



Activity 18. The effect of salinity on plant growth

Aim

To test the effect of different salinities on the growth of plants.

Background

High salinity in the root zone affects the growth of many plant species. Total growth and leaf area are affected. Different plant species may have different tolerances to salinity. This experiment takes approximately 5-6 weeks to complete.

Materials required

- germinated seeds from pervious activity
- coarse washed sand
- 5 plastic flower pots (15 cm diameter)
- measuring cylinders
- beakers
- 20 litres non-saline nutrient solution (“Aquasol” or similar mixed as per instructions; ensure micro-nutrients are included)
- 5 salt solutions using the nutrient solution in plastic squirt bottles at the following concentration:
 - a. nutrient solution only (control)
 - b. 0.25 grams of salt per litre (g/L) of nutrient solution
 - c. 1 g/L
 - d. 2 g/L
 - e. 2.5g/L
- foil

Procedure

1. Germinate the seeds in coarse washed sand using the non-saline nutrient solution pots until they have reached the first trifoliate leaf stage. Have four plants in each 15 cm diameter pot of sand.

2. Make up nutrient solutions as described in "Materials required".
3. Irrigate each of the pots when necessary from the top of the sand and let the excess solution drain away through the bottom of the pots. To save on solution you can grow the plants in beakers of solution and change the solution once a week-the plants will deplete the solution of some of the elements over that time and it needs to be replaced. If growing in solution, it will be essential to provide aeration to all root solutions. Use an air pump (e.g. an aquarium pump and a fish tank aerator in each beaker). The beakers of solution need to be wrapped (e.g. foil) to keep the roots dark.
4. Carefully measure the amounts of solution to, and amount of drainage from, each pot over the next three weeks. Measure plant growth i.e. height of stem above soil. Note events such as appearance of new leaves, and any strange symptoms on leaves. Use table at the end of this activity to record your observations.
5. At the end of 3-4 weeks when obvious differences have occurred in the treatment plants, harvest the trial, dry and weigh the shoots. If the equipment is available samples of shoots could be analysed for Cl and/or Na contents.

Following up

Compare a halophyte such as a saltbush with non-halophyte such as a bean to see the effect of different levels of salinity on growth and survival.

(Kindly reproduced from Victorian Saltwatch Activity Book.)

Solution (grams of salt per litre)	Observations						
	Amount of solution			Stem height	New leaves	Leaf appearance	Harvest dry weight (relative yield)
	Wk 1	Wk2	Wk3				
	I	I	I				
O	O	O					
Control							
0.25 g/L							
1 g/L							
2 g/L							
2.5 g/L							

I = in or added

O = out of drainage

Using the Table

1. Describe your results
2. Is there a relationship between the amount of water used and the salinity of the different experiments? Explain.
3. Plot:
 - a. the harvest dry weight (relative yield) against salinity on graph a.
 - b. the stem height against salinity on graph b.
4. Is there any relationship revealed by the data? Explain.

