



Age 10-12



Time

Discussion and set up - 1 hour
Plant growth - 2 weeks to seedling stage,
4 months to mature plant producing seed
Plant care - 10 minutes each day
Observation time - flexible

Materials

Each group will need:
Plant pots or trays.
Growth media and a pot to act as a scoop/measure.
Three *Sunflower* seeds per pot or tray compartment.
Sticky labels and pen/pencil to mark individual pots.
Pupil worksheet (enlarge to A3 size would be best).
Some groups will need:
Two black bags or cardboard boxes.
Plastic syringes.*
Room thermometer.*
Soil thermometer.*
Light meter. * (*if available)
Note: For more rapid germination and growth, seeds of the herb *Coriander* are recommended.

activity 12

Through these activities pupils can learn:

- about the factors affecting germination and growth
- about the growth cycle
- to identify and label the main parts of a plant

Skills developed:

- plant care
- close observation
- accurate measurement and recording
- prediction, questioning, researching

How to begin:

Work in small groups or as a whole class. Use discussion to establish the conditions necessary for healthy growth. The main variables involved are: light, water, temperature, and the growing medium (containing nutrients). (Q1 & 2).

Key questions:

- Q1. What do you think a seed needs in order to grow into a healthy plant and why?**
- Q2. What parts of the plant do you think will grow first?**

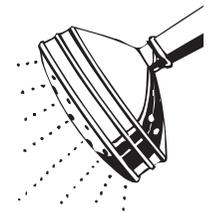
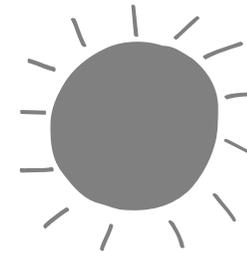
When favourable conditions have been explored through discussion, the growth activity can be introduced. A whole class might study the effect of changing just one of the variables, e.g. water, or small groups might be assigned one variable each (the first group light, the second heat, the third water, and so on) and report back to the whole class at the end of the activity.

As a parallel activity, children might also study the stages of plant growth - examining the parts of a plant and their functions. For this you may wish to use Teacher worksheet 1 from Activity 3 - the *Sunflower jigsaw*.

The growth cycle of *Sunflower* - looking at variables and planning a fair test

Possible recording options

- Floor books; pictorial diaries; pictograms, bar charts or IT. You may wish to use Pupil worksheet 12.





Age 10-12

activity 12

Continued

Teachers' note

As with all seed growth activities, it is best to over plant by a factor of three to ensure adequate germination.

Ensure good drainage by making holes in the bottom of the pots if necessary and by placing the seed pots/trays in drainage trays.

1. Investigating growth media

In this case the variable being studied is the growth medium. Children should be encouraged to decide which growth media to test (possible choices include sand, pebbles and stones, garden soil and potting compost).

They should be reminded of the fair test - that each pot or tray of seeds should:

- have the same amount of growth media (children might use a pot as a 'scoop' to measure out equal amounts of the media)
- have the same number of seeds
- receive the same amounts of heat and light
- be given the same amount of water (enough to keep the soil moist)

Expected results: Seeds in the potting compost should show the strongest growth. This is a nutrient rich environment with a friable structure ideal for root and shoot development.

Seeds in the garden soil should also germinate, although growth may be slower than the seedlings in the potting compost because the soil may not have the same concentration of nutrients and its structure may not be as friable.

The seedlings grown in sand and in small stones/pebbles may germinate as each seed has a built-in food reserve to draw on, but subsequent growth will be weak because of the lack of nutrients and the unsuitable physical structure of the stone/pebble environment.

2. Investigating water

A plastic syringe is ideal for this activity. Children might deprive the first pot or tray of water, give the second enough water to keep the soil moist and the third an excessive amount of water.

Expected results:

Pot 1 - no growth.

Pot 2 - germination and maximum growth rate.

Pot 3 - little or no germination due to over watering.

Alternatively, a set amount of water can be given to each pot of seeds but the *frequency* of watering changed for each pot.

3. Investigating light

Leave the first pot/tray of seeds in darkness by placing a black plastic bag or cardboard box over it and removing it only to water and make observations.

Give the second pot/tray bursts of light by removing its black plastic bag or box for two hours a day.

Leave the third in good light conditions e.g. close to a window (but not on a window ledge - it may get too warm behind the glass).

If facilities allow, expose a fourth pot to continuous artificial light.

Care should be taken that temperature levels are the same for each pot. If available, a light meter may be used to gain accurate measurements.

Expected results:

Pot 1 - initial germination may occur but there is little or no subsequent growth - seedlings may look yellow and limp.

Pot 2 - germination will occur but again seedling growth will be slow and plants will look weak.

Pot 3 - most of the seeds will germinate and seedling growth should be strong and healthy.

Pot 4 - germination will occur and growth will be rapid. Shoots may be elongated compared with those grown in daylight.

4. Investigating heat

Place the pots or trays in a cool outdoor location, a warm classroom location and a hot location near to a radiator, heater or behind glass. Care should be taken to ensure light levels are the same for each pot. The use of a room thermometer (and a soil thermometer, if available,) will allow accurate measurements to be taken. Mercury-in-glass thermometers should be handled by adults only. Children may use liquid crystal strips, dial type or digital thermometers.

Expected results: the seeds placed in the temperate environment of the classroom should show the best germination and growth rates, followed by those in the hot location. However this situation may reverse depending on the amount of water given to each pot (i.e. if the pot in the hot location is kept well watered a 'greenhouse effect' may lead to superior germination and growth).

Activity 12: Pupil worksheet 12

Name _____

Investigating the growth cycle of _____ (plant name)

Our prediction:
What is going to happen and why:
The equipment we will need and how we will keep the test 'fair':
The outcome of our investigation:

Week 1	Week 2
Week 3	Week 4
Week 5	Week 6