Lesson 1

PLANT IDENTIFICATION

Aim

Explain the binomial system of plant classification and demonstrate identification of plant species through the ability of using botanical descriptions for leaf shapes and flowers.

This first lesson sets the stage, so to speak, for the remainder of the course. As such, it has considerably more reading than most of the other lessons. Read the material thoroughly and understand what you are reading, but do not get bogged down in trying to remember every detail.

Horticulture deals with living things and as such is somewhat unpredictable and variable. The way you treat a plant is different 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 who it was written by (e.g. 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 might very well grow twice as tall in the eastern suburbs of a large city as the height it grows 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 of the alternatives. They all have their pros and cons, and it is up to your own preferences as to which way you choose to do something.

This subject has been written to teach horticulture in a way which will be relevant to all parts of the world. It puts aside regional techniques, and tries to teach you principles and concepts which can be applied to anywhere. Keep this in mind as you study. Try to see the principles. You are not just studying facts.

PLANT TAXONOMY

Botanical/Horticultural Nomenclature

Plants are generally given two different types of names:

1. Common Names 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 can be given to several quite different plants. This, along with the fact that there is no real control over common names, makes them inaccurate and unreliable for plant identification.

2. Scientific Names are based on the Latin language. These names often seem more complex than common names at first glance; however they have a system to them, which can make plant identification much easier. The system of scientific naming is strictly controlled and coordinated by botanists throughout the world. Scientific names should always be used in preference to common names. Much of the Latin in scientific plant names will describe certain characteristics about a plant – thus knowledge of

Latin can be of help when studying plant names.

The Binomial System

The scientific plant names, which 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. This word starts with a capital letter.
- The second word is the species name of the plant. In general, this word starts with a lower case letter. There are exceptions to this rule – some people capitalize the first letter of a species name where a species has been named after a person or country. Unless you are aware of a case like this, it is normal to start the species name with a lower case letter.

Example of how to write a binomial plant name: *Azalea indica.* Azalea is the genus and indica is the species name. When writing a scientific name of a plant, it is conventional to either italicize or underline both words in the name; e.g. *Azalea indica* or <u>Azalea indica</u>

Botanical Classification

In the scientific system, plants are classified by dividing them into groups, which have similar characteristics. These groups are then divided into smaller groups with similar characteristics. These are divided again and so the division of group to sub group and sub group to further sub groups goes on, until you finally have only one type of plant in each group.

There are many different levels of division, although the main ones which we use on a day to day basis are at the bottom end of the scale (i.e. family, genus, species and variety).

The main levels of division are as follows:
All plants are divided into PHYLA (singular: Phylum)
Phylum is divided into DIVISION
Division is 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.

The main plant phyla we are concerned with in horticulture are:
ANTHOPHYTA (i.e. Angiosperms). This group includes all of the plants that produce flowers, e.g. Eucalypts, roses, lettuce, grasses.
CONIFEROPHYTA (i.e. Conifers). This includes all plants that produce cones, e.g. Pines, cypress etc.
PTEROPHYTA (i.e. Ferns)
Other phyla include such things as mosses, fungi, bacteria and algae.

Anthophyta is divided into two classes:
1. 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 also tend to have a taproot with lateral branches, as opposed to a fibrous root system.
2. 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 (e.g. grasses, irises, orchids). Monocotyledons also tend to have a fibrous root system, as opposed to a tap root with lateral branches.

Plant Families and Species

It can be seen above that 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 (syn. Labiatae) family...foliage is perfumed, stalks are 4-sides (i.e. square-shaped) and flowers have two distinct lips.
- Araceae family...leaves are usually heart shaped (e.g. Philodendron) and plants are commonly tropical/indoor plants.
- Asteraceae (syn. Compositae)...have daisy-type flowers.
- Apiaceae (syn. Umbelliferae)...flowers occur in an umbrella-like head on a single stalk.

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”.

Example: *Eucalyptus ficifolia*
Eucalyptus is the genus, *ficifolia* is the species
The family this plant belongs to is the Myrtaceae family

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

Example: *Acer palmatum dissectum atropurpurea*
Acer is the genus
palmatum is the species
dissectum tells us that this is a variety of *Acer palmatum* which has dissected leaves
atropurpurea tells us that this variety of *Acer palmatum* has purple foliage

Hybrids, Varieties and Cultivars

You may occasionally be confused by the difference between hybrids, varieties and cultivars.

- A hybrid plant is one which has resulted from two different species cross breeding. The hybrid is a combination of characteristics from two different species; something bred or selected out of nature by man. Example: *Eucalyptus* ‘Torwood’. This is a cross between *Eucalyptus torquata* and *Eucalyptus woodwardii*. Sometimes the two plants which have been cross bred are both mentioned and a "x" is placed between them, e.g. *Eucalyptus torquata* x *woodwardii*
- A variety is just a particular type of plant in one species. A variety does not have parents from two different species (genetically different), but a hybrid does.
- The word *cultivar* is derived from the words *cultivated variety*. The accepted meaning of the word cultivar varies somewhat. In general, a cultivar is a group of cultivated plants that are clearly distinguishable from others by a certain characteristic (for example, variegated leaves). This characteristic must be passed on to the offspring (whether produced sexually or asexually) of the plant for it to be a true cultivar. In some countries, the word cultivar means the same thing as a variety.

PLANT FAMILY NAMES

The following list is not comprehensive. There are in fact many hundreds of different plant family names, and changes are continually being made. Very often, a new and old family name both remain in common usage for some time before the old name is gradually discarded. It is important for horticulturalists to realise that plant names are continually being revised.

Current Names	Old Names	Examples Of Genera
Apiaceae	Umbelliferae	*Daucus*
Asteraceae	Compositae	*Chrysanthemum*
Arecaceae	Palmae	*Phoenix*
Brassicaceae	Cruciferae	*Brassica*
Caesalpinaceae*	Leguminosae	*Cassia, Bauhinia*
Fabaceae*	Leguminosae	*Pisum*
Hypericaceae	Guttiferae	*Hypericum*
Lamiaceae	Labiatae	*Mentha, Salvia*
Mimosaceae*	Leguminosae	*Acacia*
Papilionaceae*	Leguminosae	*Kennedya, Pisum*
Poaceae	Gramineae	*Paspalum*

Note that plant family names have now been standardised so that they end in “aceae”.

PRONOUNCIATION OF PLANT NAMES

Plant names are based on the Latin language, and hence, pronunciation should normally be as with Latin. Pronunciation however, varies from place to place. Often nurserymen in one state or country will pronounce a plant name differently to the way their colleagues pronounce it in another place. The most important thing is to learn to write names correctly. If you can write them correctly, then you will be able to communicate with other people in the industry, even if your pronunciation is different.

Usually, pronunciation will develop according to the influences received from colleagues. If you work in a small nursery with an old nurseryperson, you will tend to pronounce plant names the same way as the person you work with, even if their way is 'wrong'. If you are an active member of a garden club, you will pick up the style of pronunciation which most members of that garden club use.

Pronunciation and the names (particularly common names) which you give to particular plants will be influenced by the people you mix with; and in turn, their naming and pronunciation was probably influenced by the people they worked with in the past.

Pronunciation of scientific plant names should ideally follow the rules which apply to the classic Greek and Latin languages, from which most of these names are originally derived.

In the Latin language letters or diphthongs are pronounced as shown below:

"a"	A short "a" as in fat or that
"ae"	As the "y" sounds in why; or as the "i" sounds in mite
"au"	As "ou" sounds in out or ouch
"c"	A hard c or k as "c" sounds in cool or "k" sounds in keep
"e"	As "e" sounds in bet, set or pet ... or as "a" sounds in hate
"ei"	As "a" sounds in gate
"ew"	As "ew" sounds in few, or "ough" sounds in through
"ow"	As "ow" sounds in how
"oi"	As "oy" sounds in toy
"o"	can be as "o" sounds in cob, or as it sounds in note
"g"	A hard "g" as in get, gone or good
"i"	Can be as the "i" sounds in bin, pip, or fit ... or as "ee" sounds in been
"j"	As "y" sounds in yet or yellow
"s"	As "s" sounds in sit or ask ... not as "s" sounds in as or those

"u"	Can sound as "u" does in bull or as it sounds in shute ... but never like it does in rub
"v"	Pronounced like "w" in win or wheel
"y"	Pronounced like the French pronounce "u"

Examples of Pronunciation

- Callistemon - pronounce as follows ... Kal - list - tee – mon
- Lagerstroemia - pronounce as follows ... Lag - er - strow - me – a
- Kniphofia - pronounce as follows ... nif - off - ee – a
- Pyrethrum - pronounce as follows ... Pie - reeth - rum

BOTANICAL FAMILIES OF GENERA

Use the following lists as a guide to labelling your plant collection specimens with plant family names.

DICOTYLEDONS

Family	*Genera*
Araceae	Alocasia, Arum, Calla, Anthurium, Philodendron, Caladium, Dieffenbachia, Monstera.
Compositae (Asteraceae)	Dahlia, Brachycome, Helichrysum, Olearia, Chrysanthemum, Aster, Zinnia, Ageratum, Sunflower, Dandelion.
Cruciferae (Brassicaceae)	Cabbage, Cauliflower, Broccoli, Brussels Sprouts, Kale, Turnip, Wild Turnip, Mustard.
Epacridaceae	Astroloma, Epacris, Leucopogon.
Goodeniaceae	Dampiera, Goodenia, Leschenaultia, Scaevola.
Labiatae (Lamiaceae)	Mint, Thyme, Sage (Salvia) Lavender, Prostanthera, Coleus, Hemiandra, Westringia, Stachys
Leguminosae (Legumes) (Mimosaceae Caesalpiniaceae and Fabaceae)	Erythrina, Genista, Hovea, Hardenbergia, Lotus, Pultenaea, Sophora, Swainsonia, Brachysema, Goodia, Kennedia, Wisteria, Indigofera, Pea, Bean, Clover, Lupin, Peanut, Mimosa, Cassia, Cercis, Lathyrus NB: Strictly speaking legumes have now been split into three families. At this stage in your study you can for simplicity, classify all pod bearing plants as legumes
Malvaceae	Hibiscus, Abutilon, Gossypium (Cotton), Lavatera, Althaea
Myrtaceae	Astartea, Agonis, Beaufortia, Callistemon, Calytrix, Calothamnus, Eucalyptus, Eugenia, Kunzea, Leptospermum, Melaleuca, Tristania, Thryptomene, Micromyrtus, Chamaelaucium, Hypocalymma, Angophora, Feijoa, Myrtus.
Pittosporaceae	Billardiera, Pittosporum, Hymenosporum.
Primulaceae	Primula, Anagallis, Cyclamen, Soldanella
Proteaceae	Banksia, Conospermum, Dryandra, Grevillea, Hakea, Isopogon, Macadamia, Stenocarpus,Telopea, Protea.
Ranunculaceae	Delphinium, Aquilegia, Ranunculus, Paeonia, Anemone, Clematis, Nigella
Rosaceae	Cydonia, Chaenomeles, Pyracantha, Geum, Spiraea, Rosa, Apple (Malus), Prunus, Strawberry (Fragaria), Berry Fruit (Rubus), Sorbus
Rutaceae*	Boronia, Correa, Eriostemon, Citrus, Diosma, Ruta, Skimmia
Solanaceae	Petunia, Browallia, Cestrum, Solanum, Benbane, Tomato, Potato, Capsicum, Egg Plant, Tobacco.

Verbenaceae	Verbena, Lantana, Clerodendrum, Caryopteris, Vitex, Crowea*
Apiaceae	Actinotus, Carrot, Parsnip, Parsley, Bupleurum, Coriandrum, Eryngium

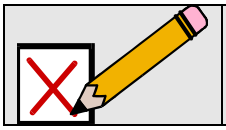
*Note: Crowea is sometimes classified under Rutaceae

MONOCOTYLEDONS

Family	Genera
Amaryllidaceae	Amaryllis, Anigozanthus, Hippeastrum, Hymenocallis, Nerine, Narcissus (Daffodil).
Gramineae (Poaceae)	The grasses, corn, cereals, bamboos etc.
Iridaceae	Freesia, Iris, Crocus, Crocosmia, Sparaxis, Sysirinchium, Watsonia.
Liliaceae	Asparagus, Xanthorrhoea, Chlorophytum, Agapanthus, Allium (Onion), Convallaria (Lily of the Valley), Hemerocallis, Hyacinthus (Hyacinth), Dracaena*, Kniphofia, Lachenalia, Lilium, Liriope, Scilla, Tulipa (tulip)

Note: *Dracaena is sometimes classified under Agavaceae

MULTIMEDIA
Watch the video ‘Plant Identification’ in the multimedia section.



SELF ASSESSMENT
Perform the self assessment test titled ‘test 1.1’
If you answer incorrectly, review the notes and try the test again.

PLANT NAMES AND HORTICULTURAL TERMINOLOGY
Background to Plant Names
Plant names are often given to a plant for one of the following reasons:

- To honour a person, in which case the name is a derivation of that person's surname (e.g. "smithii" would be named after someone called Smith). The person being honoured is often the same person who first discovered or bred the plant.
- To indicate the place or region where the plant came from (e.g. “indica” meaning it came from India).
- To describe the colour of some part of the plant, often the flowers but also commonly the foliage (e.g. "rosea" meaning it is rose coloured).
- To describe the growth habit (e.g. "erecta" meaning it is erect or upright).
- To describe the shape; usually of leaves (e.g. dentata, meaning the leaves have indentations).
- To describe some other characteristic (e.g. "fragrans" meaning it is fragrant).

Selected Plant Genus Names and their Meanings

Abelia	named after physician and author Dr. Clark Abel
Acacia	to sharpen, thorn
Allium	pungent, burning
Ananas	native South American name for pineapple
Anethum	classical Greek name
Annona	native South American name
Azalea	dry or parched
Bougainvillea	named after French navigator de Bougainville
Callistemon	most beautiful stamens
Camellia	named after a Jesuit priest, Camellus
Citrus	classical Latin name
Clerodendrum	chance tree, refers to variable medicinal properties
Coleus	a sheath
Coprosma	dung smell (of leaves)
Cotoneaster	quince-like
Eucalyptus	well covered
Euphorbia	named after physician Euphorbus
Ficus	classical Latin name
Gardenia	named after American botanist Dr. Alexander Garden
Grevillea	named after amateur botanist Charles Francis Greville
Hibiscus	ancient name for mallow-like plants
Ixora	a deity of Malabar
Jasminium	after Yasmin, a common Persian name
Juniperus	classical Latin name
Leptospermum	slender seed
Melaleuca	black and white
Mentha	classical Latin name
Morus	classical Latin name
Nandina	from Japanese name, Nanten
Ocimum	aromatic
Olea	classical Latin name
Origanum	classical Greek name
Passiflora	passion flower
Petroselinum	rock parsley
Photinia	light shining
Pittosporum	sticky seed
Plumbago	Lead (the metal)
Protea	named after Greek god Proteus who could change shape and form
Rhododendron	from Greek “rhodos” – rose and “dendron” - tree
Rondeletia	named after French physician and author G. Rondolet
Rosmarinus	dew of the sea
Salvia	From Latin “salvare” to heal – alluding to supposed medicinal properties
Spiraea	wreaths, garlands
Thuja	from Greek “thyia” – scented gum (probably that from *T. articulata*)
Thymus	classical Greek name
Vitis	Name used by the Romans for grapevine

Selected Plant Species Names and Their Meanings

aurea, aureo, aureum	golden
australis	from south, Southern or from Australasia
alata	winged, may refer to stems or seeds
alba, album, albida, albo	means white; usually referring to flower colour
albiflos, albiflora, albiflorum	white flowered
alpina, alpinum	means alpine or from an alpine or mountainous place
anglicum	from England
angustifolia	thin or narrow leaves
annuus	annual
aquaticum, aquatica	of water, from the water or a water plant
arborea, arborescens	tree-like
argentea	silver coloured
bella	beautiful
bicolor	two colours; usually in foliage or flowers
biternata	leaves divided twice
blandum, blandus	mild or charming
borealis	from north
buxifolia	box-like foliage
camara	named after a person named Camara
canariensis	from the Canary Islands
candidum, candidus	shining white
capense	from the Cape Colony
capitata	refers to flowers in a group or head
cardiaca	referring to the heart
carnea	skin colour
caudatum	tailed
chinensis	from China
cinerea	ash or grey coloured leaves
citrinum, citriodora	citrus like, in the scent or perhaps other characteristics such as yellow flower colour
coccinea	scarlet
communis	commune like or gregarious, common
compactum	tight compact growth
cordata	heart shaped, usually referring to leaves
costata	ribbed leaves, with a midrib
crispa, crispus, cristata	crispy or curled usually referring to the edge of leaves
decurrens	grows downwards
discolor	variable flower colour
elata	tall
elegans	elegant
elegantissima	the most elegant
europea	from Europe
excelsa	something which has excelled or is lofty or tall, sublime
flavum, flavus, flavidus	yellow (paler than luteus, lutea – see below)
flexuosa	flexible or zig-zag
floribunda	"Flowers abundant" or plenty of flowers
florida	rich, usually refers to flowering.
formosa	attractive or handsome
forsteriana	named after someone with the surname Forster
fragrans	fragrant or scented
fragrantissima	very fragrant

fragilis	tender or fragile
fulgens	flowers that are brilliant in colour
germanicum	of Germany or German
giganteus	gigantic or large
glabrata	smooth leaves
glauca	glaucous foliage (i.e. bluish in colour)
globosum, globulus	globular or spherical in shape
gracilis	slender or graceful
graminea, graminifolium	grass-like foliage
grandiflorum, grandiflora	large flowers
graveolens	strongly scented
hispanicus	from Spain
hortensis	from the garden
humilis	small, dwarf or humble
indica	Indian
japonica	from Japan, or Japanese
jasminoides	jasmine-like
lanceolata	lance shaped
latifolia	wide leaves
laxiflora	loose flowered
linearifolia	narrow foliage or narrow leaves
longiflorum	long flowering
longifolia	long, referring to leaves
lutea, luteus,	yellow
macrantha	long or large flowering
maculata, maculatum	spotted
maritima	near coast or coastal
maximum	largest
molle, mollis	soft leaves, tender
montana	from the mountains
multiflora, multiflorus	many flowers
muelleri	named after someone with the surname Mueller
nanus	dwarf
nutans	nodding, usually referring to flowers which have the appearance of a bowed or nodding head.
niger, nigra	black
nitida	shiny, usually the leaves.
odoratus	scented
officinale	common in the shop, usually herbal
orientalis	form the orient or eastern
ovata, ovatus, ovalifolium	oval or egg shaped
palmata	leaves in palm arrangement
palustris	from swamp or marsh like environment
paniculata	panicles arrangement for flowers
peltatum	leaves shield-like
pendula	pendulous or weeping
peruvianum	from Peru
pinnatum	pinnate leaf arrangement
plumosa	plume-like
procumbens	procumbent growth habit
prostrata, prostratum	prostrate or creeping
pulchella, pulchellum	attractive or pretty
pumila	small

pungens	prickly or spiny
purpurea, purpurata	purple
racemosa	flowers in raceme
recurvata	recurved, usually referring to leaves.
reflexum	recurved leaves
regia, regalis	regal, royal or stately in appearance
repens	prostrate or creeping habit
reticulata	striped or netted
rigidus, rigidum	rigid or stiff, often referring to stiff leaves
robustus	robust and strong
rosea, roseum	rosy, pale pure red, usually flowers
rubra, ruber	red, pure red
rosmarinifolium	foliage like Rosemary
rotunda	round shaped
rupestre, rupestris	growing on rock
sativa, sativum	commonly grown or cultivated
scabra	rough
scroparia, scroparium	broom-like
serrata	serrated, often referring to edge of leaves
sinensis	from China, Chinese
sinuata, sinuatus	scallop-edged leaves
spectabile, speciosus	very showy, splendid
spicatus, spicata	spiked in shape or bearing spikes or prickles
spinulosa	pointed or spiny margined leaves
stellata	star-like flowers
stolonifera	has stolons
striata	striped
stricta	upright
superbum	superb
terminalis	terminal or on the end, commonly referring to the position of the flowers
tetraptera	four winged, usually referring to seed pod.
tomentosa, tomentosus	felted or felt like covering, usually on leaves
tricolor	three colours, most commonly in foliage, sometimes in flowers
triloba	three lobed leaves
tristis	brown, dull coloured
truncatum	cut off, blunt
undulatum	undulating or wavy (e.g. leaves having a wavy edge)
uncinata	hook-tipped leaves
uniflora	one flowered, single flowers on each flower stem
variegata	variegated, usually foliage
vera	truthful or right
vernum	spring flowering
vimineus, viminalis	long, perhaps long plait like growths or long weeping foliage
violaceus, violaceum	violet
viride or viridus	green, often referring to flower colour
viridifolia	green foliage
virginiana	from Virginia, U.S.A.
vulgare	vulgar or common
zebrinus	striped like a zebra

Glossary of Horticultural Terms

Abscission	Normal separation of leaves or fruit from a plant using a layer of thin walled cells.
Actinomorphic	A flower that is symmetrical along two or more planes. Regular.
Adventitious Tissue	Growth from unusual locations (e.g.: aerial roots)
Agar	A polysaccharide gel, obtained from some types of seaweed, used in tissue culture.
Allele	One of two or more different expressions of a gene on a chromosome e.g. a gene for flower colour may have two alleles, one for red and one for white flowers.
Alternate	Leaves or phyllodes arranged in two rows up either side of the stem but two leaves do not occur directly opposite each other at the same point on the stem.
Amino Acids	Basic structural units which proteins are composed of.
Anther	The end part of the stamen, containing pollen.
Anther Culture	Tissue culture of anthers to obtain haploid clones, includes Pollen Culture
Apical	Tip or apex.
Apical Meristem	Meristem located at the tip of main or side shoots.
Anther Culture (or Pollen culture)	Tissue culture of anthers to obtain haploid clones
Aseptic	Free from any disease or other micro-organisms.
Asexual	Without sex, vegetative.
Autoclave	A pressurised container, used to sterilise equipment
Auxins	Hormones which cause cell division & enlargement and particularly, root initiation.
Axillary	Located in junction of leaf-stalk and branch to which the leaf is attached.
Axil	The angle between the phyllode and the stem
Bipinnate	A compound leaf twice divided (like a fern leaf in general appearance).
Bract	A small leaf like structure at the base of the flower stalk.
Callus	An unorganised growing mass of cells, not differentiated to be any particular type of cell or organ: important in rooting of cuttings
Calyx	The outer ring of the flower (sepals are in this group)
Clone	Plants produced asexually from a single plant: genetically identical to parent
Contaminants	Any type of micro-organism
Corolla	The inner ring of the flower (includes the petals).
Culture	Plant or plant parts growing in vitro.
Cytokinins	Hormones which induce bud formation & cell multiplication.
Cytology	The study of cells and their biology.
Decurrent	Where the bottom of the phyllode continues down the stem as a raised line, ridge or sheath.
Dehisce	Splitting or opening of fruit as it dries out and matures: spontaneous and can be quite violent
Deionise	To remove ions from water by the use of ion exchange resins.
Differentiate	The modification of new cells to form tissues.
Differentiation	The process by which cells become specialised.
Diploid	Having two sets of chromosomes which is typical of vegetative (somatic) cells.

Dissected	Refers to leaves that are very deeply divided or lobed.
Dominant Allele	The allele which is expressed despite the presence on the chromosomes of another but different allele for the same genetic trait.
Embryo Culture	Culture of embryos excised from immature or mature seeds.
Embryogenesis	Formation of the embryo.
Embryoids	Embryo-like vegetative structures developing in some cell and callus cultures sometimes capable of developing into embryos.
Entire	Leaf margin that is smooth.
Epinasty	Usually of leaves: petioles show downward growth curvature due to upper side elongating more rapidly than lower side
Excise	Remove by cutting.
Explant	The part of the plant used to start a culture.
F1	Filial Generation 1, the progeny of an initial cross. The F2 generation is the progeny obtained from self-pollinating F1 plants. The next generation is the F3, then F4 etc
Gamete	Sex cell or reproductive cell. The female gamete is the ovum and the male gamete is the pollen.
Gene	The unit of heredity on a chromosome. Each gene normally controls a single trait (heredity character).
Gibberellins	A group of growth regulators influencing cell enlargement.
Gland	A projection or insertion on the phyllode margin, nerve or stalks.
Glaucous	Covered with a whitish fur like layer.
Haploid	Having half the normal number of chromosomes in vegetative cells.
Hormones	Natural or synthetic chemicals that strongly affect growth.
Hybrid	The offspring of genetically dissimilar parents
Juvenility	Growth stage of a seedling before it becomes able to reproduce
Leaflets	The smallest leaf like structures which are part of a bipinnate leaf.
Linear	Long, narrow relatively straight sided.
Lobes	Partial division of part of a leaf or phyllode.
Lobed	Fused at the base and separated at the edges.
Meristem	Undifferentiated types of cells found at the growing tips of roots or shoots (also found in the cambium) from which new cells and differentiated tissues are derived.
Micro-propagation	Multiplication in vitro, used interchangeably with tissue culture.
Node	The part of the plant's stem from where leaves and branches grow.
Oblique	Uneven or off centred, not symmetrical shape.
Oblong	Longer than it is broad, but more or less straight sided leaf or phyllode
Organelles	Specialised structures within cells performing specific roles (e.g. mitochondria)
Ovary	The structure where seeds are formed. At maturity the ovary is the fruit.
Palmate	Leaf shape resembling a hand with fingers spread.
Panicle	A flowering branch containing several racemes.
Pedicel	The stalk of an individual flower.
Penniveins	Closely arranged veins extending from the midrib in a feather-like manner: also penninerved or penniribbed
Phyllotaxis	Arrangement of leaves along stem.
Pinnate Leaf	Compound leaf with leaflets either side of a central stalk.

Pip	(1) An unopened part of a flower head: (2) florist's term for a single flower in a cluster or truss especially of auriculas and other primulas: (3) popular name for the seeds of apples, pears, citrus etc.
Plastids	Organelles containing pigments e.g. chloroplasts with green pigment involved in making and storing carbohydrates.
Plastochron	Time interval between the initiation of successive leaves.
Polysaccharide	A group of carbohydrates which comprise a number of different simple sugars
Primordia	Tissues in their earliest state; differentiated and just prior to emergence particularly of leaves, primordia seen as superficial bumps in regular and predictable positions at the stem apex.
Protoplast	A cell without a cell wall but with a membrane
Protoplast Fusion	The uniting of two protoplasts
Pubescent	Soft hairy coating
Pungent	(1) Sharp and pointed (of leaves): (2) acrid smell or sharp, bitter flavour
Recessive Allele	The allele which is not expressed in the presence of another allele for the same trait. For example, if red flower colour was dominant and white flower colour was recessive, a cross between a red and a white flowered plant would produce only red flowered plants in the F1 generation
Recurved	Bent or curved backwards
Reflexed	Bent sharply backwards or downwards
Regeneration	The production of new plants or parts of plants
Regma	A type of dry dehiscent fruit:: characteristic of the Geranium family
Resinous	Sticky, having resinous or sap like material.
Scabrous	Rough surface
Sepal	The outermost leaf-like appendages of a flower, usually green in colour.
Sessile	Without a stalk
Somatic	Vegetative, as opposed to sexual
Somatic Hybridisation	The creation of hybrids by vegetative means, i.e. protoplast fusion
Stamen	The male reproductive structure of a flower, consisting of a stalk and an anther.
Stipule	Small, sometimes leaf-like appendage, found one on either side of the leaf-stem.
Superior Ovary	An ovary situated above the floral parts of a flower.
Terminal	Located at the tip.
Totipotence	Capability of a cell to develop into a whole plant
Zygomorphic	A flower that exhibits symmetry along one plane only. Irregular.

PRESSING PLANTS

Collecting Plant Specimens

When going out in search of plant specimens take a plant press or a stiff portfolio such as an old ledger cover; place sheets of newspaper in a container of this kind and collect directly into it, placing each plant in a folded sheet of newspaper. The portfolio or press is best tied up with the straps or tapes which allow for extension and another strap can be used to hang it over your shoulder. Alternatively, simply place the plant specimens into sealable plastic bags to be placed into a plant press within a couple of hours. As fresh material can be dissected more easily than dried specimens, it is often desirable to collect extra specimens for the purpose of identifying the plants concerned.

When selecting a specimen for collection, make sure that it is representative of the species in question – do not collect material from a plant which is much larger or smaller or different in any way from most of the plants of the species in the area concerned.

At the time of collection, allot each specimen a number, write this number (in pencil) on a tag and tie the tag to the specimen. It is important that a given number should only be used for material from one plant; if specimens are collected from several plants believed to belong to one species, each specimen should be given a separate number. As soon as a specimen has been numbered, this number should be recorded in a notebook, together with information about the plant and its habitat. It is most important to note the locality and date; other information should include the habit of the plant, the scent and colour of the flowers and details of the environment - altitude, slope (aspect with steepness), soil, vegetation type and abundance of the species. These details should be transferred as soon as possible to a label accompanying the specimen. In general, field notes should be so accurate and detailed that they could be used in drawing up a description of a plant or in directing someone to the site where it was collected. Photographs of the whole plant or of suitable parts of it are an excellent supplementary record to field notes.

Collect specimens which are nearly as large as the herbarium sheets to be used. If possible, the specimens for each plant should include a leafy shoot with fruits attached as well as one provided with buds and flowers. If fruits are not present on a particular plant, old fruits on the ground around the plant may be collected if it is reasonably certain that the fruits came from the species in question and if the fact that the fruits were not collected from the plant is noted on the herbarium sheet. Both male and female flowers (attached to shoots) should be collected for plants in which the flowers are unisexual. Both juvenile (seedling) and mature leaves should be collected if these are markedly different in a species; this is particularly important in the case of eucalypts, some of which cannot be identified in the absence of juvenile leaves. Specimens of small underground parts such as bulbs, rhizomes, etc. should be collected also where they occur. ***Be aware that legislation in many countries prohibits digging up or otherwise damaging all of, or parts of, plants growing in the wild.***

The Pressing Procedure

Plant specimens consisting of a few leaves and perhaps a flower or fruit can be preserved for hundreds of years by a simple technique known as "pressing". There are many ways of pressing a plant, some being more permanent than others. All basically involve the same general procedure:

1. The plant specimen is laid out flat on a sheet of absorbent material such as newspaper. Ideally, a specimen should show the leaves and reproductive parts of the plant. The specimen should be large enough to show the arrangement of the leaves on the stem of the plant. One leaf of a plant is simply not adequate in most cases.
2. A second sheet is placed on top of the plant.
3. The plant sandwiched between these two sheets is then placed in a situation where pressure can be applied squeezing all the liquid from the plant tissue. This might be via a plant press, or under heavy books or in any other situation where the specimen is gently flattened. The papers need to be changed daily for approximately two weeks. A plant press should be light and strong and should be kept in a dry, well ventilated place. A pair of wooden lattices is suitable and can be easily made at home. Alternatively two frames constructed from ¼ inch iron rods (similar to refrigerator trays) and covered with wire mesh make an excellent press.
4. After a period of time, anything from a week to several months, the plant can be removed and attached to a sheet of paper or card (i.e. mounted).
5. The mounted specimen should be stored in a dry situation if it is to be preserved for any length of time.

Hints for Pressing Plants

1. The drying process can be sped up by ironing plants between sheets of paper or by placing partially pressed and dried plants in a microwave (for 15 s at a time, repeated two or three times) or oven at a low temperature. These methods give quick results but are not suitable for all plants and may not give long-lasting results; specimens dried by such methods tend to disintegrate after a few weeks or months.
2. For quick, efficient drying, use newspaper between layers of plants. Replace the newspaper every day, or every second day, as this ensures that moisture released from the plant is completed removed from the drying plants – this will speed up the drying process. This way plants may take only one or two weeks to dry as opposed to a month. The extra effort is worthwhile, producing a better pressed specimen.
3. Label the plant the moment you collect the specimen. Take notes on its flower features, height, location you collected it from, and any other important features that will help you identify the plant.

Arranging Plants for Pressing

Don't try to press too much plant material at once. The reason for pressing a plant is to have a reference for identification. For this purpose you do not need dozens of leaves and flowers. A few leaves (so you can see the arrangement of leaves on the stem), and one or two flowers is ample.

Very fleshy fruit such as a plum or fleshy leaves, such as those from cactus and succulents do not press well. If you are a beginner, do not try to press these plants.

Instead of newspaper between specimens, you can use gauze cloth or blotting paper. Cloth and blotting paper have the ability to absorb more moisture out of the plant and in this way are very useful for drying fleshier plants. You should still use sheets newspaper on the outside of these materials though.

Preparing and Pressing Difficult Specimens

- Plants which require killing before being pressed. This group includes succulents. Bulbs of any plants should be killed. Killing may prevent the leaves of some conifers, tropical plants and heaths from falling. Killing entails treatment with 4% formalin. If formalin is not available, succulents and some gymnosperms can be killed by dipping specimens in boiling water for a few seconds. You may also microwave specimens for a short period of time – this usually kills the plant.

- Bulky plants or parts of plants can often be halved or sliced before pressing.
- Very delicate plants or plants with very thin petals can be pressed in a tissue paper folder.
- Very bushy twigs. A flatter specimen can be made by pruning but it should be obvious that the specimen has been trimmed.
- Spiny plants. Before pressing, place the specimen under a board and stand on it; this will prevent the spines from tearing the paper when the plant is pressed.
- Water plants. Float the plant out in a dish of water; slip a sheet of stiff white paper under the plant and lift it out. Dry off the excess water, then place a piece of gauze over the plant (this will prevent it from sticking to the drying sheet) and press it in the usual way. The plant will adhere to the stiff paper which is used as the herbarium mount.
- Long specimens such as some grasses, may be pressed complete if they are bent into the shape of a V, N or M.
- Plants with very large organs. Several herbarium sheets may be necessary to show the different parts of the leaves, inflorescences and fruits of plants such as palms. Photographs of the plant and its parts are essential.
- Cones of some gymnosperms and species in the Pandanaceae family may need to be enclosed in wire mesh to prevent them from falling apart.

The Drying Process

It is necessary to replace the newspaper sheets every day for the first few days after the plants have been placed in a press. Then the drying sheets can be changed occasionally until the specimens are completely dried, i.e. until they are brittle. Specimens can become mouldy unless the drying sheets are changed regularly.

The drying process can be speeded up by warming the press. A household clothes drying cabinet can be used as long as the temperature is not too high.

- Some plants have lower water content in the leaves (e.g. Grasses) and will press much faster.
- Fleshy-leaved plants will always take longer to press than drier-leaved plants.
- Plants with thicker leaves usually take longer to press than those with thin leaves.
- Plants with very aromatic foliage will generally preserve better, easier (and possibly faster).
- The oils in plants such as Conifers, Melaleucas, Eucalypts, Citrus and Thyme are preservatives which will help stop foliage from rotting.

If you wish to speed up the process of pressing plants for the purpose of submitting a plant collection, be selective about the types of plants you choose.

Mounting

Plants are attached each to a separate sheet of paper using glue or thin strips of paper tape placed over several points over the plant. Some tapes have adhesive which breaks down over time, so if you are wanting your specimens to last for a long period, it is wise to shop around.

INTRODUCTION TO AMENITY PLANTS

Amenity Horticulture refers to the cultivation of plants for purposes other than cropping; usually for either decoration or some environmental effect. It is concerned with the propagation, use and maintenance of plants for landscape improvement. Plants tend to be divided into the following groups for amenity use:

NATIVE PLANTS... Refers to any indigenous plants not introduced from other countries.

EXOTIC PLANTS...Any plants native to other countries.

INDOOR PLANTS...Any plant which can be grown inside a building without suffering drastically from the environmental restriction (eg. the gases which make up the air are often in different proportions inside. This might allow a person to survive, but for some plants can mean eventual death).

TROPICAL PLANTS...Plants which grow in tropical climates. These are often grown as indoor or glasshouse plants in cooler climates.

ANNUAL FLOWERS...Plants which complete their life cycle in one year or less (ie. the seed germinates, grows to full size, flowers and produces new seed). These are usually pulled out after flowering even though many can survive for more than one year.

PERENNIAL FLOWERS...These are plants which take more than twelve months to complete their life cycle. Usually the word "Perennial" is used loosely to refer to herbaceous or soft wooded plants grown basically for their flowers (eg. chrysanthemum, dianthus, evening primrose).

BULBS...The word bulb is often used loosely to refer to plants grown for their flowers which have some specialised form of underground part. It has the ability to store food during either dormant periods, or periods of slow growth. There are four types of plants in this group:

- Bulbs (true bulbs)...Food is stored in leafy scales which cluster around one central terminal bud which grows into a single leafy stem. There is usually at least one additional (axillary) bud on a bulb which will produce a new bulb next season (eg. daffodil or lilium).
- Corms...This is a shortened thick, vertical underground stem. Buds (or eyes as they are called) occur on the corm (eg. gladiolus).
- Tubers...These are swollen underground roots. Buds (or eyes) also occur on the tuber from which new growth can arise (eg. dahlia).
- Rhizomes...These are swollen underground/creeping stems (eg. canna and iris). These also contain buds from which new growth can arise.

While the classification given above is comprehensive and relatively clear cut, there are some plants which could be classified into more than one of the groups given AND there are other classifications which are commonly used in horticulture. Plants can be classified according to the way they dispose of excess leaves

- Deciduous - Refers to plants which lose all their leaves during a particular season of the year, for example every autumn. Regrowth occurs in following seasons e.g. spring.

- Semi Deciduous - these plants drop leaves all year round but generally at a greater rate and a greater amount in one particular season, leaving them with a much lighter mass of foliage over that season e.g. winter.
- Evergreen - these plants drop leaves continually all year round, and grow new young leaves continuously. Evergreen plants always have a reasonably similar amount of foliage throughout the year (i.e. they are always green).

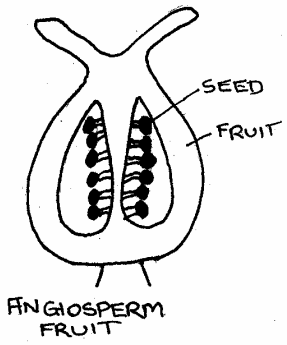
Plants can also be classified according to the type of leaves they have:

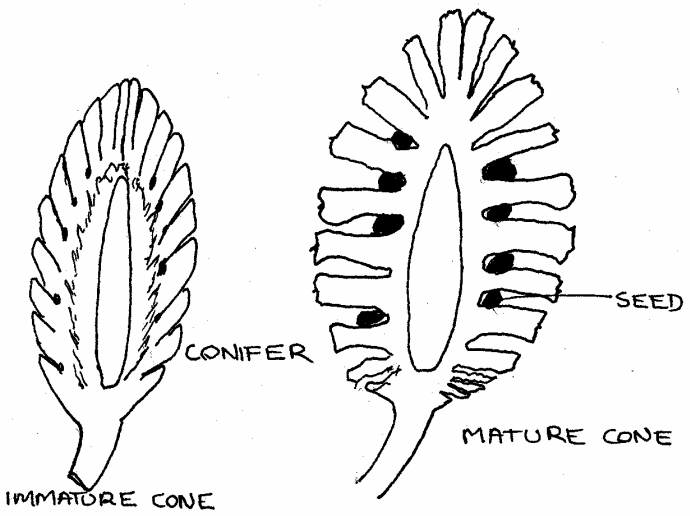
- Broad leaf Plants - Belong to the sub phyla "Dicotyledonae". The veins in the leaves of these plants are not parallel (eg. a Eucalypt or African violet).

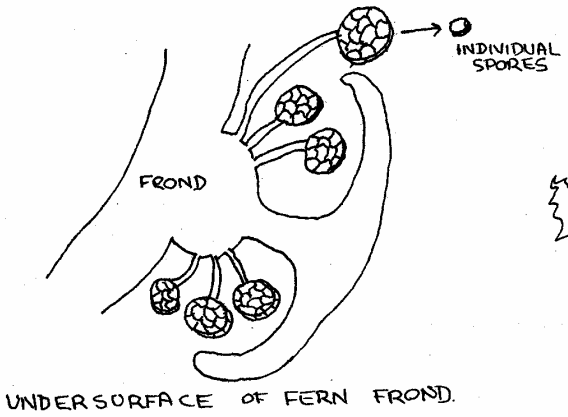
- Narrow leaf Plants - Belong to the sub phyla "Monocotyledonae". The veins of the leaves run roughly parallel to each other (eg. grasses).

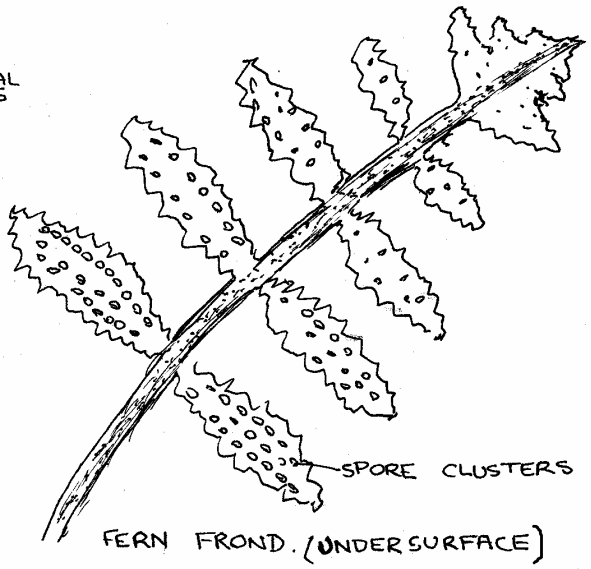
Amenity Plants

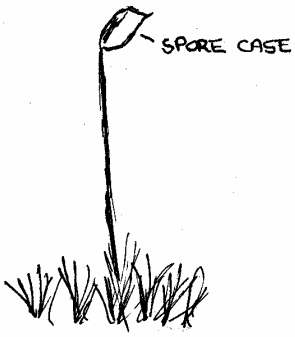
An Overview



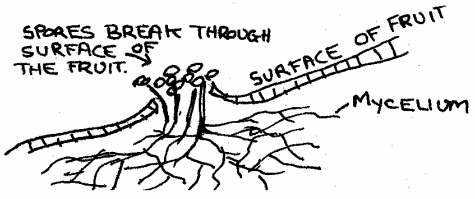








By J.Mason



SCIENTIFIC CLASSIFICATION OF PLANTS

Of all the classifications used, the most comprehensive and accurate is the scientific classification of plants. In the scientific system of plant classification there are over half a million species of plants. What is a species though?

Classification of plants, like classification of anything else, is based on the idea of grouping things which are similar together.

Species are plants that have a range of similar characteristics and are capable of freely interbreeding with each other (ie. pollen from the flower of one plant can successfully fertilise the egg cells of another plant so that they will grow to produce seed which will germinate and produce a new plant).

Species are grouped together into collections of species which are fairly similar. These groups are called genera (singular - Genus). Genera are grouped into collections of genera which have a relatively great similarity to each other. These are called families.

The only way to be able to gain a fair grasp of plant identification and culture is to learn plants by their family as well as their genus and species. Familiarisation with plant families enables a person with no prior knowledge of a particular plant to be able to place it in a family, and make an educated guess on its growing requirements, susceptibilities and other likely characteristics.

Some plant families are of a much greater significance and importance than others in amenity horticulture. It is very worthwhile learning the characteristics of the following important families:

Araceae
The "Aroids" are usually characterised by roughly heart shaped leaves, and flowers which have a single large finger-like protrusion (eg. Anthurium, Caladium, Diffenbachia, Philendron, Syngonium etc).

Asteraceae
The "Daisies" comprise a very large family of about 800 genera and 12,000 species. The flowers are actually a composite of several small flowers fused together to appear as one flower. If the flower is pulled apart it can be seen that it is made up of several individual units, each one having its own set of floral parts (ie. petal, stamen, stigma, ovary etc). Some Asteraceae flowers are incomplete and have only some of the floral parts (eg. Helichrysum, Dahlia, Zinnia, Marigold, Tansy, Chrysanthemum, Lettuce, Sunflower etc).

Lamiaceae
The "Mints" include around 160 genera and 3000 species. The stems are roughly four sided (ie. similar to a square or rectangle in cross section). The leaves are simple (ie. not divided like a pinnate leaf), and are whorled. The flowers are two lipped. Often mints can be identified by their smell when the leaves are crushed (eg. Common winter mint, Peppermint, Prostranthera, Thyme, Westringia, Sage, Marjoram, Lavender, Coleus, Rosemary etc).

Fabaceae
The 'Peas' or 'Legumes' were reclassified in recent years, splitting the one old family "Leguminosae" into three new families (ie. Caesalpinaceae, Mimosaceae and Papilionaceae). Many people still use the old name though. Legumes are characterised by a pod type fruit. Leguminosae includes around 500 different genera (eg. Acacia, Genista, Lotus, Wisteria, Clover, Pea, Bean, Peanut etc).

Ranunculaceae
The "Buttercups" have about 300 genera and 1200 species mainly in temperate and arctic regions. They include Delphinium, Aquilegia, Paeonia, Ranunculus, Anemone, and Clematis). Flower parts are regular and hypogenous (ie. flower parts occur one above the other in the following order...sepals, petals, stamens, carpels).

Brassicaceae
The "Brassicas" include about 200 genera and 1800 species from temperate and sub-arctic regions. All are herbaceous (ie. soft wooded) and most are annuals. Flowers are small, but in large numbers, therefore, conspicuous. They are complete, regular and hypogenous. There are four sepals and four petals. There are six stamens, four longer than the other two (eg. Cabbage, Turnip, Radish, Mustard, Kale, Kohl rabi, Wild turnip etc).

Solanaceae
The "Solanum" family includes such things as tomato, potato, capsicum, egg plant, petunia, belladonna, tobacco and weeds like deadly nightshade. The flowers are generally five lobed (ie. 5 petals and 5 sepals).

Apiaceae
The "Parsley" family includes parsley, celery, fennel, angelica, dill, actinotus etc. they are all characterised by hollow stems and a flower head in an umbrella shape (ie. umbel). There are 5 stamens alternating with petals, and there are a large number of individual flowers on each umbel.

Rosaceae
The "Rose" family includes a wide variety of genera commonly used in amenity horticulture (eg: Rose, Prunus, Pyracantha, Cydonia, Malus, Cotoneaster, Spirea, Geum etc.). There are trees, shrubs and herbaceous perennials all represented in this family. Flowers are generally regular, and the parts are borne on a floral disc. Fruits are usually soft or berry like encasing a hard seed.

Cucurbitaceae
The "Cucurbits" include few amenity plants. They are more important as crops and weeds (eg: Pumpkin, cucumber, melon etc.). They are creepers, warm season plants. Flowers are 5 lobed and often monoecious (ie: contain either male or female parts only).

Myrtaceae
The "Myrtle" family is very significant among Australian and Asian plants. Foliage characteristically has oil glands (ie: seen as small faint dots on the leaf), and if bruised, a characteristic aroma can be detected. Petals on the flowers are usually insignificant. Examples include: Eucalyptus, Callistemon, Melaleuca, Agonis, Angophera, Tristania, Astartea, Thryptomene, Bauera, Baeckea, Micromyrtus, Leptospermum, Eugenia, Myrtus, Feijoa, etc.

Proteaceae
The "Protea" family also tends to have insignificant petals and like the myrtles, is well represented in Australian and African flora. These plants tend to have dry, thick leaves. Seeds are large having a mass of furry hairs attached. Examples: Protea, Leucadendron, Leucospermum, Banksia, Leucopogon, Isopogon, Telopea, Dryandra, etc.

Bromeliaceae
The "Bromeliads" are a group of monocotyledons with a "spike" type of growth (like the top of a pineapple - the only crop species in this family). Bromeliads are most commonly grown for amenity purposes in pots either indoors or in protected positions outside. Some will grow either indoors or in protected positions outside. Some will grow well as epiphytes or planted in garden beds. (NB: An epiphyte is a plant which grows in the air... attached to a board or another plant ... such as an elkhorn or staghorn fern).

Gesneriaceae
The "Gesneriads" include some 500 species, most of the cultivated ones being grown as indoor plants. Leaves commonly are thick and, to a degree fleshy and flowers are normally bell shaped. Examples include: African violet, Gloxinia, Achimenes and Columnea.

Orchidaceae
The "Orchids" include around 15,000 species, mainly from warmer climates, but with some extending into colder temperate regions. Flowers are showy and complex. The corolla is irregular. The stamens unite with the pistil to form a structure called the column. All forms are perennial and have thickened roots, or tuberous or bulbous roots.

Liliaceae
The "Lilies" include some 2000 species, many being bulbs commonly cultivated for amenity purposes. The flowers have 6 petals, usually separate, but sometimes fused (ie. joined). The ovary is superior (ie. sits above the point where you find the base of the petals). Examples include: Asparagus, onions, tulip, hyacinth, lilium, aloe, day lily, etc).

Poaceae
The "Grasses" include around 4500 species. Most are herbaceous though a few are woody (such as the bamboos). These include some of our most significant crop plants ie. wheat, barley and oats.

THE LOWER PLANTS
All of the plants listed in families so far belong to the phyla "Anthophyta" (ie: the flowering plants). This is by far the most advanced, most complex major group of plants, and as such provides us with the majority of varieties which are cultivated for amenity AND crop purposes. There are some significant plants however, among lower plant phyla. Two other important phylas are the conifers (ie. coniferophyta) and the ferns (ie. Pterophyta).

Coniferophyta
This is grouped with several minor phyla to form the "gymnosperms". There are 9 families in the coniferophyta, usually identified by their conspicuous cone (though a few do not bear cones ... juniper berries are actually a cone with a fleshy covering). The Yews (ie. Taxus species) do not bear cones, but nevertheless, as with all conifers, the seeds are naked, not surrounded by an ovary wall as with the angiosperms.

Pinaceae
The "Pine" family is the most important of the conifer families includes the following genera; Pinus, Abies, Picea, Tsuga, Juniperus, Larix and Pseudotsuga.

Taxaceae
The "Yew" family includes Taxus and Torreya.

Pterophyta
This phyla includes all of those plants we know as ferns. Reproduction occurs when clusters of spores produced on the under surface of the leaf ripen and fall. The spores germinate growing into a usually obscure tiny plant called a gametophyte. The gametophyte is usually a creeping small growth close to the ground.

Upon reaching the appropriate stage in its development, the gametophyte sprouts leaves and produces the plant which we know as a fern (ie. the sporophyte stage). The sporophyte usually consists of a rhizome bearing roots and an upright stem. Usually leaves are dissected into leaflets arranged pinnately on a midrib.

RHODODENDRONS AND AZALEAS

Both of these plants belong to the same genus, "Rhododendron" in the Ericaceae family. There are both deciduous and evergreen types, and size can vary from 0.5 m to over 20 metres. Species come mainly from countries in the northern hemisphere and tropical Asia and Northern Australia. There are several hundred species, and literally thousands of cultivars. Many species come from alpine areas of the and thus, are more suited to cooler temperate climates (there are exceptions though).

The main species cultivated are:

- *Rhododendron arboreum* - tree-like, no flowers until mature.
- *R. augustini* - Azalea-like, smaller, blue flowers.
- *R. lochae* - frost tender, red flowers.
- R*. nuttallii* - large crinkled leaves, large flowers.
- *R. ponticum* - common mauve flowering rhodo, hardy.
- *R. racemosum* - dwarf species, pink flowers.
- *R. veitchianum* and *R. yakusimanum*.

When two of the species above are cross bred, a new type of plant (known as a hybrid) is produced which shares the characteristics of both parents. Most of the commonly cultivated rhododendrons fall into this group of hybrids. For example:

- *R. luteum* - yellow and scented.
- *R. reticulatum* - cerise.
- *R. schlippenbachii* -soft pink.
- *R. vasey* - rose.

Azaleas

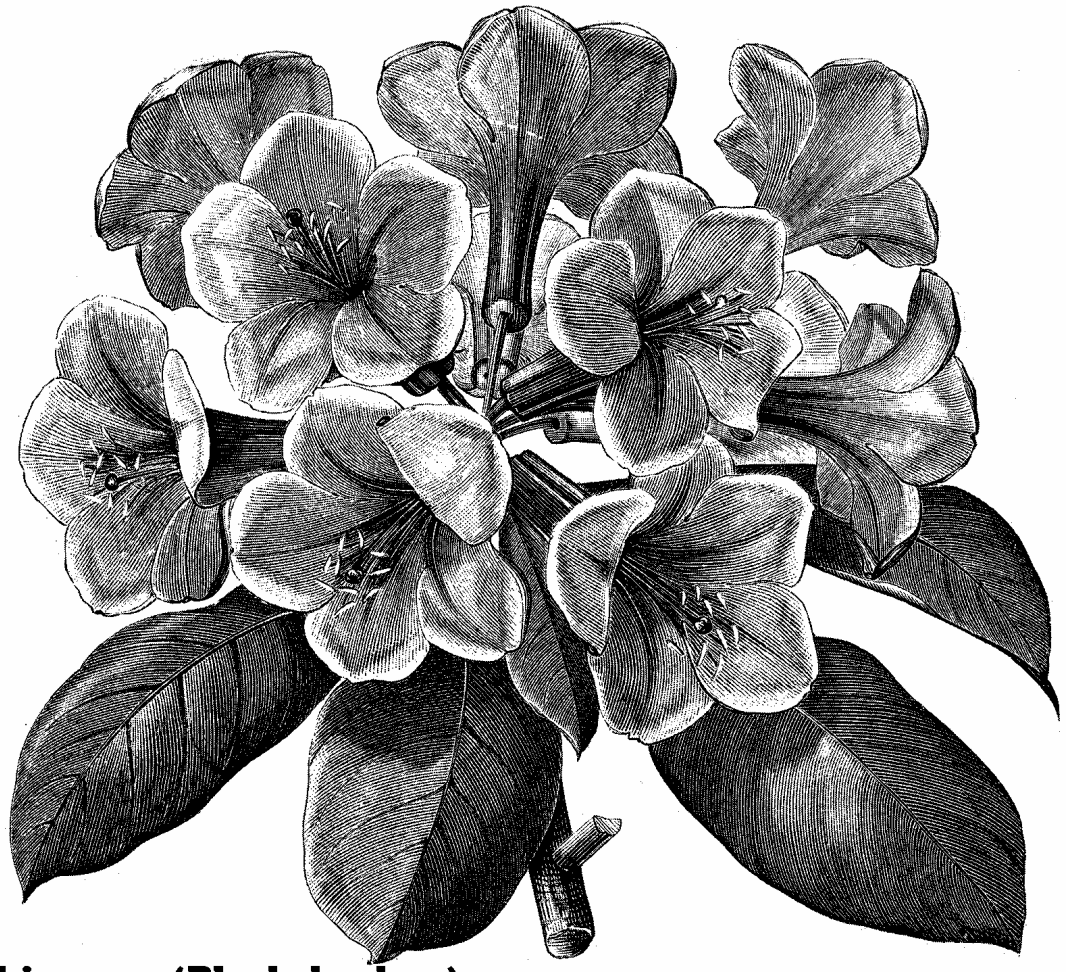
Azaleas are hybrids which are produced from these four species (and occasionally others). Azaleas are generally classified into the following 3 types:

- Mollis azaleas - Deciduous types.
- Indica azaleas - have more showy and larger flowers.
- Kurume azaleas - have smaller less showy flowers (but often a greater number of individual flowers).

Culture

The following generalisations can be made about their requirements:

- Acid soil (generally pH 5.5 - 6)
- Good drainage but also a moist soil.
- Ideally soil which is rich in organic matter. Mulching is beneficial.
- Protection from extreme heat. Semi shade is ideal. Be aware that if planted under deciduous trees, the fibrous root system of the tree can compete with the rhododendron for moisture and nutrients. If the situation is too dark, the plant can become leggy.
- Avoid disturbing the rhodo's shallow roots by digging around it.
- Pruning - remove dead flowers and dead wood regularly. It will take heavy cutting but this is only done to shape (or in severe cases, rejuvenate).
- Feeding - rhodo's respond to regular feeding, ideally well rotted animal manure.



Ericaceae (Rhododendron)

ROSES

There are species and varieties of the genus "Rosa" which can be grown in almost any climate, provided the right type is chosen for the particular situation. Most species tend to adapt better to cooler climates than to warmer climates. Roses are broadly divided into the following groups:

Bush Roses

These grow into an upright bush up to 2 m tall. The three main types are:

- Hybrid Teas (give the biggest and best flowers)
- Floribundas (greater quantity but less quality in the flowers)
- Grandifloras

Some old world species are grown as bush types also, but these are less common.

Standard Roses

These are budded into long, single, upright stems giving the effect of the bush sitting high in the air on a pole. Standard roses are anything from 1 m to 3 m tall.

Ramblers

These are very vigorous, usually untidy growers which make a lot of new growth from the base. The have large quantities of small flowers in bunches.

Climbing Roses

These have fewer basal shoots, larger flowers either individually or in small clusters, and solid, thick climbing stems.

Miniature Roses

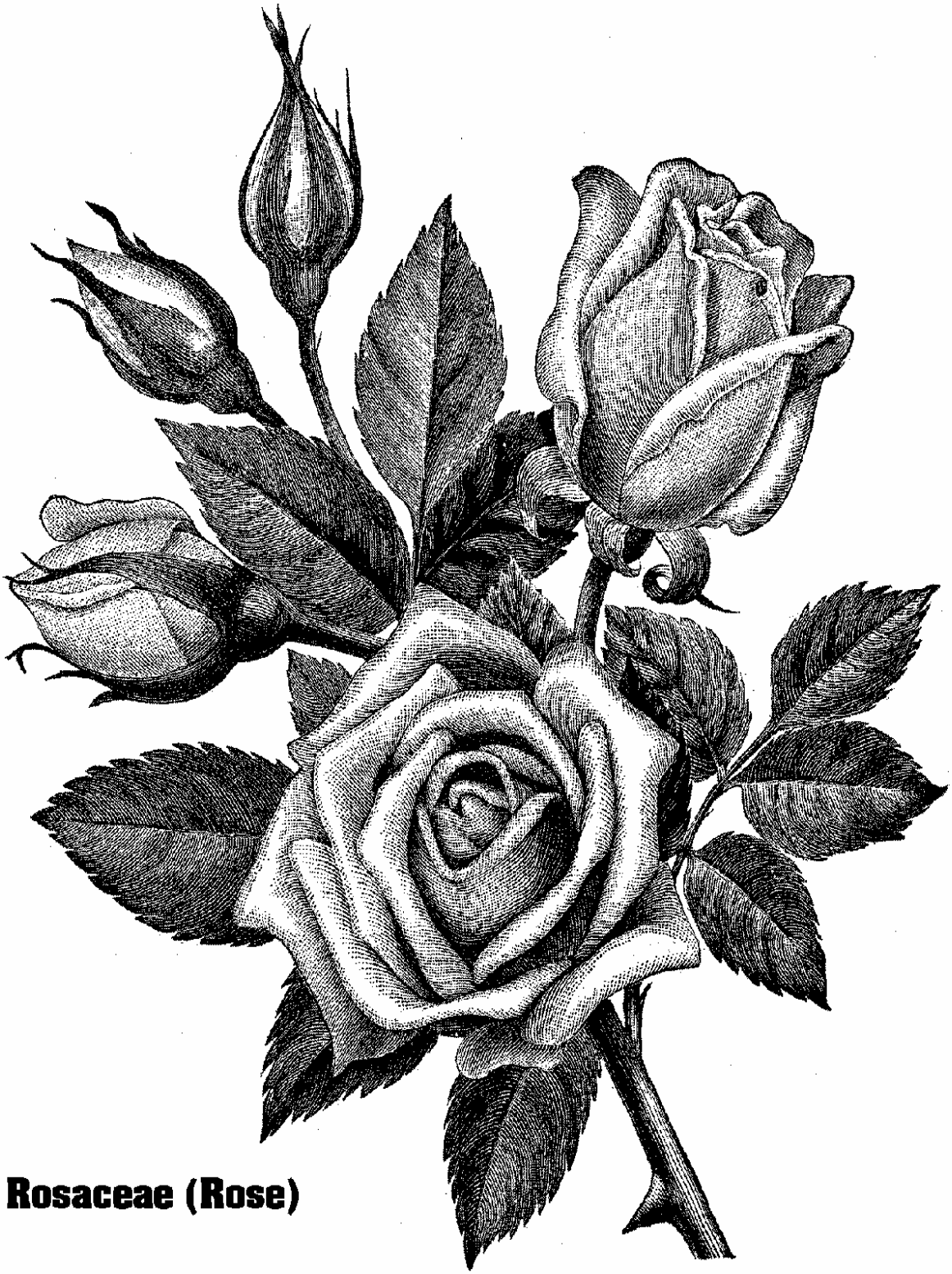
Growing from 1 to 2 feet tall, stems are thinner and flowers are smaller than normal bush roses. In effect they appear as scaled down versions of the floribundas or hybrid teas.

GROWING ROSES

- Roses prefer full sun for at least half of the day. As they have a shallow fibrous root system, avoid planting near large trees which have shallow spreading roots.
- Most soils, provided they are not waterlogged, are acceptable. Roses tolerate a wide variety of soil types, but do prefer reasonable drainage.
- Watering is essential if a rose is to flower well. Mulching can help. Don't let them dry out. It's better to make a dish in the soil at the base of a plant and fill it with water to allow slow penetration. You are better not to water the foliage.
- Roses do respond well to feeding. Don't allow the roots to come in contact with strong/concentrated fertiliser though...they will burn. A slow release fertilizer or well rotted manure is best.
- Annual winter pruning is essential to both rejuvenate the plant and to encourage growth of young wood (flowers form on these young shoots... the more young shoots, the more flowers). Usually (in temperate climates) at least half of the top growth is removed each winter. Plants pruned regularly can last more than 100 years.
- Roses are largely sold bare rooted in winter. You will buy the best selection of plants early winter when they are first released onto the market.

- Aphis and caterpillars are major problems. They can be controlled with pyrethrum, malathion or rogor sprays. Black spot, mildew and rust are common fungal problems.
- In snow areas cut plants back very hard (ie. 95%) and cover with straw over winter).

NB: Roses are usually budded. When you prune them do not cut below the bud.



Rosaceae (Rose)

BULBS

Though there are variations and exceptions, the following generalisations can be made about bulbs, corms, rhizomes and tubers:

- Because they all have a store of food, they do not need heavy feeding when first planted. Because they are all grown for flowers, they do need larger amounts of potash than other nutrients.
- They have a dormant period; they can be susceptible to rotting if left in a moist situation during dormancy (ie. their metabolism is slow in dormancy...this means their defence mechanisms are lower).
- Most prefer a rich, organic, well drained loam. They thrive on soil which has been prepared with rotted manure or compost prior to planting. These things provide a slow release for nutrients which is very appropriate for bulbs.
- Sunny but cool positions are excellent. They can often burn if there is too much heat of wind.

Gladioli

A corm. Larger corms are usually white flowering while smaller corms are other colours. Ideal pH is 6.0. Plant gladioli in spring after the frosts up till Christmas. Plants emerge 2 weeks after planting and take 80 to 90 days to flower, pick when the bottom flower starts opening, leave 4 weeks after picking then lift the corm, dust with a fungicide and store dry. Avoid wind (tie plants to stakes or use a windbreak), requires light, iron deficiency common, virus, aphis and thrip are problems.

Narcissus (Daffodil and Jonquil)

Needs good drainage, will take a lot of water provided drainage is there, pH 6-6.5, best in semi-shade (too much sun can induce iron deficiency, plant at a depth equal to three times their thickness, lift at least every few years after leaves turn yellow, temperatures should not exceed 21 degrees C. during growing season (particularly early in growth).

Dahlia

A tuber, needs full sun, frost tender, plant any time after frosts till end of summer, pH 6-7, wind sensitive, irrigate well (suffers from over drying, dwarf types 6 inches, tall types up to 2 metres (7 ft). A variety of flower types; to get exhibition type blooms, remove side shoots on developing flowers and allow only one flower to a stem, pick flowers early in the morning and dip base of stem in boiling water as soon as picked...this improves keeping quality. Lift the tubers a month or two after the flowering stops.

Hyacinth

Good drainage, cool situation at first till roots develop, if insufficient roots, the flower will abort. Plant late summer/early autumn after worst heat, pH 6.5-7.5, too much nutrient will burn, plant 4-6 inches apart with tips 3-4 inches below the soil. Flowers late winter/early spring. Lift after flowering, dust with fungicide and store dry. In warmer climates, bulbs will deteriorate over a few seasons...for this reason they are best grown in cooler mountain areas. (NB: this is Dutch Hyacinth...don't confuse with grape hyacinth etc).

Iris

More than 200 species and thousands of varieties are grown, divided into bulb and rhizome types. Most are best in fertile, well drained soil, pH 4.5-7.5 (best pH is 6), best in full sun, in hot situations they should be planted deeper, in wet situations plant shallower. Lift and divide every three years. Heavier feeders than other bulbs; bearded iris has more disease than other irises. Spanish and Dutch types are smaller and bulbs.

Other types which have a rhizome include:

- *Iris germanica*...easiest to grow (ground root is "orris root", used in potpourri.
- *Iris siberica*...to 1 m, narrow foliage, colourful.
- *Iris lavaegata*...grows in permanent water (ponds etc).
- *Iris orientalis*...wider leaves than siberica, many colourful varieties.

Liliaceae (Lilium)

CHRYSANTHEMUMS

The chrysanthemum is widely grown in temperate winter dominant rainfall areas, but is often avoided in summer dominant rainfall climates due to increased disease problems caused by the greater humidity in the growing season. But if you spray for fungus, avoid watering the foliage, feed well and ensure good drainage, it is quite possible to succeed even in subtropical areas. Culture can be summarised as follows:

- Rich humus soil, prepared with rotted manure, well drained.
- Plant mid winter to mid summer on 8-10 inch grid.
- Don't grow the same plant more than one season (for most). They are highly susceptible to a virus disease and will deteriorate. Take cuttings from flush of new season's growth early spring. This growth will be virus free.
- Keep surface free of weeds; mulch if drainage is good.
- Feed well with nitrogen when young, as the plant establishes it needs a more balanced fertiliser, particularly higher in potash.
- Control insects (aphis, thrip, and red spider) and fungal problems with regular spraying (whether organic or inorganic).

Asteraceae (Chrysanthemum)

TERMINOLOGY

Learn the following definitions:

- Species: Plants which freely interbreed with each other.
- Genus: A group comprising several species which have several common characteristics, but only interbreed occasionally.
- Variety: A type of plant within a species which can be distinguished from other types in the same species by some obvious physical characteristic. (e.g. leaf shape or colour, flower colour).
- Fruit: A matured ovary (e.g. nuts, berries, pods, fruits).

ASSIGNMENT
Download and do the assignment called ‘Lesson 1 Assignment’.