JATROPHA: A CATALYST FOR ECONOMIC GROWTH IN AFRICA

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Introduction

• In 1999 Anuanom Industrial Projects Ltd began investigating the feasibility of developing biofuels industry in Ghana.

• One goal of this investigation was to encourage the production of higher value and marketable products in Ghana.

• The outcome of such an initiative would be:

1) To lower Ghana’s reliance on imported fossil fuels and related products.
2) To increase the value of exportable products from Ghana.
3) Create massive employment for the teeming unemployed youth.
4) Reduce poverty and rural urban drift.
5) Enhance agricultural productivity and promote increased agro-processing in the country.
6) To develop biofuels processing technologies in Ghana.
Introduction…

Two products identified through this investigation as having significant potentials are:

- Bio diesel – a diesel substitute obtained from the chemical conversion of natural oils, such as vegetable oils/fats and animal fats.
- Industrial Ethanol (Bio Ethanol) used to blend bland gasoline in the United States, Brazil, Canada, etc.
Feedstock for biodiesel production

• The need to produce bio-diesel led to search for a feedstock,
  – can be obtained regularly and
  – in large quantities but
  – at comparatively much cheaper cost
- can be planted anywhere.

Among all the locally available oil bearing crops only the jatropha was found to have satisfied the selection criteria.
Which feedstock for biodiesel production?

Oil Palm, Coconut, Soybean, Sunflower, Grand nuts were considered for use as feedstock. But …

- These oils are imported, eaten and used for other industrial purposes
- The prices of these oils are high and cannot be used to produce bio diesel and sold at a reduced price.
- The development of large plantation of these crops to bring down their price could be very expensive since they cannot be grown in all parts of Ghana.

The hitherto unrecognized Jatropha became the obvious choice for the project for the following reasons:
Feedstock for biodiesel production...

1. Can be easily cultivated in all parts of the Country
2. Is not browsed by animals or humans and therefore can be dedicated to fuel production
3. Once planted it can continue bearing fruits for over 40 years
4. Maturity of the tree is achieved within 12 months of planting
5. Has many other industrial uses
6. The price of Jatropha oil is comparatively cheaper than all the available edible vegetable oils and facts.
The physic nut tree

- The physic nut plant is a basic tropical/semi-tropical tree. Found in all parts of sub-Sahara Africa. In Ghana about 8 different varieties have been identified.

The wild physic nut tree
- The wild tree is rather small in size and has very low yield ranging from about 3 to 5 tonnes seeds per hectare per annum. It takes between 3 to 5 years to mature.

The improved physic nut tree (which Anuanom has developed)
- matures in about 12 months after germination.
- develops into a height ranging from 4.5 meters to about 5 meters at maturity.
- The crown cover it develops at maturity ranges from a width of 3.6 meters to about 7.5 meters.
The crown cover of the improved physic nut tree...
Fruits Bearing and Yields

- In the tropical African weather the tree has three main fruits bearing periods in the year. Each fruit bearing cycle is about 4 month.
- During these periods, the tree produces flowers every two weeks that develop into matured fruits in 30 days.
- Under the right conditions, the improved tree produces between 0.5 – 1 kg of nuts per month.
- The yield of physic nuts per hectare per annum for the improved tree is about 13 tonne or about 9 tonnes of seeds.
- The yield of crude jatropha oil per hectare per annum is about 3.5 tonnes.
- Since the conversion of jatropha oil into bio diesel is in the proportion of 1:1, the yield of bio diesel per hectare of jatropha farm is estimated at about 3.5 tonnes per annum.
Fruits Bearing and Yields

• The physic nut tree like any other plant requires regular supply of water to produce fruits.

• So in areas where the rainfall is low, it will be necessary for large plantations to be developed near water bodies so that when there are no rains for extended period of time, the trees can be supplied with water for them to continue to produce fruits.
Fruits Bearing and Yields
Land use for jatropha plantation development.

- The physic nut tree can grow and survive in most soils, except soils with high concentration of salt, and wetlands.
- Sandy loam soils with high concentration of clay and stones are not suitable for commercial production of physic nuts.
- Jatropha trees do not compete for lands used for food and other crops. In the tropical weather physic nut trees can be grown anywhere, so long as there is enough water available for continuous fruits production.
- Physic nut trees will do well on degraded lands, reclaimed mined lands, savannah grasslands, etc where other crops fail.

- To produce about 1 million tonnes of bio diesel per year will require about 300 000 hectares jatropha plantation.
Land use for jatropha plantation development.
Jatropha for afforestation / reforestation

• The physic nut tree satisfies all the conditions set down under the UN Kyoto convention as a positive sink tree that can be used for afforestation/reforestation projects to accomplish carbon sequestration (increasing the carbon stored by tree in a forest).

• Under the Clean Development Mechanism (CDM), afforestation and reforestation projects through planting, seeding and/or the human-induced promotion of natural seed sources, forested land should be for at least 50 years.

• Under the definition of a forest of a CDM afforestation or reforestation project, a single minimum tree crown cover value should be 10% to 30%.

• The minimum height value should be between 2 and 5 meters. The physic nut tree lasts for over 50 years, and develops a crown cover value of over 30% and the average height of the single tree ranges from 4.5 to 5 meters.

• The physic nut tree can therefore be used for CDM afforestation and/or reforestation project.
Jatropha for afforestation
/reforestation
Jatropha for the Restoration of Ecosystems and biodiversity.

• Jatropha plantations quickly restore the eco systems and bio diversity when used for afforestation and or reforestation projects.
• It improves rainfall pattern and prevent soil erosion. Birds and various insects are attracted to the flowers of the tree.
• Bees extract nectar from the flowers for honey production. The development of an average size crown cover (canopy) by the tree reduces soil moisture evaporation and prevents the complete dryness of the soil and thus preserving soil nutrients.
• The tree regularly sheds off old leaves that decompose and release nitrogen, phosphorus and potassium into the soil to enrich it.
An insight into the wonderful world of physic nut

- It is somewhat difficult to imagine that the physic nut tree has been valued only for fencing, hedging, boundary tree and for its medicinal properties.
- Who would have anticipated that common Jatropha would enjoy national and international attention?
- Anuanom has made concerted efforts over the years to bring out the commercial, social, environmental and industrial potentials of the physic nut plant!
An insight into the wonderful world of physic nut...
Economic, social and environmental benefits from the jatropha plantation

• Job Creation
  • The harvesting of physic nuts or fruits from the tree is done every month, throughout the year and for over the forty years of the fruits bearing life of the tree.
  • It has been estimated that one able bodied young man or woman will harvest about 1 hectare jatropha farm per month.
  • After harvesting the dry nuts are sent to the purchasing centre for sales where purchasing clerks are to be engaged to do the job.
  • Then the carting of the nuts from the purchasing centers to the processing factory requires massive logistical activities that will involve a lot of labour.
Economic, social and environmental benefits from the jatropha plantation

• The processing factory will also need to engage machine operators and other various skilled personnel.
• After processing the nuts into finished products, there also need to be conveyed to distribution and marketing centers.
• The value chain job creation is therefore very massive.
• For one million hectare jatropha plantation project, it is estimated that direct employment generation will be over 1 million working people.
Fuel oil and electricity generation

• The processing of physic nuts into Jatropha oil and the conversion of the Jatropha oil into bio-diesel locally will help reduce the reliance of the country on imported diesel and light crude oil which are used for transportation and for electricity generation respectively. The cost of crude oil affects the cost of all fossil fuels including diesel and light crude oil.

• The crude Jatropha oil can be used directly in certain generating sets for the generation of electricity.

• Moreover. Bio-diesel produced by Anuanom is far cheaper, than imported diesel. The ex-factory price difference between imported diesel and Anuanom biodiesel is about 25%
Agriculture and food production

- Anuanom has developed organic fertilizers from the physic nut, which improve the yield of crops, fairly well. The organic fertilizers are rich in Nitrogen, Phosphorus and Potassium (NPK)
- These fertilizers when produced in large quantities and supplied to all farmers will improve the yield of agricultural crops and improve the agricultural industry’s contribution to gross domestic product in the country.
Agriculture and food production

This will go a long way to stabilize food prices and inflation which will eventually affect the stability of the local currency in real terms since part of the foreign revenue earned by the country is consumed by food import.
Jatropha plantation - impact on the economy

- With the cultivation of about 1 million hectares of physic net trees, resulting in the planting of about two billion trees, the national economy will be positively affected by it as follows
## Jatropha plantation - impact on the economy

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity (Tonne)</th>
<th>Unit Price $</th>
<th>Revenue $</th>
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<tr>
<td>Bio diesel</td>
<td>3.5 million</td>
<td>400</td>
<td>1.44 billion</td>
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<tr>
<td>Organic Fertilizer</td>
<td>13 million</td>
<td>180</td>
<td>2.34 billion</td>
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<td>Glycerine</td>
<td>350,000</td>
<td>600</td>
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<tr>
<td>Carbone Credits</td>
<td>estimated</td>
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<td>0.40 Billion</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>4.39 billion</strong></td>
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