

# Microbial Water Testing



By Briana Burke and Achyut Adhikari

## Why is water testing important?

Human and plant pathogens can spread quickly through water used for farming or packing operations. Recent outbreaks of *E. coli* and *Salmonella* point to irrigation water as a source of contamination to fresh produce. Microbial water quality is expressed in terms of levels of fecal coliforms and generic *E. coli*. These organisms come from fecal materials and are known as indicator organisms. The presence of these organisms in water indicate fecal contamination and potential presence of bacterial pathogens.

## Who will require microbial water testing?

Growers who utilize untreated ground or surface water during growing, harvesting, processing and packing should test their water. This includes water used for farming or packing operations, such as irrigation of crops, pesticide or fertilizer applications, preventing frost damage or crop dehydration, and washing or cooling of produce. If you are using water from a public water source, then you do not need to test this source as they have their own public water system results or a certificate of compliance with the Safe Drinking Water Act.

## When should I test the water?

Water testing should be done during the growing season and especially during unusual events that might affect water quality. Knowing your microbial water quality will help to identify appropriate pre- and post-harvest practices for your crop.

## General steps to collect water samples

- Contact the lab performing the analysis to determine if a special specimen cup or bottle provided by the lab is required. Make sure both parties understand and know what type of microbial testing is needed and the general requirements for collecting a water sample.
- Use only sterile sampling containers. Most labs provide a 100-milliliter container with a snap lid or screw-capped lid.



- Mark the vessel with the following information: date, time, location, the name of the person collecting the sample, storage conditions of the sample, test method and sample code (corresponding to a specific location from where you obtained the sample).
- Use sterile single-use gloves to collect the sample.
- Make sure your hands are never immersed in the water or touching the rim of the lid or container, and avoid placing the lid face down and in contact with dirty surfaces.
- Make sure you have prepared a clean insulated cooler that will keep the sample below 50 degrees Fahrenheit (10 degrees Celsius) during storage and transport.

## How to collect tap and well water samples:

- Open the tap to the flow commonly used during operations. The spigot or service connection should be selected based on its frequency of use and whether the water will be in direct contact with raw agricultural commodities (RACs) and food contact surfaces.
- Let the water run for at least three minutes.
- Follow the same general considerations for collecting a water sample.
- Using sterile gloves, open the clean and sanitized collection vessel and collect more than 1.5 liters. Use a wide-mouth container to avoid contamination issues.
- Fill the specimen cup or sterile container provided by the lab up to the fill line.
- Close the specimen cup and place it inside a clean compartment in a refrigerator or inside a cooler with ice to ensure the sample is kept below 50 degrees Fahrenheit (10 degrees Celsius) during storage and later during transport.

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## How to collect surface water samples:

- Avoid collecting sediment from the shoreline.
- According to best practice guidelines, the minimum distance from shore is half of a meter (1.6 feet).
- Another best practice, if possible, is to collect the sample at the location and depth of the water intake to the irrigation distribution or booster pump. Sample size should be larger than 1.5 liters.
- Follow the same general considerations for collecting a water sample.
- For the best description of the microbial populations in the water, collect the sample when it is raining or shortly after rain has stopped.
- Normally, after collecting these samples, the containers are wet. Bring the containers to a dry, clean table and sanitize the container using a single-use chlorine or alcohol wipe.
- Once the container is sanitized, pour the necessary volume into the labeled container for lab submission and keep the sample below 50 degrees Fahrenheit (10 degrees Celsius) during storage and later during transport inside a clean cooler.
- When sampling surface water from canals, it is in the grower's interest to run water through the field canal and sump accumulation reservoir for at least five minutes (if last irrigation was within 48 hours) or 15 minutes (if last irrigation more than 48 hours earlier), especially if daily air temperatures exceed 77 degrees Fahrenheit (25 degrees Celsius).

## How to collect sprinkler head, emitter drip-line manifold or drip-tape water samples:

- Avoid contaminating the container with soil.
- Run any of the listed systems for at least three minutes before collecting the sample.

- Follow the same general considerations for collecting a water sample.
- Using a sterile container, collect a 1.5 liter or larger sample, avoiding any contact with clothing, gloves or field debris.

- Cap the container as soon as you have finished collecting the sample.

- Normally, after collecting these samples, the containers are wet. Bring the containers to a dry, clean table, and sanitize the container using a single-use chlorine or alcohol wipe.

- Once the container is sanitized, pour the necessary volume into the labeled container for lab submission and keep the sample below 50 degrees Fahrenheit (10 degrees Celsius) during storage and later during transport inside a clean cooler.



## How to interpret your results:

Each laboratory report looks different. Testing of fecal coliforms and generic *E. coli* results may be reported as present/absent or as the number of microorganisms present per 100 milliliters of water.

The results may be reported as:

CFU/100mL = colony-forming unit per 100 mL of water

MPN/100mL = maximum probable number per 100 mL of water

Contact your LSU AgCenter extension agent, county health department or a water testing laboratory to assist you with making water management decisions if you don't meet the regulatory or market-driven water quality criteria.

## What labs are available for this testing service?

Most parish health departments will allow you to submit samples to the state lab for a total coliform bacteria presence/absence test. For more information on private water testing labs, consult with your Louisiana Office of Public Health Central Laboratory. For Louisiana residents, refer to the list below\*.

| Laboratory Names                                                                                                                                                | Organisms Tested                           | Methods                                                                                                                                                                                                                                                                                                                                                                                                                               | Certified     | Prices                                                                                                                                                                                                                                            | Website                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Louisiana Department of Health Central Laboratory<br>1209 Leesville Ave., Baton Rouge, LA 70802<br>225-219-5200<br>Contact: Shengmei Jiang, Supervisor          | Total coliform bacteria                    | MMO-MUG presence absence method: Total coliforms and <i>E. coli</i> MMO-MUG MPN 10 tube technique: Total coliforms and <i>E. coli</i> MMO-MUG MPN Quant-Tray technique: <i>E. coli</i> enumeration in source water Multiple tube fermentation: Total coliforms Multiple tube fermentation: Fecal coliforms (EC technique) Multiple tube fermentation: <i>E. coli</i> (EC-MUG technique) Heterotrophic plate count: Pour plate method  | Certified     | FEE: \$40 if you prefer to collect the water yourself OR \$75 if you prefer a local sanitarian collect the sample and provide remediation information. Check or money order only.                                                                 | <a href="http://ldh.la.gov/index.cfm/page/2908">http://ldh.la.gov/index.cfm/page/2908</a>                                                                                                                            |
| Louisiana Department of Health, Amite Regional Laboratory<br>04 N. 1st St. Suite A, Amite, LA 70422<br>985-748-2011<br>Contact: Lisa Carrier, Manager           | Total coliform bacteria                    | MMO-MUG presence absence method: Total coliforms and <i>E. coli</i> MMO-MUG MPN 10 tube technique: Total coliforms and <i>E. coli</i> MMO-MUG MPN Quant-Tray technique: <i>E. coli</i> enumeration in source water Multiple tube fermentation: Total coliforms Multiple tube fermentation: Fecal coliforms (EC technique) Multiple tube fermentation: <i>E. coli</i> (EC-MUG technique) Heterotrophic plate count - Pour plate method | Certified     | FEE: \$40 if you prefer to collect the water yourself OR \$75 if you prefer to have a local sanitarian collect the sample and provide remediation information. Check or money order only.                                                         | <a href="http://ldh.la.gov/index.cfm/page/2908">http://ldh.la.gov/index.cfm/page/2908</a>                                                                                                                            |
| Louisiana Department of Health Shreveport Regional Laboratory<br>1035 Creswell Ave., Shreveport, LA 71104<br>318-676-7809<br>Contact: Melissa Jones, Supervisor | Total coliform bacteria                    | MMO-MUG presence absence method: Total coliforms and <i>E. coli</i> MMO-MUG MPN Quant-Tray technique: <i>E. coli</i> enumeration in source water                                                                                                                                                                                                                                                                                      | Certified     | FEE: \$40 if you prefer to collect the water yourself OR \$75 if you prefer to have a local sanitarian collect the sample and provide remediation information. Check or money order only.                                                         | <a href="http://ldh.la.gov/index.cfm/page/2908">http://ldh.la.gov/index.cfm/page/2908</a>                                                                                                                            |
| Water Test Inc.<br>21220 La. 36, Covington, LA 70433<br>985-892-8329<br>Contact: Michael Metevier, President                                                    | Coliform bacteria, <i>E. coli</i> bacteria | MMO-MUG presence absence method: Total coliforms and <i>E. coli</i> (Private wells only)                                                                                                                                                                                                                                                                                                                                              | Certified     | CERTIFIED Results: St. Tammany Parish Routine bacteria test: \$125; Repeat bacteria test: \$75; Outside St. Tammany Parish: Cost of test plus 75 cents per mile<br>NON-COMPLIANT RESULTS: Routine bacteria test: \$75; Repeat bacteria test: \$75 | <a href="https://watertestinc.com/bacterial-analysis/">https://watertestinc.com/bacterial-analysis/</a> OR <a href="https://watertestinc.com/extensive-water-test">https://watertestinc.com/extensive-water-test</a> |
| LSU AgCenter Food Safety and Microbiology Lab<br>130 Agricultural Chemistry Building, Baton Rouge, LA 70803<br>225-578-2529<br>Contact: Achyut Adhikari         | Generic <i>E. coli</i> bacteria            | 1603: <i>E. coli</i> in water by membrane filtration using modified membrane thermotolerant <i>Escherichia coli</i> agar (Modified mTEC)                                                                                                                                                                                                                                                                                              | Not certified | Water sampling kit: \$25<br>Water testing fee: \$40                                                                                                                                                                                               | <a href="https://nfs.lsu.edu/resources/testing.htm">https://nfs.lsu.edu/resources/testing.htm</a>                                                                                                                    |

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