STOCKTON EAST WATER DISTRICT

IRRIGATION WATER QUALITY

Agricultural irrigation water quality testing was conducted for key points throughout the irrigation distribution system in July. Irrigation water quality remains good throughout the system.

The following definitions and guidelines will help with your interpretation of the results:

- EC - Electrical Conductivity: a measure of water salinity reported in microhoms per centimeter (µmhoms/cm). Salt in soil or water can reduce water availability to crops.

- SAR - Sodium Adsorption Ratio: SAR is used to evaluate infiltration problems created by an excess of sodium in to relation calcium and magnesium.

- mg/l - milligram per liter: This is equivalent to
  - 1 minute in 2 years
  - 1 inch in 16 miles
  - 1 cent in $10,000
  - 1 black marble in 1,000,000 white marbles

- Gypsum Requirement The addition of gypsum to soil, either directly or via irrigation water, provides a readily available source of soluble Calcium to exchange with the Sodium held on the soil exchange sites. This Sodium will combine with Sulfate to form a soluble Sodium-Sulfate compound which can then be leached from the root zone.

Guidelines for interpretation of Water Quality for Irrigation

Potential irrigation Problem	units	Degree of Restriction on Use		
		None	Slight to Moderate	Severe
Salinity				
Electrical Conductivity	umhos/cm	less than 700	700-3,000	3,000+
Specific Ion Toxicity				
Sodium				
surface irrigation	SAR	less than 3	3.-9	9+
sprinkler irrigation	mg/l	less than 3	3+	
Chloride				
surface irrigation	mg/l	less than 4	4.-10	10+
sprinkler irrigation	mg/l	less than 3	3+	

STOCKTON EAST WATER DISTRICT

2010 IRRIGATION WATER QUALITY RESULTS

Test Description	**Results mg/l and Sample ID**								
Cations	*CR-1	CR-5	MS-1	MS-2	CR-6	PC-1	M-1	PP-1	SG-1
Total Hardness	74	74	74	80	71	66	39	23	23
Calcium	18	18	18	19	17	15	9	6	6
Magnesium	7	7	7	8	7	7	4	2	2
Potassium	2	2	2	2	2	2	2	<1	<1
Sodium	5	6	6	7	6	5	4	2	2
Anions									
Alkalinity	70	70	70	80	70	70	40	30	30
Carbonate	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bicarbonate	80	80	80	90	80	80	50	40	30
Sulfate	11	12	12	11	12	7	5	<2	<2
Chloride	5	5	5	5	5	4	3	<1	<1
Nitrate	1.1	<0.4	<0.4	0.5	<0.4	<0.4	<0.4	<0.4	<0.4
Fluoride	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minor Elements									
Boron	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	<0.05	0.080	0.070	0.57	0.17	0.27	0.30	0.17	<0.05
Manganese	0.05	0.020	<0.01	0.020	<0.01	0.010	0.010	<0.01	<0.01
Zinc	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Other									
pH (units)	7.2	8.1	7.7	7.6	7.7	7.3	7.8	7.9	7.4
SAR	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
E.C. umhos/cm	179	181	182	198	177	162	105	54	56
Gypsum Requirment	0.0	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.01

Ag water quality testing was conducted for key points throughout the irrigation distribution system in August. Irrigation water quality remains good throughout the system.

Test Locations

CR-1: New Hogan Reservior
CR-5: Calaveras River at Bellota
MS-1: Beginning of Mosher Slough
MS-2: Mosher Slough after last irrigator
CR-6: Calaveras River after last irrigator
PC-1: Potter Creek after last irrigator
M-1 : Mormon Slough after last irrigator
PP-1: Peters Pipe at Potter Creek siphon
SG-1: Shirley Gulh at end of UFC

PHYTOPHTHORA

Phytophthora is a soil fungus, found in both soil and water. It is a water quality concern of surface water irrigators. There are many species of Phytophtora which can infect and cause various degree of damage to a great variety of agricultural crops given favorable conditions. Phytophthora can cause root rot, crown rot, trunk canker as well as decline and death of fruit and nut trees. Good management is the best way to minimize the effects of Phytophthora.

Recommended practices for management of Phytopthora are:

- Avoid repeated and prolonged soil saturation. A three year research effort revealed that orchards subject to flooding for 48 hours every two weeks sustained severe damage from Phytophthora. Flood Irrigation of eight hours or less every two weeks produced the least impact from the fungus.

- Eliminate standing water, particularly at the base of trees, to control the effects of the fungus. Drip or micro-sprinklers can be effective irrigation tools that keep the tree trunks dry.

- Be a good neighbor, and avoid putting tailwater into the stream which could spread the pathogen. Those farmers near the end of the streams are particularly affected when upstream neighbors allow tailwater to drain into the stream, increasing the levels of Phytophthora.

- When replanting an orchard, consider using the Phytophthora resistant rootstocks that are widely available. These can provide long-term management controls for growers.

In July 1997, irrigation water in key location throughout the District were assayed for Phytophthora. Phytophthora assays are performed by placing pears in the water source for 2 days. The pears are then taken to laboratory, where they are examined for lesion development over the next ten days. Lesions are selected and cultured for Phytophthora. The number of lesions per pear indicates the relative amount of active infective units of the listed Phytophthora species in the source water at the time of assay. The larger the number of lesions per pear indicates larger amounts of infective units of the pathogens.

The following locations were tested for irrigation water quality:

- CR-1 New Hogan Reservoir
- CR-5 Calaveras River at Bellota
- MS-1 Beginning of Mosher Slough
- MS-2 Mosher Slough after last irrigator
- CR-6 Calaveras River after last irrigator
- PC-1 Potter Creek after last irrigator
- M-1 Morman Slough after last irrigator

1997 Phytophthora Results

Sample ID	Average Lesions per Pear	Percent Lesions Caused by Phytophthora	Phytophthora Species Recovered
CR-1	0	0	
CR-5	30	90	• Phytophthora syringae • unidentified Phytophthora species
CR-6	7	71	• Phytophthora syringae • unidentified Phytophthora species
MS-1	19	29	• Phytophthora citricola • Phytophthora cambivora • unidentified Phytophthora species
MS-2	4	89	• Phytophthora syringae • unidentified Phytophthora species
PC-1	14	88	• Phytophthora syringae • unidentified Phytophthora species
M-1	14	90	• Phytophthora syringae • unidentified Phytophthora species

Note:

1. Unidentified Phytophthora species is known to cause crown rot trunk canker and scafoled branch canker.
2. Phytophthora syringae is known to cause crown rot, trunk canker and scafoled branch canker.
3. Phytophthora cambivora is very destructive on cherry trees as well as almond and apple trees.
4. Phytophthora citricola is very destructive on walnuts and almonds.

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