5 Nov 08
(Volume 48-4)

GENERAL FIELD NOTES
VARIETY TRIAL RESULTS
REDUCE FALL TILLAGE
CALENDAR: JAN 8, 2009 MTG

TOMATO INFO

GENERAL FIELD NOTES

The 2008 season processing tomato production statistics are in: California produced over 11.8 million tons. This season is our third highest pack coupled with a record average calculated yield of 43 tons per acre. The dry soil conditions in the Sacramento Valley may have contributed to reduced compaction and thus helped to achieve high yields. Higher yields were observed even for the late season harvests. Estimates are that 25 to 33% of the northern production area is currently irrigated by drip, a practice further enhancing yields, and gaining in popularity. And salute to the end of the Medfly quarantine for Dixon-area growers.

We also saw the most widespread, severe tomato powdery mildew ever in our area. Leaf desiccation especially in September was alarming. For the most part, in local tests with fungicides to control mildew, results were disappointing. Early, preventive applications fared the best, but needed follow-up treatments, especially considering the high, continuous disease pressure. Once mildew became well established, slowing disease spread was nearly a wasted effort. Some positives were: many of the fungicidal materials provided blackmold fruit rot control as a side benefit; and actual fruit yield loss was less severe than visual assessments would indicate. Degradation of fruit quality and field storage ability may well have occurred and with higher temperatures during harvest, the impact may have been worse.

Local Variety Trial Results: mid-maturity evaluation

Two local processing tomato variety evaluation trials were conducted: one early and one mid-maturity class in commercial fields. Both trials were transplanted with plants from Westside Transplants using grower's machinery and crews. Marketable yield was measured using grower harvesters with fruit elevated into a special tractor-pulled gondola outfitted with a weighing mechanism. Fruit samples were collected and sent to a local PTAB inspection station to measure fruit color, Brix and pH.

Our early maturity trial with Joe Rominger of D.A. Rominger and Sons was reported earlier.

Our mid-maturity trial was conducted on a class 1, Yolo silty clay loam soil northwest of Dixon with Steve Meek and John Pon of JH Meek and Sons. The field was transplanted on April 7 with double lines per bed. Seedbed condition was very good. Plants established well and grew vigorously. Verticillium wilt was prevalent. Spotted wilt virus was scattered at a low infection level and powdery mildew incidence was low as well. Yields were very high.

The top yielding varieties were AB 8058, Sun 6368, H 9780, UG 4305 and AB 2 with yields ranging from 65.5 to 63.6 tons/acre (Table 1). AB 2 had the highest Brix level for the top-yielding group at 5.5. Overall, sunburn levels ranged from 2 to 8% with large-fruited AB 8058 at the high end. Fruit mold was highest with UG 4305 at 6% followed by Nun 672 at 5%.

Additionally, as transplant seedlings, double plants per plug were compared to singles with varieties AB 2, H 9780 and pear-shaped H 2601. When comparing doubles to singles as a group, the difference was clear: doubles yielded almost 3 tons per acre more compared to single plants in a plug.

Bottom line: results remain mixed across several years of tests in multiple locations across the state. Conditions when responses would likely occur remain uncertain. Unfortunately, double plants have not been a backstop to boost yields under tough conditions.

Table 1. Replicated, Mid-maturity variety trial, J.H. Meek & Sons, Dixon area, 2008.

	Replicated Variety	Yield tons/A		Brix	PTAB color	pH	% pink	% green	% sun burn	% mold	% BER	lbs per 50 fruit
1	H 9780 double	67.0	a	5.0	25.5	4.45	1	2	2	1	0.1	7.08
2	AB 8058	65.5	ab	4.7	24.5	4.51	1	1	8	2	0.0	7.55
3	AB 2 double	65.5	ab	5.5	27.0	4.44	4	3	5	3	0.1	5.19
4	SUN 6368	64.6	ab	5.0	25.8	4.45	1	1	2	2	0.0	6.35
5	**H 9780**	64.2	ab	5.0	26.5	4.45	2	3	5	1	0.1	7.53
6	UG 4305	64.0	ab	5.0	24.8	4.52	0	1	3	6	0.0	6.45
7	**AB 2**	63.6	abc	5.5	26.8	4.46	3	1	3	4	0.0	7.56
8	H 2005	61.8	bcd	5.2	25.5	4.51	1	1	3	2	0.5	6.20
9	NUN 672	59.7	cde	4.8	23.8	4.56	2	5	3	5	0.4	6.09
10	H 8004	58.7	de	5.2	26.0	4.55	1	1	5	3	0.0	7.43
11	H 4007	58.5	de	4.8	23.8	4.64	0	1	5	2	0.0	5.96
12	HM 6898	57.4	ef	5.3	26.3	4.44	2	1	5	0	0.3	7.53
13	H 2601 double	56.2	efg	5.1	25.3	4.57	0	2	7	1	0.2	6.75
14	PX 1723	55.5	efg	5.3	24.8	4.53	1	1	2	2	0.6	8.53
15	NDM 5578	53.4	fg	5.1	23.3	4.53	1	1	5	1	0.0	7.94
16	**H 2601**	52.2	g	5.2	24.8	4.59	1	1	5	1	0.1	6.76
	LSD 5%	4.3		0.28	1.6	0.07	1.6	1.6	3.5	2.1	NS	1.4
	% CV	5		4	5	1	92	70	58	66	245	14
Group comparisons:												
	singles vs.	60.0		5.23	26.0	4.50	1.7	1.7	4.3	1.9	0.1	7.28
	dbl plants/plug	62.9		5.22	25.9	4.48	1.7	2.5	4.5	1.8	0.1	6.34
	F value	5.7		0.0	0.0	0.5	0.0	2.7	0.1	0.0	0.0	5.4
	Probability	0.02		NS	NS	NS	NS	0.11	NS	NS	NS	0.02

Table 2. Non-replicated, mid-maturity variety trial, J.H. Meek & Sons, Dixon area, 2008.

	Non-Replicated variety	Yield tons/A	¡Brix	PTAB color	pH	% pink	% green	% sun burn	% mold	% BER	lbs per 50 fruit
1	CXD 255	67.5	4.8	24	4.44	1	1	3	1	0.0	8.20
2	NUN 6385	64.4	4.5	29	4.60	1	1	7	0	0.0	7.55
3	BOS 1411	63.3	5.1	29	4.52	1	4	2	4	0.0	9.05
4	NUN 6390	62.7	5.2	28	4.58	1	1	7	1	0.0	6.65
5	H 8504	62.2	4.7	26	4.37	1	1	2	0	0.0	6.45
6	DRI 0303	60.9	5.3	24	4.42	1	1	2	4	0.0	8.65
7	HMX 7885	52.6	4.8	24	4.66	0	2	3	2	0.0	7.95
8	CXD 269	46.1	4.9	25	4.62	3	0	6	11	0.0	7.30
	average	60.0	4.9	26.1	4.53	1.1	1.4	4.12	2.9	0.0	7.73

Non-replicated data should be viewed with less confidence (Table 2). CXD 255 yielded 67.5 tons per acre, although most of the varieties yielded above 60 tons. Nun 6390 and HMX 7885 lost canopy cover prior to harvest, greatly exposing fruit, but not detected in the cull data.

Reduced Tillage Evaluation:

UC Specialist Jeff Mitchell has been a leader in investigating the benefits of reduced tillage for row crops in California. The primary aim was an effort to improve soil and environmental quality while supporting cost-effective crop production. Although tomatoes were included, the more easily implemented crops involved wheat and corn rotations. Various levels of implementation were explored including minimum-till, strip-till and reduced-pass methods. Traditionally, the path to efficiency was to increase ag implement width by coupling with higher horsepower tractors while retaining an aggressive tillage program. Tillage goals appeared to be: bury crop residue, loosen compacted soil, level soil surface to facilitate irrigation and if needed, rebed and keep clods size to a minimum. The general operations became disk (plow), subsoil (chisel), disk, landplane, and list & shape beds.

The movement to reduced tillage was begun in the Midwest with efforts to reduce soil erosion. Conservation programs supported by the USDA to protect topsoil against wind and rain erosion relied on crop residue retention on the soil surface. Reduced tillage programs fueled that effort. Falling grain prices and rising fuel costs led the way to economically force growers to farm more efficiently with fewer inputs. The result was a shift from traditional disking and plowing to chiseling, strip tilling the planting zone, and conservation tillage bed planting. Effective herbicides and herbicide-resistant crops further reduced the need for in-season cultivation.

We've witnessed some of those adaptations in our local area: wheat drilled into minimally worked corn, sunflower, and safflower beds; and various sequences with these field crops including planting into tomato residue.

For tomato growers, the challenge to adopt this system of reduced tillage is bottlenecked by the needs of the tomato harvester, which operates more efficiently on near level beds without clods and with a loose, dry mulch to efficiently undercut and lift fruit from the bed surface. While drastic changes in harvester header-pickup design and in plant architecture could assist the processing tomato industry move toward no-till systems, we aren't there yet.

From a distance, I have been interested in following the tillage innovations of Sano Farms in Firebaugh. This operation has embraced reduced tillage on a 3,500-acre tomato operation by utilizing cover crops, spraying glyphosate herbicide preplant, strip tilling and transplanting. A driver has been the extensive adoption of buried drip irrigation to limit weed competition and supply water in an environment that arguably is less impacted by soil management outside of the limited root zone.

With support from the California Tomato Research Institute, a field experiment was initiated on the Davis campus in 2007 to evaluate a substantial reduction in primary tillage: subsoiling in multiple directions and the associated disking, landplaning and rebedding. The reduced tillage system utilized the Wilcox Performer® to lightly chisel the bed and incorporate crop residue while retaining the beds. Operations in the spring resumed as normal.

We have completed our second tomato crop in consecutive years in the same location on a 4-acre parcel with plans to continue in 2009. Yields have been comparable between a conventional fall tillage system and that of reduced bed tillage over each of the two years when comparing a fallow or a triticale cover cropped bed (Table 3). Irrigation has been via furrow, while initially establishing transplants with sprinkler irrigation.

While the results of the experiment aren't sufficient to recommend switching exclusively to a bed tillage system, our results are encouraging for furrow-irrigated tomato production. My colleague Jeff

Mitchell continues to chide that this UCD experiment is 'old hat'. In reality, growers on semi-permanent buried drip irrigation systems are forced to practice this bed-only tillage to protect their drip tape. And the success of buried drip in raising yields while incorporating bed-only tillage is well accepted.

Table 3. Evaluation of reduced bed tillage system on yield and fruit quality of AB 2 processing tomatoes, UC Davis, 2008.

Tillage		Marketable *tons/A*		Brix	color	pH
1. Conventional		32.3		5.9	24.3	4.42
2. Bed tillage		32.9		6.0	25.2	4.40
probability				0.36	0.03	NS
a) chisel bed center		36.8		5.8	24.7	4.40
b) triticale cover crop		29.9		6.0	24.8	4.42
c) fallow		31.0		6.0	24.8	4.41
probability				0.22	NS	0.31
LSD @5%				NS	NS	NS
conventional	chisel	33.5	b	5.9	23.8	4.41
conventional	triticale	32.4	bc	5.8	24.4	4.41
conventional	fallow	30.9	bc	5.9	24.6	4.43
bed tillage	chisel	40.1	a	5.7	25.6	4.39
bed tillage	triticale	27.5	c	6.2	25.1	4.42
bed tillage	fallow	31.1	bc	6.0	24.9	4.40
interaction		0.03		0.15	0.29	0.25
LSD @5%		5.6		NS	NS	NS
%CV		11		4	4	1

One of the other notable results from the 2008 test was that in our reduced tillage system, yields increased from 31 tons to 40 tons per acre with a single chisel/subsoil shank tilling in the center of the bed in the fall to a depth of less than 20 inches.

We began with furrow irrigation in 2008. By the middle of the season, we switched to mimic furrow irrigation using a drip tape in each of the furrow bottoms. The switch was due to uneven and insufficient water infiltration caused by uneven field gradient and with no capacity to take away run-off water. In a measurement of furrow irrigation water infiltration rate by Specialist Tim Hartz, infiltration was similar between the standard and reduced bed tillage systems and not improved by a bed top, cover crop planting of triticale.

I am encouraged by the results of the field test. I think the idea of reduced subsoiling as an expense might be substituted with less extensive chiseling in the fall. Perhaps zone chiseling around the plant line makes sense. The 2008 results need to be repeated before widespread adoption would be suggested.

Note: cooperators included field assistant Mark Kochi, UC Specialists Jeff Mitchell and Tim Hartz, UC Davis Ag Engineer Shrini Upadhyaya and Leroy Garciano, students Sara Pearson and Margaret Lloyd, Westside Transplants and special help from E & J Farms and Plant Sciences Dept field crew.

Upcoming Tomato Meetings:

Jan 8, 2009 (Thurs) — S. Sacramento Valley Processing Tomato Production Meeting, Woodland Community & Senior Center, 2001 East Street, Woodland, 95776
Note: location is SE side of Woodland

Jan 29, 2009 (Thurs) — Upper San Joaquin Valley Processing Tomato Production Meeting in conjunction with CA Tomato Growers Association annual meeting, Modesto

February 4-5, 2009 (Wed-Thurs) California League of Food Processors Expo & Showcase, Sacramento Convention Center

Jan 15, 2009 (Thurs) —UC Organic Soil Fertility Management Symposium, UC Davis. 8:30 am to 4:30 pm @ Activities and Recreation Center (ARC), NW side of Davis campus off of La Rue Road. $100 fees discounted to $80 through Dec 15.

Organic symposium pre-registration is advised: on line registration is available at <http://vric.ucdavis.edu/events/2009%20OSFM%20Symposium/2009%20OSFM%20Symposium%20info.html>

Telephone (530) 752-1748 for more information or registration help.

The organic soil fertility management program will combine the latest technical information on nutrient dynamics in organically managed soils with practical results of on-farm nutrient management research. Topics include:

- effects of organic management on soil microbial community structure and function
- soil and plant testing to guide organic fertility management
- cover crop selection and management
- value and limitations of compost for nutrient supply
- choosing the product, rate and timing for in-season fertilization
- soil fertility management and environmental protection
- food safety implications of organic soil fertility management
- economics of organic soil fertility management

The program is designed for growers and consultants as the target, and for government agency personnel who work with people in this fast-growing segment of agriculture. If you are considering organic production, I believe this is a must-attend opportunity. I've already registered. Tim Hartz is the meeting organizer.

Respectfully submitted,

Gene Miyao
Farm Advisor, Yolo, Solano & Sacramento counties

UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION
70 COTTONWOOD STREET
WOODLAND, CALIFORNIA 95695

TOMATO INFO NEWSLETTER
5 November 2008