Why test my irrigation water?

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Water quality can have a huge impact on plant growth, especially in soilless plant production systems. Such production systems are extremely diverse, but are most commonly characterized as container production, raised bed production or hydroponics. Soilless systems require intensive management of water and nutrients for optimal plant growth and production. Irrigation water quality impacts nutrient levels and availability as well as other chemical characteristics of the soilless growth substrate. That is why it is critical to characterize the irrigation water source before initiating crops and possibly even during the production of a crop, depending upon the cropping cycle and expected fluctuations in water source.

Water quality factors include physical, chemical and biological properties. Physical properties include suspended solids such as soil particles. The presence of solids in the irrigation water can easily clog low-volume irrigation emitters and even more robust sprinkler heads. Filtering a water sample using filter paper or finely woven cloth can determine if suspended particles are present.

Biological properties of interest include the presence of iron fixing bacteria, plant pathogens or algae. Iron fixing bacteria can react to clog irrigation emitters and is usually associated with excessive iron levels in the water. Plant pathogens, such as water molds, can become an issue in irrigation water, especially if the irrigation water is recycled. Recycled irrigation water can be in a closed system such as hydroponics or more open systems such as holding ponds positioned to capture irrigation runoff water plus rainfall. Algae are most common in slow moving streams or ponds. Biological properties are not included in routine water tests as they are relatively expensive but the expense may be warranted for evaluation of a new water source or to assist in diagnosing the cause of crop plant abnormalities. Sending samples to a specialized, commercial water testing laboratory would be necessary for such analyses not included in a routine water test such as the one available at UK.

Chemical properties of irrigation water are the properties most often tested as they can cause immediate production issues and the information gained from the test can be used immediately in crop management strategies. Only chemical properties are included in the UK Water Test analysis. Chemical properties routinely measured include pH, alkalinity (pH buffering capacity), electrical conductivity (soluble salts), plant macronutrients such as nitrogen, phosphorus, potassium, calcium, magnesium and sulfur and micronutrients such as zinc, copper, iron, manganese and boron.

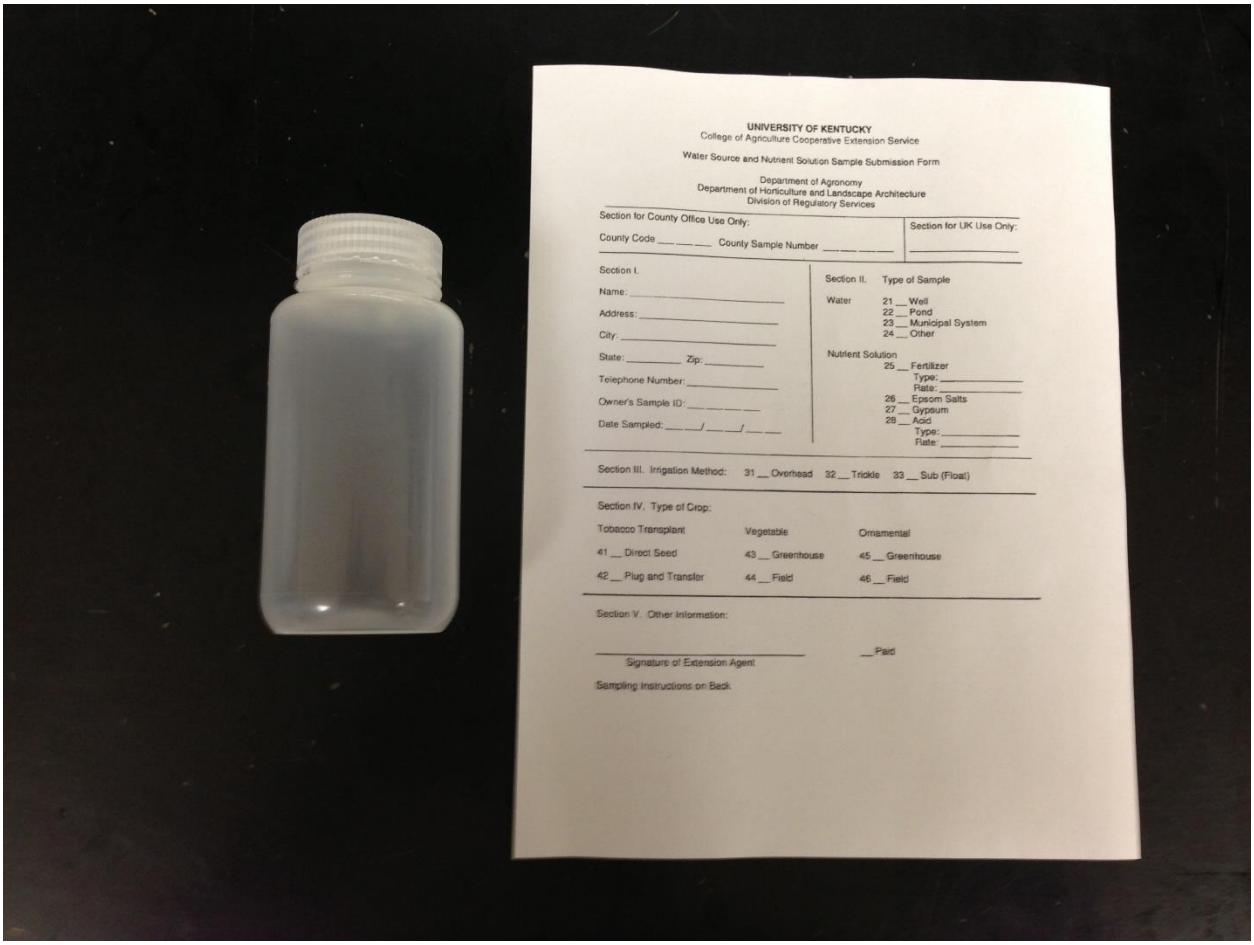
Water testing services are available through the Kentucky Cooperative Extension Service as well as private laboratories. In general the state services are less expensive but may be limited in the number of factors tested. Kentucky growers can submit water samples through the local County Extension Office for analysis by the UK Soil Laboratory in the College of Agriculture, Food and the Environment for a modest fee. The decision of which service to use will depend on the production system and water source. A standard test that measures the most critical water

quality factors is acceptable for most plants including bedding plants, potted flowering crops, hanging baskets, trees and shrubs. More rigorous testing is advisable for hydroponic systems and young plant (plug, liner, or transplant) production. Water tests can also be used to confirm the content of nutrient solutions for fertigation or hydroponics. Pesticide build-up can be an issue in production systems capturing runoff from large blocks of plants. Testing for specific pesticides requires sending samples to specialized, commercial laboratories with the necessary equipment and protocols. Water testing should also be repeated on a regular basis as the quality of water from the same source will vary over time. For example, in times of drought the mineral concentration of water from many sources will increase as some of the water evaporates, leaving the minerals behind in a small volume of water.

Regardless of the service that will be used, the sample collection protocols are generally the same. For samples to be submitted to UK, obtain a sample form and bottle (250 ml plastic) from your County Extension Office. The sample should be collected at the source to prevent contamination from residues in the irrigation system which could skew the test readings rendering the test meaningless. Leave a ½-inch air space at the top of the sample bottle. Replace the bottle cap tightly, mark the sample with the owner identification and return the sample and completed submission form to the County Extension Office. If samples must be held, store them in a refrigerator, but do not freeze them. The more information provided on the submission form about the crops to be grown, any past or current undesirable crop symptoms, etc. will result in more targeted comments and recommendations in the report. A report from the UK Soil Laboratory will be sent electronically to the County Extension Office that sent the water sample to the laboratory. The report will contain the results of the analyses and information from the submission form. The County Extension Agent will provide the report and comments, with assistance from an Extension Specialist as appropriate, to the grower submitting the sample.

Regardless of where you send a water sample for analysis, sampling your irrigation water on a routine schedule is recommended. If you have questions about sampling or analysis options, contact your County Extension Agent or email me at dingram@uky.edu.

Sample bottle and water sample submission form available at your County Extension Office.



UNIVERSITY OF KENTUCKY
College of Agriculture Cooperative Extension Service

Water Source and Nutrient Solution Sample Submission Form

Department of Agronomy
Department of Horticulture and Landscape Architecture
Division of Regulatory Services

Section for County Office Use Only:

County Code ___ ___ County Sample Number ___ ___ ___ ___

Section for UK Use Only:

Section I.

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

Telephone Number: _____

Owner's Sample ID: _____

Date Sampled: ___ ___/___ ___/___ ___

Section II. Type of Sample

Water
21 __ Well
22 __ Pond
23 __ Municipal System
24 __ Other

Nutrient Solution
25 __ Fertilizer
Type: _____
Rate: _____
26 __ Epsom Salts
27 __ Gypsum
28 __ Acid
Type: _____
Rate: _____

Section III. Irrigation Method: 31 __ Overhead 32 __ Trickle 33 __ Sub (Float)

Section IV. Type of Crop:

Tobacco Transplant	Vegetable	Ornamental
41 __ Direct Seed	43 __ Greenhouse	45 __ Greenhouse
42 __ Plug and Transfer	44 __ Field	46 __ Field

Section V. Other Information:

_____ __ Paid
Signature of Extension Agent

Sampling Instructions on Back