

Unit 3B Helping plants grow well

ABOUT THE UNIT

In this unit children learn about what plants need to grow well and why it is important that they do.

Experimental and investigative work focuses on:

- considering what evidence should be collected
- making careful measurements
- considering how good the evidence is
- using results to draw conclusions.

Work in this unit also offers opportunities for children to relate their knowledge about the growth of plants to everyday contexts.

This unit takes approximately 12 hours.

WHERE THE UNIT FITS IN

Builds on Unit 1B 'Growing plants' and Unit 2B 'Plants and animals in the local environment'

Children need:

- to know that plants grow and reproduce
- to know that plants need water to grow
- to be able to measure volume of liquids.

Links with Units 2A, 2C, 3A, 3C, 3D, 4A, 4B, 4D and design and technology (food) and geography.

VOCABULARY

In this unit children will have opportunities to use:

- words to describe physical characteristics of plants *eg yellow, pale, thin, spindly*
- expressions of reason using 'because'
- expressions making generalisations.

RESOURCES

- video/secondary sources showing plants grown for food
- black polythene
- suitable apparatus for measuring the height of plants *eg metre stick, tape measure*
- pot-bound pot plant
- two similar plants *eg geranium plants*
- celery
- germinated beans
- hand lenses
- water coloured red with ink or other dye
- plant pots with holes in the bottom
- cress seeds which have germinated in shallow containers

EXPECTATIONS

at the end of this unit

most children will:

recognise that plants provide food for humans and other animals, and that plants need light, water and warmth and healthy leaves, roots and stems in order to grow well; make careful measurements of volumes of water and height of plants and recognise that in experiments and investigations a number of plants need to be used to provide reliable evidence

some children will not have made so much progress and will:

recognise that plants need light, warmth and water to grow and make some measurements of the height of plants

some children will have

progressed further and will also:

explain why healthy roots and a healthy stem are needed for plants to grow; recognise that the leaves of a plant are associated with healthy growth; explain in simple terms why a number of plants should be used to provide reliable evidence about plant growth

LEARNING OBJECTIVES

POSSIBLE TEACHING ACTIVITIES

- Review children's knowledge of plants as living things by asking them questions eg
- *What plants can you see from the window?*
 - *Are they all living?*
 - *How do you know?*
 - *How do we help plants to grow well?*
 - *Why do we need plants to grow well?*

CHILDREN SHOULD LEARN

- that plants can provide food for us and some plants are grown for this

- ◆ Visit an allotment, market garden or large greengrocer to see the range of plants that are grown for food or show a video/series of pictures illustrating plants being grown for food. Discuss what children have seen and ask them to make a poster illustrating why we need plants to grow well.

- to make careful observations and measurements of plants growing
- to use simple apparatus to measure the height of plants in standard measures
- to use results to draw conclusions
- that plants need leaves in order to grow well

- ◆ Introduce the idea of a plant as an organism in which different parts *eg leaf, stem and root* all need to work properly if the plant is to grow well. Present children with similar plants of the same species *eg geranium* and ask them to suggest how these could be used to find out whether plants need leaves to grow well. Respond to children's suggestions or remove many of the leaves from one plant, keep both in the same place and water equally. Discuss with children what they are going to measure and observe *eg height from soil level to the tip of the shoot, colour and number of leaves*. Over a period of several weeks, help each child to make and record careful measurements of the height of the plants. Display measurements on a prepared chart. Talk with children about what the results show.

- that water is taken in through the roots

- ◆ Show children the roots of a plant which has outgrown its pot. Ask them why it will be better for the plant to be in a larger container. Extend their knowledge from *eg the roots need more room* to *eg the roots need more room so that they can take in more water*.

- that water is transported through the stem to other parts of the plant
- to make careful observations and present these using drawings
- to explain observations

- ◆ Show children a complete head of celery and ask them to look closely at the stem of the plant. Cut a stem across and observe the cut end. Put the celery stems upright in a shallow container of water coloured with red ink or food colouring. Ask children to make drawings to show what they observe and to explain on their drawing what they think has happened.

- that plants need healthy roots, leaves and stems to grow well

- ◆ Ask children to summarise what they have found out about leaves, stems and roots by drawing a plant that they think will grow well and one they think will not.

- that plants need water, but not unlimited water, for healthy growth
- to use simple apparatus to measure a volume of water correctly
- to use simple apparatus to measure the height of the plant

- ◆ Remind children that plants need water and ask them whether they think the more water they have the better they will grow. Show children a planted seedling *eg bean* and ask how they could use this and similar seedlings to investigate the question. Help children to decide what evidence to collect *eg give four seedlings no water, 5cm³ water, 20cm³ water or 50cm³ water each day or every two days* and what to measure *eg the distance from the soil to the top leaf*. Help children to use suitable apparatus to measure volume of water and height of the bean plant.

LEARNING OUTCOMES

CHILDREN

- demonstrate they understand the importance of plants growing well *eg by saying that plants provide food*

- make accurate measurements of the height of the plant
- explain how to make measurements which can be compared with others *eg I put the end of the ruler next to the stem and just on the soil. I measured where the top of the plant came to, this was how we all did it*
- describe differences in the way the plants grew
- relate differences in the way the plants grew to differences in the leaves

- explain that most plants do not grow well in pots that are too small *eg by saying the roots need space to spread out*
- explain why roots need to spread out *eg the roots take in water and they need to spread out to get it*

- make drawings showing red dye part of the way up the celery stem and explain what happened *eg the water went up the celery stem and we could see it because it was red*


- draw one plant with spread-out roots, many leaves and a straight/sturdy stem and one with tangled roots, few leaves and a thin/twisted stem

- measure specified volumes of water
- measure the height of the plant
- state that plants need water to grow but too much water may kill them

POINTS TO NOTE

Children's responses to these questions will indicate their knowledge about plants as living things. Teachers will need to take this into account in their short-term planning.

If the school has a grassed area, covering a small part with black polythene or a bucket for several days will create a teaching opportunity for the end of this unit. Alternatively, a plant *eg pea or bean seedling* can be left in a dark cupboard or box for several days.

 **SAFETY** – All off-site visits must be undertaken in accordance with LEA/school guidelines.

It may be helpful to use an analogy *eg a bicycle* in which all parts *eg wheels, chain, brakes* need to be effective if it is to work properly. Some children think that plants take in 'food' through their roots. This activity could provide a focus for a discussion about this.

Children may recall seeing a 'pot-bound' plant in Key Stage 1.

This works more effectively if the root is removed from the celery and the stem has leaves – using a piece from the heart

There are other opportunities for children to learn how to measure volumes of liquids in Units 3C and 3D. A standard teaspoon from a pharmacy can be used for measuring 5cm³.

It is important to ensure that children do not choose to over-water all the containers of seeds.

LEARNING OBJECTIVES

CHILDREN SHOULD LEARN

- to decide how much evidence about growth of seedlings is needed

- that plants need light for healthy growth
- to ask questions about the growth of plants

- that plant growth is affected by temperature
- to recognise when a comparison of plant growth is unfair
- to suggest how a fair test could be carried out
- that in experiments and investigations involving living things, using just one plant in each set of conditions does not give sufficient evidence

POSSIBLE TEACHING ACTIVITIES

- ◆ After 10 – 14 days discuss what has happened. Ask children to explain what they think their results showed and if they are sure about this. Show children a tray of cress seedlings. Ask children to suggest why using lots of seeds rather than one or two might be better.

- ◆ Take children to look at grass which has been covered or show them a plant which has been in the dark and ask them to describe and explain what has happened. Encourage children to speculate and ask questions eg
 - *What will happen if we uncover the grass?*
 - *Would it be the same for other plants?*
 - *Would the plant die if we leave it in the dark for a long time?*and test some of their ideas.

- ◆ Remind children of their visit to the allotment, market garden or large greengrocer or show them pictures of greenhouses and cold frames. Ask what else besides water and light is important for healthy growth. If necessary, prompt them to think about warmth. Show children some trays of growing cress seedlings and ask why you plan to use these to test ideas rather than pots containing just one bean seedling. Tell children your plan deliberately making the test unfair eg *by suggesting one tray is left in the fridge*. If necessary prompt children to recognise it is both cold and dark in the fridge. Ask children to suggest a better plan which takes account of the effects of water and light on plant growth. Help children to carry out an investigation ensuring they measure volumes of water accurately. Talk about the outcomes with the children. Help children to write an explanation of how they made their test fair and of what the work showed so that another class could understand it.

Remind children why we need plants to grow well. Review what children have learnt from the unit and ask children to produce a leaflet giving advice on how to look after plants kept in the classroom or at home.

LEARNING OUTCOMES

CHILDREN

- explain why experimental results, based on small numbers of plants, may not be adequate eg *'we only had one plant which we gave 50cm³ water to, it could just have died anyway'* or *'we had two we gave 50cm³ water to, one died and one grew'*

- describe what the grass or other plant looks like eg *yellow, pale, tall, thin, spindly*
- explain that this is because it did not have light
- make a generalisation from the results eg *'the same thing happens to other plants'* or *'if you put the plants back in the light they go green again'*

- identify 'warmth' as a factor affecting plant growth
- recognise that the test is unfair if some seedlings are kept in the fridge, because it is dark
- suggest that to keep the test fair, each tray of seedlings needs the same amount of light and the same amount of water
- explain that some seeds may not grow whatever conditions they are in and so it is necessary to try different conditions on many seeds

POINTS TO NOTE

Cress seedlings are suitable for showing the effects of over-watering.

Children should be encouraged to think about how good the evidence is. In biological experiments and investigations, using a relatively large number of seeds reduces the possibility of outcomes being influenced by one or two specimens which behave atypically.

Some children may be aware that there are pond plants which live in water.

Children will be given more practice in taking temperatures and reading thermometers in Unit 4D.

Some children may think it is light inside the fridge because the light is on when it is opened.

Children may have seen labels for houseplants or fertilisers which refer to 'feed' and plant 'food'. It is helpful to point out to children, if they raise this, that they have seen plants grow without this 'food' and it is different from the 'food' that animals eat. Children could be shown the very small quantities of 'food' that houseplants are given. If teachers think it appropriate the term 'nutrient' could be introduced.

It may be helpful to show pictures of plants growing in other climates and to point out that different plants are suited to different temperatures and amounts of water.

This activity provides an opportunity for the use of IT (see IT Unit 3A 'Combining text and graphics').



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