



Keeping Our Watercress Safe

**CURIOUS
MINDS**

HE HIHIRI | TE MAHARA



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Clean, safe water for watercress



Water availability is key to the growth and safety of watercress:

- Where does the water for your local watercress come from?
- What are the sources of contamination that may be a safety concern?
- Test the water around the watercress for potential pathogens.



Resources

- Water catchment maps “The Uawanui Project”
- “Growing food-safe watercress in Aotearoa”
- Pathogen testing kits

Local Growing Environment



We can maximise watercress production by optimising its growing conditions.

Measure the local environmental conditions for watercress in your region – water flow, water temperature, water pH, nitrate, light levels, soil/sediment.

Compare and contrast the best and worst watercress growing areas – what do you think limits watercress growth? How might you improve the site to increase growth?



Resources

- “Growing food-safe watercress in Aotearoa”
- Youtube clips showing how to measure the environment

Light intensity, shading, sunlight time?



What are the aspects of the site

- » Which way does the site face - North, East, South or West?
- » Is it steep or flat?
- » How might the aspect of the site influence the growing environment of the watercress?

Research shows that the more sun (light) a plant gets the larger it grows (more biomass produced). Yet many people say you should grow watercress in the shade, why is that?



Resources

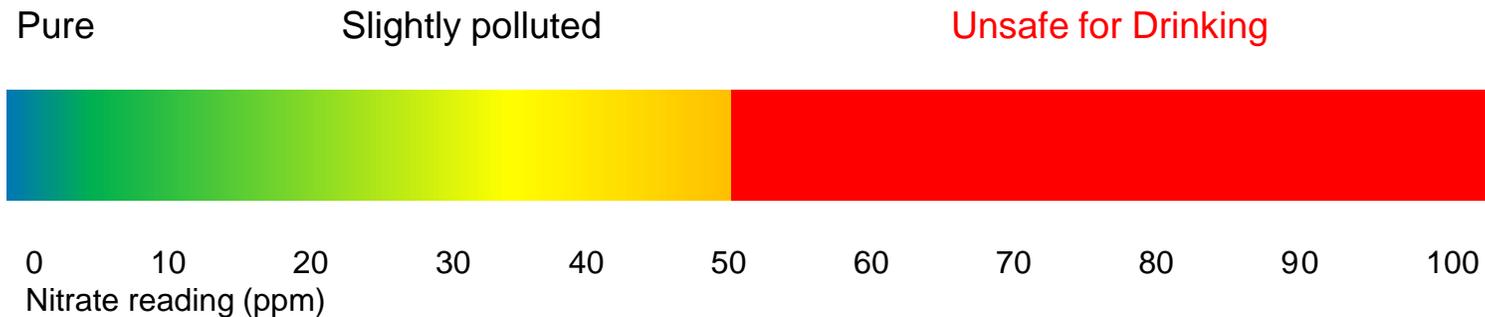
- compass

What your nitrate readings mean for

Water Quality



- Take a water sample from a depth of 5–10 cm
- Use the dip sticks to measure nitrate levels





What your nitrate readings mean for

Watercress Growth



- Take a water sample from a depth of 5–10 cm
- Use the dipsticks to measure nitrate levels

Slow growth
(<10)

Fastest growth (30-500)

Could be unsafe
for eating (500+)



0 50 100 150 200 250 300 350 400 450 500
Nitrate reading (NO_3^+ ppm)

How clear is the water?

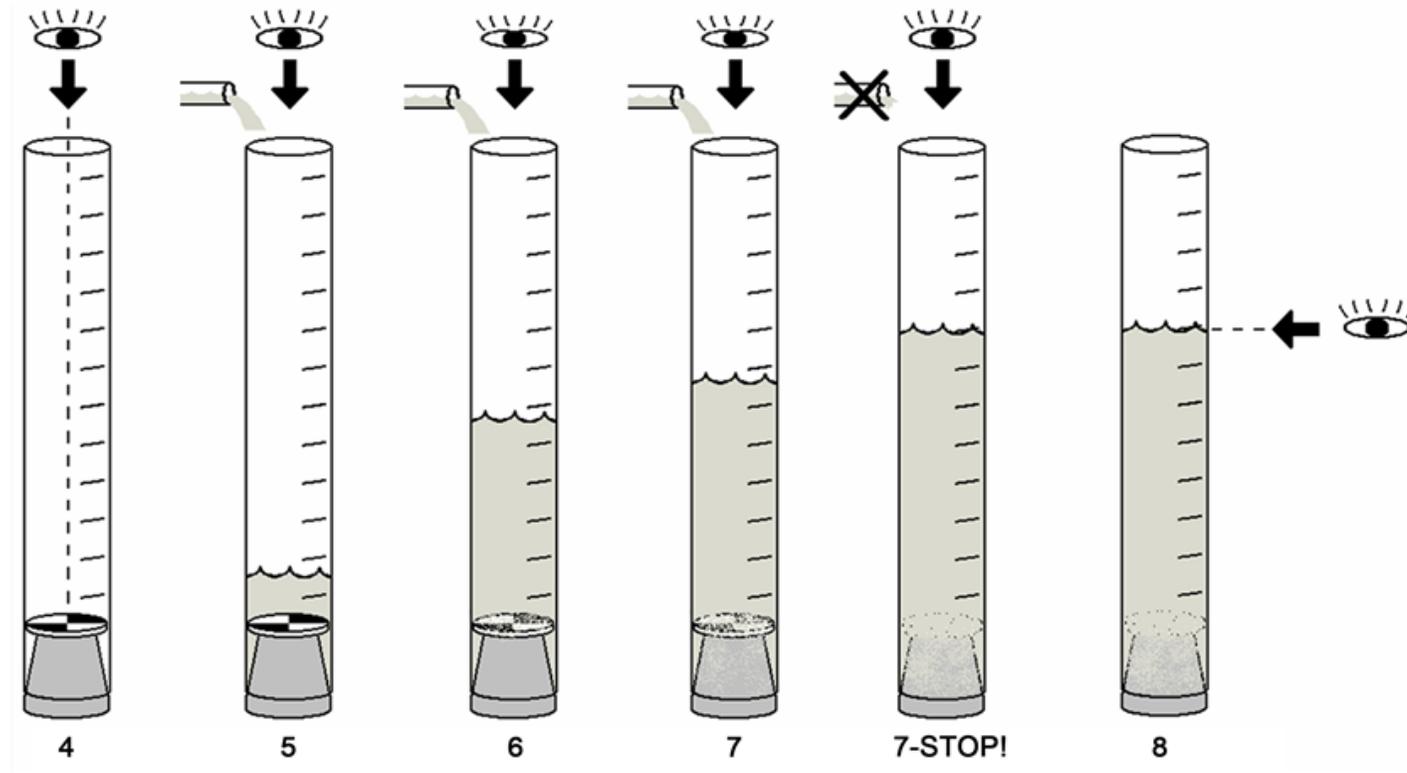


- Get a clean jar, fill it with water from the stream, shake it up and take a photo in front of a white background, you can use this to compare the water clarity over time.
- Leave the water overnight and let the sediment settle to the bottom. Observe the sediment in the jar, if it's thick enough measure the depth. The deeper the sediment, the more dirty the water.

What effect do you think water clarity has on watercress growth?



Build your own Clarity Tube



Resources

Clarity Tube - <https://www.youtube.com/watch?v=SMzBuC18Fyk>

Turbidity - <https://www.youtube.com/watch?v=f7yGbsMli3s>



Water Flow

Watercress grows well in slow flowing but not stagnant water. The recommended rate for growing watercress is 720 L/h per 0.3 m width of bed. The important thing is that the roots need to “breathe”, and flowing water brings oxygen. Water flow can be measured a number of different ways:

- » **Surface water flow** – measure section of water then have a boat race to get surface speed.
- » **Sub-surface speed** – also likely to be important (root zone conditions), use a dye tracer to measure sub-surface speed.
- » **Flow rate** – a different measure of water flow. This is a measure of water velocity in a cross section of the stream bed - need some sticks and a measuring tape and a flow meter.



Soil Depth and Type



Watercress gets most of its nutrients from the water. So as long as there is something for the roots to attach to the soil depth is not all that important.

Watercress also grows on any soil texture. However, the plant doesn't generally like really acidic or alkaline soils. Peat soils often have more extreme pHs than other soils, so these will not provide the most favourable conditions for watercress growth.

What sort of soil does your watercress grow in? You can calculate the ratio of sand to silt to clay in the soil and use this ratio to identify the soil textural class and its water holding capacity (see Terra Test Instruction Guide).

Resources

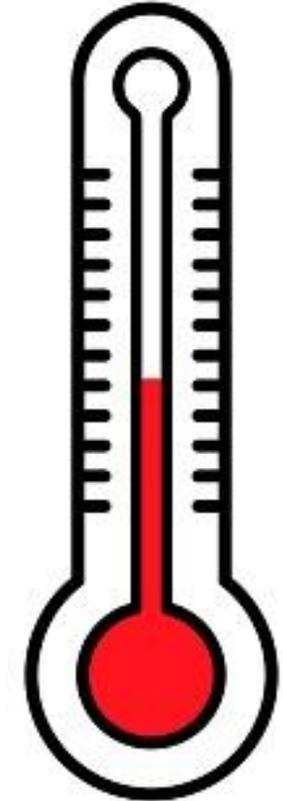
- Terra Test Instruction Guide <https://www.waterforce.co.nz/vdb/document/21>



Water temperature



- » Measure the temperature at the site - when measuring temperature, keep the thermometer shaded and leave it for 5 min. How do your temperature readings compare with the optimum temperatures reported below?
- » The optimum water temperature for watercress is 10-12°C, although the plants will tolerate temperatures of 6-27°C (that is they won't die at these temperatures).
- » Watercress does get damaged by frost, particularly the young seedlings.
- » Watercress seeds germinate best at soil temperatures of 18 – 21°C.



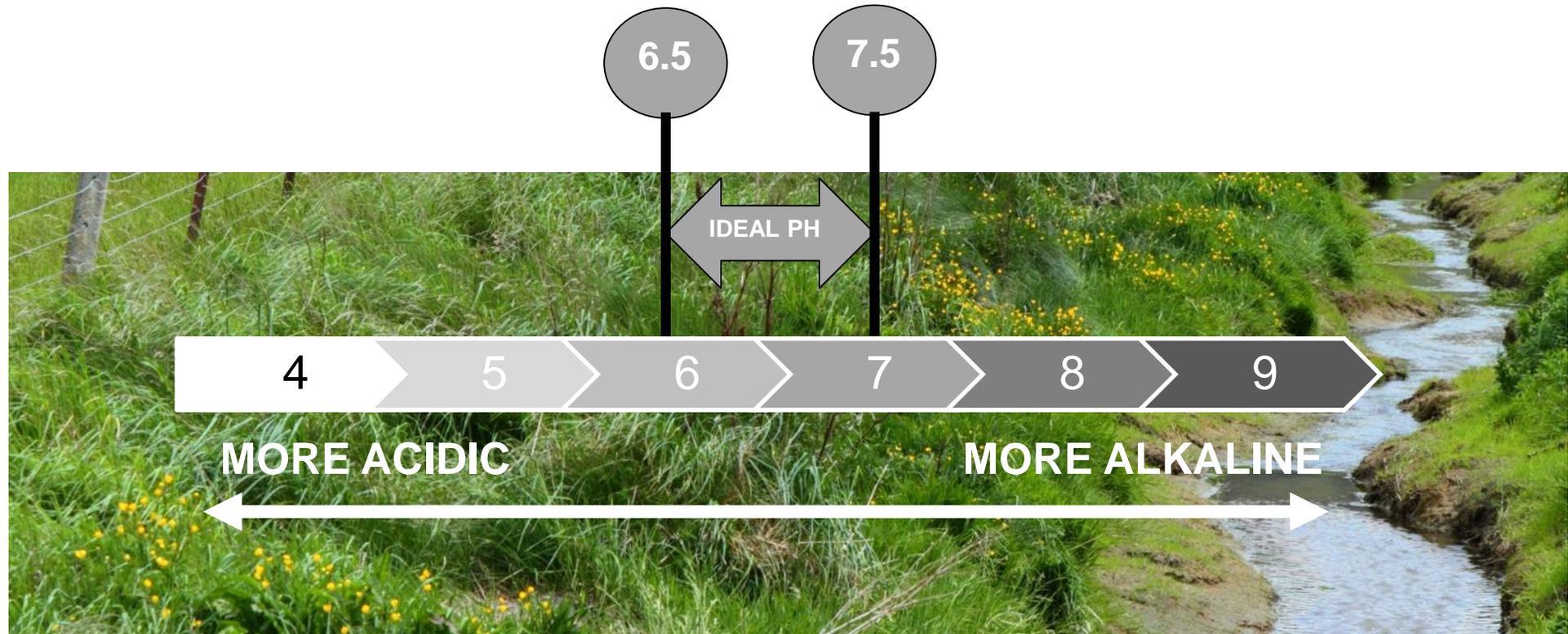
Resources

- thermometer

Water pH



- » Optimum pH for watercress is 7.2
- » The preferred pH range of watercress plants is between 6.5 and 7.5, although the plants will tolerate pH from 4.3 to 8.3.



Resources

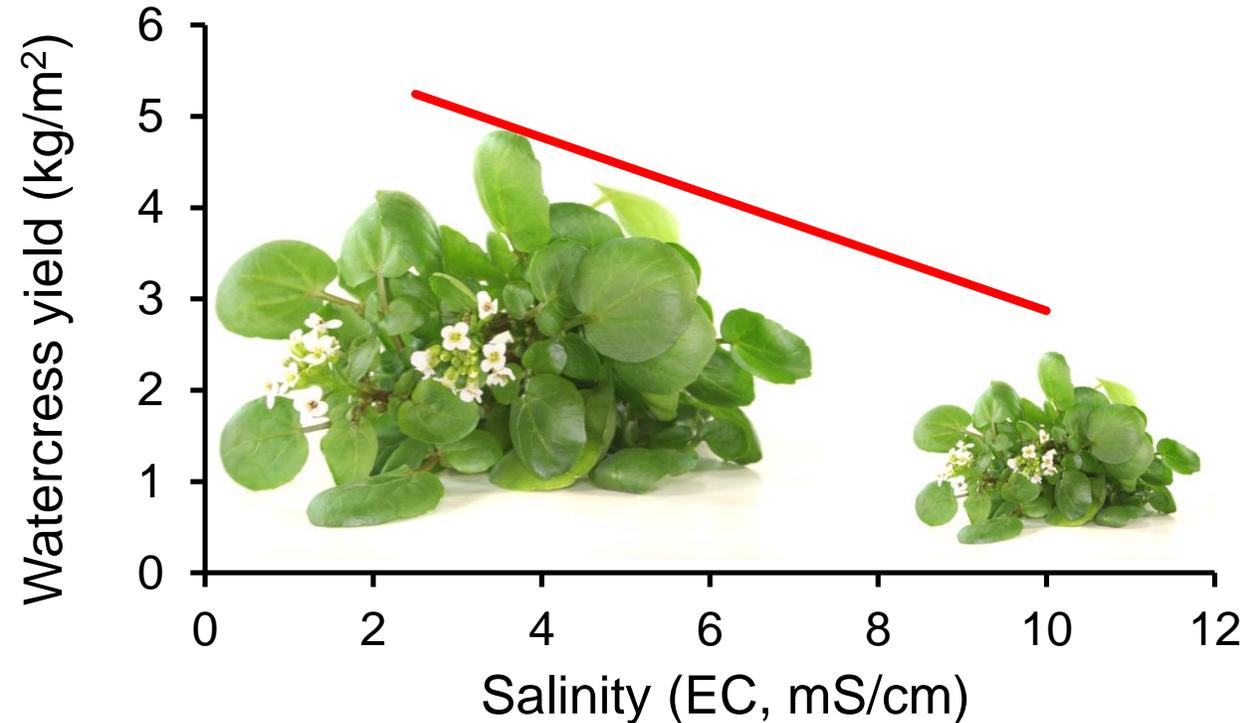
- pH dip sticks

Salinity (saltiness)



As water becomes more salty, watercress growth reduces.

The total amount of salinity in the water can be assessed by measuring the electrical conductivity (EC) of the water. Once the EC increases above 2 mS/cm, watercress growth decreases.



Drawn from data published by Lira RM et al. 2018. Horticultura Brasileira 36: 205-210

- Resources
- Salinity meter

Other plants and critters



- » What other plants are present at the site and what effect do you think they might have on the watercress?
- » Are there critters present – insects, snails, tuna, birds – and what effect do you think they might have on the watercress?
- » Observe whether the watercress has any diseases or pests – can you see moulds or rots? Are there holes in the leaves or damage caused by caterpillars, snails, birds, cows, other humans?



How well does your watercress site rate?



An individual site must provide all of these essential inputs for watercress to grow. The right balance will grow the best watercress. Think about how you might influence/change these factors to improve watercress growth?



Rate your watercress growing site



	Great (score +2)	OK (score +1)	Poor (score -1)
Water source	No contamination	Low contamination	High contamination
Light level	No shade, full light	Semi shade	Full shade
Water – nitrite	0 ppm	10-50 ppm	50 – 100 ppm
Water – nitrate (NO₃⁺)	30 – 500ppm		<10 ppm, >500 ppm
Water – pH	6.5 - 7.5	4.3 – 8.3	<4.3, >8.3
Water – temperature	10°C – 12°C	6°C – 27°C	<6°C, >27°C
Water – salinity	<1 mS/cm	1- 2mS/cm	> 2mS/cm
Water - flow	Flowing	Flowing	Stagnant
Water – clarity	Clear	Low turbidity	High turbidity
Total Score			

Total score < 10 not suitable for watercress



Watercress Garden Design



Design a garden that most closely mimics the natural conditions of local plants.



Resources

- Youtube clips of watercress production in NZ and UK
- Links to “Gardening Know How”, “Growing watercress plants in containers”

Test Your Garden Designs



SOURCING PLANTS - Take the opportunity to compare and contrast local plants with available seed lines or cuttings from other sources (plants purchased in supermarket). Which one grows best in your garden?

MEASURE GROWTH/QUALITY – measure the growth of your plants – their height/length, number of stalks, number of leaves, size of leaves. How often can you harvest from your garden? What do they taste like?

SAFETY – measure the pathogen contamination in the water your watercress is growing in. Are there any pathogens? If so where might they be coming from? Compare with the levels you found in the local streams.



Teaching Resources



Learn from Taranaki students - Students from the Waitara school and local hapū in Taranaki learned how to check the streams' temperature, depth, flow speed, clarity, dissolved oxygen, mineral content, different types of wildlife, pollution sources - <https://www.curiousminds.nz/stories/watercress-watchers-securing-wild-food/>

Learn from Northland communities - The 2019 Kai Ora Fund is a partnership between Te Tai Tokerau Primary Health Organisation, The Far North District Council, Te Puni Kōkiri, Northland Inc, Kaipara District Council, Northland District Health Board, Whangārei District Council and Manaia Health PHO. The purpose of the Kai Ora Fund is to enable Northlanders to grow and eat nutritious and sustainably grown local food. The small community grants process supports projects that address food security, benefit the wider community and encourage employment and economic development in the region. The Kai Ora Fund has supported watercress projects and may be a useful link to the Northland communities who are interested in watercress - <https://www.tttpho.co.nz/health-services/kai-ora-fund/>

Learn from NZ's commercial watercress businesses

- » **Awawhiti Cress** grow and sell hydroponic watercress and micro salad cress. Awawhiti Cress is situated in the Ruapehu District and their water is sourced from the Whanganui River headwaters in the Tongariro National Park - <http://www.watercress.co.nz/>
- » **Matakana Watercress** is a family run business located in Matakana, an hour north of Auckland. Matakana Watercress have been producing *Nasturium officinale* since 2010. <http://www.matakanawatercress.co.nz/> - Tom's video to share
- » Take a tour of the **Waikawa Fresh** farm to see a hydroponic growing systems in action – propagating from seedling to full grown plants, hydroponic systems, management and harvesting of leafy green vegetables including watercress - <https://waikawafresh.co.nz/home/tour/>

Teaching Resources



Learn how to produce watercress in pots - Marty will show you how to grow watercress in a pot, when your home garden is small scale - <https://www.youtube.com/watch?v=Md2h9FsLjKY>

Learn from overseas experiences - Watercress has been grown in many locations around the world. In the United Kingdom, watercress was first commercially cultivated in 1808 by the horticulturist William Bradbery, along the River Ebbsfleet in Kent. Watercress is now grown in a number of counties of the United Kingdom, most notably Hampshire, Dorset, Wiltshire, and Hertfordshire. The town of Alresford, near Winchester, is considered to be the nation's watercress capital; it holds a Watercress Festival that brings in more than 15,000 visitors every year. Check out the UK's commercial watercress production in Hampshire where the water comes directly from an aquifer, the team shows you how watercress is produced including sowing the seed, planting, pest management, harvesting, transport, and marketing.

» <https://www.youtube.com/watch?v=Md2h9FsLjKY>

» <https://www.youtube.com/watch?v=OKBsbk2ImTc>

» <https://www.youtube.com/watch?v=dgqz21ISBQ>

See the traditional way the UK farmers grow watercress

» <https://www.youtube.com/watch?v=2eVuDnPMUPA>

» <https://www.youtube.com/watch?v=ZrZU6OoY-bE>

Think about how you might apply technologies to watercress production - A Feilding company which has developed a machine for harvesting of water cress - <http://harvesterconcepts.co.nz/products/show/ht-cress>



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