Ziziphus mauritiana

Lam.

Rhamnaceae

jujube

LOCAL NAMES
Amharic (kurkura); Arabic (nabak (fruit),sidr); Bengali (ber boroi,kool,ber,boroi); Burmese (zee-pen,zizidaw,eng-si); English (dunks,jujube,Indian cherry,Indian jujube,Indian plum,geb,ber,common jujube,Chinese date,Chinese apple,bear tree,desert apple); Filipino (manzanita); French (jujube,jujubier,jujubier commun,le jujubier,le jujubier sauvage,liane croc-chien); German (Indischer Jujubenstrauch); Gujarati (bordi); Hindi (baer,badari,elladu,ber,khati,jelachi); Indonesian (widara,dara,bidara); Khmer (putrea); Lao (Sino-Tibetan) (than); Malay (bidara,jujub,epal siam); Mandinka (tomborongo,tomboron moussana,toboro); Nepali (bayer); Sanskrit (kuvala,karkandhu,badara,ajapriya,madhuraphala); Somali (geb,gub); Spanish (yuyuba,Ponseré,perita haitiana); Swahili (mkunazi); Tamil (elandai,yellande); Thai (ma thong,ma tan,phutsan); Tigrigna (geva); Trade name (jujube); Urdu (ber); Vietnamese (tao nhuc,tao,c[aa]y t[as]o ta)

Z. mauritiana fruit and leaves. (Anthony Simons)

Z. mauritiana cuttings, Makoka, Zambia (Hannah Jaenicke)

Ziziphus mauritiana slash (Joris de Wolf, Patrick Van Damme, Diego Van Meersschaut)

BOTANIC DESCRIPTION
Ziziphus mauritiana is a spiny, evergreen shrub or small tree up to 15 m high, with trunk 40 cm or more in diameter; spreading crown; stipular spines and many drooping branches. Bark dark grey or dull black, irregularly fissured. Where climatic conditions are severe, it is commonly a compact shrub only 3-4 m tall.

Leaves variable, alternate, in 2 rows, oblong-elliptic, 2.5-6 x 1.5-5 cm, with tip rounded or slightly notched base; finely wavy-toothed on edges, shiny green and hairless above; dense, whitish, soft hairs underneath.

Inflorescence axillary cymes, 1-2 cm long, with 7-20 flowers; peduncles 2-3 mm long; flowers 2-3 mm across, greenish-yellow, faintly fragrant; pedicels 3-8 mm long; calyx with 5 deltoid lobes, hairy outside, glabrous within; petals 5, subspathulate, concave, reflexed.

Fruit a drupe, globose to ovoid, up to 6 x 4 cm in cultivation, usually much smaller when wild; skin smooth or rough, glossy, thin but tough, yellowish to reddish or blackish; flesh white, crisp, juicy, subacid to sweet, becoming mealy in fully ripe fruits. Seed a tuberculate and irregularly furrowed stone, containing 1-2 elliptic brown kernels each 6 mm long.

The name ‘Ziziphus’ is often erroneously written as Zizyphus. The generic name is derived from the latinized version of the Arabic vernacular name ‘zizouf’ for Z. jujuba.

BIOLOGY
Some cultivars attain anthesis early in the morning, others do so later in the day. The flowers are protandrous. Hence, fruit set depends on cross-pollination by insects attracted by the fragrance and nectar. The pollen of the flower is described as ‘heavy and thick’. In India, different species of honeybees (Apis spp.) and house flies (Musca domestica) are reported to be important pollinators; the wasps Polistes hebraceus and Physiphora spp. have also been observed on flowers. Cross-incompatibility occurs, and cultivars have to be matched for good fruit set; some cultivars produce good crops parthenocarpically. Fruit development takes 4 months in early cultivars to 6 months in late ones. In Southeast Asia, Z. mauritiana flowers concurrently with shoot growth in the wet season. Mammals and birds disperse the fruits.

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ECOLOGY
Z. mauritiana is a hardy tree that copes with extreme temperatures and thrives under rather dry conditions. Fruit quality is best under hot, sunny and dry conditions, but there should be a rainy season to support extension growth and flowering, ideally leaving enough residual soil moisture to carry the fruit to maturity. Commercial cultivation usually extends up to 1000 m. Beyond this elevation trees do not perform well, and cultivation becomes less economical. Native to the tropical and subtropical regions, Z. mauritiana is more widespread in areas with an annual rainfall of 300-500 mm. It is known for its ability to withstand adverse conditions, such as salinity, drought and waterlogging.

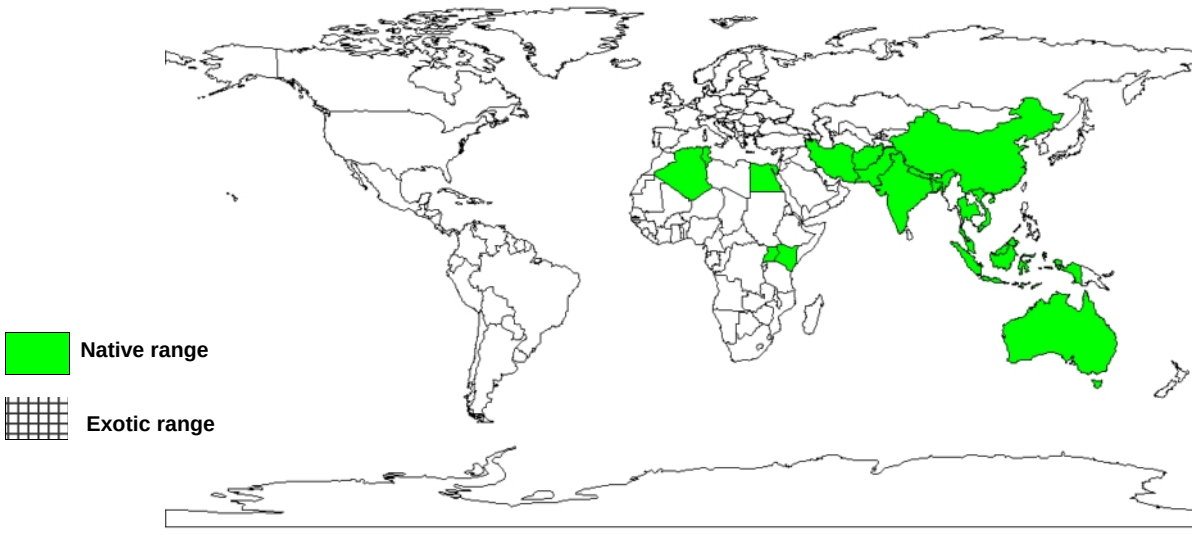
BIOPHYSICAL LIMITS
Altitude: 0-1 500 m, Mean annual temperature: 7-13 to 37-48 deg. C, Mean annual rainfall: 120-2 200 mm

Soil type: Best soils are sandy loam which may be neutral or even slightly alkaline. Can grow on a variety of soils including laterite, black cotton and oolitic limestone.

DOCUMENTED SPECIES DISTRIBUTION

Native: Afghanistan, Algeria, Australia, Bangladesh, China, Egypt, India, Indonesia, Iran, Kenya, Libyan Arab Jamahiriya, Malaysia, Nepal, Pakistan, Thailand, Tunisia, Uganda, Vietnam

Exotic: Angola, Barbados, Botswana, Burkina Faso, Cambodia, Cameroon, Chad, Congo, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Grenada, Guinea, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Philippines, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Zambia, Zimbabwe



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Food: Fruit is eaten fresh or dried and can be made into a floury meal, butter, or a cheeselike paste, used as a condiment. Also used for candy making and pickling. The fruit is a good source of carotene, vitamins A and C, and fatty oils. A refreshing drink is prepared by macerating fruits in water. In Indonesia, young leaves are cooked as a vegetable.

Fodder: In parts of India and North Africa, the leaves of Z. mauritiana are used as nutritious fodder for sheep and goats. Analysis of the chemicals constituents on a dry weight basis indicates the leaves contain 15.4% crude protein, 15.8% crude fibre, 6.7% total minerals, and 16.8% starch. In India, the leaves are also gathered to feed tasar silkworms; tasar silk, highly prized, is the only silk commercially exploited in the tropics.

Fuel: Z. mauritiana produces excellent firewood (sapwood has 4900 kcals/kg) and good charcoal. Its drooping branches are easily accessible for harvesting.

Apiculture: When in bloom it is ocassionally a source of pollen, at best a minor one.

Timber: Z. mauritiana yields a medium-weight to heavy hardwood with a density of 535-1080 kg/m^3. Heartwood is buff-coloured, pale red or brown to dark brown, sometimes banded or with dark streaks, not sharply demarcated from pale brown sapwood; grain straight, occasionally wavy; texture fine to coarse; wood fairly lustrous. It seasons well but may split slightly during seasoning; easy to work and takes a high finish. It is hard and strong. The wood is used for general construction, furniture and cabinet work, tool handles, agricultural implements, tent pegs, golf clubs, gun stocks, sandals, yokes, harrows, toys, turnery, household utensils, bowling pins, baseball bats, chisels and packaging. It is also suitable for the production of veneer and plywood. Basically, any product that needs a durable, close-grained wood can be made from it.

Tannin or dyestuff: The bark, including the root bark, has served in tanning; when pounded and mashed in water, it yields brown and grey or reddish dyes.

Alcohol: A raw, intoxicating spirit is occasionally distilled from the fermented fruit pulp.

Poison: Z. mauritiana is used to stupefy fish in Ethiopia.

Medicine: Leaves, fruits and bark are used medicinally. Pounded roots are added to drinking water and given to poultry suffering from diarrhoea and to humans for indigestion.

Other products: In India, Z. mauritiana trees are a host for the lac insects, Kerria lacca, which are found on the leaves and make an orange-red resinous substance. The purified resin makes the high-quality ber shellac that is used in fine lacquer work and to produce sealing wax and varnish.

SERVICES
Erosion control: A suitable species to aid in fixation of coastal dune sand.

Shade or shelter: The tree has been planted for shade and windbreaks.

Reclamation: Can withstand severe heat, frost and drought; hence it is planted in dry areas and on sites unfit for other crops.

Ornamental: Z. mauritiana is well suited for homegardens.

Boundary or barrier or support: Tree useful as a living fence; its spiny stems and branches deter livestock.

TREE MANAGEMENT
Z. mauritiana is a fast-growing species. Under favourable conditions, height increment on loose soil is 75 cm in 1 year and 1.2 m in 2 years; growth is stragglier by the 3rd season, when under similar growth conditions plants are thick and bushy, up to 1.5 m high. Growth is poor under natural conditions, 5-8 cm high after 1st season and 17-35 cm after 2nd season; Z. mauritiana coppices well and grows vigorously from stumps and root suckers. Fruiting starts after 3-5 years and is usually very abundant.

GERMPLASM MANAGEMENT
Orthodox storage behaviour, viability maintained for 2 years in hermetic air-dry storage at 5 deg. C. The germination rate increases during the 1st year of storage. The cleaned stones can be kept for 5 years in sealed containers, although during this period the viability drops from 95% to 30%. Z. mauritiana has 3300 pyrenes/kg.

PESTS AND DISEASES
Fruit flies are a major cause of crop losses, the insects unfortunately having a preference for the same cultivars as humans. Damage by fruit-borers, leaf-eating caterpillars, weevils, leafhoppers and mealy bugs has also been reported. Insect pests include Meridarchis scyrodes, Oocussida cruenta, Myllocerus spp., Thiacidas postica, Drepanococcus chiton, Florithirps tregardhi and Systasis spp. Powdery mildew can be so serious that leaves and fruitlets drop, but it can be adequately controlled. Lesser diseases are sooty mould, brown rot and leaf-spot.

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SUGGESTED CITATION

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