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Jatropha curcas

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Jatropha curcas L.

Taxonomy and nomenclature

Family: Euphorbiaceae

Synonyms: *Curcas purgans* Medic.

Vernacular/common names: physic nut, purging nut (English); pourghère, pignon d'Inde (French); Purgier-nuß, Brechnuß (German); piñoncillo (Mexico); coquillo, tempate (Costa Rica); tártago (Puerto Rico); mundubi-assu (Brazil); piñol (Peru); pinón (Guatemala); kanananaeranda, parvata-randa (Sanskrit); bagbherenda, jangliarandi, safed arand (Hindi); kadam (Nepal); sabudam (Thailand); túbang-bákod (the Philippines); jarak budeg (Indonesia); bagani (Côte d'Ivoire); kpoti (Togo); tabanani (Senegal); mupuluka (Angola); butuje (Nigeria); makaen (Tanzania); purgeerboontjie (South Africa); dand barrí, habel meluk (Arab); yu-lu-tzu (Chinese); purge-ernoot (Dutch); fagiola d'India (Italian); purgueira (Portuguese);

Distribution and habitat

It is still uncertain where the centre of origin is, but it is believed to be Mexico and Central America. It has been introduced to Africa and Asia and is now cultivated world-wide. This highly drought-resistant species is adapted to arid and semi-arid conditions. The current distribution shows that introduction has been most successful in the drier regions of the tropics with annual rainfall of 300-1000 mm. It occurs mainly at lower altitudes (0-500 m) in areas with average annual temperatures well above 20°C but can grow at higher altitudes and tolerates slight frost. It grows on well-drained soils with good aeration and is well adapted to marginal soils with low nutrient content.

Uses

The species is widely grown in the tropics as living fences because it is easily propagated by cuttings and not browsed by cattle. The seeds contain 30-35% oil which is used as an insecticide, for soap production and numerous other purposes. The seed oil can also be used as a substitute for diesel oil in engines and in recent years special interest has been shown in the cultivation of physic nut in energy plantations. Press cake made from the plant is valuable as organic manure. It has a nitrogen content similar to chicken manure (3.2-3.8%). The seeds are not edible mainly due to a high content of toxic proteins but all parts of the plant are used in traditional medicine. However, some provenances have been reported to produce edi-

ble seed and in Mexico the seeds from a non-toxic variety are eaten after roasting. Being drought tolerant, it can be used to reclaim eroded areas. Unfortunately it is host for the cassava virus that can be transmitted to the crops and it should never be used for fences around cassava fields.

With the combination of oil production and erosion control and the ability to grow in marginal areas with poor soil and low rainfall, this species has great potential in rural development as a source of household income and at the same time creating environmental benefits. Examples from Mali show that villages that plant 15 km of *Jatropha* hedges can harvest about 12 tons of seed which may generate 1800 US\$ of cash income when the oil is extracted and the products sold (1998 figures).



Jatropha curcas tree in village, Matabeleland Province, Zimbabwe. Photo: Jacob Jepsen.

Botanical description

Small tree or large shrub, up to 8 m tall and with diameter up to 20 cm. Trunk is straight, branching low above the ground; bark is thin and yellowish. Leaves are 6 x 15 cm and lobed. Flowers small and greenish, unisexual with male and female flowers at the same tree.

Fruit and seed description

Fruit: a grey-brown capsule, up to 4 cm long; it is normally divided into 3 cells, each containing one seed.

Seed: seeds are black, about two cm long and one cm thick. There are (1000) 2000-2400 seeds per kg.

Flowering and fruiting habit

The trees are deciduous, shedding the leaves in the dry season. Flowering occurs during the wet season and two flowering peaks are often seen. In permanently humid regions, flowering occurs throughout the year. The seeds mature about three months after flowering. Early growth is fast and with good rainfall conditions nursery plants may bear fruits after the first rainy season, direct sown plants after the second rainy season. The flowers are pollinated by insects especially honey bees.

Harvest

When the fruits begin to open, the seeds inside are mature. Collection is best done by picking fruits from the tree or hitting and shaking the branches till the fruits break off. Seeds collected from live fences can normally be reached by hand. For taller trees it is possible to collect the fruits in a small bag that is attached to a stick. In Costa Rica it is estimated that a tree produces about 30 kg fruits per year or about 12 kg seed. The yield per hectare is about 4800 kg seed.

Processing and handling

After collection the fruits are transported in open bags to the processing site. Here they are dried until all the fruits have opened. It has been reported that direct sun has a negative effect on seed viability and that seeds should be dried in the shade. When the seeds are dry they are separated from the fruits and cleaned.

Storage and viability

The seeds are orthodox and should be dried to low moisture content (5-7%) and stored in air-tight containers. At room temperature the seeds can retain high viability for at least one year. However, because of the high oil content the seeds cannot be expected to store for as long as most orthodox species.

Dormancy and pretreatment

Freshly harvested seeds show dormancy and after-ripening is necessary before the seeds can germinate. Dry seed will normally germinate readily without pretreatment. If this is the case, it is not recommended to remove the seedcoat before sowing. Although it speeds up germination there is a risk of getting abnormal seedlings.

Sowing and germination

Germination is fast, under good conditions it is complete in 10 days. Germination is epigeal (cotyledons emerge above ground). Soon after the first leaves have formed, the cotyledons wither and fall off. In the nursery, seeds can be sown in germination beds or in containers. Although the seedlings grow very fast they should stay in the nursery for 3 months until they are 30-40 cm tall. By then the plants have developed their repellent smell and will not be browsed by animals.

Physic nut can be established from nursery seedlings, bare root or containerised, by direct sowing, transplanting of wildlings or planting of cuttings. The choice of propagation method depends on use. Plants propagated by seeds are generally preferred for the establishment of long-lived plantations for oil production. Direct sowing should only be used in areas with high rainfall and the seeds must be sown after the beginning of the rainy season when sufficient rainfall is certain. For quick establishment of hedges and plantations for erosion control, directly planted cuttings are best suited. Cuttings of 30 cm length have been found to have the highest survival rate. Plants propagated by cuttings will normally produce seed within one year of planting and growth is rapid.



Fruits and seed of *Jatropha curcas* L. Photo: Jacob Jepsen.

Selected readings

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