

Plants Galore

3-6

Grouping "Plants by Name and Shape"

Hunter Region Botanic Gardens
Pacific Highway, Motto Farm, 2324
Telephone: 049 871655

Booking Date: _____

Booking Time: _____



PLANTS GALORE

- The wonderful diversity of plants in the world
- A look at the plant diversity at the Hunter Region Botanic Gardens
- How we go about naming plants and classifying them into different groups



There are huge numbers of plants in the world.

Botanic Gardens are designed to collect, grow and display many different plants from all over the world.

Closely related plants are often grouped together and labeled to help people identify them.

PLANTS GALORE

The world's rich heritage of plant life How the Hunter Region Botanic Gardens plays its part in educating people about the plant diversity of the region and other parts of Australia, and other countries

This unit looks at:

- **what is meant by biodiversity in general**
 - **what is meant by plant diversity**
 - **the characteristics of individual plants**
 - **the characteristics of groups of related plants**
 - **the structure of plant communities**
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Plants Galore focuses on the diversity of plant life (particularly Australian plants). The unit introduces students to the fundamentals of classifying plants into meaningful groups by looking at various features that certain plant species have in common, e.g., floral structure, different types of fruits, and foliage shapes and arrangements.

The central concept of this unit is **diversity** in plants.

Note that the fairly new word: "biodiversity" (a contraction of "biological diversity") is gaining popular usage. Biodiversity refers to the diversity of life on earth and in the seas: the world's plants, animals, fungi, and microbes - as well as their cells and genes, and their ecosystems.

Diversity means "being different to others", "different kinds or forms", "unlikeness", "variations", "range", "spread", "many differences".

Galore means "abundance", "large numbers", "variety", "wealth", "ubiquity"

- * diversity in size (of the whole plants; of individual leaves, etc.)
- * diversity in shape and feel (texture)
- * diversity in flowers and buds
- * diversity in fruits diversity in seeds and seed dispersal
- * diversity in flowering times (seasonality)
- * diversity in colours and odours
- * diversity in providing food, and homes (habitats) for animals
- * diversity in roots
- * diversity in bark and wood
- * diversity in leaves (simple, compound; adaptations)
- * diversity of uses by humans (food, timber, medicinal substances, etc.)

The fact that each species of plant is either slightly different or very different from other species raises the fundamental issue of **classification**. Some plants are obviously very similar to others, and it might be expected that they are closely related (genetically). Botanists have long grouped plants according to sets of characters they hold in common, notably similarity in floral structure, but also other characteristics, including types of fruits, and similarities in leaves (their shapes, or structures), types of bark, and so on.

If you don't have much knowledge about plants, you have to make an "educated guess" as to what criteria might be used to distinguish between one plant and another. Early botanists made mistakes, such as grouping plants by the colour of their flowers, e.g., all red flowers in one group.

Usually we consider not just one character to tell if a plant is related to another, but rather a set of characters. For example, the Pea family not only has flowers which are very similar (always having a standard petal, wing petals, and a keel), but also has fruits which are legumes (pods which split down two sides), and little nodules on the roots, leaves often trifoliate, and so on.

The resources of the Hunter Region Botanic Gardens

At the Hunter Region Botanic Gardens (HRBG) students can explore both:

- * the pre-existing natural environment: eucalypt forest & adjacent wetlands
- * the established theme gardens and special collections of plants, some of which are native (indigenous) plants, while others are from other countries

The natural environment (that which existed at the site prior to the establishment of the Gardens) is extremely interesting in itself. Tracks and interpretive signage have been established to assist the visitor to learn about aspects of this native vegetation and its accompanying native animal life.

The on-site eucalypt open forest gives students an opportunity to learn about the structure of plant communities. For example, students can find out that an -open forest has distinct layers:

- * the tree layer
- * the shrub layer
- * the herb layer
- * the ground cover
- * the root system

In exploring these layers, students can also discover that various animals are found mainly, or only, in one particular layer, e.g.:

- * some birds spend most of their time in the canopies of the tree layer
- * some invertebrate animals are found almost always under bark

Discovery activities by students

It is essential that the students be *involved* in this unit: **Plants Galore**.

Many opportunities will be available for students to:

- look (look up, look down, look under, etc.)
- smell
- discover
- measure
- collect
- feel
- listen
- count
- record
- label

Activities can include:

- * answering questions
- * measuring the girth (circumference) of a tree, using a string or rope
- * estimating the height of a shrub or tree
- * copying down information from labels and signage
- * comparing colours, odours and textures (of flowers and leaves)
- * collecting seeds from woody fruits
- * feeling and describing bark
- * locating particular plants
- * spotting animals (birds, insects, koalas)
- * spotting animal "homes" (habitats), e.g., hollows in tree trunks
- * tasting leaves and fruits (with due caution!)
- * doing leaf and bark rubbings
- * assessing temperatures and humidity

Concepts which might be treated:

- * the distinction between "flowering" and "non-flowering" plants
- * the distinction between "native" and "introduced" (exotic) plants
- * the concept of weeds
- * the concept of life cycle:
 - from seed γ seedling γ mature plant γ buds and flowers γ pollination and fertilisation γ fruits -seeds γ seed dispersal
- * sexual versus asexual reproduction, i.e., a new plant from a seed, or a new plant from a cutting or group of cells (tissue culture)
- * animals using plants as food (herbivorous animals)
- * humans eating: (a) leaves (e.g., lettuce); (b) stems (e.g., celery); (c) roots (e.g., carrot); (d) fruit (e.g., tomato, peach); (e) nectar (e.g., honey)
- * humans using plants for: construction timber, cut flowers, oils (e.g., eucalyptus oil)
- * the comparative size of flowers (e.g., many flowers on Australian native plants are tiny; this in turn raises the issue of which insects pollinate particular flowers)
- * the age of a particular plant -some tall trees may be quite young, when some small shrubs might be quite old - so, don't be deceived! All plants have their own lifespan, just as animals do, e.g., many wattles live for only about 8 -10 years
- * dangers of some plants: some have thorns, or stinging hairs; some leaves and fruits are poisonous if eaten

The Field Excursion ("The Botanical Walk")

This unit takes the students to the following locations at the Gardens:

- 1) The Location Map (to orientate the students)
- 2) Banks Place (to tell students a little about the history of botany)
(Note: In telling students about the contribution of botanical discoveries of the last few centuries, also acknowledge the much older botanical knowledge of the Australian aboriginal people)
- 3) The Grevillea Garden (this theme garden is a marvellous resource for showing students how many individual closely related plants can look very different in such ways as their size, and the shape and colour of their leaves; the fact that the various Grevilleas are recognisable as all belonging to the one group is found in the uniform floral structure)
- 4) The Botanical Walk track is now followed to the Acacia Garden (along this walk, short stops can be taken to look at some other theme gardens, e.g., the Lamiaceae ("Mint plants"), where students can sniff the leaves)
- 5) The Acacia Garden (the Wattles) (students can see that wattles can be divided into different groups based on such features as: (a) having compound ("feathery") leaves or flattened leaf stems (phyllodes); (b) having their yellow flowers arranged in balls or rods)
- 6) Parry Place (a selection of Australian plants)
- 7) The Succulents Garden (where two main groups of non-Australian plants exhibit water storage, either in their stems (the true Cacti), or their leaves (the Euphorbia))
- 8) The North Swamp (and Viewing Platform) (where students can see the diversity and specialised structures of wetlands plants)

Usually there will not be sufficient time to take in all the above suggested detail. The teacher should select those points or features which are most relevant to learning programs back at the school, and also be guided by the particular interest being shown by the students at any particular time.

For example, if, when looking at the Grevilleas, some Honeyeaters (birds) visit the flowers to obtain nectar, the students' attention can be switched to the topic of pollination of these flowers. The names of the birds and insects can be learned (such as Eastern Spinebill, New Holland Honeyeater, Wattle Bird).

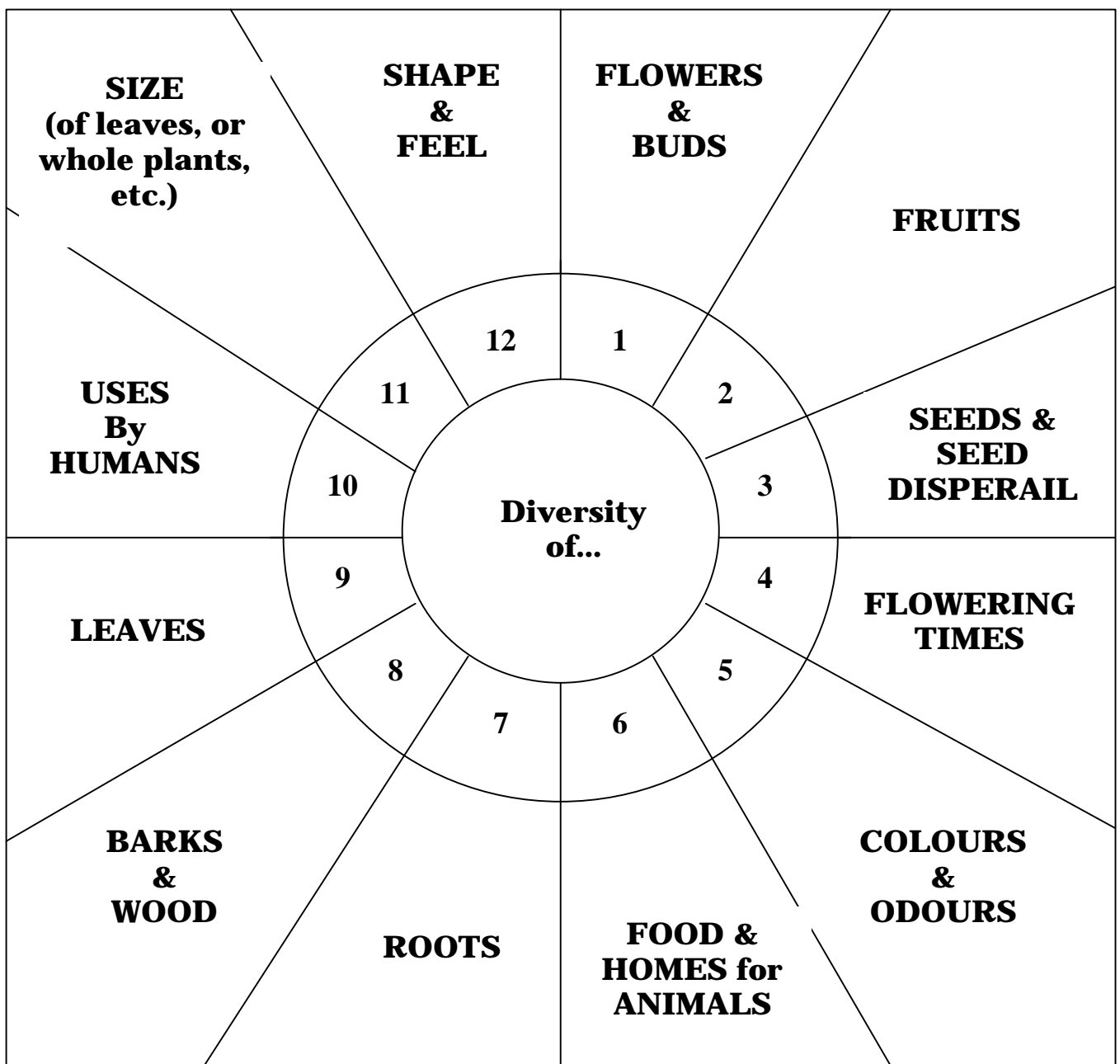
Questions that might be asked of the students

1. What types of leaf shapes can you see?
2. What types of leaf edges (margins) can you see?
3. What is the difference between a shrub and a tree?
4. Why do insects and birds visit flowers?
5. How does a Grevillea flower get pollinated?
6. How would you describe the smell (odour) of a crushed eucalypt leaf, (or mint plant leaf, Tea Tree leaf, etc.)
7. What uses did aboriginal people make of the leaves of some plants?
8. What purposes does bark serve on the trunk of a tree?
9. What are some dangers presented by some Australian plants?
10. What are some present-day uses of Australian plants?
11. What is the difference between a native (Australian) plant, and an exotic plant?
12. How long do you think different plants live? (What is their lifespan?)
13. What is the floral emblem of the Hunter Region Botanic Gardens?

- 14. What is the floral emblem of the State of New South Wales
- 15. How would you easily measure the diameter of a large tree?

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FIELD ACTIVITY 1

Acacia Scavenger Hunt

When you find the Acacia with a leaf that matches a drawing, write its full name next to it.



FIELD ACTIVITY 2

Draw a Forest Layer Cake

Have a look at a section of bush.

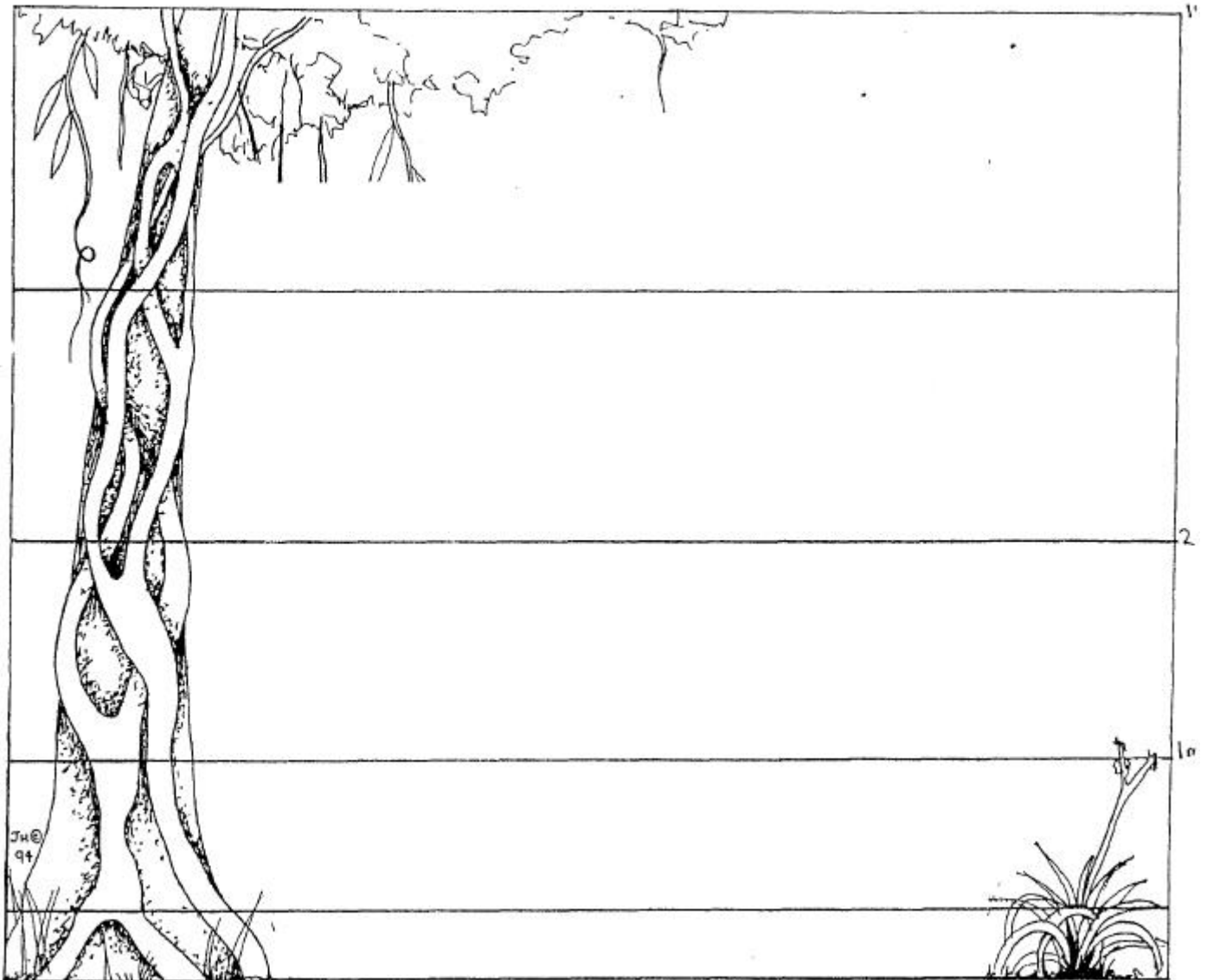
Look at the layers - can you see ground covers?

Is there a layer of small herbs, lilies or long grasses? Are there shrubs? Are there trees and climbers?

Count the layers and write the number here: _____

Now estimate the height of each layer, and then fill it in the picture below.

You should write the height on the grid like the ones shown, and draw the trees and shrubs so they are the right height.



FIELD ACTIVITY 3

Recipe for a Forest

Imagine you are creating a forest.

Write down the recipe.

You will need ingredients and a method to put it together and make it grow.

Don't forget, there is more to a forest than the plants - look around and include all the things that make up the forest, both living and dead.

Your forest might have rocks and waterfalls, a rainbow or a thunderstorm, Eagles or snakes - anything you want to make a beautiful natural forest.

FIELD ACTIVITY 4

Getting to know Banksias

There are two different types of Banksias near the visitors centre:

- I. *Banksia serrata*, the saw tooth Banksia
- II. *Banksia integrifolia*, the smooth leafed Banksia

(*Banksia serrata* is near the pond by the car park).

(*Banksia integrifolia* is in a row near the picnic tables).

Get into groups of four. Your guide will give you a seed pod and a leaf from each of the two Banksias.

Draw them below and label each picture "Saw Tooth Banksia" and "Smooth Leafed Banksia".

FIELD ACTIVITY 5

What is it? Where is it?

Get into groups of eight or ten, and each kid needs a partner.
Half of you stand in a circle, and face the centre with your hands behind your back.
Your partner finds a natural object on the ground and puts it in your hands so you can't see it. It could be a leaf, a gum nut or Banksia seedpod or even a stone.

The kids in the circle take turns describing the object in their hands to the rest of the group. How big is it? What does it feel like? What shape is it? Is it thick or thin?

Then the kids in the circle close their eyes (no peeping!) while their partner takes the object back and puts it on the ground somewhere nearby. The kids in the circle then have to try and find their object on the ground.

Swap places and repeat.

FIELD ACTIVITY 6

True or False?

Divide the group into two teams, and have them stand in two lines facing each other about 1m apart.

Name the teams the Gum Nuts and the Banksias.

About 10m behind each line, mark a home base with a school bag or jumper.

The leader makes a statement aloud.

If the statement is true, the Gum Nuts chase the Banksias.

If the statement is false, the Banksias chase the Gum Nuts.

Anyone caught must join the other team.

If they don't all know the answer, there will be pandemonium.

Let them go until it settles down, then tell them the correct answer.

Sample Statements

This is a Banksia Pod (while holding up a gum nut).

The wind is coming from behind the Banksia team ...