5. Salt and plants

Cartoon character, Chris, notices that snowdrops growing on the roadside have turned yellow, and asks what has happened to them. This prompts the children to plan a test to investigate the hypothesis that salty water has splashed onto the soil and affected plant growth.

OBJECTIVES

- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
- Recognise that environments can change and that this can sometimes pose dangers to living things.
- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

RESOURCES

Copies of Activity sheet S11, salt, yogurt pots, a combination of commercial compost, cotton-wool, snowdrop bulbs or cress seeds or bunches of flowers such as daisies, snowdrops or daffodils.

The combination will depend on the children's investigations. The teacher may limit children's choices or inform children that using snowdrop bulbs will take several weeks to show results, whereas cress seeds will show results in a few days. Snowdrop bulbs can be used September-January and flowering snowdrops can be used January-March.

The activity is introduced with Activity sheet S11, which shows a car splashing roadside plants and Chris looking at these plants. Chris notices that the snowdrops that were tall and green last week have turned yellow. What has happened to them?

The children formulate a hypothesis about what has happened to the plant shoots, based on the pictures and the knowledge they already have. The information they have is that Chris's street has been icy and salt has been sprinkled on the road and salt dissolves in water. They need to think about where the salty water goes, i.e. down the drain or splashed onto pavements and grass on the roadside. The salty water soaks into the soil where plants are growing.

Safety note

Garden soil must not be used in this activity, as harmful microbes can grow in the soil. Sterilised commercial compost provides a suitable alternative.

A good hypothesis would be; "The snowdrops have turned yellow because salty water from the road has splashed onto the soil in which the snowdrops are growing." There will be many variations on this hypothesis. If children have difficulty formulating a hypothesis, the teacher can ask children to list the information they have about salt and Chris's street.

The children plan a test to prove their hypothesis, deciding on the equipment they need, how to make the test fair, what to measure and how to record the results.

Children could consider the following points:

- Whether to use plants, seeds, bulbs, flowers, etc. (time scale of experiment and growth rate of different seeds/bulbs).
- What concentration of salty water to use and whether to test several pots of seeds/bulbs with increasing concentrations of salty water (1-2 teaspoons of salt dissolved in 500 ml water gives good results).
- Whether to plant one or more seeds/bulbs per pot.
- If using ready-grown flowers, whether to water and/or spray them with salty water.
- Whether to test different varieties of plants/seeds/bulbs to find out if other plants are sensitive to salty water.
- If several bulbs are potted, which bulb's growth rate will be measured (measure all and take an average or measure maximum and minimum growth).
- Should sketches or descriptions of seedlings be kept in diary form as well as, or instead of, measurements being made?
- Should digital photographs be taken and transferred to a power- point presentation as time lapse photography?

Fair test conditions could include keeping the following the same:

- Quantity of compost used per pot
- Type of pot
- Number of bulbs/seeds per pot
- Position of pots in the classroom
- Quantity of water added
- Frequency of watering
- Frequency of measuring and recording.

The higher the concentration of salt, the poorer the growth of the plants is likely to be. If using seeds or bulbs they may not germinate at all!

RECORDING THE ACTIVITY

The children write a letter to Chris's local council, complaining about the effect rock salt is having on the roadside plants. The complaint should be supported with reasoned arguments and data from their tests.

Alternatively, the children design posters to protest against the use of salt on the roads. In the interests of road safety, they may suggest an alternative method for de-icing the roads, such as heating them, though they should appreciate that the expense of this would prevent such a decision. They could be given information on other 'chemical' de-icers which cause less harm to plants. The posters could show, and provide concise information about, plants or flowers 'before and after' de-icing.

HANDY HINTS

Using cress or mustard seeds gives the quickest results. These are grown in tubs, (i.e. margarine,) on moist tissue paper, the tissue paper of one tub being moisten with salty water. After 24 hours one tub of seeds will have germinated (with shoots about 1 mm) whilst the other pot will not germinate at all. After a week, the pot moistened with non- salty water will have a crop of mustard or cress ready to be harvested!

TEACHER INFORMATION

Up to 90% of salt used for de-icing ends up on the roadside verge. Some of the salt is scattered there by poor spreading methods but most of it is moved to the side by the spray from traffic, by wind, snow ploughs or by dissolved salt draining off the road surface. Plants growing by the roadside are vulnerable to damage from salt that soaks into the soil and from spray. A very low concentration of salt occurs naturally in soil, but most plants are sensitive to increases in this concentration. It badly affects their growth and can prevent germination.

Leaves of affected trees become brown and the tree's growth rate is reduced in spring. Damaged leaves may contain up to two and a half times as much salt by weight as salted crisps! Some trees are resistant to salt, such as cherry trees and oak trees. There are plants that prefer to grow in salt water, i.e. sea-weed or plants that grow in salt marshes.

EXTENSION ACTIVITIES

Children can use books to research plant growth in oceans (including the Dead Sea and the Baltic Sea) and salt marshes, to learn that not all plants have the same sensitivity to salt (see geography, page 117).