Project Completion Report

EPRSC

Utilization of bioenergy by-products for value addition and nutrients enhancement

Project Title

Utilization of bioenergy by-products for value addition and nutrients enhancement

Name of PIs: Professor D C Baruah, Department of Energy, Tezpur University

Professors Michele Clarke, University of Nottingham, UK

Funding: The Engineering and Physical Sciences Research Council (EPSRC), UK funding is routed through the University of Nottingham, UK

Funding amount: An amount of 5000 GBP (INR 4.39 Lakhs)

Date of commencement : 1.4.2012

Date of completion : 31.3.2013

Other International Collaborator (s) involved

a) Dr. Helen West, Associate Professor in Environmental Biology, Faculty of Science, School of Bioscience, , University of Nottingham, UK

b) Prof. Trevor Drage, University of Nottingham, UK

Objectives:

a) To assess the feasibility of locally available surplus as anaerobic digestion feedstock

b) To assess barrier and carrier for bioenergy technology applications in rural areas through socio-economic tools

c) Exchange visit between partner institutes for development of research proposal for further research collaboration

Major Research Highlights:

- Generation of know how in the area of bioenergy by-product management and utilization applicable to India and UK.
- Characterization of by-products of anaerobic digestion plant in India and UK and to assess their potential for nutrient recovery
- Identification of locally available surplus biomasses as potential feedstock for biomethanation

- Identification of alternative pathway for by-products value addition through solid fuel production
- Development of Bio methane production and analysis laboratory
- Exchange visits of staff, research students (Postdocs/Ph.D/MSc/MTech students); laboratory and fieldwork undertaken
- Development of laboratory through procurement of Five units of laboratory biogas reactor (0.25 m^3)and one Biogas analyzer with CH_4, CO_2, H_2S sensors) which have been useful for the researches of both the University
- Engagement with end users in all parts of the research and to ensure appropriate technological solutions and knowhow dissemination for optimum profitability from bioenergy systems through capacity building programme.

Outcome of the collaboration (brief details)

a) M Tech Thesis submitted to the Department of Energy, Tezpur University

1) Investigation of Biogas production from locally available surplus Biomass in Sonitpur District by Dipam Patowary, 2013
2) Investigation of the Utilization of Solid fraction of biogas slurry as fuel by Pranjal Das, 2013

b) Conference papers

Matelloni P, Chaney J, Patowary D, West, H.M. Baruah D.C., Clarke M L (2014) Small-scale hybrid anaerobic digestion and biomass gasification using the same feedstock: prospects for second stage recovery of energy and nutrients. International Bioenergy 2014 Conference Manchester 11-13th March 2014

c) **Development of laboratory**

Five units of laboratory biogas reactor (0.25 m^3) and one Biogas analyzer with CH_4, CO_2, H_2S sensors are procured and installed from the fund available from the project. This has been useful for the researches of both the University

Details of Exchange Visit

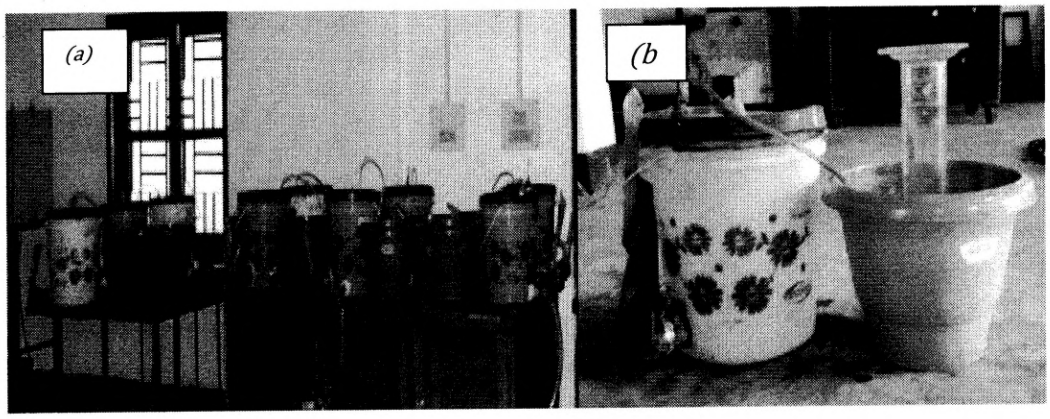
S. No.	Time of visit	Purpose of visit	Name of visitors
1	20.7.2012	Kick off meeting on the initiation of the project titled "Utilization of bioenergy by-products for value	Prof. Michele Clarke Dr. Helen West Dr. Debadayita Raha

		addition and nutrients enhancement"	Dr. Sarah martin Dr. Paolo Matelloni Dr. Joel Chaney Dr. Trevor Drage
2	25.9.2012- 5.10.2012	Initiation of research work under the following themes: a) Recovery, characterization & field testing of Phosphorus (Struvite) from by-products of Anaerobic Digestion unit b) Utilisation of solid phase digestate as downdraft gasification feedstock c) Improvement of local livelihood through Bio-energy ; investigation on community engagement	Prof. Michele Clarke Dr. Helen West Dr. DebadayitaRaha Dr. Sarah martin Dr. Paolo Matelloni Dr. Joel Chaney
3	10.2.2013- 20.2.2013	As academic visitors as a part of collaborative project "GER"	MoonmoonHiloidhari SampritiKataki DipamPatowary

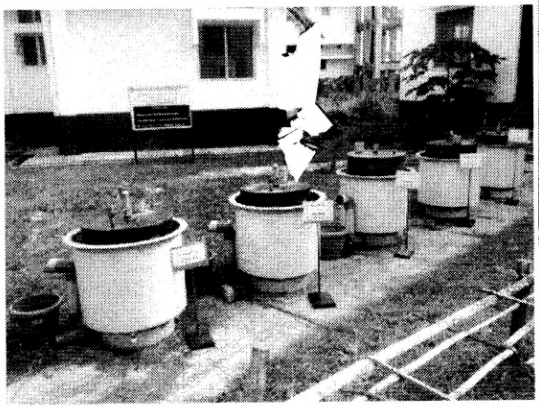
Group discussion during UoN visit to TU

Researcher working in the laboratory of UoN

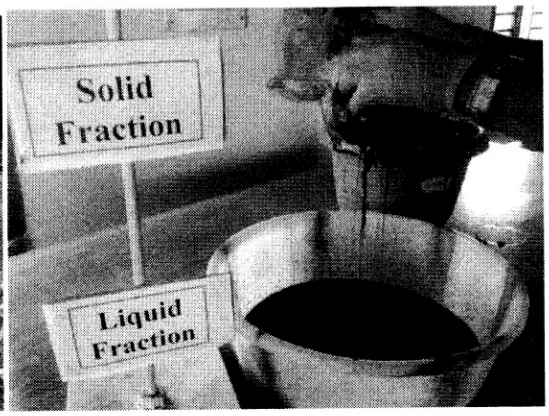
Research students from Tezpur University and the University of Nottingham, UK preparing biomass samples for experiments



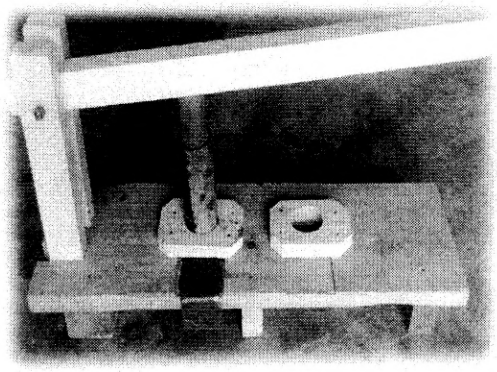
Arrangement of 20 L batch reactors (a), 20 L reactor with digestate outlet and gas collection pipe (b)



0.25 m3 digester



Digestate separation



Briquetting Machine for preparing solid fuel from biogas digestate

Briquettes prepared from digestate samples

Dr. C. Baruah)