
WATER TESTING PROCEDURE

WHY IS TESTING OF WATER REQUIRED?

Water can be contaminated from a variety of different sources and the types of contamination can vary depending on the source of the water. For Zespri, the main concern around water use on the orchard is the biological quality of water when that water contacts fruit (through contact irrigation, spray or frost protection). *E.coli* bacteria are widely recognised as a suitable indicator for the biological quality of a water supply.

Some examples of water sources used by growers in New Zealand include:

SURFACE WATER (streams, rivers, dams, shallow wells and springs less than 10m deep)

- ➔ It is possible your water will be of lower quality and the quality will vary depending on the time of year and the weather conditions. Avoid sampling after the heavy rainfall as this may affect the results. You should be aware that heavy rainfall may affect the quality of supply and should consider this if using water after rainfall.

ROOF WATER (rainwater captured and stored in tanks)

- ➔ Generally, a well-maintained roof supply should have low levels of *E. coli* contamination and be consistent in quality.

GROUND WATER E.G. BORE WATER/DEEP WELL (typically deeper than 10m)

- ➔ Bore water is generally a good quality supply that is consistent throughout the year. However there have been cases where ground water has become contaminated and should not be disregarded from testing.

IRRIGATION SCHEME WATER

- ➔ Designed for irrigation use rather than in contact with fruit, this water is generally of variable quality that will need monitoring.

TOWN SUPPLY

- ➔ Required to be from a consistent supply of good quality water that is more than likely treated, this supply is of a high quality that is monitored regularly by a local authority. Testing of these supplies is not required and Zespri does not require the certification or evidence of town supply testing.

NOTE: Water testing is only an indication of quality on the day of the test. Water supplies that can vary in quality should be tested on a more frequent basis to gain an understanding of variability.

WHAT ARE THE LIMITS?

We are using *E.coli* criteria based on international limits for water used in horticulture. It's a 3-tier limit with the results determining both whether it is fit for purpose and how close to harvesting the water can be used. This may mean that a water supply may be fit for purpose throughout most of the year, but an alternative cleaner supply must be used for spraying or frost protection that is within 14 days of harvest.

Note: these standards are for horticultural use only. Water used for drinking or handwashing must be potable. "Potable" is a much higher standard than that used for horticulture use. If your staff are drinking water on the orchard, or using it to wash their hands, then it must be potable.

Water standards (note: these only apply to water that comes in contact with fruit).

<i>E. coli</i> levels	Category
< 100 cfu/100ml	Acceptable
100 - 1000 cfu/100ml	Marginal - restricted use only
>1000 cfu/100ml	Not acceptable

NOTE: Some labs may report your E.coli results as MPN/ 100mL. This is due to the laboratory using a different method to the one the reports as cfu/ 100mL. Both methods are acceptable to Zespri.

HOW OFTEN IS A WATER TEST REQUIRED?

To ensure that water used for fruit contact irrigation, spray applications and frost protection is suitable, an annual laboratory test of the water is required to ensure it is fit for purpose. Water from town supply does not need testing (unless there has been a public notification that it is not safe to drink).

A minimum of three tests per growing season is required if:

- ✳ If it's a new supply with no testing history.
- ✳ A water source is deemed vulnerable if there is a foreseeable risk of faecal matter contamination i.e. the grower identifies potential animal contamination, sewerage storage/septic tank or distribution risks during their risk assessment and these risks cannot be eliminated. For example, animals grazing upstream of a river extraction point.
- ✳ A source of unacceptable quality (with results of >1000 cfu/100ml) has been treated /managed/modified to try and improve water quality. Testing should revert to three times per annum until 3 consecutive tests are < 1000cfu/100ml.
- ✳ A high-risk event such as flooding (washing in contaminants) or any other unforeseen event that may affect the quality of the water quality occurs.

Where three tests are required for vulnerable sources, tests should be undertaken for two growing seasons, (a minimum of 6, 3 per growing season). The results of the tests for the basis of the risk assessments and inform the decision around what action to take. After this period of testing, the grower is able to revert to annual testing, if they have assessed the risk to be reduced.

If you are unsure on whether additional testing is required on your water supply - please contact the Zespri Pre Harvest Team for further guidance.

We would encourage you to ensure that the pH of your water be tested at the same time as your *E.coli* test. This could provide you and your spray contractor with some useful information on how your sprays are performing based on the pH result of your water.

WHEN TO DO THE TEST

Tests must be taken during the growing season (i.e. whilst there is fruit on the vine), ideally close to harvest (say within a month).

We would discourage taking a water test from a surface water source during or after a period of heavy rainfall as this may adversely affect the results. It is recommended that growers wait for a period of fine weather before sampling. (As water quality can be affected by heavy rainfall, the water source may have become “vulnerable” after rainfall, and therefore the water source should not be used until the risk has been managed. For example, river water during a flood, pond water after sewage contamination etc.)

If you are wanting to apply water within 14 days of harvest but previous test results were marginal, proof is required that supply is at an acceptable level close to the time it will be used. If tests show a continuation of “marginal quality” then an alternative supply must be used (e.g. bring in a tanker of town supply water), give at least a week for the test results to return, and time to take corrective action if the result is unacceptable.

If there is a major change to the supply either through changes to pipework, tanks etc. or due to a major weather event then we would encourage growers to re-test the water to see if the quality has changed significantly.

WHERE DO I TAKE MY SAMPLE FROM?

The best place to take the sample would be at “point of use”.

Typically, this would be:

- ✳ Sprayer filling station (post tank)
- ✳ Irrigation outlet within canopy
- ✳ Frost protection outlet on orchard

HOW TO TAKE A WATER SAMPLE?

- ✳ Contact the laboratory to ensure you know where you are sending the test, to obtain sampling instructions and a submission form, and have all the resources you need to do the test.
- ✳ Follow the laboratory instructions on sampling procedure.
- ✳ Use a sample bottle supplied by the laboratory.
- ✳ Collect the water as close to the point before contact with the fruit as possible.
- ✳ If the water has not been used recently, consider cleaning the outlet of the tap with a brush and disinfectant and then run the water through the system for 5 minutes before sampling to wash out stagnant/residual water.
- ✳ Reduce water flow to avoid excessive splashing during the sampling.
- ✳ Record the collection site, date and time of collection and water source on the water bottle or submission form. Keep a record of this, plus who took the sample, for your inspection.
- ✳ Send samples for testing packaged and within the time frame advised by the laboratory (should arrive at the lab within 24 hours of sampling and be chilled during this time).

APPROVED WATER TESTING FACILITIES

Water testing laboratories should be IANZ accredited for testing potable water. Water should ideally be sampled and tested same day but can be up to 24 hrs old as long as it is chilled (allows for couriating to a laboratory if one of the below laboratories is not nearby). Cost should range around \$30-\$100.00 per test. Price may be affected if the water sample is too dirty for the filtration test.

The test you require is an *E.coli* enumeration (count) with a range of 10 to 1000 per 100mL. You do not want the lab to perform a Presence/Absence drinking water test.

Most Probable Number (MPN) test method, membrane filtration (cfu) test method and colilert method are all acceptable testing methods.

The following Laboratories are accredited to perform the appropriate water test:

Hills Laboratories
1 Clow Place
Melville
HAMILTON
mail@hill-labs.co.nz
Ph 0508 44 555 22

BOPRC Laboratory
5 Quay St
WHAKATANE
rebecca.short@boprc.govt.nz
Ph 0800 368267

Cawthron Institute
98 Halifax St East
NELSON
Ron.Fyfe@cawthron.org.nz
Ph 03 5482839

Water Testing Hawkes Bay
1105 Plunket St
St Leonards
HASTINGS
info@watertestinghb.nz
Ph 06 8706449

Northland Lab Services
54 Beach Rd
Onerahi
WHANGAREI
microbugs@xtra.co.nz
Ph 09 436-3920

Eurofins Laboratory
35 O'Rorke Road
Penrose
AUCKLAND
CarlaSteyn@eurofins.com
Ph 09 5792669

Linnaeus Laboratory
PO Box 1199
Banks St
GISBORNE
ruth@linnaeus.co.nz
Ph 0800 25 46 62

Other laboratories approved by competent local authorities may also be able to perform the test. The list above is a selection of laboratories that are used by Industry.

WHAT DO YOUR RESULTS MEAN?

The *E.coli* limits we are using for irrigation/spray water are not as strict as what are required for drinking water. We would strongly discourage using the irrigation/spray water for domestic use unless it meets potable standards.

Test Result Interpretation Table		
<i>E. coli</i> levels	Category	Use
< 100 cfu/100ml	Acceptable	Water suitable for all spraying / irrigation / frost protection right up to time of harvest.
100 - 1000 cfu/100ml	Marginal - restricted use only	Not suitable for contact irrigation / spraying/ frost protection during the 14 days prior to harvest.
>1000 cfu/100ml	Not acceptable	This water is not suitable contact with fruit at any stage. Investigate treatment or alternate supply.

NOTE: Some labs may report your E.coli results as MPN/ 100mL. This is due to the laboratory using a different method to the one the reports it as cfu/ 100mL. Both methods are acceptable to Zespri.

OPTIONS IF THE RESULT IS TOO HIGH

➔ Retest

This will confirm the quality of the water or may show that there was a contamination issue at the time of sampling.

➔ Improve the supply

There are a number of things you can do that may improve the quality of the supply without significant expense.

- Reduce surface water intrusion into well head
- Remove stock from surrounding area where water is drawn from
- Clean out tanks
- Trim overhead branches from roof supplies and rodent proof all entry points to the supply
- Adjust intake points from rivers and streams

➔ Change water source for fruit contact irrigation/spraying

- If a test result indicates that the water is unsafe for contact with the fruit the best option is to use another water source which has been proven acceptable for on-fruit use - for example a tanker of town supply water for any fruit-contact water used within 14 days of harvest.
- If you use a water tanker to supply water, use a registered tanker water provider. The operator is required to provide upon delivery a written statement stating the delivery date and volume of water as well as the source and class of that water. Registered providers have procedures in place to ensure the tank was not just used for other unsafe purposes (e.g. emptying a septic tank). Avoid using water from creeks or streams (unless risk assessed and tested).
- If a neighbouring property has an acceptable supply, this can be used as an alternative supply as long as details are kept of the supply (as evidence of its suitability).

➔ Treatment

- One option which can be used to mitigate the risk is water treatment. If treatment is deemed a suitable option, a water quality test must be undertaken to prove the adequacy of the treatment process.
- Please be aware there are risks in water treatment, for example, treatment failure, or loss of effectiveness of treatment over time, residues from chlorine treatment, or potential taste effects from chlorine reactions with organic compounds. We recommend you obtain expert advice on treatment options if you choose this option.

ADDITIONAL WATER TESTING OPTIONS

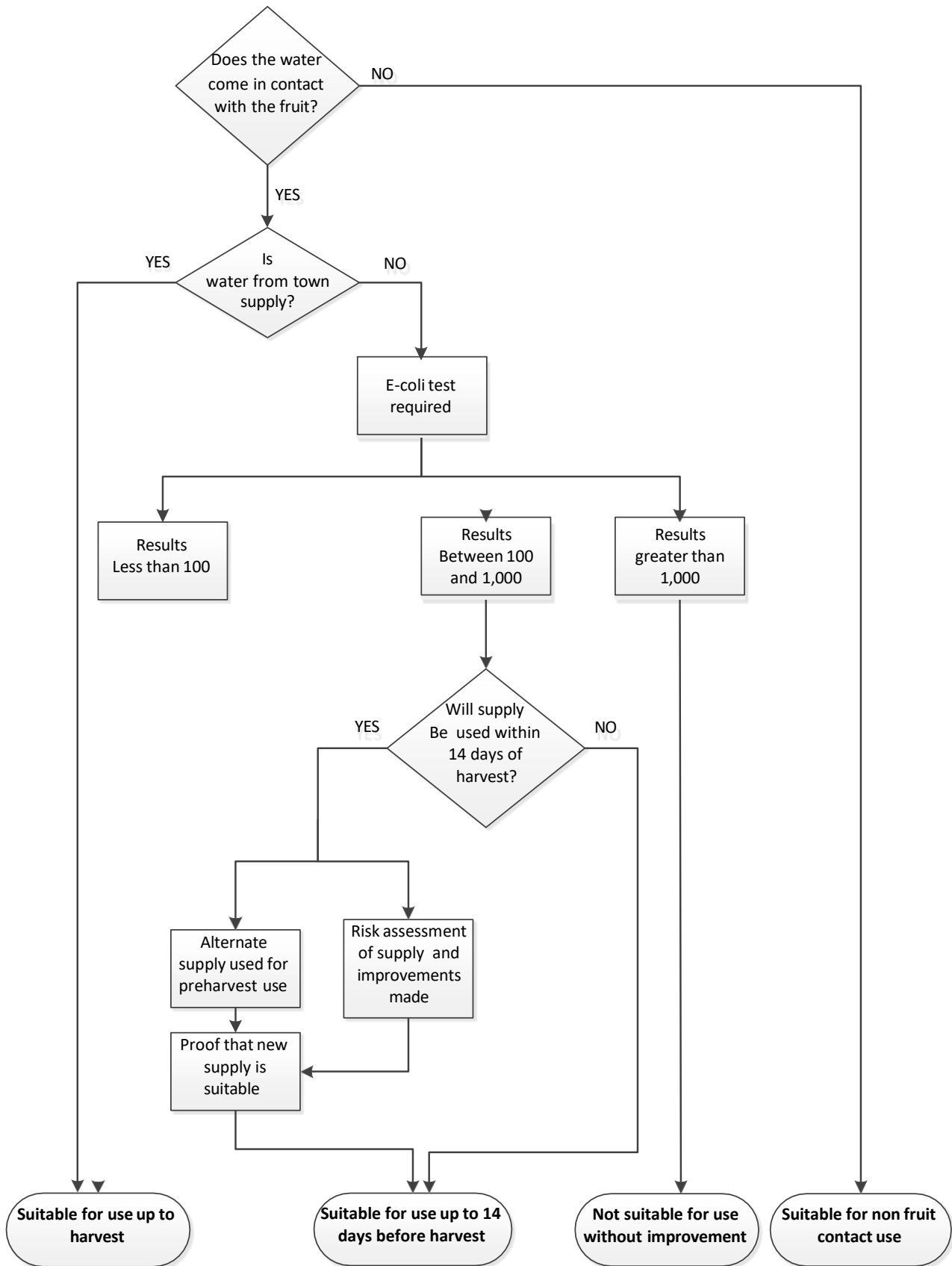
Generally, there are very few chemicals present in water that may pose a food safety risk. However, there are some chemicals found naturally in water that can pose issues through damage to pumps and in more severe cases may impact the effectiveness of sprays when mixed with the water.

- ➔ If you notice build ups on pump and pipework, or a reaction in the spray tank when water is mixed, then we would recommend talking to the spray supplier and/or your testing laboratory on the best course of action.
 - Irrigation water often has significant levels of dissolved salts, which can affect the soil and your pumping equipment. You may choose to test for these, via a laboratory, or by using a water testing kit.
 - If your risk assessment identifies potential chemical contamination contact your laboratory for advice on appropriate testing options.

RESOURCES

Food Safety Risk Assessment Template

WATER TESTING DECISION TREE



Note: except where water is required to be potable.