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SP740-A Good Agricultural Practices Series: Testing Water for Fruit and Vegetable Production

Susannah Amundson

Grant McCarty

Faith Critzer

Annette Wszelaki

UT Extension
SP 740-A

Good Agricultural Practices Series

Testing Water for Fruit and Vegetable Production

Susannah Amundson, Extension Assistant, Department of Plant Sciences
Grant McCarty, Graduate Research Assistant, Department of Plant Sciences
Faith Critzer, Assistant Professor, Department of Food Science and Technology
Annette Wszelaki, Assistant Professor, Department of Plant Sciences

Why should I test my water?

Water is used throughout fruit and vegetable production for frost protection, irrigation, fertigation and protective sprays. Water can harbor harmful bacteria called pathogens, like *Salmonella* and *pathogenic E. coli*, which can cause foodborne illnesses. When contaminated water is used in crop production, there is a risk that these pathogens may contaminate produce. Microbial risk is affected by the type and level of pathogens present, type of crop (aboveground crops are at a greater risk than belowground crops), water source (streams and lakes are at greater risk than wells), irrigation method (overhead is at greater risk than drip irrigation), and timing of application and harvest (the longer the interval between the two, the better). Testing and keeping water test records improves on-farm risk assessment and provides assistance for understanding when mitigation strategies should be adopted.

What water sources do I test?

Any water source used for irrigation, frost protection or pesticide/fertilizer application should be tested. These sources include wells and surface water like ponds, lakes, rivers and streams. If using municipal water, the local municipality or health department tests the water and a copy of test results can be requested from them. Note: Potable or drinkable water should be used for all applications on produce after harvest.

When do I test?

Well water should be tested at least twice a year: 1) at the start of the season and 2) at peak use. Microbial pathogen levels in surface water vary and are affected by many factors including time of year, flow rates, climatic events and upstream activity. For this reason, it is recommended that multiple tests be taken throughout the season to get an average microbial analysis. Testing should be done at least three times a year: 1) at the start of the season, 2) at peak use, and 3) at harvest. If using municipal water, a copy of test results can be requested from the local municipality or health department. You should have the current year test results on file.

What do I test?

A typical food safety agricultural water test should screen for quantified generic coliforms of *E. coli* bacteria. Other parameters that can be useful for both general production and food safety include conductivity, turbidity and pH.

1. **Coliforms:** Testing should include analysis for quantified generic coliforms of *E. coli*. Results should be reported as a number (colony count or MPN — Most Probable Number per milliliter) and not just as the presence or absence (P/A) of bacteria.
2. **Conductivity:** Conductivity is the measurement of the ability of water to conduct an electric current and an indicator of the salinity or mineral content of water. Great changes in conductivity readings also can be an indicator of pollution.

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3. **Turbidity:** Turbidity is a measurement of the suspended particulate matter in the water that interferes with the passage of a beam of light through the water. Materials that contribute to turbidity are silt, clay, organic material or microorganisms. The higher the turbidity of water, the greater the surface area of particles for potential bacterial growth.
4. **pH:** Testing pH gives a measurement of the hydrogen ion concentration in water and indicates the relative acidity or alkalinity of your water. Test results will range from 0.0 to 14.0, where pH 7.0 is neutral, less than 7.0 is considered acidic and greater than 7.0 is considered alkaline, or basic. The purpose of testing water pH for food safety is to provide a broad monitoring of the source.

How do I take a sample?

These are general guidelines. If the testing lab you plan to use has a specific protocol make sure to follow it.

1. Contact the testing laboratory and have them send you a water sampling kit. Contact information can be found below.
2. Supplies to have on hand (Figure 1):
   - Marker for labeling bottles.
   - Sampling bottles — two for each source being tested. (One for coliforms and one for other water parameters. These will be part of the sampling kit received from lab.)
   - Cooler.
   - Ice or ice packs.
   - Shipping labels, if mailing to lab.
   - Tape, for securing any labels.
   - Zip-close bags.
   - Sampling pole (optional, helpful for surface water sources).
3. Locate the best sampling area.
4. Samples should be taken as close to point of use as possible. This sample location can be directly from irrigation equipment in the field or from the water source itself. If taking a sample from the water source, make sure it is a representative sample by choosing an area that is: 1) near where the pump draws the water, 2) clear of debris and vegetation, and 3) undisturbed.
5. Write farm name, water source, date and time of sample on the bottle or the bottle cap (Figure 2).
6. Remove bottle lid. Do not touch inside the bottle or cap to avoid contamination. If the source is surface water (stream, pond, river, etc.), it is best to submerge the bottle before removing the lid to prevent contamination from debris on the water surface.
7. Fill bottle with water.
   - If taking a sample from irrigation equipment, make sure to 1) let the water run at least one minute before collecting your sample and 2) not allow the lip of the bottle come in contact with the equipment.
   - If sampling surface water, take a sample near the middle of the source or several feet from the side of the river, stream or pond. Also, take the sample well

Figure 1. Water sampling supplies: cooler, ice or ice packs, sampling bottles, marker, zip-close bag and tape.

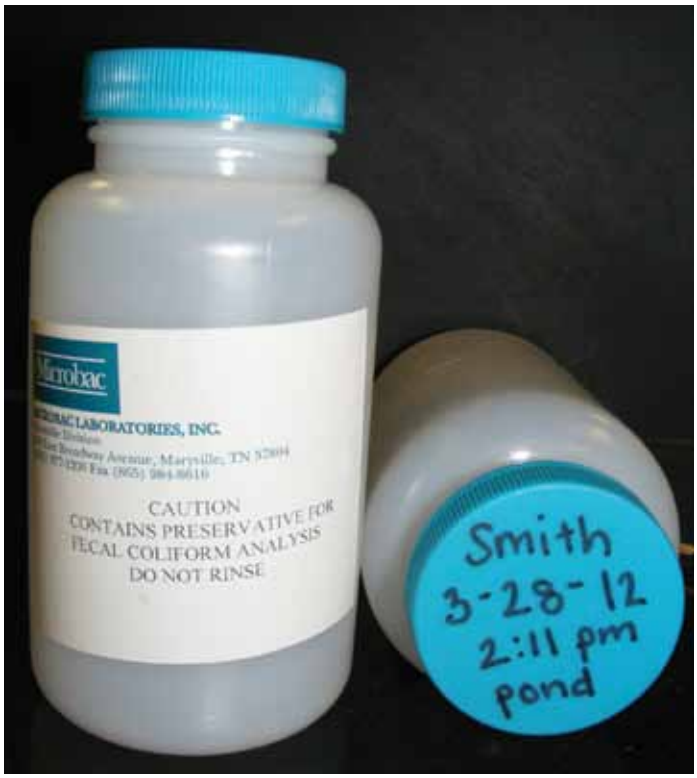

Figure 2. Sampling bottle properly labeled with name, date, time and type of water source.

below the water surface, as deep as possible without scraping the bottom of the source. Take care to NOT collect floating debris or scrape the sides or bottom of the source while sampling — all of which may contaminate the sample.

8. Replace lid.
9. As a precaution, double check the bottle label to ensure accuracy.
10. Place bottle in zip-close bag.
11. Immediately place in cooler on ice or ice packs. Sample placement in the cooler must be done within 15 minutes of collection.
12. Deliver samples to the lab within six hours of collection. Notify the lab a day prior to delivery, so they can be prepared to receive your sample. If sending your sample to the lab instead of delivering it in person, be sure to ship the sample overnight.

Examples of laboratories in Tennessee that can run all the tests listed above:

East:
Microbac Labratories
505 East Broadway Ave.
Maryville, TN 37804-5744
865-977-1200

Middle:
Dan Dodson
Lab Manager
TTU Center for the Management, Utilization and Protection of Water Resources
Box 5033
Cookeville, TN 38505-0001
931-372-3061
ddodson@tntech.edu

West:
A&L Analytical Laboratories Inc.
2790 Whitten Road
Memphis, TN 38133
800-264-4522/ 901-213-2400
support@allabs.com
Please contact the lab for their current fee schedule and sampling protocol.

For information on interpreting water test results, please review UT Extension publication SP 740-B Interpreting Water Quality Test Results for Fruit and Vegetable Production. For more information and additional food safety resources, visit: http://vegetables.tennessee.edu/food_safety.html.

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