

3. Climatic Requirements

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Photo by Greg Moulds

INTRODUCTION

Lemons are produced in a wide range of climates in tropical, subtropical and temperate regions comprising humid, semi-arid or arid conditions. Climate is the most important factor in determining where lemon trees will grow. In Australia, for example, they are successfully grown commercially near Darwin and Katherine in the Northern Territory; on the south-west coast of Western Australia; on the north, central and south coasts of NSW; in the Central Burnett, Emerald and south-east coast areas of Queensland; in the Riverland, Sunraysia and Riverina areas of southern Australia (NSW, Victoria and SA); and the inland areas around Bourke, Narromine and Alice Springs. Non-commercial trees are found in home gardens in towns of Tasmania.

TEMPERATURE

For lemons, temperature and wind are the two most important constraints to growth where water is not limiting. Excepting for limes, lemons are the most frost sensitive of the commonly grown citrus varieties.

Freezing temperatures are the most limiting factor and the frequency, timing and duration of frosts needs to be assessed. Lemons should not be planted where winter frosts are severe and temperatures fall below -4°C. Lemon trees are defoliated at -4.4 to -5.6°C, wood is damaged at -6.7°C, young fruits and flowers are killed at -1.7°C and mature fruits are badly damaged at -2°C. (J. F. Morton, *Fruits in Warm Climates* : Lemon pp 160-168)

The optimum temperature for growth is 25-30°C with the maximum rate of photosynthesis occurring at 30°C. There is little or no growth at temperatures above 40°C. However, lemons appear to be less sensitive than oranges to high temperatures and good fruit set and yields are obtained in hot regions if trees have adequate water and nutrients. High temperatures combined with low humidity can cause problems with sunburnt fruit if they are carried on the outside of trees

WIND

Lemon trees are particularly sensitive to wind and strong or cold winds will reduce yields and scar fruit. Trees should be planted in protected sites with good air drainage from cold winds. Lemon trees tend to have a naturally willowy habit with long slender limbs and branches which are easily broken in strong winds especially if they are carrying a heavy crop load. Fruit are also easily scarred by wind resulting in poor external quality and subsequent downgrading at the packing line. Pruning can be used to encourage fruit production in the insides of trees.

VARIETY DIFFERENCES

Lemon varieties vary in their ability to withstand hot and cold conditions. The Meyer lemon is the most cold and frost tolerant variety, but it also does equally well in hot tropical conditions.

The Lisbon lemon is generally hardier than Eureka with greater tolerance to cold and dry heat conditions. Fruit also tend to be produced on the insides of trees and so are less likely to be damaged by wind.

Eureka is the least tolerant of cold conditions and is best suited to milder climates where frost is unlikely. The fruit tend to be borne on the ends of branches and therefore are more prone to wind blemish and sunburn.

REGIONAL DIFFERENCES

The climatic conditions of a region significantly influence lemon tree growth, flowering and fruiting. There are major differences in the cropping pattern of lemons in cooler temperate type climates with those grown in warmer subtropical regions.

In the drier temperate type climates with typically warm days and cool nights and hot summers and cold winters lemon trees normally flower only once a year in spring. Australian growing regions with these conditions include the Riverina, Sunraysia, Riverland, Central Burnett and Emerald areas. From the spring bloom one main crop is produced and harvested in late autumn-winter depending on variety. Fruit takes around 9 months to fully mature and colour. Because of the relatively dry conditions and low humidity there are fewer problems with fungal diseases and external fruit quality is usually good unless it is damaged by wind or sunburn.

In the more humid subtropical and temperate areas with mild winters lemon trees can flower and produce fruit throughout the year. The north and central coast regions of New South Wales, south west coast of Western Australia and south east coast of Queensland are typical of these growing conditions. Trees normally flower heavily in spring followed by sporadic lighter flowerings during summer and into autumn. Although the largest (main) crop matures in winter, several smaller intermediate crops mature throughout the spring-summer-autumn period. Fruit take around 8 months to fully mature and colour.

In these regions where there is high rainfall and humidity, the trees are also susceptible to a greater range of pests and fungal diseases. The fungal diseases melanose and lemon scab are a major problem requiring multiple applications of protectant fungicides. These diseases blemish fruit reducing external fruit quality. As trees age and the amount of deadwood increases the fungal spore load also increases making control difficult. A regular pruning program is critical for spray penetration and disease management otherwise trees have a limited life-span of between 10-15 years.

In the hot tropical and subtropical regions such as those in the Northern Territory and far north Queensland, lemon trees can grow almost continuously throughout the year. Tree growth is vigorous and fruit growth is more rapid taking around 7 months to fully mature and colour.

In areas with a high humidity (Darwin) there are similar problems with pests and diseases as in other humid regions and external fruit quality can be poor as a consequence of these fungal diseases. Katherine (NT) and Kununarra (WA) are very hot but do not have problems with high humidity.