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Potential of cultivation of Gliricidia (*Gliricidia sepium)* in coconut triangle for bioenergy generation

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Evaluation of least cost and environmentally friendly energy alternatives is essential to overcome the prevailing energy crisis. Dendro thermal energy generation has been identified as one of the best options due to its potential as a low cost and locally available environmentally sound energy source. However, this potential has not been exploited by the people in most of the potential areas which hinder the further expansion of establishing bio-energy plants. With this background, a study was undertaken to evaluate the present status and the potential of gliricidia (*Gliricidia sepium)* cultivation in coconut triangle for bio-energy generation. *Gliricidia sepium* is a multipurpose crop used for wood, fuel wood, fodder and nitrogenous organic fertilizer. The wood is presently used for thermal energy i.e., electricity generation for the national grid (Walapane); electricity generation for off-grid rural electrification (Kakkapalliya, Thanamalwila);industrial heat application (Madampe, Kottawa etc.) and household cooking. The study further attempted to determine the factors associated with the supply of gliricidia for bio-energy generation and attitudes of the coconut growers towards the gliricidia intercropping. Finally, it examined the strengths and weaknesses of the supply as well as demand in order to make sound recommendations to promote gliricidia cultivation in coconut lands for bio-energy generation.

Two field surveys were simultaneously conducted to gather the necessary data. The first survey dealt with the existing suppliers in Anamaduwa area, while the second survey was carried out in Kuliyapitiya area with the potential growers. In addition, a case study was conducted with successful growers. Logit modeling was used to analyze the data.

The study found that the opportunity costs of land and labour of the both sites of study were fairly low. Moreover, the investment on agriculture related activities in marginal coconut lands were extremely low. Further the study revealed that even though there was a positive attitude and high demand for gliricidia cultivation, there is an inadequate supply to the thermal plants for bio-energy generation. The technical information on growing gliricidia for bioenergy generation had not disseminated into the people of the area mainly due to lack of awareness programmes. The results of the logit analysis revealed that income from coconut, total highland availability and willingness to become a contract farmer are significant variables that influence the willingness to cultivate gliricidia. The case study revealed that the cultivation of gliricidia appear to be economically profitable and technically feasible option given that its low input nature, availability of marginal coconut lands, low opportunity cost of labour and less income opportunities available in these areas, Government involvement and having a reasonable price with stable market for gliricidia will encourage the public to enter into this business whereas effective extension service is a must for making people aware.

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Hybrid biogas plant producing electricity

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Energy is the major cause behind the development of a nation. By thinking on it we have worked on the biogas plant and modified it to generate electricity. This generated electric current is sufficient enough to power an entire house. Also our idea can be implemented in country with huge amount of organic waste material.

Have you any time thought of "Just a switch in your house which when in ON condition can fetch you electricity, and in OFF condition can generate biogas". Yes this is absolutely possible and our extreme hard efforts have made us to achieve this successfully.

Our project is based on four absolutely different and innovative steps.

1. Removal of electrons from bacterial cells by use of accurate potential difference electrodes.(as in the microbial fuel cell).
2. Rectify this current by use of a special device designed by us and get the output as 0.25V.
3. This obtained voltage is again applied to the microbial culture in biogas plant. By this accumulation of acetic acid takes place in the biogas fermenter.
4. The accumulated acid can be easily converted into H2 gas by the action of microbes from environment , using acetic acid as a selective component.
5. Further on passing this gas through hydrogen cells large amount of electricity can be generated as per our requirement.

The entire process takes place in biogas plant fermenter and hydrogen gas can be generated only when the 0.25V voltage is applied to the culture in the plant's frementer. In the absence of voltage this plant produces 95 % methane and not 70% as per the primitive plant did (a solid experimental proof for this). Thus pure methane as well as electricity can be generated by this plant by the switch over of a single switch. For implementation of this technique large funds are also not required and even a simple farmer can adopt this technique. Moreover the existing biogas plants in the country can also be modified by the introduction of certain metal electrodes in it. It can be concluded that this technique to certain extent can help in the development of rural areas in developing countries and make their dream of "developed nation" achived.

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Consumption patterns of energy in rural sector of Sri Lanka - Analysis based on Puttalam district

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The energy crisis is prominent in developing countries where explosive populations are experienced with inefficient utilization of energy and poor technologies. Sri Lanka also fails in meeting the total national energy demand and presently seeking for alternatives while scrutinizing the potentials of efficient use of available energy sources of bio mass (mainly fuel wood), electricity and petroleum. While bio mass supplies 47.9% of the energy demand of the country, petroleum and hydropower contribute in 43.3% and 8.7% respectively. The main supply of bio mass is for domestic cooking activities in the rural sector. Out of the total electricity production of the country, around 39% is consumed by domestic sector and about 61% of the households are accessible for consumption of electricity. In provincial level, the western province shows the highest consumption of electricity and demand from other provinces is increasing drastically, mainly with industrial development activities and increasing population. However about 20% of electricity is wasted in its transmission. Although petroleum products are used mainly to supply energy for transport and industrial purposes, use of kerosene for lightening is about 48% of the country. While industrial and transport sectors consume 24.4% and 24.8% of whole the supplied energy, 51.1% is consumed by household, commercial and others. The inadequacy of energy at an affordable price is prominent in the rural sector, impeding the people in stepping into a quality life which stimulates better health practices, opportunities for education with information, and chances of income generating activities. However, complete studies with smooth analyses are imperative in reaching better policies in meeting rural energy demand.

The aim of this study was to investigate the present consumption pattern of fuel wood, Petroleum fuels and electricity as energy sources in the rural setting of Puttalam district. The results showed that more than 94% use firewood as the cooking fuel, which is freely available for them due to close proximity to the jungles and larger sizes of the home gardens. LPG consumption as a fuel was around 5%. About 82% of the sample used electricity as the main energy source for lighting while the rest used kerosene. The average monthly expenditure (kerosene, LPG and electricity) for energy consumption was 7.44%, and that was second only to the average food expenditure of 71.3%. Rather, with including a minimum expenditure for firewood, considering the time cost of fire wood collection, expenditure on energy became much higher, implicitly implying the prevailing pressure on the remaining few jungles and forest covers. The econometric results of energy demand indicated that the increasing education level, monthly income and family size affect significantly on rapid growing demand for energy, especially cleaner energy.