

## Coniferous Forest



**Temperature:**  $-40^{\circ}\text{C}$  to  $20^{\circ}\text{C}$ , average summer temperature is  $10^{\circ}\text{C}$

**Precipitation:** 300 to 900 millimeters of rain per year

**Vegetation:** Coniferous-evergreen trees (trees that produce cones and needles; some needles remain on the trees all year long)

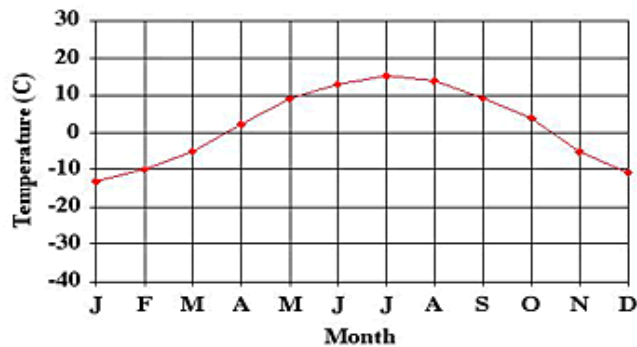
**Location:** Canada, Europe, Asia, and the United States

**Other:**

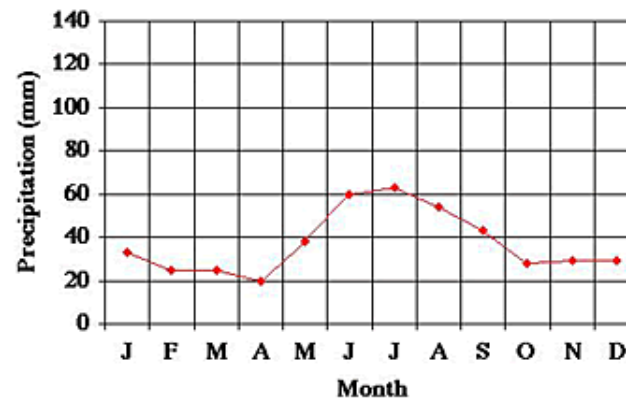
Coniferous forest regions have cold, long, snowy winters, and warm, humid summers; well-defined seasons, at least four to six frost-free months

**Example:** Beaverlodge, Alberta, Canada

Temperature graph:



Precipitation graph:



Location map:



### Description

Between the tundra to the north and the deciduous forest to the south lies the large area of coniferous forest. One type of coniferous forest, the northern boreal forest, is found in  $50^{\circ}$  to  $60^{\circ}\text{N}$  latitudes. Another type, temperate coniferous forests, grows in lower latitudes of North America, Europe, and Asia, in the high elevations of mountains.

Coniferous forests consist mostly of conifers, trees that grow needles instead of leaves, and cones instead of flowers. Conifers tend to be evergreen, that is, they bear needles all year long. These adaptations help conifers survive in areas that are very cold or dry. Some of the more common conifers are spruces, pines, and firs.

Precipitation in coniferous forests varies from 300 to 900 mm annually, with some temperate coniferous forests receiving up to 2,000 mm. The amount of precipitation depends on the forest location. In the northern boreal forests, the winters are long, cold and dry, while the short summers are moderately warm and moist. In the lower latitudes, precipitation is more evenly distributed throughout the year.

## Grassland



**Temperature:** Dependent on latitude, yearly range can be between  $-20^{\circ}\text{C}$  to  $30^{\circ}\text{C}$

**Precipitation:** About 500 to 900 mm of rain per year

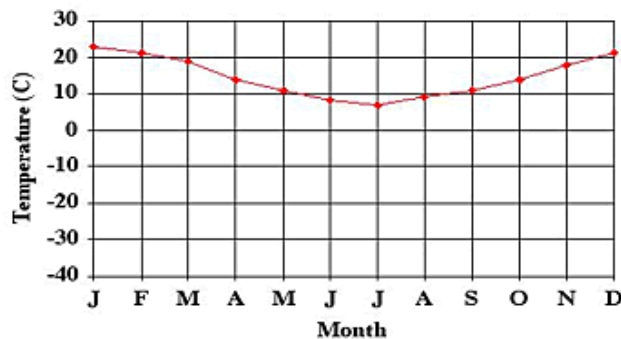
**Vegetation:** Grasses (prairie clover, salvia, oats, wheat, barley, coneflowers)

**Location:** The prairies of the Great Plains of North America, the pampas of South America, the veldt of South Africa, the steppes of Central Eurasia, and surrounding the deserts in Australia

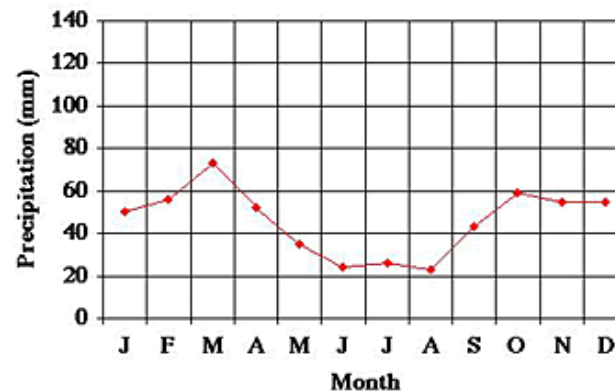
**Other:** Found on every continent except Antarctica

**Example:** Ingeniera White, Argentina

Temperature graph:



Precipitation graph:



Location map:



## Description

Grasslands are generally open and continuous, fairly flat areas of grass. They are often located between temperate forests at high latitudes and deserts at subtropical latitudes. Grasses vary in size from 2.1 m (7 ft) tall with roots extending down into the soil 1.8 m (6 ft), to the short grasses growing to a height of only 20 to 25 cm (8 to 10 in) tall. These short grasses can have roots that extend 1 m (about 3 ft) deep.

The height of grass correlates with the amount of rainfall it receives. Grasslands receive about 500 to 900 mm of rain per year compared to deserts, which receive less than 300 mm and tropical forests, which receive more than 2,000 mm. While temperatures are often extreme in some grasslands, the average temperatures are about  $-20^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . Tropical grasslands have dry and wet seasons that remain warm all the time. Temperate grasslands have cold winters and warm summers with some rain.

The grasses die back to their roots annually and the soil and the sod protect the roots and the new buds from the cold of winter or dry conditions. A few trees may be found in this biome along the streams, but not many due to the lack of rainfall.

## Shrubland



**Temperature:** Hot and dry in the summer, cool and moist in the winter

**Precipitation:** 200 to 1,000 mm of rain per year

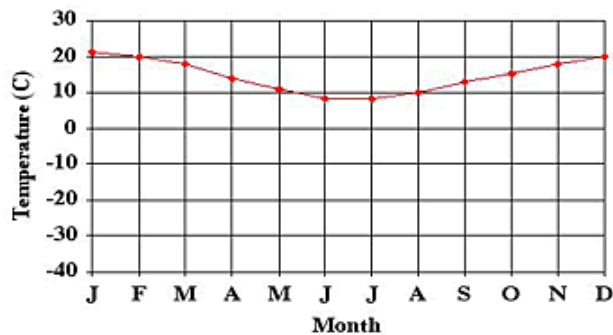
**Vegetation:** Aromatic herbs (sage, rosemary, thyme, oregano), shrubs, acacia, chamise, grasses

**Location:** West coastal regions between 30° and 40° North and South latitude

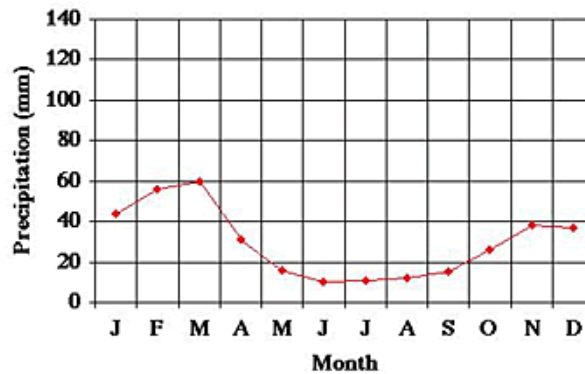
**Other:** Plants have adapted to fire caused by the frequent lightning that occurs in the hot, dry summers.

**Example:** Middelburg, South Africa

Temperature graph:



Precipitation graph:



Location map:



## Description

Shrublands include regions such as chaparral, woodland and savanna. Shrublands are the areas that are located in west coastal regions between 30° and 40° North and South latitude. Some of the places would include southern California, Chile, Mexico, areas surrounding the Mediterranean Sea, and southwest parts of Africa and Australia. These regions are usually found surrounding deserts and grasslands.

Shrublands usually get more rain than deserts and grasslands but less than forested areas. Shrublands typically receive between 200 to 1,000 millimeters of rain a year. This rain is unpredictable, varying from month to month. There is a noticeable dry season and wet season.

The shrublands are made up of shrubs or short trees. Many shrubs thrive on steep, rocky slopes. There is usually not enough rain to support tall trees.

Shrublands are usually fairly open so grasses and other short plants grow between the shrubs.

In the areas with little rainfall, plants have adapted to drought-like conditions. Many plants have small, needle-like leaves that help to conserve water.

Some have leaves with waxy coatings and leaves that reflect the sunlight. Several plants have developed fire-resistant adaptations to survive the frequent fires that occur during the dry season.

## Temperate Deciduous Forest



**Temperature:**  $-30^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ , yearly average is  $10^{\circ}\text{C}$ , hot summers, cold winters

**Precipitation:** 750 to 1,500 mm of rain per year

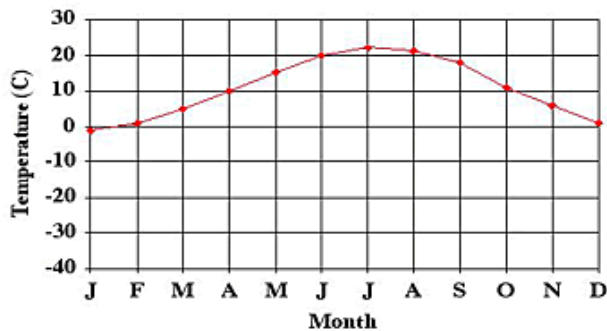
**Vegetation:** Broadleaf trees (oaks, maples, beeches), shrubs, perennial herbs, and mosses

**Location:** Eastern United States, Canada, Europe, China, and Japan

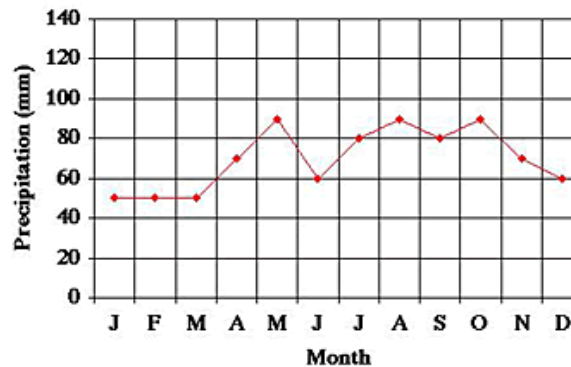
**Other:** Temperate deciduous forests are most notable because they go through four seasons. Leaves change color in autumn, fall off in the winter, and grow back in the spring; this adaptation allows plants to survive cold winters.

**Example:** Staunton, Virginia, United States

Temperature graph:



Precipitation graph:



Location map:



### Description

Temperate deciduous forests are located in the mid-latitude areas which means that they are found between the polar regions and the tropics. The deciduous forest regions are exposed to warm and cold air masses, which cause this area to have four seasons. The temperature varies widely from season to season with cold winters and hot, wet summers. The average yearly temperature is about  $10^{\circ}\text{C}$ . The areas in which deciduous forests are located get about 750 to 1,500 mm of precipitation spread fairly evenly throughout the year.

During the fall, trees change color and then lose their leaves. This is in preparation for the winter season. Because it gets so cold, the trees have adapted to the winter by going into a period of dormancy or sleep. They also have thick bark to protect them from the cold weather. Trees flower and grow during the spring and summer growing season.

Many different kinds of trees, shrubs, and herbs grow in deciduous forests. Most of the trees are broadleaf trees such as oak, maple, beech, hickory and chestnut. There are also several different kinds of plants like mountain laurel, azaleas and mosses that live on the shady forest floor where only small amounts of sunlight get through.

## Rainforest



**Temperature:** 20°C to 25°C, must remain warm and frost-free

**Precipitation:** 2,000 to 10,000 millimeters of rain per year

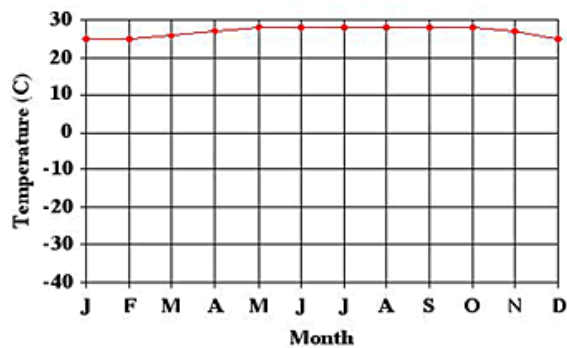
**Vegetation:** Vines, palm trees, orchids, ferns

**Location:** Between the Tropic of Cancer and the Tropic of Capricorn

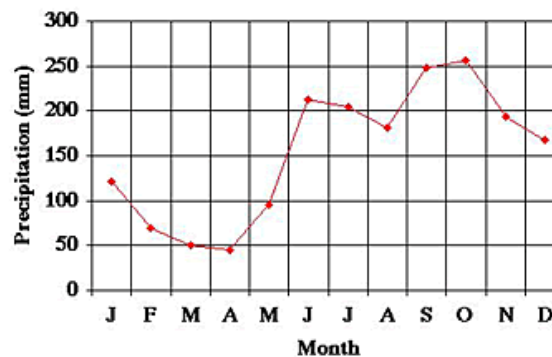
**Other:** There are two types of rainforests, tropical and temperate. Tropical rainforests are found closer to the equator and temperate rainforests are found farther north near coastal areas. The majority of common houseplants come from the rainforest.

**Example:** Campa Pita, Belize

Temperature graph:



Precipitation graph:



Location map:



## Description

There are two types of rainforests, tropical and temperate. Tropical rainforests are found closer to the equator where it is warm. Temperate rainforests are found near the cooler coastal areas further north or south of the equator.

The tropical rainforest is a hot, moist biome where it rains all year long. It is known for its dense canopies of vegetation that form three different layers. The top layer or canopy contains giant trees that grow to heights of 75 m (about 250 ft) or more. This layer of vegetation prevents much of the sunlight from reaching the ground. Thick, woody vines are also found in the canopy. They climb trees in the canopy to reach for sunlight. The middle layer, or understory, is made up of vines, smaller trees, ferns, and palms. A large number of plants from this level are used as common houseplants. Because of the small amount of sunlight and rainfall these plants receive, they adapt easily to home environments. The bottom layer or floor of the rainforest is covered with wet leaves and leaf litter. This material decomposes rapidly in the wet, warm conditions (like a compost pile) sending nutrients back into the soil. Few plants are found on the floor of the forest due to the lack of sunlight. However, the hot, moist atmosphere and all the dead plant material create the perfect conditions in which bacteria and other microorganisms can thrive.