

# Measuring the problem

## 1. Turbidity test for sodicity

- From each surface and subsoil sample weigh 100g of soil into a clean 600 ml glass jar with lid.
- Measure out 500ml rainwater or distilled water to give a 1:5 ratio of soil to water. See Figure 2.
- Gently pour this water down the side, without disturbing the soil at the bottom.
- Invert the jar slowly and gently once and then return to its original position (avoid any shaking). Then let stand for 4 hours, with no vibrations or bumping.



Figure 2. Making up a ratio of 1:5 soil to water (100g soil and 500ml water).

- Check the suspension above the sediment at the bottom of the jar and score the amount of cloudiness using the photographs in Figure 3 for comparison. Make up another soil suspension and repeat the process if unsure.



Figure 3. Estimating turbidity (soil sodicity) in a 1:5 soil/water suspension

Clear or almost clear.  
Not sodic, a score of 0

Partly cloudy,  
Medium sodicity,  
a score of 1

Very cloudy,  
High sodicity,  
a score of 2

- A white plastic spoon or spatula, that reflects light, when placed in the centre of the suspension can help identify the level of turbidity.



Figure 4. Estimating turbidity using spatula visibility

Plastic spatula  
visible.  
Not sodic

Plastic spatula  
partly visible  
Medium sodicity

Plastic spatula  
not visible  
High sodicity

# Has there been any mechanical breakdown of the soil ?

- Invert the jar vigorously 15 times and allow to stand for another 15 minutes.
- If you previously scored the jar “clear”, but now it remains “cloudy” - the soil has dispersed from mechanical cultivation, not from a high sodium level.
- Consider this as non-sodic i.e. a score of 0

## 2. Measure salinity

- Measure the electrical conductivity (EC) of the soil suspension in decisiemens per metre (dS/m) with a meter correctly calibrated according to the manufacturers instructions. See Figure 5. Wash the electrodes with rainwater or distilled water before and after each measurement.

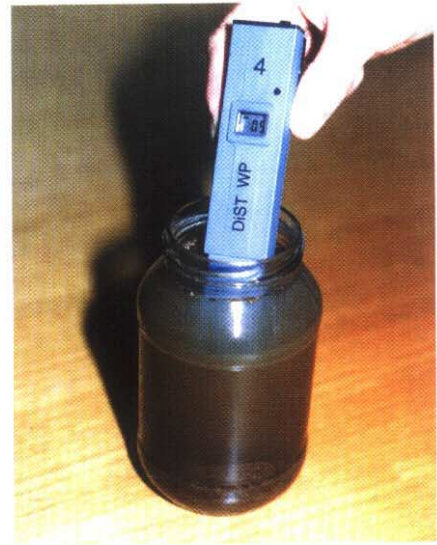


Figure 5. Measuring electrical conductivity with a hand-held meter

- As a guide:
  - Sandy or loamy soils are saline if EC is above 0.4 dS/m.
  - Clay soils are saline if EC is above 0.7 dS/m.These values are approximately the maximum in which moderately salt tolerant plants will grow.
- Decisiemens/metre is a common unit for EC, but if you need to convert to other units see Appendix 2.
- To estimate the effect of saline soil on plant growth see Appendix 3.

## 3. Measure acidity

- Measure the pH of the soil suspension with a calibrated pH meter. Stir the suspension a few times with the meter to get a good reading, and wait 20-30 seconds until the reading stabilises. Wash the glass bulb at the base of the meter with rainwater or distilled water before and after each measurement.
- Soils are considered highly acid if below pH 5.5. Soils between 5.5 and 8.5 are generally suitable for most plant growth. Soils are highly alkaline if above pH 8.5.
- Sometimes pH is measured in a solution of calcium chloride rather than water, to more accurately represent conditions experienced by the plant. This lowers the reading between 0.5 -1.2 of a pH unit.
- See Appendix 4 for tolerance of plant species to soil acidity.

## Now check the following tables to identify any major problems in the surface or the subsoil

As an example, consider a clay soil that scored 2 in the turbidity test, had an EC of less than 0.7 dS/m and a pH reading between 5.5 and 8.5. Move through the tables until you find a cloudiness score of 2. Then select the EC option of less than 0.7dS/m, which also corresponds to a pH reading between 5.5 and 8.5. (See second page of the tables. This indicates the soil is highly sodic and non saline, and that the high sodicity is likely to be the most important problem.)



Cloudiness	Electrical Conductivity decisiemens per metre (1:5 soil suspension in water)	pH (1:5 soil suspension in water)	Soil diagnosis	Likely most important problem
0	below 0.4 for sands/loams or 0.7 for clays	below 5.5	Non-sodic, non-saline, acidic.	Acid
0	below 0.4 for sands/loams or 0.7 for clays	5.5 - 8.5	Non-sodic, non-saline.	No problems
0	below 0.4 for sands/loams or 0.7 for clays	above 8.5	Unlikely to occur. High pH soils usually highly sodic and so very cloudy in water.	
0	0.4 and above for sands/loams, or 0.7 and above for clays	below 5.5	Non-sodic, saline, acidic. Not often found.	Acid
0	0.4 and above for sands/loams, or 0.7 and above for clays	5.5 - 8.5	Saline. May still be sodic as salinity can prevent cloudy reaction in water. Send sample to laboratory to test exchangeable sodium percentage.	Saline
0	0.4 and above for sands/loams, or 0.7 and above for clays	above 8.5	Saline, alkaline. May still be sodic as salinity can prevent cloudy reaction in water. Send sample to laboratory to test exchangeable sodium percentage.	Saline
1	below 0.4 for sands/loams or 0.7 for clays	below 5.5	Sodic, non-saline, acidic. Not often found.	Acid
1	below 0.4 for sands/loams or 0.7 for clays	5.5 - 8.5	Sodic, non-saline.	Sodic
1	below 0.4 for sands/loams or 0.7 for clays	above 8.5	Unlikely to occur. High pH soils usually highly sodic and so very cloudy in water.	
1	0.4 and above for sands/loams, or 0.7 and above for clays	below 5.5	Sodic, saline, acidic. Not often found.	Acid



Cloudiness	Electrical Conductivity decisiemens per metre (1:5 soil suspension in water)	pH (1:5 soil suspension in water)	Soil diagnosis	Likely most important problem
1	0.4 and above for sands/loams, or 0.7 and above for clays	5.5 - 8.5	Sodic, saline.	Saline & Sodic
1	0.4 and above for sands/loams, or 0.7 and above for clays	above 8.5	Sodic, saline, alkaline.	Saline & Sodic (alkaline)
2	below 0.4 for sands/loams or 0.7 for clays	below 5.5	Unlikely to occur. Low pH often prevents cloudy reaction in water.	
2	below 0.4 for sands/loams or 0.7 for clays	5.5 - 8.5	Highly sodic, non-saline.	Highly sodic
2	below 0.4 for sands/loams or 0.7 for clays	above 8.5	Highly sodic, non-saline, alkaline. (alkaline)	Highly sodic
2	0.4 and above for sands/loams, or 0.7 and above for clays	below 5.5	Unlikely to occur. Salinity will prevent cloudy reaction in water.	
2	0.4 and above for sands/loams, or 0.7 and above for clays	5.5 - 8.5	Unlikely to occur. Salinity will prevent cloudy reaction in water.	
2	0.4 and above for sands/loams, or 0.7 and above for clays	above 8.5	Unlikely to occur. Salinity will prevent cloudy reaction in water.	