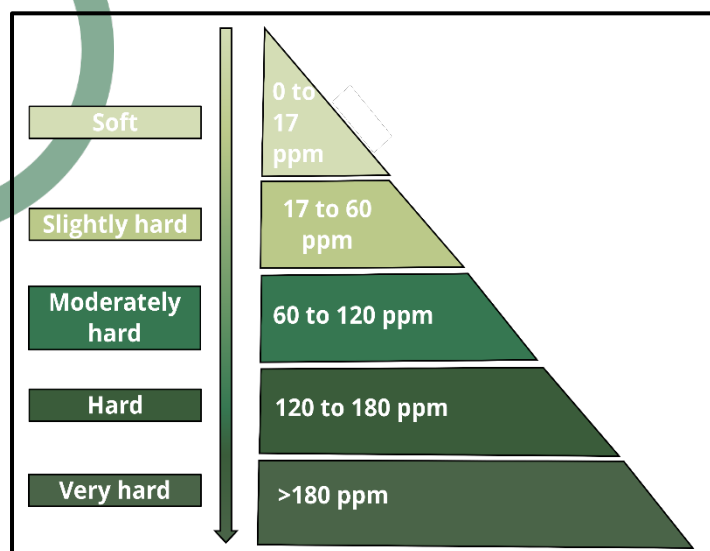


# Water Hardness

Page 1

## OVERVIEW

- 'Hard water' refers to water with high concentrations of dissolved minerals, specifically calcium and magnesium ions (**Figure 1**).
- Hard water tends to be associated with high levels of bicarbonate and serves as an indirect indicator of water alkalinity.
- Plants have varying sensitivities to water hardness, which is important for selecting appropriate plant varieties and assessing the suitability of a water source for irrigation (**Figure 2**).
- The ideal range for water hardness is 60–180 ppm of calcium carbonate ( $\text{CaCO}_3$ ) (i.e., moderate to hard).



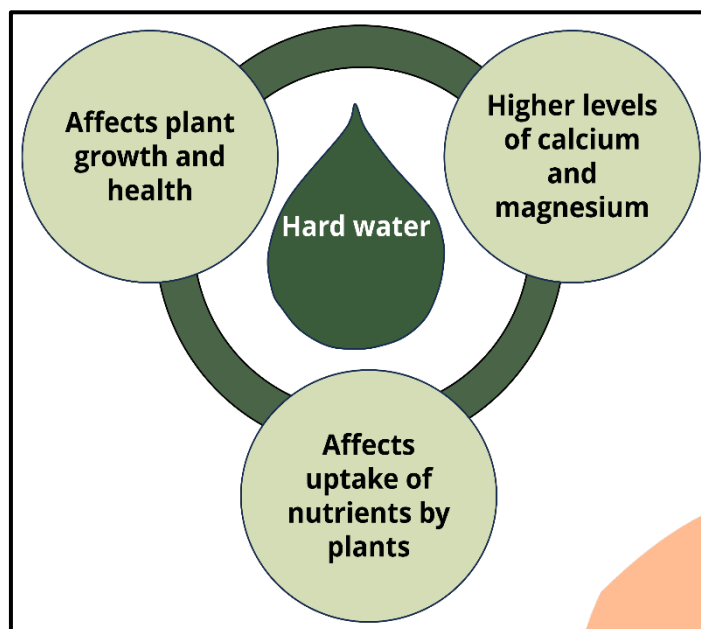
**Figure 1.** Hardness ranges of water sources, measured in parts per million (ppm) of calcium carbonate ( $\text{CaCO}_3$ ) (USGS, N.D.)

## KEY FACTORS

- The geological characteristics of a region influences water hardness. Groundwater that flows through calcium and magnesium-rich geological formations, including limestone, dolomite, gypsum, or chalk is likely to have elevated hardness levels.
- The use of fertilisers containing calcium and magnesium can also lead to the leaching of these minerals into water sources.
- Rivers can also be sources of hard water if they receive runoff from areas with naturally occurring minerals.

## HIGHLIGHTS

- High water hardness is often associated with increased salinity and alkalinity, which can negatively impact plant growth and productivity.
- Hard water can lead to scale buildup on irrigation equipment, resulting in increased maintenance costs.
- Managing water hardness is crucial for maintaining optimal conditions for plant growth and may require water treatment.



**Figure 2.** Effects of hard water on plants.

## MANAGEMENT

- Test irrigation water for hardness monthly using a handheld meter to understand its mineral composition and quality.
- Hard water can occur without high alkalinity. A good method for testing hard water is to first assess alkalinity, then chloride, calcium, and magnesium concentrations.
- Water treatment methods that use chemicals, such as lime to adjust pH and coagulate suspended particles can increase water hardness.
- Common methods for softening hard water include ion exchange (water softeners), lime softening, and reverse osmosis.