

INTRODUCTION TO TROPICAL PLANTS

Aim

Explain the nature and scope of tropical plants

What does the term 'Tropical Plant' mean?

Some people would think a tropical is a plant that comes from the tropics. Others might consider tropical to also include plants from sub tropical places.

Gardeners in some parts of the world would also consider any plant that has a tropical appearance, to be a tropical.

Cordylines for instance, are often called 'tropical plants', even though many of the common cultivars have at least partially originated in New Zealand, which does not fall within the tropics.

This course is concentrating on plants which originate from tropical or sub tropical climates; but there may be some plants covered which fit a looser definition of "tropical"

What Tropicals can you grow?

It all depends where you live. Certain plants that originate in tropical or sub tropical climates can sometimes be grown successfully out of doors in a cooler climate - particularly if provided with some protection (eg. under the canopy of a large tree or beside a wall to protect from wind and/or frost). With the right conditions (ie. light, ventilation, temperature, humidity etc) any tropical can be grown in a greenhouse, or as an indoor plant, no matter where you live.

Plant culture deals with living things and there are many variables involved; not only the environmental and soil conditions, but also the type of rose grown, and the treatment it is exposed to.

Reference material can guide you, but always understand that reference material is generic in nature. Authors write advice to a whole country, based on their own experiences. Your locality and situation is far more specific and what you read must be adapted.

When referring to a book or magazine article, always look at where it was written and who it was written by. The information contained in the article can be very location specific – an author talking about gardening in Switzerland will offer different information to someone in Australia, for example. There can also be great variations over relatively small distances in such things as rainfall, wind and soil type.

In horticulture there are different ways of tackling any job - often each one just as correct as the other. 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.

NAMING PLANTS

Plants are given two different types of names:

a. *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 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.

b. *Scientific Names*: based on 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 co-ordinate by botanists throughout the world. Scientific names should always be used in preference to common names.

In the scientific system, plants are classified by dividing them into groups that 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.

Plant Divisions

The main levels of division are as follows:

- The entire plant kingdom is divided up into Phyla
- Phyla are divided into Divisions
- 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 Subspecies and Varieties

The main plant phyla we are concerned with in horticulture are:

- Anthophyta (ie. angiosperms) this group includes all of the plants which produce flowers (eg. eucalypts, roses, lettuce, grasses, orchids etc.) The majority of horticultural plants are angiosperms.
- Coniferophyta (ie. conifers). This includes all plants which produce cones (ie. pines, cypress etc.)
- Pterophyta (ie. ferns). This includes ferns and fern allies.

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

Although there are many different levels of division, the main ones which we use are just a couple at the bottom end of the scale.

The 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
- the second word is the 'species' name of the plant

The genus name begins with a capital letter. The species name is usually written beginning with a small letter. The cultivar or variety name starts with a capital letter and is inserted in speech marks.

Both the genus and species name should be italicized or underlined. For example:

- *Macrophylla excelsa*
- Macrophylla excelsa

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 for example:

Heliconia psittacorum 'Andromeda'

Heliconia is the genus

psittacorum is the species

'Andromeda' is the cultivar

Hybrids, Varieties and Cultivars

You may occasionally be confused by the difference between hybrid and variety.

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 or by man. They are usually represented with an x between the names for example:

Heliconia x spathocircinata

A variety or cultivar is just a particular type of plant in one species. A variety does not have parents from two different species, but a hybrid does. Cultivars are distinctly different plants that may have come about through breeding, by mutation or by selection from a species that is naturally occurring.

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Monocotyledons vs Dicotyledons

Anthophyta (the angiosperms or flowering plants) is divided into two classes:

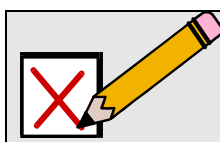
- Dicotyledonae. These plants are known as dicotyledons. In dicotyledons, the first leaves to appear from a germinating seed are in a pair (two leaves appear at once). Dicotyledons generally have one major tap root, and the veins in the leaves are not parallel. Dicotyledons include marigolds, eucalypts, pumpkins, roses, etc.
- Monocotyledonae. These plants are known as monocotyledons. In these plants, the first leaf to appear when a seed germinates is a single leaf. Veins in the leaves are usually parallel to each other and the plants generally have a fibrous root system with no main tap root. Monocotyledons include grasses, orchids, palms, bamboos, lilies, etc.

Plant Families

It can be seen above that you can distinguish between dicotyledons and monocotyledons by a couple of very simple characteristics. (Be aware, however that there are always exceptions to the rule). 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 and flowers have two distinct lips.
- Araceae family - leaves are usually heart shaped (eg. Philodendron) and plants are commonly tropical/indoor plants.
- Asteraceae - have daisy type flowers.
- Apiaceae - flowers occur in an umbrella like head on a single stalk.

Plant family names end in "aceae". Some old plant family names had different endings. Students have sometimes called the family name a genus. Note that a genus name virtually never ends in the letters "aceae".



SELF ASSESSMENT

Perform the self assessment test titled 'Self Assessment Test 1.1.'
If you answer incorrectly, review the notes and try the test again.

GROWING TROPICAL PLANTS – CLIMATIC ZONES

Tropical climates are found in South-East Asia, much of India, northern Australia, Central America, the Caribbean, Northern parts of South America, many of the Pacific islands and perhaps the central half of the African continent. Tropical areas in general have the highest average temperature levels, the longest frost-free growing seasons, and the greatest amount of light (intensity and duration), compared to other regions on the planet.

Tropical gardens can vary from dry and desert-like, to coastal, to dense, lush and leafy environs resembling the dynamic workings of a rainforest. Many different garden effects are possible using tropical plants. You can also, on a small scale, transform a garden into a microclimate using tropical plants that are not normally found in your locality.

The main climatic zones that exist on earth are Tropical, Temperate and Arid. There are of course variations between these such as subtropical, warm-temperate, dry-tropics, etc. It is important to understand that there are variations in climate within tropical and subtropical regions, and that not all tropical plants like the same conditions.

Tropical: yearly mean temperature not below 18°C. The air humidity is relatively high especially over summer and autumn. Subtropical climates have coolest months below 18°C during the day but above 0°C at night (usually frost free). Tropical areas are those parts of the world that fall between the Tropics

of Cancer and Capricorn, which are lines of latitude lying 23.5 degrees north and south, respectively, of the equator. The most highly populated parts of these areas are typically hot and humid most of the year, with a mainly dry period during the winter and a pronounced wet season during the summer period.

Humidity becomes even higher during the rainy season. Many of these areas may also be subject to cyclones and severe storms. Some parts of the tropics however are drier, even deserts. These areas may also be subject to severe windstorms, but rainfall and humidity may be much lower.

Subtropical generally warm like the tropics, but conditions may be more seasonal; refers to the regions between about 23 degrees and 30 degrees south and north of the equator. These regions generally have lower average temperatures, shorter frost free growing seasons, and less light overall than tropical regions, but without the cold winters of the temperate zone. Subtropical climates are found in Australia (eg. South East Qld), Africa (eg. Northern South Africa), the USA (eg. parts of Florida, Louisiana, Southern California, Texas), etc. Temperature fluctuations may be greater than for tropical areas. Subtropical areas can suffer from frosts, particularly inland areas. They can also have very hot days. Subtropical climates can be generally described as areas outside the tropics which exhibit a few features similar to those found in the tropics. Areas outside the tropics can be described as zones south of the Tropic of Capricorn; and zones north of the Tropic of Cancer.

Temperate: winter months below 0°C and the warmest months above 10°C mean. Polar climates have warmest months with below 10°C or in continual frost mean.

Arid: mean rainfall 500 mm or less. Deserts have mean rainfall at 250 mm or less. Generally evaporation exceeds precipitation. Some areas that are tropical have large extremes when it comes to moisture availability. Arid zones are usually very dry, with poor soils such as claypans, sands or gravels, and are subject to occasional downpours that can result in flooding. Therefore, the plants that thrive in this type of environment are either very hardy or have very specialised survival strategies to meet such conditions. Arid environments can be much colder at night and hotter during the day than other parts of the tropics or subtropics. These areas can become very hot during the day; but also very cold at night. Many inland parts of Australia, Asia, America and Africa have low rainfall; and can be very hot - temperatures in the high 40's degrees Centigrade during the day, to near zero at night. Plants here must be hardy to extremes. Gardens in such areas should be designed to buffer extreme temperature fluctuations. Use of drought tolerant plants and efficient water management can help in creating an attractive garden in such areas.

Some climatic variations

Seasonal or Constant

Many tropical climates have two distinct seasons; a wet season (monsoons), with heavy rains and high humidity and a dry season, when there is little rain. Some parts of the tropics are much less seasonal, with temperature and rainfall conditions remaining similar all year round (eg. Honolulu and some other parts of Hawaii).

Mountain

Mountains can be high and cold in some parts of the tropics. There are even snow covered mountains in tropical New Guinea. Plants which grow on tropical mountains can be quite different to plants that grow in tropical lowlands.

Savannahs (Grasslands)

Savannahs are tropical or subtropical open grasslands that are bordered either by rainforest or swamps or mixtures of both. They tend to suffer a greater variation in temperature than coastal or rainforest environments. They can be very humid and damp environments due to high moisture and open sunny conditions. Broad-leaved ground covers with bright flowers are very much at home in this environment.

Rainforest

The rainforest is one of the most dynamic environments that exist with an abundance of species that often cannot be found elsewhere. Conditions throughout a rainforest are constantly changing as the forest undergoes a competitive aging process that sees many species unable to survive. Thus those that do remain do so as a result of highly specialised ecological refinements.

Coastal

Coastal regions can be a mixture of all those previously mentioned environments with the added complications of salt-laden spray, periods of heavy winds, nutrient poor soils, and at times encroaching sand dunes. Plants that grow in coastal areas need to be quite hardy to survive in such a climate. Being close to water has a buffering affect upon temperature extremes. They do not get as hot or as cold as otherwise similar environments that are further away from water.

WARM CLIMATE GARDENING

Many of our most magnificent gardens can be found in hot places. The range of plants available for such situations, provide a palette of unique textures, colours and shapes.

The heat, and humidity in moister areas, encourages diversity of plant life. With the right approach, and careful selection of plants, a hot place can be turned into a very liveable garden.

What Causes an Area To Be Warm?

There are a number of things which contribute to a garden space becoming hot. Most heat will come directly from the sun. Generally the closer the area is to the equator the warmer it is. The average maximum daily temperature will generally increase the further you move away from coastal areas. The sea or ocean has a temperature moderating effect. Temperature also decreases as altitude increases, so even in tropical regions high altitude sites will normally be significantly cooler than adjacent lowland sites. Some coastal areas may also remain warmer than other areas at the same latitude (distance from the equator) due to the presence of warm ocean currents.

Cloud cover has an effect on air temperature near the earth's surface, by keeping it cooler in the day, but warmer at night as warmth cannot escape the atmosphere.

Existing vegetation can dramatically modify temperature over a large land area. Vegetation will buffer the temperatures by keeping air slightly warmer in winter and cooler in summer.

Some materials will absorb and/or store, and radiate heat more than others. Materials such as metal, stone, glass, and paved areas can contribute to increased heat in a garden. The more these materials are used, the more likely the garden is to warm up, and stay warm. Heat can also be generated (to a lesser extent) by human activity such as burning off, factories, motor cars, etc. Factors such as these often mean that temperatures in a city are likely to be higher than in the surrounding countryside.

The Good and the Bad News about Tropical Gardens

Warm climates can create both good and bad conditions for gardeners in a tropical climate for example:

- plants tend to grow faster, longer, and lusher in a tropical climate
- pests and diseases also tend to grow bigger and faster, but if plants are relatively healthy, they are able to recover faster from these problems in a warm climate
- humidity can be higher and more prolonged than in cool climates
- winds and storms can be more forceful
- soil can dry out faster
- foliage can suffer sun burn more readily

Generally this means that:

1. Often, plants need to be grown differently in the tropics than they are in the subtropics or a temperate climate as an indoor plant.
2. Generally (not always), the same plant grows bigger in the tropics than in the subtropics, and bigger in the subtropics than in temperate climates.
3. Drainage is very important in tropical areas to avoid roots being flooded in heavy rainfalls.
4. Plants susceptible to damage from waterlogging might be better planted on mounds or slopes.
5. Plants need to be inspected for pests and diseases more often and action take immediately. In a cool climate, you might wait for a few days or weeks to see whether insects develop into a serious problem, but in the tropics, they can develop from a minor to a serious problem over night.

Common Hot Garden Areas

When we think of hot gardens, our thoughts usually turn to the tropics or sub-tropics. Gardens in these areas are commonly hot; but not necessarily so. There are exceptions. Tall mountains in New Guinea can be covered with snow. Shaded rainforests in sub-tropical south-east Queensland can suffer at times from temperatures approaching zero degrees Centigrade. Desert areas, such as those found in central Australia, are generally regarded as hot/dry climates however night temperatures can easily reach zero degrees Centigrade or less in winter. And in cooler areas it is possible that a small paved courtyard garden may suffer higher temperatures than a shaded rainforest garden in the sub-tropics will ever face.

Heat Traps

Hot spaces are sometimes created intentionally, and sometimes unintentionally, in cooler climates.

Poorly ventilated areas (eg. a walled or fenced in garden space such as a courtyard), will not cool down as readily as more exposed sites, and can become a heat trap. Small, enclosed areas are more likely to act as a heat trap.

Walls which face the sun (eg. north facing in the southern hemisphere), tend to heat up faster than walls not exposed to as much sunlight; and they then radiate heat back over the day into the adjacent garden.

Paving or concrete heats up much more than grass, and can also produce a lot of glare.

Large ponds or pools can have a moderating effect on the local temperature. As the water heats during the day from the effect of sunlight some will evaporate lowering the temperature in the immediate area. In addition some of the incoming heat will remain in the water to be radiated back into the atmosphere at night, once the sun has gone, helping to keep temperatures slightly warmer in the immediate area.

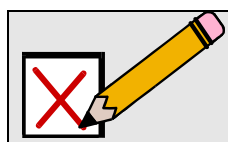
Warming the Garden

There may be reasons why an individual may wish to raise the temperature within the garden. One reason may be that they like warmth and heat as opposed to the cool or cold temperatures of winter. The gardener may however, see the advantage of raising the garden temperature as an opportunity for growing more tropical plants in their location.

The gardener must look carefully at their site, and assess which places are the warmest for placement the most cold sensitive plants. These sites may be facing north against a wall, in a garden protected from winter winds, or even in a glasshouse.

Greenhouse Growing

A greenhouse is simply a structure or building used to provide suitable growing conditions for particular plants that could not normally be grown, or could only be grown with difficulty, in the outside environment. Tropical plants are most commonly grown as greenhouse or indoor plants in cooler climates.



SELF ASSESSMENT

Perform the self assessment test titled 'Self Assessment Test 1.2.'
If you answer incorrectly, review the notes and try the test again.

PLANT REVIEW WORKSHEETS

With each assignment you will be required to prepare plant reviews. Each plant should be named, described and illustrated.

Naming the Plant

Include the common name, scientific name; and the plant family name if possible.

If you cannot provide one of these, write a note to the tutor explaining that you attempted to find the information and why you could not.

Your tutor will often be able to help at least partly identify the odd unidentified plant; if you submit an illustration and good description (ideally presenting not only a leaf, but also a flower, fruit or seed head),

Describing the Plant

You should record any information that might be important to selecting and using this plant for a landscape design for example:

- Height: how high can it grow in your locality?
- Width: how wide can it grow in your locality?
- Flowers: what colour and when does it flower?
- Leaf colour: shape, texture. What colour are the leaves when young and mature? Are the leaves round, feathery, lobed or spiky? Are the leaves fine or coarse textured?
- Scent: are the flowers scented?
- Animal Attraction: does the plant attract birds, butterflies, bees? If so what part of the plant (flower or fruit)?
- Hardiness: is it frost tender? How does the wind affect it?
- Culture: are there any special things the plant requires? How hard should it be pruned and how often? Does it need good drainage? How often should it be fertilised? etc.
- Pests and Diseases: list any pests and diseases that are particularly bad for this plant.
- Maintenance: are there any maintenance requirements for the plant such as pruning or raking fallen leaves in winter?
- Write approximately up to half a page for each plant.

Illustrating the Plant

This may be done any of the following ways:

- Submit a photograph or drawing of parts of the plant
- Send a scan of a photograph or drawing (do not send large graphics files over the internet. Consult your student manual for details)
- Refer to a web site page location where you have found the plant illustrated on the internet.
- Submit a pressed specimen or a photograph of a pressed specimen (Note: do not send pressed specimens across state or national borders. To do so may be illegal and in breach of Quarantine regulations).

Plant Review Submissions

As part of each assignment you will prepare plant review sheets (with two plants on each sheet) containing a photo or illustration of each plant and a description of that plant.

With each assignment submit a tropical plant collection that includes 1 tree, 2 shrubs, 1 native, 1 climber, 1 indoor plant, 1 tropical plant that is part edible and 1 other tropical plant of your selection. Each lesson will require eight (8) specimens to be submitted. When you submit each assignment, submit plant identification sheets at the same time. This is a total of 80 over the whole course. You may include up to two plants on the same sheet of paper.

Use the plant identification worksheet example on the last page of this lesson as guide.

SET TASK

1. Research the climatic factors and ranges of your district. You may need to contact the Bureau of Meteorology or your local weather station. Record figures such as average monthly temperatures, rainfall, humidity etc.
2. Walk around your local area. Observe the plants that grow in gardens and on commercial properties. Are these plants typical of tropical landscapes as you would expect? Do you think the planting are suitable for the climate?

**ASSIGNMENT**

Download and do the assignment called 'Lesson 1 assignment'.

EXAMPLE OF A PLANT IDENTIFICATION WORKSHEET

Plant No. 1.

Plant Family.....	Sketch Or Photo
Genus	
Species.....	
Common Name.....	
How and Where to Plant it.....	
Height..... Spacing.....	
Hardiness	
Appearance	
Uses	
Culture	
Pest and Disease	

Plant No. 2.

Plant Family.....	Sketch Or Photo
Genus.....	
Species.....	
Common Name.....	
How and Where to Plant it.....	
Height..... Spacing.....	
Hardiness	
Appearance	
Uses	
Culture	
Pest and Disease	

NOTE: This is a sample only! Change it as needed to suit your situation.