Purdue University
Purdue e-Pubs

Purdue Fruit and Vegetable Research Reports | Purdue Fruit and Vegetable Connection

12-1-2001

Fresh Market Tomato Cultivar and Pruning Evaluation for Northern Indiana, 2000

Elizabeth Maynard
Purdue University - Main Campus, emaynard@purdue.edu

Follow this and additional works at: http://docs.lib.purdue.edu/fvtrials

Part of the Agricultural Science Commons, and the Horticulture Commons

Maynard, Elizabeth, "Fresh Market Tomato Cultivar and Pruning Evaluation for Northern Indiana, 2000" (2001). *Purdue Fruit and Vegetable Research Reports.* Paper 43.
http://docs.lib.purdue.edu/fvtrials/43

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.

Fresh Market Tomato Cultivar and Pruning Evaluation for Northern Indiana, 2000

Elizabeth T. Maynard
Dept. of Horticulture, Purdue University North Central, Westville, IN 46391

Fresh market tomatoes were evaluated at the Pinney-Purdue Agricultural Center in Wanatah, Indiana. Nine beefsteak types and one roma type were evaluated in a replicated trial. Plants were grown with and without pruning 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. Seven cultivars had two subplots per cultivar: one subplot pruned to leave 3 branches below the first mainstem cluster (moderate pruning) and one subplot unpruned. Three cultivars had four subplots each: 1) pruned to leave 1 branch below the first mainstem cluster (heavy pruning), 2) pruned to leave 3 branches below the first mainstem cluster, 3) pruned to leave 6 branches below the first mainstem cluster (light pruning), and 4) not pruned.
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./A N, 60 lb./A P_2O_5, and 250 lb./A K_2O from 14 - 7- 29, applied and incorporated before planting. Transplant starter solution supplied 0.75 lb. N, 3.5 lb./A P_2O_5, and 1.2 lb./A K_2O from 9-45-15 (0.75 lb. in 50 gal. water). Magnesium sulfate, 20 lb./A, applied as foliar spray Aug. 4.
Planting, Pruning:	Seeded April 7 in 128-cell flats, transplanted May 15. Trained in a trellis-weave system. The four plants of each subplot were pruned as described above on June 15, except for some plants of late cultivars that were pruned a week later. At the time of pruning, flower buds were visible on all plants and early cultivars had begun to bloom.
Weed control:	4-ft wide black plastic mulch, Lexone DF between plastic at 0.5 lb./A May 26, and hand weeding.
Disease control:	Champ, 72 oz./A June 19; Quadris 2.08 EC, 6 oz./A June 30 and July 7; Kocide LF, 5 pt./A July 7; Bravo C/M 4 lb./A July 14, July 27, Aug. 4, Aug. 11, Aug. 18.
Insect control	Dipel, 1 lb./A, July 11.
Irrigation:	Drip irrigation beneath plastic mulch as needed.
Harvest:	Weekly harvests of fruit at or beyond pink stage 8/14 through 9/7. 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.
Data collected:	Weight and number of fruit in each category. Number of culls due to catfacing, cracking, blossom end rot, and other reasons. Observations on fruit firmness and appearance. Data from the moderate and no pruning treatments for the nine beefsteak cultivars were analyzed using ANOVA followed by mean separation using Fisher's protected LSD. The effect of

Originally published in Midwestern Vegetable Variety Trial Report for 2001. Compiled by Mario R. Morales and Liz Maynard. Bulletin 808. Dept. of Horticulture and Office of Agricultural Research Programs, Purdue University, W. Lafayette, Indiana. December 2001.

pruning on the roma type was analyzed with a separate ANOVA. Data from the cultivars with four pruning treatments were also analyzed separately, using ANOVA and orthogonal contrasts to test for linear and quadratic effects of pruning severity, and overall pruning effects.

Cultivars

Table 1 shows the results averaged across pruning treatments for beefsteak types. U.S. No. 1 yield ranged from 13.5 to 23.0 lb. per plant (588 to 1002 cwt./A). Mt. Fresh produced the greatest yield and EX 1703302 produced the least yield. Yield of other cultivars did not differ significantly from one another. EX 1703302 and SunChief produced the greatest early yield, followed by EX 1703292, Sunsation, and Mt. Spring. Fruit quality for EX 1703302 and SunChief was not as good as for the later varieties. SunChief tended to crack, and EX 1703302 tended to produced catfaced fruit. Florida 91 produced the largest fruit (0.64 lb. or 10.2 oz.), followed closely by Mt. Spring, SunChief, Sunsation, and EX 1703292. EX 1703302 produced the smallest fruit (0.51 lb. or 8.2 oz.). Fruit size was also reflected in the percent of fruit in various size classes: Florida 91 had over 60% of No. 1 fruit in the maximum large size class, while EX 1703302 had 30% in that size class. Culls represented from 8% to 23% by weight of all fruit produced. Cultivars with above-average amount of catfacing included EX 1703302, Mt. Spring, and Floralina. Blossom end rot was 1% or lower in all cultivars. Cracking was below 2% in all cultivars except SunChief. In 1999 SunChief also exhibited a tendency to crack. Depending on grower needs, most varieties in this trial would be worth looking at. **Mt. Fresh** has consistently yielded well and produced very good quality fruit in trials at this location. **Sunsation**, **EX 1703292**, and **PX 771297** can be compared to Mt. Spring: they appear slightly earlier (particularly the first two), with slightly smaller fruit, and perhaps fewer culls. **Floralina** is a little later than Mt. Spring, with smaller fruit of good quality. **Florida 91**, another later-maturing variety, is notable for its large fruit and good quality. It also performed well in last year's trial at this location.

Moderate Pruning compared to No Pruning

Pruning made a large difference in No. 1 yield, total yield and fruit size (Tables 1 and 2). Averaged over all beefsteak cultivars, pruning reduced yield of No. 1 fruit and total yield by 38%, and increased fruit size by 25% (Table 1). Last year results were similar: No. 1 yield was reduced by 40% and fruit size increased by 19%. There were some differences among varieties in how much pruning influenced yield. EX 1703292 showed no significant difference in No. 1 yield (lb. per plant) between pruned and unpruned treatments, while Sunsation showed a 47% decrease in No. 1 yield due to pruning. For the roma line PS 150046, pruning reduced yield by 33%, and increased fruit size by 21%. It is likely that per acre yield reductions due to pruning could be partially offset by planting pruned plants at higher populations than used in this study. Growers have reported planting pruned plants 12" to 18" apart in the row. Pruning did not influence the percentage cull fruit this year, in contrast to last year when pruning increased cull fruit 30% due to greater incidence of cracking on pruned plants. There was no effect of pruning on early yield (measured as pounds of No.1 fruit harvested in the first two harvests) when averaged over all beefsteak cultivars. When each cultivar was considered separately, the two earliest cultivars, EX 1703302 and SunChief showed a reduction in early yield of about 30% with pruning. In 1999, early yield of SunChief was also reduced by pruning.

Light, Moderate, and Heavy Pruning
Results for additional pruning treatments on Mt. Spring, SunChief, and Mt. Fresh, are shown in Figs. 1, 2, and 3. Yield of No. 1 fruit as well as total yield was greater for unpruned plants than for pruned plants (Fig. 1). The heavier the pruning, the less yield. On average, for each branch left on the plant, No. 1 yield increased by 1.75 lb. per plant, or roughly 10%. For the first harvest, there was a slight trend for increased total yield (No. 1, No. 2, and culls) with heavier pruning when averaged over all cultivars, but cultivars differed. For SunChief, unpruned plants yielded more than pruned plants on all harvest dates. For Mt. Spring on the first harvest date, unpruned plants produced slightly less total yield than pruned plants (0.54 lb. vs. 1.12 lb.). For Mt. Fresh on the first harvest date, pruning didn't influence yield. Because of the small plot size, significant differences in yield at the first harvest are difficult to detect, and conclusions based on first harvest yields should be quite tentative. By the second harvest date, unpruned plants yielded the same or more than pruned plants for all cultivars.

Fruit from unpruned plants was the smallest, and the more a plant was pruned, the larger the average fruit size (Fig. 2a). On average, for each branch left on the plant, average fruit weight decreased by 0.2 oz, or about 2%. Pruning did not affect fruit size of Mt. Spring as much as it did Mt. Fresh and SunChief. Pruning effects on fruit size were also apparent in the percentage of yield in the maximum large size category (Fig. 2b). For each branch left on the plant, the percentage maximum large yield decreased by 7.6 for SunChief, by 4.3 for Mt. Fresh, but did not change for Mt. Spring.

Pruned plants and unpruned plants produced similar percentage cull fruit (Fig. 3a). Among the pruned plants, the percentage of culls tended to increase as pruning increased from light to moderate to heavy. The incidence of catfacing was higher on unpruned plants for the cultivars Mt. Spring and SunChief (Fig. 3b). All cultivars showed greater incidence of cracked fruit on pruned plants than unpruned plants (Fig. 3c).

Summary of Pruning Effects
The main benefit of pruning is larger fruit size. For some cultivars, there might be an increase in total yield at the first harvest with pruning, as was seen to a small extent for Mt. Spring. Pruning also reduced the incidence of catfacing, especially for early cultivars. The main drawback of pruning is reduced yield. For pruning to be profitable, the labor cost of pruning and the reduction in total yield must be offset by higher plant populations, higher prices, or other market advantage.

Table 1. Yield and fruit size of nine tomato varieties and effect of pruning on yield and fruit size, Pinney Purdue Ag Center, Wanatah, Indiana, 2000.#

		No. 1 Fruit										Total Fruit							
		Yield per Plant		Average Wt. per Fruit	% Max. Large	% Ex. Large	% Large	% Med. +Small	Early Yield per Plant (8-14 to 8-21)			Yield per Plant		% No. 1	% No. 2	% Culls	% Catface	% BER	% Crack
Cultivar	Co.	Number	Weight (lb.)	(lb.)	-------(% of no. 1 Fruit by wt.)------				Number	Weight (lb.)	%by Wt.	Number	Weight (lb.)	------(% by wt.)------			---(% by number)---		
EX1703292	AS	30	18.2	0.61	49	43	8	0.3	8.4	5.7	31	37	23	81	9	10	1.8	0.0	1.0
EX1703302	AS	28	13.5	0.51	30	52	15	2.1	13.4	7.2	53	42	21	63	14	23	10.2	0.5	1.7
Floralina	PS	33	18.2	0.57	44	47	8	0.7	3.9	2.3	14	42	23	79	7	14	5.5	1.0	0.2
Florida 91	AS	31	18.8	0.64	61	36	3	0.2	3.0	2.0	12	37	23	82	7	11	3.1	0.8	0.0
Mountain Fresh	RU	42	23.0	0.59	42	51	7	0.6	4.3	2.7	13	48	26	86	5	8	1.7	0.3	0.5
Mountain Spring	RU	29	17.6	0.62	57	38	4	0.4	5.6	3.9	24	40	24	73	10	17	6.7	0.3	0.8
PX771297	PS	33	18.1	0.58	48	45	7	0.6	5.8	3.6	21	40	23	80	9	12	3.8	1.0	0.1
SunChief	AS	26	15.3	0.61	49	45	6	0.4	10.3	6.6	47	36	22	67	11	22	3.8	0.7	9.0
Sunsation	AS	34	19.4	0.61	52	40	8	0.4	8.2	5.4	32	42	25	77	12	11	4.5	0.4	0.7
Grand Mean		32	18.0	0.59	48	44	7	0.6	7.0	4.4	27	40	23	76	9	14	4.6	0.6	1.6
LSD .05##		7	3.6	0.04					2.6	1.8		7	4						
Prune Treatment																			
Pruned		21	13.8	0.66	59	37	4	0.3	6.6	4.4	33	28	18	75	10	14	3.8	0.5	2.3
Unpruned		42	22.2	0.53	37	51	11	1.0	7.4	4.4	22	53	29	77	9	14	5.3	0.6	0.8
Significance+																			
Pruned vs unpruned		****	****	****					ns	ns		****	****						
Cultivar X Prune		*	†	ns					*	†		*	*						

#Pruning = removed all branches from soil up to (and including) 4th branch below first mainstem flower cluster.

##Fisher's protected least significant difference, p=.05.

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

Table 2. Yield and fruit size of ten tomato varieties grown with (p) or without (u) pruning, Pinney Purdue Ag Center, Wanatah, Indiana, 2000.#

		No. 1 Fruit										Total Fruit							
		Yield per Plant		Average Wt. per Fruit	% Max. Large	% Ex. Large	% Large	% Med. +Small	Early Yield per Plant (8-14 to 8-21)			Yield per Plant		% No. 1	% No. 2	% Culls	% Catfac	% BER	% Crack
Cultivar	Prune Trt.	Number	Weight (lb.)	(lb.)	------(% of no. 1 Fruit by wt.)------				Number	Weight (lb.)	%by Wt.	Number	Weight (lb.)	------(% by wt.)------			---(% by number)---		
EX1703292	p	26	17.2	0.67	59	36	4	0.1	9.6	6.7	38	31	21.2	81	12	7	0.9	0.0	0.9
EX1703292	u	35	19.2	0.55	38	49	12	0.5	7.2	4.6	24	42	23.9	80	7	13	2.7	0.0	1.1
EX1703302	p	19	10.7	0.56	40	51	8	0.8	9.9	6.0	56	31	18.2	59	15	25	11.6	0.5	2.4
EX1703302	u	37	16.4	0.45	21	54	22	3.4	16.8	8.3	51	54	24.7	66	12	21	8.8	0.6	1.1
Floralina	p	21	13.3	0.62	54	41	4	0.4	4.3	2.4	18	26	16.6	80	8	13	4.7	0.6	0.4
Floralina	u	45	23.1	0.52	35	52	12	0.9	3.6	2.1	9	57	29.8	78	7	15	6.3	1.4	0.0
Florida 91	p	19	13.0	0.70	72	27	1	0.0	2.8	1.9	15	23	15.6	83	7	10	0.3	1.3	0.0
Florida 91	u	43	24.6	0.58	50	44	5	0.4	3.3	2.0	8	52	30.3	81	7	13	5.8	0.4	0.0
Mountain Fresh	p	26	17.1	0.67	55	42	3	0.1	4.5	2.9	16	30	20.0	85	7	8	1.2	0.3	0.6
Mountain Fresh	u	58	28.9	0.50	28	60	11	1.1	4.0	2.5	9	65	32.8	88	4	8	2.2	0.4	0.4
Mountain Spring	p	22	14.7	0.66	64	33	3	0.1	6.3	4.5	31	30	19.6	75	10	15	4.2	0.2	0.6
Mountain Spring	u	35	20.5	0.58	51	43	6	0.8	5.0	3.2	16	49	28.8	71	11	18	9.2	0.4	1.0
PX771297	p	22	13.9	0.65	60	37	2	0.1	6.5	4.2	29	27	17.4	79	8	13	4.5	1.2	0.0
PX771297	u	44	22.3	0.51	36	52	11	1.1	5.1	3.1	14	54	28.0	80	10	10	3.1	0.9	0.2
SunChief	p	17	11.1	0.66	60	36	5	0.1	7.8	5.4	51	26	17.7	62	12	26	2.5	0.4	14.6
SunChief	u	35	19.4	0.55	38	55	7	0.6	12.9	7.9	42	47	26.9	72	11	18	5.0	1.0	3.3
Sunsation	p	20	13.5	0.70	68	30	2	0.6	7.4	5.3	41	25	17.9	75	14	11	4.4	0.3	1.1
Sunsation	u	48	25.3	0.53	36	50	13	0.3	9.0	5.6	22	59	31.8	79	10	11	4.6	0.6	0.3
LSD for effect of pruning within a cultivar.##		9	4.9	0.06					3.8	2.2		9	4.8						
Roma Type																			
PS150046	p	84	19.2	0.23	–	–	–	–	19.4	4.9	26	91	20	95	2	3	0	0.1	0.1
PS150046	u	147	28.4	0.19	–	–	–	–	32.3	6.8	24	164	30	94	1	5	0	0.5	0.0
Significance+		*	†	*					ns	ns		*	†						

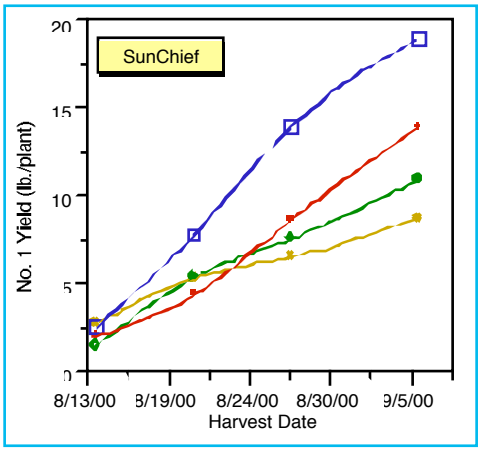
#Pruning = removed all branches from soil up to (and including) 4th branch below first mainstem flower cluster.

##Fisher's protected least significant difference, p=.05.

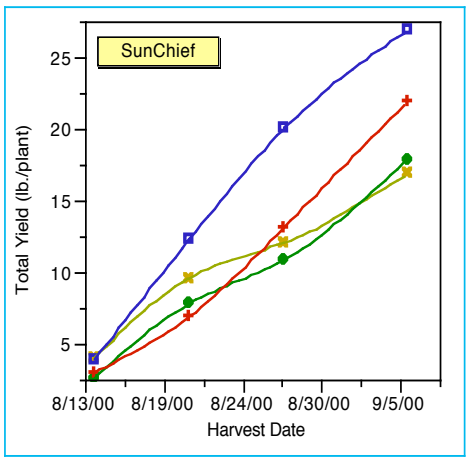
+ns, †, and * indicate non-significance, and p<.1, .05 respectively.

Figure 1. Cumulative No. 1 and total yield of unpruned tomato plants and plants pruned to leave 1, 3, or 6 branches below the first mainstem flower cluster for three cultivars at Wanatah, Ind., 2000. a,b. 'SunChief'. c,d. 'Mt. Spring'. e,f. 'Mt. Fresh'. Symbols: blue square=unpruned; yellow x=1 branch; red circle=3 branches; green +=6 branches.

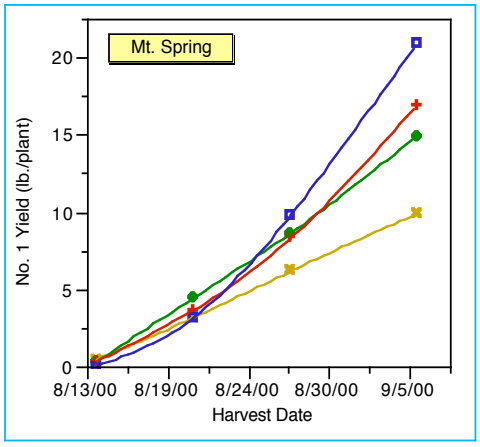
a.



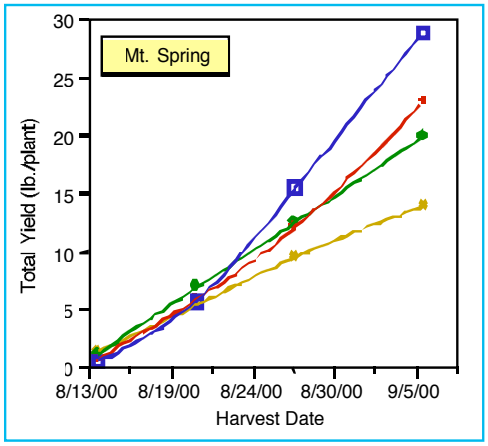
b.



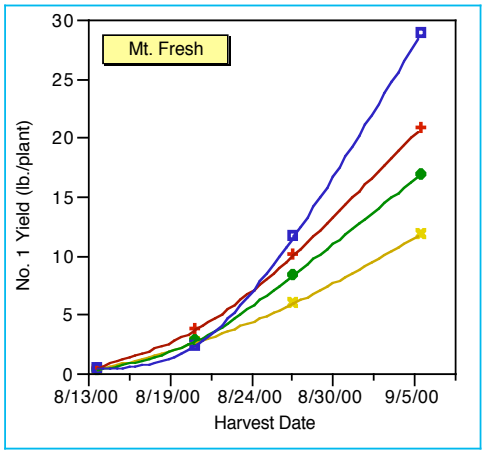
c.



d.



e.



f.

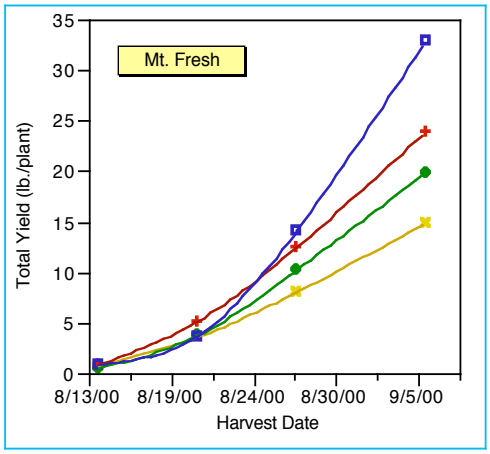
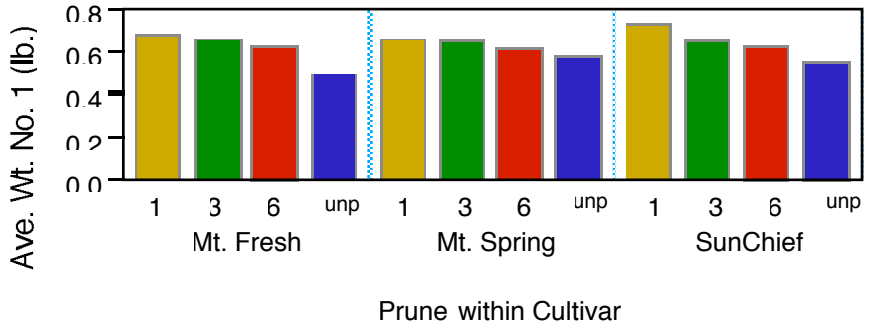


Figure 2. Fruit size for unpruned tomato plants and plants pruned to leave 1, 3, or 6 branches below the first mainstem flower cluster for three cultivars at Wanatah, Ind., 2000. a. Average weight per No. 1 fruit. b. Percentage of No. 1 fruit in maximum large size category.

a.



b.

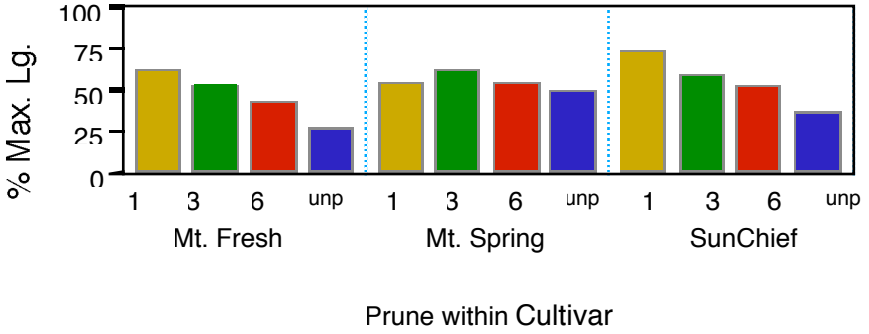
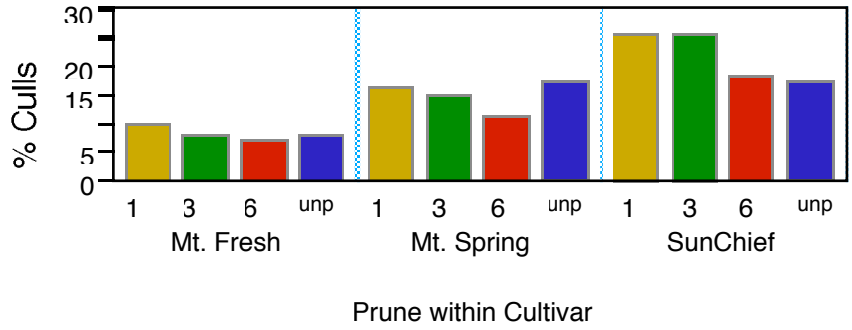
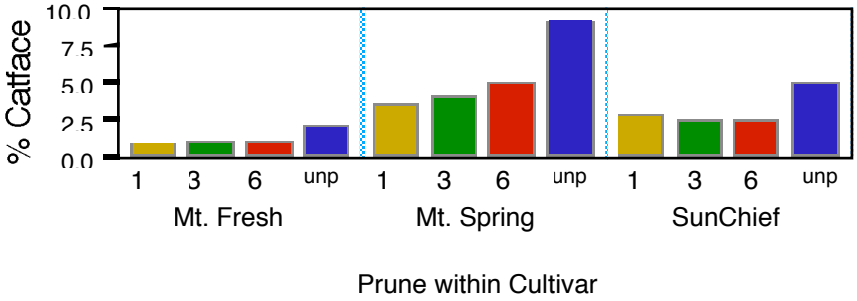
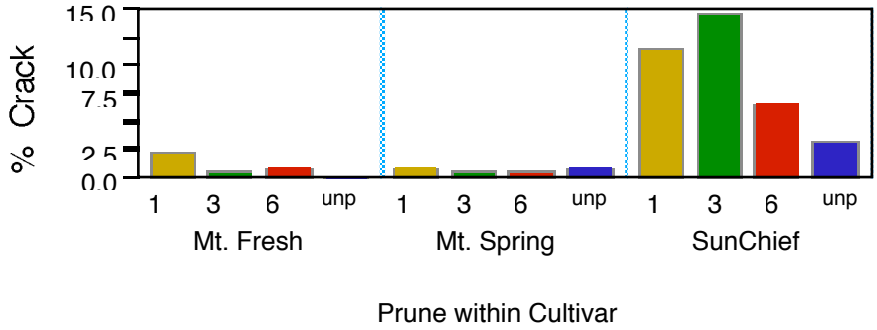


Fig. 3. Percentage cull fruit and incidence of catfacing and cracking on unpruned tomato plants and plants pruned to leave 1, 3, or 6 branches below the first mainstem flower cluster for three cultivars at Wanatah, Ind., 2000. a. Percentage of total yield that was cull (by weight). b. Percent of all fruit that was catfaced (by number). c. Percent of all fruit that was cracked (by number).

a.



b.



c.