

'Let's get Practical'
– How Science Works

Seed Germination



Apparatus and chemicals:

Petri dishes, with lids

Filter papers to fit

Cress seeds

Aqueous solutions of sodium chloride: concentrations 20; 15; 10; 5 and $1 \text{ g} / 100 \text{ cm}^3$

10 cm^3 syringe or measuring cylinder

Ruler

A supply of distilled water

Reference: ELBS Unit B 683.1

In winter months the roads are often kept free of ice by spreading with a mixture of sand and salt [sodium chloride]. The grit provides adhesion with vehicle tyres through physical methods and the salt by dissolving in the water on the surface of the ice and in so doing depressing the freezing temperature. This causes the ice to melt away, but the process carries the dissolved salt with it leading to the need to reapply to keep the road surface safe for motorists.

The salt washings drain into the gutters, but may also drain over the soil in which road-side plants are growing. This increased salinity in the soil water can have serious effects upon the plants and trees, leading in extreme cases to their deaths.

Whilst it is perfectly true that plants require a real mixture of different soluble minerals in order to survive, there are clearly limits to this tolerance. This simple investigation sets out a way to look at this question; *"that increased concentrations of sodium chloride in soil water has a detrimental effect on the germination of seedlings."*



Remember
Ruler
Cress seeds
Syringe
Pencil



Procedure

- 1 3 or 4 filter paper circles are placed in each of six Petri dishes. The top one is marked in pencil as shown in figure 1.
- 2 8 cross seeds are placed on the top paper, one in each of the demarcated sections.
- 3 Each Petri dish is labelled, the last being used as the control in which just water will be used.
- 4 Each dish is then charged with 10 cm^3 of appropriate solution, or water in the control, and the lids replaced. All dishes are then placed next to each other in a place suitable to promote germination.
- 5 Seedlings are checked regularly, daily, and their germination status noted.

Extensions and questions

- 1 What would be the effect of leaving the dishes uncovered during the experiment?
- 2 Would other solutions have similar effects? For example, solutions of table sugar are not electrolytes, what effect would this have?
- 3 Are seedlings susceptible to presence of heavy metal salts, such as silver nitrate solution?
- 4 Plants need potassium compounds to provide the element needed to make enzymes used in photosynthesis and respiration. Would increasing concentrations of potassium salts have similar effects?
- 5 Devise a method to investigate: "that germination and growth of seedlings is affected by concentration of carbon dioxide in the atmosphere". Students may come up with a number of ideas involving sealed bottles of various types in which empty tea-bag sachets containing sodium hydroxide pellets are suspended to absorb the carbon dioxide. The sealed container would also obviate the need for watering and disturbing the system.

I Love science

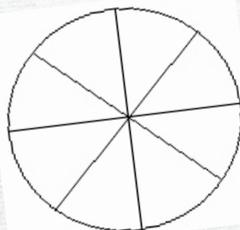


fig.1

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