

SAMPLE

Plant Identification

Part 1 Aim

Know the plant naming system and understand how plants are classified.

INTRODUCTION

At its simplest, a garden is a place for growing flowers, herbs, vegetables, trees or shrubs. Growing plants is an involved process though, and an idea to plant a flower bed might become a daunting challenge to a new gardener. However, once the basic principles are understood and put into practice, gardening becomes a rewarding activity, offering many hours of enjoyment.

Horticulture deals with living things and as such is somewhat unpredictable and variable. The way you treat a plant differs from place to place, time to time, and according to what you are trying to get from the plant.

When referring to a book or magazine article, always look at where it was written and by whom it was written. Most gardening writers usually write about gardening in their own locality. If you live in a different city those recommendations might be quite misleading for you! There can be great variations over relatively small distances in such things as rainfall, wind and soil type. A certain type of tree may very well grow twice as tall in the eastern suburbs of a large city compared to its eventual height in the western suburbs of the same city.

In horticulture, often there are different ways of tackling a job; each one just as valid as the next. Never consider that a particular technique is the only way of doing something! You should try to be aware of the advantages and disadvantages of all the alternatives. They all have their pros and cons, and it is up to you to choose the technique that will work best in your situation.

This subject has been written to teach horticulture in a way that is relevant to any place in the southern or northern hemisphere. It puts aside regional techniques and tries to teach principles and concepts which can be applied to anywhere. Keep this in mind as you study; try to see the principles, not just black and white facts.

PLANT NAMES

Plants are given two kinds of names: common and scientific.

Common Names

These are English language names usually given to plants by amateur gardeners as a descriptive, easy-to-remember tag. Many plants have more than one common name and sometimes the same common name is given to several quite different plants. This, and the fact that there is no real control over common names, makes them inaccurate and unreliable for plant identification.

Scientific Names

Based on Latin language, these names seem more complex than common names. However, they have a system to them that actually makes plant identification easier. The system of scientific naming is strictly controlled and coordinated by botanists throughout the world. Scientific names (e.g. *Camellia japonica*) should be used in preference to common names.

In the scientific system, plants are classified by dividing them into groups with similar characteristics. These groups are divided into smaller groups with shared characteristics. These may be divided again and again into sub-groups, each with shared characteristics, until you finally have only one type of plant in each group.

The main levels of division are as follows:

- Phyla are divided into CLASSES
- Classes are divided into ORDERS
- Orders are divided into FAMILIES
- Families are divided into GENERA (singular: Genus)
- Genera are divided into SPECIES
- Species are sometimes divided into VARIETIES.

Although there are many levels of division, the main ones we work with are at the lower end of the divisional scale: family, genus, species and variety/sub-species.

The scientific names you see in books or on plant labels in a nursery will usually consist of two words:

- The first word is the *genus* name of the plant. The first letter of the genus name should always be capitalised.
- The second word is the *species* name of the plant. This should never be capitalised.

ANGIOSPERMS, CONIFERS AND FERNS

The main plant phyla we are concerned with in horticulture are Anthophyta – the flowering plants; Coniferophyta – the conifers; and Pterophyta - ferns.



Angiosperm (Rosa variety)

Anthophyta

Commonly called Angiosperms or Flowering Plants, this group includes all plants that produce flowers, e.g. eucalypts, roses, lettuce, grasses. They are seed-bearing plants.



Conifer (Pinus species)

Coniferophyta

Commonly called Gymnosperms or Conifers, this group includes all plants that produce cones, e.g. pines, cypress, junipers.



Pterophyta

Commonly called Ferns, this group includes plants that reproduce by spores rather than seeds

Pterophyta – fern

Other phyla include such plant groups as mosses, fungi, bacteria and algae.

The Angiosperms or Flowering Plants are divided into two classes:

Dicotyledonae - In these plants the first leaves to appear from a germinating seed are in a pair (two leaves appear at once). In general, the veins in the leaves of dicotyledons are not parallel (e.g. pea, eucalypt). Dicotyledons (commonly called dicots) also tend to have a taproot with lateral branches, as opposed to a fibrous root system.

Monocotyledonae - In these plants the first leaf to appear when a seed germinates is a single leaf. In general, the veins in the leaves of monocotyledons are parallel to each other. Monocotyledons (commonly called monocots) also tend to have a fibrous root system, as opposed to a tap root with lateral branches. Grasses, irises and orchids are examples of monocots.

As you can see, you can distinguish between dicotyledons and monocotyledons by a couple of very simple characteristics. In the same way, we can usually distinguish which *family* a plant belongs to by a few basic characteristics. For example:

- Lamiaceae family: foliage is perfumed, stalks are four-sided (i.e. square-shaped) and flowers have two distinct lips (e.g. Mint).
- Araceae family: leaves are usually heart-shaped, and the plants commonly originate in tropical regions (e.g. Philodendron).
- Asteraceae: plants in this family have 'daisy' flowers (e.g. Chrysanthemum).
- Apiaceae: flowers occur in an umbrella-like head on a single stalk (e.g. Parsley).

You should be able to tell a family name from other types of names by the fact that it will end with 'aceae'. Genus names do not end in 'aceae'.

For example: *Calodendrum capense* (Cape Chestnut)

Calodendrum is the genus

capense is the species

The family this plant belongs to is Rutaceae.

Sometimes a third word (and perhaps a fourth) is added to follow the species. These words refer to the variety of that particular species.

For example: *Acer palmatum* 'Dissectum Atropurpureum'

Acer is the genus, *palmatum* is the species

Dissectum tells us this is a variety (a cultivar) of *Acer palmatum* with dissected leaves

Atropurpureum tells us this variety (a cultivar) of *Acer palmatum* has purple foliage

HYBRID AND VARIETY

You may be confused by the difference between hybrid and variety:

- A hybrid plant is one which has resulted from two different species cross breeding. The parent plants are almost always in the same genus. Most hybrids are deliberately bred by humans, although some occur in nature where the distributions of the two-parent species overlap. For example, *Eucalyptus* 'Torwood' is a cross between *Eucalyptus torquata* and *Eucalyptus woodwardii*. Sometimes the two plants which have been cross bred are both mentioned, and an "x" is placed between them, e.g. *Eucalyptus torquata* x *woodwardii*.

- A variety is a particular type of plant in one species. It displays minor variation/s from the typical species. It does not have parents from two different species, but a hybrid does. For example, *Camellia japonica* 'Desire' is a variety of *Camellia japonica*.

WHAT GENUS BELONGS TO WHAT FAMILY?

The following lists show some of the most common botanical families and horticultural genera within those families. These are just a sample – there are many others which, no doubt, you will come across when you look at books and visit nurseries and gardens.

Dicotyledons	Genera
Acanthaceae	<i>Acanthus</i> , <i>Aphelandra</i> , <i>Hypoestes</i> (freckle face), <i>Justicia</i> , <i>Pachystachys</i> , <i>Thunbergia</i>
Anacardiaceae	<i>Cotinus</i> (smoke bush), <i>Mangifera</i> (mango), <i>Pistacia</i> , <i>Rhus</i> , <i>Schinus</i> (pepper tree)
Apiaceae (Umbelliferae)	<i>Actinotus</i> (flannel flower), <i>Angelica</i> , <i>Daucus</i> (carrot), <i>Eryngium</i> (sea holly), <i>Foeniculum</i> (fennel), <i>Petroselinum</i> (parsley)
Asteraceae (Compositae)	<i>Achillea</i> , <i>Ageratum</i> , <i>Anthemis</i> , <i>Aster</i> , <i>Brachyscome</i> , <i>Calendula</i> , <i>Chrysanthemum</i> , <i>Coreopsis</i> , <i>Cosmos</i> , <i>Dahlia</i> , <i>Gazania</i> , <i>Gerbera</i> , <i>Helianthus</i> (sunflower), <i>Helichrysum</i> , <i>Olearia</i> , <i>Osteospermum</i> , <i>Rudbeckia</i> (cone flower), <i>Santolina</i> , <i>Senecio</i> , <i>Tagetes</i> (marigold), <i>Taraxacum</i> (dandelion), <i>Zinnia</i>
Betulaceae	<i>Alnus</i> (alder), <i>Betula</i> (birch)
Bignoniaceae	<i>Bignonia</i> , <i>Campsis</i> , <i>Catalpa</i> , <i>Jacaranda</i> , <i>Pandorea</i> , <i>Paulownia</i> , <i>Pyrostegia</i> , <i>Spathodea</i> (African tulip tree), <i>Tecoma</i> , <i>Tecomaria</i>
Brassicaceae (Cruciferae)	<i>Alyssum</i> , <i>Arabis</i> , <i>Aubretia</i> , <i>Brassica</i> (cabbage, cauliflower), <i>Erysimum</i> (wallflower), <i>Lobularia</i> (sweet alyssum), <i>Matthiola</i> (stock), <i>Nasturtium</i>
Caprifoliaceae	<i>Abelia</i> , <i>Kolkwitzia</i> , <i>Lonicera</i> (honeysuckle), <i>Viburnum</i> , <i>Weigela</i>
Caryophyllaceae	<i>Dianthus</i> (carnation), <i>Gypsophila</i> , <i>Lychnis</i> (campion)
Epacridaceae	<i>Astroloma</i> , <i>Epacris</i> , <i>Leucopogon</i>
Ericaceae	<i>Arbutus</i> , <i>Erica</i> , <i>Pieris</i> , <i>Rhododendron</i>
Euphorbiaceae	<i>Acalypha</i> , <i>Codiaeum</i> (croton), <i>Eurphorbia</i> , <i>Omolanthus</i> , <i>Ricinus</i> (castor oil plant)
Fagaceae	<i>Castanea</i> (chestnut), <i>Fagus</i> (beech), <i>Quercus</i> (oak)
Gesneriaceae	<i>Achimenes</i> , <i>Columnea</i> , <i>Gloxinia</i> , <i>Saintpaulia</i> (African violet)
Goodeniaceae	<i>Dampiera</i> , <i>Goodenia</i> , <i>Leschenaultia</i> , <i>Scaevola</i>
Hamamelidaceae	<i>Corylopsis</i> , <i>Hamamelis</i> (witch hazel), <i>Liquidamber</i> , <i>Loropetalum</i>
Lamiaceae (Labiatae)	<i>Ajuga</i> , <i>Lavandula</i> (lavender), <i>Nepeta</i> (catnip), <i>Mentha</i> (mint), <i>Origanum</i> (oregano, marjoram), <i>Thymus</i> (thyme), <i>Prostanthera</i> , <i>Rosmarinus</i> (rosemary), <i>Stachys</i> (lamb's ears), <i>Salvia</i> (sage), <i>Westringia</i>
Legumes	NB: Strictly speaking legumes have now been split into three families: Mimosaceae, Caesalpinaceae and Fabaceae. At this stage in your study you may, for simplicity, classify all pod-bearing plants as legumes.

Mimosaceae	<i>Acacia, Albizia, Calliandra, Mimosa</i>
Caesalpinaceae	<i>Bauhinia, Cassia, Cercis, Delonix (poinciana)</i>
Fabaceae	<i>Clanthus, Erythrina (coral tree), Genista (broom), Hardenbergia, Laburnum, Lathyrus (sweet pea), Lupinus (lupin) Medicago (alfalfa, lucerne), Phaseolus (bean), Pisum (pea), Robinia, Trifolium (clover), Ulex (gorse), Virgilia, Wisteria</i>
Magnoliaceae	<i>Liriodendron (tulip tree), Magnolia, Michelia</i>
Malvaceae	<i>Abutilon, Gossypium (cotton), Hibiscus</i>
Moraceae	<i>Ficus (fig), Morus (mulberry)</i>
Myrtaceae	<i>Agonis, Angophora, Astartea, Beaufortia, Callistemon, Calytrix, Calothamnus, Chamaelaucium, Eucalyptus, Eugenia, Feijoa, Kunzea, Leptospermum, Lophostemon, Melaleuca, Metrosideros, Micromyrtus, Thryptomene, Tristania, Tristaniopsis, Myrtus, Xanthostemon</i>
Nyctaginaceae	<i>Bougainvillea, Mirabilis</i>
Oleaceae	<i>Forsythia, Fraxinus (ash), Jasminum (jasmine), Ligustrum (privet), Olea (olive), Osmanthus, Syringia (lilac)</i>
Pittosporaceae	<i>Billardiera, Hymenosporum. Pittosporum, Sollya</i>
Plumbaginaceae	<i>Armeria (thrift), Ceratostigma, Limonium (statice), Plumbago</i>
Primulaceae	<i>Cyclamen, Primula</i>
Proteaceae	<i>Banksia, Conospermum, Dryandra, Grevillea, Hakea, Isopogon, Macadamia, Protea, Stenocarpus, Telopea (waratah)</i>
Ranunculaceae	<i>Anemone, Aquilegia, Clematis, Delphinium, Helleborus, Paeonia, Pulsatilla, Ranunculus.</i>
Rubiaceae	<i>Coffea (coffee), Coprosma, Gardenia, Ixora, Luculia, Pentas</i>
Rutaceae	<i>Boronia, Citrus, Coleonema (diosma), Correa, Crowea, Eriostemon, Murraya,</i>
Rosaceae	<i>Chaenomeles (flowering quince), Cotoneaster, Crataegus (hawthorn), Cydonia (quince), Fragaria (strawberry), Geum, Kerria, Malus (apple), Prunus (almond, apricot, cherry, peach, plum), Pyracantha (firethorn), Pyrus (pear), Rosa (rose), Rubus (raspberry, blackberry), Sorbus (rowan), Spiraea</i>
Saxifragaceae	<i>Astilbe, Bergenia, Deutzia, Hydrangea, Philadelphus, Saxifraga</i>
Scrophulariaceae	<i>Antirrhinum (snapdragon), Calceolaria, Digitalis (foxglove), Hebe, Linaria, Nemesia, Penstemon, Russelia, Verbascum, Veronica</i>
Solanaceae	<i>Browallia, Brugmansia, Capsicum, Cestrum, Datura, Lycopersicon (tomato), Nicotiana (tobacco), Petunia, Solanum (potato, eggplant)</i>
Theaceae	<i>Camellia, Gordonia</i>
Verbenaceae	<i>Clerodendrum, Duranta, Petrea, Lantana, Verbena</i>
Vitaceae	<i>Cissus, Parthenocissus (Virginia creeper, Boston ivy), Vitis (grape)</i>

Family: Rosaceae:

Genus: *Malus* (apple)



Family: Asteraceae (daisies)

Genus: Taraxacum (dandelion)



Family: Rosaceae:

Genus: Fragaria (strawberry)



Monocotyledons	Genera
Agavaceae	<i>Agave, Yucca</i>
Amaryllidaceae	<i>Agapanthus, Anigozanthus</i> (kangaroo paw), <i>Clivea, Hippeastrum, Narcissus</i> (daffodil, jonquil), <i>Nerine</i>
Araceae	<i>Acorus, Alocasia, Anthurium, Arum, Caladium, Calla, Dieffenbachia, Monstera, Philodendron, Zantedeschia</i>
Arecaceae	Palms: <i>Acanthopheonix, Archontophoenix, Caryota, Chamaedorea, Cocos, Howea, Livistona, Phoenix, Rhapsis, Sabal, Trachycarpus, Washingtonia</i>
Bromeliaceae	Bromeliads
Cyperaceae	<i>Carex</i> (sedge), <i>Cyperus</i> (papyrus)
Poaceae (Graminae)	The grasses, corn, cereals, bamboos
Iridaceae	<i>Crocus, Dietes, Dierama, Freesia, Iris, Ixia, Sparaxis, Watsonia</i>
Liliaceae	<i>Allium</i> (onion, chives, garlic, leek), <i>Asparagus, Chlorophytum, Crocus, Hemerocallis, Hyacinth, Dracaena, Kniphofia</i> (red hot poker), <i>Lachenalia, Lilium, Liriope. Tulipa, Xanthorrhoea</i> (grass tree)
Marantaceae	<i>Calathea, Ctenanthe, Maranta</i>
Orchidaceae	Orchids: <i>Brassia, Calanthe, Cattleya, Cymbidium, Dendrobium, Epidendrum, Oncidium, Phalaneopsis, Spathoglottis, Vanda</i>

Sometimes plant families and botanical names that have been in common usage are replaced with new names. This may lead to confusion as to which family some plant genera belong to. There are eight plant families that have been known for so long by other names that either name can be used. These are:

- Compositae = Asteraceae
- Umbelliferae = Apiaceae
- Labiatae = Lamiaceae
- Palmae = Arecaceae
- Graminae = Poaceae
- Cruciferae = Brassicaceae

- Leguminosae = Fabaceae
- Guttiferae = Clusiaceae

SET TASK

Set Task Activity 1

Visit a nursery or plant shop (or if you are in an isolated area, obtain some nursery catalogues or look at nursery web sites on the internet). Look closely at the names on the plant labels and for each plant, try to work out which part of the name is the "genus", which name is the "species" and which name is the "variety".

Set Task Activity 2

Pick out one of the plant families listed under the heading 'What Genus Belongs to What Family?' Find as many plants in that family as you can in when you visit the nursery (or look in the catalogue or website). Make a note of the family and write down all of the plants you find in that family.

Multimedia

Watch the video 'Plant Identification' online via the ACS Distance Education YouTube Channel.

Planting

Part 2 Aim

Understand plant terminology and planting methods.

HOW TO PLANT

One of the most important aspects of gardening is choosing the right plant for the right place. Every garden plant should be grown in a position that will best assist its growth and health. It is unrealistic to expect a plant that favours tropical conditions to flourish in cold conditions, or to expect a cold-climate plant to do well in the tropics.

It is also important to learn 'how to plant'. While almost anyone can dig a hole and put a plant inside it, understanding the plant's soil requirements and using an appropriate planting method will give much better results. This lesson will broaden your knowledge of both planting methods and plant types.

People garden for many different reasons. Some people may want a garden that does not require high maintenance but allows them to relax. Others may want to be active or obtain a yield from their garden. A garden might be a utilitarian area for growing vegetables. It may be a bed of flowers arranged to be seen from the kitchen window; a simple gardenia placed by a path to provide a fragrance; a garden of mostly stones and rocks with a few feature plants, or an extension of the house with outdoor 'rooms' for contemplating, eating, or being active.

Many components are manipulated to create gardens. Gardening involves manipulating soil, water, plants, animals, and other environmental influences, as well as 'hard' landscape features such as paving and fencing, to provide particular effects and functions.

A garden is created by arranging the various components in a harmonious and functional design. Ideally a garden highlights the desirable aspects of the site and minimises the effects of undesirable views. It is important to know how you will use your garden, so you can then develop it to suit your needs. It helps to have a little understanding of how the different components of a garden work (shown in the following table).

Plants	Trees	Woody plants that usually have a bare trunk below and foliage above. Usually over 5 metres tall
	Shrubs	Woody and other plants that have branches extending from low down the trunk. Usually less than 4 metres tall
	Climbers	Plants that climb up structures, trees etc
	Creepers/Groundcovers	Plants that spread over the ground surface
	Grasses	Used for lawns, screens, and features (e.g. bamboo)
	Herbs	Culinary - plants that can be used to flavour foods, prepare tea or fragrant oils, etc. Horticultural - plants that do not produce woody stems and may die back in winter; usually perennial
	Annuals	Plants that live for only one season. Includes many flowers, vegetables and bedding plants
	Aquatics and sub-aquatics	Plants that grow in water, either fully or partially submerged

	Mosses, lichens and fungi	Mosses, lichens and fungi can be used to great aesthetic effect in the garden.
Animals	Pets	Some gardens may need to be designed to accommodate the needs of pets. Some pets may be useful in the garden; for example, goldfish can enhance a pond, or chickens can assist in weed control.
	Birds and wildlife	Gardens can be designed to encourage birds and wildlife. Similarly, some gardens may be less attractive to them. Wildlife can also cause problems or damage in the garden.
	Feral animals	Wild or un-socialised animals can cause problems in the garden if they are present in the area.
	Pests	Pests can cause significant damage in the garden. Pests might include insects, micro-organisms, birds or larger animals. Wildlife, domestic and feral animals can also be pests in the garden.
Environmental factors	Soil	Soil is the basis for plant growth. Alteration of soil properties can be a valuable tool in garden improvement
	Water	Water in the garden can include irrigation, rain, water features.
	Topography	Topography or the 'lie of the land' is an important consideration in garden design. Topography can be manipulated by terraces, levelling, etc.
	Wind	Wind can be manipulated in the garden with wind-breaks, screens etc. Gardens may be designed to make use of particular beneficial breezes or to prevent impact from unpleasant wind.
	Frost, snow, ice	In areas prone to these conditions, gardens should be designed to accommodate them. Mulches, screens, greenhouses etc can minimise the effects of cold.
	Sun	Sunlight is essential for plant growth. Removal of trees and structures can sometimes increase sunlight. Shade-houses, shade trees, screens etc can be used to minimise sun-light.

Hard landscape features	Paving and paths	Paving and paths have practical benefits. They can also be used to create visual effects
	Walls	Walls can be used to block winds, retain earth, provide shade or shelter etc
	Fences	Fences have practical benefits. They can be designed to enhance the garden
	Rockeries	Rockeries are beds set in such a way as to appear natural
	Seating	Seating can be placed to emphasise particular garden features and allow passive enjoyment of garden areas
	Garden structures	Structures such as gazebos, sheds etc can enhance the recreational appeal of gardens and provide practical benefits such as tool storage
	Barbeques	Barbecues are a central aspect of many gardens

Statues, ornaments,
letter boxes etc

Furniture and other garden features can all be designed and placed to enhance the overall appeal of the garden

Table: Components of a Garden

COLD AND THE GARDEN

Understanding Frost

Frost is most likely to occur or be at its worst just before dawn.

Frost moves and settles lower down a slope, so plants higher up the slope are less likely to be affected.

On a frosty night, the air is colder at ground level. Frost can occur on the ground while not occurring on foliage a couple of metres up.

A wall or fence can provide protection from frost for up to half the height of the wall.

Increased ventilation stops frost settling: in some orchards, growers install huge fans to prevent frost damage!

Sometimes an abnormal warm spell that encourages new growth is followed by a cold snap; this tender new growth is MOST sensitive to cold.

Protecting Trees and Shrubs

Newly-planted evergreen trees and shrubs are most at risk from cold weather. At the start of winter, place tree guards made from hessian or plastic around susceptible plants.

Protecting Fruit

Excessive cold might not cause any obvious damage to fruit trees, but if you look carefully you may see the fruit buds have withered or dropped, and that can significantly affect your crop in the coming season.

Some cold is good though. Many fruit trees need a cold spell for the fruit buds to form but the same fruit trees can suffer if a frost occurs late in winter, especially if the buds have started to swell or open. Protect fruit trees by covering with shade cloth, applying thick layers of mulch, using irrigation at times of frost, or using fans to generate warm air.

Cold Weather Checklist

- Watch the weather report daily.
- Move cold-sensitive indoor plants away from windows. (Unless you have double glazing, frost can even move a few inches inside a heated house or greenhouse).
- Move susceptible tub plants under a shade tree or the eaves of the house.
- At the start of winter, put tree guards around newly planted trees and shrubs.
- Ensure good ventilation in the garden to minimise frost.
- Put a thick layer of organic mulch around cold-sensitive plants (as the mulch rots it generates heat; mixing in manure can help generate even more heat). Note that while mulches insulate the soil, they can attract frost as well.
- Cover seedlings with a cloche (a small portable frame covered with plastic or glass) or bell jar (use an old plastic drink bottle with the neck cut off).

Three Ways to Make the Backyard Warmer

- Trap heat – by creating suntraps or heat banks;
- Create heat – place mulch around plants to keep the soil warm;
- Stop cold coming in – by planting windbreaks and building fences; by putting guards around cold-sensitive plants.

PLANT SELECTION CRITERIA

When selecting plants for use in horticultural situations, keep in mind the following criteria:

Availability and cost of obtaining plants

Some varieties of plants are only available in certain sizes or at certain times of the year. If the supplier is some distance from you, transportation costs also need to be considered. Also consider the cost to your time. Can all of your selected plants be purchased from one nursery or do you need to visit several places?

Ease of handling

Larger plants are more difficult to handle. Creeping, sprawling and prickly plants are also difficult.

Sundry materials

Stakes, ties and tree guards can be a significant proportion of planting costs. Some plants need more of these than others.

Vandalism

Consider the likelihood of both deliberate and accidental damage. Consider how easily the plant tissue will break and how well it will rejuvenate.

Pruning

Some plants require regular pruning to regulate or rejuvenate growth.

Fertilising and watering

How necessary will it be to provide this type of attention, and how often? If your region has water restrictions or if you pay for water, this can be an important issue.

Pest and disease susceptibility

Consider the likely need for regular pest control. Some plants (for example, citrus and roses) are more susceptible to pests and diseases than other plants. Disease-resistant plants will pose fewer problems in the long term

Tendency to drop fruit, bark or leaves

All plants drop wasted vegetation, but the rate and pattern of drop can create a lot (or very little) work. Consider where the plant will be located and its inherent characteristics. For instance, placing a deciduous tree beside a pool will require lots of additional pool cleaning.

Ease of removal

If the plant does die, how easy will it be to remove and dispose of? Is the wood hard or soft? Does the plant tissue burn, or is it non-burnable? Can the dead plant be used for composting?

Recycling of plant matter

If a plant is constantly pruned (or if it needs to be removed), can the material be used for something else? Compost, mulch, building material and fuel can all be provided this way.

Longevity

How long will the plant live? Some species live hundreds of years (e.g. oaks, elms, some eucalypts) while annuals and herbaceous perennials can have very short lives and need to be replaced each year.

General hardiness

Consider how hardy the plant is in respect to the following environmental features:

- Gas - Underground gas mains etc.
- Drainage - Does the site ever become very wet?
- Dryness - Does the site ever become over dry?
- Pollution – Carbon-monoxide, sulphur-dioxide etc. Are you near a main road or factory?
- Frost
- Wind

AESTHETIC PLANTING EFFECTS

Decide what aesthetic affects you want to achieve with your planting. Consider the following aesthetic elements:

- Mass/Density – Some plants have open foliage, others are dense. Also, you may want massed plants in some areas but not in others.
- Texture – Fine needle leaves give a different effect to large broad leaves.
- Colour – Changes occur throughout the year in the colour of flowers, fruit and foliage.
- Tone – Consider the degree and intensity of colour, as well as the relationship of light, colour and texture.
- Rhythm – Patterned arrangements of planting creates rhythm.
- Balance – A plant may be chosen for the way it relates to other plants, or equal numbers of plants may be used to create a sense of balance between two areas.
- Proportion – This aspect of balance concerns size relationships. A variety of short and tall plants may work best.
- Contrast – Contrast is a result of difference between components, and can be created with contrasting colours, textures, sizes and shapes.

PLANTING TECHNIQUES

Transplanting from Pots

Most container-grown plants are planted into the ground as follows:

1. Thoroughly soak the plant in the pot. This helps the plant come out of the pot more easily. Allow it to drain.
2. Dig an irregular-shaped hole at least twice the width of the pot, and one and a half times the depth of the pot. Roughen the sides of the hole with the edge of the spade – this is especially important in hard-packed clay soils.
3. Fill the hole with water to check for drainage.
4. Adjust drainage if required by either (a) loosening the subsoil using a fork, or (b) loosening the subsoil. You can also plant into a raised bed or install drainage pipes. The method used depends on how quickly the soil drains.
5. Add well-decomposed compost to the soil that was removed from the hole and also some organic fertiliser such as Blood and Bone.
6. Fill in one third of the hole with the mixed soil.
7. Take the plant out of the pot.
8. Loosen any exposed roots (i.e. if most of the roots are inside the soil ball, you might not need to do much. If there is a tight mass of roots on the outside of the soil ball, you may need to break a centimetre or so into the ball all over. This is best done with a sharp knife or secateurs: cut into the root ball from the bottom to the top in four sections around the ball). A hose can also be used to wash soil from the outside of the root ball then gently free the roots.
9. This is a particularly good method when the potting soil has become air dry and no longer holds water and roots become more or less trapped within the dry root ball. Free any roots circling the bottom.
10. Place the plant in the hole and cover with soil, then press the soil gently using your hands.
11. Make a lip of soil around the base of the plant to hold water.
12. Soak thoroughly with water.

Drainage can be tested easily by observing the way in which water moves through soil which is placed in a pot and watered. However, when soil is disturbed by digging, its characteristics may change. Another way to get a

more reliable result is to use an empty tin can. With both the top and bottom removed, it forms a parallel-sided tube which can be pushed into the soil to remove a relatively undisturbed sample. Leave a little room at the top to hold water, add some to see how it drains and then saturate the soil and add some more water to the top. You will often note slower drainage on saturated soil.





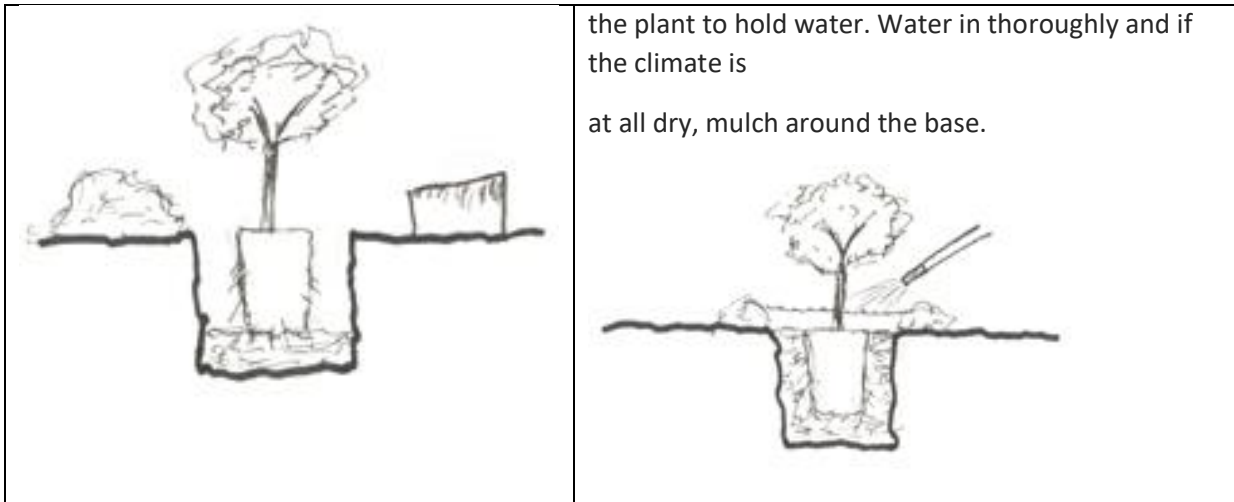
When adding fertiliser of any type, always read the instructions on the bag. Over fertilising is as bad as under fertilising. Non-organic fertiliser is best added once the plant has had time to establish itself, eight or so weeks after planting.

Fertiliser

You can use concentrated, fast-acting fertilisers which will feed more nutrients to the plant very quickly, or slower-acting, long-term fertilisers. There are many possibilities in between these two extremes. Avoid direct contact between the roots of a young plant and the stronger fertilisers. Usually, a slower-acting fertiliser is more appropriate with planting, particularly in sandy soils. Blood and bone or slow-release pelleted fertilisers are ideal for most plants.

Basic Planting Procedure

<p>Step 1.</p> <p>Dig a hole bigger than the root ball</p> 	<p>Step 2.</p> <p>Put loose soil back in the bottom of the hole, sufficient that the plant will be raised to ground level when planted. Mix some fertiliser into the loose soil and moisten. If soil is dry, fill hole with water and let it drain before planting.</p> 
<p>Step 3.</p> <p>Remove plant from container and place in hole.</p>	<p>Step 4.</p> <p>Fill in the sides with soil and firm down then make a ridge around</p>



Staking

Staking is often not necessary. It can, in some cases, do more harm than good. Plants should be staked if they are likely to fall over (perhaps because they are exposed to severe winds or because they are loose in the soil). They might be staked to protect them from vandalism or unintentional damage.

When you do tie a plant to a stake, the tie should be loose, allowing the plant to move about in the wind. If movement is restricted, the tree may never develop proper strength in its join between the roots and trunk.

Bare-Rooted Plants

These include such plants as deciduous trees and roses (occasionally perennials and herbs also). When handling a bare-rooted plant, it is essential to keep the roots protected from drying out. Store plants in a container filled with moist wood shavings. When you are ready to plant, look carefully over the roots first. When you are ready to plant, look carefully over roots first. Any broken, rotten or dead roots should be cut off. If you cut the roots back for this or any other reason, cut the top back proportionally. Ideally any cuts should be dusted with some type of fungicide.

Time of Planting

Avoid planting on hot or windy days. Plants are more likely to dry out in these conditions. Deciduous trees are usually planted in early winter (as are all bare-rooted plants), because it is at this time of the year that these trees are released to the nurseries for sale. This is because these plants are generally dormant at this stage, and transplant shock will usually be only minimal. Also they are easier to transport and handle without their leaves.

If plants are likely to get a lot of attention, they can be planted successfully at almost any time of year, however, if they are going to be neglected they are best planted prior to the cooler months, or wetter time of the year (ie. in the cooler climates planting is best in autumn or winter, allowing plants to establish before the harsher months). If planting in warm areas where the wetter months are over summer, you can plant almost any time of the year as long as you provide sufficient moisture during dry periods, and good drainage during wet periods.

WHEN TO PLANT?

The time of planting is determined by the following:

Plant Variety

Most evergreen plants are planted in mild weather. In temperate and warm climates, they are usually planted in late summer to early autumn. This allows the root system to establish before the rapid growth of spring and the harshness of the next summer. Very hardy plants can be planted with the same chance of success at any time.

Frost-tender evergreen plants are usually planted in mid to late spring, after frosts have finished. This allows them to establish before the harshness of the next year's frost.

Deciduous plants are best planted in winter because they are dormant at this time. This means the risk of disturbing the plant is minimised.

Area or Locality

Consider the effect of rainfall patterns, soils, climatic extremes and altitude:

- High rainfall areas with good rich soils can be planted at most times of the year.
- Areas prone to strong winds should not be planted until after the windy time of year is over. This gives plants a chance to establish before the next windy season.
- Exposed, hot areas are best planted after the hottest time of year, allowing time for establishment before the next hot season.
- Areas prone to flooding (even if planting flood-tolerant plants) are best planted after the wet season so that the young root system can firmly establish in the soil before the plants experience their first wet season. This means the young plants will have a better chance of holding in the soil when they face their first flood.

Availability of Plants

The nursery industry produces different types of plants to become available for sale at particular times of the year. At certain times you cannot plant certain varieties because you cannot buy them.

DIFFERENT POTTING NEEDS

Moving Plants

When you move to a new house, some plants are just too good or cherished to leave behind. If the plant is small enough for you to manage, here's what to do.

- Well before you are ready to leave, dig a trench the size of the pot around the plant. This severs any roots that won't fit into the pot and reduces transplant shock.
- One or two days before removal, thoroughly water the root zone. This helps to bind the soil together.
- Prepare the container you are going to use. Place a layer of standard potting mix at the bottom.
- Dig up around the plant, taking as much soil and roots as possible.
- If the soil is crumbly, slide a plastic or hessian bag underneath to bind the root ball together when you move it to the pot.
- Place the plant in the pot, backfill with potting mix and water well. (Remember to let all the water drain out before you put it into the car!)
- Don't leave garden plants in pots any longer than you have to. Garden soil is not suitable for use in containers. Place the plant into your new garden as soon as possible.

Potting up a Hanging Basket

Hanging baskets are prone to drying out because they are up high, exposed to drying winds. They tend to be smaller and shallower than plants in other pots, holding less soil and water. Often, they are not watered enough because they are too hard to reach.

- Use small plants, preferably ones that are easy to replace as soon as they die out (e.g. annuals).
- For a wire basket, line the basket with sphagnum moss or use a fibre liner.
- Half-fill the basket with potting mix specially designed for hanging baskets. These mixes contain water crystals, so if you use an ordinary mix make sure to add your own water crystals.
- Take the plant(s) out the pot(s) and place in the basket. Small plants (preferably with trailing stems) can also be planted into the sphagnum moss in the sides of the basket.
- Cover the roots with soil and water thoroughly.
- Cover the basket surface with fine bark mulch to hold in moisture.
- Water daily throughout warm weather and pinch back any leggy, vigorous growth.

Porous Pots Need Different Treatment

Some pots dry out more easily because they soak up moisture from the potting mix, e.g. terracotta pots. These may be good for plants that like dry soil but are a problem with plants that need moist soil.

For the best results:

- Use a potting mix specially designed for terracotta pots; these have materials added that retain water for longer;
- Add peat to the potting mix (soak the peat first so that it can absorb water);
- Add water crystals to the mix;
- Cover the surface of the mix with mulch (small pebbles or a fine bark mulch).

MULCHING

Mulching has several advantages as follows:

- Mulches help to control weeds. A thick layer of mulch will prevent the germination of many weed seeds. Weeds that do grow in the mulch layer are easily pulled out by hand.
- Mulches conserve soil moisture. A layer of mulch shades the soil from sun and wind, reducing the rate of moisture evaporation.
- Organic mulches improve soil structure. As the organic matter breaks down it is incorporated into the soil, leading to improved drainage, aeration and moisture-retention.
- Organic mulches may increase the nutrient level and fertility of the soil.
- Mulches reduce fluctuations in soil temperatures.
- Organic mulches promote earthworms, which have beneficial effects on soil fertility and structure.
- Mulches reduce soil erosion by intercepting runoff during heavy rain.

Almost anything organic (that is, deriving from plant or animal material) can be used for mulch. Here are just a few examples: household compost, wood shavings, composted sawdust, tan bark, pine bark, leaf litter, shredded paper, straw, prunings, rotted animal manure, lawn clippings (best dried and mixed with other organic matter for improved water penetration), cardboard. There are even some inorganic materials which are useful as mulches: gravel, scoria, blue metal, coarse sand, river pebbles. However, inorganic mulches do not enrich the soil.

Note that although plastic was used extensively as a garden mulch in the past, and there is a technique for successful use of plastic in some horticultural crops such as strawberries, general home garden use of plastic mulch is now discouraged. Problems associated with use of plastic sheet mulches include poor water penetration, souring of soil under the plastic, moulds growing under the plastic, and weeds growing through cracks as the plastic cracks over time.

GARDEN TOOLS

Shovels and Spades

The mouth of a shovel is designed to hold earth (it is more cupped) whereas a spade is straight and shaped to cut or dig the soil. Spades and shovels can both be purchased with long or short handles. Short-handled spades are designed for lighter work than the long-handled spade. Both spades and shovels can also be obtained in different gauges (i.e. thickness) of steel and in different strengths or quality of steel.

Long-handled tools give more leverage and reach.

Hoes

Commonly used for weeding vegetable, shrub and flower bed areas, hoes are available in a variety of different types (all usually with long handles).

The three basic styles are:

- Chipping hoes (e.g. swan-necked, thistle, chipping, burr and grubbing hoes) - These move from above the weed, chipping into the soil at its base.
- Push action (e.g. Dutch hoe or onion hoe) - These have one cutting edge at the front which is pushed through the soil with the cutting edge below the soil. The cutting edge should always be kept sharpened with a grinding stone.
- Push pull hoes (e.g. push pull and torpedo hoes) - These hoes have both the front and back edges sharpened. They are pushed AND pulled below soil level. Weeds are cut with both actions.

Rakes

Used for levelling areas in preparation for planting etc. As with spades, they are available in different quality steels. For continual use, it is important to have a quality tool. Home garden rakes will fall apart very quickly if used daily by a landscaper. Nail rakes (where teeth are riveted into a separate piece of metal) are usually weaker than solid steel castings.



Forks

Potato or digging forks are suitable for heavy digging. Manure, hay or baling forks are not suited to digging. Once again, these are available in different quality steels.

Secateurs

There are three main types of secateurs:

- By-pass secateurs - By-pass secateurs use a scissor-type action and have a sharp upper blade which cuts against a sharp lower blade to make a clean, precise cut.
- Anvil secateurs - Anvil secateurs have a sharp upper blade that cuts against a lower anvil. These secateurs can crush woody material if they are blunt.
- Parrot-beak secateurs - Has rounded blades that use a scissor-like action. Use care with these, as they can be dangerous.



How to cut

All cuts should be made at a sharp angle in relation to the ground. This prevents water from collecting on the cut surface, thus reducing the likelihood of disease problems. Where possible, cuts should be made just above a node (where the leaves and/or flower stems are or have been attached to the plant stem). This reduces the likelihood of dieback along the stem. It is also important to only cut material that is not too thick for the secateurs (ideally no more than 1-1.5cm, depending on the secateurs), otherwise you will find cutting to be a strain on both the secateurs and yourself, and the final cut is likely to be rough, torn or uneven. When using anvil secateurs, you should always cut down onto the anvil.



It is important to sharpen the secateurs' cutting blade regularly with a sharpening stone:

- On anvil types the blade should be sharpened on both sides.
- On scissor cut types, the blade should only ever be sharpened on one side (i.e. the outer edge - the side furthest away from the other blade when a cut is made).

Hedge Trimmers - Manual or Mechanised?

Shears (manual)

Manual shears are like a large pair of scissors, with two blades that cut upwards and downwards. They are useful for small areas of hedging.

Reciprocating blade trimmers

These are the most popular type of mechanised hedge trimmer. They have two long bars with sharp-edged teeth that move back and forth across each other. The blades are either single-sided, cutting only when moved in one direction, or double-sided, cutting when the blade moves up or down.

Reciprocating blade trimmers can be powered by petrol, electricity or hydraulics (ie. tractor mounted). Electric and petrol trimmers are the most commonly used hand-held trimmers. Electric trimmers are useful for small to medium hedges. They either have a power cord or a rechargeable 12V battery. Rechargeable trimmers have the advantage of not having a cord (which means they're safer and don't need to be plugged into an electricity outlet while they're being used), but they can only be used for short periods before losing power.

For frequent, heavy-duty use, a more powerful petrol-driven model is needed, typically with a 3 hp engine with the blades around 6cm long.

How to use trimmers

Most electric and petrol machines need to be handled with both hands to ensure a smooth and controlled cut. As with all power tools, safe use is a priority, especially if they're used standing on a ladder. Always be careful of sharp edges and take extra care with electric trimmers. Don't use them in wet weather and make sure the cord doesn't become tangled or a tripping hazard.



Lawn Edger

A lawn edger is used to give a neat and professional looking finishing edge to garden beds. Edgers are available as electric, two-stroke and four-stroke engines ranging from 850 watts through to 5 hp motors. Although it is possible to use a whipper snipper (brush cutter) with a specific line attached, to create a lawn edge, the dedicated steel blade edger is easy to manoeuvre and creates clean cut edges that are difficult to achieve with a whipper snipper or spade.

Bow Saw

Has a tubular steel frame in the shape of a 'C'. It is designed to cope with heavy duty garden work i.e. cutting logs and thick branches.

Pruning Saw

These generally have teeth designed to cut moist living timber, the teeth being generally larger than those on saws used for cutting furniture or construction timber. There are two types:

- Straight-bladed saws which allow variation in the type of cut according to the type and size of the material being cut.
- Curved blade saws with teeth on one side. This curved saw is generally used by the experts because the curved blade allows access to restricted areas such as near closely interlocking branches.

The pruning saw is ideal for pruning tall shrubs, hedges or trees it has a telescopic handle that allows you to extend your reach to at least two meters.

Mowers

Mowers can be either push type or motorised. For small areas, a hand mower is cheap to buy, cheap to run and can give an excellent finish to a lawn. If you have a medium to large area of lawn or are in business, you will need a motor mower. Motor mowers are powered by either 2- or 4-stroke motors or an electric engine.

2-stroke petrol mowers

Normally rotary, these engines are easier to maintain than 4-stroke engines, and cheaper to buy than 4-stroke engines.

4-stroke petrol mowers

These can be rotary or cylinder mowers. These are normally more expensive than 2-strokes but generally longer lasting mowers.

Electric mowers

These are less expensive than petrol mowers, because an electric motor is cheaper; but they don't last as long. A power cord trailing behind can be dangerous if you are not careful.

Cylinder vs. rotary mowers

- Cylinder mowers cut the grass by a shearing or scissor action. The blade hits the grass at a sharp angle (e.g. 45 degrees); this causes a clean cut with minimal bruising or tearing (blades are damaged by rough surfaces and by stones, sticks etc.). Cylinder mowers are generally safer to use than rotary mowers.
- Rotary mowers cut by impact action, hitting the grass at a 90 degree angle. This causes bruising, tearing and a less even cut than a cylinder mower. Rotary mowers will handle rough surfaces better than cylinder types. Rotary mowers are less expensive and easier to maintain than cylinder mowers.

Hover mowers

These are wheel-less mowers which float like a hovercraft on a cushion of air created by movement of the rotary cutting blade. They can be powered by either a petrol or electric motor. Hover mowers won't cut long grass or slightly damp grass very well at all but are very good on steep slopes and on rough ground (if grass isn't too long). Hover mowers generally cut faster than cylinder or rotary mowers, as long as the grass is not too long.

Ride-on mowers

There are many different types of ride on mowers on the market. Some are notorious for breaking down. Generally, you get what you pay for. Shop around and talk to people who have used ride-ons before. Talk to several different mower repair shops and people who work in the horticultural industry. Some ride-ons are not very manoeuvrable in tight corners (e.g. around trees) and can cause compaction on heavy, wet soils. You will almost certainly need a hand mower or brush-cutter to cut inaccessible places.

Ride-on mowers have the advantages of quicker coverage of the land area, a high degree of manoeuvrability, and a wide width of lawn can be cut in one run.

Modern hydrostatic drives give smooth rides and gear changes to offer quick, easy and light handling of the machine.

Mowers are available with front, mid or rear-mounted mower decks (the cutting unit). You can select to have the clippings left on the ground or an attachment will have them collected in a catcher for later 'dumping' (for compost).

Front mowers cut the grass before the wheels of the machine press the grass down. This means the lawns will be cut more evenly to produce a level finish. Additionally the front-mounted mowers tend to glide over uneven ground very well.

For the gardener there are two slight variations available:

- Ride-on Mower – these generally have a rear-mounted single cylinder engine
- Lawn Tractors – these are better suited to larger gardens with a mid-mounted two blade mower deck.

Brushcutters/Trimmers

Brush-cutters are mainly used to cut long grass or trim weeds and grass along fence-lines, around the base of solid obstacles (e.g. trees, statues, seats etc), or over ground too rough to use a mower on.

There are two different types of brush-cutters: those with a nylon cord which will cut grass and light weed growth, and those with a metal blade (i.e. like a circular saw), used to cut heavier growth such as woody weeds or scrub. Some brush-cutters are able to do both with a simple change of the head equipment.

Nylon cord cutters (e.g. Whipper Snippers, Trimmers)

- A spinning nylon cord (up to 30cm long)
- These are generally smaller, more lightweight and used for trimming around the edge of lawns, the base of buildings or trees, or cutting grass on slopes or other inaccessible places.
- These are relatively cheap machines. The nylon cord is cheap and easy to replace when damaged.

- May be powered by an electric motor or petrol engine.

Metal blade cutters

- A spinning disc with blades made from plastic or metal.
- These are more heavy duty machines able to cut long grass, blackberries or (in the case of the more powerful machines) more substantial brush.
- The machines and blades are more expensive than the nylon cord brush-cutters. The blades need to be kept sharp.
- Powered by petrol motors

Mulchers

In recent years a number of garden mulchers/shredders/chippers have become available. These range from small, portable, usually petrol driven types for the home garden to large, heavy duty machines either petrol driven or operated by power take-off units attached to tractors and trucks. They generally operate by feeding plant materials of a suitable size into a chute where it comes into contact with a rapidly revolving blade or series of blades. These shred the material into small pieces and expel it into a container such as a truck tray or onto a pile on the ground. As the blade rotates and cuts the plant material it helps pull the rest of the material down the chute. For home garden versions, the size of the material that can be shredded is generally up to about 2 to 3cm thick. Larger machines used by commercial operators can chip material up to around 15cm in diameter.

Only plant material should be put into the machine to be shredded. Other material can readily damage the blades and other working parts. These machines are noisy. Hearing protection should be worn when the machine is being operated and the manufacturer's safety instructions should be followed closely. These machines should only be operated by adults and they should be used in observance with the safety instructions provided by the manufacturer.

Rotary Hoes/Rotovators

Rotary hoes are used to loosen or cultivate soil, making it easier to dig in or move about. They may be self-propelled or driven by a "PTO" attachment to a tractor or mini tractor. Self-propelled machines normally use petrol engines and move forward by rubber tyre drive-wheels or by using the rotating blades to pull the machine. Most need a reasonably strong and fit person to operate them properly. Tractor mounted machines are easier to operate but more expensive to buy (given that you need a tractor to operate them).



Small self-propelled units are best in small areas and soil depths of 15 to 20cm, while the tractor operated versions are best for larger areas and where greater depths of cultivation are required.

A rotary hoe (with or without operator) can be hired at a very reasonable rate to cultivate soil prior to landscaping a new garden. The home gardener would not normally buy a rotary hoe unless they were going to use it regularly (perhaps to cultivate a large vegetable garden). In comparison, a business person may be able to justify the purchase of such a machine.

TERMINOLOGY

Annual: A plant that completes its lifecycle in one year (i.e. a seed germinates, grows to full size, develops flowers, then seed, within one year).

Biennial: A plant that takes two years to complete its lifecycle.

Perennial: A plant that takes several years to complete its lifecycle.

Deciduous: A plant that loses all its leaves regularly at a time during the year (e.g. winter in cool climates, summer in warm, dry climates).

Evergreen: A plant which retains leaves all year round, dropping a few at a time all year round, but never all their leaves.

Semi-deciduous: A plant which drops more leaves in one season than in another but never loses all its leaves at the one time.

Herbaceous: In botanical terms, a herbaceous plant is simply a non-woody (i.e. soft-wooded) plant. In horticulture, the term is often used to describe soft plants which in their native climate die back each year and then regrow from the old root system.

Pot-bound: a plant growing in a container which has excessive root growth for the size of the container it is in. A pot-bound plant has two problems:

- The root system has been restricted from developing. If planted, it might have difficulty breaking out of the tight ball it is in.
- The pot may have become so full of roots that there is little left for the plant to feed on.

150mm pot: This indicates the pot size in terms of diameter of the rim.

Tube: Indicates a pot which is deeper in relation to its diameter than a standard pot. Usually tubes are smaller-sized containers which are commonly used for potting on individual seedlings and cuttings, and also for germinating individual large-sized seeds.

SET TASK

Set Task Activity 1.

Drive or walk around your locality. Note what types of plants are growing in gardens in your area. Observe how well or poorly different types of plants seem to grow. Observe which species which seem to be most popular in local gardens.

Set Task Activity 2.

Find two plants which have been planted in good locations and two plants which have been planted in poor situations.

List why the positioning of each of these plants is good or bad.

Pruning

Part 3 Aim

Understand plant pruning requirements and methods.

WHY DO WE NEED TO PRUNE TREES AND SHRUBS?

Trees and shrubs growing in their natural state manage to attain full size without the help of humans; however there are important differences between plants in nature and plants growing in a man-made environment. Trees, shrubs and other plants in the garden need to remain shapely and attractive – without pruning many garden plants become lanky, unattractive and flower poorly. Also, in many situations, access and safety are important. Pruning ensures public access is maintained and prevents unsafe branches dropping on buildings, power lines and people.

Common Reasons for Pruning

- To remove old, dead, or diseased plant material.
- To improve, maintain or change the shape.
- To thin out branches and foliage that are crossed and tangled.
- To clear branches obstructing things such as power lines or buildings.
- To maintain a bushy, compact habit.
- To stimulate new growth.
- To stimulate or sustain flowering.
- To reduce fruit load so that remaining fruit grows well.
- To limit the size of a plant.

When to Prune

- Spring flowering shrubs and trees - immediately after flowering.
- Rhododendrons and azaleas - mid to late spring as the main flush of flowers diminishes.
- Conifers - when new growth is lush (candle stage).
- Hedges - several times a year, whenever they look untidy.
- Birches, walnuts and maples - late autumn or early winter. These trees bleed sap badly and are best pruned when sap flow is minimal.
- Deciduous fruit trees – when bare but not too cold (normally June and July in the southern hemisphere; October to November in the northern hemisphere. Watch for trees that flower late in the season, and do not prune when buds are moving.
- Ornamental fruits and berries - after the fruits or berries finish.
- Australian natives - tip prune all year. Avoid peak flowering times.
- Frost-tender plants - after frost period.
- Deciduous trees - avoid late winter, early spring if possible.

BASIC RULES OF PRUNING

1. Always prune to a bud. A cut should always be made just above a bud, or just above the join with the main branch. The plant will die back along a stem to the next bud or stem down the branch; you should aim to minimise the amount of die back at all times.
2. Always cut on an angle to the ground so that water doesn't sit on top of the cut causing rot to develop.

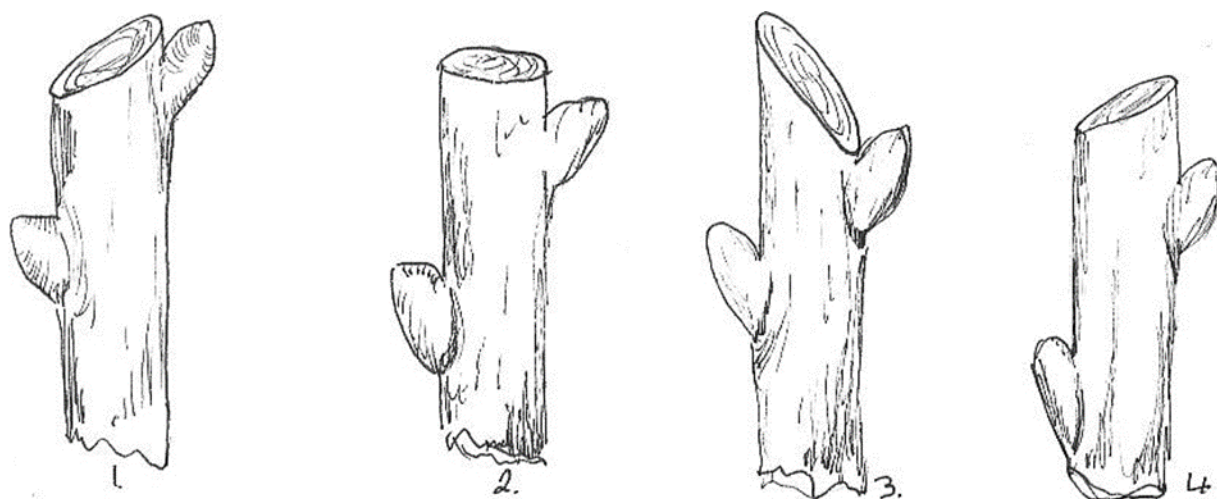
3. If your cut is rough or torn, trim it up with a sharp knife, making it as smooth as possible. Disease will enter through torn and damaged surfaces.

4. The time of pruning will depend on what you want to achieve from the plant. If you are growing it for flowers, prune it after flowering, otherwise you will be cutting off the flowers). If you are pruning to thin flowers or fruit (to encourage better quality flowers and fruit), prune before flowering.

If a deciduous fruit tree needs pruning, you should do it in winter because:

- You can see what you are doing (there are no leaves on tree)
- You can thin out the fruit buds, controlling their distribution over the tree
- You can cut to encourage development of the type of growth which will produce fruit buds in the next year.

5. Most deciduous plants, trees and herbaceous plants can be pruned reasonably hard (although there is a degree of variation from plant to plant). Many evergreen shrubs can react badly to heavy pruning, though light but frequent tip pruning is generally advantageous.



Pruning cuts for fruit trees. Cut no 1 is correct. Other cuts are unsuitable

Rejuvenating Plants Through Pruning

The lifespan of a plant is generally lengthened by regular pruning. Removing old wood, and leaving newer wood on the plant, will rejuvenate most plants. Roses are typically pruned this way in temperate climates - over a period of years, the younger growth emerging from the base of the plant are left if strong, while the older woody stems are cut out. The lifespan of a rose is increased greatly by this method.

Different Pruning Techniques

- Thinning - Removing old, twiggy, crossing over, weak, diseased and excess wood to reduce density of growth without reducing the plant's height or width.
- Heading - Producing more compact and better shaped plants, reducing height and any imbalance in width (e.g. unsymmetrical growth).
- Shearing - Cutting to predetermined lines (e.g. trimming a formal hedge).
- Rejuvenation - Hard pruning aimed at replacing basic framework of the plant with a new framework made from new, vigorous and healthy wood.

HOW TO PRUNE TREES

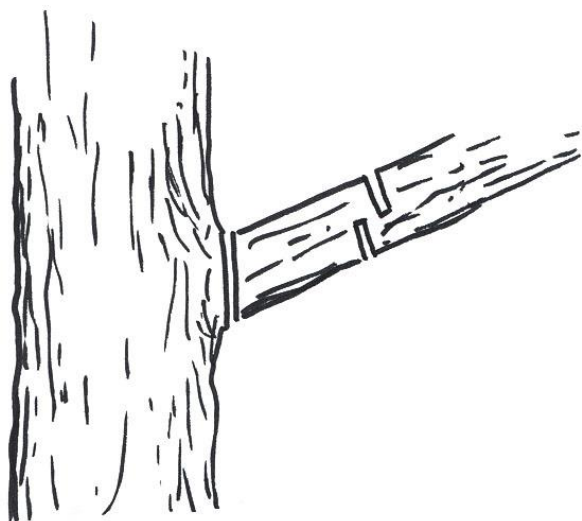
The main objectives of tree pruning are:

- To shape the young tree in way that will develop a well-balanced crown.
- To remove dead and dangerous branches before they fall.

- To remove crossing branches in order to open up the inside of a crown and to reduce the likelihood of wounds through branches rubbing together.
- To thin the crown. This decreases wind resistance, allows more light and air in the centre, reduces demand on roots (desirable if roots have been damaged), renews growth, and decreases the likelihood of branches dropping.
- To remove lower branches to improve access past or under the tree.
- To reduce overall size of the crown where the tree has outgrown its situation.
- To repair damage through fire, storm, etc.
- To promote flowering or fruiting.

When you prune a tree you should do the following with each cut you make:

- Use sharp and clean tools. Your cut should be sharp with no tears.
- When removing a branch don't cut it only half off; take it right back to where the branch is joined to a more major branch.
- At this intersection, make your cut from the outer point of the bark ridge (i.e. a fold/swelling of growth on the top or inside of the intersection between the two branches), to the outer point of the collar (i.e. the swollen section on the bottom of the intersection between the two branches).
- When dropping a heavy branch, first cut about 45cm above where you will make the final cut on the underside of the branch. Next, cut about 15cm further up the branch than this on the upper side. These two cuts allow you to remove the greater mass of the branch with minimal tearing. You can then make your final clean cut.



The safest way to remove a heavy branch is in three steps:

- Cut under the branch, at least 30cm up from the trunk.
- Cut above, but further out from the trunk. The bulk of the branch can then be dropped.
- With far less weight left on the stump, make a final cut back close to the trunk.

Some Commonly Used Tree Pruning Terms

Crown maintenance: Refers to a tree's crown (includes the trunk and canopy) involving any treatment to enhance structure, aesthetics, longevity and safety.

Formative pruning: To improve upon form, structure, create a desired shape. Usually applies to young trees.

Crown lifting: Raising of canopy for greater access and light penetration.

Crown reduction: Reduction in size by cutting branches back to growth points (or laterals) no less than 1/3 the diameter of the branch being removed. Also known as Drop Crotch Pruning

Lopping: Lopping or heading is the indiscriminate removal of a tree's crown to internodal areas, leaving stubs.

Crown cleaning: Akin to hazard-reduction pruning, is the removal of dead, diseased, dying, crowded, poorly attached branches and water shoots.

Crown thinning: Is the reduction of foliage density to encourage wind and light filtration, as well as lighten weight of limbs.

Corrective pruning: Is for injured (storm/mechanically damaged) and lopped trees.

PRUNING IN THE HOME ORCHARD

There is much less certainty today about the best method to prune a fruit tree than there was thirty or so years ago. In the past, fruit trees were pruned in the shape of an inverted cone (called a vase shape). Experiments have shown that several other techniques can be just as, or more, productive than the vase system.

With improved watering, fertilising and weed control, trees are now able to carry a lot more fruit than they could a few decades ago. Consequently, the detailed heavy pruning of the past is not generally practised nowadays. In the home orchard, pruning can be largely adapted to shape the tree so that it fits into the general function and design of your overall garden. If you want to prune so that you can walk under or past one side of your fruit tree, this is acceptable.

Before Pruning

Before you start pruning, look closely at the tree and try to understand how it grows. What parts of the tree produce flowers and fruit? What shape do you want to achieve? Would you prefer a heavy crop of small fruit or a smaller crop with larger fruit?

Deciduous fruit trees are usually pruned in winter because the tree is bare of leaves and it is easier at that time to see what you are cutting.

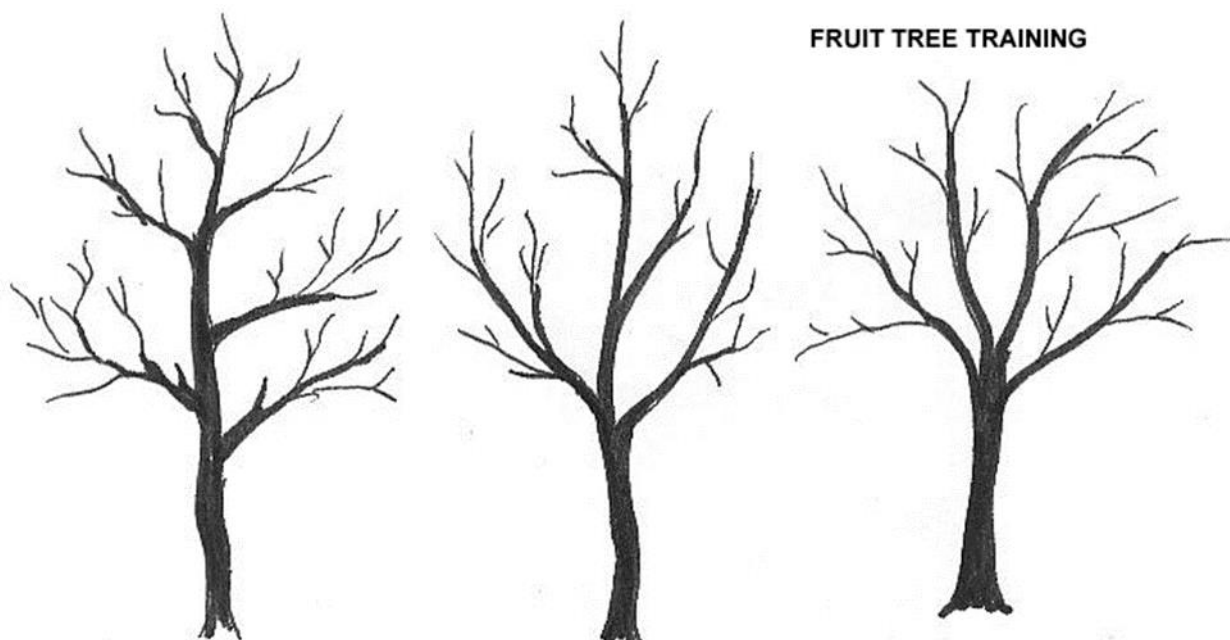


The almond (A), peach (B) and apricot (C) stems showing differences between vegetative and flowering buds.
Vegetative buds are small and pointed, where fruit buds are large and plump

Note the size of the buds. Larger, plump buds are flower/fruit buds. Narrower buds are vegetative (these buds give rise to leaves or green shoots.) The frequency of flower buds gives an indication of the amount of fruit the tree is likely to bear. (Note: On some types of trees, one bud can produce several fruit; on others one bud only produces one fruit.)

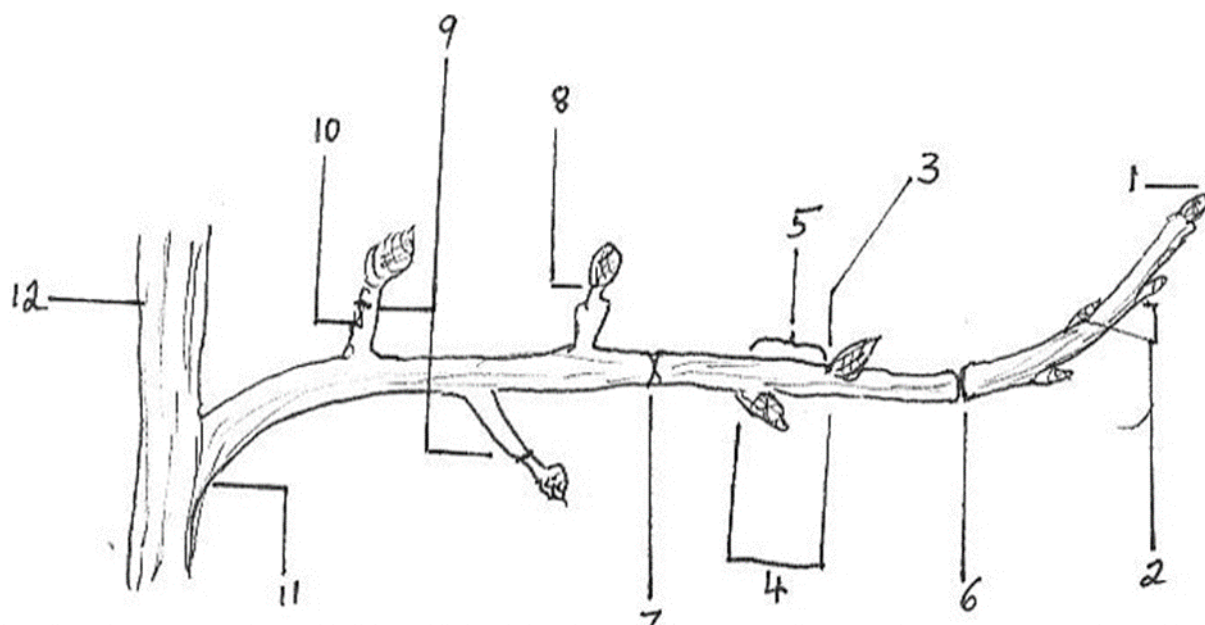
You will notice that fruit buds are borne on particular parts of a tree. For example, peaches bear fruit on one-year-old laterals; apples bear fruit on the tips of one-year-old laterals as well as in small clusters of compact growths called 'spur systems'.

The basis of your pruning should be to cut in a way that encourages development of the type of growth that will produce fruit for future years but, at the same time, leaves sufficient fruit buds to allow a reasonable crop for the coming season.



FRUIT TREE TRAINING

Different pruning system: central leader, modified leader and open center



Twig of apple or pear: 1 terminal bud, 2 lateral buds, 3 leaf scar, 4 nodes, 5 internode, 6 annual rings (last year's growth from here out), 7 annual rings (previous growth, here to 8 spur that has not yet fruited), 9 spurs that have fruited, 10 annual rings or spur, 11 annual rings (twig started growth from here), 12 parent branch.

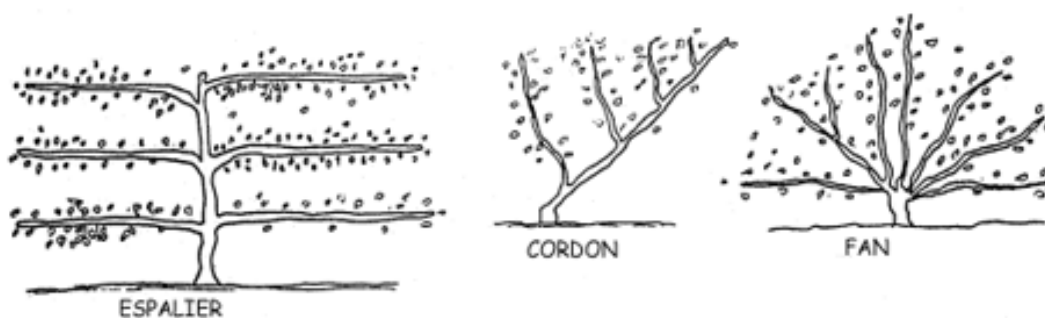
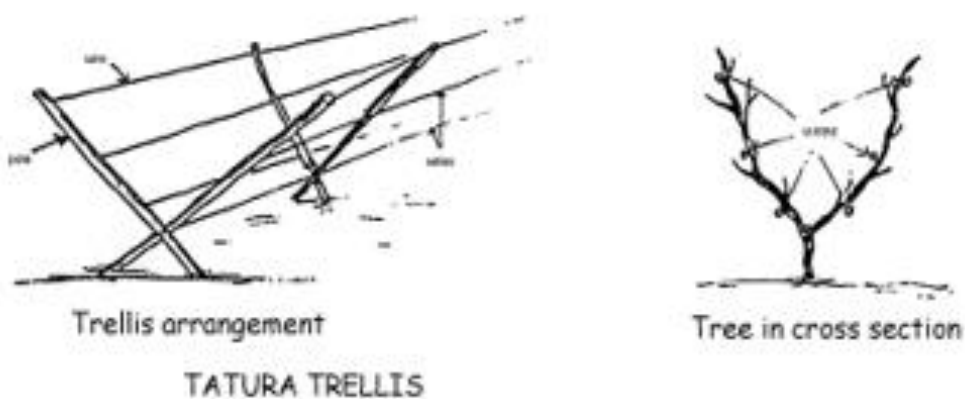
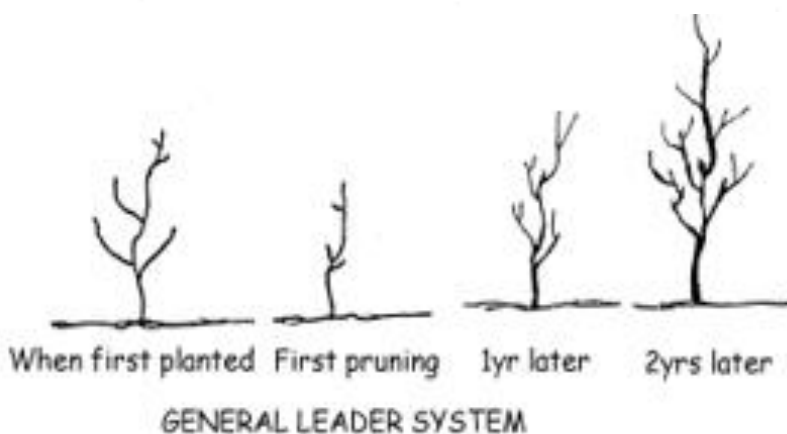
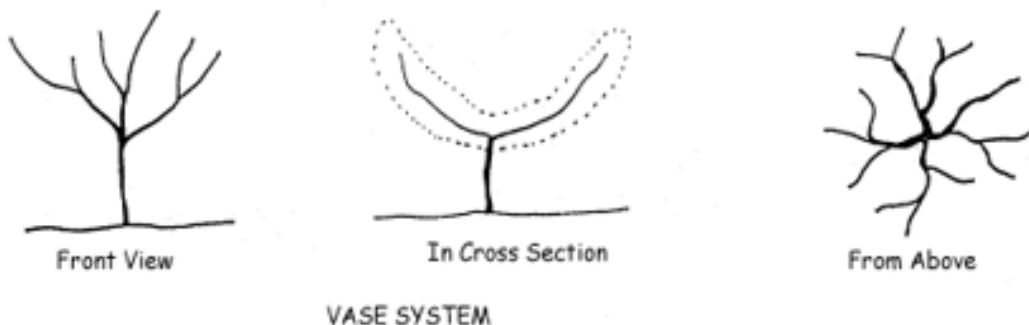
Crown Thinning

The density of branches and stems is reduced without reducing the overall height or width of the tree.

Points to Consider when Pruning

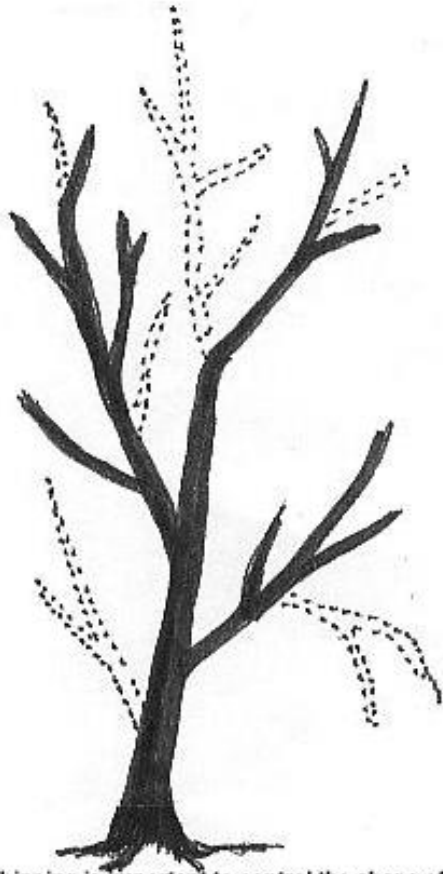
- Keep pruning tools sharp and clean (preferably sterilise between uses).
- Smooth, clean cuts are best to avoid disease.
- Cut on an angle, away from the node or bud below, so that water can drain off.
- The vigour of the plant or shoot depends on the direction of growth and the amount of leaf surface (among other things).
- The more a shoot approaches the vertical position, the stronger its growth will be.

- The top or terminal bud of a shoot generally has the greatest amount of growth. The growth potential of the buds will gradually decrease as you come closer to the base of a shoot.
- The greater the vegetative growth, the lighter the crop, resulting in larger but poorer quality fruit.
- The fewer the number of buds on a shoot, the stronger will be the growth made by each individual shoot arising from these buds.
- All fruit should be removed from young trees for the first few years after planting, to allow the leaf and stem growth to develop.



METHODS OF TRAINING ON A TRELLIS

PRUNING DIAGRAM



Thinning is important to control the shape of a plant either when young or mature

OTHER SPECIALISED PRUNING METHODS

Bonsai

During spring and summer, shoots are selectively shortened to a predetermined shape.

There are five bonsai cuts:

- To shorten a shoot
- To remove a branch from the trunk or removing a dead or diseased branch from the trunk
- To shorten the trunk
- To shorten a branch
- To eliminate unwanted branches if a branch does not conform to the required shape.

Topiary

This is where plants are shear pruned to form predetermined shapes. The shape may be cut from a dense-growing shrub (e.g. *Buxus*) or from another plant grown on a framework (wire, metal pipe, etc).

Standard

The basic shape achieved is a single trunk or stem with a clump of symmetrical growth on top.

SET TASK

Set Task Activity 1

Use the internet to gather as much information as you can about different types of pruning tools available, noting how they compare in price, quality and any other features.

Set Task Activity 2

If you are able, also visit two businesses that supply pruning tools and observe the different types of equipment available.