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Jatropha curcas Q and A

The following answers are based on real queries from persons interested in growing *Jatropha curcas*. For more information, or for further clarification, refer to the contact information at the end of this page to forward your queries.

Q: What is *Jatropha*?

A: *Jatropha* is the genus name for a number of plants which occur in the family Euphorbeaceae. In Florida, there are several different species of *Jatropha* which are commonly grown in gardens, or as ornamental plants. Many of these *Jatropha* species produce very colorful flowers and are huge butterfly and bee attractants. Examples include;

Jatropha integerrima

Jatropha cardiophylla

Jatropha cathartica

Jatropha cinerea

Jatropha cuneata

Jatropha podagrica

Jatropha curcas

The last species listed above, *Jatropha curcas* has been identified as having the potential to produce relatively large amounts of oil for biodiesel. Biodiesel is the alternative to petrol diesel which is used to power diesel engines.



Green fruits of *Jatropha curcas*



Dried fruits and seeds

Q: What Jatropha species do I get and why this type?

A: *Jatropha curcas* is the species you will need. This is because it is the highest oil yielding species in the genus, capable of well over 400 gallons per acre (650 trees/acre).

Q: Is Jatropha curcas the best crop for Biodiesel, why?

A: As an oil producing plant, *Jatropha curcas* is part of the biodiesel solution to the world's energy problems. There is no BEST crop for biodiesel, just the most appropriate species for the region in which the crop will be grown. We believe that Florida's subtropical environment gives us a competitive edge (over most US States) in the production of this high yielding oil crop.

Q: Does Jatropha curcas produce the most oil per acre?

A: Oil Palm may produce more oil per acre than some *Jatropha curcas* varieties being grown across the world, but oil palm is susceptible to frost conditions and may not perform well in Florida. Nearly all varieties of *Jatropha curcas* collected from the wild have higher seed oil content than soy and corn and potentially out perform these crops on a per acreage basis. With the recent identification of *Jatropha curcas* varieties with very high seed oil content (>40%), and with current research being embarked on to improve the genetic performance of the species, the prospects for this plant as a commercially viable crop appear to be very good.

Q: What price would you sell the seeds for?

A: Seed farmers or seed companies are important and will be important for the maintenance of varietal and yield standards, as well as to make seeds available for farms and nurseries. Tropilab Inc (<http://www.tropilab.com/jatropha-cur.html>) of St. Petersburg Florida sells 20 seeds from Suriname for \$3.36 for 'medicinal purposes'.

Q: Where can I get Jatropha curcas seeds and seedlings?

A: Seeds are available from several sources which are abundantly advertised online...even on E-bay. Companies which may supply seeds or seedlings include;

- Mr. Gerry Dulaquis (Florida/Haiti) 502-594-2290 or email Eejhaiti@aol.com
- Labland biotech/My Dream Fuel (India/Florida): <http://www.lablandbiotechs.com/jatropha.html>
- Tropilab (Florida): <http://www.tropilab.com/>
- Xenerga (Florida): <http://www.xenerga.com/>
- Jatropha Oil Fields (India): <http://www.jatrophaoilfields.com/>
- Jatropha curcas plantations (Australia): https://bne078u.server-secure.com/vs1495_secure/jatropha-curcas.htm
- Jatropha seeds.com (India): http://www.jatrophaseeds.com/jatropha_seeds.htm
- Jatropha World (India): <http://www.jatrophabiodiesel.org/jatropha-kit.php>
- Jatropha Plantations (Thailand) <http://www.jatrophacurcasplantations.com/>

Q: What is the best soil for this crop?

A: Like any other plant, *Jatropha curcas* does well under 'Best' conditions of soil, water and spacing. Ideally, a pH range of 6 to 8 suits the plants well, as well as adequate irrigation and fertilization. However, *Jatropha curcas* will survive under harsh conditions (poor, dry soils) but fruit and oil yields will be measurably lower.

Q: What types of soil will these grow in and produce 600 - 1000 gallons of fuel?

A: Yield and fuel production is NOT simply a matter of soil, but will also depend on weather, irrigation, availability of nutrients and species variety. Avoid land which floods. Based on our findings, this is the single most constraining factor on plant health. Soils with adequate amounts of organic matter, well drained with a pH of 6-8 will be optimum. In order to obtain high oil yields per acre in addition to the factors mentioned above, farmers will have to start with the best seeds or seedlings available. Best seeds mean seeds with 'high' seed oil content and with the genetic potential to develop into high fruit bearing trees.

Q: What would be the optimal fertilization regime for *Jatropha*?

A. Fertilization should be aimed at the soil and not at the plant. Plants get their nutrients from the soil. Soil tests are highly recommended prior to cultivation to determine what the nutrient needs, if any, should be. However, the vegetative development of *Jatropha* responds dramatically to Nitrogen (N) applications if other conditions are optimum. Plants will respond to N applications by developing the plant structure on which future yields depend. In my opinion, early in the establishment of a new planting and during the active growing phases in the spring and summer, N is important to develop a large vegetative structure on which to hang fruit. Later, the N is important to re-grow vigorous branches after pruning. Based on very preliminary trials, 150 lb N per acre per year or 15 lb N per acre per month seems to make very good sense, with consideration given to what the levels of phosphorus (P) and Potassium (K) in the soil are. In most cases in natural Florida soils, low level of phosphorus is required and not much potassium, but soil tests should determine whether these should be added.

Q: What is the recommended spacing?

A: Spacing should be determined by soil type/nutrient availability. Our plots are spaced 7 feet within the row and 8 feet between the rows to accommodate mowing of grass and also mechanical harvesting. For citrus farmers contemplating a transition to *Jatropha*, spacing used for citrus (15 feet by 15 feet) also will work, but much space may be wasted using this option. Refer to the following table.

Plant spacing (ft)	Plants per Acre
6 x 6	1000
8 x 8	640
10 x 10	444

Q: Is *Jatropha curcas* frost tolerant?

A: There may well be ‘varieties’ which are more cold tolerant than others. Most of the literature will tell you that *Jatropha* species will tolerate only light frost. Our plots in Florida experienced two consecutive nights of 26 degrees F (for 6-8 hours each night) on January 3rd and 4th 2008. We had a 100% survival with 75% of plants losing leaves. The plants re-grew leaves in two weeks and flowered by March 2008. A variety of *Jatropha curcas* has been present in Florida for several decades. One can infer that this variety would have adjusted to seasonal frost spells in Florida. The following photos document what we observed at one plot in North Fort Myers, Florida.



1. Before frost – December 07



2. Effect of Frost (26 degrees) 01/04/08



3. Two weeks later



4. One month later – fully recovered

Q: How has the development of a frost resistant variety been coming along?

A: As observed from our data in Florida, *Jatropha* is fairly resistant to frost temperatures above 24 degrees F. Recent frost in February 2009 with temperatures dropping below 20 degrees F for 6 to 8 hours saw very unfavorable response with plants dying back to the lower parts of the trunk. Regardless, more than 95% re-grew in 4-6 weeks. (See photos below). Overhead irrigation of plants even at sub 20 degree temperatures resulted in no significant frost damage to *Jatropha* plants.



Before (20 degree F Frost in February 2009)



After (April 2009)

Q: What kind of land preparation would you recommend before planting?

A: Appropriate sized holes for the size of seedlings to be planted. We use a post hole digger (may be manual) or a auger attached to a tractor PTO for digging. Berm or bed the land if flooding potential exists. Organic material in each hole stimulates tap root development.



1. Hand held gas powered post-hole digger



2. Hole made to accommodate root ball



3. Plant placed in hole



4. Plants eight months later

Q: What is necessary to maintain the health of these plants?

A: Watering? YES

A: Inorganic fertilizer? NO, but plants perform better with added nutrients, especially nitrogen during the first few weeks of establishment, and during active growing phases.

A: Pesticides? I have been documenting pest problems affecting *Jatropha*. None have affected it adversely (to date).

Practice Integrated Pest Management (IPM) with *Jatropha curcas*. Monitoring, evaluation and timely diagnosis of pest and disease conditions with the use of low impact treatment strategies will ensure the best environmental approach to plant health care.

Q: Are there any negative environmental effects from planting crops like this?

A: There are always some ecological impacts with any mono-culture such as we have had with sugarcane, citrus and vegetables in Florida. Species of wildlife may be pushed away or drawn to cultivations of *Jatropha curcas*. Pest or disease problems may also increase as

commercial production increases, as well as the probability of invasiveness. However, *Jatropha curcas* has had a long historical presence in Florida without evidence of invasiveness, and insect pests and diseases have been documented.

While animal and bird species have not been observed to consume *Jatropha curcas* seeds, the seeds, leaves and other parts of the plant contain the alkaloid curcin which has the potential of being toxic to wildlife if ingested in large quantities. There have been no reports of toxicity to wildlife species in Florida, or in Latin America and the Caribbean where the plant has its origins.

Positive environmental impacts occur with *Jatropha* cultivation, as data collected in Latin America indicates that an acre of *Jatropha* has the potential of removing 4 metric tonnes of CO₂ from the atmosphere. Growers stand to benefit from the development of carbon credits and cap and trade arrangements which will provide another source of farm income.

Q: Would you recommend planting native trees along the boundary of *Jatropha* plantations?

A. When *Jatropha* is planted as a grove crop with boundaries of native forest tree species along the grove boundaries, it will impact positively on native wildlife species as these trees will form corridors or channels providing habitat for native animal species. In some cases, a buffer area may be required as indicated in the 'Florida Biomass Rule'. Native trees may provide the required buffer zone. A link to this 'rule' follows.

<https://www.flrules.org/gateway/readFile.asp?sid=0&tid=6138080&type=1&File=5B-57.011.doc>

Q: Have you ever looked at the economics of making a business out of this?

A: Based on fairly conservative projections, and given that *Jatropha curcas* is still an undomesticated plant, I have calculated average yield per acre in Florida (using seeds with relatively low seed oil content) at 411 gallons.

- The average cost of establishing production (inputs) on a 1 acre un-improved plot (using seedlings valued at \$2.00 per seedling) is around \$2,200 (*Federal incentives may be available to offset some of these costs*)

- If payments for oil produced is at the unit price of \$3.50/gallon, it would take 3 production years (reasonable production starts at year 2) to break even. The tree however, will produce for 40 years or more, requiring low annual maintenance costs associated with weeding, pruning, addition of nutrients, irrigation water, insurance, and miscellaneous inputs.

Q: I heard you could sell the nut/fruit to FPL to burn for energy?

A: I believe that higher priced products such as biodiesel could be made from *Jatropha curcas* seeds. Additionally, the fermented crushed waste of *Jatropha curcas* may contribute to the production of value added products such as Methane Gas (biogas). Many cities such as Fort Myers, Florida, have 'Waste to Energy Centers' that may pay for the husks or seedcake for use as horticultural (bio-mass) fuel in incinerators. Due to the relatively high oil content in the seeds, some people believe that *Jatropha* seed cake residue are ideal for use in pellet stoves or heaters which are common in the northern US and Canada.

Q: Will it be possible to harvest *Jatropha curcas* mechanically?

A: Two companies have already developed and tested mechanical harvesters for *Jatropha*. These are;

1. OXBO <http://www.oxbocorp.com/>
2. BEI International <http://www.beiintl.com/>

A video demonstration of the OXBO *Jatropha* harvester and additional information on the machine is available on their website at <http://www.oxbocorp.com/jatropha.php>

Photos of the BEI self propelled *Jatropha* harvester appears below.



Front view



Side view

Q: Do you think it's fairly reasonable to make the Biodiesel yourself?

A: Investing in a small biodiesel refinery should be informed by careful business planning as well as an investigation of available marketing options, market prices and possible market niches where the product may be sold. There are currently over 170 biodiesel refineries in the United States, each interested in buying *Jatropha* oil. A small home/garage based operation will not be able to compete with these 'economies of scale', but there are many small biodiesel producers who produce for small groups of buyers. Some people produce all the fuel they need for themselves by converting (through transesterification) waste vegetable oil to biodiesel.

Send your questions to:

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