Section 2 of 22 (2h - Irrigation Water Quality Sampling)

Why Sample: Effects of Poor Water Quality on Soils

Irrigation water quality refers to the kind and amount of salts present in the water and their effects on crop growth and development. Soil samples as well as water quality samples must be taken to determine the quality. If levels of calcium, magnesium, and sodium, as well as chlorides, sulfates, and bicarbonates, as a group or alone, are too high, crop growth can be hurt. High levels can even cause crop failure. Often it is associated with poor soil structure.

Crop growth reductions because of dissolved substances in the soil are similar to drought-stressed effects. An osmotic gradient on salty soils is formed. Water uptake by plant roots is increasingly restricted as the concentration of soil salts increases. Because of this, as soil salts build up in the soil, more frequent irrigation is necessary to help flush out salts and reduce water stress.

A breakdown of soil structure is a major effect of elevated sodium. Soil aggregates are bonded by calcium and magnesium. High levels of dissolved sodium tend to displace these bonding elements and disperse the aggregates. As sodium increases, dispersion increases and soil tilth declines. Soil dispersion caused by sodium can make soils run together, crust easier, and can limit water infiltration.

How to Take Irrigation Water Quality Samples

Levels and specific makeup of dissolved substances in irrigation water affect crop productivity and soil structure. They also determine if water is suitable for irrigation.

Water analyses can only be as accurate as the sample taken. Contact your laboratory first to obtain the form and any specific procedures to follow. Follow these simple guidelines when collecting a water sample:

Containers and Handling

Sample early in the week to avoid having the sample sit in a lab over the weekend. Samples should be collected in a new clean, plastic bottle (at least a pint) with a screw cap. Rinse the plastic bottle and cap 3 times with the water you wish to sample to eliminate any contamination. Fill the bottle to the top and cap tightly. Wipe the bottle dry. Clearly identify each container with a simple sample identification which matches the request form for the laboratory. Tape the bottle shut so that it doesn't leak. When mailing, place bottles in a box and pack with a loose, soft packing material to prevent crushing. Avoid glass containers, as boron concentrations may change and glass has higher potential for breakage. Some samples may require overnight delivery. If the sample can't be sent immediately, refrigerate it before sending to the laboratory. Keep good records of the date and location of each sample. This can best be done by keeping a copy of the laboratory information sheet that must be submitted with each sample.

Well Water

Let the pump operate twenty minutes to an hour before taking the sample to be sure the water is representative of what is being tested. Take the sample from water at the pump so that residues from the lines do not contaminate the sample. If two or more wells supply an irrigation system, one sample may be taken from the system after pumping (flushing) for at least one hour. However, if a water test indicates a problem, all wells supplying the system will need to be tested individually to determine the source of the problem. Sometimes one poor quality well can dramatically reduce the quality of a mixture.

Other Water Sources

Testing should also be done on irrigation water from ponds, reservoirs, streams, canals, or other surface water sources. Samples can be obtained by collecting water from a faucet near the pumping station after operating for twenty minutes or longer. For irrigation water sources where no pump is present, obtain samples by attaching a clean bottle to a pole or extension and collecting and mixing several samples into a "composite" which is sent to the laboratory. Samples from lakes, streams, or ponds should be taken below the surface for a representative sample. Where sprinkler or pivot irrigated, fill the bottle directly from the sprinkler or point of emission.

What Analyses to Request

In most cases, a routine irrigation water analysis is the most appropriate test to request for irrigation water. Regardless of laboratory selected, be certain that the analysis includes the three major factors – total soluble salts, sodium hazard (SAR) and individual potentially toxic ions. The most recommended analyses to request are:

pH, Electrical Conductivity, Sodium Adsorption Ratio, Total Dissolved Solids, Nitrate Nitrogen, Carbonates, Bicarbonates, Chlorides, Sulfate, Fluoride, Calcium, Sodium, Potassium, Magnesium, Boron

For microirrigation systems, also analyze for Iron and Manganese.

Special Analyses Processing -
For microbiological analysis see instructions for specific lab.

How Often to Sample

Surface waters are subject to seasonal weather and flow patterns and may need frequent monitoring. The chemical composition of groundwater changes slowly and usually needs to be tested only every few years. Deep basalt aquifers are less likely to change than shallow alluvial aquifers, which are influenced by management.

Water Quality and Subsurface Drip Irrigation systems:

The irrigation water to be used in a drip system should be evaluated carefully to assess any potential clogging problems. Materials suspended in the water, such as sand, silt, and algae, can block emitter flow passages or settle out in the drip lines. Other contaminants, such as calcium, bicarbonate, iron, manganese, and sulfide, can also precipitate to clog emitter flow passages. All water needs to be tested to determine levels of dissolved salts, pH, and turbidity (sediment levels). Growers need to be aware of high levels of pH (7.5) and high dissolved bicarbonate levels (=> 5.6 meq/liter). If water quality analysis indicates these levels, sulfuric acid (for organic production, use approved alternative, e.g. acetic acid) should be injected to acidify the water to lower the pH to prevent the emitters from clogging with precipitates. A pH of 6.5 is favorable for injecting fertilizers or other agricultural chemicals into the system.

NM Certified Laboratories for Drinking Water Analyses – Can be Used for Irrigation

ABCWUA Water Quality	M	Albuquerque, NM	(505) 873-6955
Aqua Environmental	M,E	Angus, NM	(575) 336-1107
Ana-Lab Corp	M,E	Kilgore, TX	(903) 984-0551
Analytical Services	**S**	Williston, VT	(800)723-4432
BioVir Laboratories, Inc.	**S**	Benicia, CA	(707) 747-5906
CH Diagnostics	S	Berthoud, CO	(970) 532-2078
City of Carlsbad	M	Carlsbad, NM	(575) 887-1191
Columbia Analytical Services, Inc.	C	Kelso, WA	(360) 577-7222
Diagnostic & Technology Center, Inc.	M,E	Alamogordo, NM	(505) 434-4944
City of Farmington Env. Lab	M,E	Farmington, NM	(505) 599-1373
Gallup Micro Biology Lab	M	Gallup, NM	(505) 863-2001
Hall Environmental Analysis	M,E,C	Albuquerque	(505) 345-3975
City of Hobbs	M	Hobbs, NM	(575) 397- 9315
ILFC Inc.	M	Rio Rancho, NM	(505) 892-1666
Indepth Water Testing	M	Santa Fe, NM	(505) 471-2023
Kramer & Associates, Inc	M	Albquerque, NM	(505) 881-0243
City of Las Vegas	M, E	Las Vegas, NM	(505) 454-1401
NM Micro Biology Lab	M	Milan, NM	(505) 287-8104
NM American Water Co.	M	Clovis, NM	(575) 763-5538
NM Water Testing Lab, Inc	M,E	Espanola, NM	(505) 753-6028
Raton Water Works	M	Raton, NM	(505) 445-3861
Town of Red River	M	Red River, NM	(575) 754-2277
City of Roswell	M	Roswell, NM	(575) 622-1449
Scientific Laboratory Division/DOH	M,E,C	Albuquerque, NM	(505) 841-2516
Town of Silver City	M	Silver City, NM	(575) 538-3731
SWAT Lab	M,E,C	Las Cruces, NM	(575) 646-4422
City of Tucumcari	M	Tucumcari, NM	(575) 461-4372
M: Microbiological; E: Enumeration for E. coli for LT2ESWTR; C: Chemical; S: Giardia, Cryptosporidium, MPA		Source: http://www.nmenv.state.nm.us/dwb/certified_labs.html	Updated 5/19/10

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