Plants

Activity Pack for Primary Teachers

LinneanLearning

Discovery Kits

Discovery Kits

Incorporating practical activity into science lessons can be tricky at a primary level, particularly for non-specialist teachers. A recent SCORE (Science Community Representing Education) report found that many schools lack sufficient resources for teaching practical science. These Discovery Kits not only provide some of the equipment necessary for practical lessons, but also provide ideas and guidance for teachers - we hope you find them useful!

The activities suggested in the packs are by no means an exhaustive list of the possible lessons you could carry out using the kit provided. We have tried to provide a variety of indoor and outdoor practical activities, suitable for pupils in Key Stages 1&2. Many of the activities are cross-curricular, providing opportunities to develop skills in literacy, mathematics, art and ICT.

If you have an idea for using the equipment in this kit, we would love to hear about it! If you'd like your idea added to this activity pack then full credit will of course be given to you.
Email us with your suggestions: learning@linnean.org.

Please check at our website for full details of other available kits, covering topics such as **life cycles**, **habitats**, **classification** and **evolution** - www.linnean.org/discovery-kits.

ALSO! We love seeing your pictures. Tweet us @LinneanLearning #DiscoveryKits

Disclaimer: The Linnean Society is pleased to lend these kits to schools, and believes each kit to be suitable for its suggested use. However, we recommend that teachers thoroughly examine and check each kit to make sure it is fit for the purpose intended, making any risk assessment that is appropriate. The Linnean Society excludes any liability for injury or damage howsoever caused by the use of the kits, is not responsible for the standard of development or safety of any of the products used in the kits, and makes no warranty against errors and omissions in any kit or accompanying material.

Objectives & Links

The activities in this pack encourage students to:

- Observe and recognise some simple characteristics of a variety of living things
- Develop curiosity and interest by exploring their surroundings using their senses
- Treat animals in the environment with care and sensitivity
- Work together in pairs or groups, taking turns and sharing fairly
- Communicate through conversation by sharing experiences, ideas and information
- Develop scientific and research skills, either individually or in groups

We've designed the pack to help teachers cover the following curriculum areas:

Year 1

- Identify and name a variety of common and wild garden plants, including deciduous and evergreen trees
- Identify and describe the basic structure of a variety of common flowering plants, including trees

Year 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

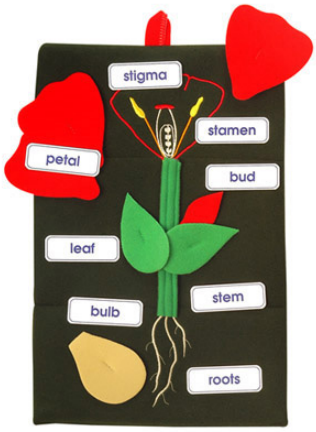
Year 3

- 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

What's in the Kit?

Magnetic Plant Life Cycles

Time Lapse Camera

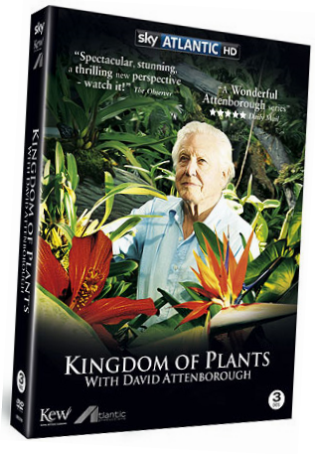


Velcro Plant Labelling Kit

Flower Press

Paper potter

Kingdom of Plants DVD Set



3x Studying Seeds Images

Activity ideas

Pressing matter

Students will collect a range of plant material, dry press it and then create a herbarium sheet.

In the Kit:
Plant press

You need to provide:
Plant material
Several sheets of newspaper (or kitchen paper)
Corrugated card (optional)

Let's go!

Head into the school grounds and gather some plant material - be careful not to take too much, or to badly damage any plants in the process. Avoid cutting large stems or branches, you want a specimen that is similar in size to a piece of A5 paper.

When you're collecting plant material look for the whole plant where possible—if there are seeds or flowers make sure you include these. Does the plant have different leaves at the top and bottom of the main stem? Make sure you have both types in your sample. If the plant is particularly large it may be necessary to cut the specimen in half and press the two halves individually.

Once you're happy with your specimen you need to press it. Cut or fold a sheet of newspaper to the size of the plant press, then arrange your specimen on it. Make sure that all parts are clearly visible and try to show both the top and underside of the leaves if possible. Cover the specimen with another folded sheet of newspaper—clearly label the specimen with the name of the plant (if known), the date it was collected, where it was collected and the person or people who collected it.

Stack the specimens in their newspaper sheets on top of one another, adding extra newspaper or kitchen paper between the layers for absorbency. You can add corrugated card between the layers as well, to improve air circulation and speed the drying process. Place the entire bundle into the plant press and compress the specimens by tightening the wing nuts—make sure the press is really tight. Check regularly to see how the specimens are drying.

After 5-10 days the plants should be dry and flat—sooner if they've been near a radiator. Now it's time to mount the specimens on a herbarium sheet.

Pressing matter 2

You need to provide:
Pressed plant material
Glue and brushes
Sheets of A4 paper

What next?

A herbarium sheet is simply a dried plant specimen displayed on a piece of paper, showing all leaves, flowers, seeds and fruits of a given plant. The herbarium sheet also details which plant is shown, where and when it was collected, and the name of the scientist(s) who collected it.

Arrange your dried and pressed plant material on a piece of A4 paper, then glue the specimen down - use as little glue as possible. If the plant is very heavy you may wish to glue small strips of paper across the stem to help hold it in place.

You also need to clearly label your herbarium sheet with the following information:

- Name of plant
- Location of specimen collection
- Date of specimen collection
- Name of collector(s)

Now your herbarium sheet is ready to be displayed or stored for future scientists to refer to!

Take it further:
Research herbarium collections around the wold - can you find the largest? What other ways do scientists store plant material? Find out about the Millennium Seed Bank.

Teacher tips:

You can also make your own plant press of any size if you'd like to collect larger specimens. Use two pieces of stiff board, heavy card or thin wood as the outer surfaces, and interleave the specimens in newspaper with corrugated card to speed the drying process. Tie the bundle shut with rope, heavy string, twine or two belts (you may need to punch extra holes in the belts to close the press tightly enough). Alternatively pile lots of heavy books on top of the press and leave somewhere well out of the way of children while the specimens dry.

Crazy grass heads

Students will grow some grass from seed to make a 'grass head'.

You need to provide:
Grass seed
Old (clean!) tights or pop socks
Compost
Plastic cups
Small elastic bands (those used for loom bands are ideal)
Googly eyes
Mouth stickers
Water

Let's go!

If you're using old tights cut each leg to around 15-20cm, keeping the toe end.

First off put the grass seed into the toe of the tights or pop socks. Make sure it goes right to the end! Put some compost into the plastic cup until it's three quarters full. Stretch the tights over the plastic cup then tip the cup so the compost falls into the tights. Make sure you hold tight! You'll need the cup again later, so be careful not to break it.

Push the compost down to the toe of the tights so that it makes a ball, and tie a knot behind the compost so it doesn't fall out. Rest the ball of compost on top of the plastic cup, with the 'tail' of tights inside the cup.

Next, pinch a piece of compost from the centre of the ball and shape it into a round nose. Tie an elastic band around the nose to keep it in place. Draw features, stick on googly eyes and mouth stickers to finish your grass head.

Add some water to your cup until it is about half full. The 'tail' of the tights should hang into the water and soak it up, keeping your compost damp. Keep an eye on the water level and top up when necessary. The grass should start growing within a week. Once it's grown for a while why not give your grass head a crazy hairdo?

Take it further!
Run a class experiment - each group of students should grow a different type of grass seed. How about trying oats, wheat or barley? Which grew fastest? Which was the tallest after one month?

Timelapse photos

Students will use time lapse photography to visualise the growth and movement of plants.

The camera

A time lapse camera is a fantastic tool for the study of plants, allowing you to easily see growth and movement, both of which happen very slowly over a long period of time. The camera is simple to use, and works well in many different conditions. Using the camera does require a little patience and creativity, but the results are well worth the effort!

The best way to get started is to read the full user guide, but a summary is given here for those in a hurry.

If you'd like to continue with a more complicated project there are many settings you can change - this may require some experimentation with positioning of the camera, so full instructions are included for you in the kit. You can reset the camera to its default settings at any time.

The camera has a USB port to connect it to your computer, and an SD card port to increase memory. There is a light sensor which can be used to wake the camera during daylight hours.

The rotary dial on the front of the camera has four positions – LASER, AUTO, SETUP and PLAYBACK. Switching between them allows use of different functions.

- **SETUP** allows you to change time lapse interval, convert photos to a time lapse video and adjust other camera settings.
- In **AUTO** mode the camera takes photos according to the settings you have chosen in SETUP. The camera will count down for five seconds, take a photo and then go into standby mode until the next photo is due. It will continue this process until the memory is full or the batteries are empty!
- The **PLAYBACK** mode allows you to view photos and video on a television – full instructions are in the user guide.
- The **LASER** setting is used to aim the camera.

IMPORTANT: NEVER look at the laser while it is activated and NEVER activate the laser when the camera is pointed at another person.

Timelapse photos

Students will use time lapse photography to visualise the growth and movement of plants.

In the Kit:
Time lapse camera

You need to provide:
Plants (either in a garden, potted or ready to be grown from seed - depending on your project)
Computer - with time lapse software installed

Let's go!

To get started, remove the camera from the packaging and use the SETUP mode to adjust the time lapse interval and any other settings you wish to change.

Mount the camera, aiming it at your target – there are a wide variety of mounting options. The camera has two tripod nuts embedded into the case - these will attach to a standard tripod. There are also strap & stretch cords included in the kit which attach the camera directly to a tree.

Once the camera is mounted use the viewfinder and the laser level to ensure accurate aim. Adjust if necessary. Once the camera is adjusted use the tape measure to find the distance between the camera and the target, and then adjust the focus ring on the front of the camera to match this distance.

Set the rotary dial to SETUP and press the Power button to turn the camera on. Check the date and time, adjust if necessary. Turn the rotary dial to AUTO, close the door and secure the latches – then leave the camera to its own devices until your target has grown.

You can take images throughout the growth process and create a time lapse video to show the entire life cycle of a plant – it's best to choose one that grows fairly quickly though!

Good options are sunflowers, sweet peas, snapdragons, marigolds, cress, mustard, bean sprouts, primrose, pansy, nasturtium, cosmos etc.

CD case beans

Students will grow a bean inside an empty CD case, then label the various parts of the plant after germination.

You need to provide:
Empty CD cases - clear plastic
Compost
Water
Bean seeds

Let's go!

Lay the CD case on the table and fill the 'tray' side with some compost - about half full. Dampen the compost with a little water, then plant the bean seed in the soil. Make sure it has compost all around it.

Place the CD cases in a sunny spot, and wait for the beans to germinate. You'll need to water them carefully every few days.

Once the beans have germinated, label the CD cases with the various parts of the plant, as in the picture below.

Take it further!
You might want to take photographs of the beans as they grow. You could turn them into a time-lapse video or a flip-book.

Try other types of plants and compare the structures you can see—are they all the same?

Colourful carnations

Students will colourfully visualise a flower's natural uptake of water from their roots.

Students will need:

White carnations
Food colouring - try to get a range of strong colours
Vase, empty bottle or jar
Water

Let's go!

Fill each vase around a quarter full of water. Add a reasonable amount of food colouring (15-20 drops) to each vase—or more if your vases are large.

Cut the carnations to fit the vases—make sure you trim the stems at an angle. Add the carnations to each vase and leave them for at least 24 hours.

At the end of the experiment examine the whole plant carefully, including the stem, leaves and petals. What parts of the plant have changed colour? Can you find out why this has happened?

Take it further!

Try the experiment again, but this time carefully cut down the middle of a carnation stem, from around two thirds of the way up, splitting it in half. Put each half stem into a different food colouring—what happens this time?

Paper potter

Students will create small paper pots, then sow some seeds and observe their growth.

In the Kit:
Paper potter

You need to provide:
Newspapers
Compost
Seeds

Let's go!

This fun gadget allows students to make their own mini plant pots from old newspapers. They can grow their own plants from seeds, and experience the germination and growth processes first hand. You'll need lots of old newspapers – students enjoy making pots and can get a bit carried away!

The paper potter is very simple to use. First cut dry newspapers into strips (8cm x 57cm approximately). Roll them loosely around the paper potter. Fold the excess paper at the bottom, then press and twist the potter into the base mould.

Remove the pot from the paper potter and fill it with compost. Remember it's only newspaper, so don't water too heavily!

Once your seedlings have germinated, you can transplant the seedlings into the garden or a large pot – don't worry about removing the newspaper, it is biodegradable and will disintegrate with time.

Take it further!
You could link the paper pots into a session on plant life cycles, recycling, waste management and sustainability, an experiment on plant growth under various environmental conditions or even an art lesson!

Seeds go POP!

This activity helps students understand how some plants disperse their seeds by explosion.
Note: This activity can be a little messy!

You need to provide:

A balloon
Confetti or the contents of a hole punch
A pin

Let's go!

Ask children how they think plants disperse their seeds. Discuss some of the different ways this can occur. Explain to the children that you are going to demonstrate one of the methods of seed dispersal, using a balloon as a seedcase. You may wish to gather suggestions as to what may be used as seeds.

Fill the balloon with the confetti or paper clipping - you may need to use a funnel or paper cone. Blow up the balloon and tie it. Make sure the children are a safe distance away from the balloon and then pop it using the pin. The seeds should disperse, scattering over the whole area.

Take it further!

Go on a seed search - locate as many seeds as possible and record your findings. Use a microscope to look at the seeds more closely - can you work out how each seed type is dispersed?

Do students think glitter would work well in this experiment instead of confetti? Why? Can you test your theories? This might be better done outside!

Find out about the squirting cucumber - how does it disperse seeds?

Pollination roleplay

Students learn about the parts of a flower and their role in the plant life cycle by taking part in this role play activity. Students will also gain an understanding of the role insects play in pollination.

Let's go!

Discuss with children why bees visit flowers and what happens there when they do. Look at the photos of bees - what are the similarities and differences? Do these bees do different jobs?

Explain that bees are a bit like flying Velcro, and you're going to play a game to demonstrate this. Dress children up as the various parts of the flower and organise them into two flowers and one bee. A flower with five sepals, five petals, five stamens and one stigma involves sixteen children - you can adapt the number of flower parts to suit the number of children in your class.

You need to provide:
Photos of types of bees
Video clip of bees pollinating a flower

Dress up:
Sepals and petals (*cut out of card and attached to clothes/ headbands*)
Stamens (*empty yoghurt pots to hold pollen grains*)
Pollen grains (*ping pong balls with sticky Velcro hooks*)
Stigma (*woolly hat*)
Nectar (*drinks carton with straws*)
Bee (*a headband/hat with antennae, striped trousers, sunglasses and wings*)

Explain the roles each part of the flower plays - petals attract the bee and offer it nectar as food, stamens transfer pollen onto the bee and the stigma takes pollen from the bee.

Now the 'bee' will visit the first flower, making buzzing noises. It collects pollen by removing a pollen grain from the pot. It flies to the second flower, which is waving its petals to attract the bee. The bee deposits the pollen on the stigma, by brushing the Velcro hooks against the woolly hat. This can be repeated several times until children fully understand the process.

Take it further!
Show a video clip of bees pollinating flowers, or go and watch some bees in the garden. Discuss pollination in more detail and talk through any concepts the children are struggling with. Explain the importance of insects in plant reproduction and that some plants would not be able to reproduce without them.

Studying seeds

Students will study plants to discover where seeds come from. This can be extended to what is needed for a seed to germinate.

You need to provide:
Halved peppers, tomatoes and apples
Pictures of pepper and tomato plants and apple trees in blossom
Colouring pencils

Let's go!

Show students the pictures of the pepper and tomato plants and apple trees. Ask where the fruit comes from, and ascertain that it comes from the flowers of the plant.

Show students the various sliced fruits and ask about the seeds - why are they inside the fruit? What will happen to them when the fruit is eaten? This leads well into a discussion about seed dispersal.

Students should then choose a picture of the pepper, tomato plant or apple tree and underneath draw the associated fruit. The diagram should be labelled and students should write a short explanation of how the flowering part of the plant produces the seeds.

Take it further!
Students can conduct an experiment to see what is necessary for a seed to germinate. Ask for their ideas - what factors do they think are important, what equipment do they need, how do they want to run their experiment and how will they make sure it's a fair test?

You may wish to provide a science investigation framework for children to fill in.

Teacher tip:
The extension experiment is investigating germination not growth. Light is not required for germination as seeds contain their own food source and do not use photosynthesis.

Attracting insects

Students will create an insect garden and observe the insects which can be found there.

You need to provide:
Flowerpots
Trowels
Spades
Stones, bark or logs
Seeds or seedlings

Let's go!

The garden needs to be well planned before you start planting. Think about the flowers and plants you will grow - what shape, size and colour are they? When will they flower? Does your school have a garden that students can work in or will they need to plant in pots? This may affect your choice of flowers. You'll also need to think about other features to include in your garden, such as stones, puddles or a water feature.

Once you've decided on the design for your garden you'll need to get your hands dirty! Plant your chosen flowers and keep them well watered. Observe the butterflies that come to visit the garden - can you identify them? Try keeping a log of all the creatures you see.

Teacher tips:

Butterflies like sun-loving flowers that produce lots of pollen and nectar. They are also attracted to brightly colour flowers, particularly blues and yellows. Try to get a good mixture of plants in your garden to attract the most butterflies. If you are planting your garden in pots place them as close together as possible. Remember if you plant in pots they will need daily watering to continue producing nectar. If possible avoid watering plants in direct sunlight.

Suggested plants and flowers:
Bluebell, buddleia, busy lizzie, buttercup, chives, chrysanthemum, clover, cornflower, daisy, dahlia, dandelion, forget-me-not, heather, hebe, honeysuckle, hydrangea, lilac, lavender, lobelia, marjoram, mint, nasturtium, onion, pansy, primrose, parsley and thyme all produce lots of nectar and attract many different butterflies.

To provide food for caterpillars you may want to include some of these:
Cabbage (or other Brassicas), cowslip, grasses, heather, honeysuckle, nasturtium, nettles, oak, primrose, thistle, thyme, and violets.

Sowing sunflowers

Students will grow their own sunflowers, learning about the plant life cycle from direct observation.
NOTE: Seeds should be sown March-May.

You need to provide:
Sunflower seeds
Pots - large yoghurt pots may do to begin with
Empty plastic bottles
Compost

Let's go!

Fill the pots with compost to 1cm below the rim. Tap each pot to settle the compost and firm gently with the back of the hand.

Sow one seed per pot - sunflowers form large seedlings. Poke the seed around 1.5cm down into the compost, and cover it over with more compost.

Label each pot with student's name and place pots onto trays on a sunny windowsill. Water so that the compost is moist throughout - make sure you don't overwater!

Cut the moulded bottom off of the plastic bottle and use the remaining top half to cover the seedling in the pot. This will help keep seedlings warm. Water your seedlings regularly. Once the last frosts are over (May - June) you can take your pots outside, or plant your sunflowers directly into the garden. Now wait to see how tall they will grow!

Take it further!
Hold a tallest sunflower competition - ask students to set a date for the judging, and then use metre sticks to measure each others sunflowers. Once your sunflowers are grown why not try brining the flower heads into the classroom and studying the arrangement of the petals and the seeds.

Teacher tip:
Ask students to collect large yoghurt pots a week or two before you intend to plant your seeds (the 450g pots are ideal). It's always worth planting an extra pot or two - some of the sunflowers might not germinate properly.

A root with a view

Students will grown their own bean plant and observe the root system that develops.

You need to provide:
Clear plastic cups
Sand (optional)
Cotton wool balls
Butter beans (dried from the supermarket is fine)
Water

Let's go!

Weight the bottom of the cup with some sand (optional). Fill the cup past half way with cotton wool balls, and gently compress them. Press a butter bean down the side of the cup, making sure it doesn't hit the bottom.

Water gently until the cotton wool balls are damp but not soaked, and place the cup on a sunny windowsill. You'll need to keep an eye on the moisture level and top up with water when necessary. Within 2-3 days the bean should have germinated, and you'll begin to see roots and shoots. Eventually the plant will develop leaves - make sure the cup doesn't topple over at this stage!

Once you've finished watching the development of the plant, take it out of the cup and gently remove the cotton wool balls. You should be able to examine the root system that has developed. If you have access to a microscope try looking at the root hairs.

Take it further!

Students may wish to keep a 'bean diary'. This could take the form of explanations, drawings, measurements and/or photographs of the observations made by the student throughout.

You could also transplant the developing beans into larger pots and put them into the garden/playground. Have a look every now and again to see if any insects have stopped by, or if the plant has flowered or begun to develop pods.

Teacher tip:

Your beans will be fine over the weekend without watering, but make sure they are topped up on a Friday before you head home.

The Linnean Society of London

This education resource was developed by Linnean*Learning*, the Education Team at the Linnean Society of London. The Linnean Society is the oldest active biological society in the world. Founded in 1788, the Society continues to provide a forum for the discussion and the advancement of the life sciences.

Our name is taken from the Swedish naturalist Carl Linnaeus who helped to shape our understanding of the natural world through his work in taxonomy and classification of living things. We're proud of our unique collections and of our history. Did you know it was at a meeting of the Society in 1858 that Charles Darwin and Alfred Russel Wallace outlined the theory of evolution?

Linnean*Learning* is working hard to bring brilliant biology alive in the lives of people of all ages and walks of life. We'd love to hear from you if you have any ideas, or would like to collaborate on a project, or just want to give us some feedback.
Contact us at learning@linnean.org.

The LINNEAN SOCIETY of London

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