6th World Congress on

BIOFUELS AND BIOENERGY

September 05-06, 2017 | London, UK

Scientific Tracks & Abstracts

Day 1

Biofuels Congress 2017

Major Sessions:

Day 1 September 05, 2017

Advanced Biofuels | Algae Biofuels | Food Vs Biofuels | Production of Biofuels | Renewable Energy

Session Chair
Markus Brautsch
Technical University of
Applied Sciences Amberg-Weiden, Germany

Session Chair
Frank Rosillo-Calle
Imperial College London, UK

Session Introduction

Title: **The food and fuel conraversy- Perceived and real potential conflict of biofuels and food security.**
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Title: **Comparison of Bio-Ethanol and Biogas: Net energy ratio, total yield, and greenhouse gas emissions**
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Title: **Growth of the algae *Chlorella vulgaris* at the photobioreactor and extraction of fatty acids for biodiesel production**
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Title: **Performance analysis of an IT-SOFC/GT hybrid system using gasified biomass fuel under different operating modes**
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Title: **Economic study on the potential of bio-based-industry in UAE**
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Title: **Towards the development of rapid biofilm antibiotic sensitivity testing (BAST)**
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Title: **Estimation of the production of electric and thermal energy for a controlled landfill (Morocco)**
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Title: **Prospects of bioethanol production from lignocellulosic rich weeds of North East India**
Pankaj Bharali, Gauhati University, India

Title: **Lipidomic Profiling: Unveiling a direct route for conversion of polar lipids to neutral lipids in microalgae *Chlorella species* and *Scenedesmus abundans* under Nitrogen Limited Condition**
Jyoti Singh, IIT Roorkee, India

Frank Rosillo-Calle, J Bioremediat Biodegrad 2017, 8:5(Suppl)
DOI: 10.4172/2155-6199-C1-008

THE FOOD AND FUEL CONTROVERSY - perceived and real potential conflict of biofuels and food security

Frank Rosillo-Calle
PhD; Honorary Senior Research Fellow, CEP, Imperial College London

Dealing with food and fuel can be very emotive, because for many people, the use of land to produce fuel instead of food is ethically wrong, particularly when so many people go hungry or are undernourished; there is a large body of literature to testify this. Misinformation, misconceptions, and vested interests, have accompanied the development of the biofuel industry since almost its origins. There are, however, multiple reasons to challenge this misrepresented view of reality. The underlying reasons of why this situation has arisen are multiple. Also, the narrowness of the debate e.g. the focus in just a few feedstocks (maize, sugarcane, cereals), and the geographical dimension [although biofuels are global, just a few countries (Brazil, and USA and to a lesser extent the EU)], are the key players. This has been further compounded by the emphasis of many studies on the negative implications of biofuels without taking fully into account their intertwin nature e.g. agriculture sector, environmental and social implications. More recently the geographical diversity is being enriched by a greater diversification of the feedstock and better understanding of the implications. For far too long the emphasis has been on the potential conflicts rather than to the complementarity of food and fuel production. The development of biofuels is limited by many factors, but not necessarily by these so strongly emphasized throughout history such as direct land use competition with food production or ethical considerations. The aim of this presentation is to outline the latest developments on food and fuel and the extent to which the debate is overcoming old prejudices. Scientific facts, greater pragmaticism and holism should be the main pillar. Also, it should be recognised that much will also depend on factors indirectly linked to biofuels such as eating habits. Innovation in the agricultural sector, environmental, social and policy considerations, will also play a key role.

Biography

Frank Rosillo-Calle is an Honorary Senior Research Fellow in Biomass Energy, Imperial Centre for Environmental Policy, Faculty of Natural Sciences, Imperial College London. He has been conducting research in Biomass Energy for more than 35 years. His areas of interest are: biomass resource assessment, biomass energy (production, conversion and use), liquid biofuels, agriculture, and food security implications. He has extensive international research experience and has published extensively in this field. He has taught biomass energy-related subjects at PhD and MSc level at various universities, and has published various books on biomass energy.

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Notes:

Wolfgang Bauer, J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Comparison of bio-ethanol and biogas: Net energy ratio, total yield, and greenhouse gas emissions

Wolfgang Bauer
Michigan State University, USA

Liquid and gaseous biofuels can have a significant impact on the reduction of fossil transportation fuels and thus make a large contribution to reducing global CO_2 emissions. Examples for these biofuels include ethanol produced from sugarcane, sweet sorghum, corn, switchgrass, and other energy crops, but also biogas/methane produced from the same energy crops or algae cultures. However, it is of fundamental importance to consider all fossil fuel based inputs into the biofuel production in a life-cycle analysis. In addition, we need to optimize the total yield of biofuels per area of energy crops in order to minimize the conflict of fuel versus food, we need to reduce the use of artificial fertilizers as much as possible, and we need to minimize the net emissions of greenhouse gases in the biofuel production process. In this presentation, I will evaluate different biofuels and compare them to each other, taking all of the above considerations into account.

Biography

Wolfgang Bauer is a University Distinguished Professor at Michigan State University (MSU). He received his PhD in Physics from the University of Giessen in Germany in 1987. After a one-year Postdoctoral appointment at the California Institute of Technology, he joined the faculty at MSU in 1988. From 2001 to 2013, he served as Chairperson of the Department of Physics of Astronomy, and in 2009 he became the Founding Director of the Institute for Cyber-Enabled Research. He has consulted on energy issues for hedge funds and oil companies, and he is co-owner of several companies in the renewable energy sector.

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Handan Erturk et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Growth of the algae *Chlorella vulgaris* at the photobioreactor and extraction of fatty acids for biodiesel production

Handan Erturk and **H Avni Oktem**
Konya Food and Agriculture University, Turkey

Microalga is known to have higher lipid contents and biodiesel efficiency than most plant oil sources e.g. palm oil. We conduct algae research at our laboratory in Konya, Turkey. We studied the growth of *Chlorella vulgaris* at the photobioreactor in our laboratory first. We aimed to use this photobioreactor of lab scale as feed stream to an open pond larger scale bioreactor for future work. Photobioreactor had three compartments which had separate controls for light and air circulation. Temperature was kept at 22°C - 26°C. The circulation rate was 180 L/hr. The light intensity was set at 16 hours on and 8 hrs off. The nutrient powder was dissolved in sterile water and the pH of the solution was 6.5-6.7. Inoculation of culture was performed aseptically. The algae culture was an original strain of *Chlorella vulgaris*, supplied from the USA. This specific culture was proposed for use as bioenergy and bio fertiliser due to high lipid content. The continuous growth was achieved at the bioreactor without contamination for more than 9 months. Slurry was dried and algae biomass was obtained. Extraction of lipids of the dried algae was performed by Bligh and Dyer method. Extracted lipid was subject to transesterification reaction for production of fatty acid methylesters (FAMES). The lipid contents of sample was analysed by GC. The results for the lipid contents were: palmitic acid: 33%, linoleic acid: 25%, oleic acid: 11%, palmitoleic acid: 8%, atearic acid, arachidic acid, myristic acid traces. The fatty acid profile was as expected from the literature except the lipid composition showed some changes due to photobioreactor configuration. We achieved successful growth of algae at the photobioreactor and extraction of lipids for biodiesel production. Future research for optimization of the conditions of the bioreactor should be performed.

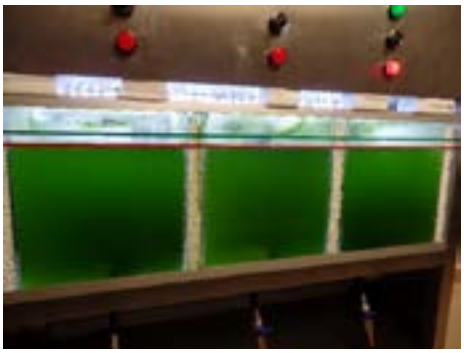

Figure: A picture of the photobioreactor with the algae grown for nine weeks

Biography

Handan Erturk got her BS and MS degrees in Food Engineering of Middle East Technical University in Turkey. Later she went to USA for graduate study. She earned her PhD at Penn State University, Agricultural & Biological Engineering Department. Her expertise and publications were mainly on plant tissue culture, aseptic growth, modelling of biological systems, micropropagation. After she got back to Turkey, she has been researching and teaching on plant biotechnology, e.g. cell cultures. She has worked with the industry and now she is an Assistant Professor at the University in Konya, Turkey. She has been working on algae culture growth and long term maintenance at the laboratory. Her most recent research has been on production of biodiesel and biofertilizers from algae cultures grown at the laboratory.

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Xiaojing Lv et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Performance analysis of an IT-SOFC/GT hybrid system using gasified biomass fuel under different operating modes

Xiaojing Lv[1], **Chenghong Gu**[2], **Xiaoyi Ding**[2] and **Yiwu Weng**[1]
[1]Shanghai Jiao Tong University, China
[2]University of Bath, UK

This work elaborates the load performance and safe characteristic of an intermediate-temperature solid oxide fuel cell (IT-SOFC) and a gas turbine (GT) hybrid system using gasified biomass fuel under different operating modes. Three operating modes are adopted to investigate the off-design performance. And some malfunction restrictions of components (such as fuel cell thermal crack, compressor surge, reformer carbon deposition) are also considered for the effect of operating mode. Results show that the hybrid system has a high efficiency 60.78% at the design point using wood chip gas, which is an interesting reference for distributed power stations. The system output load changes almost from 46% to 120% when it is operating with Modes A and C, however, the compressor surge is occurred easily with Mode A. When with Mode B, the system has a rather wider load range than that of above two operation situations, but its performance variation is very complicated. The system performance will be affect by the too low turbine inlet temperature and carbon deposition phenomenon occurred in the reformer when in low load operation. The system can't operate safely because the turbine is damaged easily by the too high inlet temperature when in high load operation. The results further illustrate that, the designer or the user should pay attention to the matching relationship between too much flow rate and flow characteristics for turbine and compressor, when the high load output is required.

Biography

Xiaojing Lv is a Postdoctoral Researcher in School of Mechanical Engineering, Shanghai Jiao Tong University. Her main research direction is advanced power cycle system based on high temperature fuel cell and gas turbine, and the scientific utilization of low calorific value gas. She has authored more than 15 papers in both international and national journals.

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Valentino S Junior Te'o et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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A research into the microbial hydrolysis and bioconversion of coal

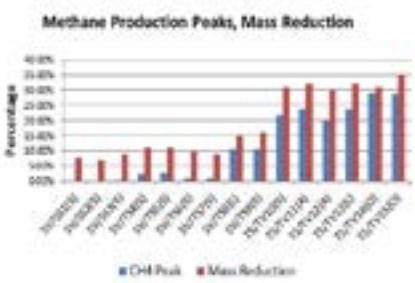
Valentino S Junior Te'o, Jonathan Evers, Ancy Besoc and Kevin Dudley
Queensland University of Technology, Australia

Background and Research Problem: Coal is an abundant and economical feedstock for the production of energy globally. In Australia, coal is mined primarily in Queensland, New South Wales and Victoria. The predominant use for coal is to generate electricity, with the 430.9 million tonnes of coal mined 2013/14; 375.1 million tonnes was exported to Asia (Australian Office of the Chief Economist, 2015). In 2013, Australia was the world's fifth-largest coal producer, after China, the United States, India, and Indonesia (WCA, 2014). Victoria hosts 430 billion tonnes of brown coal, representing a significant proportion of the world's brown coal resource. Burning coal for fuel is economically important worldwide, but decades of production and emission of Green House Gases such as CO2 and CH4 have contributed to Climate change. The research at QUT focuses on cleaner alternative methods for the conversion of feedstocks such as lignocellulosics and coal to energy. Emphasis for this research is on understanding the complex bioreactions during microbial hydrolysis of coal, in order to design more cost-effective bioconversion processes for different coal types from different parts of Australia.

Methodology: Different coal types (eg. Brown, Black and Shale) were treated with microbial consortia using Batch and Fed Batch controlled conditions, with gas samples removed and analyzed using gas chromatography. Different samples of microbial consortia were tested, for their contribution during the bioconversion reactions.

Findings: So far, up to 30 % CH_4 and 60% CO_2 have been generated over a period of 5-10 days, with a mass reduction of around 35% (Figure 1). Identifications of different microbial consortia have been achieved, with the genus Bacillus and Lisinibacillus found important during the production of CH_4.

Conclusion & Significance: Microbial bioconversion of coal to bioproducts such as biogases offer a cleaner alternative for energy production, but importantly, more cost effective bioprocess designs are needed that relies on a critical fundamental understanding and subsequent application of the microbial activities.



Biography

Junior Te'o employed at Queensland University of Technology has extensive experience in microbial biotechnological bioprocess applications such as bioremediation, and biofuel production from different feedstocks such as lignocellulosics, coal and shale, under controlled fermentation conditions. He also has experience in microbial strain improvement, enzyme production and fermentation bioprocess method development and optimization from laboratory scale (1-20L) to industry scale, > 1000L.

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Notes:

Naeema I Aldarmaki et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Economic study on the potential of bio-based-industry in UAE

Naeema I Aldarmaki and **Maryam AlShehhi**
UAE University, UAE

Economy of the United Arab Emirates (UAE) depends mainly on fossil fuels. Crude oil, and natural gas drive the wheel of industry, providing energy for heat and manufacture, and the raw materials for production, while distillates from the petroleum industry have reformed the face of modern life. Fossil fuels are finite in amount and their combustion makes gaseous products. The increase in atmospheric greenhouse gases (GHGs) has led to a major climate changes. Combining the need to renewable energy resources and the need of cleaner energy with less impact on environment have led the change towards a low-carbon bio-economy and renewable energy, which are products of bio-based industry. It is very important for the UAE to avoid the depletion of the oil and to reduce the greenhouse emission (GHGs). Futuristic studies are essential to understand, predict and therefore make the suitable decisions. In this study a UniSim simulation was built for the biodiesel production from the oil extracted from date pits in a continuous-stirred reactor (conventional method) to study the effect of different variables on the total yield of biodiesel. A comparison on economic analysis using various biomass oils as a feedstock was also conducted.

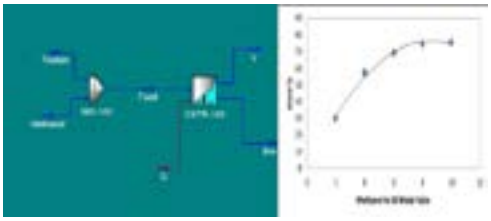

Figure 1: UniSim design of biodiesel Production using CSTR, with the results obtained of Yiled% as a function of Methanol to oil molar ratio.

Biography

Naeema I Aldarmaki has joined UAE University as first female faculty member in Chemical and Petroleum Engineering. She received her PhD in Chemical Engineering from Birmingham University, UK, in 2012 in the area of Supercritical Fluids Technology where carbon dioxide is used as solvent media for the separation and extraction of high valued lipid compounds. Her research interests are mainly in supercritical fluids technology, extraction and purification processes from biomass, phase equilibrium studies and mathematical modeling. She has worked as Visiting Researcher in Tohoku University (June-July 2013), Japan, in the area of Gas Hydrates and its application in the area of hydrogen storage. She received the UNESCO-L'ORÉAL Award 2013, Pan Arab Regional fellowship.

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Notes:

Bassam O AlJohny et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Towards the development of rapid biofilm antibiotic sensitivity testing (BAST)

Bassam O AlJohny[1], **AL Quthami Khalid**[2] and **Milton Wainwright**[3]
[1]King Abdulaziz University, Saudi Arabia
[2]Regional Laboratory, Makkah, Saudi Arabia
[3]University of Sheffield, UK

This study presents a modification of the antibiotic susceptibility testing (AST), which is a rapid means of determining the response of planktonic bacteria to different antimicrobial agents, for application to biofilms. Colony biofilm was first developed on a cellulose filter/membrane disc, over which an antibiotic disc was imposed. Zone of inhibition was measured after incubation on nutrient agar. Biofilms were not as susceptible to test antibiotics as compared to the planktonic cultures. The results point to the possibility of this method as a rapid means for antibiotics for treating biofilm infections. Limitations and potential application for biofilm AST are discussed.

Biography

Bassam O AlJohny has completed his PhD from Sheffield University, England and has been trained on Molecular Techniques from Department of Molecular Biology and Biotechnology, Sheffield University. Presently he has been working as Associate Professor in Molecular Microbiology, Department of Biology. He is an energetic and enthusiastic Microbiologist and has 7 years' experience in both teaching and research activity. He has participated in several international, national conferences, symposia, workshops and presented his research papers in several countries and recently presented his novel research in Paris. He has published more than 9 papers in reputed national, international and ISI journals and serving as an Editorial Board Member of reputed journals and also has lifetime membership in Microbiology Associations worldwide.

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Henry T Bedoya et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Production of microalgae biomass: Upscaling of five commercial microalgae strains in greenhouse at northern latitudes

Henry T Bedoya[1], Kumar Sahu[2], Hans R Gislerød[1] and **Bjørn Rusten[2]**
[1]Norwegian University of Life Sciences, Norway
[2]Aquateam COWI AS, Norway

Statement of the Problem: The feasibility of upscaling of microalgae biomass at Norwegian latitudes in greenhouse without artificial illumination nor extra heating as a future sustainable energy source has been evaluated.

Methodology & Theoretical Orientation: Two marine(m) and three freshwater(f) algae were cultivated in duplicate, from inoculum batch to upscale in polypropylene open Tray PhotoBioReactor (TPBR, 25 L). *Chlorella vulgaris(f), Dunaliella salina(m), Nannochloropsis oculata(m)*, cultivated for 63 days (20.06.12-23.08.12), and *Scenedesmus sp(f), Chlorella wild mix Årungen(f),* cultivated for 42 days (20.07.12-23.08.12), at semi-continuous operation system, enriched CO_2 air (3%) and prepared in situ, trifold nitrogen nutrition media (3N-BBM+Vit) and tap water, with volumes replenished when need. Effects investigated: 1. Irradiance and temperature on specific growth rate and daily growth. At 23°C *Scenedesmus* sp. grew faster at 0.05 h-1 and fivefold when doubling the irradiation energy input, meanwhile *Dunaliella salina*, reported 0.024 h^{-1} and 71.4% growth increase. 2. Outside weather condition in conjugation with irradiation and temperature on oxygen evolution (dissolved, DO) showed that cloudy days generated 31% more DO with 2.64 times less PAR irradiation than sunny days. 3. Optimized Dilution (D) and Mixing (M) regimes on biomass productivity (P) of marine algae increased by 60%. 4. Irradiance (I) on Photosynthetic Efficiency (PE), for marine strains 61% lower irradiance gave 4 times higher PE, and for freshwater strains, a four times lower irradiance gave 4.6 times higher PE. 5. Irradiance on areal CO_2 fixation rate, the mean CO_2 fixation rate was 55.44 $gCO_2m^{-2}d^{-1}$, which is 2.6 times higher values than found by Hulatt (2011). 6. Outdoors weather conditions on TPBRs energetic efficiency found the overall Irradiation Utilization Efficiency (IUE) provided by the TPBR. *Nannochloropsis oculata*, performed best with 1.37 gMJ-1, and optical pathway 0.09 m.

Conclusion & Significance: A cost-efficient greenhouse microalgae biomass production at northern latitudes shows great potential as sustainable energy supplier e.g., raw ingredients for nutraceutical and animal feed industries.

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Naimi Youssef, J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Estimation of the production of electric and thermal energy for a controlled landfill (Morocco)

Naimi Youssef
University of Hassan II Casablanca, Morocco

The United Nations Framework Convention on Climate Change was signed in 1992 at the Rio Summit. The Conference of the Parties shall, as the supreme body, regularly review the implementation of the Convention and any other related legal instruments that it may adopt and take, within its mandate, Effective implementation of the Convention. The Conference of the Parties (COP) is the supreme body of the UNFCCC and meets annually to take stock of progress in combating climate change in order to negotiate and monitor the implementation of the Convention. It ratified the Kyoto Protocol on 16 February 2005. The twenty-second meeting will take place in Marrakech, Morocco, from 7 to 18 November 2016. The reduction and valorization of household waste is one of the main objectives of the COP22 in Marrakech. Waste recovery is conceivable through the construction of controlled landfills. The work presented in this article represents a study of modeling the operation of the controlled dump of Fez thanks to several calculation techniques. The controlled landfill in Fez is the first controlled landfill built at national level, and even in Africa, for modern solid waste management. It allows to control all the effluents, while preserving the environment of the city. This study presents an inventory of the production of electrical energy and heat energy by cogeneration. We will show that the quantity of electrical energy estimated by the mechanization of household waste from the Fes landfill is 65.5 GWh, and the amount of thermal energy estimated by the cogeneration of the electrical systems is 142.174 GWh, then these quantities are currently available at the Fes landfill. This alternative allows a reduction in the tonnage of accumulated waste. Thus, it avoids its negative impact on the environment.

Biography

Naimi Youssef has his expertise in the fields of renewable energies, and particularly in biomass, fuel cells, and environment. He is Full Professor at Sciences Faculty of Ben M'sik, the University of Hassan II of Casablanca. He is a Vice-President of association, The Moroccan Society for Advancement of Renewable Energy (SMADER), Coordinator of the course "Chemistry of the Environment" License Materials Science Chemistry (SMC), responsible for the Specialized Master "Renewable Energy and Material".

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Young Research Forum Day 1

Pankaj Bharali et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
DOI: 10.4172/2155-6199-C1-008

Prospects of bioethanol production from lignocellulosic rich weeds of North East India

Pankaj Bharali[1], **Arup Kumar Das**[2] and **Mohan Chandra Kalita**[1]
[1]Gauhati University, India
[2]Rajiv Gandhi University, India

North East region referred to as "Paradise of the Botanist" exhibits a plethora of trees, shrubs, herbs, epiphytes, ferns, cryptogams and houses numerous rare, endangered, and endemic species. Bio-resources in North East India have been exposed to many challenges in recent years. 80% people are farmers relying heavily on agriculture. Weeds are the major problems in the agricultural fields. The cell walls of the Weeds are rich in the lignocelluloses contents which are a good source of sugar. Lignocellulosic materials consist mainly of three polymers: cellulose, hemicellulose, and lignin. These Lignocellulosic feedstocks may liberate sugars for fermentation after aggressive pretreatment to yield a substrate easily by hydrolyzing with commercial cellulolytic enzymes, or by enzyme producing microorganisms. For the collection of organic biomass, weed biomass is one of the easily available sources as compare to other plant products. Due to the favorable climatic condition there is a huge diversity of weed in the agricultural field of North east India which leads to the production of large weed biomass. Among the 60 recorded weeds of this region *Ipomea carnea, Eichhornia crassipes, Mikania micrantha, Cassia occidentalis, Cassia occidentalis, Mimosa invisa, Mimosa pudica, Lantana camara, Leucaena leucocephala Chromalaena odorata, Ageraum conyzoides, Marsilea minuta, Saccharum spontaneum, Cyperus imbricatus Chloris barbata, Chromolaena odorata, Cleome viscose, Aeschynomene indica, Amaranthus spinosus*, etc., are the lignocellulosic rich weeds of North East India. The lignin content in various weeds were recorded a minimum of 4.6±0.4% in *Cyperus imbricatus* to a maximum of 17.46±0.48% in *Aeschynomene indica*. Cellulose contents were found to be more than the fiber of Jute plant in *Leucaena leucocephala* 57.36±1.8% which is a credible source of biofuels. Hemicellulose was recorded highest in the whole plants of *Amaranthus spinosus* 35.23±.23% and lowest in Cleome viscose 3.9±.32%. Due to the huge amount of Lignin, Cellulose and Hemicellulose in the weeds of the North East region, there is a tremendous scope of production of Biofuels which can solve the scarcity of the fossil fuels and also the agricultural problems.

Biography

Pankaj Bharali (PhD in Botany) has his expertise in Plant Taxonomy and the phytochemical investigation and bioactivity evaluation of the selected medicinal plants from North East India. Presently he is working as DBT-RA in the field of Phytochemistry of some rare and endangered medicinal plants from Arunachal Pradesh, India. He has also recorded a numbers of species as new to India and two as new discovery to science from the alpine areas of Arunachal Pradesh, India.

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Jyoti Singh et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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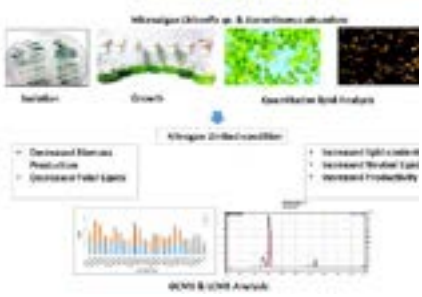
Lipidomic profiling: Unveiling a direct route for conversion of polar lipids to neutral lipids in microalgae *Chlorella species* and *Scenedesmus abundans* under nitrogen limited condition

Jyoti Singh, Swati Dubey and **R P Singh**
IIT Roorkee, India

Microalgal strains can accumulate greatly enhanced levels of lipids under nitrogen-deficient condition, making these as one of the most promising sustainable sources for biofuel production. High-grade biofuel production from microalgal biomass could be facilitated by analyzing the lipid content of the microalgae and enumerating its dynamics under varying nutrient conditions. In the present study, a detailed investigation of changes in lipid composition in *Chlorella species* and *Scenedesmus abundans* in response to nitrogen limited condition was performed to provide novel mechanistic insights into the lipidome during stress conditions. The mass spectroscopic approaches mainly LC-MS and GC-MS were employed for lipidomic profiling in both the microalgal strains. The analyses of lipid profiling using LC-MS revealed distinct forms of lipids mainly phospho- and glycolipids, including betaine lipids, and various other forms of lipids in both the microalgal strains. As detected, an overall decrease in polar lipids was observed. However, GC-MS analyses had revealed that the synthesis of the storage lipid i.e. triacylglycerol (TAG) was substantially stimulated in both the strains under nitrogen limited conditions. The changes observed in the overall fatty acid profile were primarily due to the decrease in proportion of polar lipids to TAGs. This study had enabled in analysing a detailed and orchestrated form of lipidomes in two different microalgal strains having potential for biodiesel production.



Biography

Jyoti Singh has her expertise in biochemical and molecular aspects of algae to enhance the lipid production in algae that will further lead to increased biofuel production. She has been working in this area for more than 4 years. She has worked on 'omics' based approaches (transcriptomics and lipidomics) applied to defining whole cell metabolic and regulatory pathways in algae that will further help in increase of biofuel production from algae, moreover, optimize the productive capabilities of algae as a potential biofuels production host. Her demonstrated creativity, adaptability, and abundant enthusiasm explore new and potential molecular targets in algae, which are regulating the increased lipid production in algae to enhance the biofuel production. She has skilled in many biochemical and molecular techniques.

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Scientific Tracks & Abstracts

Day 2

Biofuels Congress 2017

Major Sessions:

Day 2 September 06, 2017

Biomass, Bioenergy Conversion & Applications | Biomass feed stocks for renewable energy generation, Process for Bioenergy | Biogas, Bioethanol &Biodiesel

Session Chair
Sivakumar Nallusamy
Sultan Qaboos University, Oman

Session Chair
Andrés Moreno
University of Castilla-La Mancha (UCLM), Spain

Session Introduction

Title: **Speciation study of bioethanol from dates (HPLC-ICP-MS) linked to molecular sieve and sodium borohydride treatment**
mirella ELKADI, The Petroleum Institute Campus, UAE

Title: **Biofuel precursors from food wastes using microwaves radiation**
Andrés Moreno, University of Castilla-La Mancha (UCLM), Spain

Title: **SOFC CCHP – treating biogas for the use in a SOFC-system**
Christof Weinlaender, Insitute of Thermal Engineering, Austria

Title: **Bioethanol from lignocellulosic biomass: current findings determine research priorities**
Qian Kang, KU Leuven, Belgium and Beijing University of Chemical Technology, China

Title: **Bioethanol Production from two monoculture algal species *Cladophora fracta (Dillw.) Kützing* and *Euglena polymorpha Dangeard***
Ghazala Butt, GC University, Pakistan

Title: **Partial separation of simulated lignocellulosic hydrolyzate via nanofiltration**
Gopal P Agarwal, Indian Institute of Technology Delhi, India

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Title: **Title:Microalgae of Northeast India for bio-energy and other products of commercial potential based on the biorefinery approaches**
Mohan Chandra Kalita, Gauhati University, India

Title: **Using of the ecological analysis to justify the environmental feasibility of biohydrogen Production from cassava wastewater biogas**
Jonni Guiller F Madeira, CEFET and UFRRJ, Brazil

Title: **A comparative study on biodiesel production from waste cooking oils obtained from different sources using supercritical methanol**
Omar Abo El-Azayem, London South Bank University, UK

Title: **Mass and energy recovery from rice straw as a biomass resource**
MennatAllah Labib, The British University in Egypt, Egypt

Title: **Use of 4-dodecylbenzenesulfonic acid catalyst on the methanolysis of the rapeseed oil in meso- integral baffled reactor**
Luma Al-saadi, Newcastle University, UK

Title: **Eco-Design of integrate system of drying and separating of olive residues in olive oil industry**
LAJDEL abdellatif, UNIVERSITE HASSAN II Casablanca, Morocco

Title: **Biorefinery approach of microalgae feedstock for the production of bioethanol and biodiesel**
Sivaramakrishna, Chulalongkorn University, Thailand

Mirella Elkadi et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Speciation study of bioethanol from dates (HPLC-ICP-MS) linked to molecular sieve and sodium borohydride treatment

Mirella Elkadi, Afrah AlAmri, Avin Pillay and **Sasi Stephen**
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The prospect of producing bioethanol from biomass available locally is in the interest of widespread sustainable growth and development. The novelty of our study focused on maximizing the recovery and purity of bioethanol from dates by subjecting the process to specialized treatment for removal of water and toxic species. Bioethanol production from dates of the Fard and Khalas cultivars is relatively unexplored, and was achieved by adopting standard protocol of thermal sugar extraction followed by fermentation and distillation. Water de-contamination of the product utilizing molecular sieve treatment led to enhanced purity of bioethanol (98%). Co-treatment with sodium borohydride resulted in reduced levels of toxic species Cr^{3+}, Cr^{6+} and As^{3+} by about 20%. The speciation study was conducted using hybrid liquid chromatography/mass spectrometry (HPLC-ICP-MS). A built-in dynamic reaction cell facilitated detection of the species of interest. Elemental profiling of bioethanol samples employing standard ICP-MS demonstrated that the levels of trace elements were higher in general for the Fard dates. Our research is significant from the perspective of deploying surplus dates for biofuel production to obviate competition for arable land. The study could make a useful contribution to ongoing research associated with climate change.

Biography

Dr. Mirella Elkadi is an Associate Professor in the Department of Chemistry at the Petroleum Institute. She is experienced in essential instrumental techniques including NMR, GC, IR and mass spectroscopy. Her recent interests are biofuels and alternative sources of energy.

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Andrés Moreno et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Biofuel precursors from food wastes using microwave radiation

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In biomass technologies, microwave radiation earned importance as a green and environmental friendly energy, for getting biofuel precursors from agricultural wastes. Biomass waste is becoming increasingly recognized as a good feedstock and carbon source with different components and applications. Plant cell wall is mainly composed by cellulose, hemi-cellulose and lignin. One example of this type of feedstock is the agro-food waste from the external part of melon rind, which is considered in this work as a potential bio-resource with several applications. Indeed, this material is fairly rich in carbohydrates, phenolic compounds and fatty acids. The carbohydrate fraction of melon rind is mainly composed of cellulose, hemicelluloses and pectin, with glucose, xylose and galactose being the major monosaccharides present. Typically, 5-hydroxy-methylfurfural (5-HMF) is obtained by the dehydration of monosaccharides (hexoses such as glucose or fructose) at high temperature using an acid catalyst in aqueous solution, leading to levulinic acid (LA) and formic acid (FA) as by-products. In the work described here, this process is studied, comparing microwave and conventional heating, as well as the use of sulfuric acid (H_2SO_4) and the Montmorillonite KSF clay as catalyst. Some improvements were observed when the reactions were carried out using a biphasic system (water:THF) which provides a more effective product extraction than the monophasic systems. The highest 5-HMF and LA recoveries where obtained with the combination of the biphasic systems and microwave radiation using MKSF as catalyst. This approach highlights the opportunities of melon rind carbohydrate fraction to be transformed in a source of biofuel precursors, in a clean and efficient manner, using environmental-friendly techniques. Hence, the aim of this work is the study of the hydrolysis and dehydration of microcrystalline cellulose by microwave radiation using homogeneous and heterogeneous catalysts and different reaction systems. The optimal conditions obtained have been applied for the obtaining of HMF and LA, both of them well-known biofuel precursors, from some waste such as beer bagasse and melon rind. For conclusion, this work has been able to obtain biofuel precursors from waste using a green and environmentally friendly energy such as microwave radiation. In addition, we have developed different methods to obtain one precursor or another, using different pre-treatment and changing experimental conditions.

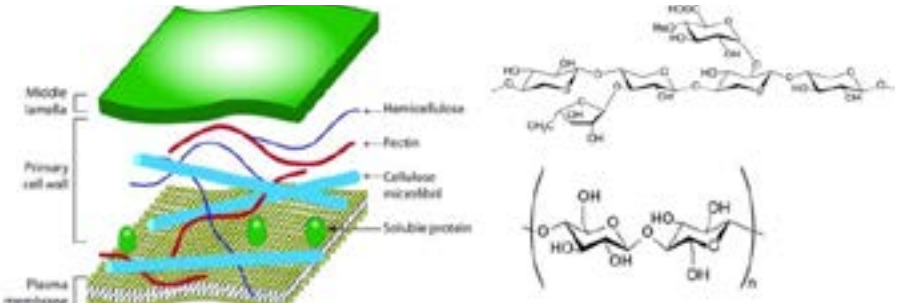

Figure 1: Components of the cell wall

Biography

Andrés Moreno began his academic and research career in University of Castilla-La Mancha (Spain) getting PhD degree in Organic Chemistry in 1990. He carried out Postdoctoral Studies at University of Oxford and University of Paris-Sud. He worked as an Assistant Professor in Organic Chemistry in 1995. He worked as Visiting Professor at University of Oxford, and also short stays at "Green Chemistry Centre of Excellence of York" & University of Rome I. In 2015, he obtained a Full Professor position by Spanish Educational Government. The main lines of his research are: application of microwave radiation in organic synthesis; use of solid supports and not pollutants oxidizers in reactions catalysed by acids; chemistry of food; structural identification of its components by nuclear magnetic resonance (multinuclear and qNMR); synthesis and characterization of biofuel precursors from agricultural wastes.

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Christof Weinlaender et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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SOFC CCHP – treating biogas for the use in a SOFC-system

Christof Weinlaender[1], **Raphael Neubauer**[1], **Martin Hauth**[2] and **Christoph Hochenauer**[1]
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A SOFC CCHP system (Combined Cooling, Heat and Power) using renewable energy sources (biogas, sewage gas, landfill gas) will be developed to achieve high efficiencies. While electrical power will be produced at very high efficiencies using a SOFC (Solid Oxide Fuel Cell), the energy of the hot exhaust gas will be used to operate an absorption chiller system which provides a low temperature coolant and its waste heat can be used for heating. The combined system allows the utilization of various renewable energy sources and a high annual efficiency. Depending on the utilized fuel, which will be converted in the SOFC, different requirements for the gas cleaning unit have to be taken into account. Due to the planned multi fuel ability of the system, an overall concept for the gas cleaning and gas processing unit must be developed to achieve a high degree of standardization. The desulfurization of biogas is essential for the successful operation of SOFCs. H_2S is one of the main components in biogas. In order to feed a solid oxide fuel cell, the contaminated gas has to be reduced to a certain degree. In this work, different parameters onto the desulfurization performance of commercially available desulfurization adsorbents were investigated. H_2S removal efficiency was monitored under various operating conditions such as different temperatures, space velocities and inlet concentrations. The experience obtained from these tests provides fundamental knowledge for further development activities for such systems. This includes the determination of the useful power range for a product, the real dynamic of the system, the suitability of different fuels and their influence on the system performance as well as potentials for process simplifications and useful data for adsorption tower design and process optimization.

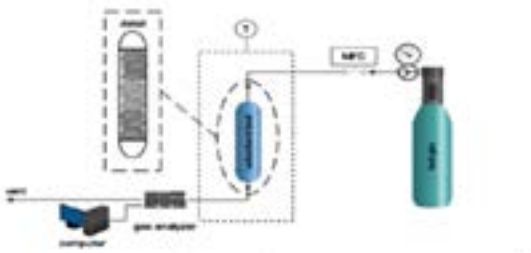

Figure 1: Schematic diagram of the experimental apparatus.

Biography

Christof Weinlaender studied Chemical Engineering at Graz University of Technology, Austria. In 2014, he finished his Master's thesis about liquid-liquid extraction at the Department of Chemical Engineering at Graz University of Technology. Since 2014, he is working at the Department of Thermal Engineering at Graz University of Technology as Assistant Project Scientist. Key areas of his interest are biofuels, adsorption processes and solid oxide fuel cells.

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Qian Kang et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Microalgae for biodiesel and 3rd generation bioethanol: Prospects and research priorities

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Algae are gaining wide attention as an alternative renewable source of biomass for the production of biofuel, including biodiesel and bio-ethanol. The utilization of algal biomass is undoubtedly an eco-friendly approach towards sustainability although more research and development is needed for the efficient use of these easily cultivable microorganisms to generate biofuel. The paper reviews the current state-of-science with respect to microalgal biofuel production, with a specific focus upon the biodiesel and bio-ethanol production potential. An updated literature review reveals that different types of microalgae can be applied, although *Chlorella* sp. and *Chlorococcum* sp. are most appropriate for biofuel production and can also be used for bio-ethanol. The bio-ethanol productivity from green algae is higher than for red algae. The complete production process is analyzed from algae growth, to harvesting, and conversion into biodiesel and bio-ethanol. The use of microalgae in a hybrid objective, i.e., the treatment of wastewater and generation of raw material for biofuel, has drawn a lot of attention over the past years and is reviewed. Clearly, biofuel from microalgae, produced from natural resources (sunlight, water and O_2/CO_2) is widely considered to be the most sustainable option for biodiesel and associated bio-ethanol production, and priority research can enhance the further development.

Biography

Qian Kang completed her Chemical Engineering Bachelor's study at the Tianjin University in China (2008). She completed PhD studies at the Beijing University of Chemical Technology in China, where she was a member of the PhD research team of Prof. Tan and is currently Postdoc at the Catholic University of Leuven, within the team of Prof. Dewil and Prof. Baeyens. Her main PhD research focus was improving the energy consumption of the production of Bio-ethanol, especially in combination with membrane technology. Her immediate research actions focus upon energy and exergy analysis of the next generation of concentrated solar power plants (hybrid combined cycle). Within the framework of this renewable fuel, she has participated in different conferences (Beijing, Tianjin, Korea, London). She has (co-)authored 8 publications in international peer-reviewed journals.

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Bioethanol from lignocellulosic biomass: Current findings determine research priorities

Qian Kang[1], **Jan Baeyens**[2], **Raf Dewil**[1] and **Lise Appels**[1]
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[2]Beijing University of Chemical Technology, China

"Second generation" bioethanol, with lignocellulosematerial as feedstock, is a promising alternative for first generation bioethanol.

This paper provides an overview of the current status and reveals the bottlenecks that hamper its implementation. The current literature specifies a conversion of biomass to bioethanol of 30 to ~50% only. Novel processes increase the conversion yield to about 92% of the theoretical yield. New combined processes reduce both the number of operational steps and the production of inhibitors. Recent advances in genetically engineered microorganisms are promising for higher alcohol tolerance and conversion efficiency. By combining advanced systems and by intensive additional research to eliminate current bottlenecks, second generation bioethanol could surpass the traditional first generation processes.

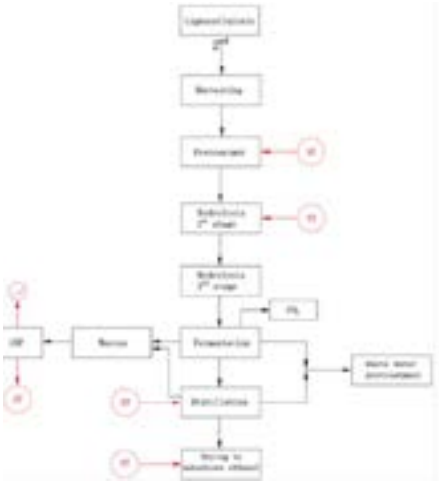

Figure 1: Second generation biomass-to-ethanol production (ST: steam addition)

Biography

Qian Kang completed her Chemical Engineering Bachelor's study at the Tianjin University in China (2008). She completed PhD studies at the Beijing University of Chemical Technology in China, where she was a member of the PhD research team of Prof. Tan and is currently Postdoc at the Catholic University of Leuven, within the team of Prof. Dewil and Prof. Baeyens. Her main PhD research focus was to improving the energy consumption of the production of Bio-ethanol, especially in combination with membrane technology. Her immediate research actions focus upon energy and exergy analysis of the next generation of concentrated solar power plants (hybrid combined cycle). Within the framework of this renewable fuel, she has participated in different conferences (Beijing, Tianjin, Korea, London). She has (co-)authored 8 publications in international peer-reviewed journals.

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Ghazala B et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Bioethanol production from two monoculture algal species *Cladophora fracta* (Dillw.) Kützing and Euglena polymorpha Dangeard

Ghazala B, Shafaq Ch and **Nasim H**
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Algae are an attractive biofuel feedstock because of their fast growth rates and improved land use efficiency when compared with terrestrial crops. Altogether two microalgae species *Cladophora fracta* (Dillw.) Kützing and *Euglena Polymorpha* Dangeard were collected from various freshwater ponds, channels and tanks of Sheikhupora. Collected species were analyzed for bioethanol production capacity *Cladophora fracta* (Dillw.) Kützing treated showed high quantity of bioethanol (0.29 gm) whereas *Euglena polymorpha* Dangeard untreated became the least efficient (0.10 gm). Euglena polymorpha Dangeard untreated left 99% biomass after bioethanol. pH of bioethanol of all experimental algal species fall in the range of 5.8-6. The Fourier transform infrared spectroscopy (FTIR) analysis was performed to prove the bond representation events including purified fatty acid ethyl esters of biomass. A dominant peak at 3342.67 cm^{-1} corresponds to OH bending in cellulose and hemicellulose. This band was expanded to 1641.70 cm^{-1} in treated sample of *Cladophora fracta* (Dillw.) Kützing which is showing the separation in some parts of cellulose. The band was expanded to 1415.10 cm^{-1} in treated sample of *Euglena polymorpha* Dangeard which is showing the separation in some parts of cellulose. Gas Chromatography-Mass Spectrometer (GC-MS) analysis has shown ions composition in the bioethanol. The ethanol contents in the bioethanol was measured by gas chromatography.

Biography

Ghazala B has her expertise in algal culturing and extraction of biofuel. She has 12 years' experience in this regard and many projects were completed under her supervision. She works as Associate Professor of Phycology and Chairperson of Department of Botany, GC University.

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Partial separation of simulated lignocellulosic hydrolyzate via nanofiltration

Gopal P. Agarwal and **Manish Jain**
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In recent years, bioconversion of lignocellulosic biomass into ethanol has been identified as a promising technology for producing liquid biofuels. However, lignocellulosic biomass hydrolysis produces a mixture of hexose and pentose sugars, which together are difficult to ferment to produce ethanol. Moreover, it also contains several fermentation inhibitors such as acetic acid, furfural, 5-hydroxyl methyl furfural and some phenolic compounds. Thus in literature several recombinant strains, capable of simultaneous uptake of glucose and xylose have been developed. Along with use of recombinant strains, nanofiltration has also been applied to concentrate the sugars in hydrolyzate and for simultaneously removal of inhibitors from hydrolyzate, which increased the overall sugar consumption and improved the ethanol yield [Sasaki K. et al Bioresource Technology 169, 380, 2014 also 185, 263, 2015 & Maiti S.K. et al, ibid,114, 419, 2012]. However, genetically modified strains may suffer from low yields, low productivities and genetic instability. In this study, a new strategy is used where nanofiltration is applied for separating the xylose from a synthetic hydrolyzate mixture (as shown in Fig. 1). Sjoman E. et al [Sjoman E. et al JMS 292, 106, 2007] had already shown that glucose and xylose can be separated by using nanofiltration membranes, however, their aim was towards complete separation. On the other hand in the proposed process, hydrolyzate is divided into two streams one has higher glucose to xylose ratio (retentate stream) and another has lower glucose to xylose ratio (permeate stream). Most of the inhibitors, present in hydrolyzate get enriched along with glucose in the retentate stream, which can be easily fermented by S. cerevisiae. Permeate stream with lower inhibitors concentration and lower glucose to xylose ratio can be effectively fermented by suitably adapted P. stipitis [Patent pending]. In this study simulated hydrolyzate solutions were experimentally examined using commercially available spiral wound nanofiltration modules. Experiments were performed in the volume reduction (dynamic) mode at variety of operating conditions by using different cut-off nanofiltration membranes in order to optimize the operating conditions and to identify the best suitable cut-off for maximizing the separation. The optimization study involved would be to minimize presence of xylose in the glucose enriched stream by combination of suitable concentration factor and separation factor.

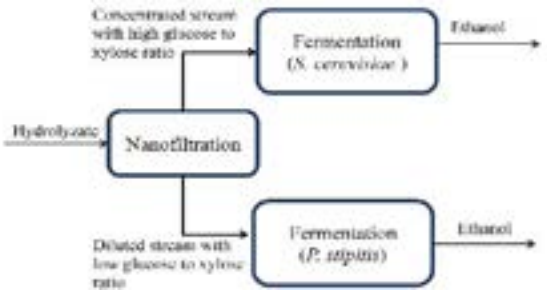

Fig. : Proposed strategy for processing of hydrolyzate from lignocellulosic biomass via nanofiltration

Biography

Dr. Gopal P. Agarwal is a Professor in the Department of Biochemical Engineering and Biotechnology at Indian Institute of Technology Delhi, INDIA for over 22 years. He has been teaching a course on Applications of membranes in Bioprocessing and Biotechnology. His research interests are also in applications of pressure driven membrane processes in downstream processing in food and biotechnology. He has been Principal Investigator of several sponsored projects worth Rs 3.5 crores from Government of India Agencies agencies like DST, DBT, IFCPAR, MDWS and ICAR. He has over 30 publications in the Journals of Membrane, Bioseparation, Separation Science & Technology, Journal of Chromatography and Bio-resource Technology.

Dr. Manish Jain worked in the area of membrane separation applied to systems in chemical and chemical industry. He has seven international publications in the field of membrane technology. He is currently working on application of nanofiltration for biofuel production.

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Mohan Chandra Kalita, J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Microalgae of Northeast India for bio-energy and other products of commercial potential based on the biorefinery approaches

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In the recent times, microalgae have been the immense source of attraction as a highly potential and promising renewable biomass source of energy, biomittigation and sustainable valuable products. Biotechnological explorations of the underutilized bountiful indigenous algae diversity of NE India, have potentially opened up a new avenue for sustainable product development including biofuel production . Several microalgae species have been marked as potential source of naturally occurring high valued products such as lipids, vitamins, proteins, carbohydrates, antioxidants , colorants ,food supplements and other bioactive molecules. The North East India, apart from being one of the mega biodiversity hotspots in the world, has bestowed upon with vivid freshwater microalgal resources. These diverse bio-resources of the region are yet to be explored to the extent for their potential biotechnological applications. Recent studies carried out are envisaged with the isolation and screening of freshwater biodiesel potential microalgae of the region yielding with the isolation of 24 indigenous freshwater microalgae species, which require further works for possible commercial utilizations and biotechnological applications. Among the isolated microalgae, Chlorella sp, Botryococcus braunii, Ankistrodesmus sp, Scenedesmus sp, Euglena sp, Haematococcus sp, Navicula sp, and Nitzchia sp are known to be a few oleaginous microalgae noteworthy for biofuel production. Oil (lipid) contents were quantitatively evaluated in laboratory cultures of isolated Ankistrodesmus sp, B.braunii, Scenedesmus sp, Chlorella sp and Chlorococcum species. The lipid content of some of the isolated microalgae species grown in normal BG11 medium were found to be in the range between 11.3 – 42.0% of dry weight. Analysis of the carotenoid contents of the selected native microalgae species also revealed higher content of lutein, lycopene and astaxanthin, which can be produced as other high valued products for additional fund generation in the course of liquid biofuel production. The liquid hydrocarbon producing green microalgae B.braunii is found to be significant among the isolated microalgae, which exhibited hydrocarbon in the range between 21.9-60.7% of dry weight. Some of these isolated microalgae e.g. Scenedesmus sp (8-56% Protein; 10-52% Carbohydrate), Chlorella sp (51-58% Protein; 12-26% Carbohydrate), Euglena sp (39-61% Protein; 14-18% Carbohydrate & 14-20% Lipid) are also reported to contain high percentage of carbohydrate and protein in addition to its moderate to high lipid content, which justify the enough scope for utilization of these species in developing a technology for potential biofuel production and other value added products of commercial potential based on biorefinery approaches .

Biography

The author has already been granted two Indian patents and filed another six patents. He has published over 130 research papers of national and international repute. A devoted worker for popularization of Science and Technology among the masses in Assam and promotion of biodiversity and environment conservation in North East India.

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Kefale Wagaw et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Comparative study on the nutrient concentration and productivity of bio-slurry before and after treatment with chemical fertilizer

Kefale Wagaw and **Kassa Widneh**
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In biogas plant, there are mainly two products: methane gas which is use for different purposes like cooking, lighting and slurry which can be used as organic fertilizer. The main target of this study was characterizing the slurry by measuring the relative amount of macro and micro nutrients like Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, and Manganese by using standard methods. And comparative study on the productivity of organic fertilizer at different treatments steps with commercial fertilizer on selected crops has been performed. Potassium and Calcium values increase when it was composted. This is because of that decomposed vegetables are sources of both Ca and K during composting while Magnesium and Manganese values decrease when the slurry converts to compost. Both compost and commercial fertilizer have the same productivity for onion cultivation. Compost, gives the highest incremental yield of chills (even higher than that of chemical fertilizer). From productivity test 1.5 kg/m^2 onions and 3.75 kg/m^2 chills was produced using biogas-slurry compost.

Table: elemental composition of biogas feed stock at different treatment stages

Sample	K[mg/l]	Ca[mg/l]	Mg [mg/l]	P [mg/l]	N2 (%)	Mn [mg/l]
Manure	66.92	0.84	5.1	0.22	2.10	36.50
Slurry	107.56	0.69	2.3	0.20	2.52	46.16
Compost	146.11	2.22	4.91	0.33	1.68	55.35

Nitrogen decrease (33%) during composting this is due to volatilization of N_2 in the form of NH_3 and NH_4

Biography

Kefale Wagaw is a Lecturer in Chemical Engineering Program and Researcher in biofuel energy and essential oil extraction from plants and fruits such as: biogas co-digestion and optimization, oil/biodiesel blending with kerosene. He is also interested in characterization and utilization of bioslury for crop production, and bio-ethanol production.

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Jonni Guiller F Madeira et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Using of the ecological analysis to justify the environmental feasibility of biohydrogen Production from cassava wastewater biogas

[1]Jonni Guiller F Madeira, [2]Ronney Arismel Mancebo Boloy, [3]Angel Ramon Sanchez Delgado, [4]Flávia Renata Lima and **[5]Eluã Ramos Coutinho Ricardo de Castro Pereira Filho**
[1]CEFET and UFRRJ Brazil, [2]CEFET Brazil [3]UFRRJ Brazil, [4]UFRRJ, Brazil, [5]UNESP, Brazil

The use of bioenergy has turned into a good alternative for reducing the emission of pollutant gases. In Brazil, this sort of energy has increased in usage during the last years. Biohydrogen, produced from cassava, appears as an alternative fuel to fossil fuels and, also, becomes economically competitive, since this is a low cost carbon source. The repertoire of results about the ecological impact from the production of bioenergy from cassava wastewater is very limited because, in general, this commodity is more common in underdeveloped countries. This paper evaluates and quantifies the environmental impact of electricity production in a cassava wastewater treatment plant. The ecological efficiency methodology developed by Cardu and Baica [Regarding a new variant methodology to estimate globally the ecologic impact of thermopower plants. Energy conversion and management 40, no. 14 (1999): 1569-1575] is used as a benchmark in this study. The methodology mainly assesses the emissions of equivalent carbon dioxide (CO_2, SOx, CH_4 and particulate matter), pollutant indicators and ecological effects of a cassava wastewater plant utilizing biohydrogen as energetic carrier. As a result some environmental parameters, such as equivalent carbon dioxide emissions, pollutant indicator and ecological efficiency are evaluated due to the fact that they are important to electricity production. In this way, the environmental parameters was calculated to evaluate how interesting is the process from the environmental feasibility point of view. The average values of the environmental parameters among different biogas compositions was calculated, the average pollution indicator was 10.11 $kgCO_2e/kgH_2$ with an average ecological efficiency of 93.37%. As a conclusion, bioenergy production using biohydrogen from cassava wastewater treatment plant can be justified by the determination of environmental parameters, allowing innovation for producing energy from a cassava wastewater treatment plant, and adding important findings to the energy industry.

Table 1: Comparison of the environmental parameters of hydrogen production via steam reforming from different types of fuels.

	Energetic efficiency	Pollution indicator	Ecological efficiency
Biogas from cassava wastewater (average values)	60.42%	10.11 $kgCO_2e/kgH_2$	93.37%
Ethanol steam	73%	21$kgCO_2e/kgH_2$	92.13%
Natural gas	71.78%	25.05$kgCO_2e/kgH_2$	91.63%
Biogas from manure cow	80%	15.43$kgCO_2e/kgH_2$	94.95%

Biography

Jonni Guiller Ferreira Madeira is a mathematician with a Master's degree in Nuclear Engineering. He is a researcher and teacher at the Federal Center for Technological Education Celso Suckow da Fonseca (CEFET-Angra dos Reis) and PhD student at Federal Rural University of Rio de Janeiro, both institutions are located in Brazil. His Researcher is related to mathematical modeling, nuclear energy, thermodynamics and biohydrogen. Its recent research is related to exergetic analysis, economic analysis and ecological analysis of the production of biohydrogen from cassava wastewater.

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Omar Aboelazayem et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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A comparative study on biodiesel production from waste cooking oils obtained from different sources using supercritical methanol

Omar Aboelazayem[1, 2], **Mamdouh Gadalla**[1] and **Basudeb Saha**[2]
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Biodiesel has been considered as a reasonable replacement fuel for petroleum diesel. It has many advantages over petroleum diesel including its biodegradability and non-toxicity. In addition, it provides free aromatics and sulphur combustion and it is a greener fuel with lower carbon monoxide and hydrocarbons emissions. However, biodiesel has lower heating value and it is relatively more expensive than petroleum diesel. In an attempt to reduce the cost of biodiesel, waste cooking oil (WCO) has been considered as a competitive feedstock. It also provides more sustainability for the produced biodiesel as it is a result of transformation of waste to greener source of energy. The main concern for using WCO as a feedstock for biodiesel production is the presence of high concentration of free fatty acids (FFA), which result in saponification reaction while using the conventional alkaline catalysed process. Saponification lowers the biodiesel yield by preventing the separation of biodiesel from the product. In this study, a non-catalytic method for biodiesel production from WCO using supercritical methanol has been investigated. Two different feedstocks with different FFA concentration have been examined. Response surface methodology (RSM) using Box Behnken Design (BBD) and Central Composite Design (CCD) has been employed to analyse the effect of different reaction variables including methanol to oil (M:O) molar ratio, temperature, pressure and time on biodiesel yield. Numerical optimization has been applied to determine the optimum conditions for maximum production of biodiesel for each feedstock. It has been concluded that the feedstock with higher FFA concentration produce higher biodiesel yield within the same reaction conditions. This result indicates the significance of using supercritical methanol technique for feedstocks with high FFA concentration as it enhances both esterification of FFA and transesterification of triglycerides (TG) to fatty acids methyl esters (FAME).

Biography

Omar Aboelazayem is a Teaching Assistant in the Chemical Engineering Department of The British University in Egypt (BUE) (2013-present). He received Bachelor of Science (Honours) (BSc) with Distinction from the BUE in Chemical Engineering (2013). He also earned a validated Bachelor of Engineering Honours degree (BEng) with Distinction in Chemical Engineering (2013) from London South Bank University (LSBU). He has enrolled in LSBU as a PhD student in February 2015. His research is focused on sustainable production of biodiesel from renewable sources. He has published more than 5 research papers from his Doctoral work.

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Notes:

MennatAllah M A Labib et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Mass and energy recovery from rice straw as a biomass resource

MennatAllah M A Labib[1], **Mohamed Hammam**[1], **Mamdouh A Gadalla**[1] and **Fatma H Ashour**[2]
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[2]Cairo University, Egypt

Statement of the Problem: Egypt is a country that faces major environmental issues; ranging from pollution of water bodies to the litter piling up in the streets to the severely polluted air. Egypt is facing an energy crisis because the energy consumption of oil has increased due to the increase in population, while the production has remained stagnant. One of the best ways to tackle this problem is to use renewable energy. The proposed solution that is capable of partially solving the air pollution, agricultural solid waste and energy crisis problems is the production of fuel from rice straw. The Dutch Avantium Technologies proposed using ethoxymethylfurfural (EMF) as a fuel which is produced from furfural. Furfural is a valuable chemical that has many uses in the fields of renewable energy, medicine, agriculture, paints and dyes, plastics and resins, solvents, and organic products.

Methodology & Theoretical Orientation: Six different factors with the potential to affect the furfural production were assessed using ANOVA. From this analysis the optimum operating conditions were evaluated. The reaction kinetics of the formation and subsequent degradation of furfural were determined experimentally. All tests and analyses carried out were done using standard methods.

Findings: Production of furfural by acid hydrolysis was found to be possible. Optimum operating conditions for furfural production from rice straw were experimentally determined using analysis of variance to ensure statistical significance. Reaction kinetics were determined to be used in the design of a reactor in a furfural production plant.

Conclusion & Significance: Furfural is emerging with increasing value in many fields. The ability to easily produce furfural from rice straw, which would otherwise end up as a solid waste cannot be overstated. This has the double advantage of reducing solid waste and creating a valuable product that can greatly impact the renewable energy sector.

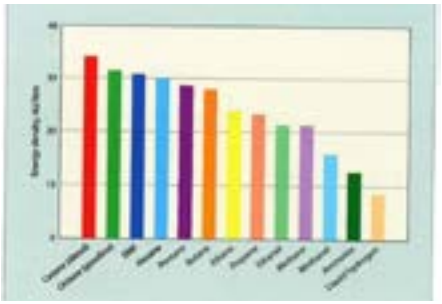

Figure 1: Fuel densities showing the advantage EMF has over traditional biofuels and its ability to compete with diesel and gasoline

Biography

MennatAllah M A Labib graduated as the valedictorian of her class with a BSc degree with Distinction (Honours) in Chemical Engineering (2013) from the British University in Egypt (BUE), specializing in Environmental Engineering. She earned also a validated BEng degree with Distinction with Honours in Chemical Engineering (2013) from London South Bank University (LSBU), also specializing in Environmental Engineering. She is preparing for MSc degree in Renewable Energy, Faculty of Engineering, BUE. She hopes to continue in the academic field and looks forward to continue research in the field of Environmental Engineering and Green Processes.

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Luma Sh. Al-Saadi et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Use of 4-dodecylbenzenesulfonic acid catalyst on the methanolysis of the rapeseed oil in meso-integral baffled reactor

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This study investigates the use of 4-dodecylbenzenesulphonic acid (DBSA) as a catalyst for fatty acid methyl ester (FAME) production from rapeseed oil, using a mesoscale oscillatory baffled reactor ("meso-OBR") as a screening platform. The effects of oscillatory mixing intensity, methanol-to-oil molar ratio, catalyst to oil molar ratio and residence time on the conversion to FAME were evaluated. The reaction conditions were optimised using the Design of Experiments (DoE) methodology. A Box-Behnken design with one block, three variables (methanol to oil molar ratio, catalyst to oil molar ratio and residence time) and three replicates of the central point was used. A response surface model was able to predict the FAME conversion over a broad range of operating conditions. ANOVA analysis revealed that the catalyst to oil molar ratio and residence time were more significant than the methanol to oil molar ratio. 100% conversion of rapeseed oil to FAME was achieved under mild reaction conditions 6.5:1 methanol to oil molar ratio, 0.48:1 of catalyst to oil molar ratio and 120min. The DBSA catalyst allowed operation at a significantly lower molar ratio than in conventional acid catalysis: below 7:1, as opposed to the 9:1 typically used with sulphuric acid. Furthermore, the degree of agitation required was greatly reduced, due to its behaviour as a surfactant. Only 180 min was required to accomplish the reaction compared with 19hr that for sulphuric acid. Finally, very little DBSA catalyst was required (0.18wt %), compared to sulphuric acid (0.5 wt. %), under the reaction conditions investigated here. The significant reductions in excess methanol and degree of agitation would significantly reduce operating costs, and the substantial reduction in reaction time would significantly reduce reactor size, and therefore capital cost.

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Eco-design of integrate system of drying and separating of olive residues in olive oil industry

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[2]Université Chouaib Doukkali, Morocco

Objective: The objective of this research is optimizing a process of recycling residues called olive cake (stones) for renewable energy use and Pomace for animal feed industry use. This study includes a drying and separation of solid residues from pulp and store final product for an expedition to recommended user. Drying will proceed continuously in parallel with the existing production process of olive oil. The olive tree has been present in the Mediterranean since the last glaciations. The olive oil industry generates a significant amount of residues that impact not only the country but the entire planet by mainly polluting the soil. Their recycling is still partial for technical and economic reasons. However, in the majority of cases, the cost factor limits the use of these resources. On the other hand, residues with a high humidity of 45 to 55% cannot be stored indefinitely or converted into energy without drying. This dehumidification requires a high energy consumption to reach levels between 10 and 15% to be a source of renewable energy.

Material: We used a sample for the experimentation of a mass of 1200 kg of the residues of olive oil brought to a humidity of 53% close to the maximum value which is of the order of 54%, this sample is under an ambient temperature of 20°C.

Discussions: Technical: With this experimentation, we prepared a rich medium with dry performance where about an average of 15.94% of liquid is removed from 1.2 kg of olive cake residues with a vacuum pump working at power of 120 W.

Perspectives: The subject of our innovation (research) concerns an innovative combination in order to make profitable and optimize the process of drying. It consists of a combination of drying by vacuum with option of drying by solar energy.

Tests	Volume removed water/liquid (ml)	Ratio % (/total weight) Removed
Experience 1	195	16,3
Experience 2	185	15,4
Experience 3	200	17,2
Experience 4	190	15
Experience 5	190	15,8
Moyenne	**190**	**15,94**
Ecart type	**7.9056615**	**0.8532988**

Table 1: result of the experimentation of the drying of olive oil residues by a vacuum system.

Biography

Abdellatif Lajdel has his expertise in mechanical construction of new plant. He is preparing for his PhD submission. He has a brevet (WO 2016/163866) on combined drying system of olive cake and has an experience in research, mechanical construction. He also has PMP certification from Mars 2012. He has experience in project management in industrial environment.

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Ramachandran Sivaramakrishnan et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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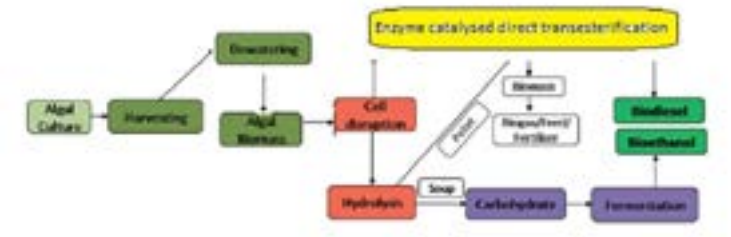
Biorefinery approach of microalgae feedstock for the production of bioethanol and biodiesel

Ramachandran Sivaramakrishnan and **Aran Incharoensakdi**
Chulalongkorn University, Thailand

The continued use of fossil fuels depletes the reserves; more than 75% of petroleum based fuels are burnt in the transportation sector. The utilization of global energy is expected to be increased in the future due to increased population and demand. Therefore, there is a need for alternative fuel, which is not only satisfying the need, but also solving the environmental problems. Microalgae feedstocks, a reliable biofuel source, have drawn much attention as an alternative and renewable. This is due to the microalgal species have the excellent photosynthetic efficiencies and the biomass reproducibility potential than any other terrestrial crops. In this study the integrated approach of ethanol and biodiesel production from algal biomass has been proposed. This integrated method is to develop the microalgae based biorefinery model. The present study focuses on the biorefinery approach of integrated production of bioethanol and biodiesel from microalgae feedstock. Various pretreatment methods were used to determine the maximum recovery of sugars from *Scenedesmus* sp. The total sugar yield of 84% was obtained when pretreated separately by acid hydrolysis. The hydrolysate produces 90% of ethanol (theoretical yield) after the fermentation. Enzyme catalyzed ultrasound assisted direct transesterification of biomass was performed and the maximum of 91% methyl ester yield, 2.6% glycerol carbonate and 5.6% glycerol dicarbonate was obtained. The integrated process of initial acid hydrolysis produces 84% of total sugar. The sugar extracted biomass was initiated with enzyme catalyzed direct transesterification with ultrasound irradiation. The obtained hydrolysate was further fermented with S. cerevisiae and at the optimized conditions of fermentation 90% of ethanol (theoretical yield) was obtained. The conditions of direct transesterification using enzyme were optimized and produces 89% of biodiesel yield with 2.1% glycerol carbonate and 4.9% glycerol dicarbonate. Thus, the microalgal biomass efficiently produces both ethanol and biodiesel as well glycerol carbonate, which could be the biorefinery model for sustainable future development.



Biography

Ramachandran Sivaramakrishnan has been working in the production of biofuels from microalgae. He is working as a Post-doctoral researcher in the Department of Biochemistry, Chulalongkorn University. His Doctoral studies were about methyl ester production from macroalgae using lipase catalyst. He has been awarded as Junior Research Fellow by Department of Science and Technology, India. He has published five research articles in international journals.

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6th World Congress on

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Video Presentation

Sitwat Aman et al., J Bioremediat Biodegrad 2017, 8:5(Suppl)
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Influence of temperature on lipid production and stress responses in yellow in dark mutants of *Chlamydomonas reinhardtii*

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Pakistan

Lack of control at high temperatures is one of the major environmental factors that has significant effects on the growth and lipid production of microalgae. Therefore, it is important to evaluate the effects of temperature on the growth and physiology of microalgae. We attempted to enhance the growth and total lipid production of three yellow in dark mutants of green microalgae *Chlamydomonas reinhardtii* under high temperature stress in view of their possible utilization as novel raw materials for biodiesel production. In the present study, effects of cultivation temperature (25 and 33 ˚C) on biomass and lipid productivity, carbohydrate, protein, chlorophyll and carotenoids content, detail Fatty Acid Methyl Ester (FAME) signature, and stress biomarkers like reactive oxygen species, anti-oxidant enzymes like catalase, ascorbate peroxidase and lipid peroxidation have been investigated. Results have revealed that all three mutant strains have strong negative correlation between biomass accumulation and lipid content. CC-4033 grew faster at 25˚C but CC-1171 grew faster at 33˚C among the three mutant strains while CC-1173 strain performed equally at both temperature points. The CC-4033 contained the highest lipid content while CC-1173 had lowest lipid content at 33˚C. In all three mutant strains C16:0, C18:1, C18:2, C18:3 were identified as the major FAMEs which are suitable to be used as biodiesel components. Stress biomarkers like reactive oxygen species (ROS), antioxidant enzymes like catalase and ascorbate peroxidase except lipid peroxidation were also low at 33˚C in the three mutant strains. Taken together our evidence supports that temperature which is a critical environmental factor can modulate the amount and composition of fatty acids. The CC-4033 strains should be considered as a potential mutant among all three mutants strains for exploration of new renewable energy.

Biography

Sitwat Aman has worked on microalgae during her Post-doc in China, where she tried to find out the best strains for biodiesel production. Nowadays, she is working as an Assistant Professor.

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