Year 2 - Plants

Reference to the Programme of Study 2014

Pupils should be taught to:

- Observe and describe how seeds and bulbs grow into mature plants
- Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

The learning journey: Plants

Year group	Statutory Requirements from the Programme of Study
1	• Identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen • Identify and describe the basic structure of a variety of common plants including roots, stem/trunk, leaves and flowers.
2	• Observe and describe how seeds and bulbs grow into mature plants • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
3	• Identify and describe the functions of different parts of plants; roots, stem, 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 ways in which water is transported within plants. • Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

How the children should learn science at Key Stage 1

The principal focus of science teaching in Key Stage 1 is to enable pupils to **experience and observe phenomena**, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to **be curious and ask questions** about what they notice.

Suggestions for Working Scientifically

Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.

Further Guidance

These opportunities for working scientifically should be provided across Years 1 and 2 so that the expectations in the programme of study can be met by the end of Year 2. Pupils are **not** expected to cover each aspect for every area of study.

Asking questions. Children should ask simple questions and recognise that they can be answered in different ways.
Scientific enquiries. They should be able to do the following types of enquiry:
Observations**.** They should observe closely, using simple equipment.
Simple tests
Identifying and classifying
Secondary sources. They should use simple secondary sources to find answers.
Recording. They should gather and record data to suggest answers to their questions. With help, they should record in a range of ways and begin to use simple scientific language.
Analysing observations. They should use their observations and ideas to suggest answers to questions. They should notice patterns and relationships in their observations. They should talk about what they have found out and how they found out.

Preparation for this unit of study

Hurdles to overcome when studying plants:

1. Convincing children they are alive. In order to do this one must systematically collect evidence over a period of time. This time might be longer than just a single term.
2. Teacher subject knowledge. There is a huge variety of plants, so time needs to be spent identifying the plants available, knowing their requirements and knowing about their life cycles.

Conservation note
In Britain it is illegal to dig up wild plants and to pick some wild flowers. Removing any plant or part of a plant without a landowner's permission is illegal.

When –

The majority of this unit is best to study in **late spring or summer**. However, there are aspects of the learning that will need to be covered at different times of the year. For example, check when is the best time of year to sow the seeds and plant the bulbs that you are using. Some of the bulbs, for example, might need planting in late autumn. You will need to collect seeds from trees during the autumn for use later in the year. Ensure that you take the children out **throughout the year** so that the children can tend the plants that they are growing, and so that they can see how plants change over a long period of time.
Look through this whole unit of study at the start of the academic year so that you can plan when in the year you will allow the children to do each of the activities.

Know the names - Do a little research and **find out the names of some of the plants** growing around your school. This should include any trees, wild flowers and garden plants.
The following website is useful to help you work out which plants you have: www.shootgardening.co.uk/plant/identify
The identification charts from Gatekeeper, the identikit from the Great Plant Hunt website (free) and the identification charts from OPAL (free) are useful for you and the children.

Recording findings throughout the year - It may be worth keeping a **large floor book** (like a giant scrap book) in which 'evidence' of the plant world developing in the school can be placed – e.g. photos of trees in different seasons, photos of dandelions over a period of time, etc. Some of this 'evidence' could be **collected at different points throughout the year**, but used in the studies during this unit of work.

Preparing the learning spaces –
Autumn – Plant the bulbs

Make sure that you have **a great range of plants growing in the school grounds.** This will mean having: long grass areas, wild flower area, garden flower area, trees, plants in and around a pond, vegetable allotment, and possibly plants in a green house. You will need to mark where particular plants are for particular activities. This could be done by laminating letters or number with a background of a particular colour that links to a particular activity. This will help not only for the children to focus in on the plants that are relevant to their activity, but can help the children to make links over time.

Collecting seeds – Seeds that can be collected from trees in autumn can be used in spring to study how they grow. You can collect seeds from trees such as beech, oak and horse chestnut (conkers).

Collecting twigs - Twigs from different species of trees can collected in late winter/early spring. These will need to be cut from the trees using secateurs.

Use information from CLEAPSS (Developing and Using Environmental Areas in School Grounds L221), as well as organisations such the Bee Conservation Trust, the Butterfly Conservation Trust and the RSPB to ensure that plants you grow are useful for the range of animals that could live in your school grounds.

Also, look out for any **national surveys** that may be taking place which are looking different plants in local environments.

Growing plants indoors

In this unit of work there will be many opportunities for children to grow seeds/bulbs and plants in a range of conditions. The children could lose track; not remembering what each of the plants was testing for. Therefore, ensure that every plant being used is labelled to remind the children which investigation is going on. For example, 'Do seeds need water for them to grow?'.

One of the best ways to grow plants indoors is to place pots on gravel in a plastic trough (you can buy these at garden centres).Water from the pots can drain into the gravel and then it evaporates. This helps to keep the air around the plants a little more humid and the roots a little cooler. A problem often encountered in a classroom is likely to be currents of dry, hot air from heaters. So, if your plants need to be placed above heaters, deflect the upward air currents away from the plants with card underneath the trough.

Plants that are good for growing indoors

Two types of perennial plants that will grow for most of the year are geraniums (pelargoniums) and various species of 'wandering sailor' (tradescantia and its relatives). All pelarganiums require high light levels, will grow well in direct sunlight and flower for most of the year. Tradescantias will tolerate much lower light levels and prefer less or no direct sunlight; otherwise they have similar needs.
A good annual plant to have in the classroom is white mustard (Sinapisalba). These keep very well, germinate quickly at any time of the year and can be used to observe germination, growth of roots, and response to light, shoot structure and root structure.

Resources

- Badges showing the roles within the garden centre
- Plants and seeds for an allotment area
- Tools for maintaining the allotment
- Bird seed containing a variety of seeds
- Microscopes

- Hand lenses
- Home-made ‘seed size chart’
- Five easy bulbs to grow:

1. Narcissus ‘Tête-à-Tête’
2. Tulipa ‘Queen of Night’
3. Scilla siberica ‘Spring Beauty’
4. Fritillaria meleagris
5. Crocus vernus 'Pickwick'

- Flower pots
- Old woolly socks
- Fast growing seeds: white mustard, rocket, flax, mung beans or radishes.
- Cut-down empty 2L plastic bottles
- Sunflower seeds and broad beans seeds
- Sunflowers seeds
- Broad bean seeds
- 2L plastic bottles
- Cotton wool
- Card
- Seeds collected when they have fallen in autumn; beech masts, acorns and horse chestnuts. – and then stored
- Polythene bags
- Measuring tape
- White paint
- Twigs from different species of trees collected in late winter/early spring

- Secateurs
- Indoors; lots of pots and cut-down plastic bottles for growing plants in.
- Outdoors; plenty of different areas containing plants. You might want to consider purchasing cheap ponchos for children so that they can go outside whatever the weather.
- Large floor book (can be made from A2 sheets of card/sugar paper folded and stapled).
- Video camera
- Digital camera
- Plant identification charts from Gatekeeper (www.gatekeeperel.co.uk)
- The Great Plant Hunt identikit – (www.greatplanthunt.org/teachers) – scroll down the menu
  www.opalexplorenature.org/sites/default/files/7/file/OPAL-Tree-chart-web.pdf

- http://butterfly-conservation.org/121/habitat-advice.html
- http://bumblebeeconservation.org/get-involved/

Key vocabulary

Trees - deciduous, evergreen, ash, birch, beech, rowan, common lime, oak, sweet chestnut, horse chestnut, apple, willow, sycamore, fir, pine , holly, etc

Wild flowering plants - cleavers, coltsfoot, daisy, dandelion, garlic mustard, mallow, mugwort, plantain, red clover, self heal, shepherd's purse, sorrel, spear thistle, white campion, white deadnettle and yarrow.

Garden plants – crocus, daffodil, bluebells, etc

Parts of plants – roots, branch, trunk, stalk, leaf, flower, petal, seeds, bulbs and twigs

Need of plants – water, light, heat, temperature

Key information for teachers

Structure of plants

In most plants the part above the ground is the shoot system and the part below is the root system.

The leaf. The leaf makes food for the plant by photosynthesis.

The stem. The stem supports the leaves and is also part of the plant's transport system.

Buds. Buds are undeveloped shoots.

Flowers. Some buds produce flowers. These are shoots specialised for sexual reproduction.

Roots. Roots anchor the plant to whatever material it is growing on or in. They also absorb water and other chemicals that the plant needs in order to live healthily and grow normally.

Requirements of plants

Plants require water, the correct temperature, nutrients and light in order to be healthy.

Requirements of bulbs and seeds

Bulbs and seeds require water and the correct temperature in order to grow healthily.

Key scientists

Barbara McClintock (1902 – 1992)

Joseph Banks (1743 – 1820)

Gregor Mendel (1822 -1884)

Carl Linnaeus (1707 – 1778)

George Forrest (1873 – 1932)

The Royal Horticultural Society (RHS) – Information on the RHS and the work that they do can be found on their website - http://www.rhs.org.uk/About-Us/Who-we-are

Learning Expectations	Possible Tasks	Resources
	Hook – Being gardeners at a garden centre Explain to the children the work that people do at garden centres; growing and looking after plants, and advising the public on which plants they should buy and how they can be cared for. Inform the children that they are going to gardeners for the whole year. As such, they will need to do a lot of growing and caring for plants. You could even create roles (with badges) that you share out each week: carer for the allotment, carer for the herb garden, composter, head gardener, etc. These roles could be shown a display board, along with photos of children doing some of the tasks. **Ongoing task throughout the year – Keeping an allotment** It is highly recommended that throughout the year the children maintain an allotment area. This will help to reinforce the learning they will gain from the more focussed tasks, as well as provide a meaningful link to why it is important for scientists and farmers to know the conditions that seeds and plants require in order to grow. **Recording** The children could keep a large floor-book in which they can stick drawings and photos of their allotment and other plant areas throughout the year.	• Badges showing the roles within the garden centre • Plants and seeds for an allotment area • Tools for maintaining the allotment
To be able to observe closely using simple equipment. To be able to sort objects using observable features	**Observing - What are different seeds like?** Children could use sight and touch to observe their seeds. Encourage children to look at seeds carefully with a hand lens or microscope. **Sorting - How many ways can we sort seeds?** Provide children with a range of different seeds (many different types can be found in bird seed). Ask them to find different criteria for sorting them – e.g. colour, shape, size and texture.	• Bird seed containing a variety of seeds • Microscopes • Hand lenses • Home-made 'seed size chart'

Learning Expectations	Possible Tasks	Resources
(non-statutory).	Provide the children with a 'seed size chart'. This you can make yourself; simply draw around 6 or so different sized seeds. Shade in these drawings. The children can then try placing these seeds on this chart; trying to find the drawing that has the closest size to that seed. **Recording** The children could draw some of their seeds in their books. They could group the seeds together according to one of their criteria. They could add any descriptive words.	
To be able to observe how bulbs grow into mature plants. To be able to recognise that questions can be answered in a range of ways. To be able to perform a simple test.	**Comparative test - What do bulbs need so that can grow healthily?** NB The primary curriculum clearly states that the children should NOT be conducting a fair test or predicting what they think will happen. The children should be encouraged to share their ideas about what they think the bulbs and seeds will need, as well as how they could go about finding out what the seeds/bulbs need. **Recording** – Discuss the question above with the children; capture their ideas in the large class floor-book. The bulbs will need to be planted in the autumn; from October to December, before the first frost.. Daffodils, tulips, crocus, grape hyacinths and fritillarias are just some of the plants to choose from. For information on growing bulbs visit - http://www.bbc.co.uk/gardening/basics/techniques/plant_bulbs1.shtml This is an investigation for children to do over some time. They could try growing bulbs in different conditions; pots/garden beds, areas that receive water/drier areas, area in sunlight/areas in the dark, etc. Once the bulbs have started to sprout the children can measure growth over time. **Recording** Take a photo of the different types of bulb before they are planted and stick these in the whole-	Five easy bulbs to grow: 1. Narcissus 'Tête-à-Tête' 2. Tulipa 'Queen of Night' 3. Scilla siberica 'Spring Beauty' 4. Fritillaria meleagris 5. Crocus vernus 'Pickwick' • Flower pots

Learning Expectations	Possible Tasks	Resources
	class floor-book. Leave space alongside each of the photos to stick in more photos taken of the same plant at different times in the year. Each time new photos are stuck in, include speech bubbles with comments that the children have made. Remember, as the bulbs begin to sprout, to record some length measurements alongside each of the photos.	
To be able to observe and describe how seeds grow into mature plants. To be able to gather and record date to help in answering a question.	**Simple test – My woolly socks are covered with seeds from outside. How could we find out if they will grow?** **Hook** – Video clip from www.bbc.co.uk/learningzone/clips/ - 'Growing plants' and 'Seeds' Pick a time of year when there are plenty of seeds in your long grass area; e.g. middle of summer. Give each small group an old pair of woolly socks. Go for a walk in your meadow/long grasses area. Use microscopes and hand lenses to observe the type of seeds that have become attached to the socks. The children could select 5 or so different seeds. The children must decide what conditions they think the seeds need in order to grow. They could place each seed in a small plant pot which has been half filled with soil. They will need to place a numbered tag next to each seed. They could then place more soil over the seeds. They can decide where to place the pot and when to water the seeds. **Recording** The children can draw each of their seeds They can draw how they are trying to grow the seeds. As time passes, they can keep a diary showing changes	• Old woolly socks • Plant pots • Fast growing seeds: white mustard, rocket, flax, mung beans or radishes. • Cut-down empty 2L plastic bottles • Sunflower seeds and broad beans seeds
To be able to observe and describe how seeds grow into mature plants. To be able to gather and record date to	**Investigation over time – Do seeds need water so that they can grow?** Ask the children to discuss how they could find out the answer to this question. Hook - Mystery seeds. Provide the children with a small bag of seeds. Ensure that there are pairs of each type of seed. The children will need to ensure that one of the pair is placed in a container with soil and is watered, whereas the other one of the pair is in soil but receives no water. **Recording** Once again, the children can maintain a table over time in which they can draw (maybe including	• Fast-growing seeds (e.g. white mustard, rocket, flax, mung beans or radishes). You can use dried beans or peas from the supermarket but make sure you soak them in cold water the night

Learning Expectations	Possible Tasks	Resources
help in answering a question. To use their observations and ideas to suggest answers to questions.	measurements later on) the growth of their seed. The children could record 'germinate' when they see their plant begin to grow from the seed.	before you want the children to use them. • Soil
To be able to observe and describe how seeds grow into mature plants. To be able to gather and record date to help in answering a question. To use their observations and ideas to suggest answers to questions.	**Investigation over time – Do all seeds germinate in the same way?** Children will need to prepare a container which is transparent so that they can see the growth of the seeds inside. To do this they can cut off the top of a 2l plastic bottle. They then need to place a rolled-up tube of card inside the remainder of the bottle so that there is only a small space between the card and the bottle. Into this space the children can place cotton wool. In one part of the bottle they can place a sunflower seed, and in another, a broad bean. They will need to water their seeds. The children will be able to observe over a period of time how the seeds germinate in a different way. Recording The children can draw their seeds' growth over time; attaching dates to their drawing.	• Sunflowers seeds • Broad bean seeds • 2L plastic bottles • Card • Cotton wool
To be able to observe and describe how seeds grow into mature plants. To be able to gather	**Investigation over time – Can we grow our own trees?** Using tree seeds (e.g. beech masts, acorns and horse chestnuts) that you stored from the autumn, devise an investigation to watch their growth over time. Large seeds can be placed in their own pot, whilst 3 or 4 small seeds can be placed in another pot. Once they are covered in soil the whole pot can be wrapped in a polythene bag until the shoots begin to show.	• Seeds collected when they have fallen in autumn; beech masts, acorns and horse chestnuts. – and then stored • Pots

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<tr><td>and record date to help in answering a question.</td><td>Recording
Children can record significant dates in a table.
<table><tr><th>Tree species</th><th>Planting date</th><th>First sign of shoot</th><th>Shoot 1 cm high</th><th>Seed leaves</th><th>First true leaves</th></tr><tr><td>Oak</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Horse Chestnut</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Beech</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Sycamore</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>• Polythene bags</td></tr>
<tr><td>To be able to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

To use their observations and ideas to suggest answers to questions.</td><td>Investigation over time – What type of temperature do plants need so that they can grow?
Show children 4 plants of the same species each in its own flowerpot; ‘A’, ‘B’, ‘C’ and ‘D’.
Using some white paint make two marks on each of the plants; where a leaf joins a stem and the next point further up the stem where another leaf joins. Measure the length between the two white marks. Ask them to decide the places outside to place the pots. Explain that each of the places should have a different temperature. Take the pots to the places that the children have decided upon. Model how to measure the temperature in these places with a thermometer.

Recording
The children can draw a map of outside, showing where the plants have been left and the temperature in each of these locations.
They can then be provided with the table below, which they can complete over time.
Visit the plants outside over a period of time.
<table><tr><td>Letter on plant</td><td>Where it is</td><td>Temperature</td><td>Date:
Length</td><td>Date:
Length</td><td>Date:
Length</td></tr><tr><td>A</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>• Measuring tape
• White paint</td></tr>
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<tr><td>D</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>To be able to find out and describe how plants need light to grow and stay healthy.</td><td>
Investigation over time – Do plants need light so that they can grow?
Children could suggest what they could do to find the answer to this question.
Some might choose to place a plant in the cupboard and one on the windowsill. Whereas others might choose to cover just one with an opaque bag.
The children might also help to make a decision as to which part of the plant will be measured. It would also be worth taking photos of each of the plants (possible with a ruler standing next to them) so that over time children can see the changes in height and colour.

To reinforce this learning, you could cover several leaves on different trees with opaque bags and see what happens to those leaves over time.

Secondary sources
Children can watch videos to find out how the plant uses leaves to make it food.
http://www.bbc.co.uk/nature/life/Plant#p00lx6cl (be selective on the parts you choose)

Phototropism - All plants carry out small movements in turning their leaves to face the sun, opening flowers and bending towards the light.
A few days before this lesson place a plant that you have been growing near the window. Ask the children a couple of times each day to take a photo of the plant from the same point. By the time of this lesson the plant should have turned itself towards the light. This is what is known as a phototropic response.
Ask the children ‘Do plants move on their own?’ .Ask them to try and explain what has happened to the plant by the window by referring to the photos that have been taken.
Ask the children if there other investigations that they would like to do that are related to plants moving towards the light. Ideas that they might want to do might include:
• Will different types of light (e.g., fluorescents, sunlight) promote the same types
</td><td>• Opaque bags</td></tr>
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<tr><td></td><td>of phototropic responses?
• How long will it take plants to bend back toward light after being rotated?
• Do some types of plants move more quickly or markedly in response to light than others?
• Can plants actually "seek" light through a hole when grown in an enclosed box?
• Can we find evidence of phototropism outdoors?</td><td></td></tr>
<tr><td>To be able to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</td><td>Investigation over time – What would be the best way to try and grow twigs from trees?
The teacher must cut cleanly some twigs (on which there are buds) from different species of trees using secateurs.
These twigs can be placed vertically in pots of water and then observed over time.

Recording
The children can complete information on the buds in the table below:
<table>
<tr><th>Species of tree</th><th>Colour of bud</th><th>Shape of bud</th><th>Average length of terminal bud</th><th>Arrangement of side buds</th><th>Colour of twigs</th><th>Spines on twigs?</th></tr>
<tr><td>Sycamore</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Lime</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Beech</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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Simple test - Do twigs need water? (late winter/early spring)
Can the children think up an investigation to find out whether twigs take up water? They could</td><td>• Twigs from different species of trees collected in late winter/early spring
• Secateurs</td></tr>
</table>

Learning Expectations	Possible Tasks	Resources
	place each twig in a jar of water and then seal around the top of the jar (leaving the top of the twig poking out) with a polythene bag. They could compare these to an identical pot which has the same amount of water but does not have a twig.	

Year 2 – Plants

Assessing children's knowledge and understanding of the nature, processes and methods of science

Learning expectation	Group 1 (lower ability)	Group 2 (average ability)	Group 3 (higher ability)	Comments
To be able to observe how bulbs grow into mature plants.				
To be able to observe and describe how seeds grow into mature plants.				
To be able to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.				
To be able to perform a simple test.				
To be able to recognise that questions can be answered in a range of ways.				
To be able to observe closely using simple				

equipment.				
To be able to sort objects using observable features (non-statutory).				
To be able to gather and record date to help in answering a question.				
To use their observations and ideas to suggest answers to questions.				

Children <u>below</u> the learning expectations	**Children <u>above</u> the learning expectations**