University of California Cooperative Extension

Vegetable Crop Facts

Merced and Madera Counties

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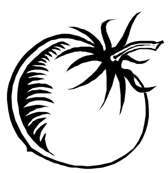
CDFA TOMATO PRODUCTION ESTIMATES

California Department of Food and Agriculture recently released its production estimates for tomatoes for each county. Merced county produced 511,200 tons of processing tomatoes in 2003, which is down slightly from the 2002 crop. Average yields were 32.6 tons per acre. Kings county continues to expand acreage, and has now surpassed Merced in production. Contract price remained the same, at about $50 per ton.



Fresh market tomato acreage and production were down in 2003 as compared to 2002, however, prices were much better, and the total value of the crop increased 16%. Individual county acreages were not reported. The Kings County production estimate for 2002 (31 tons, or 2500 boxes/A) is probably incorrect.

Table 1. California tomato production estimates from CDFA.

	Area Harvested		**Average Yield**		**Production**		**Price**		**Total Value**	
	2002	**2003**	**2002**	**2003**	**2002**	**2003**	**2002**	**2003**	**2002**	**2003**
Processing		**Acres**		**Tons/Acre**		**Tons**	**$**	**$**	**$**	**$**
State Toal	291,000	274,000	38.0	33.8	11,056,000	9,252,000	50.30/ton	50.20/ton	628 million	529 million
Fresno	107,000	102,200	39.3	35.9	4,200,000	3,666,000				
Yolo	41,600	34,400	36.2	32.7	1,505,000	1,123,000				
San Joaquin	32,600	33,500	37	32.5	1,206,000	1,087,000				
Colusa	18.7	16,900	41.0	38.3	764,000	648,000				
Kings	13,400	17,900	38.0	29.2	507,000	522,200				
Merced	**18,200**	**15,700**	**36.0**	**32.6**	**653,500**	**511,200**				
Stanislaus	16,600	14,600	36.5	32.0	605,000	466,900				
Fresh Market Tomatoes										
State Total	36,000	33,000	15.75	14.0	567,000	462,000	6.30/box	9.00/box	287 million	333 million
Merced	**10,500**	**9,800**	**13.82**	**------**	**145,000**	**------**				
San Joaquin	11,000		9.15		100,700					
Fresno	4500		20.9		94,000					
San Diego	2281		23.9		54,500					
Stanislaus	1920		22.4		43,000					
Kings	784		31.3		24,500					

INPUT COSTS AND $$….

At the recent CTGA meeting in Modesto, there was much discussion on what the price will be in 2004, considering the short crop we had last year. While no one can say exactly, the expectation is that it will be not much different this year than last. Long term, the trend appears to be much the same. Bottom line for producers in Merced county is that you need to plan your budget and management to be profitable at $50.00 per ton. This is a substantial challenge considering that input costs and insurance continue to go up each year. Cost savings methods to consider:

- ✓ Reduced tillage. Research by UCCE Vegetable Crops Specialist Dr. Jeff Mitchell has shown that you can significantly reduce the number of tillage operations and still maintain yields. Most of this reduction occurs by eliminating the heavy ripping and discing operations in the fall. Depending on the amount of compaction in the field after harvest, you may be able to do just a light "fluffing up" of the beds instead.
- ✓ Reduced nitrogen fertilizer. Research by UCCE Vegetable Crops Specialist Dr. Tim Hartz has consistently shown that nitrogen rates > 150 lbs/A do not increase yield. If you have sound fertility program that includes preplant and sidedress nitrogen, you may not need to water run any additional N.
- ✓ Drip irrigation. A bad word in these parts? We do not have a lot of production under drip, but growers in Yolo/Colusa and other northern counties are increasing the acreage with drip every year. Improved production is the main reason (labor savings are basically offset by equipment costs). Many UCCE trials have shown how yields can be improved while maintaining high soluble solids.
- ✓ Weed control. Herbicides do more than just improve yields—they can make a hoeing crew unnecessary or prevent a cultivation. Dual Magnum now has full registration and provides good suppression of many weeds, including nightshades. Matrix can also be effectively used over the top as a post emergence material for nigtshades. Sandea is newly registered and provides excellent control of nutsedge as a post emergence treatment and can be tank mixed with Matrix.

2003 RESEARCH SUMMARY

The full report for these trials is available at the Merced office and is also available online at http://cemerced.ucdavis.edu.

Processing Tomato Variety Trial.
In the replicated trial, best yields were observed for H 8892, AB 5, NDM 0098, H 2801, and U 941, which ranged from 41 – 35 tons/A. No significant differences were seen between varieties for soluble solids, which averaged 5.1% (Table 2). Highest Brix yield was achieved with AB 5. A copy of the complete statewide report is available at www.vric.ucdavis.edu.

Fresh Market Tomato Variety Trial.
No significant differences in marketable yield were seen for any of the varieties. Yields were excellent, and ranged from 37.5 to 27.5 in the replicated trial. In the observation trial, several of the BHN lines look promising. Regionally, best yields were noted for BHN 499, Sun King, and Quali T-23 (Table 3).

Nightshade and nutsedge herbicide evaluation trial.
Six herbicides were evaluated for their control of nightshade and yellow nutsedge in processing tomatoes. Tillam, Eptam, and Dual Magnum were all at-transplant incorporated and provided good initial suppression that faded as the season progressed. Post weed emergence sprays of Sencor provided good burn-down if the nightshade was in the cotyledon stage. Post-emergence applications of Matrix gave good control of nightshade; Sandea gave excellent control of nutsedge. A tank mix of Matrix + Sandea + non-ionic surfactant gave excellent control of both weeds for the entire season (Fig. 1)

Colored mulch on fresh market tomatoes.
On an early planted field, best yields were obtained with black, red, green, and silver. White, blue, and white-on-black resulted in reduced yields and increased incidence of tomato spotted wilt virus (Fig. 2).

Late season worm control.
This trial evaluated several different insecticides on beet armyworm control in a late season fresh market tomato field. All of the treatments except Warrior and ProAxis (new material not yet registered) significantly reduced worm counts and fruit damage. Best results were with Success, Intrepid, Avaunt, and Proclaim (Fig. 3).

Table 2. 2003 Processing Tomato Variety Trial replicated results, Merced County

#	Variety	Company	disease resistance	Yield tons/A		Brix (% ss)	brix Yield tons/A	LED Color	pH
8	H 8892	Heinz	VFFN	40.674	a	4.4	1.806	28.8	4.39
2	AB 5	AB Seeds	VFNP	39.683	a b	5.0	1.990	27.3	4.37
14	NDM 0098	Nippon DelMonte	VFFNT	38.834	a b c	5.0	1.946	25.0	4.43
10	H 2801	Heinz	VFFNP	36.634	a b c d	5.1	1.867	28.0	4.49
18	U 941	Unilever	VFFN	35.153	a b c d e	5.2	1.771	30.0	4.40
7	H 2601	Heinz	VFFNP	34.641	b c d e f	4.9	1.693	29.0	4.45
9	H 9780	Heinz	VFFNP	34.397	b c d e f g	5.0	1.723	29.5	4.37
6	H 2501	Heinz	VFFNP	33.215	c d e f g h	5.3	1.743	28.5	4.40
16	PX 849	Seminis	VFFNBsk	31.374	d e f g h I	5.2	1.638	30.3	4.38
1	AB 2	AB Seeds	VFFP	30.470	e f g h I	5.2	1.589	24.8	4.33
5	CXD 222	Campbells	VFFNP	30.056	e f g h I	5.4	1.617	29.0	4.36
15	PS 296	Seminis	VFFNBsk	29.828	e f g h I	5.5	1.648	28.0	4.35
13	La Rossa	Rogers	VFF	29.392	f g h I	4.8	1.386	28.0	4.44
4	CXD 221	Campbells	VFFFNP	28.924	g h I	5.3	1.541	28.5	4.44
12	HM 0830	Harris Moran	VFFN	28.586	h I	5.2	1.484	26.5	4.46
3	CPL 155 (15-58)	CPLTS	VFFNP	28.379	h I	5.4	1.531	27.5	4.42
17	SUN 6119	Sunseeds	VFFN	28.358	h I	5.2	1.437	31.5	4.41
11	Halley 3155	Orsetti	VFF	26.484	I	4.9	1.297	28.8	4.40
	average			32.505		5.1	1.650	28.3	4.40
	LSD 0.05			5.6		NS	0.36	NS	0.08
	CV, %			12.2		9.5	15.3	11.5	1.3

LSD 0.05 = least significant difference at the 95% probability level.
Means followed by the same letter are not significantly different

CV% = Coefficient of variation, a measure of the variability in the experiment

Table 3. Fresh market tomato variety trial yield and grade results, 2003.
Replicated varieties, Merced County.

Var #	Variety	Company	Market Yield Tons/A	Market Yield Boxes/A	XL	L	M	S tons/A	Culls tons/A	total tons/A	Red %
					% of marketable yield						
7	Q-23	Syngenta	37.45	2996	39.1%	44.5%	16.4%	4.94	8.5	50.93	23.4%
6	Q-21	Syngenta	34.59	2768	36.1%	42.6%	21.3%	7.57	6.2	48.40	14.5%
2	BHN 499	BHN Seed	32.81	2625	34.3%	35.8%	29.8%	8.74	12.3	53.85	20.4%
4	Sun King	Seminis	31.71	2537	22.9%	44.0%	33.1%	8.43	6.6	46.75	20.1%
8	Bobcat	Syngenta	31.59	2527	34.6%	41.7%	23.8%	7.76	7.3	46.60	18.2%
5	Shady Lady	Sun Seeds	31.05	2484	28.1%	41.6%	30.3%	8.09	7.4	46.56	27.4%
3	L-312	LSL	29.09	2327	50.3%	38.8%	10.9%	2.59	12.9	44.53	15.5%
1	BHN 464	BHN Seed	27.49	2199	27.9%	38.6%	33.5%	9.96	6.6	44.05	13.0%
	Average			2558	34%	41%	25%	7.3	8.5	47.7	19%
	LSD 0.05			NS	9.5	5.3	8.2	1.9	3.5	NS	8.2
	CV, %			14.2	18.9	8.7	22.3	17.7	27.9	11.6	29.2

Market yield = XL + L + M size fruit, average of four replications. One box = 25 lbs.
XL, L, M% = weight of respective fruit sizes divided by marketable yield.
Red% = weight of all red fruit divided by total yield. Indicates relative maturity among tested varieties.
Culls, tons per acre: Any fruit so disfigured (due to rot, cat facing, insect damage, etc.) as to be unmarketable.

XL = 3 inches and larger in diameter
L = 2.5 to 3"
M = 2.25 to 2.5"
S = 2 to 2.25" Fruit smaller than 2" were not harvested.

LSD 0.05 = least significant difference at the 95% probablility level.
Yields followed by the same letter are not significantly different.
NS = not significant at the 95% probability level.
CV = coefficient of variation, a measure of the variability in the experiment.

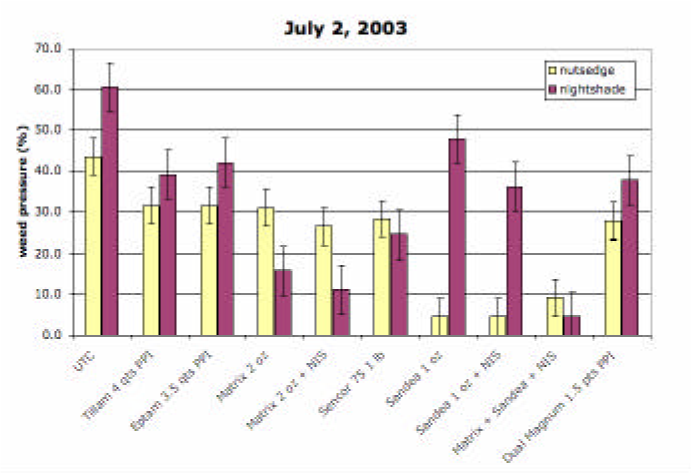


Figure 1. Nightshade and nutsedge weed pressure as affected by herbicide treatment on July 2. Error bars represent LSD 0.05.

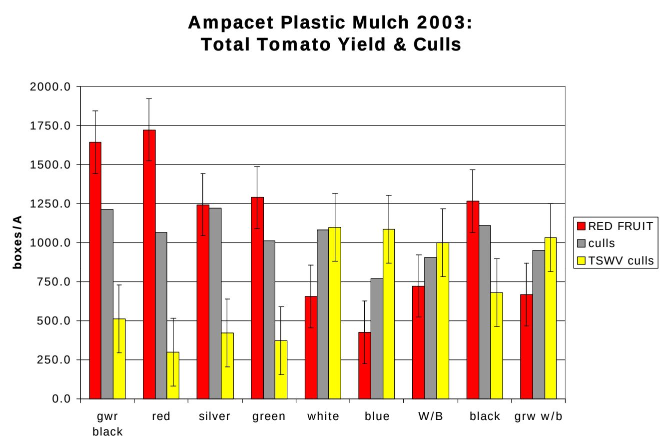


Figure 2. Fresh market yield, culls, and virus infected fruit as affected by color of plastic mulch.

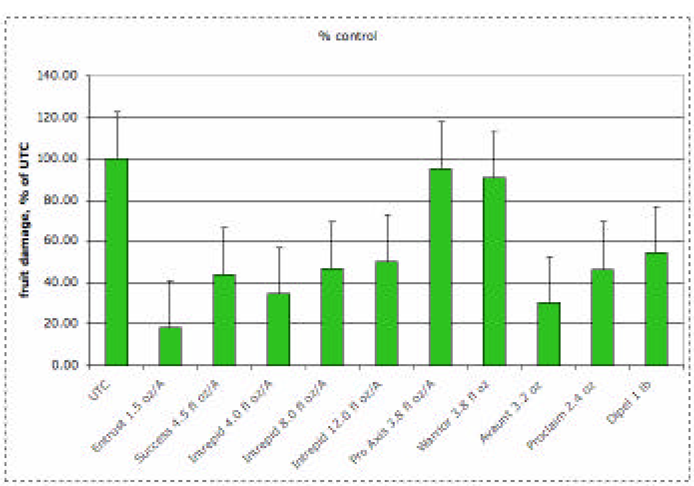


Figure 3. Fresh market tomato fruit damage (% of UTC) for the different insecticide treatments.

SPRING FREEZE PROBABILITIES

Based on long-term weather data, the table below gives the probability of having a frost by a certain date in LeGrand, Merced, and Los Banos. For example, there is a 50% probability of having a low temperature of 32.5° F after March 11 in the LeGrand area, but only a 10% chance of this occurring after April 11.

Area	Low Temp (°F)	90%	70%	50%	30%	10%
LeGrand	36.5	3/16	3/31	4/16	4/23	4/29
	32.5	2/15	3/3	3/11	3/21	4/11
Los Banos	36.5	2/26	3/13	3/26	4/3	4/21
	32.5	1/29	2/9	2/23	3/9	3/27
Merced	36.5	3/9	3/29	4/9	4/20	5/12
	32.5	2/1	2/26	3/8	3/21	4/2

XX% = percent probability that a minimum temperature below the threshold will occur on or after the given date. *Source*: Western Regional Climate Center.

RECENT DISEASE DEVELOPMENTS IN LETTUCE

Steve Koike, Farm Advisor, Monterey County

A number of recent disease developments have occurred on lettuce grown in California. Growers, PCAs, and other field personnel will need to be able to recognize some new diseases that have been detected and documented on the crop. Other, more familiar and established diseases have undergone changes in either the pathogen or distribution of the problem; again, the industry should keep informed on such changes because new information might influence disease management decisions.

New disease of romaine

Phoma basal rot was first reported as a problem on lettuce production in the United Kingdom in the early 1990s. More recently (since 1999), this disease has caused significant losses in some romaine fields in coastal California. Above ground symptoms are similar to those caused by lettuce drop and gray mold diseases and consist of wilting and yellowing of lower leaves, one-sided growth of plants, overall stunting, and eventual plant collapse. However, in contrast to these other crown rots, there is no visible fungal growth at the crowns of infected plants. Rather, Phoma basal rot causes distinct, dark brown to black, sunken cavities to develop at the crown and upper tap root tissues. Lesions can extend deep into the crowns and roots, resulting in extensive weakening of the plant structure; such plants can easily be broken off at the ground level. In greenhouse grown lettuce in Europe this disease also causes circular, dark gray to black leaf spots that can expand up to 1 inch in diameter, though such spots have not yet been observed in California.

The causal agent of Phoma basal rot is *Phoma exigua*, a soilborne fungus. Most lettuce types show some susceptibility, though romaine cultivars are the most sensitive to damage. Because this is a new disease in California, limited information is available regarding control measures. Avoid growing romaine in fields having a history of the disease. Preliminary field trials indicate some currently unregistered fungicides can provide good control.

Lettuce dieback disease in Huron

Lettuce dieback, a recently described soilborne virus disease, was first documented in coastal California and later in Arizona. However, the disease has now been confirmed in the Huron area. The pathogen was initially identified as *Tomato bushy stunt virus* (TBSV). This virus causes severe stunting of lettuce with mature, diseased plants failing to develop past the 8 to 10 leaf stage. Extensive chlorosis develops on the outermost leaves while younger, inner leaves often remain dark green in color, but may become rough and leathery in texture. The yellow outer leaves usually develop necrotic (dead, brown) spots that expand into extensive areas of dead tissue. Romaine cultivars consistently show the most serious symptoms, several leaf and butterhead lettuce cultivars are also susceptible, but commercial iceberg cultivars remain symptomless.

Symptoms may vary due to age of plants when infected, time of year, environmental conditions, and cultivar involved. Molecular analysis indicates that the TBSV-like viruses isolated from California lettuce are substantially different from other strains of TBSV. Because of these genetic differences, a new name has been given to the lettuce dieback pathogen: *Lettuce necrotic stunt virus* (LNSV). LNSV (and also TBSV) is unusual in that it has no known invertebrate (insect or nematode) or fungus vector to carry it to its plant host. Rather, the virus resides in soil and water, and is spread by river water, irrigation runoff, flood waters, and infested soil. This characteristic is consistent with the occurrence of the disease in the Salinas Valley, as most affected fields are near the Salinas River or have been flooded in the past few years. At least one field became infested when silt from an adjacent ditch was dredged up and spread onto the field.

To manage lettuce dieback, crop rotations should be arranged so that romaine and other susceptible cultivars are not planted in infested fields having a history of the problem. Resistant cultivars will likely be the best method of managing the disease, and promising sources of resistance have been identified. New resistant romaine cultivars should soon be available.

Changes in downy mildew

Downy mildew, caused by *Bremia lactucae*, is a familiar disease that has been affecting lettuce for many years and is the most important foliar problem on this crop. Downy mildew results in light green to yellow angular lesions on the leaves. White fluffy growth of the pathogen develops primarily on the under sides of these spots. With time the lesions turn brown and dry up. Older leaves usually exhibit symptoms first; such leaves that have lesions and are in contact with the soil can become soft and rotted due to secondary decay organisms. On rare occasions the pathogen can cause systemic infections that result in dark discoloration and streaking of internal vascular and pith tissues.

Bremia lactucae is well known for its ability to change. Shortly after the fungicide Ridomil was registered and used regularly on lettuce, strains developed insensitivity to the product and were no longer controlled by the chemical. Recently, strains in coastal California have been found to be insensitive to the fungicide Aliette. Laboratory experiments indicate that variation exists in the degree of insensitivity. Some isolates will continue to grow and sporulate on lettuce treated with twice the labeled field rate (10 lb/acre) for Aliette, while others show intermediate levels of such insensitivity. Yet other isolates remain sensitive to the product. Field personnel should note if downy mildew disease continues to be serious despite timely Aliette applications. Such a development might indicate the presence of insensitive strains.

The downy mildew pathogen is also noted for its diverse genetic strains, or pathotypes, in California. During any one season, a series of *B. lactucae* pathotypes may exist in all lettuce producing regions. Coastal field surveys dating back to 1982 illustrate that the downy mildew population is a quite dynamic ion response to the deployment of resistant lettuce cultivars (see table below for data since 1995). In the mid- to late-1990s pathotype CA V was prevalent with pathotypes IIA, IIB, III, and IV being a part of the population. However, by the 2000s, the prominent pathotypes were CA VI and VII, with CA V perhaps declining and the other pathotypes not being detected.

Novels are the downy mildew pathogens that are genetically distinct from the designated, numbered pathotypes. Novels are isolates that usually are infrequently encountered and may be transient and not survive for more than a few seasons. If a particular novel becomes established in the population, that strain is assigned a pathotype number.

Growers should be aware of the diversity of *B. lactucae* and remember that cultivars will vary in their resistance to pathotypes and novels in California. *(Steve Koike thanks Richard Michelmore and Oswaldo Ochoa for their help with this article.)*

Diversity of lettuce downy mildew in coastal California[1]

Percentages per year of California pathotypes

Year[2]	IIA	IIB	III	IV	V	VI	VII	Novels[3]
1995	5	15	6	15	26	0	0	33
1996	1	4	3	14	29	0	0	49
1997	0	5	0	0	51	0	0	44
1998	1	0	0	0	49	0	0	50
2001	0	0	0	0	17	29	29	25
2002	0	0	0	0	0	22	39	39

[1] Table adapted from R. W. Michelmore, Lettuce Board Annual Reports. Note that these numbers are based on samples, so that the diversity of all populations in the state may or may not be represented by these research statistics.
[2] The 1995 to 1997 data are based on systematic sampling. The 1998 to 2002 data are derived from samples submitted by growers and advisors. The 2001 and 2002 collections comprise significantly fewer samples than in previous years.
[3] Novels are virulence phenotypes that are distinct from the accepted pathotype categories, usually are not found in great numbers, and have not yet been assigned to a pathotype designation.

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