
How to Read Soil
And Water Reports

pH, and water

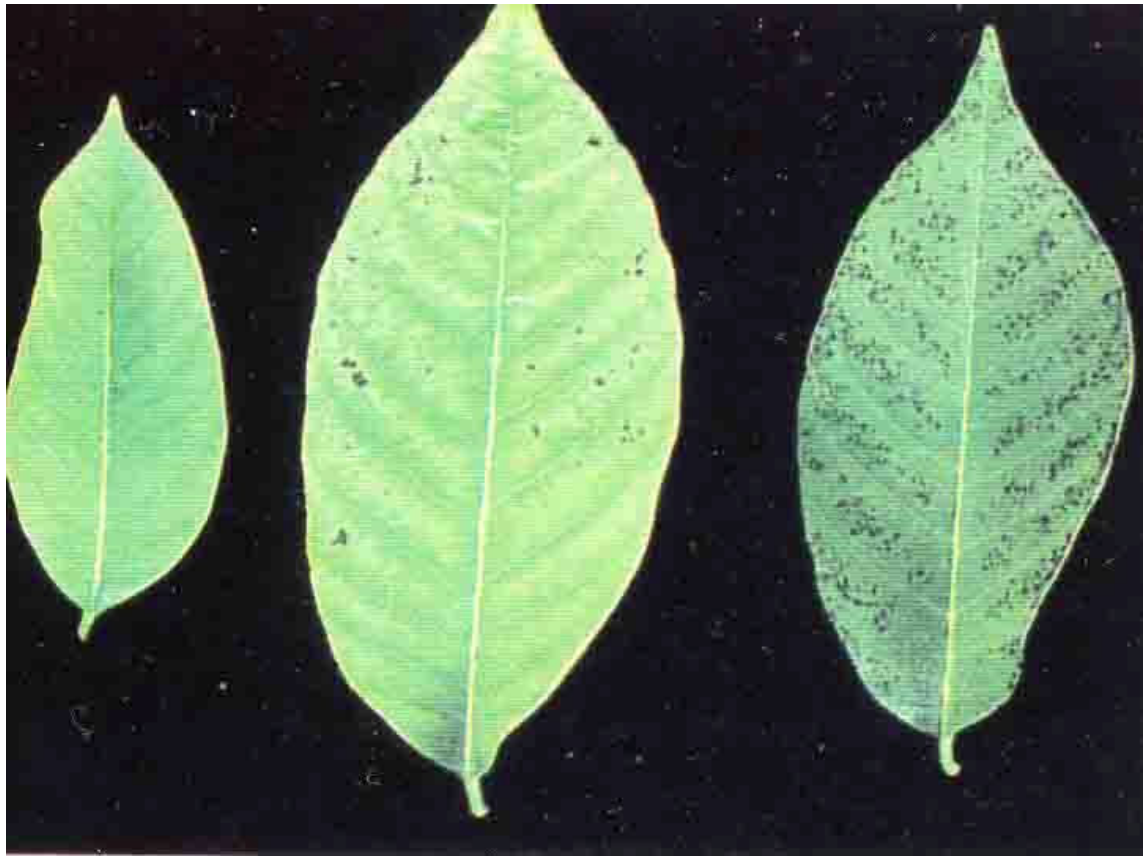
Leaf analysis
Water analysis
Soil analysis

pH – power of hydrogen –
controls the availability of many
nutrients

Correcting is easy before
planting
Hard once tree is in the
ground

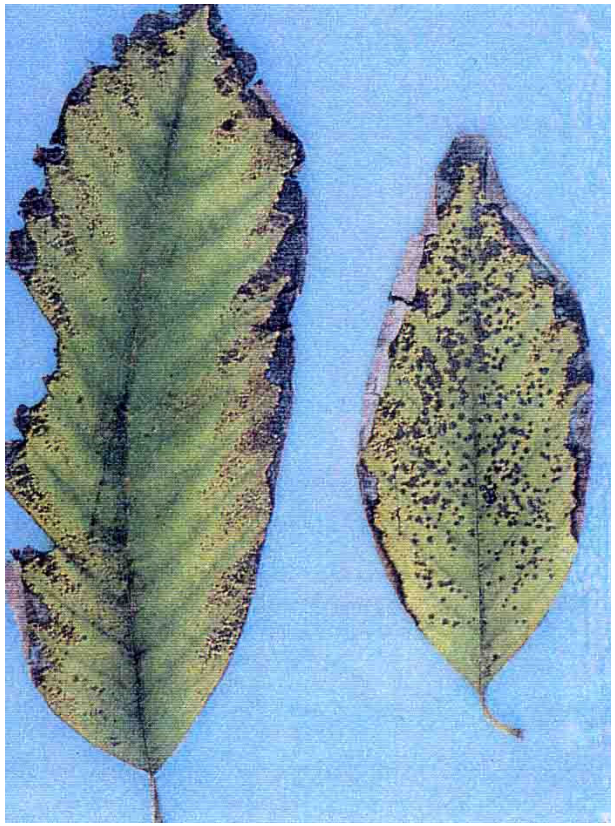
Before jumping on a report,

Look at the plant to see what it is telling you



Boron (B) toxicity
on old leaves

Zinc Deficiency on young leaves



Most macronutrient deficiencies show up on old leaves

Nitrogen deficiency

overall yellowing of older leaf

But so do toxicities

A Guide to Citrus Nutritional Deficiency and Toxicity Identification1 Stephen H. Futch and David P. H. Tucker
https://edis.ifas.ufl.edu/pdffiles/CH/CH14200.pdf

Where do salts in the soil come from?

- **Irrigation water**
- **Natural soil content**
- **Fertilizers**
- **Ocean spray**

Salts are also nutrients – N, P, K, etc.

Salinity – Total Dissolved Solids(TDS)

- Calcium
- Magnesium
- Sodium
- Chloride
- Sulfate
- Bicarbonate/carbonate
- Boron
- Minor – nitrate, potassium

Soil and water reports are best used for identifying problems

- pH
- salinity
  - chloride
  - sodium
  - boron
    - sodium adsorption ratio -SAR

When water exceeds:

1 ppm boron

100 chloride, sodium

1,000 TDS

Watch out

When SAR > 4

SAR = sodium adsorption ratio , how much sodium compared to calcium and magnesium
more sodium, poor infiltration

Just because you can measure it, it may not mean anything to the plant

There are no good **SOIL** measurements for fertility management of perennial crops

Leaf Sampling: Citrus

Leaf analysis guide for diagnosing nutrient status of mature Valencia and navel orange trees

Interpretation	Nutrient (values in % dry weight)		
	Nitrogen	Phosphorus	Potassium
Deficient	< 2.2	< 0.09	< 0.40
Low	2.2 - 2.3	0.09 - 0.11	0.40 - 0.69
Optimum	2.4 - 2.6	0.12 - 0.16	0.70 - 1.09
High	2.7 - 2.8	0.17 - 0.29	1.10 - 2.00
Excess	> 2.8	> 0.30	> 2.30

Lovatt, C.J., 2014. Nutrient deficiency and correction. In: Ferguson, L., Grafton-Cardwell, E.E. (Eds.). Citrus Production Manual. pp. 161-182.

More information at http://apps.cdfa.ca.gov/frep/docs/Citrus.html

Leaf analysis integrates

Sun

Water

Soil

Disease

Crop load

It doesn't necessarily tell you why the plant has a certain level

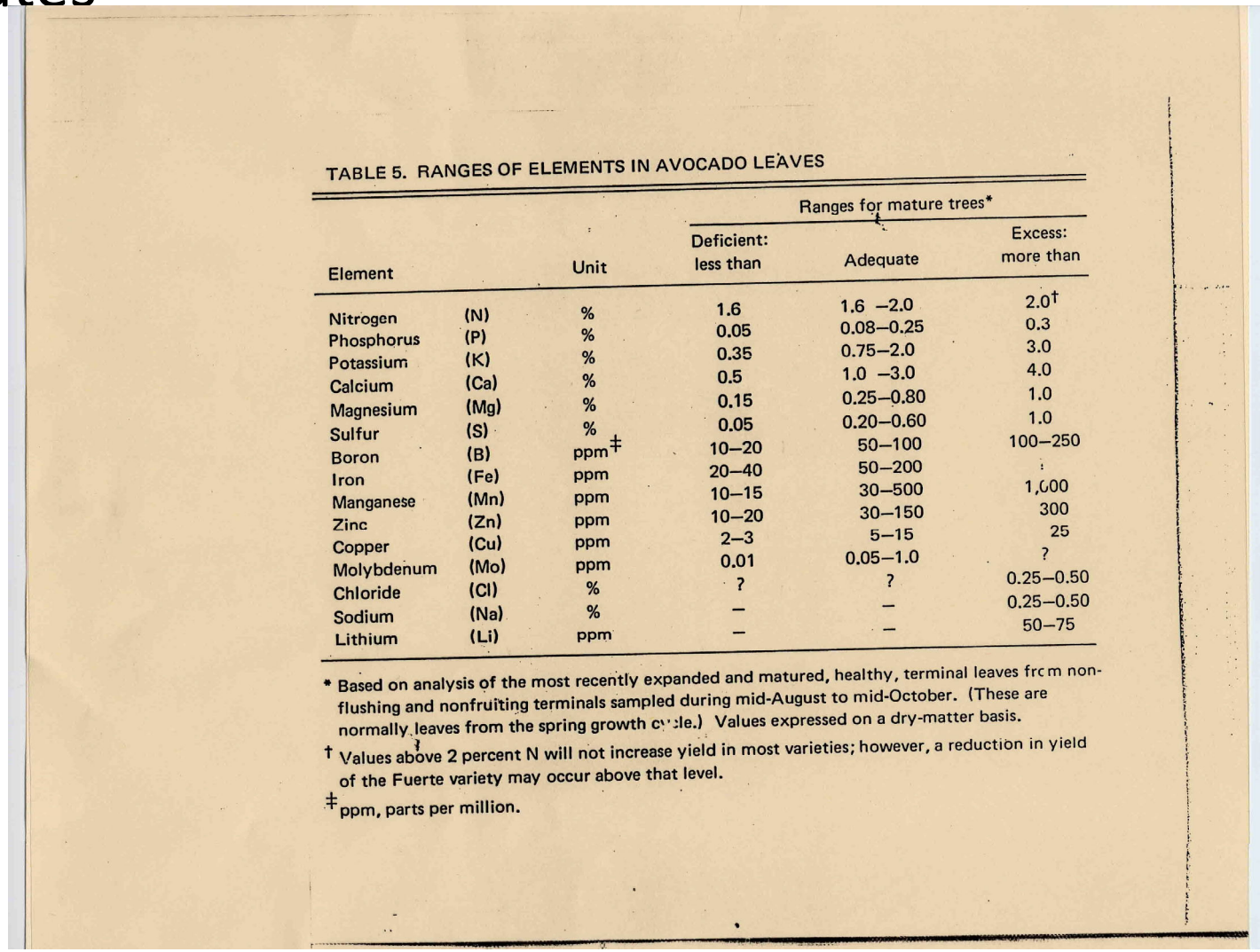


TABLE 5. RANGES OF ELEMENTS IN AVOCADO LEAVES

Element		Unit	Ranges for mature trees*		
			Deficient: less than	Adequate	Excess: more than
Nitrogen	(N)	%	1.6	1.6 –2.0	2.0†
Phosphorus	(P)	%	0.05	0.08–0.25	0.3
Potassium	(K)	%	0.35	0.75–2.0	3.0
Calcium	(Ca)	%	0.5	1.0 –3.0	4.0
Magnesium	(Mg)	%	0.15	0.25–0.80	1.0
Sulfur	(S)	%	0.05	0.20–0.60	1.0
Boron	(B)	ppm‡	10–20	50–100	100–250
Iron	(Fe)	ppm	20–40	50–200	
Manganese	(Mn)	ppm	10–15	30–500	1,000
Zinc	(Zn)	ppm	10–20	30–150	300
Copper	(Cu)	ppm	2–3	5–15	25
Molybdenum	(Mo)	ppm	0.01	0.05–1.0	?
Chloride	(Cl)	%	?	?	0.25–0.50
Sodium	(Na)	%	–	–	0.25–0.50
Lithium	(Li)	ppm	–	–	50–75

* Based on analysis of the most recently expanded and matured, healthy, terminal leaves from non-flushing and nonfruiting terminals sampled during mid-August to mid-October. (These are normally leaves from the spring growth cycle.) Values expressed on a dry-matter basis.

† Values above 2 percent N will not increase yield in most varieties; however, a reduction in yield of the Fuerte variety may occur above that level.

‡ ppm, parts per million.

General Irrigation Quality Guidelines
(U.C. Leaflet 2995, 1979)

Measurement	No problem	Increasing	Unsuitable
Effect on plant growth			
EC (dS/m)	<0.75	0.75-3	>3
Na^+ (SAR)	<3	3-9	>9
Cl^- (ppm)	140	140-350	>350
>350			
H_3BO_3 (ppm)	<0.5	0.5-2	>2
Effect on soil permeability			
EC (dS/m)	>0.5	<0.5	-
SAR	<6	6-9	>9
>9			

1.5 feet of water with EC of 1.6 dS/m adds 10,000 # of salt

Table 3-1. Laboratory determinations needed to evaluate common irrigation water quality problems.

Water parameter	Symbol	Unit	Usual range in irrigation water
Salinity			
Salt content			
Electrical conductivity	EC_w	mmho/cm or dS/m	0 - 3
Total dissolved solids	TDS	mg/L	0 - 2000
Cations and anions			
Calcium	Ca^{++}	mg/L	0 - 400
Magnesium	Mg^{++}	mg/L	0 - 60
Sodium	Na^{+}	mg/L	0 - 900
Carbonate	CO_3^{--}	mg/L	0 - 3
Bicarbonate	HCO_3^{-}	mg/L	0 - 600
Chloride	Cl^{-}	mg/L	0 - 1100
Sulfate	SO_4^{--}	mg/L	0 - 1000
Miscellaneous			
Boron	B	mg/L	0 - 2
pH (hydrogen ion activity)	pH		6.5- 8.5
Sodium adsorption ratio	$SAR^{a,b}$ or R_{Na}		0 - 15

Some rough guides to water

And some of the reports have weird units
and confusing units

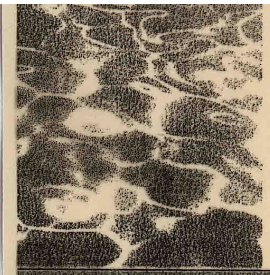
ppm = mg/l
meq, me ↔ ppm knowing atomic wt of element
EC ↔ TDS, 640 X conductivity = dS/m, mmho/cm, 1000 umhos

Samples Taken: Samples Rec'd: 5/16/96

Sample 11 - Field Mulch (Ground Blend) Log Number 96-A14645

ELEMENT OF INTEREST	AMOUNT PER CUBIC YARD TOTAL	AMOUNT PER CUBIC YARD AVAILABLE	AMOUNT PER TON, As Rec'd at 10.2% Moisture TOTAL	AMOUNT PER TON, As Rec'd at 10.2% Moisture AVAILABLE
Nitrogen	3.17 lbs	0.05 lbs	24.78 lbs	0.42 lbs
Phosphorus	0.52 lbs	0.15 lbs	4.04 lbs	1.14 lbs
Potassium	2.62 lbs	1.61 lbs	20.47 lbs	12.60 lbs
Calcium	3.84 lbs	0.86 lbs	29.99 lbs	6.68 lbs
Magnesium	0.78 lbs	0.36 lbs	6.11 lbs	2.79 lbs
Copper	0.09 ozs	0.03 ozs	0.69 ozs	0.23 ozs
Zinc	0.57 ozs	0.29 ozs	4.48 ozs	2.30 ozs
Manganese	0.59 ozs	0.30 ozs	4.60 ozs	2.36 ozs
Iron	20.4 ozs	0.13 ozs	159.2 ozs	1.03 ozs
Boron	0.24 ozs		1.91 ozs	

The above results reflect only the fraction smaller than 1/2 inch. If a substantial portion of this
1/2 inch, the above values should be adjusted accordingly if further screening is not intended. The
much slower with the soil and not have significant impact upon soil nutrition over the short term.



Water Quality Analysis Chart

Utilizing data gathered in 1998.

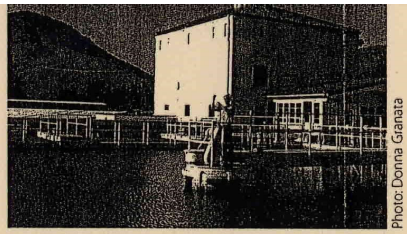


Photo: Donna Granata

City of Ventura Water Treatment Plant

Trihalomethanes are by-products of disinfecting water, which is necessary to eliminate waterborne diseases and protect public health.

Q: ***Should I be concerned about the level of Trihalomethanes in my tap water?***

No. The level of Trihalomethanes in Ventura water averages at 0.058 parts per million which is well below the state's drinking water standard of 0.100 parts per million.

Parameter		Units	Maximum Contaminant Level	Public Health Goal (CA)	Maximum Contaminant Level Goal (Fed)	Surface Water		Ground Water		CMWD (Casitas)		Saticoy Country Club	
						Average	Range	Average	Range	Average	Range	Average	Range
Water Clarity	Turbidity	NTU	5	NS	NS	.15	.03-.35	.25	.1-.6	0.4	.02-2.8	0.20	0.1-0.35
Microbiological Quality	Total Coliform Bacteria	% of Tests Positive	5	NS	NS	0.00	0	0.00	0	0	0	0	0
	Fecal Coliform Bacteria			NS	NS	0.00	0	0.00	0	0	0	0	0
Primary Standards **Organic Chemicals**	Total Trihalomethanes	mg/l	0.1000	NS	NS	.062	.04-.076	.059	.011-.1035	.082	.063-.097	0.030	.023-.039
Inorganic Chemicals	Barium	mg/l	1	NS	2	ND	ND	ND	ND-0.12	0.1	0.1	ND	ND - 0.12
	Chromium	mg/l	0.05	NS	0.1	ND	ND	ND	ND-0.01	0.001	0.001	ND	ND - 0.01
	Fluoride	mg/l	1.4◆	1	NS	.47	.31-.55	.62	.53-.64	0.03	0.03	.55	.45-.64
	Lead (consumer tap)	mg/l	0.015▲	0.002	NS	.013	ND-0.015	.013	ND-0.015	ND	ND	–	–
	Mercury	mg/l	0.002	NS	0.002	ND	ND	ND	ND-0.001	ND	ND	ND	ND
	Nitrate (as Nitrogen)	mg/l	10	10 as N	NS	1.4	0.7-2.8	2.7	1.7-4.1	3.1	ND-5.8	4.1	2.4-5.3
	Nitrite (as Nitrogen)	mg/l	1	10 as N	NS	ND	ND	ND	ND	ND	ND	ND	ND
Radioactivity	Gross Alpha Radioactivity	pCi/l	15	NS	NS	5.1	2.7-5.8	7.4	3.3-10.0	1.3	0.3-3	18.0*	13.9-21.2
	Gross Beta Radioactivity	pCi/l	50	NS	NS	5.28	ND-11.0	8.02	ND-15.8	ND	ND	6.8	6.2-13.0
	Radium 226 pluc Raium 228	pCi/l	5	NS	NS	0.413	ND-.827	.87	ND-1.7	ND	ND	1.01	.241-1.78
	Uranium	pCi/l	20	NS	NS	1.2	ND-2.4	4.15	1.5-6.8	ND	ND	9.1	ND - 18.2
Secondary Standards **Aesthetic Standards**	Color	Color Units	15	NS	NS	ND	ND	ND	ND	2	1-3	ND	ND
	Odor	Threshold #	3	NS	NS	ND	2	ND	ND-1	2	1-2	ND	ND
	Chloride	mg/l	500	NS	NS	23	6-56	47	38-64	10	10	85	81-89
	Copper (sources)	mg/l	1	NS	NS	ND	ND	ND	ND-0.37	ND	ND	ND	ND - 0.08
	Copper (consumer tap)	mg/l	1.3▲	0.17	NS	0.78	ND-1.37	0.78	ND-1.37	–	–	–	–
	Iron	mg/l	0.3	NS	NS	ND	ND-0.1	ND	ND-0.3	ND	ND	ND	ND
	Manganese	mg/l	0.05	NS	NS	ND	ND-0.05	ND	ND-.08	ND	ND	ND	ND
	Sulfate	mg/l	500	NS	NS	236	81-430	526	476-601	130	130	472	366-624
	Total Dissolved Solids	mg/l	1000	NS	NS	450	232-796	1112	1024-1356	350	350	1172	1096-1248
Additional Constituents	Temperature	°C	None	NS	NS	18.5	13.5-23.6	19.8	12.7-26.9	18.4	13.5-26.2	19.3	14.0-24.1
	pH	pHUnits	6.5-8.5	NS	NS	8.13	7.71-8.55	7.39	7.28-8.12	7.3	7.0-8.1	7.60	7.40-7.71
	Chlorine Residual	mg/l	3.0	NS	NS	0.82	0.4-1.3	0.75	0.05-1.3	1.5	0.51-2.2	0.87	ND - 1.3
	Conductivity	uMHO	1600	NS	NS	740	350-990	1420	1340-1640	553	490-690	1507	1420 - 1640
	Hardness	mg/l as $CaC0_3$	None	NS	NS	292	216-410	362	216-644	220	220	508	243 - 575
	Hardness	(gr/gal)	None	NS	NS	29	19-36	32	24-43	ND	ND	37	34 - 38
	Boron	mg/l	None	NS	NS	0.23	0.11-0.35	0.52	0.48-0.56	0.2	0.2	0.60	0.47- 0.70
	Calcium	mg/l	None	NS	NS	96	55.4-178	125.6	54.2-197	55	55	149	138 - 158
	Magnesium	mg/l	None	NS	NS	23.0	13.2-54.6	39.0	14.0-65.0	20	20	59.7	58.4 - 62.3
	Phosphate	mg/l	None	NS	NS	ND	ND	0.20	ND-0.4	ND	ND	0.02	ND - 0.15
	Potassium	mg/l	None	NS	NS	0.08	ND-0.41	0.03	ND-0.22	ND	ND	4.1	3.6 - 4.7

FAX (4
P.O. Box 1648, Bellevue, Washington 98009-1648/(2

Stone & Earth Landscape
247 Calle Serrento
Goleta, CA 93117

SOIL FERTILITY AND AGRICULTURAL SUITABILITY
(AO4)

Orange Office
Lab No. 34254
August 13, 1990

Soil samples rec'd 8-6-90

Sample #	Half Sat. %		Parts Per Million Dry Soil NO3-N	NH4-N	PO4-P	K	Ca	Mg	pH	Saturation Extract Values ECe	Ca Me/l	Mg Me/l	Na Me/l	K Me/l	B PPM	SAR	QUAL LIME
1	20	Mondo	31	7	36	140	2130	374	6.8	2.9	10.6	12.6	11.1	0.6	0.92	3.3	LOW
2	18	Pool Bank	41	11	15	220	1900	618	6.8	3.2	13.0	11.0	9.9	0.8	0.04	2.9	LOW
3	20	Flower	7	6	30	90	2360	428	7.7	1.1	5.9	3.9	2.2	0.2	0.14	1.0	LOW

Half Saturation %-approx. field moisture capacity. Salinity = ECe (mmhos/cm at 25 degrees C.).
SAR - Sodium Adsorption Ratio.

(1) Location 1 Mondo Grass
(2) Location 2 Pool Bank
(3) Location 3 Flower Garden

Soil Analysis

N, P, K in ppm
Ca, Mg, Na in Me/L

Na = 11.1 Me/L = 23 x 11.1 = 252 ppm Na
B = 0.92 ppm
SAR = 3.3

mEq = meq = Me = me = milliequivalent

REPORT NUMBER
W267-50

A & L WESTERN AGRICULTURAL LABORATORIES

1311 WOODLAND AVE. • MODESTO, CALIFORNIA 95351 • (209) 529-4080

SAMPLES SUBMITTED BY: [redacted]

SEND TO:
GROWTH RESOURCES
387 VALMONTE SUR
PALM SPRINGS
CA
92262

GROWER: [redacted]

DATE OF REPORT [redacted] PAGE 1

SOIL ANALYSIS REPORT

(SEE EXPLANATION ON BACK)

INFO SHEET # 33905

SAMPLE NUMBER	LAB NUMBER	ORGANIC MATTER % RATE	ORGANIC MATTER ENR lbs./A	PHOSPHORUS P_1 (Weak Bray) ppm-P RATE	PHOSPHORUS P_2 $NaHCO_3$-P ppm-P RATE	POTASSIUM K ppm-K RATE	MAGNESIUM Mg ppm-Mg RATE	CALCIUM Ca ppm-Ca RATE	SODIUM Na ppm-Na RATE	pH SOIL pH	pH BUFFER INDEX	HYDROGEN H meq/100g	Cation Exchange Capacity C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
1 Tico A1	51403	0.9VL	48	36VH	21M	86L	251 VH	1800H	169VH	7.5		0.0	12.0	1.8	17.4	74.7	0.0	6.1
2 A3	51404	0.8VL	46	17M	11L	139M	265 VH	2050H	158VH	7.7		0.0	13.5	2.6	16.4	75.9	0.0	5.1
3 C2	51405	0.7VL	44	3VL	5VL	68L	337 VH	2050M	473VH	7.7		0.0	15.3	1.1	18.4	67.0	0.0	13.5
4 C3	51406	0.7VL	44	17M	20M	145H	214 VH	1610H	128VH	7.9		0.0	10.8	3.5	16.6	74.8	0.0	5.2
5 Tico A1	51407	1.2L	54	26H	14L	145M	450 VH	2380H	276VH	7.7		0.0	17.2	2.2	21.8	69.1	0.0	7.0

SAMPLE NUMBER	NITRATE NO_3 ppm-NO3-N RATE	SULFUR S ppm-S RATE	ZINC Zn ppm-Zn RATE	MANGANESE Mn ppm-Mn RATE	IRON Fe ppm-Fe RATE	COPPER Cu ppm-Cu Rate	BORON B ppm-B RATE	EXCESS LIME RATE	SOLUBLE SALTS mmhos/cm RATE	CHLORIDE Cl ppm-Cl RATE	MOLYBDENUM Mo ppm-Mo RATE	PARTICLE SIZE ANALYSIS % SAND	% SILT	% CLAY	SOIL TEXTURE
1	6L	698VH	1.5 M	2VL	4VL	3.4 VH	1.7 H	H	3.0 M						
2	10L	168VH	1.0 L	2VL	3VL	2.8 VH	1.4 H	H	1.7 L						
3	110VH	537VH	0.6 L	2VL	2VL	1.6 H	2.6 VH	H	4.4 H						
4	19M	52VH	1.1 M	2VL	3VL	2.0 VH	2.2 VH	H	1.6 L						
5	33H	900VH	1.0 L	2VL	5VL	3.8 VH	4.8 VH	H	3.8 M						

This report applies only to the sample(s) tested. Samples are retained a maximum of thirty days after testing. Soil Analysis Prepared By

A & L WESTERN AGRICULTURAL LABORATORIES

By R. East
RICHARD EAST

Soil Analysis

pH 7.5
B = 1.7 ppm
Cl – ?
Na = 169 ppm
SAR = 3.3

FAX (206) 562-9531

ERSIFIED MINERALS
5 E Wooley Road
ard, CA 93030

COMPLETE SOIL EVALUATION AND
MICRONUTRIENT ANALYSIS
(A05-2)

Orange Office
Lab No. 159
SOIL AMENDMENT

Samples Taken: 7/28/97 Samples Rec'd:

m e	Half Sat% TEC	Parts Per Million Parts Dry Soil NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Sat Ext	Sample Description & Log Number
	26	143	26	176	790	3530	214	29	70	7	176		West Canyon
	214	3.2		5.6	2.4	1.0	0.5	6.8	6.5	0.3	1.7		97-A21444 16 5

7/30/97

ufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed.
f Saturation %=approx field moisture capacity. B, Na and salinity(ECe (dS/m at 25 deg.C.)) by sat ext method. Major elements
y sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. eSAR=Est.
Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg)

	Saturation Extract Values pH	ECe	Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	Cl me/l	SAR	Qual Lime
	6.7	2.4	15.8	3.0	1.4	3.8	0.27		0.5	Med

m e	Organic Percentage	Percent of Sample Passing 2 mm Screen Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
	5.6	0.0	7.3	11.9	15.1	43.4	21.7	7.9	Sandy Loam

7/30/97

avel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2") sieve. Particle sizes in millimeters.

Soil Analysis

pH 6.7

B = 0.27 me/L = 11 x .27 = 2.97 ppm

Na = 1.4 me/l = 23 x 1.4 = 32 ppm

SAR = 0.5

Organic % - 5.6

Constituent	Results	
Total Hardness (CaCO3)	492 mg/L	
Calcium (Ca)	136 mg/L	50 %
Magnesium (Mg)	37 mg/L	22 %
Sodium (Na)	86 mg/L	28 %
Potassium (K)	2 mg/L	0 %
Carbonate (CO3)	<1 mg/L	
Bicarbonate (HCO3)	265 mg/L	33 %
Sulfate (SO4)	267 mg/L	42 %
Chloride (Cl)	108 mg/L	23 %
Nitrate (NO3)	20 mg/L	2 %
Fluoride (F)	0.4 mg/L	
pH	7.3	
E.C.	1290 umhos/cm	
TDS (by Summation)	921 mg/L	
Boron (B)	0.1 mg/L	
Iron (Fe)	<0.05 mg/L	
Manganese (Mn)	<0.03 mg/L	
Sodium Absorption Ratio (SAR)	1.7	
Recommended Gypsum Application (100% Pure Gypsum, or Equivalent)	NA lbs/acre ft. water	

Water Analysis

pH – 7.3

Cl = 108 ppm

B = 0.1 mg/L = 0.1 ppm

Na = 86 ppm

SAR - 1.7

Constituent	Results	
Total Hardness (CaCO3)	1540 mg/L	
Calcium (Ca)	368 mg/L	42 %
Magnesium (Mg)	152 mg/L	28 %
Sodium (Na)	302 mg/L	30 %
Potassium (K)	3 mg/L	0 %
Carbonate (CO3)	<1 mg/L	
Bicarbonate (HCO3)	382 mg/L	14 %
Sulfate (SO4)	1050 mg/L	51 %
Chloride (Cl)	440 mg/L	28 %
Nitrate (NO3)	192 mg/L	7 %
Fluoride (F)	<0.1 mg/L	
pH	7.6	
E.C.	3580 umhos/cm	
TDS (by Summation)	2890 mg/L	
Boron (B)	1.4 mg/L	
Iron (Fe)	0.17 mg/L	
Manganese (Mn)	0.81 mg/L	
Sodium Absorption Ratio (SAR)	3.4	
Recommended Gypsum Application (100% Pure Gypsum, or Equivalent)	NA lbs/acre ft. water	

!!!! !!!!! 43#/ac-ft

Water Analysis

pH 7.6

Cl = 440 mg/L = 440 ppm

B = 1.4 mg/L = 1.4 ppm

Na = 302 mg/l = 302 ppm

SAR 3.4

Nitrate = 192 mg/l = 43#/ac-ft

Bicarbonate Alkalinity, mg/1 $CaCO_3$	320
Carbonate Alkalinity, mg/1 $CaCO_3$	<1
Hydroxide Alkalinity, mg/1 $CaCO_3$	<1
Calcium, mg/1 Ca	216
Chloride, mg/1 C1 (500)	164
Copper, mg/1 Cu (1.0)	<0.02
Surfactant, mg/1 MBAS (0.5)	<0.02
Iron, mg/1 Fe (0.3)	0.05
Magnesium, mg/1 Mg	57
Manganese, mg/1 (0.05)	<0.02
pH factor, unit	7.4
Sodium, mg/1 Na	87
Sulfate, mg/1 SO_4 (500)	457
Conductance, electrical, 25° C (1600)MMH/CM	2000
Total Dissolved Solids, mg/1 TDS(at 180° C)(1000)	1196
Total Hardness, mg/1 $CaCO_3$	772
Calcium Hardness, mg/1 $CaCO_3$	540
Magnesium Hardness, mg/1 $CaCO_3$	232
Zinc, mg/1 Zn (5)	<0.02
GENERAL PHYSICAL ANALYSES	
Color, Unit (15)	
Turbidity, NTU (5)	
Threshold Odor Number at 60 C (3)	
OTHERS: Theoretical TDS(Summation of Solids)	1303
Total Anions, Milligram Equivalent/liter	19.3
Total Cations, Milligram Equivalent/liter	19.4
Standard Deviation, Anion-Cation Balance	± 0.2

	RESULTS
Arsenic, mg/1 As (0.05)	
Barium, mg/1 Ba (1.0)	
Cadmium, mg/1 (0.01)	
Chromium, mg/1 Cr (0.05)	
Lead, mg/1 Pb (0.05)	
Mercury, mg/1 Hg (0.002)	
Nitrate as Nitrogen, mg/1 NO_3N (10)	
Nitrate as NO_3, mg/1 NO_3 (45.0)	
Fluoride, mg/1 F (2.0)	
Selenium, mg/1 Se (0.01)	
Silver, mg/1 Ag (0.05)	
ORGANIC CHEMICAL ANALYSES	
Chlorinated Hydrocarbons:	
Endrin, mg/1 (0.0002)	
Lindane, mg/1 (0.004)	
Methoxychlor, mg/1 (0.1)	
Toxaphene, mg/1 (0.005)	
Chlorophenols:	
2,4-D, mg/1 (0.1)	
2,4,5-TP Silvex, mg/1 (0.01)	
MISCELLANEOUS	
Boron, mg/1 B — No guideline	4.0
Potassium, mg/1 K	1.5
Sodium Adsorption Ratio (SAR)	1.4
Per Cent Sodium	19.6
Aluminum(1.0), ppm Al	

Water Analysis

pH 7.4

Cl = 164 mg/L = 164 ppm

B = 4 mg/L = 4 ppm

Na = 87 mg/L = 87 ppm

SAR 1.4

Anions = 19.3, Cations = 19.4

arbonate Alkalinity, mg/1 $CaCO_3$	12
rbonate Alkalinity, mg/1 $CaCO_3$	<1
droxide Alkalinity, mg/1 $CaCO_3$	<1
cium, mg/1 Ca	6
loride, mg/1 C1 (500)	60
pper, mg/1 Cu (1.0)	<0.02
factant, mg/1 MBAS (0.5)	<0.02
, mg/1 Fe (0.3)	<0.05
gnesium, mg/1 Mg	<1
nganese, mg/1 (0.05)	<0.02
factor, unit	7.6
dium, mg/1 Na	133
fate, mg/1 SO_4 (500)	200
nductance, electrical, 25° C (1600)MMH/CM	650
al Dissolved Solids, mg/1 TDS(at 180° C)(1000)	396
al Hardness, mg/1 $CaCO_3$	16
Calcium Hardness, mg/1 $CaCO_3$	16
Magnesium Hardness, mg/1 $CaCO_3$	<1
c, mg/1 Zn (5)	0.04
NERAL PHYSICAL ANALYSES	
or, Unit (15)	10
bidity, NTU (5)	0.4
eshold Odor Number at 60 C (3)	1.0
HERS: Theoretical TDS(Summation of Solids)	411
al Anions, Milligram Equivalent/liter	6.1
al Cations, Milligram Equivalent/liter	6.1
ndard Deviation, Anion-Cation Balance	± 0

Arsenic, mg/1 As (0.05)	
Barium, mg/1 Ba (1.0)	
Cadmium, mg/1 (0.01)	
Chromium, mg/1 Cr (0.05)	
Lead, mg/1 Pb (0.05)	
Mercury, mg/1 Hg (0.002)	
Nitrate as Nitrogen, mg/1 NO_3N (10)	
Nitrate as NO_3, mg/1 NO_3 (45.0)	
Fluoride, mg/1 F (2.0)	7.50
Selenium, mg/1 Se (0.01)	
Silver, mg/1 Ag (0.05)	
ORGANIC CHEMICAL ANALYSES	
Chlorinated Hydrocarbons:	
Endrin mg/1 (0.0002)	
Lindane, mg/1 (0.004)	
Methoxychlor, mg/1 (0.1)	
Toxaphene, mg/1 (0.005)	
Chlorophenols:	
2,4-D, mg/1 (0.1)	
2,4,5-TP Silvex, mg/1 (0.01)	
MISCELLANEOUS	
Boron, mg/1 B	0.10
Potassium, mg/1 K	<0.2
Sodium Adsorption Ratio (SAR)	14.9
Per Cent Sodium	95.1
Aluminum(1.0), ppm Al	

Water Analysis

pH 7.6

B = 0.1 mg/L = 0.1 ppm

Cl = 60 mg/L = 60 ppm

Na = 133 mg/L = 133 ppm

SAR 14.9

Ca = 6 ppm Mg <1 ppm

LEACHING

Used to improve the infiltration of water into the soil so that salts can be leached out of the root zone – gypsum when sodium dominated water

Leaching - only known method for salinity control

“Magic potions”

- **No scientific basis for claims**
- **No properly-collected data to support claims**

Amendments???????

Leaching method of controlling salts

Two types:
Maintenance – maintaining salinity at a more or less constant level

Reclamation –periodic leaching to reduce accumulated salts down to an acceptable level

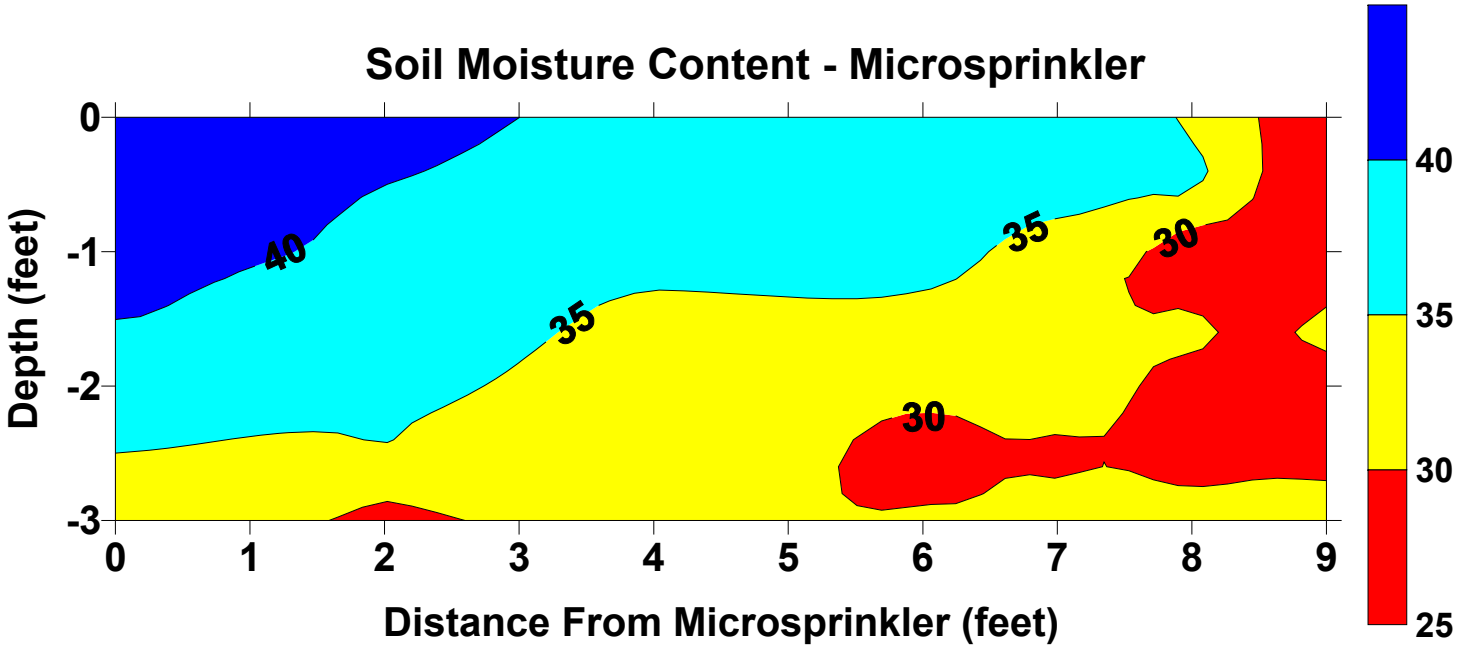
Blending? Bumping?

No rain, accumulated salts in rootzone

can lead to “Stem and Leaf Blight”

caused by fungus

Uneven distribution of water makes for uneven salt distribution



Does gypsum correct soil pH

$CaSO_4$??

No

Nope

Nada