

Biology of *Jatropha curcus*

Commonly named physic nut, Barbados nut, purging nut and being a member of Euphorbiaceae family, *Jatropha curcus* has yellow-green flowers and large (pale) green and shallow lobed leaves that are arranged alternatively. It is a drought resistant shrub with a smooth gray bark that grows up to 6m tall. Its bark exudes copious amounts of watery sap when cut. With irrigation, it can produce seeds from the second year of plantation and produce seeds year around for as long as 50 years. Seeds contain ca. 30% oil that are pressed to produce high-quality biodiesel fuel, usable in a standard diesel engine. Native to tropical America, it is now cultivated widely in tropical countries throughout the world.

Multiple traditional uses

Though purgative and toxic, the nuts are sometimes roasted and dangerously eaten. The oil from seeds has been used for illumination, soap, candles and making Turkey red oil. In India, pounded leaves are applied near horses' eyes to repel flies. The latex was strongly inhibitory to watermelon mosaic virus and bark used as a fish poison. Reported to be abortifacient, antiseptic, depurative, lactagogue, narcotic, purgative and vulnerary, *Jatropha curcas* is a folk remedy for burns, convulsions, cough, dermatitis, diarrhea, dysentery, dyspepsia, eczema, fever, inflammation, jaundice, paralysis, pneumonia, rash, rheumatism, sores, stomachache, tetanus, tumors, ulcers and yellow fever. Some anti-tumor compounds including jatropham and jatrophone have been recently reported.

Growth environment

J. curcas grows on well-drained soils with good aeration and is well adapted to marginal soils with low nutrient content. Its water requirement is extremely low and it can stand long periods of drought by shedding most of its leaves to reduce transpiration loss. On heavy soils, root formation is reduced. It can also grow in lower temperatures and can withstand light frosts.

Flower and seed

Flowering occurs terminally on branches during wet season. In permanently humid conditions, flowering can occur throughout the year. The plant is monoecious, with male and female flowers on the same plant (generally with many more male than female flowers). Ten stamens arranged in two distinct whorls of five each in male flower. In female flower, the three slender styles are connected to about two thirds of their length. Flowers are pollinated by insects especially honey bees. Seeds mature about three months after flowering. A fruit contains 2-4 large black, oily seeds. The seeds contain up to 37% of non edible oil that can be used for candles, soap and bio-diesel production. The four most important fatty acids components in *J. curcas* seed are: palmitic (C16:0), stearic (C18:0), oleic (C18:1) and linoleic acids (C18:2). *Jatropha* seeds contain considerably higher unsaturated fatty acids (oleic acid and linoleic acid) than saturated fatty acids (palmitic acid and stearic acid). Fruits are harvested when they turn yellow or black and should be dried under shade since direct sun has a negative effect on seed viability. Seeds should be dried to low moisture content (5 to 7%) and stored in air-tight containers. At room temperature, the seeds can remain viable for up to one year. Freshly harvested seeds may show dormancy, and after-ripening is necessary before the seeds can germinate.

Cultivation

Direct seeding can be used if good quality seeds are available. Transplantation of pre-germinated seedlings

in nursery will get better survival rate. Pre-soaking of seeds and partial removal of seed coat are reported helpful to germination.

Density of plantation is 2-3 meters between plants.

Pruning is generally practiced to increase number of side branches and to manage plant height.

Fertilizers are often used after transplantation and annually.

A wide range of seed yield has been reported. Productivity depends on plant variety, rainfall and soil fertility.

Vegetative Propagation

Seed derived plants are often variable in agronomic traits.

Jatropha curcas can be easily vegetatively propagated by cutting. Compared to seed derived plants, plants from cuttings do not have tap roots.

Recently, *in vitro* tissue culture has also been used to propagate elite plants for plantation.