

Developments in Applied Phycology 7

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Algae and Environmental Sustainability

 Springer

Algae And Environmental Sustainability Developments In Applied Phycology

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Algae And Environmental Sustainability Developments In Applied Phycology:

Algae and Environmental Sustainability Bhaskar Singh, Kuldeep Baudhh, Faizal Bux, 2015-12-22 This book presents the dynamic role of algae in a sustainable environment Two major aspects namely bioenergy and bioremediation have been elaborated in various chapter contributed by scientists and teachers from different geographical areas throughout the world Algal biofuels is an emerging area of equal interest to researchers industries and policy makers working or focusing on alternative i e renewable fuels Algae have been an area of interest due to their wide range of applications Over the last 5 decades eukaryotic algae have been used in the aquaculture industry as feed for invertebrates providing a rich source of antioxidants dietary fiber minerals and protein More recently there has been a focus on the use of algal biomass in the development of alternative fuels The extraction of oil from algae has been widely explored as a much more viable feedstock than plant based oils in large scale fuel production using algae as feedstock has the advantages that it doesn t require arable land and that wastewater can be used as a source of nutrients in their culture The multifunctional approach of algae includes pollution remediation carbon sequestration biofuels production and delivery of value added products However there are still some obstacles that need to be overcome to make their use as potential feedstock for biofuels techno economically feasible In order to maintain the sustainability aspect of algal biofuels various aspects have to be studied and critically analyzed to assess the long term sustainability of algal derived biofuels This book discusses the role of algae as a promising future feedstock for biofuels They are known to sequester carbon in much larger amounts than plants and as such the book also describes their phycoremediation potential for conventional as well as emerging contaminants It describes the role of anaerobic digestion in algal biorefineries bioreactions and process parameters biogas recovery and reuse The role of algal biofilm based technology in wastewater treatment and transforming waste into bio products is discussed and remediation of sewage water through algae is assessed The book also describes the production of biohydrogen bio oil biodiesel and the major bottlenecks in their usage The emerging characterization techniques of these biofuels bio oil and biodiesel are described as are the decolorizing potential of algae and the genetic engineering techniques that could enhance the production of lipids in algae Other aspects of the book include the role of remote sensing technology in the monitoring of algae and a life cycle assessment of algal biofuels

Soil Fertility Management for Sustainable Development Deepak G. Panpatte, Yogeshvari K. Jhala, 2019-03-07 Soil fertility is the backbone of agricultural systems and plays a key role in determining food quantity and quality In recent decades soil fertility has decreased due to indiscriminate use of agrochemicals and nations around the globe are now facing the challenge of increasing food production while sustainably maintaining soil fertility Written by leading international scientists in the field this book explores soil fertility management strategies including agronomic microbiological and soil science based strategies Highlighting the practices that can be incorporated into organic farming and discussing recent advances it is a valuable resource for researchers wanting to

broaden their vision and the scope of their investigations

Sustainable Development of Algal Biofuels in the United States National Research Council, Division on Engineering and Physical Sciences, Board on Energy and Environmental Systems, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Committee on the Sustainable Development of Algal Biofuels, 2013-01-18 Biofuels made from algae are gaining attention as a domestic source of renewable fuel. However, with current technologies scaling up production of algal biofuels to meet even 5 percent of U.S. transportation fuel needs could create unsustainable demands for energy, water, and nutrient resources. Continued research and development could yield innovations to address these challenges, but determining if algal biofuel is a viable fuel alternative will involve comparing the environmental, economic, and social impacts of algal biofuel production and use to those associated with petroleum-based fuels and other fuel sources. Sustainable Development of Algal Biofuels was produced at the request of the U.S. Department of Energy.

Bioreactors Lakhveer Singh, Abu Yousuf, Durga Madhab Mahapatra, 2020-04-08 Bioreactors: Sustainable Design and Industrial Applications in Mitigation of GHG Emissions presents and compares the foundational concepts, state of the art design, and fabrication of bioreactors. Solidly based on theoretical fundamentals, the book examines various aspects of commercially available bioreactors, such as construction and fabrication, design, modeling, and simulation, development, operation, maintenance, management, and target applications for biofuels production and bio-waste management. Emerging issues in commercial feasibility are explored, constraints and pathways for upscaling, and techno-economic assessment are also covered. This book provides researchers and engineers in the biofuels and waste management sectors a clear, at-a-glance understanding of the actual potential of different advanced bioreactors for their requirements. It is a must-have reference for better-informed decisions when selecting the appropriate technology models for sustainable systems development and commercialization.

Waste to Wealth Reeta Rani Singhania, Rashmi Avinash Agarwal, R. Praveen Kumar, Rajeev K. Sukumaran, 2017-12-07 This book focuses on value addition to various waste streams which include industrial waste, agricultural waste, and municipal solid and liquid waste. It addresses the utilization of waste to generate valuable products such as electricity, fuel, fertilizers, and chemicals, while placing special emphasis on environmental concerns and presenting a multidisciplinary approach for handling waste. Including chapters authored by prominent national and international experts, the book will be of interest to researchers, professionals, and policymakers alike.

Fuels, Chemicals and Materials from the Oceans and Aquatic Sources Francesca M. Kerton, Ning Yan, 2017-06-26 Fuels, Chemicals and Materials from the Oceans and Aquatic Sources provides a holistic view of fuels, chemicals, and materials from renewable sources in the oceans and other aquatic media. It presents established and recent results regarding the use of water-based biomass, both plants and animals, for value-added applications beyond food. The book begins with an introductory chapter which provides an overview of ocean and aquatic sources for the production of chemicals and materials. Subsequent chapters focus on the use of various ocean bioresources and feedstocks, including microalgae, macroalgae, and waste from aquaculture.

and fishing industries including fish oils crustacean and mollusc shells Fuels Chemicals and Materials from the Oceans and Aquatic Sources serves as a valuable reference for academic and industrial professionals working on the production of chemicals materials and fuels from renewable feedstocks It will also prove useful for researchers in the fields of green and sustainable chemistry marine sciences and biotechnology Topics covered include Production and conversion of green macroalgae Marine macroalgal biomass as an energy feedstock Microalgae bioproduction Bioproduction and utilization of chitin and chitosan Applications of mollusc shells Crude fish oil as a potential fuel

Algal Biorefinery Sanjeet Mehariya, Bikash Kumar, Shashi Kant Bhatia, Obulisamy Parthiba Karthikeyan, 2025-03-21 Algal Biorefinery A Sustainable Solution for Environmental Applications focuses on algae s possibilities assets and functions as a renewable and sustainable resource that can act as an excellent alternative to withstand adverse environmental conditions to generate useful products Thus apart from helping reduce environmental pollution and the carbon footprint algae can help mitigate factors causing rapid climate change via concurrent bioremediation resource recovery and environmental sustainability This comprehensive book will examine dedicated state of the art information on the topic of how algae can act as a cushion against climate change It will also explain how algal based biorefineries can act as a potential solution to climate change lack of natural resources and environmental pollution Elucidates algal biorefinery as a sustainable solution for carbon emission reduction and fossil fuels alternatives Offers up to date information on algal based wastewater treatment and resource recovery to assist in climate change Provides flowcharts schematic diagrams and figures showing mechanisms and processes for the depiction of strategies for algal based technologies Examines the environmental impact assessment of existing and developing algal based technologies for future environmental sustainability

Biodiversity and Bioeconomy Kripal Singh, Milton Cezar Ribeiro, Ozgul Calicioglu, 2023-09-30 Biodiversity and Bioeconomy Status Quo Challenges and Opportunities comprehensively delivers the latest developments in theories of biodiversity and ecosystem functioning and their major implications for biodiversity conservation through diversifying agriculture forestry and biomass production systems and linking these developments with sustainability of bioeconomy This book provides basic understanding of biodiversity and bioeconomy different views of their interrelationship and their links with sustainable development goals It also examines the research and practice of biodiversity and ecosystem functioning in agriculture forestry and biomass production systems to achieve sustainable bioeconomy Finally this book examines status challenges and opportunities for biodiversity centered bioeconomy providing a way forward Examines the status of scientific understanding of biodiversity and bioeconomy and interrelatedness Describes challenges and opportunities for socioeconomic and ecologically sustainable development of bioeconomy Covers agriculture forestry and aquatic ecosystems and explores their biodiversity and bioeconomy potentials

Algal Bioreactors Eduardo Jacob-Lopes, Leila Queiroz Zepka, Mariany Costa Depira, 2024-11-21 Algal Bioreactors Science Engineering and Technology of Upstream Processes Volume One is part of a comprehensive two volume set that provides all

of the knowledge needed to design develop and operate algal bioreactors for the production of renewable resources Supported by critical parameters and properties mathematical models and calculations methods and practical real world case studies readers will find everything they need to know on the upstream and downstream processes of algal bioreactors for renewable resource production Bringing together renowned experts in microalgal biotechnology this book will help researchers scientists and engineers from academia and industry overcome barriers and advance the production of renewable resources and renewable energy from algae Students will also find invaluable explanations of the fundamentals and key principles of algal bioreactors making it an accessible read for students of engineering microbiology biochemistry biotechnology and environmental sciences Presents the physical biological environmental and economic parameters of upstream processes in the operation and development of algal bioreactors to produce renewable resources Explains the main configurations and designs of algal bioreactors presenting recent innovations and future trends Integrates the scientific engineering technology environmental and economic aspects of producing renewable resources and other valuable bioproducts using algal bioreactors Provides real world case studies at various scales to demonstrate the practical implementation of the various technologies and methods discussed

Microalgae for Environmental Biotechnology Pau Loke Show, Wai Siong Chai, Tau Chuan Ling, 2022-07-29 This is the first book to present the idea of using Industry 4.0 and smart manufacturing in the microalgae industry for environmental biotechnology It provides the latest developments on microalgae for use in environmental biotechnology explains process analysis from an engineering point of view and discusses the transition to smart manufacturing and how state of the art technologies can be incorporated It covers applications technologies challenges and future perspectives Showcases how Industry 4.0 can be applied in algae industry Covers new ideas generated from Industry 4.0 for Industrial Internet of Things IIoT Demonstrates new technologies invented to cater to Industry 4.0 in microalgae Features worked examples related to biological systems Aimed at chemical engineers bioengineers and environmental engineers this is an essential resource for researchers academics and industry professionals in the microalgae biotechnology field

[Handbook of Algal Technologies and Phytochemicals](#) Gokare Ravishankar, Ranga Rao Ambati, 2019-07-12 Key Features The most comprehensive resource available on the biodiversity of algal species their industrial production processes and their use for human consumption in food health and varied applications Emphasis on basic and applied research addressing aspects of scale up for commercial exploitation for the development of novel phytochemicals phytochemicals from algae Addresses the underexplored and underutilized potential of chemicals from marine sources for health benefits Each chapter written by expert contributors from around the world includes a Dictionary of Terms Key Facts Summary Points Figures and Tables as well as up to date references The second book in this two volume set explores phycoremediation applications and the sustainable use of algae for biofuels and other products of economic value It also looks at aspects such as macro and micro algal impact on marine ecosystem and remote sensing of algal blooms The

commercial value of chemicals of value to food and health is about 6 billion annually of which 30 percent relates to micro and macro algal metabolites and products for health food applications As a whole the two volumes explore the aspects of diversity of micro and macro algal forms their traditional uses their constituents which are of value for food feed specialty chemicals bioactive compounds for novel applications and bioenergy molecules Bio business and the market share of algae based products are also dealt with providing global perspectives

Microbial Applications for Environmental Sustainability Arun Karnwal, Abdel Rahman Mohammad Said Al-Tawaha, 2024-05-13 This book focuses on the various applications of microorganisms for sustainable environment and the reduction of hazardous pollutants released in various forms including xenobiotics e waste pesticides insecticides plastic heavy metals paper waste medical waste textile dyes and their impact on environmental and human health The book involves a series of research reports that explain the application of microbes used to solve real life issues raised due to changes happening in environment including pollution by covering applications including the use of bacteria fungi microalgae and biofilm in the detection and degradation of crude oil pesticides dyes e waste heavy metals and other pollutants It also focuses on integrative strategies in the application of microbial nanomaterials for remediation of pollutant This material will help environmental scientists and microbiologists to learn about existing environmental problems and suggest novel ways to control or contain their effects by employing various treatment approaches

Advances in Sustainable Applications of Microalgae José Carlos Magalhães Pires, Ana Filipa Cruz Esteves, Eva Margarida de Azevedo Campos Salgado, 2024-10-30 Advances in Sustainable Applications of Microalgae discusses different mechanisms used by microalgae to treat various gaseous streams wastewaters and pollution bioremediation In addition the advantages of the application of microalgal biomass in the agricultural and food feed sectors are presented and bioenergy from microalgae with a view to sustainability is explored The present covers the use of microalgal cultures in various applications such as the treatment of gaseous streams by removing various contaminants wastewater treatment through the removal of several pollutants biomass valorization for agriculture purposes bioenergy from microalgae and industrial integration of all these processes in a biorefinery concept Finally the book emphasizes the importance of gathering scientific knowledge to overcome drawbacks related to microalgal production and develops the concept of biorefinery based on microalgal biomass for a more sustainable future Presents recent advances and future trends in the microalgal field Provides an integrated point of view of the applications as a concept of biorefinery based on microalgal biomass for a more sustainable future Explores wastewater treatment heavy metals environmental contaminants and nutrient recovery in relation to microalgae cultivation Emphasizes sustainability aspects of microalgae cultivation and processing which provides an outlook on the integrated processes available that can enhance the biomass production and its environmental impact

Algal Biotechnology Nivedita Sahu, S. Sridhar, 2024-08-30 This book deals with an interdisciplinary approach towards present day practical challenges and recent developments in algal biotechnology and

covers a broad spectrum of issues ranging from diverse algae and its applications in agriculture human food animal feed wastewater treatment and industry to algal metabolites Major themes covered in this volume include algae based processes for the treatment of industrial effluents algal biorefinery industrial trends and applications of algae in food feed nutraceuticals and pharmaceuticals Features Explores the possibility of utilization of algae in human food and pharmaceutical compounds Presents recent state of the art of design and tools in algal biorefineries Reviews concepts of membrane bioreactors and microbial fuel cells including their process and performance Algae based technologies for safe and eco friendly processes to promote a sustainable bio economy Discusses algae as a source for potential aquafeed This book is aimed at graduate students and researchers in biotechnology bioenergy renewable energy energy fuel and petrochemicals wastewater novel technologies clean technologies bioremediation environmental biotechnology functional foods and nutraceuticals and marine and aquatic science

Sustainable Food Fortification Gaurav Sanghvi,Ashok Kumar Bishoyi,Sanket J. Joshi,Hesham A. El Enshasy,2025-11-01 This book addresses the pressing global challenge of malnutrition particularly the nutritional deficit impacting longevity It delves into the limitations of traditional methods such as supplements and crop fortification which often struggle with affordability and sustainability By focusing on biobased strategies the book highlights innovative biofortification techniques that enhance the nutritional value of functional foods using advanced technologies Each chapter explores diverse ecological sources ranging from aquatic and microbial to plant based that contribute to nutrient bioavailability Additionally the economic aspects of nutrient improvement across various food sources are thoroughly examined The book s unique holistic approach spans the entire food chain from crop production to consumption while emphasizing the role of technological advancements in boosting nutrient bioavailability This resource serves as a valuable guide for food science researchers policymakers and stakeholders equipping them with insights to accelerate the implementation of effective biofortification programs

Green Adsorbents to Remove Metals, Dyes and Boron from Polluted Water Inamuddin,Mohd Imran Ahamed,Eric Lichtfouse,Abdullah M. Asiri,2020-08-31 This book reviews adsorption techniques to clean wastewater with focus on pollution by dyes and heavy metals Advanced adsorbents include carbon nanomaterials biomass cellulose polymers clay composites and chelating materials

Algae Refinery Sanjeet Mehariya,Pradeep Verma,2023-12-18 *Algae Refinery Up and Downstream Processes* offers complete coverage of algae refinery including up and downstream processes while proposing an integrated algal refinery for the advancement of existing technologies and summarizing the strategies and future perspectives of algal refinery It provides a concise introduction to the algal science biology technology and application of algae It explains downstream and upstream steps of algal refinery for the production of algal biomass with several social benefits Features Provides various aspects of algal bioprocess including upstream and downstream processes Explains the major research streams of algae structures and their pathways Covers algal based CO₂ capture technology Explores the potential applications of algae for socioeconomical benefits Deliberates

algal bioremediation approach for clean and sustainable development **Algal Biorefineries in Circular Economy for Climate Change Resilience** Fayaz A. Malla, Suhaib A. Bandh, 2025-11-20 This book explores the multifaceted role of algae in addressing sustainable development circular economy practices and climate change mitigation issues The integration of flue gas for algal biofuel production and its contribution to sustainable energy solutions is included along with role of algae based biofertilizers in reduction of carbon footprints Other topics discussed include algae for biomass production and carbon sequestration algae based carbon credits production of bioplastics for climate resilient packaging and their integration into waste management Key features Covers algal biorefineries in circular economy and climate change mitigation Discusses the role of biogas and microplastics Provides insights into waste management strategies Reviews the role of biorefineries in the achievement of Net Zero Emission targets Explains government incentives regulations and the economic feasibility of implementing pertinent technologies This book is aimed at graduate students and researchers in biotechnology environmental sciences and climate change *Marine Greens* Sesan Abiodun Aransiola, Oluwafemi Adebayo Oyewole, Naga Raju Maddela, Udem Joshua Josiah Ijah, Bangeppagari Manjunatha, 2024-03-27 This book provides an in depth overview of marine greens and their environmental and biotechnological applications It addresses concepts such as the niche adaptation strategies of marine greens in their natural habitats as well as their global distribution and factors affecting their distribution and proliferation Marine greens are posited as an alternative to fossil fuels mitigating global climate change and thereby fostering future environmental sustainability In addition the book explains the remediation of xenobiotics wastewater microplastics marine debris and marine green contamination Expert authors from around the world explore the industrial and agricultural applications of marine greens in the production of enzymes and marine bioenergy and what is needed to improve its production potential This is important reading for government and non governmental organizations as well as industries and research institutions looking for ways to combat current industrial and environmental challenges Thematic Background Study – Genetic resources for farmed seaweeds Hurtado, A.Q., 2022-01-21 The increasing global population needs to source food from the ocean which is a much greater area than the land The ocean is rich with diversified flora and fauna and both are sources of proteins vitamins minerals phytohormones and bioactive compounds Thousands of species of macroalgae seaweed dominate the vegetation of the seafloor from the intertidal to the subtidal zone The domestication of several economically important seaweed such as *Saccharina* *Undaria* and *Pyropia* in China Japan and the Republic of Korea and *Kappaphycus* and *Eucheuma* in Indonesia Malaysia the Philippines and the United Republic of Tanzania led to the intensive commercial cultivation of these seaweeds Except for the United Republic of Tanzania the commercial farming of seaweed both temperate and tropical species is centred in Asia Despite the presence of several economically important seaweeds outside Asia commercial farming is practised only in a few of non Asian countries These include Chile for *Gracilaria* and *Macrocystis* Buschmann et al 2001 France for *Palmaria palmata* *Porphyra umbilicalis* and *Undaria pinnatifida* *Netalgae*

and Canada for *Saccharina latissima* in integrated multi trophic aquaculture IMTA Chopin et al 2013 and *Chondrus crispus* Trial cultivation of *Saccharina* spp and *P. palmata* is now taking place in Western Europe Seaweeds are farmed mainly for food such as sea vegetables and food ingredients Bixler and Porse 2011 as well as feed Wilke et al 2015 Norambuena et al 2015 However there is increasing interest in their use for biorefinery products that require a vast amount of biomass which must be farmed

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