Royal Botanic Gardens Victoria Education Service

A visit to the Royal Botanic Gardens is an ideal excursion for the Early Years. As an enjoyable, hands-on experience it immerses children in the wonderful sensory and imaginary world of plants while looking at the important role plants play in our lives. This program introduces children to basic understandings in botany, ecology and horticulture.

This booklet will assist teachers in planning and curriculum development to maximise the learning opportunities that the excursion offers.

Gardens can readily become a context or theme to approach a number of the Domains of the Victorian Essential Learning Standards. Learning outdoors through gardens, whether they are public gardens or school-grounds, provides a very useful and effective means of integrating curriculum and incorporating effective pedagogies.

VELS Guide

Domain: Health and Physical Education

Within the program the children identify signs that are used in the Herb Garden to identify plants that are used for cooking, pest repellents, medicine and for their scent (Learning Focus Level 1). They look at plants as the source of food and their connection to good health (Health Knowledge and Promotion Level 3).

Domain: Civics and Citizenship

Using a sensory and discovery approach the students are led to appreciate the beauty in the Royal Botanic Gardens and the importance of preserving this environment for future generations. Students explain why protection and care for the natural environment is important. (Standards Level 3).

Domain: The Arts

The students collect plant material for artistic creation in the classroom; they make and decorate a potpourri bag.

They explore colour, texture and discuss responses to plants and landscape. (Level 1).

Domain: The Humanities

Through an exploration of the role and value of an urban garden such a the Royal Botanic Gardens students describe how people use and effect different environments in Victoria (Level 3) and recommend ways of protecting environments in a sustainable way (Level 4).

Domain: Science

Within this program the students use their senses to explore the natural environment using specific language to explore concepts. The students identify and describe structural features of plants and identify how these features operate together to form systems that support the plant within its environment. Students also explore interactions between plants, animals, and human influences within the environment. Standards: Level 1, 2 and 3.
**Domain: Communication**

In this program the students are encouraged to be active listeners not only with the presenter but also with their peers and other adults within the group. The students are encouraged to ask and answer questions and use appropriate body language when speaking and listening. Standards: Levels 1, 2 and 3.

**Domain: Design, Creativity and Technology**

In this program the students use a sensory approach to explore the Gardens and investigate natural materials and how they are used both within the Garden’s environment and in the wider world. Standards: Level 1.

**Domain: Thinking Processes**

Within this program the students use a sensory approach to make discoveries which they are encouraged to share with their presenter and peers. Questions and wondering are encouraged and shared orally. Where appropriate suggestions are made for further study back at school. Standards: Level 1, 2 and 3.

**Pedagogy**

“Surely a garden is not a success if it doesn’t bring joy to children.” Edna Walling

**Image of the Child:** Children construct understandings through discovery and exploration. At the Royal Botanic Gardens, the capabilities of children are deeply valued. Our goal is to encourage them “to learn with excitement each unique and enchanting day in a unique and inspiring life.” (Kriegler)

**Early Years and Environmental Education:** The early years of life are fundamental in the formation of environmental attitudes. If an appreciation and love for the outdoor environment is developed in childhood, it will be a lasting one.

**Human Relationship:** Programs provide opportunities for children to interact with each other, and with the staff and volunteers of the Royal Botanic Gardens.

**Developmentally Appropriate:** Learning activities are planned for the children’s correct age and level and are suited to the interests and abilities of individuals.

**Discovery Learning and Participation:** Children learn easily through authentic experiences that immerse the senses. Learning is interactive with opportunities for participation in discovery and investigation.

**Multiple Intelligences:** Comprehensive planning allows children to exercise all their intelligences to create understandings. Teachers make provisions for children of varied ability to seek challenges, to be creative and original.

**Pleasurable and Joyous:** When children develop a conviction that learning is satisfying and fun, they become lifelong learners. Pleasure, enjoyment, humour and laughter should be a part of each child’s day. We believe that teachers and parents should enjoy their visit also.

**Objectives:**

The children will be given opportunities to:

Experience and enjoy the natural beauty of the gardens.

Acquire and apply general knowledge related to plant and animal interactions and life cycles.

Use their senses as a basis for exploration.

Explore the gardens through the mediums of art, gardening and storytelling.

Be exposed to simple botanical words and concepts.

Value and learn how to care for the environment.
Practicalities

**Times:** All programs are offered both morning (10.15am to 12 noon) and afternoon (12.30pm to 2.15pm) each weekday.

**Transport:** Most groups travel by chartered bus to the Gardens, but it is accessible by public transport. The Number 8 Toorak tram that travels along Domain Road is the closest. Alight at Stop Number 22 and walk up Dallas Brooks Drive to the Observatory Gate area.

**Meeting Point:** School groups start from the Education Entrance near the Observatory Gate complex on Birdwood Avenue.

**Play:** Provide an opportunity for free play in the gardens before or after your session. Play stimulates development and supports growth. Children use play to internalise and make meaning of their experience in the garden.

**Snack or lunch:** Ensure that the children bring a snack or lunch. The morning program begins with a picnic snack time and is essential.

**Rubbish:** Rubbish is the responsibility of the visiting classes. Please take it away with you.

**Clothing and footwear:** The Royal Botanic Gardens is an outdoor excursion and involves significant walking. Warm, waterproof attire is important in the cooler months, and from September to April sun protection is a priority. Children should wear protective clothing, legionnaire or broad brimmed hats and SPF 30+ sunscreen.

**Additional Needs:** The sensory focus of the programs is well suited to children with special needs. If there are children in the group with particular needs please advise at the time of booking, so staff can be prepared to assist in appropriate ways and vary the program as necessary. Wheelchairs can be accommodated.

**First Aid:** It is advisable to come equipped with a basic first aid kit, however in an emergency first aid is available at the Gardens. Contact the Visitors Centre on Tel: 9252 2429.
Oak Lawn

There are more than 30 kinds of oak on Oak Lawn. The most famous of oak trees is the one lived in by Robin Hood and his band of ‘Merry Men’ in the forest of Nottingham in England. It is supposed to be almost 800 years old and needs lots of support to stand. Some of the trees on Oak Lawn are at least 100 years old. This is a special lawn because it’s been listed by the National Trust as important for all Australians. In autumn the leaves of the oak trees change to gold, scarlet and amber. Can you find the acorn, the seed of this giant tree?

Did you know the wood does not splinter if hit by cannon balls, so it was used extensively in the ships of the English navy. It comes from an ancient botanical family that arose about 90 million years ago. There are some species of oak that are evergreen. When we think of oaks we think of England probably because large forests once covered about 1/3 of the British Isles. This slow growing tree was used to build England’s barns, cathedrals and mansions.

The Lightning Tree

This oak was stuck by lightning on Melbourne Cup day in 1972. There is a big scar down the trunk showing where it split. The tree crew used winches and steel cables to fix the damage.
Cross-Curricular Pre and Post activity ideas

History and Legend
Investigate the stories of Robin Hood, Maid Marian and the Merry Men.
Find a history book that describes what life in England was like at the time Robin Hood lived.
Discuss the connections between historical fact, myth and legend.
Write imaginary stories or create works of art to imagine life in an oak forest.
Read the story *Ten Tall Oaktrees*, which follows the history of uses of oak trees and provides many useful connections to the oak trees at the RBG.

Looking at Leaves
Doing leaf rubbings at the Gardens can lead to a closer examination of leaves.
Try rubbings with other leaves collected from student’s homes or school. Try printing, collage and pressings for card making.
Do you eat leaves? Prepare a salad using leafy vegetables.

Seasonal Change
Autumn is the perfect time to observe seasonal change and discuss the weather.
Include discussion of the children’s favourite story at the Gardens, the Lightning Tree.
Write a story or poem from the point of view of the tree during the storm and after.
Ask the children to bring autumn ‘treasures’ to class for sensory immersion activities such as art and poetry and creative movement.
Investigate why leaves change colour and drop during autumn. Discuss effects of the non-living environment upon living things.
Read poetry from books such as *A Child’s Seasonal Treasury*, Betty Jones, Tricycle Press, California, 1996.
Susan Coolidge’s poem *How the Leaves Came Down* is great for children to learn and to use in creative movement.

Dinosaur Trees

**Bunya – Bunya Pine Aracaria bidwillii**
Bunya Bunya pines have very spiky leaves and the cones were possibly eaten by dinosaurs. The large egg-shaped seeds contained in the large glossy-green female cones were a favourite food for Aboriginal people of Southern Queensland. Particular Aboriginal families were custodians of individual trees. In March, the female cones ripen at the top of the tree. Every 3 years, there is a crop and groups of Aboriginal people for about 100 kilometres around would be invited to the feast. The young men of the custodial families would climb the trees using ropes or vines. They would pick one cone to check ripeness and then knock the remainder to the ground, where the women would collect the seeds. They were carried to the open plains, shared between everyone and a bunya nut feast occurred. Some cones were buried and later dug up, cooked and eaten. The seed is starchy and delicious, with a texture like waxy boiled potatoes.

**Cycad – Lepidozamia peroffskyana**
Is this a palm tree or a tree fern? It is neither a palm tree, nor a tree fern, but from a very ancient group of its own. It grows a very large cone on top that contains the seeds. Fossils of cycads 200 million years old have been found. Aborigines ate the seeds in the cones after extracting the poison from them. One method of treatment was to bake the seeds in ashes for some time, cut it in half, soak in water for 6-8 days, and then eat them. Feel the knobbly trunk and the thick, leathery leaves.
Inside the large cone are many kernels which contain starchy material, a bit like potato.
Early explorers ate these as an emergency food but often became ill as a result. Captain Cook established the poisonous nature of the seeds after feeding them to his crew and observing the results. After WW2 Japanese soldiers survived on isolated islands living on native cycads. The oldest known cycad was near Brisbane and was 3000 years old.

**Cross Curricular Pre and Post Activities**

NB If you or your students have a particular interest in dinosaur plants, a 2 hour education program Plants the Dinosaurs Ate, is available through the RBG Education Service. Activities include propagating a ‘dinosaur plant’, finding fossils in fossiliferous shale, making ancient plant ‘fossil’ leaf-rubbings and meeting the dinosaur plants.

**Fossils from Treasures**

Use the treasures collected by the children from dinosaur plants such as cones, bunya leaves, gingko leaves etc to push into soft clay. Plaster can be poured into the impression for children to make their own plaster cast fossil.

**Australian Dinosaurs**

Ask the students to investigate an Australian dinosaur such as Muttaburrasaurus. Investigate diet (herbivorous or carnivorous), habitat and where the fossils were discovered.

Use the Gould League poster about Australian dinosaurs to identify plants that grew during the Jurassic and introduce the concept of continental drift and the great southern continent Gondwana.

Contact Dinosaur Dreaming at the Bunurong Information Centre at Inverloch to find out about the Monash University dinosaur dig. Tel: 56743738 Friday-Monday 10am-4pm.

**Plant Evolution**

Conifers or cone-bearing plants evolved before flowering plants. Male cones produce pollen, which is dispersed by wind to fertilise female cones. The expansion of flowering plants occurred in tandem with the expansion of insect species. Insects became the main method of ensuring pollination for flowering plants and features such as colour, smell, shape and size became more diverse as insects evolved into many diverse forms.

Ask students to make a collection of the reproductive structures of both conifers and flowering plants. Discuss the differences between flowers and cones and identify adaptations to suit each reproductive method. E.g. landing platforms, colour, fragrance, nectar etc in flowers and cone position, shape, texture etc. Draw and label the reproductive features and life cycles.
Herb Garden

Herbs have been used by people for many centuries. Their uses range from the superstitious to the practical. Our ancestors believed that certain spirits lived in plants which would either protect them or cast bad luck on them. Herbs were used to make love potions, flavourings for foods, insect repellents, meat preservatives, fragrant oils, and medicines. The sweet smell of the small flowers was also an excellent reason for a herb garden to be maintained as they attracted bees which supplied a rich source of honey.

Herbs have often been grown in a traditional knot style garden which dates back to early Elizabethan times. They were often very detailed and intricate gardens designed to be viewed from a first floor or terrace of a castle or monastery. They were a beautiful resource for making sweet waters, cosmetics, fragrant candles and pot-pourri. The one seen in the RBG is the simple spoked wheel form. The Herb Garden is an important resource to the Royal Botanic Gardens and it was originally planted as a medicinal garden and pharmaceutical students from various institutions made use of the collection.

Pot Pourri

Like the herb garden, the making of pot pourri dates back many centuries. Bathing was considered a major health hazard and something as minor as the common cold could have been fatal. So to cover up the pungent smell of body odour people made sweet smelling sachets of dried herbs. Another method that people used to cover up smells in their homes was called strewing. This is the method of throwing fresh herbs onto floors so that as people were walking around the herbs would be crushed and a pleasant aroma would fill the air.

Lemon Verbena *Aloysia triphylla*

A great plant to demonstrate how to rub and smell the leaves as its fragrance is similar to lemonade icypoles and is loved by all. The leaves make a nice tea especially good for tiredness, indigestion or depression.
Pineapple sage *Salvia rutilans*
Both leaves and flowers can be used in cooking especially salads and fruit salads, cakes or roast pork.

**Vietnamese Hot Mint** *Polygonum odoratum*
The foliage on this plant has a hot peppery taste and can be used in hot or cold dishes. It is especially delicious with spring rolls. You will notice that the leaves are very aromatic.

**Thyme** *Thymus spp*
Smell the various kinds of thyme. It’s a popular herb for flavouring soups, stews, sauces etc, especially Italian food. Oil from thyme is used in perfumes. Thymol, derived from the oil, is used in antiseptics, mouthwashes and toothpaste.

**Lavender** *Lavandula angustifolia*
The name is thought to have come from the Latin *lavare* - to wash, as the Romans put lavender in their bath water for its fragrance and therapeutic properties. The essential oil from lavender is a powerful antiseptic able to kill common bacteria and an antidote to some snake venom. The qualities of lavender were recognised from early times as a strewing herb and as a deterrent for moths and mosquitoes.

**Parsley** *Petroselinum crispum*
Parsley is a favourite; it was used by the ancient Greeks for making wreaths to adorn the dead and for around their tombs. The Romans wore garlands of parsley at feasts to avoid intoxication. Many years ago it was thought to destroy poison, probably as it neutralised the smell of garlic.

**Mint** *Mentha spp*
Used by the ancient Greeks to scour their banqueting tables as it was an antiseptic. Philosophers suggested a wreath of mint would assist scholars with concentration. Arabs have for centuries made hot mint drinks. Mint was often grown in monasteries and convents. Rats and mice dislike mint and so it was used as a strewing herb in medieval times to protect cheese and grains. The medicinal properties of mint are good for people feeling off-colour, suffering with insomnia, digestion, headaches, sore throats and toothaches.

**Cross Curricular Pre and Post activities**
If you are interested in gaining further skills in propagating and growing herbs inquire about our program Get Your Sustainable Garden Going, in which students try herb propagation, start their own worm farm, explore a kitchen garden and learn about mulching and composting.

**History of Herb Gardens**
Learn the song *Are you going to Scarborough Fair?* (Parsley, Sage, Rosemary and Thyme)

Or try Lavender Blue Lavender Green for Early Years.

Investigate the history of gardens and you will discover that herb gardens were the first types of gardens. Ask the students to find out why. Look at designs of old herb gardens and ask the students to design their own.

**Hands on Herbs**
Cooking activity. Make herb bread and herb tea. Students could try writing recipes using herbs e.g. *Bouquet Garni*, and include in a recipe book to share with the school community.

Try growing a herb garden outside or in your classroom. Try propagating herbs by taking cuttings from student’s gardens and experiment with different growing conditions to discover what plants need to survive.

Ask students to bring fresh herbs and roses from home if possible. Hang them up in bunches to dry or in paper bags. Try using orange slices, spices and orris root as a fixative. Each child brings a favourite bowl from home for their potpourri. Decorate the
top of the potpourri with flowers the students have dried from their own gardens or with ‘treasures’ from the Gardens.

The Fern Gully

The Fern Gully is a rainforest garden. Lots of ferns, cool damp air and tall trees making a canopy that keeps in the moist air. There are many different kinds of ferns to see. The tree ferns grow tall above the ground layer. Other ferns of different shapes such as the fishbone ferns or bracken ferns are able to grow in the shade on the forest floor where many other plants can’t. The birds nest fern is an epiphyte which can be seen on the ground and in trees. They are shaped like a basket to catch falling leaves and organic matter and this gives them their nourishment. Epiphytes are plants that do not have roots in the soil to collect nutrients, they live on other plants to get closer to the light. They may also provide a home for rainforest animals like frogs and ants. Animals provide food for the epiphyte in a number of ways. They can leave behind left over food, droppings, and eventually their decomposing bodies.

An epiphyte isn’t a parasite, it does not hurt the plant on which it grows, it’s simply along for the ride. The word epiphyte comes from epi meaning “upon” and phyton meaning “plant”. Mosses, lichens, liverworts, ferns, bromeliads, and orchids are all examples of epiphytes.
Moeton Bay Fig *Ficus macrophylla*

The Moreton Bay figs come from Queensland and they have traditionally been used by local indigenous Australians as food. They have often been planted as shade trees, but they need lots of space for their big buttress roots.

Cross Curricular Pre and Post Activities

If you are interested in investigating rainforests in more depth inquire about our *Into the Rainforest* program which provides students with the opportunity to taste rainforest fruit, make a rainforest animal and explore features and adaptations of rainforest plants and animals. A teacher’s kit is also available.

An Exploring Literature program using Jeannie Baker’s book, *Where the Forest Meets the Sea* is also available.

**Links to Literature**

Read Jeannie Baker’s *Where the Forest Meets the Sea* and discuss themes such as change caused by humans in the environment, being alone in nature, our place in nature, plant and animal connections.

Students can try writing about their own experiences alone in the natural world and make their own collage to match.

Work with the art teacher to make a group collage. Students could try writing and dramatizing their own creative writing about being alone in a rainforest, using the group collage/mural as a backdrop.

Identify some of the plants that grow in the Fern Gully that feature in Jeannie Baker’s book e.g. epiphytes, creepers, fig trees, ferns, palms, or dinosaur trees such as the kauri pine.

**Other investigations**

Invent and prepare a recipe using rainforest foods such as chocolate (cocoa), bananas, vanilla and pineapple.

Choose a rainforest animal to investigate, showing all the ways it uses plants to survive eg The gorilla eats plants, uses plants for bedding material and to express aggression.

Research a rainforest somewhere in the world to investigate some of the plants and animals that live there and the rainforest’s conservation status. Present your information by poster, a talk or power point presentation.

**Animals**
The Birds

The water birds are native to this area and have always been living on the natural billabongs around the Yarra. There are also many smaller native birds that live in the Gardens. There are 38 species of birds that live in or visit the Gardens. Some of the common water birds that you will be looking at are:

**Black Swans** are the largest birds in the Gardens. They are all black with white tipped wings. You may be lucky enough to see the grey cygnets in spring.

**Black Ducks** are very common in the Gardens. They eat water-weeds, seeds and insects. You will notice them because they are all brown with black markings on their face.

**Eurasian Coots** have a short white beak and have a black body. These birds are strong divers and can be found grazing on the lawns.

**Dusky Moorhens** have orange and red beaks, a brown/black body and is usually found grazing on the lawns around the Lakes.

**Eels**

The eels you may see here are short finned eels. They have a good sense of smell in order to find food. They feed on aquatic and terrestrial insects, molluscs, fish as well as plants. They also feed on the rotten leaves found on the bottom of the lake. All of the large eels in the Gardens are females. The eels have reached the lake through storm water outlets that connect the Yarra and the lake, or they may have slithered up the river banks and overland into the Gardens if the ground is moist. This occurs during mid-winter to late spring. Eels are mostly nocturnal and can travel overland. Eels can bite so don’t try to feed them.

This eel spawns in the Coral Sea off North Queensland then the fertilised eggs develop into larvae, turn into juveniles called glass eels and are carried by ocean currents to the coast line where they move into freshwater streams. These young eels are also called elvers. They are probably aged from 1-3 years at this stage. The majority of eels migrating upstream into freshwater turn into females, whilst those remaining in the estuaries, rivers and creeks develop into males. Once in the Gardens they may remain for some years before making the journey to the Coral Sea to spawn. The mature males may be 8-12 years and the mature females 10-20 years before setting off to the Coral Sea. The trip may be 3000 kms and it is thought they die after spawning. In Victoria the eels (now known as silver eels at this stage of the life-cycle) gather at the mouths of rivers, creeks etc to commence their spawning migration. This occurs in late summer to autumn.

**Cross Curricular Pre and Post Activities**

Look at a map of Melbourne (Melway) to discover the relationship of the Yarra River to the RBG and Port Phillip Bay to see where the eels swim. Use a map of Australia to trace the journey of the female short-finned eel.

If your school is suburban, locate it on the map. Is there a creek near you that is a tributary of the Yarra? What other animals might use the Yarra system? Visit your local creek if you are able to, to identify some of the animals that live there. Identify the plants that live there also and include in your observation the ways that plants are used by the animals.

Alternatively observe the birds that visit your school and identify them as introduced or indigenous birds. Ask the students to record which plants are most visited by both the introduced and indigenous bird life.

Design a school garden to attract animals indigenous to your area. What plants would you choose and why? See lists of butterfly and bird attracting plants available. What else would you include in your garden? (water, nest boxes, a hide..?)

Use wetlands as a topic of investigation. What are some of the plants and animals that
require wetland as their habitat? What can threaten their survival? What does biodiversity mean and how do healthy wetlands contribute to biodiversity? If you have wetlands locally, visit them to examine ways indigenous plants and animals are being or can be protected.

If you are interested in investigating plant and animal connections in more detail inquire about the Plants and Animals program which gives students the opportunity to study the Yarra habitat and develop observation skills, using binoculars and microscopes on Long Island.

A Plants and Animals teacher’s kit is also available from the RBG Education Service.

Further Activities

Propagating Herbs

Many herbs are easy to propagate asexually, that is by not using seeds. Taking a stem cutting is a simple asexual propagation. For some ground hugging plants it is quite natural for roots to grow from the stem. This is an adaptation that allows a plant to spread by taking root at different places. Most plants can do this with a little extra encouragement.

Because herbs are generally soft stemmed plants, they can be propagated as softwood cuttings or semi-hardwood cuttings. Softwood cuttings are taken on herbaceous plants, which have very little woody tissue. These are best taken in spring when plants are actively growing. More woody plants are taken as semi-hardwood cuttings which are generally best taken in autumn.

Taking a semi-hardwood cutting.

Herbs such as lavender and rosemary are easy to propagate as semi-hardwood cuttings around May.

Take a length of stem about 10cm long, making sure that the cut is at the base of a growing node. A growing node is at the base of a leaf or the stem itself.

Make sure the cut is clean and even. Cut a growing node. Remove about two thirds of the foliage on the steam. Without any roots, if there are too many leaves there is too much demand put on the stem to draw water up to them.

Fill a pot with propagating medium. The propagating mix is a mixture of materials that should contact just the right amount of air spaces with just the right capacity to hold moisture.

One type of mixture could be:

- 5 parts coarse propagating sand
- 1 part peat moss

Sand has the disadvantage of being very heavy. Other more convenient but more expensive options include perlite and vermiculite. They do have differing properties to sand so would need to be used in different proportions.

Your cutting will be inserted into the growing medium about half way up the stem. Before placing it into your medium:

Dip the tip into some rooting hormone. This is easily available in powder form. Cuttings can be taken without using hormone powder.

Measure how deeply the cutting needs to go into the medium and make a hole for it with a dibber (stick or pencil).

Insert the cutting into the hole and firm the medium around it.

Water thoroughly.

Placing a plastic bag or the bottom of a soft drink container over the potted cutting is helpful because it reduces evaporation and keeps in some extra warmth. It works like a mini greenhouse.

Label the cutting with:
Bottled Plants

What makes a plant survive? Why does it die?

Using discarded plastic soft drink bottles is a fun way of investigating the different factors for plant survival.

The factors that most affect plant survival that can be tested are:

Water
How moist should the soil be?

Light
How much light does the plant need to make its food?

Minerals
How much fertilizer should be in the soil?

Air
How much oxygen needs to be available for the roots?

Temperature
How warm does the plant prefer to be?

Each of these factors could be tested for:

What makes the plant flower best?

What makes it grow fastest?

Plants that are easy to use in the bottle planters include impatiens, snapdragons, primulas, marigolds or any easily available seedlings.

Seeds such as radish or grass seeds grow quickly. Beans also are interesting to grow.

If there is plenty of light in the classroom, different plants can be grown for some months.

Making the bottle planter

To make the simplest bottle planter from a large clear plastic drink bottle:

Cut the bottle in half

Punch a hole in the cap

Fix a length of moist, absorbent cloth through the hole so that there is about 15cm inside and outside the half bottle.

Poke holes around the side of the bottom half of the bottle.

Pour water into the bottom half so that when the top half is inverted and placed into it, the bottle cap is above the water level.

The top half is now the container for growing medium such as soil, potting mix or hydroponic mixes such as perlite or vermiculite.
Depending on the year levels, students could be encouraged to design experiments to discover the answers to such questions as:

What mixture of growing medium provides the best conditions for growth?
How does salt affect plant growth?
How does pollution, such as detergent or oil, affect plant growth?
What is the most environmentally friendly detergent?
How does competition from other plants (weeds) affect plant growth?
Does mulch help in retaining moisture?
Does soil from different areas make a difference to plant growth?
Does compost or worms help plant growth?

Students may like to design their own experiments, or activities may be less scientifically structured where children may create their own balance of ingredients and compare its progress with those of other students.

This set up is also a convenient way of studying systems. This may be the systems of the plant:

Water transport system
Food transport system
Reproductive system

It is also a way of creating and studying a mini ecosystem. Try introducing small animals (minibeasts) such as a slater or worm. The planter could be enclosed with the bottom of another bottle, or even made more complex by including a number of tiers or layers of bottles so that animals can pass from one layer to another.
References

Children's Picture Story Books

Henkes, K. 2002, *Grandpa and Bo*. Greenwillow, USA.
Simmons, J. 1999, *Come on Daisy*. Orchard, Lane Cove, NSW.
Simmons, J. 2000, *Daisy and The Egg*. Orchard, Lane Cove, NSW.

**Children’s Picture Reference Books**
Moss, M. 2000, *This is the Tree - A Story of the Baobab*. Frances Lincoln, London.
Teacher References


For further information and bookings, please contact:

Phone:  03 9252 2358
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Website:  rbg.vic.gov.au

You will receive a confirmation letter, invoice and map by mail following your booking.

The Botanic Gardens Education Service also offers professional development sessions for teachers of the Early Years. These may be based on the programs regularly offered or can be designed to meet the needs of particular groups.