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RECYCLING OF BY-PRODUCTS OF ANAEROBIC DIGESTION: FEEDSTOCK RELATED VARIABILITY AND SCOPE OF PROCESSED APPLICATION FOR IMPROVED MANAGEMENT

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Anaerobic digestion is a matured technology with high adaptability for wide range of feedstocks to produce biogas as primary product. This has led to utilization of variety of organic residues for optimum energy yield, depending upon region specific availability and feedstock suitability. Such developments are leading to concerns regarding the quality of resultant residues (digestates) as fertilizer, since their physico-chemical characteristics vary as a function of parent biomass. Further, growth of bioenergy sector would necessitate proper attention on management of the by-products. There are some related issues such as understandings on the quality of by-product with respect to feedstock and processing which is necessary to undertake their suitable and optimum utilization options. Research is undertaken to generate required knowhow about digestates through comprehensive characterization in terms of nutritional characteristics, spectroscopic and phytotoxic properties with variation of (i) feedstock *viz*. a) cowdung, b) co-digested *Ipomoea carnea*: cowdung (60:40 dry weight) and (c) co-digested rice straw: greengram stover: cowdung (30:30:40 dry weight), and (ii) application option (whole, separated solid, separated liquid, ash from solid digestate) for evaluation of their utilization prospects in agriculture. Organic matter and nutrient content of the whole and solid digestates suggest their potential agricultural application. On the other hand, liquid digestates were relatively nutrient poor, though rapid plant uptake could be ensured due to higher availability (60-90%) of total $NH4^+$-N. *Ipomoea* based digestates in all application phases were significantly higher in nutrient content (Total N, P, K, Ammonia-N, Ca, Mg and S) compared to respective phases of digestates from other two feedstocks, however its applications in liquid and whole phase need attention due to potential phyto-toxicity. Use of analytical techniques such as FTIR and XRD further support the findings obtained from the chemical analysis of the bioenergy by products and can be useful for quick assessment of fertilizer properties of digestate.

Biography

Sampriti Kataki has an M.Sc. in Environmental Science and she did her PhD in Energy-Environment interaction from Tezpur Central University, Assam, India. Currentlly she is working as a Research Assistant in Department of Energy, Tezpur University. Dr. Kataki keeps her research interest in Biomass Energy, Bioenergy intervention in rural areas, Bioenergy and Agriculture, Biogas system and Value addition of By-products of bioenergy system. She has experience of working with rural communities in Assam, India in relation to Biogas technology and has been invited to University of Nottingham, UK as academic visitor in 2013 and 2015. She has published more than 16 publications in reputed journals, conference proceedings and book chapters and has been serving as a reviewer of reputed journals like Chemosphere, Waste Management, Agricultural Systems, Waste and Biomass Valorisation, Biotechnology for Biofuels, Environmental Progress and Sustainable Energy etc. She has been awarded excellent paper award in International Conference of Solid Waste management, 2016.

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