ROLE OF BIOMASS IN RURAL DEVELOPMENT– A MICRO LEVEL STUDY

by

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CERTIFICATE

This is to certify that the thesis entitled, **"ROLE OF BIOMASS IN RURAL DEVELOPMENT - A MICRO LEVEL STUDY"**, submitted by **Mr. T. Sampath Kumar** has been prepared under my supervision in confirmity with the rules and regulations of Indian Institute of Technology, Delhi. The research report and results presented in this thesis have not been submitted for any degree in any other University/ Institution.

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Abstract

A B S T R A C T

Dependence of Indian rural population on biomass is inevitable. Biomass meets nearly all the needs for sustaining life in the rural sector. In fact the villages in remote areas have been existing on natural surroundings bestowed with abundant biomass since time immemorial. Surprisingly, detailed studies on the role of biomass have been very few. The limited studies available can not be taken as representative of all the regions in the country due to enoromous diversities in the nature of local biomass and social structures prevailing in the villages. Hence, there is a necessity of a large number of such studies for different situations. Against the above backdrop, a study was undertaken in a village New Gwal Pahari in Haryana State for understanding the role of biomass and the level of its utilization in the village life.

Availability of non-commercial energy sources (firewood, dung cake, agricultural residues etc.,) and their consumption were estimated by survey. In view of sharp climatic variations during winter and summer seasons, the survey was carried out twice, corresponding to peak winter and summer seasons. The village burns about 174 tonnes of dung cakes, 21.17 tonnes of sarkanda and 21 tonnes of firewood. Interestingly, the Hukka - a smoking device in rural areas - was found to consume a notable amount of dung. All the cooking and smoking energy requirements are met free of cost in the village. Unfortunately, these resources are burnt in inefficient domestic cookstoves.

It was observed that improved cooking stoves as well as biogas technology will be useful in improving the energy scenario. Since the villagers were not aware of applications of biogas technology, the biogas system was first demonstrated to them.

A survey was conducted to find the Saccharum munja Roxb (sarkanda) occupied area in the village. Thirty random sample sites were selected and biomass per unit area was calculated. The village could provide 805 tonnes of fresh sarkanda per year for various uses.

The village pond was found to be populated by Azolla pinnata R.Brown and Spirodela polyrhiza L.Schleid. Growth studies were undertaken for these on a weekly basis over 16 weeks. The doubling time varies from 5.5 to 13.3 days for Azolla. Based on this study, the total availability of aquatic biomass in the village was calculated.

Experiments were carried out using Azolla as a feedstock for biogas generation. A sigmoidal growth curve was observed for biogas generation. One Kilogram of dry Azolla produced 77.5 litres of biogas with 60-65 percent methane. A mixture of sarkanda and Azolla (65:35) was also used for biogas studies in a pilot plant. One Kilogram of the mixture could generate 112 litres of biogas with 60 % methane. Thus the studies established the possibility of using Azolla and sarkanda either alone or in combination with dung for biogas generation.

At the end, possible applications for the total utilization of dung, sarkanda and aquatic biomass were analysed keeping in view the overall needs and development of the village. Suitable technologies using these resources are listed and discussed. Calculations indicate that the dung, if used through a biogas system, would be sufficient to meet the energy requirements for cooking, lighting and running pumps for irrigation for the village. The aquatic biomass and sarkanda would also supplement dung for biogas generation. Further, various parts of sarkanda can provide raw materials for a chain of rural industries.

In all, available biomass in the village could generate 27,100 mandays of work. This could provide full employment to every house in the village. Thus the present study explores the possibility of utilising ignored, non-commercial biomass resources through suitable and efficient technology mixes for essential needs of the village. Results indicate that this could conveniently be achieved in a decentralised manner with effective participation of the villagers for their betterment.

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