

PASTORAL AND AGRO-PASTORAL SYSTEMS

CGIAR RESEARCH PROGRAM ON LIVESTOCK

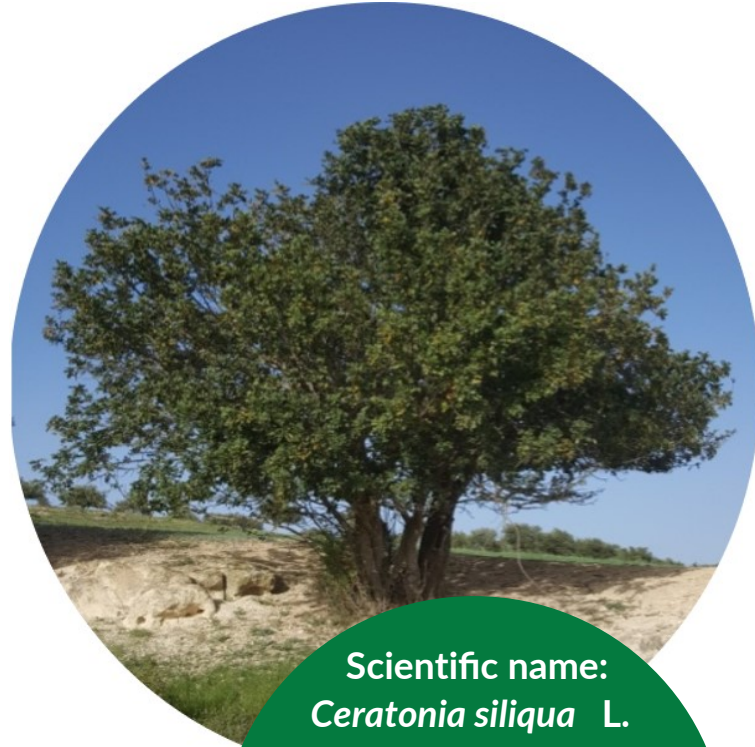
Aims to increase the productivity of livestock agri-food systems in sustainable ways across the developing world.

Managing rangelands: promoting native legume tree species

Ceratonia siliqua L.: an agrosilvopastoral tree

Legume trees play a significant role in both agricultural and natural ecosystems by feeding into the nitrogen cycle, providing an alternative feed resource for livestock, and rehabilitating degraded ecosystems. As such, legume trees are attracting considerable interest for agroforestry in the arid and Mediterranean regions.

Ceratonia siliqua L., commonly known as the carob tree or locust tree, is a long-lived evergreen legume tree native to the Mediterranean. It grows to 5–10 m in height in agricultural situations that feature crops,



Scientific name:
Ceratonia siliqua L.

Common names:
Carob tree, locust tree,
الخروب, caroubier

Locations:
Native to the
Mediterranean region

Benefits:

- Tolerates drought
- Grows on a wide range of soils
- Performs as a multipurpose tree
- Produces nutritious fruits (carob beans/ pods)
- Provides shades for livestock during summer
- Carob gum is a common food thickener and stabilizer which is used also to make adhesive
- Carob leaves or pods could be used to feed livestock
- Used in traditional medicinal mainly to treat diarrhea
- Provides an aesthetic value to the land

forestry and animal pasture (agrosilvopastoral systems) and has high ecological and socio-economic value. The carob tree has a broad hemispherical crown, a thick trunk and sturdy branches. Its foliage is dense, with shiny, green, round and leathery leaves. These leaves are alternate and pinnate, sometimes with terminal leaflets, and are 10–20 cm long. The dark green leaflets have a very thick epidermis containing large amounts of tannins. The carob flowers are small, combined and form clusters. Pollination of these flowers is carried out mainly by insects and wind. Carob flowers in the summer and is largely dioecious (with male and female flowers on different trees), although some trees can be hermaphroditic. Carob pods have a wrinkled surface that turns dark brown and leathery when the pods mature. These pods contain 5 to 18 hard brown seeds embedded in a sweet thick pulpy substance.



Carob during flowering stage



Green carob fruit pods



School pupil planting carob seedling

The fruit is a dark brown flattened pod, 13–30 cm in length and about 2.5 cm wide. Beekeepers value carob because it blooms not just in summer (August to October) but also in autumn (September to November) when there are fewer forage sources available for bees.

Ecology of the carob tree

The carob tree is a slow-growing species: it may live for more than 100 years and begins fruiting after 6 or 7 years of growth. It has an extensive root system with a deep taproot and lateral roots and prefers mild winters and hot dry summers. Carob trees can grow on a wide range of soils and are saline tolerant up to 3% NaCl in the soil. However, they prefer sandy well-drained loams or calcareous soils with a high lime content. Being hardy, and drought- and salt-tolerant, with low management requirements, the carob tree can be a good option for agricultural diversification in semi-arid environments. Carob trees may also be used for the afforestation of degraded areas affected by soil erosion. Another important benefit of carob trees is the shade that their dense foliage provides to livestock. For open landscapes denuded of trees, the advice is often to plant carob trees in clumps – 5 to 10 trees adjacent – to provide sufficient shade for livestock during hot periods of the year. Indeed, carob agroforestry has received increasing attention to support sustainable livelihoods and environmental conservation. As such, a viable carob industry could improve agricultural productivity and diversify farm incomes, assist in the management of land and water degradation, and contribute to the development of regional industries.

Establishment and management

Multiplication of carob trees can be achieved with seedling, cuttings, grafting or by micropropagation. Fresh seeds germinate quickly and may be sown directly in the field. To break the dormancy of dried hard seeds, these seeds must be scarified or chipped and then soaked in water or dilute sulfuric or hydrochloric acid solutions until they swell. Seeds can also be planted in sand and kept wet for 6 weeks or more: it is then possible to periodically sift out those seeds that have swollen to three times their normal size. As the germination rate is low, these swollen seeds will constitute around 25% of the seeds planted.

The swollen seeds are usually planted in flats of individual cells. When these seeds produce their second set of leaves, they are transferred to small pots. When the plants reach 30 cm in height, they are transplanted to large containers or nursery rows. Budding takes place when the stem is at least 1 cm thick. For certain sites, direct sowing of pre-germinated seeds may be preferable.

Effective Management

- Seeds germinate best in soil that is 22–26°C in temperature
- Trees grow best in full sun and a well-drained soil
- Trees can withstand drought and alkalinity, but do not tolerate acidic soil (pH 6.2–8.6)
- Winter temperatures below -8°C will cause injury and can retard fruiting

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ICARDA's Rangeland Ecology and Management Unit

ICARDA's Rangeland Ecology and Management Unit aims to address the unsustainable use of resources induced by adverse effect of climate change and an increasing demand for food and feed in the dry areas. ICARDA programs promote the enhanced quality and productivity of crop, forage, livestock, and the improved management of water resources through close cooperation with farmers and national researchers.