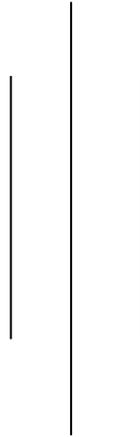


**A Case Study on *Jatropha curcas*  
For Biodiesel Production in Nepal**



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**# I am a Powershifter**

## **Climate change**

The use of fossil resources in the energy system has been a main contributing factor to the increase in greenhouse gases (GHG) in the atmosphere (IPCC 2007a). The challenges presented by climate change poses a great risk that may threaten the very existence of the human society (Lynas 2008). Energy use is a global issue and there is no simple, single solution. However, one thing is certain, changes in the energy systems will occur whether we like it or not. Climate changes will alter weather conditions and affect ecosystems, hydrological cycles and a whole range of ecosystem services that are linked to energy systems (Ebinger and Vergara 2011). In addition there is growing evidence that the fossil oil era is coming to an end and we seem now to have reached a point where the known reserves of oil do not grow at the same pace as the demand for oil, a situation not known previously. Global climate change is forcing society to find environmentally friendly energy such that carbon dioxide (CO<sub>2</sub>) emissions can be reduced. Biofuel is considered as one of the environmentally friendly source of energies because of its recyclable nature.

## **Energy Crisis**

The future global economy is likely to consume ever more energy, especially with the rising energy demand of developing countries. At the same time, the tremendous risk of climate change associated with the use of fossil fuels makes supplying this energy increasingly difficult. This challenge can hardly be addressed by single local solutions. Rather, it requires an interconnected global portfolio of energy sources that matches regional characteristics and that can satisfy the global energy demand in as efficient and carbon-free a way as possible. Conventional energy sources like fossil fuel stocks are decreasing in the world. And energy crisis is the major concern of present and future global economy. Being a landlocked country Nepal fully dependent on India for liquid fuel. Any changes in price and fuel supply policy in India can have devastating effect in Nepal's economy. Hence it is very important for Nepal to diversify the fuel sources so as to reduce vulnerability to external shock. Moreover, inaccessibility of road to the rural areas makes its almost impossible or very expensive to transport the imported fuel to those areas. Nepal imports petroleum products to meet its ever increasing demand. There has been increasing trend of fuel import since 1993 to 2010 and a sharp increase since 2007.

## **Biofuel as solution**

Rising world fuel prices, growing energy demand, concerns over global warming from GHG emissions and increased openness to renewable energy resources, domestic energy security, are all factors driving interest in expanding bioenergy use. In recent years, bioenergy has drawn attention as a sustainable energy source that may help cope with rising energy prices, but also maybe provide income to poor farmers and rural communities around the globe. The steadily increasing trend of gasoline prices over time strengthens the rationale for seeking cheaper supply alternatives. Besides alleviating the reliance of energy driven economies on limited fossil fuel sources, bioenergy has continued to receive increasing attention from those concerned with promoting agricultural and environmental sustainability through the reduction of carbon emissions, an important component of climate change mitigation.

Germany and France accounted for 69 percent of global biodiesel production. Despite the apparent success of bioenergy production in these countries, other countries have been reluctant to take a more aggressive approach towards bioenergy development, due to the existence of institutional, financial or political constraints. Several factors could contribute towards this hesitancy to adopt these technologies, including

- a) A lack of understanding, among policymakers, of the potential benefits;
- b) The neglect of biofuel within the national political, economic, and social agendas, thereby preventing its integration into energy statistics and national energy planning;
- c) The inattention of forestry and agricultural agencies towards the development, management and use of biomass energy resources; and
- d) Misunderstanding that Biofuel plants crowd out food crops which is not the case at least under the study conducted here. Rather it provides room for rural agricultural development and socioeconomic growth go hand in hand with enhancement of bioenergy production capacity.

## **Jatropha Curcas**

It is a multipurpose, drought resistant, perennial plant belonging to the *Euphorbiaceae* family. This plant doesn't need much water and thus can be produced in marginal land. Since it doesn't have food value, it doesn't affect food supply to society. The Nepal government has developed a

national program since 2007 for promotion of this plant as feedstock for biodiesel and this year, it has allocated a budget for its promotion in different parts of the country. The Nepal government has established a Alternative Energy Promotion Center (AEPC) to implement programs for alternative energies including biodiesel from *Jatropha*. *Jatropha curcas* (JC) induces GHG abatement directly by substituting fossil fuel, through extracted oil from the seeds, and indirectly by fixing carbon stocks in soil and plant biomass, two of the most important biologically active carbon stores. Considered to be high in oil content, early yielding, and requiring little irrigation and even requires less management production of bio-diesel from *Jatropha* plantations set up on degraded land. They become highly relevant for energy importing developing countries with large tracts of land already degraded or under the threat of degradation. There is no loss of land for food production or other purposes as only degraded land where profitable food production would not be possible are foreseen to be used. The benefits of plant over other crops for biofuel production are:

- Unlike the first generation biodiesel and biofuel crops such as soy or corn, *Jatropha* is a non-food crop and can grow in non-agricultural and marginal lands not suitable for food crops.
- *Jatropha* can use wastewater for its growth
- Fertilizer and pesticide requirements, and crop management costs, are relatively lower for *Jatropha* than for many other energy crops
- *Jatropha* is a perennial; hence it needs to be planted just once and it yields oil for over 30 years

## **CASE STUDY**

Name of the company: Everest Biodiesel Company Pvt. Ltd.

Established: 2066 B.S.

Address: darechowk-2 VDC chumlingtar, chitwan

Study Area: For our research on present status of *Jatropha* promotion for biodiesel in Nepal, Everest biodiesel company Pvt. Ltd. was selected as study site. Located in Darechowk-2 VDC chumlingtar, chitwan the company was established in 2066 BS in collaboration with a national NGO, DC Nepal and funded by Finland Embassy as a three years project for promotion of *Jatropha curcas* plantation. According to Krishna Dhital, field coordinator of Sajiwan Research and Training Center, Chumlingtar, Everest Biofuel Company received funds from The Embassy of Finland for three years for promotion of *Jatropha* plantation and Biodiesel production in Nepal and from Alternative Energy Promotion Center (AEPC) for biochemical analysis of *Jatropha* seeds collected from different samples along different altitudes of Nepal. The Embassy of Finland funded through a local NGO, Development Center Nepal and AEPC funded through a research consultancy, Himalayan Forum to screen the genetic diversity available on *Jatropha curcas* population and selection and distribution of best genotypes that have high potentiality of production as well as high oil content .

The farmland including processing plant germplasm garden and office is extended over an area of 2 bigha ( around 1 bigha land is degraded land in the periphery of Trishuli river and the rest 14 kattha is the fertile land). *Jatropha* plantation was conducted for the first time on bhadra-4, 2066 BS. And the harvesting of the *Jatropha* seed was started ever since 2067. On their first year of harvest they were able to collect around 18 kg *Jatropha* seeds. The harvesting season is long and lasts for Jestha- Poush. In these 5 years they are able to collect around 11 quintal of *Jatropha* seeds. They have an expeller plant but lack transesterification machine to convert *Jatropha* oil into biodiesel. There are 7 shareholders of the company and the technical part is looked after by Dr Khem Raj Bhattra.

WORDS OF KRISHNA DHITAL, FIELD CO-ORDINATOR

“Bio fuel is not a new thing. After the environmental issues of conventional diesel became concern along with the challenges for income generation and land use; biodiesel got the popularity mostly in developed countries. People got interest on this and started to invest on it. In this way *Jatropha* plantation got popular also in Nepal. In Nepal bio fuel came to practice because the donor provided the money without any research done in this field. Government also started to separate the budget for bio fuel. Government also conducted two –three training and nursery plant two three places. Later conflict arised among people to whether stop or continue the *Jatropha* farming in spite of these conflicts we continued with little contribution by bio fuel committee and those who are involved in this. Here we present 4 questions addressed by Dhital sir:

What is the main purpose of taking this area for *Jatropha* Plantation?

Where we got we took and also looked after that it will take attention of the people. In this high way, every type of people comes such as high and low class people and everyone knows about it. This is the center part as this is only the route to go to Pokhara, Bhairawa and so on. Another part is that this area has more waste land. We can use this kind of waste land in maximum use and it lies in the central part and there is possibility to reach to every kind of people.

Does this plant have any criteria to survive?

Yes, every plant has its own criteria to survive. This plant can be grown in the altitude of 400m-1200m. in depth research has not been done. Normally 400m is suitable but it can also be grown below 400m, this is not good for commercially. For the commercial purpose, 400m height is good. Best height for the plant: according to my view, the best height is 700-800m.

What type of land is required for this plant?

Firstly the promotion of this plant was done by saying that they donor need fertilizer, if you plant once it does not need care in this way the promotion was done. There was wrong way of promotion of this plant. Every plant has their criteria which need to be fulfilled to grow. This is more fruitful in sloppy area than in plain area. In sloppy we can grow this plant more compactly because of their steepness they get equal amount of light and air. But in plain land peripheral area are more good than the middle part of the land since the middle part of the land gets little

light and air. There is some difference in the production of seed in fallow land and plain cultivated. Cultivated land is fertile and the leaf decompose their only which acts as fertilizer, increasing in the productivity of the seed. Whereas in the fallow if we use the fertilizer and take care of it then the productivity will also increase. The only factor is that we should know the technique.

Does the company produce biodiesel at present?

During past we produced biodiesel and it was used to fuel truck. But at present the oil from *Jatropha* is exported to Gorkha ayurved company Pvt. Ltd. for soap production. We buy the seeds from districts like Dhading, chitwan, makwanpur, gorkha, lamjung, tanahu, nawalparsai and palpa and produce oil.

Is there any testing of biodiesel for vehicles in Nepal?

In Nepal that kind of test has not been conducted. But the expert from different places such as Netherland, Germany, China, and India have come here and shared their research. On the basis on their research result, we have been following. In Nepal we don't have equipment and laboratory for testing. So, this type of research is not done in Nepal. India has supported some money and has given the certification; on this basis we are conducting it. We don't have the proof from the State that we have done this and these are the result. This is one of the drawbacks of the State. It is not possible that investing corer of money for one research by one private sector.

Status of Everest Biodiesel Company

Till now, the company has distributed seeds in 10 quintal peripheral land and more than 2 lakh of plant has been distributed. It provided training for 2500 farmer to extend in their farming and assured them buy their seeds. This way they made planned to form a group to make it successful company. Also the company made a network with sajivan sarokar samuha and this network helped to create the pressure on the State. From the state, the coordinator of Dr Ram Prashad Sharma again formed committee, to know what has happened and later on workshop was also held. In this workshop, the decision was made to make three sector works:

- first was government role to make the policy
- Second was the private sector investment and
- third one is the social sector for the promotion

And finally on the contribution of Dr Khem Ananda Chaulagai a committee called Mausauda was formed. This has gone to the government for the process but the implementation has not been done.

Reason behind the slow- down of *Jatropha* promotion in Nepal

First reason for the slow- down is, the donor agencies stopped the fund which lead to no money and those who were doing by their own investment couldn't see the prospect because this was not one party that will lead to the success ,this is related to state, environment ,agriculture, industry, forest and technology. Only one party cannot do all this activities by themselves there must be involvement of the state. Because of lack of government policy many farmer have suffered, in previous days they brought the seeds and planted, today they are uprooting the plant; both money and energy has been wasted. Because of this situation the plantation of *Jatropha* plant has slowed down. Those who are working in the field of biodiesel, they are not able to say proudly; what they are doing in this sector. Government being inactive and the all the work carried by private sector's own risk is bit challenging. If there is the support of Government then it will be easy for us to work. The main aim of government support should in the policy, in the way that they should separate the area for cultivation, how to cultivate, managing the market, ad in providing technology support.

Government should take the responsibility for convincing the car owner to use this oil and should also take the responsibility of car engine. Buying the diesel and selling to the car is the responsibility of Nepal Oil Corporation, this is why involvement of only one company is not effective. Money is not only the thing that is important, we need money for technical aspect but the most important part is the policy on this.

Suggestions for better *Jatropha* promotion

Regarding *Jatropha* extension, it shouldn't be planted in cultivable land. Farmer should be provided with essential skills and techniques for plantation, proper awareness should be provided to farmers, also, farmers should be convinced that plantation would be productive and income generative. I believe that there are many other agencies and private institution promoting techniques, awareness and management system for *Jatropha* however, Government of Nepal should be responsible for those factors. For making it a long lasting project and visionary, government should accept the idea of *Jatropha* which would potential the *Jatropha* oil project.

Budgets from government alone would not help to sustain.

### **Conclusion and recommendation:**

Nepal which depends on India for importing fuel lacks substantial fossil fuel resources and has huge energy debt with India. And it's crucial that Nepal have its own domestic energy supply so we don't have to depend on the supply and the pricing dictated by the world market. So generation of biofuel can be a sustainable energy option for Nepal. Nepal could benefited directly through Wasteland Reclamation and Reforestation

- Income generation from previously unusable areas: *Jatropha* plantation is labor intensive hence creates jobs for poor indigenous people. Nepal has huge amount of degraded and waste land in rural areas that can be utilized for *Jatropha* plantation.
- Provide huge opportunities from new sustainable and renewable land resources and crops creating employment Nursery development, soil preparation, irrigation systems, Plantation maintenance, seed collection, oil extraction and Refinery control
- Renewable and clean energy option.
- Erosion Control and Soil Improvement: *Jatropha* cultivation has a huge potential to alleviate soil degradation, desertification and deforestation by greening this vast wasteland while providing employment to rural extremely poor and marginalized communities
- Promotion of Women employment as it uses local manpower and reduction of poverty.
- Decentralized energy solutions for remote areas.

### References

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