What is Jatropha?

JATROPHA CURCAS

Jatropha curcas belongs to the family. Euphorbiaceae and is thus related to other important cultivated plants like rubber, varan, neem etc. It is believed to be a native of South America, Africa & the Caribbean. It was introduced by Portuguese traders in the 16th century in India and since then Jatropha has been grown as a medicinal plant & hedge crop.

There are number of varieties of Jatropha now thrive in India's varied regional climate. It is found in almost all the states & is generally grown as a live fence for protection of agricultural fields from damage by live stock as it is not eaten by cattle or goat. Amongst all the variety,

JATROPHA curcas is the best since the seed oil is reported to possess insecticidal, mollucicidal, fungicidal & nimaticidal properties. Some of the jatropha varieties are as under:

» Jatropha curcas (Non-toxic) -suitable species for Jatropha oil and biodiesel production.

» Jatropha curcas integrerrima.

» Jatropha Gossypifolia.

» Jatropha Glandulifera.

» Jatropha Tranjorensis.

» Jatropha Multifield.

» Jatropha Podagrica

JATROPHA ANALYSIS

Analysis of the JATROPHA CURCAS SEED shows the following composition:
Moisture - 6.20%
Protein - 18.00%
Fat - 38.00%
Carbo hydrate - 17.00%
Fibre - 15.5%
Ash - 5.30%

The chemical anaIysis of Jatropha curcas Oil:

Item	Value
Acid Value:	38.2
Saponification:	195.0
Iodine Value:	101.7
Viscosity (31°C) cp:	40.4

Fatty acid composition:

Palmitic Acid:	4.2%
Staric Acid:	6.9%
Oleic Acid	43.1 %
Linoleic Acid:	34.3 %
Other Acid:	1.4%

Jatropha oil V/s Fossil Diesel oil

OIL COMPARISONS

The comparison of properties of JATROPHA CURCAS OIL & Standard specification of DIESEL OIL:

Specification	Standard specification of Jatropha Curcas Oil	Standard specification of Diesel Oil
Specific Gravity	0.9186	0.82 / 0.84
Flash Point	240/110°C	50°C
Carbon Residue	0.64	0.15 or less
Cetane Value	51.0	>50.0
Distillation Point	295°C	350°C
Kinematics Viscosity	50.73 cs	>2.7cs
Sulphur	0.13%	1.2% or less
Calonific Value	9,470 KcaL/Kg.	10,170 Kcal/Kg
Pour point	8°C	10°C
Colour	4.0	4 or less

Physical & Chemical properties of JATROPHA CURCAS OIL & DIESEL OIL:

Property	Jatropha curcas Oil	Diesel Oil
Viscosity (cp) 30°C	5.51	3.06
Specific Gravity (15°C/4°C)	0.917/0.923 (0.881)	0.841/0.85
Solidfying point (°C)	2.0	0.14
Cetane Value	51.00	47.8 to 59
Flash point (°C)	110/340	80
Carbon Residue (%)	0.64	<0.05 to <0.15
Distillation (°C)	248 to 295	<350 to <370
Sulphur (%)	0.13 to 0.16	<1.0 to 1.2
Acid VaIue	1.0 to 38.2	
Saponification Value	188 to 198	
Iodine Value	90.8 to 112.5	
Refractive Index (30°C)	1.47	

India has emerged as one of the four major players in the vegetable oil scenario of the world. Vegetable oil scenario is complex and is highly influenced by various factors. For mitigating climate change by reducing emission of green house gases, meeting rural energy needs, protecting the environment and generating gainful employment, Jatropha curcas has multiple role to play. All efforts and endeavour to increase its production & productivity, oil extraction by application of appropriate technology, product development and diversification and policies that will protect and promote national interest world would be welcome.

JATROPHA CULTIVATION

YIELD AND PRODUCTIVITY

Jatropha requires specialized nursery techniques to raise the saplings in the nursery. The first step in Jatropha plantation is to plant the seeds to raise the nursery, which is very vital and requires guidance of professionals. Jatropha can also be propagated vegetative from cuttings.

Seeds are best sown during mid-February to mid-march and the seedlings 60-75 cm.tall can be transplanted to the prepared field.

Ideal planting pitch has been found to be 2m x 2m. thereby resulting in 2500 plants per hectare. Wider spacing would give larger yields of fruit @794 Kgs./Hac. Like all perennial plants, Jatropha shows vigorous growth in youth that tails off gradually towards maturity.

1Kg. of good Jatropha seed will give around 1100 seeds.

Germination time under good nursery care is 10-21 days.

In equatorial regions where moisture is not a limiting factor, Jatropha can bloom & produce fruit throughout the year.

Although Jatropha is adapted to soils with low fertility & alkalinity, better yield can be obtained on poor quality soils if fertilizers containing small quantity of nutrients are for first 2 years which is considered to be vital for their growth.

Jatropha starts yielding seeds from the end of first year & the economic yield stabilizes from the end of 3rd year onwards.

Under Indian condition, the yield varies from 6-10 MT Near from the end of 3nl year under proper care & supervision.

The plantation cost per hectare inclusive of site preparation, plant, material, maintenance for one year, overheads etc. shall be in the tune of Rs.30000/Hectare

Ripe fruits are plucked from the tree and the seeds are sun dried. Ripe fruits are decorticated manually or by decorticator.

To prepare seeds for oil extraction, the seed should be solar heated for several hours or roasted for 10 minutes. Overheating is to be avoided.

Oil can be extracted from seeds by mechanical extraction, solvent extraction etc.
For a yearly plantation of 200 Hectares,we propose to raise a nursery of 20 Lakh seedlings to be developed initially and then to raise 10 lakh nursery every year. This figure can be pegged up and down in discussion with you.
The income from the plantation at the end of 3rd year is around Rs.60,000/- per Hectare.

THE FOUR MAIN BENEFITS OF JATROPHA CULTIVATION:
(1) Renewable Energy
(2) Erosion Control and Soil Improvement
(3) Promotion of Women employment
(4) Poverty Reduction.

COST OF JATROPHA PLANTATION

The cost of plantation has been estimated to be Rs.30000/hectare inclusive of plantation & maintenance for 1 year, training, overheads ect. It includes elements such as site preparation, digging of pits, fertilizer & manure, cost of saplings and planting, irrigation, deweeding, plant protection, maintenance for 1 year i.e. the stage up to which it will start seed production etc. The cost of training, awareness generation, monitoring and evaluation is also included.

Employment Generation and Cost in Jatropha Plantation

SlNo	Item	Cost (Rs.)		Employment in person days	
		Year		Year	
		1st	2nd	1st	2nd
1	Site preparation i.e. cleaning and leveling of field 10 Man Days	600		10	
2	Alignment and staking, 5 Man Days	300			
3	Digging of pits (2500Nos) of 30Cm 3 size @- 30 pits per man day, 50 Man days	3000		50	
4	Cost of Manure (including transport) 2 Kg. per pits during 1st Year (2MT) 1kg per pit during second year onward and 2 man Days for each application.	2000		20	
5	Cost of fertilizer @ Rs. 6 per kg (50 gm. Per plant during 1st year and 25 gm from 2nd year onward and 2 Man Days for each application. .	870	495	2	1
6	Mixing of Manure, insecticides fertilizers and refilling of pits @100 pits per Man Day 25 Man days	1500		25	
7	Cost of plants (including carriage) 3500 Nos. during first year and 500 Nos. of plants during second year for replanting @ Rs. 4 per plant.	14000	2000	100	20
8	Planting and replanting cost 100 plants per Man day. - 25 Man Days and 5 Man Days, respectively	1500	300	25	5
9	Irrigation - 3 irrigation during 1st and one irrigation during 2nd year @ Rs. 500/- per irregation.	2500	500	5	2
10	Weeding and soil working 10 Man Days X 2 times for 2 years	1200	1200	20	20
11	Plant Protection measure	300		1	
Sub Total		22770	4495	263	48
Contingency (approx. 10% of the above)		2230	505		
Grand Total		25000	5000	263	48

JATROPHA CURCUS FACTSHEETS

First and foremost, the following points are to be read carefully and understood by the users. One must be in possession of land for this project to be successful. Any type of land will do in diverse weather conditions but the crop & oil yield will vary accordingly. Plant per hectare generally varies between 2500 – 4000 Nos.

Seed & Oil yield from Jatropha curcas
Per Hectare under different Agro climatic conditions.

Year	Dry Land Irrigated 2500 P/Ha	Semi Dry Irrigated 2500 P/Ha	Arid Irrigated 2500 P/Ha	Arid Non-Irrigated (Rain Feed) 3000 P/Ha
1st	1kg / tree	0.8kg / tree	0.6kg/tree	0.5kg/tree
2nd	2kg / tree	1.8kg / tree	1.6kg / tree	1.2kg / tree
3rd	3kg / tree	2.5kg / tree	2.2kg / tree	2kg / tree
4th	4kg / tree	3.5kg / tree	3.6kg / tree	2.5kg / tree
5th	4.8kg / tree	4.8kg / tree	3.6kg / tree	2.66kg / tree
Seed/ Ha	1200Kg/ Ha	10,000Kg/ Ha	9000Kg/ Ha	8000Kg/ Ha
Oil / Ha	46% 5,520 Lts	42% 4,200 Lts	40% 3,600 Lts	35%2800 Lts

Jatropha is not a crop to be cultivated in lands on short-term lease as the plant stands for 40-50 years bearing oil seeds.
Allotments of non-agricultural lands are possible from the govt. on long lease.
NABARD and other nationalized banks are financing the Jatropha cultivation & biodiesel projects. A professionally prepared project report is a must for the sanction of the loans.
One can sell the Jatropha seeds / expel the oil from the seeds and sell/ or convert the Jatropha oil to biodiesel in a refining process, which is not cost prohibitive. All products are readily saleable. Railways, IOC and other bodies are ready buyers of any quantity offered as India cannot meet its diesel requirement even by mass scale plantation for next 25 years. In case of refining to biodiesel, the buy products are Jatropha oil cake and crude glycerin valued presently @ 3500/- & 50,000/- per MT respectively. For refining process to biodiesel the requirement is methanol, which needs explosive license from the govt. And proper storage facility. The other chemical needed is KOH /NAOH/ Sulphuric acid which is freely available.
With the production of biodiesel, one is expected to get tax rebates applicable to mineral diesel but no specific policy has yet been announced by the GOI.
The conversion cost of Jatropha oil to biodiesel is around rs.4/- inclusive of operational and reactant costs / Ltr. The conversion rate from Jatropha oil to biodiesel is roughly 1:0.95.
Biodiesel reactors are available with biodiesel technologies from 10ltr/day to 1,00,000 Ltr/day.
Intercropping can be done under all the conditions of cultivation. The following are the possibilities and reality. Suggested crops for intercropping are:

Inter Cropping Crop	Economic Life	Seed + Planting EXP/Ha	Income Per Ha. Per Year
Safed Musli	9 Months Crop		600 kg/Ha Rs. 1,80,000/-
Ashwagandha	6 Months Crop		Rs. 25,000/-
Sarpagandha	18 Months Crop		Rs. 2,00,000/-
Haldi	6 Months Crop		Rs. 60,000/-
Adrak	6 Months Crop		Rs. 60,000/-
Sonamukhi	3 Years Crop		Rs. 5,000/-
Kounch	4-5 Years Crop		Rs. 45,000/-
Kalihari	3 Months Crop		Rs. 90,000/-

A.	Land area	100 Hectares
B.	Jatropha seed	8 Lakh Kilograms
C.	Jatropha oil	2,88,000 Litres
D.	Biodiesel	2,80,000 Litres
E.	Jatropha oil cake	520 MT
F.	Crude glycerol	20 MT
G.	Biodiesel processing plant Capacity/day Jatropha seed feed stock Required per day	933 Lts/Day @ 300days a year 933 Lts

As per above paragraphs. A 100-hectare plantation of Jatropha curcas is well capable of feeding the above schedule.

1.2: The Cultivation Expenses. (100 hect, 3lakh plants} @ Rs.60/- Per labour wage.

FIXED CAPITAL INVESTMENT-I

SLNo	Expenditure heads	I ST YEAR	2ND YEAR	3RD YEAR
1.	Site preparation /Cleaning & leveling of land @30 MD/HA	3000 MD Rs.1, 80,000	NIL	NIL
2.	Alignment & staking @2 MD / 1000 (200 MD/ lakh)	600 MD Rs.36, 000	NIL	NIL
3.	Digging of planting pits @2 MD / 100 (2000 MD/ lakh)	6000 MD Rs.36, 00,000	NIL	NIL
4.	Cost of manure @ 50gm/pit 5mt/lakh = 15mt x Rs. 4,000	Rs.60, 000	Rs.60, 000	Rs.60, 000
5.	Mixing of manures/ insecticide	3000 MD	INFILLING 20%	Rs.2, 000

	& planting in the pits @100/MD	Rs.1, 80,000	Rs.36, 000	
6.	COST OF SEEDLINGS 3 LAKH NOS. @Rs. 5/-	Rs.15, 00, 000	Rs.3, 00,000	Rs.10, 000
7.	Mulching @ 100/MD	3000 MD Rs. I, 80,000	1500 MD Rs. 90,000	NIL
8.	Weeding @ 200 Plants/MD x 1(500 MD/Lakh)	1500 MD Rs. 90,000	500 MD Rs. 30,000	NIL
9.	Pest & Disease Control @10 MD/ Ha	1000 MD Rs. 60,000	500 MD Rs. 30,000	300 MD Rs. 18,000
10.	Cost of Chemicals Thiodan- IR = 100 ltsCopper- IR = 100 kgs	Rs.25, 000 Rs.15, 000	Rs.25, 000 Rs.15, 000	Rs.20, 000
11.	Irrigation 3 Rounds During Dry Period	Rs. 30,000	Rs. 30,000	Rs. 15,000
12.	Total:	Rs. 27, 16, 000 @ 27,160/- per hect.	Rs. 5,86, 000	Rs. 1,25,000

**Cost of land has not been taken into consideration in the tabulation. Cost of land for Jatropha cultivation is available in 1000's of hectares and we can organize that for you, the approximate cost of land per hectare will be somewhere near Rs. 45,000 - 50,000 per hectare.

JATROPHA PLANTATION IN INDIA

Non-Forest Areas proposed for Jatropha Curcas Plantation
200 districts in 19 potential_tates have been identified on the basis of availability of wasteland, rural poverty ratio, below poverty line (BPL) census and agro-climatic conditions suitable for jatropha cultivation. Each district will be treated as a block and under each block 15,000 hecter jatropha plantitttfon will be undertaken through farmers. Proposal is to provide green coverage to about 3 Million hectares of wasteland through plantation of jatropha in 200 identified districts over a period of 3 years.
Andhra Pradesh Adilabad, Anantapur, Chittoor, Cuddapah, Kuroool, Karim Nagar, Mehboob Nagar, Nellore, Nalgonda, Prakasam, Visakhapatnam, Warrangal.

Bihar Araria, Aurangabad, Banka, Betiah (West Champaran), Bhagalpur, Gaya, Jahanabad, Jamui,-Kaimur, Latehar, Muzzaffarpur, Munger, Nawada.

Chhattisgarh Bastar, Bilaspur, Dantewada,"Dhamtri, Durg, Jagdalpur, Janjgir-champa, Kanker, Kawardha, korba, Mahasaund, Rajnandgaon, Raipur, Raigarh, Surguj.

Jharkhand Bokaro, Chatra, Daltenganj, Devgarh, Dhanbad, Dumka, Garhwa, Godda, Giridih, Gumla, Hazaribag, Jamshedpur, Koderma, Pakur, Palamu, Ranchi, Sahibganj, Singbhum(East), Singbhum(West).

Gujarat Ahmedabad, Amedi, Banaskantha, Bhavnagar, Junagarh, Jamnagar, Kutch, Rajkot, Surendranagar, Sural.
Goa Panaji, Padi, Ponda, Sanguelim.

Himachal Pradesh Bilaspur, Nahan, Parvanu, Solan, Unna.

Haryana Ambala, Bhiwani, Faridabad, Gurgaon, Hisar, Jind, Jhajjar, Mohindergarh, Punchkula, Rewari, Rohtak.

Karnataka Bijapur, Bellary, Bangalore, Belgaum, Chikmagalur, Chitradurga, Daksina Kannada, Dharwad, Gulbarga, Hassan, Kolar, Mysore, Raichur, TumkW, Udupi.

Kerala Kottayam, Quilon Trichur, Thiruvananthapuram.

Madhya Pradesh Betul, Chhindwara, Guna, Hoshingabad, Jabalpur, Khandwa , Mand Saur, Mandla, Nimar (Khargaon), Ratlam, Raisena, Rewa, Shahdol, Shajapur, Shivpuri, Sagar, Satna, Shahdol, Tikamgarh, Ujjain, Vidisha.

Maharashtra Ahmednagar, Aurangabad, Amrawati, Akola, Beed, Buldana, Dhule, Nasik, Osmanabad, Parbhani, Pune, Ratnagiri, Raigad, Thane, Yavatmal.

Orissa Bolangir, Cuttack, Dhenkanal, Ganiam, Gajapati, Jajapur, Koraput, Keonjhar, Kalahandi, Nowrangpur, Nawapra, Phulbani, Puri.

Punjab Ferozpur, Gurdaspur, Hoshiarpur, Patiala, Sangrur.

Rajasthan Ajmer, Alwar, Barmar, Bilwara, Bikaner, Jaisalmer, Jodhpur, Kota, Sikar, Sawai Madhopur, Udaipur.

Tamil Nadu Coimbatore, Chennai, Dharmapuri, Erode, Madurai, Peri gar, Salem,

Tirunelvelli, Vellore.

Uttar Pradesh Allahabad, Agra, Balia, Bulandshare, Bhadohi, Baharaich, Chhitrakut, Deoria, Ferozabad, Faizabad, Ghazipur, Hardoi, Jaunpur, Shahjahanpur.

Uttaranchal Chamoli, Dehradun, Pithoragarh, Rishikesh, Udhamsingh Nagar, Uttrakashi.

West Bengal Balurghat, Barasat, Burdwan, Cochbehar, Darjeeling, Hoogly, Howrah, Jalpaigudi, Mednapur, Murshidabad, Malda, West Dinajpur, 24-Parganas South.

For Any Business Enquiries Please Contact our Support Team at:-

Bulk Agro India Pvt. Ltd.

126, ABC Ground floor , Near Shahi Bhagh,
Hiran Magri Sector-11, Udaipur,
Rajasthan (India)

E-mail: bulkagro@bulkagro.com
Phone No: +91-294-2483162
FAX No: +91-294-2483182
Mobile: +91-9414156473