and Greens/Rots may not always equal the Total Yield due to rounding off. Means within columns followed by the same letter are not significantly different, DMRT.

Table 4. Processing Tomato Yield Trial, 1992. Yield (tons/acre) from the Albuna site (Berrien sand).

Name	Total Yield		Red Ripe	Breakers	Greens/Rots
CC 195	27.9	g	16.6	9.2	2.1
CC 164B	28.8	fg	18.8	5.8	4.2
RCAT 9201	45.9	bcde	32.2	8.4	7.4
CC 329	29.9	fg	23.9	3.8	3.9
CC 193A	32.6	efg	23.6	5.5	3.5
RCAT 9202	48.3	ab	31.2	10.7	6.4
CC 71-22	34.7	bcdefg	27.3	4.0	3.3
Ohio 8556	42.2	bcdef	28.6	9.8	3.8
Ohio 8550	40.1	bcdefg	26.4	8.7	4.9
Ohio 7983	**47.7**	abc	**30.4**	**12.0**	**5.4**
HRS 3	41.7	bcdef	29.7	7.2	4.8
HRS 9202	39.9	bcdefg	27.1	4.0	7.0
RCAT 9210	38.8	bcdefg	26.5	8.9	3.4
OX1	46.7	abcd	33.3	9.3	4.3
OX4	40.9	bcdefg	24.7	10.4	5.8
Peto 2196	48.0	ab	32.5	11.1	4.4
HRS 9204	33.4	defg	21.1	10.0	2.3
HRS 9203	46.6	abcd	29.7	11.7	5.2
CC 218	38.2	bcdefg	20.8	11.6	5.0
Peto 696	**59.1**	a	**40.1**	**14.5**	**4.4**
HRS 9201	47.7	abc	22.0	20.1	5.5
HRS 2	45.3	bcde	25.3	12.6	7.5
RCAT 9102	45.1	bcde	25.0	10.4	9.8
RCAT 9211	34.2	cdefg	18.5	11.0	6.1
SO 12	43.6	bcde	31.7	6.6	5.7
Ohio 8245	**45.5**	bcde	**31.7**	**10.2**	**3.7**
CC 390	40.4	bcdefg	28.4	6.9	5.0
Probability	0.0001		0.0001	0.006	0.01
cv	16.7%		17.8%	42.6%	40.6%

Entries are ranked according to average maturity from all test sites. The sum of Red Ripe, Breakers and Greens/Rots may not always equal the Total Yield due to rounding off. Means within columns followed by the same letter are not significantly different, DMRT.

Table 5. Processing Tomato Yield Trial, 1992. Yield (tons/acre) from the Bradley site (Clyde loam).

Name	Total Yield	Red Ripe	Breakers	Greens/Rots
CC 195	35.0	15.0	16.7	3.2
CC 164B	34.0	27.5	4.4	2.4
RCAT 9201	39.8	26.1	9.5	4.0
CC 329	32.1	33.3	8.6	5.3
CC 193A	34.4	29.9	2.2	2.3
RCAT 9202	38.1	24.9	7.6	5.7
CC 71-22	31.2	26.0	3.5	1.8
Ohio 8556	48.5	30.1	8.9	9.6
Ohio 8550	41.9	33.5	2.9	5.6
Ohio 7983	**45.6**	**33.9**	**4.9**	**6.8**
HRS 3	45.6	34.7	6.1	4.9
HRS 9202	43.5	28.6	5.4	8.0
RCAT 9210	39.4	20.3	4.5	14.7
OX1	42.5	34.1	2.5	6.1
OX4	35.4	28.4	2.8	4.2
Peto 2196	37.1	32.6	1.2	3.4
HRS 9204	37.5	28.3	6.2	3.1
HRS 9203	40.1	32.2	13.0	4.7
CC 218	32.7	23.8	3.5	5.6
Peto 696	**41.4**	**34.5**	**2.9**	**4.0**
HRS 9201	47.6	33.3	9.5	5.8
HRS 2	37.1	25.1	7.5	3.9
RCAT 9102	26.3	21.4	1.4	3.5
RCAT 9211	35.5	21.5	5.8	8.1
SO 12	45.2	34.3	3.6	7.4
Ohio 8245	**34.6**	**29.0**	**4.3**	**1.3**
CC 390	37.1	34.4	1.4	1.3
Probability	--	--	--	--
cv	--	--	--	--

Entries are ranked according to average maturity from all test sites. The sum of Red Ripe, Breakers and Greens/Rots may not always equal the Total Yield due to rounding off. Means of two replications are reported.

Table 6. Processing Tomato Yield Trial, 1992. Yield (tons/acre) from the Chatham site (Thames clay loam).

Name	Total Yield		Red Ripe	Breakers	Greens/Rots
CC 195	52.7	bcde	33.5	13.6	5.7
CC 164B	45.9	de	30.4	11.2	4.3
RCAT 9201	74.4	a	56.0	12.6	5.8
CC 329	50.3	bcde	37.2	9.4	3.7
CC 193A	54.2	bcde	44.1	5.5	4.0
RCAT 9202	74.1	a	42.3	19.8	11.9
CC 71-22	54.1	bcde	39.4	10.8	3.9
Ohio 8556	45.0	de	26.9	13.2	5.0
Ohio 8550	51.9	bcde	30.4	15.2	6.2
Ohio 7983	**54.6**	bcde	**41.3**	**8.3**	**5.0**
HRS 3	57.7	abcde	33.6	18.6	5.5
HRS 9202	66.7	ab	42.6	18.0	6.0
RCAT 9210	50.4	bcde	31.2	10.7	8.5
OX1	48.0	cde	35.9	8.6	3.5
OX4	55.2	bcde	39.3	10.4	4.7
Peto 2196	62.5	abcd	34.8	22.8	4.2
HRS 9204	58.4	abcde	40.1	12.1	3.6
HRS 9203	66.0	abc	42.2	19.3	4.7
CC 218	42.6	e	36.1	4.0	3.7
Peto 696	**57.9**	abcde	**33.0**	**20.8**	**4.2**
HRS 9201	53.8	bcde	25.5	20.2	8.2
HRS 2	53.0	bcde	20.3	24.0	8.6
RCAT 9102	44.7	de	28.7	8.6	7.3
RCAT 9211	40.6	e	19.7	17.0	3.8
SO 12	48.0	cde	29.9	10.4	7.6
Ohio 8245	**51.5**	bcde	**25.6**	**22.2**	**3.8**
CC 390	52.3	bcde	34.4	14.7	3.0
Probability	0.001		0.0005	0.0001	0.0004
cv	16.7%		22.8%	36.8%	38.4%

Entries are ranked according to average maturity from all test sites. The sum of Red Ripe, Breakers and Greens/Rots may not always equal the Total Yield due to rounding off. Means within columns followed by the same letter are not significantly different, DMRT.

Table 7. Processing Tomato Yield Trial, 1992. Yield (tons/acre) from the Ridgetown site (Brookston clay).

Name	Total Yield		Red Ripe	Breakers	Greens/Rots
CC 195	32.5	e	17.9	12.9	1.7
CC 164B	41.4	bcde	29.1	7.5	4.3
RCAT 9201	44.8	abcde	21.7	9.8	13.3
CC 329	48.4	abcd	31.6	13.3	3.6
CC 193A	52.8	ab	41.5	3.3	8.1
RCAT 9202	41.8	bcde	8.1	1.9	31.8
CC 71-22	46.2	abcde	27.1	5.1	14.4
Ohio 8556	49.3	abc	32.0	6.9	10.4
Ohio 8550	42.9	bcde	25.9	8.5	8.5
Ohio 7983	**44.2**	bcde	**31.0**	**3.4**	**9.8**
HRS 3	46.4	abcde	24.6	11.8	10.0
HRS 9202	34.6	de	4.2	5.7	30.9
RCAT 9210	49.1	abc	31.1	10.9	7.1
OX1	37.0	cde	13.4	7.0	16.6
OX4	42.0	bcde	24.7	8.7	8.6
Peto 2196	43.6	bcde	26.6	9.1	8.0
HRS 9204	46.3	abcde	30.4	7.6	8.5
HRS 9203	45.6	abcde	30.4	8.2	7.0
CC 218	45.3	abcde	32.1	3.9	8.8
Peto 696	**47.6**	abcd	**27.3**	**14.2**	**6.1**
HRS 9201	46.3	abcde	4.4	18.1	23.9
HRS 2	52.3	ab	13.2	21.1	20.0
RCAT 9102	42.5	bcde	23.0	6.3	13.2
RCAT 9211	52.0	ab	31.8	13.1	7.1
SO 12	51.3	abc	27.0	11.4	13.1
Ohio 8245	**58.8**	a	**35.2**	**20.0**	**3.7**
CC 390	44.1	bcde	34.8	5.5	3.6
Probability	0.02		0.0001	0.0004	0.0001
cv	15.7%		32.6%	51.6%	49.2%

Entries are ranked according to average maturity from all test sites. The sum of Red Ripe, Breakers and Greens/Rots may not always equal the Total Yield due to rounding off. Means within columns followed by the same letter are not significantly different, DMRT.

Part B. Peeling and Canning Trials

After plot harvest from the yield trials fruit samples were retained for evaluation of peeling quality on the RCAT peeling and canning line.

Peeling Protocol:

The peeling protocol was designed to reflect the procedures used in wholepack tomato canneries. The procedure used in shown in Figure 2. It is recognized that each processor will vary the basic procedure however all entries in the trial were treated in the same way so that results are useful for comparison.

As part of the peeling evaluation, measurements are taken on average fruit size, as well as the distribution of fruit sizes to gain some information on the uniformity of fruit size. Average fruit weight does not provide as much information as desired for determining suitability for canning, particularly where uniformity of fruit size is important. In order to get a better indication of the proportion of fruit useful for canning the samples were sized according to diameter. The fruit were passed over a size grader made from steel bars separated by different sized gaps. These results are shown in Table 8.

Size 1 represents the percent of fruit with the narrowest diameter of 1 inch or less. Size 2 is the percent of fruit greater than 1 inch and less than or equal to 1 1/2 inches in diameter. Size 3 is the percent of fruit greater than 1 1/2 inches minimum diameter and less than or equal to 1 3/4 inches diameter. Size 4 includes all fruit with a diameter greater than 1 3/4 inches.

The fruit included under Size 1 could be considered excessively small. These were so small that they tended to get caught or lost among the belts of the peel eliminator. Fruit of Size 1 would rarely, if ever, be used for canning in a commercial situation. Sizes 2 and 3 were considered to be the most desirable sizes for canning and the last column of Table 8 shows the sum of these two categories. Size 4 tends to be larger than desired for canning. The ideal cultivar would be one with the highest percent of fruit in Size 2 and Size 3 categories. This would then imply a high degree of uniformity of fruit size.

In order to get an estimate of the firmness of the fruit, the sample is dropped from a 4 foot height onto a cement floor. Any fruit that have cracked extending into the flesh are counted and weighed. This measurement provides some indication of how firm the fruit are. The results of this test are shown in Table 9.

After the preliminary evaluations the fruit were peeled using the procedure outlined below in Figure 2.

In order to determine what weight of fruit is lost in the peeling process the peeling recovery was calculated (Table 10). Lines with severe cracking would be expected to be adversely affected as would lines with a large proportion of small fruit, in addition to those which lose weight from cell layers under the peel.

Figure 2. Peeling and Canning Protocol.

Peeling Line

1. Weigh a 3 kg subsample from the red ripe fruit.

2. Count the number of fruit with stems and without stems. Then remove any stems in sample.

3. Size the sample using the size grader.

4. Drop tomatoes from 4 foot height onto floor. Weigh any fruit in which the crack extends into the flesh.

Caustic Solution: (20 % by weight)
63 litres water
12.6 kg KOH flakes Maintain temperature between 102 and 104 C.

5. Put into basket and immerse in caustic for 50 seconds.

6. Make certain that tomatoes are well stirred in the lye solution.

7. Rinse tomatoes in the rinse tank on lye applicator.

Citric Acid Rinse: (pH 3.5)
12.5 g Citric acid
23 litres water

8. Put tomatoes into water tank of peel eliminator for a second rinse.

9. Run the fruit over the peel eliminator.

10. Collect fruit from peel eliminator into citric acid rinse.

Colormet pass/fail threshold set at 2.6 in "Whole" mode.

11. Remove from acid rinse and photograph sample.

12. Weigh sample.

13. Grade fruit using Colormet to find cannable fruit and weigh.

14. Put cannable tomatoes in cans (3 can sample).

Juice Line

1. After 3 kg sample is weighed out for peeling wash a sample of the remaining fruit as required for juice.

2. Blend sample for 1 minute.

3. Measure out 1.5 L of thin pulp and pour into a beaker and heat in microwave to hot break point (95 C) and hold for 15 sec.

4. Pass heated thin pulp very slowly through finisher to ensure that no pulp is ejected. (.033 size screen)

5. Can a sample for pH, RI, and Bostwick measurements to be taken when sample is 20 C (+/- 2 degrees).

(Use 50 ml of thin pulp, let run for 30 seconds on Bostwick)

6. Keep remaining juice hot until put into can.

Canning

1. Fill 3 cans with peeled tomatoes.

2. Add 15 ml brine to each of two cans, and 15 ml brine + firming agent to the third can.

Brine: 488 g NaCl in 1500 ml water.
Add 15 ml of this to give 4.88 g NaCl in each 19 oz (540 ml) can.

3. Top up cans with juice.

4. Seam cans and LABEL.

Brine + Firming agent: 488 g NaCl + 103 g CaCl2.2H20 in 1500 ml water. Add 15 ml of this to give 4.88 g NaCl and 1.03 g CaCl2 in each 19 oz (540 ml) can. (Ratio of salt to firming agent 6:1).

5. Cook cans in still retort for 50 minutes at 100 C.

Centre of can must reach 195 F for 3 minutes.

6. Cool cans after cooking to 38 C.

Table 8. Processing Tomato Yield Trial, 1992. Average Fruit size and Uniformity of Fruit size.

Name	Average Fruit Size (g)	Size #1 (%) 1"	Size #2 (%) 1 1/2"	1 3/4"	Size #3 (%) > 1 3/4"	Size #4 (%)	Size 2+3
CC 195	57.4	0.2	32.3		39.4	28.0	71.8
CC 164B	49.0	1.8	73.7		21.5	2.6	95.2
RCAT 9201	48.4	0.3	63.0		34.4	2.4	97.2
CC 329	54.0	0.7	58.7		33.0	6.8	92.4
CC 193A	47.6	0.7	78.8		13.7	6.8	92.5
RCAT 9202	54.4	0.3	54.2		35.5	9.8	89.7
CC 71-22	46.1	2.3	81.7		15.5	0.7	97.2
Ohio 8556	64.3	0.1	21.9		40.6	37.4	62.6
Ohio 8550	58.2	0.1	30.3		50.7	22.9	77.0
Ohio 7983	**59.5**	**0.1**	**36.3**		**43.8**	**17.6**	**80.1**
HRS 3	49.3	0.2	52.2		35.6	11.9	87.9
HRS 9202	48.9	1.1	72.3		23.1	3.3	95.5
RCAT 9210	45.5	1.4	66.6		21.6	10.1	88.2
OX1	67.8	0.1	19.8		34.4	45.9	43.7
OX4	63.1	0.2	26.1		34.3	39.9	60.4
Peto 2196	57.8	0.0	32.7		37.6	29.6	70.2
HRS 9204	52.9	0.3	51.5		35.6	11.9	87.1
HRS 9203	55.2	0.4	47.6		42.4	9.7	89.8
CC 218	49.5	1.4	73.7		21.7	2.9	95.4
Peto 696	**58.1**	**0.0**	**32.7**		**37.6**	**29.6**	**70.2**
HRS 9201	69.2	0.0	19.7		33.6	46.6	53.8
HRS 2	59.7	0.1	40.9		36.5	21.9	77.4
RCAT 9102	59.6	0.0	34.0		44.5	20.9	78.9
RCAT 9211	60.0	0.3	35.2		34.9	29.8	70.1
SO 12	57.7	0.0	45.2		40.1	14.8	85.3
Ohio 8245	**58.3**	**0.1**	**32.0**		**35.4**	**32.3**	**67.4**
CC 390	61.2	1.6	46.4		41.3	11.3	87.7
Probability	0.0001	0.14	0.0001		0.0002	0.0001	0.0001
cv	9.92%	235%	32.2%		36.4%	64.5%	14.8%

Entries are ranked according to average maturity from all test sites. The sum of different size categories across rows may not total 100 due to rounding off.

Table 9. Processing Tomato Peeling Trial, 1992. Percent Cracked Fruit.

Name	Cracked Fruit (%)
HRS 9204	9.7
HRS 9203	10.5
CC 390	11.7
CC 218	11.8
RCAT 9210	12.2
Peto 696	**14.0**
CC 193A	14.1
RCAT 9211	16.2
S0 12	17.4
Ohio 8245	**18.2**
HRS 2	18.7
Ohio 7983	**18.9**
CC 329	19.1
CC 164B	20.7
CC 71-22	21.3
HRS 3	22.5
Peto 2196	24.5
OX4	24.8
RCAT 9202	26.3
RCAT 9201	26.4
HRS 9201	27.0
RCAT 9102	28.0
HRS 9202	28.3
Ohio 8550	34.4
OX1	36.1
Ohio 8556	38.1
CC 195	45.4
Probability	0.0001
cv	40.9%

Table 10. Processing Tomato Peeling Trial, 1992. Percent Peeling Recovery.

Name	Peeling Recovery (%)	
RCAT 9211	89.7	a
Peto 2196	89.0	a
SO 12	87.6	ab
Peto 696	**87.5**	abc
CC 71-22	87.4	abcd
HRS 9203	86.5	abcd
HRS 9204	86.4	abcd
Ohio 7983	**86.3**	abcd
CC 218	85.9	abcd
HRS 2	85.9	abcd
Ohio 8245	**85.6**	abcd
OX1	85.1	abcd
Ohio 8550	84.8	abcd
HRS 9201	84.2	abcd
RCAT 9102	84.2	abcd
CC 390	84.0	abcd
CC 329	83.8	abcd
HRS 3	83.7	abcd
CC 193A	83.6	abcd
Ohio 8556	83.6	abcd
OX4	82.9	abcd
CC 195	82.4	abcd
RCAT 9202	82.4	abcd
HRS 9202	80.6	bcd
RCAT 9210	80.6	bcd
RCAT 9201	79.9	cd
CC 164B	79.7	d
Probability	0.11	
cv	5.86%	

Means followed by the same letter are not significantly different, DMRT.

After peeling the tomatoes were sorted in order to find out what percent of peeled tomatoes were suitable for canning. These results are expressed as a percent of the weight of tomatoes after peel removal and are shown in Table 11. Fruit were sorted on the basis of colour, freedom from peels, and severe superficial blemishes. Acceptable peeled colour was determined using the Colormet as a standard. Fruit with more than 50% of the peel remaining were considered unacceptable and so the ease of peel removal is a component of this number. Percent cannable shows the percent of tomatoes that had no significant colour defects, and that peeled well. This provides some idea of how much sorting may be required, and indicates what percent of tomatoes will have to be put into the juice/sauce line. It gives some idea of how good the tomatoes looked after peeling.

The data can be looked at another way by summarizing according to the percent canning recovery (Table 12). These data are equivalent to taking the percent cannable (Table 11) and multiplying by the peeling recovery (Table 10). The result will be percent canning recovery (Table 12). The benefit in looking at these data is that they indicate the percent, by weight, of tomatoes that are of good enough quality to end up in a can, based on the initial amount of tomatoes received at the factory.

Table 11. Processing Tomato Peeling Trial, 1992. Percent Cannable.

Name	Cannable Fruit (%)	
HRS 9203	78.0	a
RCAT 9210	77.4	ab
SO 12	74.7	abc
RCAT 9102	70.8	abcd
CC 390	69.8	abcd
Ohio 8556	69.5	abcd
CC 218	69.0	abcd
Ohio 7983	**68.8**	abcd
Peto 2196	68.1	abcd
CC 329	68.0	abcd
OX1	67.4	abcd
HRS 9204	65.8	abcde
CC 164B	65.4	abcde
Ohio 8245	**61.2**	abcde
HRS 3	57.3	abcde
CC 193A	56.6	abcde
OX4	55.9	bcdef
CC 71-22	55.2	cdef
RCAT 9211	53.8	cdef
Ohio 8550	53.6	cdef
Peto 696	**53.6**	cdef
HRS 2	50.5	defg
RCAT 9201	49.2	defg
RCAT 9202	48.9	defg
HRS 9202	44.6	efg
CC 195	35.2	fg
HRS 9201	30.7	g
Probability	0.0001	
cv	23.7%	

Means followed by the same letter are not significantly different, DMRT.

Table 12. Processing Tomato Peeling Trial, 1992. Percent Canning Recovery.

Name	Canning Recovery (%)	
HRS 9203	67.1	a
SO-12	65.3	ab
RCAT 9210	64.5	ab
Peto 2196	64.3	ab
Ohio 7983	**64.0**	ab
Ohio 8556	63.3	ab
RCAT 9102	63.1	ab
Ohio 8245	**60.2**	ab
CC 390	60.1	ab
OX1	59.4	ab
CC 218	58.4	ab
CC 329	57.0	ab
HRS 9204	56.8	ab
HRS 3	55.7	ab
Peto 696	**54.7**	ab
Ohio 8550	53.3	ab
CC 164B	52.0	abc
HRS 2	50.6	abc
HRS 9202	49.9	abc
OX4	48.6	abc
CC 71-22	48.2	abc
RCAT 9211	47.6	abcd
CC 193A	46.9	abcd
RCAT 9201	44.8	abcd
RCAT 9202	41.7	bcd
CC 195	30.5	cd
HRS 9201	26.1	d
Probability	0.002	
cv	28.2%	

Means followed by the same letter are not significantly different, DMRT.

Part C. Fruit Quality Trials

In conjuction with the peeling and canning evaluations quality measurements were taken on each fruit sample collected from the yield trial.

Sample Preparation:

Juice samples were prepared according to the methods outlined in the peeling protocol above. These samples were canned and evaluated after the harvest season was over.

Results and Discussion:

The results for Agtron, Soluble Solids, pH, and modified Bostwick consistency are summarized in Table 13.

Table 13. Processing Tomato Quality Trial, 1992. Results of Lab Evaluations on Juice Samples.

Name	Agtron		Soluble Solids		pH		Bostwick (cm)	
CC 164B	29.6	abc	4.8	ab	4.25	bc	5.8	a
CC 193A	31.6	abcde	4.8	ab	4.35	de	7.6	abcdef
CC 195	35.4	def	4.3	abc	4.29	cde	7.2	abcde
CC 218	32.4	abcde	4.8	ab	4.29	cde	7.4	abcdef
CC 329	29.8	abcd	4.9	a	4.27	cd	8.1	bcdefg
CC 390	32.0	abcde	4.9	ab	4.28	cd	7.3	abcde
CC 71-22	29.4	ab	4.7	ab	4.30	cde	7.5	abcdef
HRS 9201	38.8	f	4.1	abc	4.21	abc	9.3	efg
HRS 9202	34.6	bcdef	4.0	abc	4.38	e	7.6	abcdef
HRS 9203	28.8	a	4.7	ab	4.25	bc	7.7	abcdef
HRS 9204	31.4	abcde	4.4	abc	4.27	cd	6.8	ab
HRS 2	35.1	bcdef	3.8	abc	4.25	bc	8.2	bcdefg
HRS 3	34.1	abcdef	4.2	abc	4.25	bc	8.8	bcdefg
Ohio 7983	**33.4**	abcdef	**3.9**	abc	**4.22**	abc	**9.5**	fg
Ohio 8245	**33.8**	abcdef	**4.6**	ab	**4.21**	abc	**9.0**	cdefg
Ohio 8550	32.2	abcde	4.1	abc	4.26	cd	10.2	g
Ohio 8556	30.4	abcd	4.4	abc	4.30	cde	9.9	g
OX1	33.4	abcdef	3.4	c	4.16	ab	9.1	defg
OX4	33.6	abcdef	4.2	abc	4.23	bc	7.0	abcd
Peto 696	**36.7**	ef	**3.8**	bc	**4.22**	abc	**7.8**	abcdef
Peto 2196	35.2	cdef	4.2	abc	4.13	a	8.3	bcdefg
RCAT 9102	30.6	abcd	4.8	ab	4.30	cde	6.9	abc
RCAT 9201	33.6	abcdef	4.7	ab	4.27	cd	8.2	bcdefg
RCAT 9202	34.0	abcdef	4.0	abc	4.28	cd	7.6	abcdef
RCAT 9210	34.2	abcdef	4.9	a	4.28	cd	8.7	bcdefg
RCAT 9211	34.9	bcdef	4.3	abc	4.22	abc	8.3	bcdefg
SO 12	34.2	abcdef	4.5	abc	4.25	bc	6.9	abc
Probability	0.006		0.05		0.0001		0.0001	
cv	11.2%		16.2%		1.4%		17.2%	

Means within columns followed by the same letter are not significantly different, DMRT.

Part D. Conclusions and Recommendations

It should be noted that these conclusions are based only on the data presented in this report, and are thus limited to only a single year's results. However, there are still some important conclusions that can be drawn.

CC 164B
- maturity is extremely early, only CC 195 was earlier
- yield was good at Ridgetown site, but poor overall, which is not surprising with early maturity
- peeled colour was better than CC 195
- firmness was average, as was canning recovery
- the Soluble Solids and viscosity were both very good compared to the other entries in the trial

CC 193A
- overall marketable yield was excellent
- firmness was good
- very early maturity
- very good soluble solids
- colour was poor

CC 195
- notable for its extremely early maturity, the first entry to be ready for harvest, up to a week earlier that Ohio 7983, the early check
- fruit were soft, yield was poor, and colour was disappointing

CC 218
- total yield was fair, to poor, although marketable yield was average
- fruit were very firm

CC 329
- marketable yield was good
- very early maturity
- firmness was average, peeled colour was average
- Soluble Solids were excellent

CC 390
- very late maturity, but excellent marketable yield
- fruit were very firm
- canning recovery was good, and percent cannable fruit was excellent
- Soluble Solids were also excellent

CC 71-22
- yields were average
- matured slightly earlier than Ohio 7983
- firmness was average, canning recovery was fair
- Soluble Solids were good

HRS 9201
- showed excellent yield potential
- mid to late season maturity
- fruit size was very large
- peeled colour was very poor

HRS 9202 - yield potential was average, and marketable yield was below average
- peeled colour was fair
- will probably be dropped for next season

HRS 9203 - excellent yield potential and marketable yield
- excellent peeled colour
- very firm
- good soluble solids
- midseason maturity
- shows much promise, it will be a good candidate for recommendation if it looks good next season

HRS 9204 - average yield, and peeled colour
- very firm, and very good viscosity
- fruit size is a bit small, but very uniform
- midseason maturity

HRS 2 - good yield potential, but poor marketable yield compared to lines with similar maturity
- fair peeled colour
- good firmness
- will probably be dropped for next year

HRS 3 - very good yield potential and good marketable yield
- good canning recovery
- has had good peeled colour in previous years.
- average firmness
- looked good in 1991, but fruit size was a problem, and was this year too
- will be dropped for next year due to problems with small fruit size

Ohio 8550 - tends to relatively large fruit size
- fruit tend to be soft
- peeled colour was average
- yields were average, and not as good as Ohio 7983, which has similar maturity

Ohio 8556 - fruit size was somewhat variable, with a fair number of large fruit
- fruit tended to be soft
- yields were not as good as Ohio 7983
- peeled colour was excellent, as expected

OX1 - early midseason maturity
- marketable yield was average, compared to other lines of similar maturity
- fair canning recovery
- good viscosity
- tends to be a bit soft

Peto 2196 - very good yield potential and marketable yield
- excellent canning recovery
- better colour and earlier than Peto 696, but not as high a yield, similar to previous year's results
- Petoseed is going to drop this one

RCAT 9102 - yield was poor
- peeled colour was very good
- tends to be a bit soft
- will be dropped for next year

RCAT 9201 - yield potential and marketable yield very good
- very early maturity
- peeled colour was poor
- tends to be a bit soft
- fruit size is uniform
- will be tested further because it offers the combination of high yield with very early maturity, however colour was disappointing

RCAT 9202 - yield potential was good, but marketable yield unacceptable
- early maturity
- poor peeled colour and average firmness
- will be dropped for the next season

RCAT 9210 - yield was poor
- canning recovery was excellent and Soluble Solids were good
- will be dropped for next year

RCAT 9211 - yielded well at Ridgetown, but was poor elsewhere
- colour was poor
- fruit size was variable
- will be dropped

<u>For 1993:</u>

Ohio 7983 - still recommended for early season
- colour was very good in the trials this year
- even though total yield was low, marketable yield was good

Peto 696 - midseason maturity
- as expected, it was a top yielder, it is difficult to beat for yield
- peeled colour was fair
- fruit are very firm
- soluble solids levels were disappointing

SO 12 - recommended for trial for late season maturity
- looked very good last year and again this year
- yields very similar to Ohio 8245, but better peeled colour

Ohio 8245 - still the standard for late season
- yields and firmness were good
- peeled colour was better than expected in the trials this year

For the future two lines look very promising. HRS 9203 has very good yield, and excellent peeled colour. RCAT 9201 has very high yields and very early maturity, however peeled colour in a year like 1992 was poor. These two lines require further testing before recommendations can be made.

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