

How salinity is measured

Water and soil salinity are measured by passing an electric current between the two electrodes of a salinity meter in a sample of soil or water. The electrical conductivity or EC of a soil or water sample is influenced by the concentration and composition of dissolved salts. Salts increase the ability of a solution to conduct an electrical current, so a high EC value indicates a high salinity level.

Electrical conductivity (EC) is also a term used to describe a measurement unit of salinity. The table below shows the different units used to measure salinity and their relationship to each other.

deciSiemens per metre (dS/m)		milliSiemens per centimetre (mS/cm)		microSiemens per centimetre (μ S/cm)		electrical conductivity (EC)		parts per million (ppm*)
1	=	1	=	1000	=	1000	=	640
4	=	4	=	4000	=	4000	=	2560

Source: NSW Agriculture (2003).

*ppm is only an estimate dependent on temperature and types of salt. It ranges between 0.5 to 0.7.

Salinity can be measured in a number of ways. Simple field tests using a hand-held salinity meter are quick and easy and are useful for conducting preliminary investigations, point sampling of selected areas and ongoing monitoring activities. Electromagnetic mapping (EM) using instruments such as an EM38 and EM31 can be used to characterise and map spatial variability of soil and apparent salinity over larger areas. This is a valuable tool for land use planning and provides a rapid assessment of differences across a paddock. It allows areas of low and high electrical conductivity and related attributes to be identified. More precise soil and water laboratory tests can be performed and should be used to confirm preliminary field testing where a possible salinity problem is suspected.

Salinity measurements are often reported with subscript abbreviations to indicate the origin of the sample tested and the method used to determine the salinity measurement. The method used will influence the accuracy of the results and confidence in interpretation. Common abbreviations and their descriptions are explained below.

EC_w is the salinity of water. This can be measured in the field or a laboratory.

EC_{1:5} is the first of three steps to estimate soil salinity (EC_e). It is determined by mixing 1 part soil with 5 parts distilled or deionised water. After mixing the sample and allowing the sediment to settle, the electrical conductivity of the solution is tested. An EC_{1:5} can be performed in the field or a laboratory.

EC_e is the estimated amount of salt in the soil. It is estimated by multiplying the EC_{1:5} value by an appropriate factor related to the soil texture of the sample. This can be determined in the field or a laboratory.

EC_{se} is the electrical conductivity of a saturated soil extract which should be conducted by a National Association of Testing Authorities, Australia (NATA) accredited laboratory.

EC_a is the apparent electrical conductivity. It is a measure of bulk electrical conductivity of undisturbed soil in the field. It is measured with an electromagnetic instrument (EM38 and EM31) in a soil survey.

References

This information sheet has been reproduced using information contained in the *Salinity Glove Box Guide for NSW Murray & Murrumbidgee* compiled by Deb Slinger and Kath Tension, NSW Department of Primary Industries, 2005.