

Salinity

notes

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How do I test water salinity ?

Measuring water salinity will indicate if it is safe to use the water for irrigation. You may be limiting plant growth and importing salts onto your farm without realising the cause. Measuring groundwater salinity will show how salty your surface soil is likely to become if the watertable rises close to the surface.

You should regularly test groundwater samples from bores and piezometers; and surface water from drains, creeks, dams, bay water, seeps and discharge sites.

A pocket-size salinity meter is accurate enough to determine the salinity of water for most farm purposes. Alternatively, a sample can be sent to a laboratory for testing and analysis if the water will be used for household purposes or livestock.

Note that although a water salinity test is easy, testing a soil sample is a more reliable assessment of the amount of salt actually affecting crops and pastures. Surface water tests provide a reading that is only accurate at the time of testing. The salinity can change sharply in a short space of time, so test water salinity regularly. For example, evaporation can

concentrate salts, and rainfall can dilute them. Also, slugs of particularly salty water can flow down rivers and creeks. Groundwater salinity tends to remain more constant in the short term.

How to collect and test water samples

1. Thoroughly mix the water you want to test before taking a sample.
2. Dip a water sampling container into the water being tested and rinse thoroughly.
3. Allow the jar to half fill with water.
4. Remove the protective cap from your salinity meter and turn the unit on.
5. Immerse the salinity meter into the sample up to the raised mark (about 25mm), and slowly swirl the meter. The two electrodes of the meter must be covered. (If testing free water in the paddock don't rest the end of the meter in sediment on the bottom).
6. Allow the displayed value to stabilise (it takes several seconds to compensate for the temperature of the sample).
7. Read the number on the meter, then convert it to the desired units (see Tables 1 and 2) and record the reading.
8. Wash off lower part of the meter with fresh water (especially the electrodes).

Table 1: Comparing Salinity Meters (Hanna, Eutech and Cole-Parmer/Oakton brands)

Hanna	DiST 3	DiST 4	DiST 4WP	
Eutech, Cole-Parmer	TDScan 3	TDScan 4	WP TDScan 4	ECTestr high+
Unit of Measurement	EC ($\mu\text{S}/\text{cm}$)	EC ($\mu\text{S}/\text{cm}$)	dS/m (mS/cm)	dS/m (mS/cm)
Measurement Range	10 - 1990 EC (up to 1.99 dS/m)	100 - 19900 EC (up to 19.9 dS/m)	0.01 - 19.9 dS/m (mS/cm)	0.01 - 19.9 dS/m (mS/cm)
Resolution	10 EC	100 EC	0.1 dS/m (100 EC)*	0.01 dS/m (10 EC)
Reading for calibration (with NSW Ag solution)	141	14	1.41	1.41

Note:

- Hanna DiST4WP reads to 0.01dS/m (10EC) increments if reading is below 10 dS/m
- All these meters will automatically compensate for temperature if sample is 5 to 50 °C (41 to 122 °F)
- Meters are accurate to within +/- 2% of the maximum reading (+/- 1% for ECTestr).
- ECTestr also measures temperature (in °C) and has push-button calibration.

Table 2: Units used for measuring Salinity

1dS/m = 1mS/cm = 1000 EC (μS/cm) = 640 ppm 1 deciSiemen per metre (dS/m) = 1 milliSiemen per centimetre (mS/cm) = 1 millimho per centimetre (mmho/cm) = 1000 EC (microSiemens per centimetre) = 640 parts per million in water (mg/litre)	So, to convert...		Do this
	from this unit	to this unit	
	EC (μ S/cm) ppm (mg/l) dS/m dS/m	dS/m dS/m EC ppm	divide by 1000 divide by 640 multiply by 1000 multiply by 640

Sampling & testing tips

- Make sure that you mix the water thoroughly before taking a sample to test.
- Rinse the sample container with the sample water before collection.
- When sampling from a dam: collect a sample from any channel entry points, and at several other locations around the dam. Avoid collecting muddy sediment.
- When sampling from a channel, creek or river: try to collect sample from the middle of the streamflow and near your pump intake.
- When sampling from a bore: collect a sample from a turbulent area near the outlet pipe, after pumping for at least 30 minutes.
- When sampling from a testwell: try to bail out as much of the water already in the testwell, and allow fresh groundwater to flow in (because some water in the testwell will have evaporated, concentrating the salts in the remaining water and giving an artificially high reading).
- The salinity meter should read zero when held in the air. If it doesn't, the meter needs to be calibrated. Refer to the Irrigation Salinity Note: *Understanding Salinity Meters*.
- If the salinity is out of the range of the meter, samples can be diluted by a fixed amount. For example, mixing a sample with an equal volume of distilled water will halve the total salinity. Double the reading to find the true salinity of the sample.

Testing surface water is especially important when reusing drainage water, as salts can enter the drainage or storage system where it crosses salty ground or areas with shallow watertables.

Water salinity monitoring

Measure the salinity of irrigation water sources (especially dam, bore and drain water) when they are first used, and every month afterwards. Because water salinity can change sharply over short periods of time, measure water salinity every time you resume irrigation with that water.

Saline water may need to be shandied to dilute salts and prevent damage to valuable crops and pastures.

Other tests of water quality

There are many other factors that will influence the quality of water: such as pH, alkalinity, hardness, chloride, nutrients, heavy metals, odour and turbidity.

The water samples you have taken can be sent away to be tested. Water tests cost around \$50, and can provide a measurement of all these quantities with a basic interpretation of the readings. This is especially important if you will be using the water for a household supply.

To have a water test conducted, collect a sample (250–300 ml in a clean plastic bottle). Bring the sample to your local NSW Agriculture office (who can arrange testing with the department's **Water Testing Service**).

This information has been produced as part of Salt Action, the community and government initiative for managing salinity in NSW.

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