Fact sheet

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Desalination for irrigated crops

Saline groundwater used for irrigation can be detrimental to crop performance, weed control and equipment longevity. Desalination is one option available to growers to improve their water quality.

Water salinity and irrigated crops

Salinity is one of the major concerns for irrigation water supplies.

High concentrations of salts in irrigation water causes osmotic stress – plants access water by making their root hairs highly saline, which attracts water molecules. When the saline water is added to the soil, this process is reversed, and water moves from the plant root into the soil.

Crops vary in their tolerance to salinity, ranging from sensitive to tolerant.

Water quality for chemical spraying

Saline water can cause blockages and corrode the metal parts of equipment and spray rigs. Foliar fertiliser applications using salty water can burn crop foliage, and several herbicides lose efficacy when mixed with saline water.

Common examples include Diuron, Simazine, MCPA amine and 2,4-D ester. It can also become difficult to adjust the pH using buffers.

Mixing with fresh water (shandying) is generally the only way to utilise saline water for spraying operations.

Crop	Yield penalty		
	No reduction (mg/L)	10% reduction (mg/L)	25% reduction (mg/L)
Cabbage	660	1,045	1,595
Capsicum	550	825	1,210
Cucumber	935	1,210	1.595
Eggplant	385	935	1,705
Grape	550	935	1.485
Lettuce	495	770	1,155
Potato	605	935	1,375
Tomato	825	1,045	1,320

Table 1: Salinity tolerances of various irrigated crops. Source: NSW Government Department of Primary Industries.

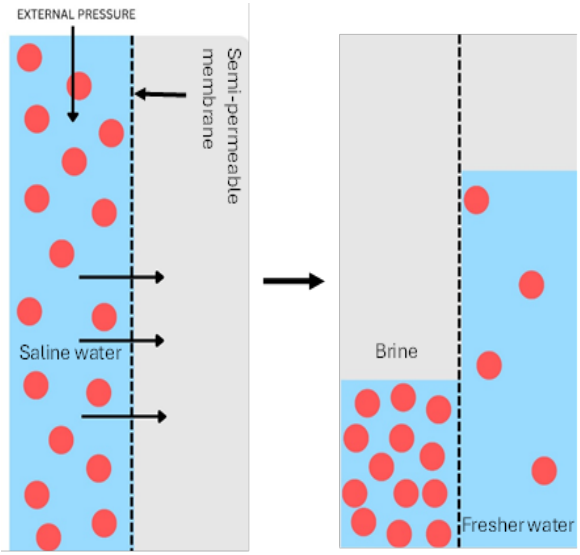


Desalination

Desalination is one solution available to landholders to overcome saline water sources.

There are multiple ways to desalinate water. Reverse osmosis is the method this fact sheet will describe.

Reverse osmosis is the engineered movement of water through a semi-permeable membrane. High pressure is applied to saline water to force it through the membrane. The membrane allows passage of water but traps the salt particles, producing fresh water. The salinity level of the fresh water produced by desalination depends on the salinity of the water source, and pre-treatment may be required to remove contaminants and microorganisms such as Iron-related bacteria.



Waste management

Desalination produces a highly saline by-product (brine). This brine is not suitable for consumption or irrigation and may contain chemicals used in the pre-treatment process. Brine must be disposed of in a manner which will not affect the surrounding environment.

Brine should be disposed of using an **evaporation pond** or by **aquifer injection**.

Evaporation ponds are the most common option used in Australia. The ponds hold the brine until the water evaporates, leaving salt crystals behind, which are removed as required. Ponds need to be carefully designed to suit the climate (temperature, solar radiation, humidity) of the area and the volume of brine produced. A well-constructed pond will minimise or eliminate brine leakage into the surrounding environment. Lining with a durable plastic is a good option. Check with your local Landscape Board whether this is a Water Affecting Activity before construction.

Aquifer injection involves using an injection well to dispose of the brine into shallow or deep aquifers. This is only suitable for small quantities of brine disposal, and when done correctly should not degrade the quality of the aquifer.

This is considered a Water Affecting Activity under the *Landscape South Australia Act 2019* – contact your local Landscape SA board to discuss before you act to avoid penalties.

Water testing

Water testing should be carried out regularly for all farm water supplies.

Desalination units are built to suit the water source, meaning that a water test is required prior to purchase – consult your local Landscape Board or agricultural consultant for help if required.

Other considerations

Ensure that the property has the required license, permit or allocation that may be required to extract water from a dam or bore.

Desalination units require a power source (grid or solar), and infrastructure for housing the unit and brine disposal. Consider these additional costs when developing a budget.

For any matters relating to water licences, please contact the Department of Environment and Water – Water Licencing Office on 8372 7561 (option 3) or email DEWwaterlicencing@sa.gov.au.

Contact your local Landscape Board for advice on water quality, infrastructure and regulations when planning to install a desalination unit.

We're here to help

Not sure where to start or who to talk to? Get in touch with your local Landscape Board. We can assist you to find the right connections.

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