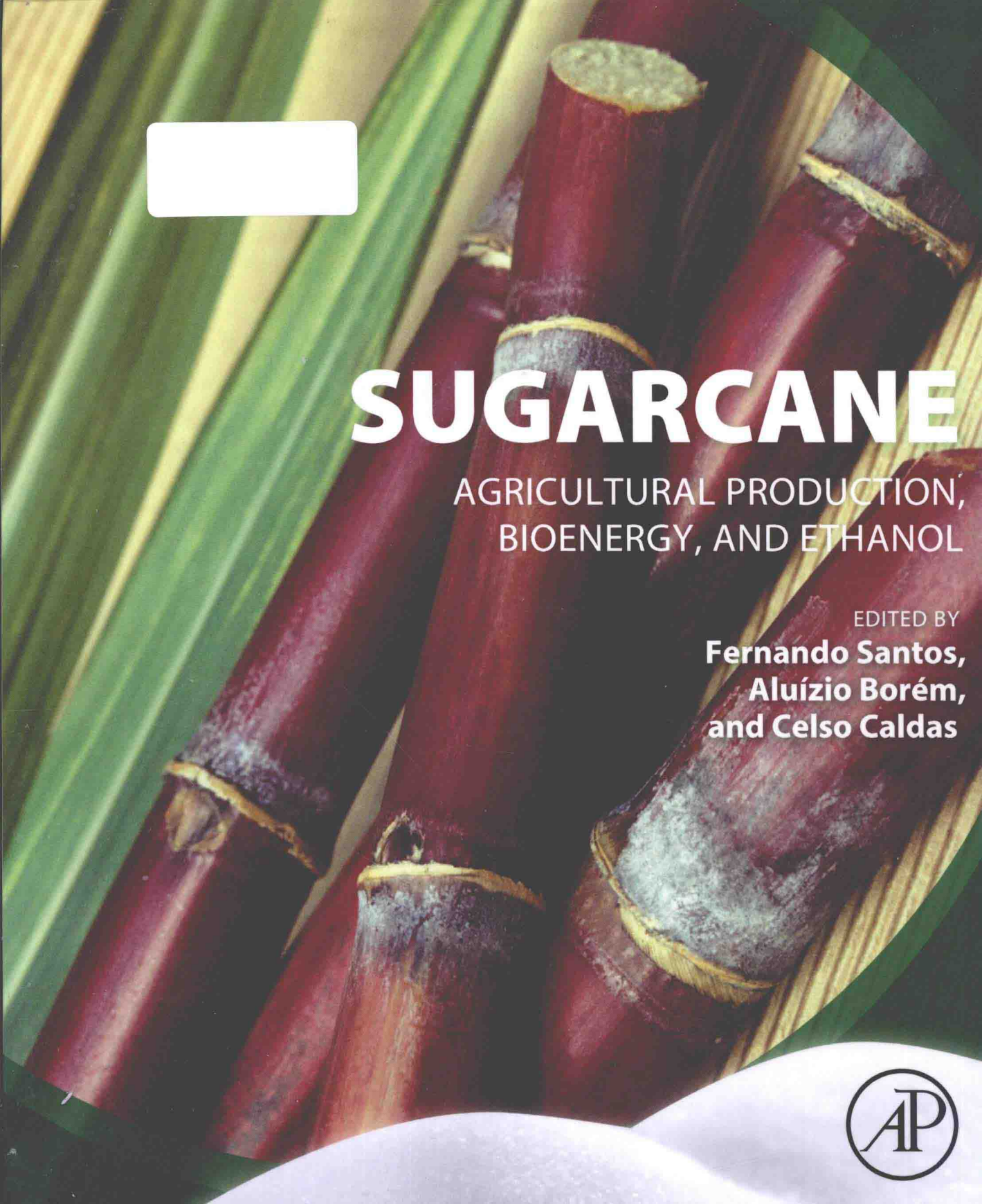




SUGARCANE

AGRICULTURAL PRODUCTION,
BIOENERGY, AND ETHANOL

EDITED BY

**Fernando Santos,
Aluizio Borém,
and Celso Caldas**



Sugarcane

Agricultural Production, Bioenergy, and Ethanol

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Sugarcane

*Agricultural Production,
Bioenergy, and Ethanol*

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Foreword

Sugarcane crops have been established in Brazil since nearly five centuries ago. At that time, sugar cane brandy and brown sugar were special products.

For almost a century, Brazil has had cars fueled by ethanol and has been an important player in world sugar production and exports.

However, in the last 35 years the industry experienced its most impressive leap in production and productivity, based on absolutely spectacular technological progress.

The Proálcool Program, the largest program on energy alternatives resulting from the seventies' "oil shocks", conferred a new face to the sugarcane production chain.

Soon after, the introduction of the Program for Sugarcane Payment by Sucrose Contents produced one of the greatest technological revolutions of 20th century agribusiness: new varieties were developed, as well as different cropping practices, planting and harvesting dates, fertilizer formulas, everything changed; mechanization evolved greatly, and techniques were vigorously implemented in all segments of the agricultural industry.

All such advancements made Brazil become, in a sustainable and highly competitive manner, the world's largest exporter of sugar and ethanol.

The prospects for the future are even more promising: the so-called "green economy", so widely used by the world's greatest leaders, opens up amazing opportunities for agroenergy, whether for biofuels, bioelectricity, or for bagasse pellets as an alternative to firewood in the fireplaces of cold countries.

All of these topics are well addressed in this timely and notable book. At this moment in history, when global warming represents a major challenge, the role of the sugarcane production chain transcends national boundaries. However, there is a concerning aspect: the lack of coordination among sector policies, both in the public and private spheres.

So far, we have not defined the amount of ethanol we should or want to produce, in what period of time, and for which market — internal or external?

There are no long-term contract models.

We have not defined who will be in charge of logistics, storage, production contracts, or final product certification.

There is no liaison between the areas of technological development and human resources training.

Nothing is defined as to the future of hydrated ethanol.

Nothing is organized on the issue food $\times$ energy, a ridiculous theme that still gets media attention because of minor interests of other sectors.

The production system, so well described by Barbosa Lima Sobrinho in the Sugarcane Production Statute in the forties, turned to dust with IAA's end.

Sugarcane suppliers, who "deliver" their production to plants, and do not sell it, are in an extremely awkward position in terms of links in the production chain, since they cannot choose who they sell to: they can only sell to industries nearby their agricultural area. This renders the production chain uneven. In addition, since the end of IAA, the process lacks arbitration, even though Consecana is a good beginning.

Finally, in such a promising segment for Brazil, at such an important time, this lack of coordination may inhibit the country's progress, even as regards leading a global geopolitical shift, with the exportation of technology to poor tropical countries in Latin America, Africa, and Asia for them to produce agroenergy associated with food.

For all this, we welcome the publishing of this enlightening book, written by some of the foremost experts in each of the topics addressed.

Dr. Roberto Rodrigues
Former Secretary of Agriculture

Preface

Sugarcane is native to the warm temperate to tropical regions of South Asia, and is used for sugar, ethanol and spirit production. Sugarcane is the world's largest crop by production quantity. In 2014, the FAO estimated that it was cultivated on about 29.0 million hectares, in more than 90 countries, with a worldwide harvest of 1.84 billion tons. Brazil was the largest producer of sugar cane in the world. The next five major producers, in decreasing amounts of production, were India, China, Thailand, Pakistan and Mexico.

Cane accounts for over 80% of sugar produced; most of the rest is made from sugar beets. Sugarcane predominantly grows in the tropical and subtropical regions, and sugar beet predominantly grows in colder temperate regions of the world. In India, between the sixth and fourth centuries BC, the Persians, followed by the Greeks, discovered the famous “reeds that produce honey without bees”. They adopted and then spread sugar and sugarcane agriculture. A few merchants began to trade in sugar — a luxury and an expensive spice until the 18th century. Before the 18th century, cultivation of sugarcane was largely confined to India. Sugarcane plantations, like cotton farms, were a major driver of large human migrations in the 19th and early 20th centuries, influencing the ethnic mix, political conflicts and cultural evolution of various Caribbean, South American, Indian Ocean and Pacific island nations.

Sugarcane became an even more important crop with the importance of bioenergy in today's society. Bioenergy is renewable energy made available from materials derived from biological sources and sugarcane is currently the major source of biofuel.

The Brazilian sugarcane industry employs modern agronomic management practices to enhance productivity and protect the environment. In fact, Brazil is the leader in sugarcane production and research.

Written by experts in each topic addressed, the intention is that this book will be used by new and advanced students, as well as serving as a reference book for those interested in the sugarcane crop and processing. Instructors are encouraged to select specific chapters to meet classroom needs. Readers will also benefit from the list of references that accompany each chapter.

The Editors

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