

# TOPIC 4

# How does your garden grow?



## About this topic

Curriculum link: Year 3, plants

### SUMMARY:

Children work scientifically on a variety of quick challenges and longer tasks to learn about plants. They learn about the different parts of plants, what plants need to live, water transportation in plants and pollination.

### UNITS:

4.1: Plant parts

4.2: Let's get growing

4.3: Flower power

### ACTIVITY RESOURCES:

- 4.1: Plant parts
- 4.2: Flower power
- 4.3: Types of seed

### ONLINE RESOURCES:

Teaching slides (PowerPoint) : How does your garden grow?

Interactive activity: How does your garden grow?

CPD video: How does your garden grow?

Pupil video: How does your garden grow?

Word mat: How does your garden grow?

Editable Planning: How does your garden grow?

Topic Test: How does your garden grow?

## Learning objectives

This topic covers the following learning objectives:

- Identify and describe the functions of different parts of flowering plants: roots, stem / trunk, leaves and flowers.
- 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.
- Investigate the way in which water is transported within plants.
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

## Working scientifically skills

This topic develops the following working scientifically skills:

- Ask relevant questions and use different types of scientific enquiries to answer them.

- Set up simple practical enquiries, comparative and fair tests.
- Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment including thermometers and data loggers.
- Gather, record, classify and present data in a variety of ways to help in answering questions.
- Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identify differences, similarities or changes related to simple scientific ideas and processes.
- Use straightforward scientific evidence to answer questions or to support their findings.



## CROSS-CURRICULAR LINKS

This topic offers the following cross-curricular opportunities:

### English

- Create a glossary of key scientific words related to plants.

- Use different question stems to ask questions about plants.
- Interview a gardener or botanist.
- Use adjectives to describe plants, flowers, seasonal change.
- Retrieve and record information from non-fiction books about plants.
- Research a plant of the week, e.g. Venus Fly Trap.

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- Increase the legibility, consistency and quality of handwriting.
- Draft and write by composing and rehearsing orally a range of sentences.
- Explain using scientific language.
- Use simple organisational devices such as headings and sub-headings when writing about a fair test.
- Write a set of instructions for growing plants: design seed packet with instructions.
- Write a poem, song or rap about the different parts of a plant and their roles.
- Proofread their own and other's work for spelling and punctuation errors.
- Use conjunctions, adverbs and prepositions to express time and cause when writing about plant growth and observations over time.

### Mathematics

- Look at different plants and count the number of petals on their flowers to make a tally chart and draw a bar chart.
- Estimate the answer to a calculation and use inverse operations to check answers.
- Add and subtract numbers mentally.
- Measure, compare, add and subtract: lengths (m / cm / mm); mass (kg / g); volume / capacity (l / ml).
- Interpret and present data using bar charts, pictograms and tables.
- Explore a range of different seeds, taking measurements as you go. What is the largest, smallest, lightest and heaviest? Present findings to the rest of the class.

### Computing / ICT

- Use a digital camera to take photographs of trees and plants around school at regular intervals to show change over a year.
- Make a presentation or slideshow about the parts of a plant.
- Use a time-lapse camera to show plant growth over time.
- Use apps for classifying plants and trees.
- Use or create QR codes with pictures or information about plants.
- Use a digital video camera to make a short TV show, 'Garden World', that explains what plants need to grow.
- Make a slideshow presentation using digital photographs of the plants grown during the different activities.

- Make a video using stop-frame animation to explain the process of pollination.

### Art

- Use sketch books to record their observations of plant parts and plants growing over time.
- Draw, paint or create a sculpture of a plant in the school grounds or a favourite or unusual plant.
- Create leaf collages, e.g. patterns, faces.
- Leaf rubbings, colours and patterns.
- Still-life drawings.
- Use pressed leaves and flowers.
- Look at the work of David Hockney who painted the same scene through the seasons.

### Geography

- Look at plants in different habitats locally, e.g. hedgerow, pond, woodland.
- Map local habitats, e.g. in school grounds.
- Locate habitats around the world, e.g. deserts, rainforests.
- Research interesting / famous / unusual plants around the world.

### History

- Famous botanists, e.g. Beatrix Potter, Robert Fortune.
- Famous gardeners, e.g. Capability Brown, Gertrude Jekyll.



## STEAM (SCIENCE TECHNOLOGY ENGINEERING ART AND MATHS) OPPORTUNITIES

### Invite into class

- A local botanical organisation to work with children, e.g. identifying plants.
- STEM Ambassadors to link with local business and to work with children.
- A florist to give children a demonstration and for children to make flower arrangement.

### Visit

- Your local garden centre, so that children can be given a 'masterclass' in planting seeds, potting on, using garden equipment, etc.
- Your local botanical gardens to work with experts.



## HEALTH AND SAFETY

Check *ASE – Be Safe* for a list of plants that are poisonous and irritants that should not be used, or log onto <http://primary.cleapss.org.uk>



## TEACHER SUBJECT KNOWLEDGE

The main parts of a flowering plant are:

- the roots
- the leaves
- the stem
- the flower.

The roots of a plant anchor it into the soil. They absorb water and any dissolved nutrients. These are then transported to the rest of the plant via bundles of tubes inside the stem called vascular bundles.

The stem is the main support structure of the plant, allowing it to stay upright and providing a frame for the leaves. In many plants the stem is also a place where nutrients can be stored.

For plants to grow healthy they need a number of things, such as:

- water
- sufficient space
- light
- a supply of minerals and other nutrients.
- air

Plants do not need soil to grow, as long as they get a suitable supply of minerals and nutrients. In fact, in many modern commercial greenhouses plants are grown in a nutrient-rich liquid instead of soil. This growing technique is called hydroponics.

It is important to be aware that there's a difference between what seeds need to germinate and what plants need to grow. Seeds just need warmth and water to germinate, they do not need light. They initially grow using the food stores within the seed. If they do not get any light before these stores are used up, then they can die.

The leaves are where the plant makes its food. They take in carbon dioxide from the air and water from rain, converting them into oxygen and a sugar called glucose. Leaves also get energy from the Sun, capturing it using a green chemical known as chlorophyll. This whole process is called photosynthesis.

Water moves upward to the top of the plant through long, thin tubes running up from the roots through the stems and leaves called xylem. Water moves up the xylem through a process called capillary action. Capillary action is the name of the process when liquids, like water, move up through a solid, like a hollow tube or spongy material. At this stage children do not need to know terms such as xylem or capillary action. When discussing how water is transported in a plant use the word moves and avoid suggesting the plant sucks up water (as a human sucks up water from a straw).

Flowers are the reproductive organs of the plant. They produce pollen and eggs, which then produce seeds that the plant then disperses (spreads away from the plant) so new plants can grow.

### Plant reproduction

Flowering plants reproduce sexually. Most flowers have both male and female parts. The male parts produce the pollen and the female parts produce the ova (eggs). Both the pollen and eggs contain half the genetic information necessary to make a new plant, in the same way that sperm and eggs do in animals.

Plants cannot pollinate their own flowers; instead, they need to get their pollen to the flowers of their own plant or of another plant. Often this is carried by insects, but plants can also disperse their pollen into the wind. When pollen lands on the stigma of another flower, it joins with the egg and their DNA combines. The egg is now fertilised. This will happen many times with all the eggs in the ovary.

Each egg develops into a seed and, as this happens, the flower will change and lose its petals. The ovary swells up and turns into a structure known as a fruit. In some plants the fruit is attractive to animals who then eat it, carrying the seeds inside their body until they go to the toilet elsewhere where the seeds can then grow. Other seeds are dispersed on the wind, via water or other methods.

Remember:

Stamen = 'men' = male. Stigma = 'mama' = female.



## CHILDREN'S MISCONCEPTIONS

### Children might think...

- that plants get their food through their roots: in fact, they take in water and some minerals through the roots, but make their food in their leaves.
- that trees are not plants: they are.
- that mushrooms are plants: they are not; they are fungi.
- that plants get their food from the soil: plants make their own food, but the roots help them get water, minerals and nutrients that help them grow.

- that seeds need light to germinate: this is not true as, they just need water and warmth. There's enough food stored inside the seed to provide the energy it needs to produce a shoot and roots.

### Children already know...

- the basic structure of a plant (Year 1).
- that plants need water, light and a suitable temperature to grow and stay healthy (Year 2).
- how seeds and bulbs can grow into mature plants (Year 2).



## SCIENTIFIC VOCABULARY: HOW DOES YOUR GARDEN GROW?

You can download a Word mat of essential vocabulary for this topic from *My Rising Stars*.

**carpel:** female part of the flower – made of stigma, style and ovary

**flower:** the part of the plant where seeds are made

**germinate:** when a seed starts to grow and produce a root and shoot

**leaves:** catch sunlight and use this to make food

**life cycle:** the stages a living thing goes through during its life

**nutrients:** materials in the soil that help to nourish plants

**ovary:** the part of the flower that contains the ovules

**ovule:** these are like eggs; they develop into seeds

**petal:** part of the flower that attracts insects, often brightly coloured

**photosynthesis:** how green plants make their own food

**pollen:** dust-like powder made in the stamen of a flower

**pollination:** transferring pollen grains from the male anther of a flower to the female stigma so that new plants can be made

**root:** helps anchor the plant into the soil; takes up water and nutrients

**root hairs:** tiny hairs on a root that take water and nutrients from the soil

**seed dispersal:** the way seeds get from the parent plant to a new place so that they can grow

**sepals:** protect the rest of the flower as it grows

**stamen:** the male part of the flower which produces pollen

**stem:** holds the plant upright and supports the leaves; it contains tubes that allow water to travel from the roots to the rest of the plant

**style:** the middle part of the carpel, connecting the ovary to the stigma

**stigma:** part of the carpel that pollen grains attach to during pollination

**veins:** tubes in the leaf that carry water and food