NORTHERN SAN JOAQUIN VALLEY VEGETABLE CROPS MEETING
MERCED, STANISLAUS, & SAN JOAQUIN COUNTIES

March 29, 2000 – 8 am to 12 noon
University of California Cooperative Extension
Ag Center Harvest Hall
3800 Cornucopia Way, Modesto

Moderator:	**Bob Mullen**, Farm Advisor, San Joaquin County
8:00 - 8:05 a.m.	Welcome and Introductions
8: 00 - 9:00 a.m.	**Laws and Regulations** *Kevin Wright, Stanislaus County Ag Commissioner's Office*
9:00 – 9: 20 a.m.	**Disease and Pest Control, Research Update** *Jesus Valencia, UCCE Stanislaus County, Farm Advisor*
9.20 – 9:40 a.m.	**Weed Control on Asparagus & Summer Vegetables, Research Update** *Bob Mullen, UCCE San Joaquin County, Farm Advisor*
9:40 – 10:10 a.m.	**Weed Control on Leafy Vegetables, Update**, *Steve Fennimore* *Extension Vegetable Weed Control Specialist, Weed Science Program, Salinas*
10:10 - 10:15 a.m.	Short Refreshment Break
Moderator:	**Bill Weir**, Farm Advisor, Merced County
10:15 - 10:35 a.m.	**The Good, the Bad, and the Aphid — Aphid Biology** *Benny Fouche, UCCE San Joaquin County, Farm Advisor*
10:35 – 11:25 a.m.	**Food Safety Concerns & Public Perceptions Associated with Genetically Modified Crops** *Dr. Christine Bruhn, Extension Food Marketing Specialist, UCD*
11:25 a.m. - 12 noon	**Pollination Requirements of Vegetable Crops and Update on Africanized Honey Bees** *Dr. Eric Mussen, Extension Apiculturist, UCD*
12 Noon	Head for Home

PCA Credits:
1 hr L&R, 2 hrs OTHER

VARIETY TRIAL REPORTS AVAILABLE.

Fresh market 1999 tomato variety trial research reports for Tulare, Merced, and San Joaquin counties are available from each of the respective counties. Contact Bill Weir (209-385-7403), Michelle LeStrange (559-733-6366), or Bob Mullen (209-468-2085) to get a copy. Many of these reports also include information about weed and disease control as well.

Statewide processing tomato variety trial summaries for 1999 are also available. These trials are held each year in multiple county locations (Colusa, Sutter, Yolo, San Joaquin, Merced, and Fresno counties in 1999). Individual reports are available at each county office; a combined report is available by contacting Gene Miyao, Farm Advisor Yolo and Solano counties. Call (530) 666-8143 or e-mail emmiyao@ucdavis.edu to request a copy.

Most recent cost of production estimates for processing tomatoes are also available through Gene Miyao.

Bell Pepper and asparagus variety trial results are available from Bob Mullen, Farm Advisor, San Joaquin County. Call (209) 468-2085 or e-mail rjmullen@ucdavis.edu to request a copy

Free used oil and filter collection centers open. For small growers in Merced County, call Bartlett Petroleum in Merced at 209-723-5402 or C.L. Bryant in Los Banos at 209-826-2236.

IMPORTANT DATES TO REMEMBER…

June 10-13, 2000 IV World Congress of the Processing Tomato (VII International Processing Tomato Symposium); Sacramento, California. For more information contact the California League of Food Processors, 980 Ninth Street, Suite 230, Sacramento, CA, 95814.

Phone (916) 444-9260;
FAX (916) 444-2746;
Email: www.clfp.com

Fresh Market Tomato Summer Field Meeting. End of July or early August in LeGrand, CA in Merced County. Variety trial, cover cropping, worm trapping, and more. BBQ lunch will be served. Exact date, time, and location will be sent at a later date

SWEETPOTATO LISTED AS MOST NUTRITIOUS VEGETABLE

According to the Center for Science in the Public interest (CSPI), the sweetpotato is considered the most nutritious vegetable on a per serving basis. Overall scores for several vegetables are listed below.

Vegetable nutrition score

Sweetpotato	582
Carrots	434
Spinach	408
Collard Greens	241
Red Pepper	166
Kale	161
Broccoli	145

CSPI Nutrition Action Healthletter, 1991. The higher the score, the more nutritious the food.

BACTERIAL CANKER

Clavibacter michiganensis subsp. *michiganensis*

What are the symptoms?

On seedlings — usually none.

On young plants — poor growth and temporary wilting of branches. Lower leaves yellow and shrivel. However, symptoms may not show until flowering.

On mature plants — two kinds, those resulting from systemic infections (i.e. the bacteria enter the vasculature and invade much of the plant), and those resulting from secondary infections (i.e. the bacteria cause local infections of leaves, stem, and fruit). In systemic infections, leaflets of the oldest leaves curl, yellow, wilt, and finally turn brown and collapse (known as firing). Sometimes, only one side of a leaf is affected. Plants grow poorly and wilt. Pith of stems becomes yellow and later reddish brown, especially at the nodes, and has a mealy appearance. The pith may later become somewhat hollow. In advanced infections, cankers may or may not form at the nodes. Light and later dark streaks may develop on stems. Branches break off easily. Plants may die. In secondary infections, infection of the margins of leaves is common. Lesions are dark brown to almost black. Round to irregular spotting of leaves also occurs. Fruit may be spotted, especially near calyx.

On fruit — yellow to brown spots, slightly raised, surrounded by a persistent white halo ("bird's eye spot"). Spots are usually less than 1/4 inch in diameter. Vascular tissue under the calyx scar and leading to seeds may be brown.

What is the primary souce of the bacterium?

In California, probably seed and transplants. Overwintering in our soils does not seem to be important. In colder climates, the bacterium may overwinter on undecomposed plant residue.

Can certified seed eliminate the disease?

Seed comtaminated with only a few bacterial cells, apparently below the level of detection, can result in relatively high numbers of infected transplants. For that reason, certified seed reduces the chances of infections, but is no guarantee of contaminated-free seed. A seedlot contaminated with very few infested seeds can cause serious problems in a greenhouse.

How does it spread?

When the seed germinates, the bacteria enters the seedling through small wounds in the cotyledon, probably through broken trichomes. The bacteria move systemically through the xylem from which it invades the phloem, pith, and cortex. In a highly conducive environment, like a greenhouse, bacteria on the surface of infected plants are then splashed to surrounding plants during overhead irrigation. This kind of spread accounts for the occurrence of groups of plants or trays in the greenhouse and subsequent rows of infected transplants in the field. During planting, which invariably causes wounds, transplants may be inoculated after a contaminated plant is handled, especially if the plants are wet.

Secondary spread occurs in splashing water, on contaminated equipment, during clipping, cultivation, or vine training operations, and other activities. In the field, such spread usually only results in local infections, (i.e. leaf, stem, and fruit spots). In the greenhouse, these sources can lead to local and systemic infections.

How long does the bacterium survive?

In the field, it will survive indefinitely in tomato tissue. Once that tissue has decomposed in the ground, however, the bacteria will die since they are not soil inhabitors. Thus, it is very important to turn under infected plant residue at the end of the season. Once that residue decomposes, the bacteria will die and the field does not pose a problem for subsequent plantings. It is prudent, however, to rotate to another crop for at least one season to assure that the tomato residue is completely gone.

In research trials, bacteria have survived as long as 10 months on contaminated wooden stakes. Hence, in the greenhouse it may be extremely important to disinfect the surface of benches and equipment to prevent spread to subsequent trays of transplants. In fields of more mature plants, disinfecting equipment is not as critical since any spread to other plants would probably result in local, and not systemic, infections. It is cautious, however, to wash equipment that has been through a heavily infested field. Surface disinfectants include bleach solutions (0.5 to 1% calcium hypochlorite) and Physan, among other products.

What are the hosts of the causal organism?
Almost exclusively tomato. Several nightshades, including perennial nightshade (*Solanum douglasii)*, black nightshade (*S. nigrum)*, and *S. triflorum*, are naturally infected. Pepper and eggplant can be successfully artificially inoculated, but they are probably not important in the epidemiology of the disease on tomato. It is not known how long the bacterium can persist on nightshade.

Does canker cause problems in direct-seeded fields?
In California, economic losses in direct-seeded fields are probably very uncommon. During unusually wet weather, however, secondary spread from frequent vine-training, cultivation, or other operations may cause extensive leaf loss. Canker probably occurs at a low incidence in many direct-seeded fields but almost always goes unnoticed.

What are some control measures?
Planting clean transplants is the most important control measure. Seed fields should be vigilantly monitored and strict quality control measures implemented. Seeds should be assayed for detectable levels of contamination and lots

discarded if the bacterium is found. It may be prudent to soak seed in a 0.5% solution of calcium hypochlorite for 20 minutes or dip the seed in 130°F water for 25 minutes as an extra precaution. In the greenhouse, potting mix and flats should be steamed or washed with a 1% solution of calcium hypochlorite. Greenhouses should be emptied between crops of transplants to allow time to disinfect benches, irrigation hoses, etc. Overhead water pressure should be low to prevent wounding. Streptomycin or copper applications may be necessary to reduce the efficient, yet unnoticeable spread between plants.

In the field, special measures may have to be taken once canker has been identified. Do not work fields when the foliage is wet. Frequent field operations at the wrong time can result in spread of the disease throughout the entire field. Unless the number of infected plants is small, it may do more harm than good to try to remove the symptomatic plants. Copper or streptomycin applications offer limited benefits since systemic infections cannot be affected and localized infections (the most probable scenario if other precautions are taken) pose a small economic threat. During wet weather, however, bactericides are probably justified. At the season's end, incorporate all plant tissue. Tissue that remains on the surface and doesn't decompose is a real risk to subsequent tomato crops. Once the tomato residue decomposes, however, canker is no longer a threat. To be absolutely certain that the bacterium has been eliminated from the field, rotate out of tomatoes for at least one year.

Mike Davis
CE Specialist

PROCESSING TOMATO NITROGEN FERTILIZER TRIAL

According to the publication, *Fertilizer Guide for California Vegetable Crops* (1991), tomatoes require 100 to 200 lbs of N per acre for optimal production. The UC IPM manual for tomatoes (4th edition) makes a recommendation of 120 to 180 lbs N/a for either fresh market or processing tomatoes. Interestingly, an earlier UC publication, Guide for Fertilizing Vegetables (1981) strongly states that total N applied, including starters, manure, previous crop residues, and sidedress applications should not exceed 120 lbs per acre.

Applying more nitrogen than is required does not necessarily increase yields, and instead may cause problems such as unwanted secondary growth, uneven fruit ripening, stretched out fruit setting, and/or decreased yields. Often, growers may tend to apply towards the upper range of the recommendation as a type of insurance to ensure that the crop will have adequate N.

Many UCCE farm advisors and specialists throughout the state have noticed little to no yield response in fertilizer tests on commercial fields where heavy rates of nitrogen are used. By using the data from another test, we decided to investigate the yield effects of different rates of sidedress N on processing tomatoes in Merced County.

Methods

This trial was located in a commercial tomato field near Dos Palos, in Merced County. Treatments were:

1. 0 lbs sidedress N/a (UTC)
2. ½ farmer standard rate (70 lbs N/a)
3. Farmer rate (140 lbs N/a)
4. 1 ½ farmer rate (210 lbs N/a)

Nitrogen source was UAN 32, shanked into the bed two weeks after transplanting. The field was previously fertilized with 500 lbs/A of 4-10-10. A starter was used in the transplant water (10-34-0) that provided 5 lbs N/a. Early season CAN17 was water run at 50 lbs N/a. Field variety Heinz 9491 was used.

Results

There was no significant yield increase in this test as sidedress N applications increased, though there was a trend for 3 to 5 tons more fruit where N was applied (Table 1). Best overall yields occurred at the ½ standard rate (70 lbs N/a) at 36.9 T/a.

Plant tissue samples were taken June 7, 1999 and analyzed for NO_3-N from all treatments. The ½ sidedress rate had significantly greater NO_3-N than the untreated control, but there were no differences between the other treatments (Table 1.)

The lack of significant response to sidedress applications of N in this test illustrates the need to credit all sources of nitrogen when determining sidedress N rates. Soil tests taken in this field before transplanting averaged 24 ppm NO_3-N in the upper one foot. This is equivalent to at least 50 lbs/a available nitrogen, and does not include the potentially mineralizable portion coming from soil organic matter. Total nitrogen inputs in this field other than sidedressing can be estimated as follows:

Spring soil NO_3-N:	50 lbs/a
Preplant fertilizer:	20 lbs/a
Starter:	5 lbs/a
Early CAN17:	50 lbs/a
TOTAL:	**125 lbs/a**

Thus, the lack of response to sidedress N was likely because there was already adequate nitrogen in the soil.

Basing N rates on yield goals may provide a baseline for estimating fertilizer needs. Processing tomatoes will average about 3% N on a dry weight basis. Assuming that 94 – 95% of the weight of a crop is water (corresponds to 5 – 6% Brix), nitrogen removal can be calculated.

Crop Yield, T/a	*Estimated N removal, lbs/a*
25	75 – 90
30	90 – 105
35	105 – 125
40	120 – 140
45	135 – 160
50	150 – 180

To determine the sidedress N rate, simply work backwards from the N rate based on average yield in previous years. Credit should be given for all N inputs, including soil residual, manure, starters, and preplant incorporated fertilizer.

Table 1. Yield response and petiole nitrate of processing tomatoes as affected by different sidedress N rates.

Treatment	*Reds*	*Greens T/a*	*Total*	*NO_3-N ppm*
1. UTC	27.0	4.24	31.9	2530
2. ½ N	30.2	6.1	36.9	5640
3. Std N	28.3	5.3	34.8	3880
4. 1 ½ N	30.4	5.0	36.7	5490
Average	28.7	5.2	35.1	4387
LSD 0.05	NS	NS	NS	2618
CV (%)	13.0	35.6	11.6	47.3

NO_3-N in tissue in early bloom stage.

STATEWIDE FRESH MARKET TOMATO VARIETY TRIALS

Three fresh market tomato variety trials are conducted in the San Joaquin Valley each year. The early season trial is conducted by Michelle Le Strange in Tulare County; the mid season trial is conducted by Bill Weir in Merced County; and the late season trial is conducted by Bob Mullen and Jesus Valencia, farm advisors in San Joaquin and Stanislaus Counties, respectively. The trials consisted of 10 replicated lines and 15 lines which were for observational purposes. The table below shows the results of the replicated trial in each location.

Bill Weir
UCCE Advisor

1999 Fresh market tomato variety trials combined and individual trial yields (tons per acre) for the replicated varieties.

Variety	***Combined Market Yield***	*Tulare (early)*	*Merced (mid) Tons per acre*	*San Joaquin (late)*
XPH 12179	**29.7**	30.6	33.6	24.9
QualiT 23	**28.8**	30.1	32.1	24.1
Shady Lady	**28.4**	33.9	30.9	20.5
QualiT 21	**28.2**	29.9	32.1	22.5
Sunbrite	**27.5**	29.6	31.6	21.4
DeVille	**27.4**	30.6	29.2	22.3
LSL R-428	**24.2**	27.0	26.9	18.8
PX 208795	**23.9**	25.5	26.7	19.4
STM 3104	**23.7**	23.0	26.8	21.3
SRT 6615	**23.4**	27.4	26.2	16.5