

Production Of Ethanol From Sugarcane In Brazil From State Intervention To A Free Market Natural Resource Management And Policy

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Handbook of Bioenergy Economics and Policy: Volume II Madhu Khanna 2017-05-22 In its second volume, this book aims to link the academic research with development in the real world and provide a historical and institutional background that can enrich more formal research. The first section will include an assessment of the evolution and the state of the nascent second-generation biofuel as well as a perspective on the evolution of corn ethanol and sugarcane ethanol in Brazil. It will also include a historical and institutional background on the biofuel industry in Brazil that has global lessons, and later, provide a technical overview of major analytical tools used to assess the economic, land use and greenhouse gas implications of biofuel policies at a regional and global level. Additionally, the book analyzes the various drivers for land use change both at a micro-economic level and at a macro-economic level. It presents studies that apply regional and global economic models to examine the effects of biofuel policies in the US, EU and Brazil on regional and global land use, on food and fuel prices and greenhouse gas emissions. These papers illustrate the use of partial and general equilibrium modeling approaches to simulate the effects of various biofuel policies, and includes studies showing the effects of risk aversion, time preferences and liquidity constraints on farmers decision to grow energy crops for biofuel production. By presenting the tools of lifecycle analysis for assessing the direct greenhouse gas intensity of biofuels, this handbook investigates the types of indirect or market mediated effects that can offset or strengthen these direct effects. It will include tools to assess the direct and indirect effects of biofuel production on greenhouse gas emissions in the US and Brazil, and ultimately provide a comprehensive background to understand the state of biofuel in the present and how to analyze their implication.

Advances in Sugarcane Biorefinery Anuj Chandel 2017-12-14 Advances in Sugarcane Biorefinery: Technologies, Commercialization, Policy Issues and Paradigm Shift for Bioethanol and By-Products, by Chandel and Tomé, compiles the basic and applied information covering cane and biomass processing for sugar and ethanol production, as well as by-products utilization for improving the economy of sugarcane biorefineries. In this unique collection of 14 chapters, specialists in their field provide critical insights into several topics, review the current research, and discuss future progress in this research area. The book presents the most current advances in sugarcane biorefinery, including sugarcane crop cultivation, new sugarcane varieties, soil health, mechanization of crop, technical aspects of first and second generation ethanol production, economic analysis, life cycle assessment, biomass logistics and storage, co-generation of heat and electricity, process intensification and alternative by-products utilization. The book also explores the business ecosystem of sugarcane biorefineries, marketing analysis of ethanol demand and price dwindling patterns, aiming for a futuristic scenario. This book will be especially useful for scientists, researchers and technicians who are working in the area of biomass based biorefineries, as well as professionals in the sugar and alcohol industry. It also brings relevant content for policy makers, market analysts, agriculture scientists and managers. Presents technological updates on biomass processing, system biology, microbial fermentation, catalysis, regeneration and monitoring of renewable energy and recovery processes Includes topics on techno-economic analysis, life cycle assessment, sustainability, markets and policy Explores the future potential of biorefineries with zero or near zero waste, and the potential of valorization of all by-products, including alternatives to current applications and the management of a large amount of residues

The Role of Sugar Cane in Brazil's History and Economy Plinio Mario Nastari 1983

Expansion of the SugarCane Plantation in Brazil for Ethanol Production Elio Ferrato 2017-07

Advances of Basic Science for Second Generation Bioethanol from Sugarcane Marcos S. Buckeridge 2017-03-10 This book focuses on the basic science recently produced in Brazil for the improvement of sugarcane as a bioenergy crop and as a raw material for 2nd generation bioethanol production. It reports achievements that have been advancing the science of cell walls, enzymes, genetics, and sustainability related to sugarcane technologies and give continuity to the research reported in the "Routes to Cellulosic Ethanol", from Springer. The Introduction (Chapter I) explains how the National Institute of Science and Technology of Bioethanol, founded in 2008 in Brazil, became part of the main international initiatives that started to search for forms to use biomass for bioethanol production in Brazil, US and Europe. Part I reports the advances in plant cell wall composition, structure and architecture, and physical characteristics of sugarcane biomass. These discoveries are opening the way to increased efficiency of pretreatments and hydrolysis, being therefore important information for 2nd generation processes as well as for biorefinery initiatives. Part II focuses on the discovery and characterization of hydrolases from microorganisms that could be used in industrial processes. Recent advances in the search for hydrolases using metagenomics is reported. A great number of genes and enzymes from microorganisms have been discovered, affording improvement of enzyme cocktails better adapted to sugarcane biomass. Part III reports two key issues in the process of 2G ethanol, pentose fermentation and sugarcane genetics. These are the discoveries of new yeast species capable of producing ethanol more efficiently from xylose and the advances made on the sugarcane genetics, a key issue to design varieties adapted to 2G ethanol production. Part IV approaches sustainability through two chapters, one discussing the sustainability of the sugarcane agricultural and environmental system and another discussing how national and mainly international policies of Brazil regarding 2G ethanol production affected the country's strategies to establish itself as an international player in renewable energy area.

The Brazilian Experience with Sugarcane and the New Perspectives for the Use of it as an Exportable Energy Jaime Rotstein 1984

Sugarcane Biorefinery, Technology and Perspectives Fernando Santos 2019-11-21 Sugarcane Biorefinery, Technology and Perspectives provides the reader with a current view of the global scenario of sugarcane biorefinery, launching a new expectation on this important crop from a chemical, energy and sustainability point-of-view. The book explores the existing biorefinery platforms that can be used to convert sugarcane to new high value added products. It also addresses one of today's most controversial issues involving energy cane, in addition to the dilemma "sugar cane vs. food vs. the environment", adding even more value in a culture that is already a symbol of case study around the world. Focusing on the chemical composition of sugarcane, and the production and processes that optimize it for either agricultural or energy use, the book is designed to provide practical insights for current application and inspire the further exploration of options for balancing food and fuel demands. Presents the productive chain of sugarcane and its implications on food production and the environment Includes discussions on the evolution of

the sustainable development of the sugar-energy sector Contextualizes and premises for the technological road mapping of energy-cane Provides information on new technologies in the sugar-energy sector

Ethanol, Renewable Fuel for Brazil Enio Roque de Oliveira 1979

Production of Ethanol from Sugarcane in Brazil Márcia Azanha Ferraz Dias de Moraes 2014-03-31 The success of Brazil in the large-scale production and use of fuel ethanol has been widely discussed and analyzed by other countries interested in adopting policies designed to encourage the use of biofuels. Within this context, certain questions arise: Could the Brazilian experience be replicated in other countries? What were the conditions that enabled the creation of the Brazilian Proálcool (National Ethanol Program) and what lessons can be learned? To examine these issues, it is important to understand the functioning of the key, interconnected markets (those for sugarcane, sugar and ethanol), which, from their inception, were the objects of extensive government intervention until 1999. Two main conditions enabled the creation of Proálcool: robust production of sugarcane and sugar (tightly regulated by the government, which applied the numerous regulations then in place); and the military regime that was in place at the time, whose decision-making and enforcement powers were quite broad, facilitating the carrying out of the necessary actions, as well as making it easier to coordinate the activities of the various stakeholders and sectors involved. This book increases understanding of the functioning of the sugarcane supply chain in Brazil, not only during the phase of government intervention but also in recent years (in the free-market environment). The lessons, positive and negative, gleaned from the Brazilian experience can contribute to reflection on and the development of alternative modalities of biofuel production in other countries, making the book of interest to scholars and policy-makers concerned with biofuel and renewable resources as well as economic development.

Expected Growth of Sugarcane Industry and Impact on the Brazilian Economy Cinthia Cabral da Costa 2014 The sugarcane sector in Brazil has been achieving large increases in production since the beginning of the 2000s, owing to the deregulation of its two main products: sugar and ethanol. This growth has been driven more by the ethanol production, which grew at a rate of 13% per annum (between 2000 and 2009), than by sugar, which grew at an annual rate of 8% over the same period. Nevertheless, instability in the supply of ethanol is still a problem in the industry. Structural changes, such as the mechanization of sugarcane harvesting, are also in progress. Taking into account the future demands for sugar and ethanol and structural changes in projections, made by industry representatives for the years 2015 and 2020, this article employs input-output analysis to estimate the impact of these projections on the Brazilian economy. The results show that in 2010, with a production of R\$ 66.6 billion for sugar and R\$ 36.2 billion for ethanol (at 2010 prices), the total impact on the economy was about R\$ 374.6 billion in Total Output (TO), R\$ 210 billion in the Gross Domestic Product (GDP), R\$ 62.4 billion in remuneration to employees, and a gain of 5.1 million jobs, per annum. For 2015, the estimated economic impact on TO, GDP and employee earnings was 56% higher than the values for 2010. As for 2020, the projections showed that the increases were in the range from 109 to 117% in scenario 1, or 91 to 98% in scenario 2. For job numbers, the impact in 2015 was 48% higher than that reported for 2010, while in 2020 it was between 82 to 99% higher. It was also observed that the income effect of the shocks in the ethanol and sugar sectors was the most significant part of the predicted impact on the number of jobs created in the economy. The results showed, therefore, the importance of the sugarcane industry in the economy, emphasizing the need for government policies to foster the growth of this sector.

Sugarcane Fernando Santos 2015-05-16 Sugarcane: Agricultural Production, Bioenergy and Ethanol explores this vital source for "green" biofuel from the breeding and care of the plant all the way through to its effective and efficient transformation into bioenergy. The book explores sugarcane's 40 year history as a fuel for cars, along with its impressive leaps in production and productivity that have created a robust global market. In addition, new prospects for the future are discussed as promising applications in agroenergy, whether for biofuels or bioelectricity, or for bagasse pellets as an alternative to firewood for home heating purposes are explored. Experts from around the world address these topics in this timely book as global warming continues to represent a major concern for both crop and green energy production. Focuses on sugarcane production and processing for bioenergy Provides a holistic approach to sugarcane's potential – from the successful growth and harvest of the plant to the end-use product Presents important information for "green energy" options

Techno-economic Analysis for Production of Sugarcane Cellulosic Ethanol in Brazil Tiago De Assis 2016

Sustainable Sugarcane Production Priyanka Singh 2018-03-21 The sugarcane crop, one of the most important crops commercially grown in about 115 countries of the world, faces a number of problems, such as low cane productivity, biotic and abiotic stresses, high cost of cultivation, postharvest losses, and low sugar recovery. This volume addresses these issues and provides a comprehensive account of the major advancements in sugarcane research. The book is compilation of recent achievements in sugarcane development and cultivation. It covers a number of improvements made in cane and sugar yield using both conventional and new biotechnological approaches by agricultural scientists and researchers. The comprehensive coverage includes sustainable sugarcane cultivation, development, and management of sugarcane production, covering farming and biotechnology, entomology, pathology, breeding, physiology, biotechnology, agronomy, seed production, and more. It also presents research on modern crop production methods in a comprehensive and easily understood manner. With chapters from expert researchers from internationally renowned institutes (primarily in India), the volume presents the latest information from the literature at the international level to make it usable to many agroecological regions of the world. It will be a valuable resource for agronomists, breeders, plant physiologists, farmers, and students of agricultural sciences.

How a Change in Brazil's Sugar Policies Would Affect the World Sugar Market

Colombia Jose Toasa 2010-01 Colombia's sugarcane-based ethanol industry, after operating for only 3 years, is the second most developed in the Western Hemisphere. Most Colombian ethanol plants are energy self-sufficient and even generate surplus power that is sold to the national electric grid. Colombia's sugarcane-based ethanol production is increasing; proposed expansion projects have the potential to more than triple daily production from 277,000 gallons in 2007 to almost 1 million gallons in 2010. Most of the expansion is intended for exports, principally to the U.S. However, it is unlikely that Colombia could export ethanol anytime soon because domestic production is insufficient to meet nationwide requirements that gasoline contain a 10% ethanol blend. Maps.

Green Business in Brazil Keila Marques Barbosa 2010 Globally green business has witnessed tremendous growth and is seen as an alternative to fossil fuel and a solution to global climate change. Among the green businesses, biofuel industry has witnessed a tremendous growth globally. Brazil is the leading producer of ethanol at 27 billion sugarcane based liters in 2009. This report discusses the history of ethanol in Brazil by considering the role played by the government in making the ethanol program successful; the challenges and impact faced by sugarcane ethanol; and the future sustainability of sugar and ethanol. Ever since the spike in oil prices globally and the increasing concern about carbon emissions and global climate change, Brazil has pursued a policy of promoting international climate change commitments. The blossoming of the ethanol industry can be traced to a number of public policy initiatives. The initiatives taken by the Brazilian government to enhance the productivity of sugarcane cultivation through large investment in R&D is one crucial factor. The enhanced production of ethanol was accompanied by the initial development of a vehicle operating purely on ethanol in the 1980s, as well as the revolutionary introduction of Flexible-Fuel Vehicles (FFVs), which are capable of running on gasoline and ethanol or at any blending rates of both fuels. FFVs to a large extent have contributed to the development and sustenance of the biofuel industry in Brazil. However, many analysts have cast doubt about the sustainability of the Brazilian ethanol program as the government has recently suggested lowering the current ethanol-to-gasoline blending rate for fuel in Brazil from 25 to 20 percent. The system seems to be facing a need for changes through better planning and consideration for internal consumers. If ethanol prices continue to rise due to demand-supply unbalances, carbon emission targets could be impacted due to potential switching to gasoline. Studies have indicated that when ethanol prices are above the 70 percent ceiling price of gasoline, then consumers will switch to gasoline.

The Sugarcane Complex in Brazil Felix Kaup 2015-03-28 This book offers an in-depth analysis of the Brazilian sugarcane complex with a special

focus on technological advances that promote sustainable development. It first examines the question why sugarcane-based ethanol from Brazil is considered a superior alternative to fossil fuel compared to other biofuels produced on an industrial scale and subsequently analyzes the most dynamic areas within the sugarcane sector with regard to relevant actors, technologies and markets in order to determine if the sector can be considered an innovation system. The empirical research presented here is based on multiple research methods and derives its data from interviews with Brazilian experts of the sugarcane sector and by a thorough literature review. The book will be of special interest to researchers and practitioners interested in understanding the key mechanisms in successful innovation systems that promote a transition towards sustainable development and mobility.

A Mixed-methods Analysis of Biofuels Teresa Cristina Garcia 2020 Brazil has the largest sugarcane acreage in the world (FAOSTAT, 2020) and is the world leader in the production of sugarcane-based ethanol (Sousa Junior et al., 2017). Due to the technical experience in the production of biofuels and the availability of sugarcane straw and bagasse, the country has a great potential to commercially produce second-generation ethanol (E2G) (Nyko et al., 2010). In 2017, Brazil enacted a new National Biofuels Policy, called *RenovaBio*, to expand the production and use of biofuels in the country. This dissertation combines three essays that explore biofuels law and policy with a special focus on Brazil. The first essay analyzed biofuel policy uncertainty, which is one of the main issues impeding the development of biofuels globally (Tyner, 2010).

Specifically, the essay systematically reviewed select public policy literature that addresses biofuel policy uncertainty, as it appears in peer-reviewed scholarly journals between 2008 and 2018 in English and in Portuguese. The 33 journal articles identified in this literature review share a common thread in that they all engage, to varying degrees, the ways that uncertainty affects biofuels. I have found that, even though biofuel policy uncertainty has increasingly been given more attention by researchers in recent years, the focus of their analyses is on the U.S., Germany, and Canada. Thus, it is suggested that more research on biofuel policy uncertainty is needed in important countries for biofuel production. The second essay analyzed the ethanol law and policy in Brazil, and the policy-making process *RenovaBio*, through the lenses of the Multiple Streams Framework (MSF) developed by John Kingdon (2011). The factors, events, and policy actors at play in the policymaking process of *RenovaBio* were investigated through the use of primary and secondary sources of data comprised mainly of legal and government documents, books, journal articles, and survey data collected for this study. The separate examination of the problem, policy, and political streams within Kingdon's MSF provided a useful framework for reconstructing the conditions for the enactment of *RenovaBio*. The last essay examined the current situation of second-generation ethanol (E2G) in Brazil to assess consumers' willingness to pay (WTP) for E2G. A survey was conducted with consumers in 24 Brazilian states to collect data on consumers' WTP for E2G, driving patterns, knowledge about biofuels, acceptance of relevant government policies in the biofuels sector, and demographic characteristics. A dichotomous-choice contingent valuation methodology was used to estimate WTP for E2G and investigate factors that affect consumer choice. The findings indicated that, on average, Brazilian consumers are willing to purchase E2G at an 11 percent premium price compared to conventional fuel. In addition, results suggested that consumers who are generally more knowledgeable about biofuels and have a higher income are more likely to pay a premium for E2G.

Land Change Dynamics in the Brazilian Cerrado Gabriel Granco 2017 Biofuel ethanol has been proposed as the most viable solution to mitigate greenhouse gas emissions (GHG) from the transportation sector; however, the impact of such production on the environment is not completely known. Environmental impacts are of more concern when ethanol production occurs in areas of high biodiversity value such as the Cerrado (Brazilian savanna). The Cerrado is a global biodiversity hotspot and an important breadbasket--at the same time, it is on a path to becoming the major sugarcane ethanol-producing region in Brazil. The main goal of this dissertation is to examine the impacts of sugarcane expansion on farmers' land use decision processes in the Cerrado and to consider its consequences on biodiversity and the impacts of climate change. In the following chapters, land change dynamics are investigated using a combination of theory and methods from geography, GIScience, economics, and ecology. Chapter 2 presents an examination of the drivers for the sugarcane expansion. The findings suggest that the Cerrado attracted mills because of the good agricultural conditions, affordable land prices, and favorable state-level fiscal incentive policies, while factors that have prevented traditional sugarcane-producing regions from meeting the increasing demand for ethanol. Chapter 3 develops a procedure to identify intensification and extensification responses at the field level. The main finding is that extensification is the main response. Additionally, this response has a higher probability of occurrence the farther an area is from a mill. Chapter 4 applies the partial adjustment framework to understand farmers' land use decisions regarding sugarcane production. Estimates found that price of cattle have the largest cross-price elasticity with sugarcane acreage. In addition, the results suggest that acreage of sugarcane and soybean double-crop are positively correlated. Chapter 5 focuses on the impacts of climate change on land suitability for sugarcane and amphibian species. The findings show that land suitability for sugarcane is vulnerable to climate change and that the Brazilian zoning policy for sugarcane is not addressing this issue.

Additionally, amphibians are affected by climate change and conflict with areas suitable for sugarcane in climate change scenarios.

Fuel Ethanol Production from Sugarcane Thalita Peixoto Basso 2019 This book offers a broad understanding of bioethanol production from sugarcane, although a few other substrates, except corn, will also be mentioned. The 10 chapters are grouped in five sections. The *Fuel Ethanol Production from Sugarcane in Brazil* section consists of two chapters dealing with the first-generation ethanol Brazilian industrial process. The *Strategies for Sugarcane Bagasse Pretreatment* section deals with emerging physicochemical methods for biomass pretreatment, and the non-conventional biomass source for lignocellulosic ethanol production addresses the potential of weed biomass as alternative feedstock. In the *Recent Approaches for Increasing Fermentation Efficiency of Lignocellulosic Ethanol* section, potential and research progress using thermophile bacteria and yeasts is presented, taking advantage of microorganisms involved in consolidating or simultaneous hydrolysis and fermentation processes. Finally, the *Recent Advances in Ethanol Fermentation* section presents the use of cold plasma and hydrostatic pressure to increase ethanol production efficiency. Also in this section the use of metabolic-engineered autotrophic cyanobacteria to produce ethanol from carbon dioxide is mentioned.

Sugarcane ethanol Peter Zuurbier 2008-11-07 Climate change is a challenge facing human life. It will change mobility and asks for new energy solutions. Bioenergy has gained increased attention as an alternative to fossil fuels. Energy based on renewable sources may offer part of the solution. Bio ethanol based on sugar cane offers advantages to people, the environment and the economy. Not surprisingly, governments currently enact powerful incentives for the development and exploitation of bio ethanol. However, every inch we come closer to this achievement, evokes more scepticism. Many questions are raised relating to whether sugar cane is really a sustainable solution. Still much is unknown about the net release of carbon dioxide and what the impacts of sugar cane expansion are on green house gas emissions. This book looks at the scientific base of the debate on sugar cane bio ethanol. Authors from Europe, Brazil and the USA capture many aspects of what is known and address assumptions while not denying that still much is unknown. It covers impacts on climate change, land use, sustainability and market demands. This publication discusses public policy impacts, technology developments, the fuel-food dilemma and the millennium development goals. This makes this publication unique and extremely relevant for policymakers, scientists and the private energy sector worldwide.

How a Change in Brazil's Sugar Policies Would Affect the World Sugar Market Brent Borrell 1991 By changing its policy, Brazil could increase its sugar exports greatly. The world price would decline, but Brazil's sugar revenues would increase.

Food and Fuel Marcos Fava Neves 2011-09-25 This book is a contribution of the authors to the food - fuel debate. During 2007 and 2008 several factors led to the food inflation problem: growing population, income distribution, urbanization, biofuel, social programs, production scarcity etc.. Biofuel got most of the blame for food inflation but its responsibility was only limited. There are several possibilities of solving the food inflation problem that are discussed this book. It explores the example of Brazil's agricultural sector, where a quiet revolution occurred in the last 15 years. This development is leading to Brazil becoming one of the largest food exporters globally. This position will strengthen as an additional 100 million hectares becomes available for crop development. The second part of the book explores the basics of the sugar cane chain. Sugar cane occupies less than 2% of Brazilian arable land and supplies 50% of Brazilian car fuel. In 2010 Brazil produced 53% of the world's sugar.

Sugar cane produces sugar, ethanol (used as car fuel), biogases that are used to co-generate electricity and other by-products. Biofuel is a booming industry. New technologies allow production of diesel and other fuels from cane. Sugar cane ethanol is the only renewable fuel that can currently compete with gasoline. Coca Cola just launched the plastic bottle with sugar cane plastic. This book helps us to understand Brazilian agribusiness and sugar cane economics from various perspectives e.g. international investments, sustainability, future trends and the strategic plan for the Brazilian industry.

Performance of Brazilian Biofuels 2007

Towards the Production of Second Generation Ethanol from Sugarcane Bagasse in Brazil T.P. Basso 2013 Towards the Production of Second Generation Ethanol from Sugarcane Bagasse in Brazil.

Sugarcane Biofuels Muhammad Tahir Khan 2019-06-29 Sugarcane exhibits all the major characteristics of a promising bioenergy crop including high biomass yield, C4 photosynthetic system, perennial nature, and ratooning ability. Being the largest agricultural commodity of the world with respect to total production, sugarcane biomass is abundantly available. Brazil has already become a sugarcane biofuels centered economy while Thailand, Colombia, and South Africa are also significantly exploiting this energy source. Other major cane producers include India, China, Pakistan, Mexico, Australia, Indonesia, and the United States. It has been projected that sugarcane biofuels will be playing extremely important role in world's energy matrix in recent future. This book analyzes the significance, applications, achievements, and future avenues of biofuels and bioenergy production from sugarcane, in top cane growing countries around the globe. Moreover, we also evaluate the barriers and areas of improvement for targeting efficient, sustainable, and cost-effective biofuels from sugarcane to meet the world's energy needs and combat the climate change.

Brazil's Ethanol Industry: Looking Forward

Energy, Bio Fuels and Development Edmund Amann 2011-03-07 This collection examines the important and topical issue of the economic, social and environmental implications of concerted attempts to diversify energy sources away from fossil fuels. The book expertly examines this issue by focussing on the contrasting experiences of two major economies; one developed, and the other a rapidly expanding, emerging market. Energy, Bio Fuels and Development evaluates the experience of Brazil, with elements of that of the US highlighted for the purpose of comparison. A key area of concern surrounds the causes and consequences of the contrasting routes to biofuel production represented by sugar cane (in Brazil) and corn (in the US). The book also places the recent biofuels drive in perspective by discussing the broader energy policy context. The book shows the complexity and interdependence of the issues involved in moving a society reliant on non-renewable energy sources to one based on alternative sources of energy. The key conclusion to emerge is that Brazil, in pursuing a flexible mix of fossil fuels and bio-fuels, has greatly diminished its exposure to exogenous energy shocks. The US experience – in particular its development of corn-based ethanol – has been more problematic, though by no means without successes. It is argued that bio fuels should not be seen as a panacea. There are clear limits to the efficiency and cost effectiveness of current biofuel production technologies while there remain concerns surrounding potentially adverse effects on food production and rural livelihoods. This book should be an excellent resource for students focussing on economic development, particularly in the areas of energy, biofuels, rural development and food supply.

Bittersweet Development Travis Scott High 2007

Sugarcane Bioenergy for Sustainable Development Luis A. B. Cortez 2018-10-25 In recent years, there has been a rapid expansion of the growing of crops for use in bioenergy production rather than for food. This has been particularly the case for sugarcane in Latin America and Africa. This book examines the further potential in the context of the food versus fuel debate, and as a strategy for sustainable development. Detailed case studies of two countries, Colombia and Mozambique, are presented. These address the key issues such as the balance between food security and energy security, rural and land development policies, and feasibility and production models for expanding bioenergy. The authors then assess these issues in the context of broader sustainable development strategies, including implications for economics, employment generation, and the environment. The book will be of great interest to researchers and professionals in energy and agricultural development.

Global Economic and Environmental Aspects of Biofuels David Pimentel 2012-04-02 Biofuels and food are dependent on the same resources for production: land, water, and energy. The conjuncture of food, energy, and climate crises demands a new direction in how to harness agriculture to the joint tasks of energy-saving, emissions reduction, and food security. Global Economic and Environmental Aspects of Biofuels focuses on the all-important question of the efficacy of biofuels as a solution to the global energy problem. Written by a distinguished team from five countries and multiple disciplines including agronomy, petroleum engineering, ecology, and meteorology, the book addresses the use of biofuels produced from crops and various organic materials as alternatives or supplements to petroleum. Key Features Discusses biofuels within the context of the world population problem, food, malnutrition, resource depletion, and climate change Asks the critical question whether the production of ethanol from corn, sugar cane, crop residues, and other organic materials has proven too costly in both economic and environmental terms Analyzes the uses and interdependencies among land, water, and fossil energy resources in food versus biofuel production Includes case studies on the economic and environmental impacts of biofuel production and use from the United States, Europe, Brazil, and tropical environments Explores the future production of biodiesel and ethanol from salt-water algae and tropical palms, while recognizing the technological problems that must be resolved in processing these materials This book examines key environmental and economic issues associated with the production of ethanol as a fuel, from corn, sugar cane, crop residues, and other organic materials. It brings together the opinions of a number of U.S. scientists and experts from Spain, Italy, the United Kingdom, and Brazil, and highlights the remarkable agreement among the contributors on the pros and cons of biofuels as an answer to future petroleum shortages. This mix of contributors and opinions presents a well-rounded view of the subject that puts a spotlight on unresolved concerns and complexities that are often overlooked.

Sugarcane-based Biofuels and Bioproducts Ian O'Hara 2016-05-16 Sugarcane has garnered much interest for its potential as a viable renewable energy crop. While the use of sugar juice for ethanol production has been in practice for years, a new focus on using the fibrous co-product known as bagasse for producing renewable fuels and bio-based chemicals is growing in interest. The success of these efforts, and the development of new varieties of energy canes, could greatly increase the use of sugarcane and sugarcane biomass for fuels while enhancing industry sustainability and competitiveness. Sugarcane-Based Biofuels and Bioproducts examines the development of a suite of established and developing biofuels and other renewable products derived from sugarcane and sugarcane-based co-products, such as bagasse. Chapters provide broad-ranging coverage of sugarcane biology, biotechnological advances, and breakthroughs in production and processing techniques. This text brings together essential information regarding the development and utilization of new fuels and bioproducts derived from sugarcane. Authored by experts in the field, Sugarcane-Based Biofuels and Bioproducts is an invaluable resource for researchers studying biofuels, sugarcane, and plant biotechnology as well as sugar and biofuels industry personnel.

Fuel Ethanol Production from Sugarcane Thalita Peixoto Basso 2019-01-23 This book offers a broad understanding of bioethanol production from sugarcane, although a few other substrates, except corn, will also be mentioned. The 10 chapters are grouped in five sections. The Fuel Ethanol Production from Sugarcane in Brazil section consists of two chapters dealing with the first-generation ethanol Brazilian industrial process. The Strategies for Sugarcane Bagasse Pretreatment section deals with emerging physicochemical methods for biomass pretreatment, and the non-conventional biomass source for lignocellulosic ethanol production addresses the potential of weed biomass as alternative feedstock. In the Recent Approaches for Increasing Fermentation Efficiency of Lignocellulosic Ethanol section, potential and research progress using thermophile bacteria and yeasts is presented, taking advantage of microorganisms involved in consolidating or simultaneous hydrolysis and fermentation processes. Finally, the Recent Advances in Ethanol Fermentation section presents the use of cold plasma and hydrostatic pressure to increase ethanol production efficiency. Also in this section the use of metabolic-engineered autotrophic cyanobacteria to produce

ethanol from carbon dioxide is mentioned.

Compendium of Bioenergy Plants Eric Lam 2016-01-05 This volume of the Bioenergy Plants compendium contains a collection of chapters that focus on the history, economics, and practical sciences related to sugarcane. As one of the key biofuel crops in the world that is under large-scale cultivation, sugarcane is attracting interests for its adoption and emulation worldwide. With a high ratio of energy

Biofuels in Brazil Silvio Silvério da Silva 2014-04-02 This book discusses the commercialization of biofuels and the Brazilian government policies for the promotion of renewable energy program in Brazil, which could be a learning module for several countries for implementing biofuels policy to improve their socioeconomic status and make them energy independent. Researchers in academia and industries, policy makers, and economic analysts will be assisted by important source of information in their ongoing research and future perspectives. This book will benefit graduate and postgraduate students of chemical and biochemical engineering, forestry, microbiology, biochemistry, biotechnology, applied chemistry, environmental science, sustainable energy, and biotech business disciplines by signifying the applied aspects of bioenergy production from various natural sources and their implications. Graduate and postgraduate students as well as postdoctoral researchers will find clear concepts of feedstock analysis, feedstock degradation, microbial fermentation, genetic engineering, renewable energy generation and storage, climate changes, and techno-economic analysis of biofuels production technologies.

The Dynamics of Perennial Crop Production and Processing Daniel Trevellan Tregeagle 2005 Perennial crops are plants, used in agriculture, that can be harvested multiple times before replanting. They are beneficial in a variety of ways, producing food and fuel, and providing agronomic, environmental, and cultural benefits. Economic analysis of the production of perennials is complicated by the long life of these crops, and by the changing pattern of productivity over the crop's lifespan. This dissertation contains three studies looking at the implications of these two facts on perennial crop production and processing. The first chapter introduces perennial crops and the history of agricultural economists' attempts to study these issues. Chapters 2 and 3 analyze perennial crop production and processing in the context of biofuel production in Brazil. Chapter 4 presents the foundation of a unifying framework that can overcome limitations in the proceeding two chapters. Brazilian sugarcane production growth, being a key feedstock to sugar and ethanol production, exhibited a puzzling slow-down in the decade starting in 2010. In chapter 2 I investigate a noted, but unexplored, mechanism to explain this slow-down: the link between credit availability, sugarcane replanting, and sugarcane yield. Using secondary sources, I establish the plausibility of the conjecture that credit restrictions affected sugarcane farmer replanting decisions. To establish the link between replanting and yield, I develop a formal model to analyze the dynamics of yield after a change in the replant rate. I test this model econometrically using data from the South-Central region of Brazil, finding evidence mostly consistent with the model. The model is able to explain around one third of the variation in sugarcane yields, implying that, while this channel is important, it alone cannot explain the production slow-down. Perennial crop field-biorefinery supply chains are necessary in the production of many agricultural products. In particular, the low-cost production of low-carbon biofuels, such as ethanol from sugarcane or cellulosic feedstocks, relies on minimizing the costs of production along a perennial crop field-biorefinery supply chain. In chapter 3 I develop and analyze an unexplored mechanism to reduce perennial crop field-biorefinery supply chain costs: adjusting the age-structure, and hence yield, of the perennial feedstock. I present comparative statics of this model, finding that smaller biorefineries are most likely to benefit from age-structure endogenization. However, the results from a simulation of this model, calibrated to the sugarcane ethanol industry in the South-Central region of Brazil and comparing the cost-minimizing to the yield-maximizing age-structure, show that the cost-reductions from endogenization are small in this case (less than 1 percent cost reduction). Generally, the magnitude of the cost-reduction will depend on the growing pattern of the crop, the costs of growing and transporting the feedstock, and the reference age-structure. In chapter 4 I adapt the theoretical framework of \cite{Mitra1991} to a two-age-class, finite horizon model, recasting their growth theoretic model into a form better suited for policy analysis. After introducing a simplified version of the model, and its general case, I determine necessary conditions on key parameters (relative productivity of mature trees, opportunity cost of land, and farmer patience) for each qualitative trajectory type in an arbitrary period. I use these conditions to develop a proposition about planting in the final period, and to analyze an example trajectory. Finally, I propose ways that this model can be used to answer several questions about perennial crop management.

Sugarcane Bioethanol Luís Augusto Barbosa Cortez 2010 In Brazil, sugarcane ethanol supplied, in 2009, 17.6 % of the energy for land transportation (excluding railroads) and about 55% of the total energy supplied by liquid fuel for Otto cycle engines. Besides the lower production costs ethanol produced from sugarcane in Brazil has another important advantage: in Central-South Brazil only 1 unit of fossil energy is used for each 8-9 units of energy produced by ethanol from sugarcane. Carbon emissions reduction also benefits from sugarcane ethanol: for each cubic meter of ethanol used as fuel, there is net saving of around 2 t CO₂ not emitted to the atmosphere while, at the same time, no SO₂ is emitted. Sugarcane was introduced in Brazil in 1532. The "Brazilian model" of producing concomitantly sugar and ethanol, brought important technical benefits and made possible an outstanding increase in the competitiveness in the international market for sugar and ethanol. Today about 50% of the sucrose of sugarcane produced in the country is directed to the production of sugar while another half is used to produce Ethanol. Industrial and academic R&D has helped to increase the productivity of ethanol steadily over the past 35 years, at a rate of 3.2% per year. Productivity gains implied savings of planted area by a factor of 2.6. In 2009/2010 the area planted with sugarcane for Ethanol production was 4.2 Mha, amounting to 1% of the total arable land available in Brazil. About 60% of the Ethanol produced in Brazil comes from the State of Sao Paulo, where the productivity is the highest (around 86 t/ha.year). Most of the recent expansion is happening in the center-west region of the country, in degraded pasture lands. The FAPESP Program for Research on Bioenergy, BIOEN, aims at articulating public and private R&D, using academic and industrial laboratories to advance and apply knowledge in fields related to ethanol production in Brazil. The BIOEN Program has a solid core for supporting academic exploratory research activities that will generate new knowledge and form scientists and professionals essential for advancing industry capacity in ethanol related technologies. On top of this, BIOEN includes partnerships with industry for cooperative R&D activities between industrial and academic laboratories, which are to be co-funded by FAPESP and industry. Federal agencies, such as CNPq, will also co-fund the research.

Brazil's Sugarcane Sector Brent Borrell 1994 The Brazil sugar and ethanol story is as follows: direct government intervention overrides market forces, markets undergo dramatic change, intervention establishes vested interests, rent-seeking blocks adjustment to market change, economic objectives become blurred behind political objectives, opportunities go begging, industry profitability suffers, and national income is foregone. A simple economic model of the Brazilian sugarcane sector and policy, interventions is used to measure the costs of existing policies and to develop better policies. Brazil is an efficient producer of sugar, but policy intervention causes: underproduction of sugarcane, the wrong mix of sugar and ethanol from cane (too much ethanol, not enough sugar), missed opportunities to market ethanol in high value uses (as an octane enhancer and clean fuel), and missed opportunities to make the work sugar market more competitive. Adopting more market based policies could be worth billions of dollars extra to Brazil annually.

Sugar Cane's Energy 2005

Bioenergy for Sustainable Development and International Competitiveness Francis X. Johnson 2013-07-03 Growing concerns about the impacts of climate change and dependence on fossil fuels have intensified interest in bioenergy from sugar cane and other crops, highlighting important links between energy, environment and development goals. Sub-Saharan Africa is characterized by severe poverty; the possibility to exploit a renewable energy resource offers valuable avenues for sustainable development and could support a more dynamic and competitive economy. This book describes how the bioenergy expansion will improve rural livelihoods, reduce costly energy imports, reduce GHG emissions, and offer new development paths. Drawing on international experience, it is shown that harnessing this potential will require significant increases in investment, technology transfer, and international cooperation. Because of its high efficiency, the authors argue that sugar cane should be viewed as a global resource for sustainable development and should command much greater focus and concerted policy action. Through an

analysis of the agronomy, land suitability and industrial processing of sugar cane and its co-products, along with an assessment of the energy, economic and environmental implications, this volume demonstrates that sugar cane offers a competitive and environmentally beneficial resource for Africa's economic development and energy security. With forty-four authors representing thirty organisations in sixteen countries, the book offers a truly international and interdisciplinary perspective by combining technical and economic principles with social, political and environmental assessment and policy analysis.