

# Pongamia oil - a promising source of bio-diesel

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Pongamia oil is a non edible oil extracted from seeds of *Pongamia pinnata*\* (L) Pierre, family Fabaceae commonly known as 'Karach', 'Karanja' in Assam. It is a hardy tree of 12-15 meter height, branches spread into hemispherical crown of dense green leaves and native to the Asian sub-continent. It grows all over India from the cost line to the hilly slopes. In North East India it grows up to an elevation of  $\pm 600$  meter. It can be grown in different types of flood free soil and matured tree withstand water lodging. Pongamia grows very well along water ways. Its propagation is by direct seedlings or by planting nursery raised seedlings. Propagation by branch cuttings and root suckers is also possible .Its seeds can immediately be sown after removing from matured pods and start germination after 7 days of sowing and cent percent seeds germinate. Seeds may be stored for an year without removing from pods and when removed they may be stored in an airtight box for delayed sowing. Fruits setting of Pongamia starts from fifth year onwards of plantation. It flowers in April-May and fruits mature in January-February. Each pod bears single seed and average fresh weight of a matured seed is 1.2 gm. From 5<sup>th</sup> year onward of plantation it starts flowering and fruiting. Commercial productions of seeds start from 10 years onwards of plantation and a full-grown tree may yields up to 100 kg. or even more fresh seeds per annum up to 60-70 years. In North East India cattle do not browse Pongamia though in other parts of the country its leaves are used as fodder. It is very easy to grow and needs little care, though till today 'karach' is a much ignored tree.

Seeds of Pongamia have about 30-35% oil and upto 27-28% oil can be expressed in crusher and most of the physical and chemical properties of the oil is almost similar to those of the diesel , though 'conardson carbon' residue is higher incase of it and due to high viscosity preheating is needed to start a diesel engine (Shirinivasa, 2001 ). Pongamia oil is commonly known as Honge oil in Karnataka and diesel pump sets are run there with pongamia oil by the farmers for lift irrigation. The Nizam of Hyderabad set up the Azamshahi Textile Mill in 1940 and generated all the power needs of the factory using non edible oils. Oil is also used as a lubricant, water paint binder, pesticide and in soap making and tanning industries.

Tap roots of Pongamia are deep seated and mines water for its need even from 10 meters depth without competing other crops. It is also a drought resistant plant. Oil cakes are good organic fertilizer and bears nitrogen 4%, phosphorous 1% and potassium 1% ((Kaushik and Kumar, 2004 ) which is better than vermicompost . Root nodules formation due to *Rhizobium* Strains in nursery and in fields is common by which nitrogen is replenished in soil. Dense network of lateral roots of Pongamia control soil erosion. Leaves are good manure.

In North East India leaves are commonly infected by fungi like *Uromyces* sp. and *Cercospora* sp. in winter. In some trees leaf galls are also found. . These diseases do very les harm to the vegetative growth of Pongamia but how they affect in seeds productions are yet to be ascertained. Diseases at seedling stage are not found.

\* It has also been called *Derris indica* (Lam.) Bennet and *Pongamia globra* Vent.

### Cost of Pongamia Cultivation in one Hectare

Spacing : 5m x 5m  
 No. of Sapling : 400/Ha  
 Wage : Rs. 60.00/ MD  
 Casualty replacement 20%

Sl. No.	Particulars of works	Unit	Expenditures (Rs)				Total
			1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
1.	Land preparation.		2000	-	-	-	2000
2.	Digging of 400 pits (45cm <sup>3</sup> ) and refilling of pits with FYM and soil.	10MD	600	-	-	-	600
3.	Cost of FYM.	Rs.300/ton	300	-	-	-	300
4.	Cost of Chemical fertilizer (NPK) @100gm per plant.	Rs10/kg	400/-	400/-	400/-	400/-	1600
5.	Cost of saplings 400 nos. 1 <sup>st</sup> year 80 nos.2 <sup>nd</sup> for gap filling.	Rs.4/sapling	1600/-	320/-	-	-	1920
6.	Cost of planting and replanting ( 2 <sup>nd</sup> yr.) @ 80plants per MD	5MD	300/-	60/-	-	-	360
7.	Weeding, fertilizer application.	25MD	1,500/-	600/-	600/-	600/-	3300
	Total		6,700	1,380	1000	1,000	10,080
8.	Contingencies @5%	@5%	335	669	50	50	504
	Grand Total		7,035	1449	1050	1,050	10,584

### Yield and income per hectare @Rs.5.00/kg of seeds :

Year	Seeds per tree	No. of trees	Quantity of seeds	Income
5	3 kg	400	1,200	6,000
6	3.5 kg	400	1,400	7,000
7	4 kg	400	1,600	8,000
8	5 kg	400	2,000	10,000
9	6 kg	400	2,400	12,000
10	8 kg	400	3,200	16,000

### Economics of Pongamia cultivation per hectare :

Years	1	2	3	4	5	6	7	8	9	10
Expenditure	7035	1449	1050	1050						
Income					6000	7000	8000	10000	12000	16000
Net Income					5000	6000	7000	9000	11000	15000

From 5<sup>th</sup> year onward for maintenance and seed harvest there will incur expenditures of Rs. 1,000/- per year. From 15 years onwards minimum seed yield will be 20 kg per plant and total benefit will increase over the years and stabilized at 20 years.

Demand for transport fuel is increasing unabatedly in India. . On the other hand there are frequent hikes of prices of fossil fuel and uncertain supply in international market. To minimize the import of crude oil we must go for Bio fuels which are renewable and eco friendly. Pongamia oil may stands as Bio-diesel which is renewable, safe and non-polluting. It holds great promise to the rural sectors of North East India to meet the energy and organic fertilizer requirements. Of course researchers are to be carried out on Pongamia to standardize agro-technology , low cost and efficient mechanical device to expel oil , to find out the economics, high yielding and high oil content varieties suitable to the different agro-climates of North East India. In that way researchers are also to be carried out value addition on by products of Pongamia oil. By planting Pongamia on roadsides, river bank, on the two sides of irrigation canals, marginal and degraded soils. . N.E. India will able to produce tons of Bio-diesel and organic fertilizers (Oil cake) in near future.

#### References

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