

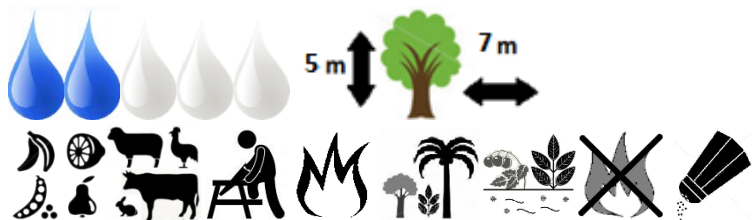
Trees for Palestine

Booklet I: Frost tolerant species

Fostering Adaptation to Climate Change among Farming Systems in the northern Jordan Valley project



Ceratonia siliqua, carob tree



Why?

The fruits of *Ceratonia siliqua* can be used to make syrup or juice and can also be eaten fresh or dried. The seeds known as *locust beans* act as a food thickening agent. The fruits provide fodder for all animals and the carob seed flour is a nutritious additive to animal foods. The hard, closed-grained wood of the carob tree provides a fine, pink-coloured timber that is extremely versatile: Carob provides acceptable firewood and a slow-burning charcoal.

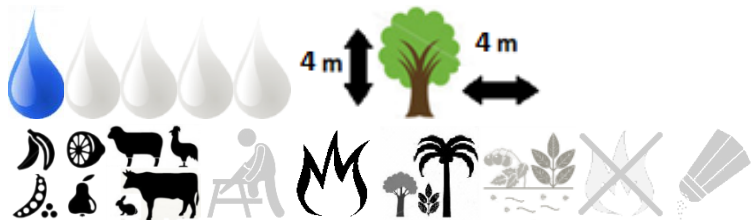
Ceratonia siliqua is a weak nitrogen-fixing species. The tree's extensive root system penetrates rock and soil and fertilizes the surface soil, promoting the growth of neighboring crops. Because the tree is fire retardant and evergreen it is an ideal perimeter windbreak. The carob grows well with all common fruit trees.

How?

Use the freshest seeds possible. Before sowing, the seed must be boiled for 1 minute, then leave in cold water to cool for 24 hours. The water should be changed after 12 hours. Sow the seed outdoors at a depth of 1 cm. There are male and female trees and only female trees grow fruits. Grow females if there is a male in the neighborhood. Carob trees can grow literally right on the rock.



Crataegus azarolus, azarole



Why?

The fruits are delicious fresh or dried and can be preserved as syrup. Both fruits and leaves can be used as animal food. The hard and heavy wood can be used for small wooden items and as fuelwood. Its strong rootstock is used for the grafting of apple, pear and quince. The tree is also good for apiculture and it attracts birds and insects. It can be planted in orchards since it is a very small tree.

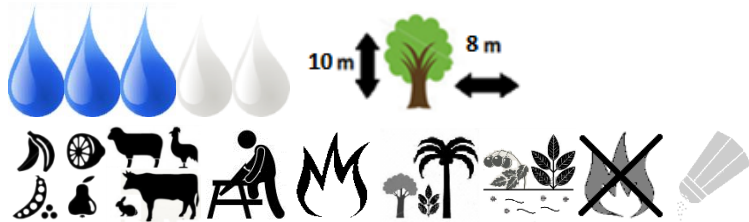
Azarole is a good hedge species and can therefore be planted around crops to protect them. It can be grown on every soil type, including on thin, rocky soil, protecting it from erosion.

How?

The seeds are best sown as soon as they are ripe in autumn. To speed up the germination process the seed can be fermented in its own pulp for a few days. It should be sown in containers and then transplanted after one year. It will grow on thin soil and rocky slopes.



Leucaena leucocephala, leucaena



Why?

This tree continuously produces tender green pods, green seeds and leaf tips that are a nutrient-rich food, delicious when cooked and serve as highly valuable animal food. The tree also produces huge quantities of foliage, flowers, fruits and bark and pollen and nectar for apiculture, as well as copious fuelwood and straight wooden poles. *Leucaena leucocephala* is very fast-growing and, although drought tolerant, it will greatly increase productivity with adequate irrigation.

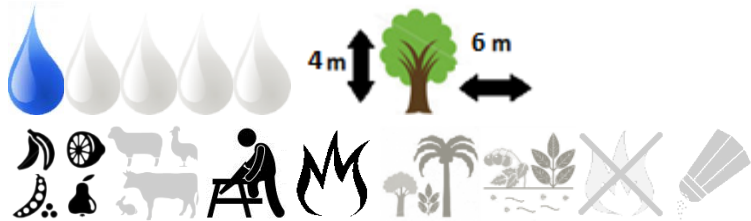
Because *Leucaena* never rests it provides important services all year. It has the highest recorded rate of nitrogen fixation of any tree and is therefore the best choice for improving soil fertility.

How?

Propagation from seed is easy. Use ripe, fresh seeds sown at maximum one centimeter depth. Boil seeds for one minute and soak them for 24 hours before sowing for more prompt and synchronous germination.



Pistacia palaestina, terebinth



Why?

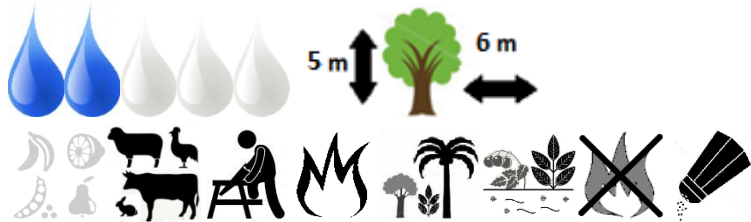
The tree is extremely drought tolerant. The rootstock can be used to grow the pistacia vera on. The tree is a source of a resin called *mastic* used as a preservative. Traditionally seeds are milled and added to bread flour to spice it. It is also possible to gain oil out of the seeds. The tree also provides excellent firewood and the fast-growing wood can be used as timber.

How?

Cleaned seeds are soaked in warm water for 3-4 days prior to sowing. Still, germination is slow and patchy. Higher germination rates are achieved with acid treatment for 90 minutes followed by soaking in cold water for 24 hours prior to sowing. The tree is either male or female and only females produce fruits.



Quercus calliprinos, kermes oak



Why?

The tree provides good animal fodder for sheep and goats. Its acorns are an alternative to barley and maize. The oak grows slowly, providing the highest quality fuelwood and timber. The wood is very dense and heavy.






The tree survives fires but regrows in the form of a dense and branched shrub. It is a good wind break and attracts a lot of different birds and insects which also have a positive influence on other plants. In a long-term perspective it is the most important species for soil improvement.






How?

The seed is best sown as soon as possible as it loses its viability when it dries out. The tree should also be transplanted soon after the growing has begun.



Symbols

Symbols	Explanation
	<p>Water requirement: the tree needs a minimum annual rainfall of:</p> <ul style="list-style-type: none"> ➤ Less than 300 mm ➤ 300-500 mm ➤ 500-700 mm ➤ 700-900 mm ➤ more than 900 mm
	<p>Tree dimensions</p>
	<p>Food: The <i>food</i> icon shows if the tree produces edible and appetizing plant parts like fruits.</p>
	<p>Animal Food: Rates the amount and quality of animal fodder produced by the tree.</p>
	<p>Timber: Besides the quality of the wood, the growth rate and the growth form also play an important role in rating the timber of an appropriate tree.</p>

	<p>Firewood: Most of the trees have the <i>firewood</i> symbol since every wood can be burned. Trees without this symbol produce either too little or too much wood and sometimes emit a poisonous smoke when burned.</p>
	<p>Utility: This symbol shows if a tree has a positive effect on other plants, for example: acting as a wind break, attracting different birds and insects, or if it can be intercropped with other plants.</p>
	<p>Soil improvement: This icon represents all benefits gained from a tree regarding the improvement of soil fertility. If a tree fixes nitrogen or if its roots penetrate the soil deeply to make nutrient matter available, the tree receives this symbol.</p>
	<p>Fire resistance: A tree that receives this icon can be planted around a piece of land to protect crops from fires.</p>
	<p>Salt tolerance: High salinity restrains most plants from growing. However, some trees can tolerate a relatively high salinity or even act as a desalinating agent. These species are awarded the <i>salt tolerance</i> icon.</p>

This agroforestry booklet has been prepared by MA'AN Development Center with the assistance of Bustan Qaraaqa. It is part of the project

“Fostering Adaptation to Climate Change among Farming Systems in the northern Jordan Valley

For more information about the trees and how to procure them, please contact MA'AN Development Center at

E-Mail: maan@maan-ctr.org

Tel: 970 - 2 – 2954451

<http://www.maan-ctr.org/index.php>

or

Bustan Qaraaqa at <http://bustanqaraaqa.weebly.com>