FAPESP

THE STATE OF SÃO PAULO
RESEARCH FOUNDATION

Brazil world leader in sugarcane and ethanol knowledge and technology

FAPESP's contribuition

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São Paulo – Brazil
2007

When knowledge turns into wealth

Brazil is the largest producer of ethanol from sugarcane in the world and occupies the leadership in technology for its production. The advances in technology have meant that its productivity is outstanding and the costs of production much lower than those of its international competitors. This leadership is due to the long work of many years undertaken by researchers in institutions of higher education and research and in private enterprises, which has resulted in a valuable baggage of knowledge and technology on sugarcane and its derivatives and on the process of ethanol manufacture. The research has dealt with a variety of themes, such as the genetic improvement of the plant, combating pests, agricultural and harvesting techniques, impact of the cultivation on the environment, and technologies concerning the manufacture of ethanol, including hydrolysis and fermentation.

To maintain the leadership and competitiveness at a time when the world is discovering ethanol as an alternative energy source and many countries are investing massively in the technology of its production, mainly based on cellulose, demands even greater effort from Brazilian research.

FAPESP has always been attentive to the importance of sugarcane and ethanol to the State of São Paulo economy, and has continued to make a significant contribution to the advance in scientific knowledge and technology in the sector. Over the course of its 45 years, the State of São Paulo Research Foundation has supported, and continues to support a large number of research projects centered on diverse topics related to the sugarcane cultivation, its industrial uses, and to ethanol. These are research activities undertaken by means of financial awards for different levels of academic training, by means of individual grants to researchers or by means of programs geared to technological research. In 1999, for example, FAPESP created the Sugarcane Genome Project, within the ambit of the FAPESP-Genome program, for the sequencing and analysis of sugarcane genes relating to productivity, resistance to pests and diseases and climatic variations. Since 2001, in partnership with the Center for Sugar Technology (CTC) and Dedini, FAPESP has supported the Dedini Rapid Hydrolysis program for the development of technology for ethanol production via acidic hydrolysis on an industrial scale.

Support for research has also been delivered by means of the Technological Innovation in Small Businesses (PIPE) and the Partnership for Technological Innovation (PITE) programs. The latter contemplates agreements for scientific cooperation signed between FAPESP and the Oxiteno and Dedini companies. Under the first agreement R$ 6 million (approximatelly US$ 3.1 million) will be contributed towards alcohol-chemical and sugar-chemical research. Under the second agreement, R$ 100 million (approximatelly US$ 52.6 million) will be invested in research geared to the industrial production of ethanol.

In this publication there is information on research projects into sugarcane, ethanol and other industrial products supported by FAPESP over the last 10 years.

The publication also gathers together a selection of features on the subject published in the *Pesquisa FAPESP* magazine.

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FAPESP: promoter of development

The State of São Paulo Research Foundation (FAPESP) is one of the leading Brazilian agencies for the funding of scientific and technological research. This means that FAPESP is the São Paulo State funding body for the generation of knowledge, in all areas. The Foundation's strategy has three pillars: support for the training of human resources; support for academic research, principally fundamental; and support undertaken with a view to applications. Along with its commitment to the generation of fundamental knowledge, FAPESP has always been concerned, and continues to be concerned with increasing intensity, with the dissemination and application of knowledge, acting therefore, as a promoter and inducer of the applications of science. This means a concern and activity increasingly in tune with the aspirations and needs of São Paulo and Brazilian society as a whole and with the social and economic development of the country.

To accomplish adequately its support mission for the generation of knowledge, which also assumes the training of qualified human resources, FAPESP has at its disposal a line of funding which is dedicated to the awarding of bursaries, at different levels of academic training, and financial awards for research, granted to researching doctors in institutes of higher education and research in the State of São Paulo.

For research geared towards applications, the Foundation provides support by means of the articulation of academic research with research in private enterprise, in government, and by means of the development of research in small businesses. This is undertaken chiefly within the ambit of the Technological Innovation in Small Businesses program (PIPE), the Partnership for Technological Innovation program (PITE) and the Research in Public Policies program (PPPP).

PIPE and PITE

Since June 1997, when it was created, to June 2007, PIPE has supported with non-refundable investment more than 700 research projects developed in small businesses in the State of São Paulo. This represents on average the approval of more than one project per week. The projects submitted to FAPESP are evaluated by specialists and, if approved, develop in three phases. Phase 1 studies the viability of the proposal. In phase 2, research is carried out to develop a prototype of the innovation sought. Phase 3 is dedicated to the scaled production and commercialization of the product or process developed.

The Partnership for Technological Innovation research program (PITE) was created by FAPESP in 1994, with the objective of stimulating partnership between universities or research institutes and businesses. It supports projects in two ways:

PITE – Researchers from institutes of higher education and research in the State of São Paulo, in partnership with researchers from a business, present a project to FAPESP. The financial support for the research is undertaken by the Foundation with match-funding from the business.

PITE agreement – FAPESP signs a scientific cooperation agreement with a business to support various research projects related to a theme or area. The agreement establishes a total value of the funding to be delivered by the institutions in the agreement. Projects can be submitted through the call for research proposals, by researchers from institutions of higher education and research in the State of São Paulo.

Agreements

Scientific cooperation agreements are already operating within the ambit of the PITE program:

FAPESP-Dedini agreement to support research into industrial processes for the manufacture of ethanol from sugarcane. Value of R$ 100 million (approximatelly US$ 52.6 million). Agreement signed on 17 July 2007.

FAPESP-Oxiteno agreement to support research in the areas of alcohol chemistry and sugar chemistry. Value of R$ 6 million (approximatelly US$ 3.1 million). Agreement signed in November 2006. 23 projects have already been approved for phase 2 of selection from the first call for proposals.

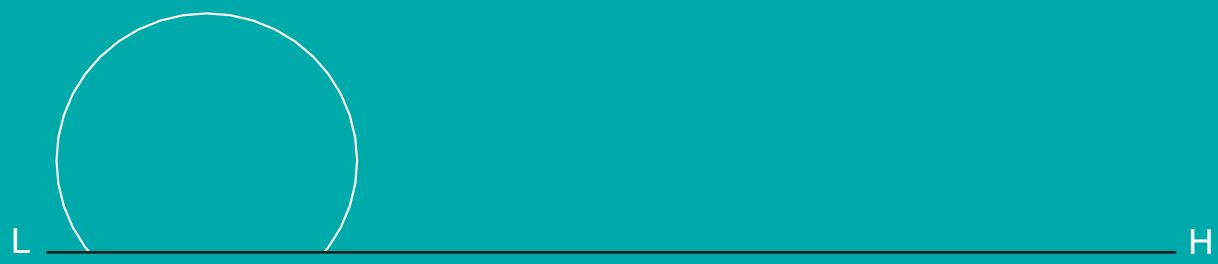
FAPESP-Grupo Ouro Fino agreement to support research in the area of development of actives principles and their vehiculation in the area of veterinary pharmaceuticals. Value of R$ 2 million (approximatelly US$ 1 million). Agreement signed in July 2006 and with 7 projects already approved.

FAPESP-Padtec agreement to support research in telecommunications and optic communications. Value of R$ 40 million (approximatelly US$ 21 million). Agreement signed on 12 June 2007.

FAPESP-Telefônica agreement to support research in information technology (IT) and telecommunications. Value of R$ 12 million (approximatelly US$ 6.3 million). Agreement signed on 26 April 2007.

FAPESP-Microsoft agreement to support research in information and communications technology (ICT). Value of R$ 1,6 million (approximatelly US$ 840 thousand). Agreement signed on 10 April 2007.

Summary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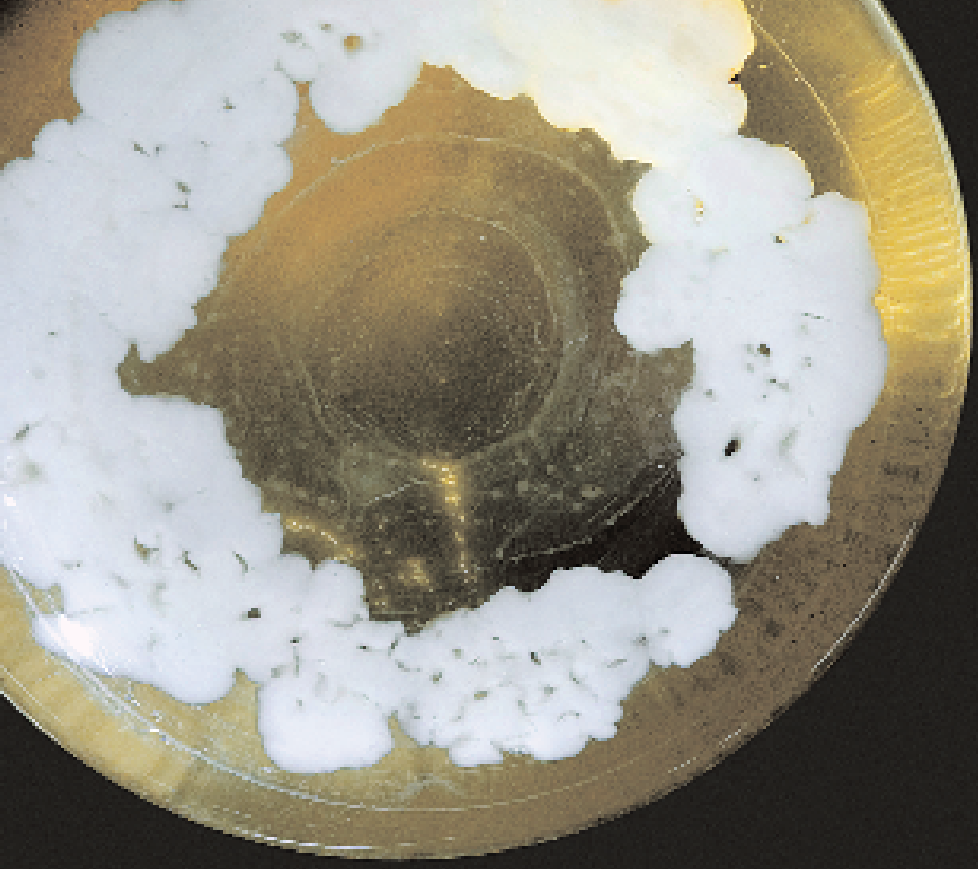
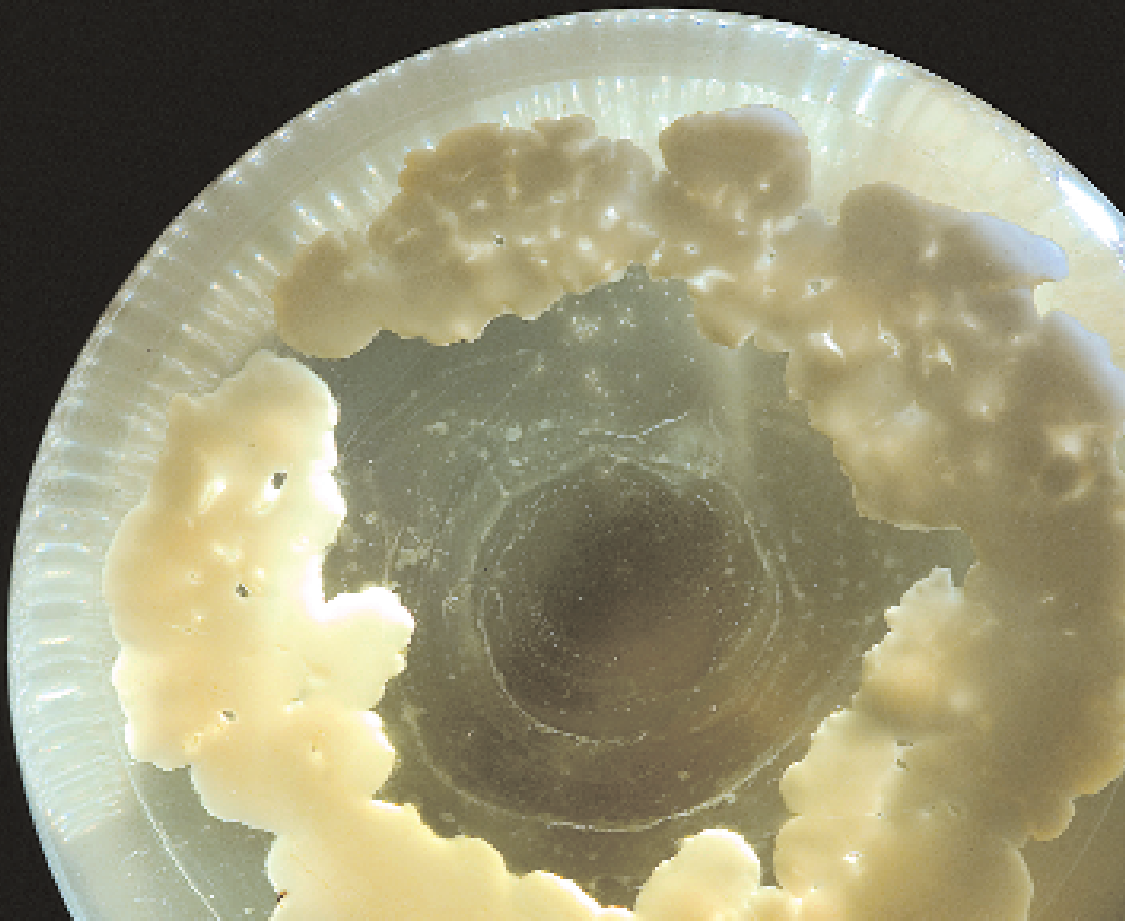
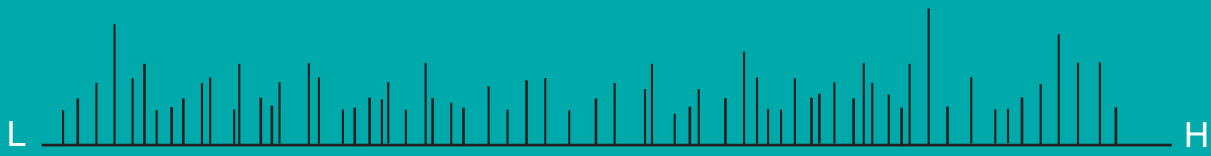


PIPE

Technological Innovation in Small Businesses

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Administration

1 Consultancy for supply chains on web platform

Process
2005/04476-3

Coordinator
Odair Oliva de Farias

Company
Log1 Consulting Soluções em Redes Ltda.

Start: 1/12/2006
Finish: 30/11/2008

This project proposes the development of a solution in layers with functional application on consistent servers and with interfaces of high portability so that the system linked to radio frequency and positioning devices via satellite can monitor the logistical operations and display to its users the main restrictions of the system to be optimized, as well as alternative solutions. The proposal arose from studies and consultancies undertaken by the Coordinator of the project on various supply chains, such as fuel alcohol, which are extremely demanding in terms of their logistical efficiency and performance. These studies continue in conjunction at Log1, a logistical solutions development company. Log1 was born in March 2005 and today, in addition to overseeing some projects of social responsibility, offers the market consultancy and training services. The parties involved in this partnership firmly believe that providing the actors of the actual logistical scenario with functional solutions and scientifically underwritten consultancy services, these actors are then given the opportunity to dedicate their efforts to their specific competencies, minimizing the logistical costs and cranking up corporate development. The strategic and operational alignment of the supply chains proposed in this project is directly related to Log1's mission of transforming the logistical challenges of its clients into opportunities for liquidity and sustainability. Therefore, the participants in the project believe in the real capability of logistical innovation from the external problem-solvers involved, as well as in better management alternatives made viable by the new technologies available today. The proposal for several systems to communicate through a single resource is based on the concepts of collaborative logistical management, as proposed in the CPFR (Collaborative Planning and Forecast Replenishment), with the project thus being in tune with the presumptions of the new computing age, the *ubiquitous* computer (many computers and one system for various businesses).

Agronomy

2 Mass rearing and commercialization of *Trichogramma spp.* and *Cotesia flavipes* for the control of agricultural pests

Process
2001/08394-0

Coordinator
Alexandre de Sene Pinto /
José Roberto Postali Parra

Company
CP2 Ltda. – ME (ex-Bug)

Start: 1/1/2002
Finish: 28/2/2005

The aim of this project is to make available to the user good quality insects, since the lack of this requirement represents the greatest obstacle to the popularization of biological control in Brazil. Nowadays, there is enormous interest in the use of this alternative, but insects are not always available for purchase and, when they are, the biological specimens are not always of the desired quality. The insects will be produced using conventional techniques which will be fine-tuned, adapting them to the Brazilian reality, especially in the acquisition of components of artificial diets for breeding, lowering the manpower costs and monitoring biological characteristics through the generations to ensure the quality of the insect produced as well as its performance in field conditions. The project intends to use *Cotesia flavipes* (Cameron, 1891) in cane sugar, a larval parasitoid for the control of *Diatraea saccharalis* (Fabr., 1794), traditionally used in Brazil, and *Trichogramma spp.*, an egg parasitoid which can be used to control this pest in areas where the egg-predation is low or in areas where the climatic conditions did not permit the adaptation of the braconidae mentioned. In this case, *Trichogramma galloi* will be used, with other species of *Trichogramma* (especially *T. pretiosum*) being suited to commercialization for the control of lepidopterans in tomato (vine, staked and in greenhouses), cotton plants, maize, etc., since the production of these natural enemies is considerably advanced in our conditions.

3 Development of bioinsecticide formulations based on the entomopathogenic fungus *Metarhizium anisopliae*

PROCESS
2002/08006-3

COORDINATOR
Marco Antônio Tamai

COMPANY
Bio Soja Indústrias Químicas and Biológicas Ltda.

START: 1/9/2003
FINISH: 28/2/2007

The use of *Metarhizium anisopliae* for the control of *Mahanarva fimbriolata* (Stal) in the cultivation of sugarcane in the State of São Paulo has greatly increased in recent years. The objective of this project is the refinement of existing techniques and the development of new production and formulation processes of *Metarhizium anisopliae*, produced in liquid and solid culture media, so as to raise levels of quality control and reduce production costs. Consequently, the following stages have been outlined: 1) selection of complex and low economic cost media, as well as sources of nitrogen, carbon and vitamins; 2) evaluation of toxicity of the inerts for liquid and solid formulations; 3) development of different types of formulations; and 4) evaluation in the field of the agronomic efficiency of the selected formulations. In phase 1 of the project, alternative products of low economic cost were selected (molasses, glycerin, yeast extract and beer yeast) for the composition of liquid culture media, with a view to large scale production of different structures of the biological cycle of *Metarhizium anisopliae*. The resultant information will be used in phase 2 for the development of new bioinsecticide formulations based on blastospores and dry mycelium and to make viable the use of mycelium mass as inoculant in biphasic systems of production of airborne conidia.

4 Study of effective formulation of conides of the fungus *Metarhizium anisopliae* for the biological control of pests

PROCESS
2005/55780-4

COORDINATOR
Ana Lúcia Santos Zimmermann

COMPANY
Biocontrol Sistema de Controle Biológico Ltda.

START: 1/12/2005
FINISH: 31/7/2006

The control of pests in agriculture has been conducted, largely, by the use of chemical insecticides. However, the large scale use of these insecticides has caused many environmental problems, in addition to the development of resistance of some target pests. The biological control of pests has provided an alternative technology for a decrease in the use of chemical insecticides. Fungi are organisms with a great potential for the control of pests, with *Metarhizium anisopliae* being one of the most widely used agents in fungi-based bioinsecticides. To increase the efficiency in the field and to maintain the viability and virulence at ambient temperatures, the concentrated dust of the conides of this fungus, produced by the Biocontrol company, needs to be subjected to technological processes of formulation, with the appropriate mixture of substances with protective properties. With the intention of innovating existing products in Brazil based on the fungus *Metarhizium anisopliae* to combat pests, principally in cultivations of sugarcane and grazing grounds, this project proposes the development of three solid formulations, two wettable powders and one granulate, that do not exist in the Brazilian market. The formulations will be able to guarantee the viability and virulence of the conides of *M. anisopliae* for at least six to twelve months, at ambient temperatures. This makes it possible to increase production of *Metarhizium* by Biocontrol, with the distribution of formulated products which guarantee the quality of the product, for a period, up until the moment it is used in the field.

AGRICULTURAL ENGINEERING

5 System for detection and localized application of herbicides in sugarcane

PROCESS
1999/11576-1

COORDINATOR
Luiz Geraldo Mialhe

COMPANY
Agrionics - Instrum. Equipamentos Agrícolas and Industriais Ltda.

START: 1/4/2000
FINISH: 31/12/2000

The onboard instrumentation available today in

the market is almost entirely imported and of the "black box" type. These characteristics, in the case of complete systems, are interesting both to suppliers and to users and, when correctly installed, they provide a secure return on investment. There are still few complete systems available on the national market and, given the complexity of how they are structured, they demand a high initial investment and renders obsolete that part of the non-instrumented fleet in use on the property. The perception of this reality and the evidence from a concrete case in the fleet of ten herbicide duster-combines in the Usina Rafard (União S. Paulo S/A) motivated the research aimed at the study and development of a system capable of satisfying the needs of this agricultural operation under critical conditions (sloping topography, infestation intensity, use of different products, risks of losing control etc.). In Brazil, currently, the use of electronic controls in dusters is limited to conventional systems (command of flow valves via pressure sensor signals) which aim to maintain the dosage of the application independent from the variation in speed of displacement of the tractor in the field. Exceptions are the few cases of imported equipment of the self-propelled type and of fairly high cost, generally applicable under conditions of flat topography. The project proposes to develop the electroelectronic and mechanical components, the software and operational methodologies that will make it possible to achieve a system for detection and localized application of herbicide in sugarcane.

6 Development of a productivity monitor for sugarcane in order to obtain productivity maps for self-propelled harvesters

PROCESS
2004/08777-5

COORDINATOR
Domingos Guilherme Pellegrino Cerri

COMPANY
Enalta Inovações Tecnológicas para Agricultura

START: 1/2/2005
FINISH: 31/1/2007

Much of the research carried out in precision agriculture concentrates on the development of corrective dosers and evaluators of yield for grain crops such as wheat and soya, which are products cultivated in sub-tropical areas and predominantly in developed countries. Thus, in this project the cultivation of sugar cane was chosen because, in addition to being of great economic importance in Brazil, it has barely been explored by precision agriculture techniques. This project aims to instrument a sugar cane harvester, so as to be able to obtain the productivity map for this crop. The system to be refined is based on the productivity monitor designed, developed and patented by the State University of Campinas (Unicamp), with support from FAPESP. The equipment uses weighing cells as an instrument for determining the weight of the raw material harvested and will be capable of measuring the flow of stalks that pass over the belt before being thrown into the transporting vehicle. This data, together with the information obtained from a Differential Global Positioning System (DGPS) installed in the harvester, permits the creation of a digital map which represents the production surface for the harvested area. This system will be tested in the laboratory and in the field.

7 Development of a mechanical aid for the harvesting of sugarcane without prior burning

PROCESS
2004/14468-5

COORDINATOR
Efraim Albrecht Neto

COMPANY
Agricef Soluções Tecnológicas
para Agricultura Ltda.

START: 1/1/2006
FINISH: 30/6/2006

Currently, total or partial mechanization would seem to be the sole option for the harvesting of sugarcane, both from the ergonomic as well as the economic point of view and, principally, from the legal and environmental point of view, since only mechanical cutting makes harvesting without prior burning viable, a fact which in turn will make the profitable use of the straw viable. Thus, this work aims to develop an alternative technology geared to the harvesting of sugarcane, without prior burning, which can operate on sloping terrains and minimize the impact of unemployment in the rural environment caused by conventional mechanized harvesting. The equipment assists the manual harvest, carrying out base cut operations, trimming of stalk tops, removal of leaves and delivery of the stalks to the storage carrier, leaving to the worker the function of handling the stalks after the base cut, passing through the trimming of the tops on to the straw stripping unit. In order to evaluate the equipment,

in field and laboratory conditions, a prototype will be built which will simultaneously harvest three rows of sugarcane. The factors to be evaluated will be: 1) determination of the steerability of the equipment, as well as its stability against toppling; 2) quantitative evaluation of the losses of raw material and its technological quality; and 3) comparative economic analysis of operational cost and investment requirement. Based on the analyses, possible modifications will be suggested so as to obtain a commercial piece of equipment with an accessible cost which can be used for the harvesting of sugarcane.

8 An automatic mapping system of agricultural productivity

PROCESS
2005/04485-2

COORDINATOR
Rafael Alexandre Ferrarezi

Company
AGX Tecnologia Ltda.

START: 1/9/2006
FINISH: 28/2/2007

Given the importance of agribusiness to the Brazilian economy, it is of great interest to develop new technologies that generate advantages and benefits for this sector. The most advanced technological resources are present in this sector through precision farming, which is a method of management of the production system which aims to improve the productivity of crops as well as the quality of the products. One of the tools used in precision agriculture is the generation of productivity maps, which involves the instrumentation of farm machines for the collection, downloading and processing of data. This method considers the spatial variability of parameters in the cultivated areas as a source of information vital in helping make decisions for a better management of the production process. Important agricultural crops, such as sugarcane, have still to benefit from these possible technological advances. Thus the present project aims to develop a productivity system for these crops which use transport vehicles, being able to detect automatically the moment and the position of the crop-gathering throat and to quantify the load gathered in each cycle in a precise manner. It will also be necessary to develop a technological platform for the farm machines, where the automatic download will be effected, with communication via a wireless network, of geo-referenced data and the software necessary for the drawing up of productivity maps. Due to its economic importance to the State of São Paulo, the system will be developed initially for the cultivation of sugarcane. Nevertheless, as it possesses a versatile architecture, it will be able to incorporate new functionalities and be easily adapted to other crops which in a similar manner use transport vehicles for the harvesting of the production.

9 Automated control of the synchronism between the sugarcane harvester and the transport vehicle

PROCESS
2006/56581-8

COORDINATOR
Rodrigo Fernando Galzerano Baldo

COMPANY
Agricef Soluções Tecnológicas
para Agricultura Ltda.

START: 1/4/2007
FINISH: 30/9/2007

One of the problems encountered in the mechanized harvesting of sugarcane is the lack of synchronism between the harvester and the transport vehicle. This problem generates losses both of raw material and of operational efficiency. The first of these occurs when the machines fall out of alignment and parts of the sugarcane stalks are thrown out of the transport vehicle. Operational loss occurs when the machines fall out of alignment and are forced to carry out maneuvers in order to get back into a working position, the fact being that the maneuvers take time and therefore represent a reduction in the efficiency of the harvest. The present research aims to develop a system capable of identifying and controlling the parallelism between the sugarcane cutting harvester and the transport vehicle. The project will be a refinement of the synchronism already developed in Unicamp in 2005. What differentiates the two projects is that the present one will be capable of identifying, through radio-frequency, the exact relative position of the machines and thus will automatically control the velocity and positioning of the transport vehicle through control theories. For the correct functioning of the system, relative positioning sensors via radio-frequency will be developed to be installed in the harvester and the transport vehicle. To control the speed of the transport vehicle a servo-motor will be fitted to the tractor accelera-

tor. Functioning tests will be undertaken in a specific factory of the Cosan group.

10 Development of a system for monitoring the cutting, loading and transport of sugarcane for fleet management

PROCESS
2006/56606-0

COORDINATOR
Domingos Guilherme Pellegrino Cerri

COMPANY
Enalta Indústria and Comércio
de Equipamentos Eletrônicos Ltda - EPP

START: 1/2/2007
FINISH: 31/1/2009

In the production process for obtaining sugarcane subproducts, the costs involved in the operational and agricultural activities represent a large proportion of the final costs. One way of reducing them is to implement new technologies in the agricultural mechanization using a combination of mechanics and electronics. Complementing this, the use of information technology combined with the use of intelligent components can help to improve the performance of machines and equipment. The present proposal aims to develop a monitoring system for the cutting, loading and transport (CLT) of sugarcane. This system will be integrated with the sugar mill's corporate database, in order to provide ordered and precise information and thus enable better management of the fleet and, consequently, improve efficiency in the field and reduce operational costs. The proposed system will be based around: a) a productivity monitor designed, developed and patented by Unicamp (Simprocana); b) a floating base cutter; c) PIMS-SIG- Transport and Agricultural software for the control and management of the fleets of support trucks and cane transporters; d) Digital Automotive Controllers (DAC) to be installed in trucks and in the farm machines. Items b, c and d are pieces of equipment developed by Enalta company. These systems will be optimized, implemented, integrated and tested in the laboratory and in the field. Enalta will be responsible for the development and commercialization of the proposed system and according to its needs may request technical and scientific support from the following institutions: Agricef, Próxima Software and Sistemas, Feagri-Unicamp, LAA-Poli-USP and the Center for Technology and Sugar Cultivation.

MATERIALS AND METALLURGIAL ENGINEERING

11 Production and characterization of environmentally degradable polymers (EDPs) based on renewable sources: sugarcane

PROCESS
2001/02909-9

COORDINATOR
Jefter Fernandes do Nascimento

COMPANY
PHB Industrial S/A

START: 1/11/2001
FINISH: 30/6/2004

Poly(3-hydroxybutyric acid) or PI-113 is an environmentally biodegradable polymer, synthesized and accumulated as a reserve substance by a series of bacteria, with thermoplastic properties similar to those of conventional polymers. However, it manifests the peculiarity of being highly biodegradable when exposed to biologically active environments, which makes it very attractive in refuse situations in the environment. This polymer is also biocompatible, with a high regularity of polymeric chain and high molecular weight, which permits numerous industrial applications, including flexible packaging (films), rigid packaging (blown bottles, plastic bottle tops and thermoforming sheets) and surgical components, among others. The biodegradable plastic PHB (polyhidroxibutirate) synthesized by biotechnological production is extremely competitive commercially, since starting with cane sugar, with the stages of synthesis, extraction and purification of the polymer with natural solvents, a final product with a very low cost is obtained. The present project aims to launch this product on the plastic packaging market. In order to characterize and formulate the polymer, it will be necessary to acquire some basic equipment in polymer technology which will go towards complementing the investments already made by PHB Industrial S/A in this project.

12 Production of porous parts in high performance alloys

PROCESS
2001/08425-3

COORDINATOR
Francisco Ambrózio Filho

COMPANY
Brats Indústria and Comércio Ltda.

START: 1/9/2002
FINISH: 31/8/2005

Sinterized metal filters are produced using powder metallurgical techniques and the most frequently applied is that of uniaxial compactation in matrix by hydraulic or mechanical press. Depending on the type of application, different materials can be used, among which bronze, stainless steels, inconel, hastelloy, monel, aluminum and titanium stand out. In Brazil there is a well-developed market for bronze filters, in which some modest-sized businesses are active. As for other materials, there is a broad market to be explored, especially for stainless steel filters 316L and 304L which are the object of this proposal. Demand exists for various applications, especially in the gases industry with flame-cutter filters, dosers, attenuators, tubes and porous plates for the petrochemical industry and cartridges with or without seams for the alcohol industry, all in stainless steel. Some cases of special filters in inconel, monel and titanium for the chemical and nuclear industries were also identified. In the majority of these applications, all with high added value, components such as replacement parts are imported and the national industry has enormous difficulty discovering who makes these special parts to measure. The main objective of this research is the determination of the parameters for compactation and sinterization necessary for the elaboration of porous materials with the performance with appropriate characteristics for applications of liquid-solid and solid separation, in the mechanical, chemical and food industries. Phase 1 of the project verified the viability of the production of high technical and commercial performance porous metal parts (filters). Phase 2 seeks to make viable the installation of a manufacturing unit to produce parts which will replace the importation of a part of the porous elements consumed in Brazil.

MECHANICAL ENGINEERING

13 Development and optimization of integrated ethanol reformation unit for the production of hydrogen

PROCESS
2005/50908-2

COORDINATOR
João Carlos Camargo

COMPANY
Hytron Assessoria Tecnológica
em Energia and Gases Industriais Ltda.

START: 1/8/2005
FINISH: 31/3/2006

The present research project proposes the simulation, development, optimization and dimensioning of an integrated system of ethanol reformation for the production of quality hydrogen for application in systems of electrical energy generation, especially through polymer electrolyte fuel cells (PFMFC). The system characterized as the central element of the present project will be subdivided into a reformation subsystem and a purification subsystem. The focus of the research will be on demonstrating the technical viability through the dimensioning and design of the integration of these subsystems, based on the knowledge already acquired by the Hydron team in similar concluded or on-going projects in Unicamp's Hydrogen Laboratory. The theoretic study aims to optimize the energy balance of the system through the simulation of the parameters of the plant operation, such as temperature, pressure and leakage of raw materials in the reformer, so that the maximum efficiency of conversion of ethanol to hydrogen will be obtained, with the system dimensions being adequate to cope with fuel cells with an electrical energy generating capacity between 5 and 30 kW. The design and dimensioning of the reformer components will seek constructive least cost solutions aiming for the future commercialization of this equipment by the company.

CHEMICAL ENGINEERING

14 Refinement of the Vacuum Press filters for the sugar and alcohol industry

PROCESS
1997/07452-0

COORDINATOR
Pedro Gustavo Córdoba Junior

COMPANY
Technopulp Consultoria and Com.
de Equipamentos Industriais Ltda.

START: 1/1/1998
FINISH: 30/11/2000

The objective of the research is the technological refinement of the continuous double screen filter known as Vacuum Press, used in the purification treatment of raw sugar juice (garapa) in sugar and alcohol factories, enabling an increase in efficiency and productivity. The project aims at a more detailed study of the market, research in the laboratory to test new screen membranes and filtering aids, such as polymers and chemical coagulation agents, for higher operational performance. This is only possible by means of work in the laboratory and plant, using a pilot filter for trials and tests. The installation of a laboratory with pilot equipment will make it possible to attain higher levels of automation and efficiency, and for the company to broaden the market range, resulting in socioeconomic benefits with the creation of new jobs. The Vacuum Press filter is the most recent development of the company which is active in the areas of engineering and processes linked to the sugar and alcohol, paper and cellulose sectors, and is being used in the sugar and alcohol sector with satisfactory results, as a replacement for conventional rotating filters, which have a low power of retention of impurities and a high level of sucrose loss.

15 Advanced system for producing electricity with high efficiency, low cost and non-pollutant

PROCESS
2001/08486-2

COORDINATOR
Antonio Cesar Ferreira

COMPANY
Unitech

START: 1/3/2002
FINISH: 30/6/2004

The project is aimed at the development of a system for the production of electrical energy, using a fuel cell integrated with a hydrogen production system. Two sources of hydrogen will be researched: solar energy (via water electrolysis) and ethanol reformation. The studies of this first phase will be undertaken to ascertain the technological and economic viability of the two sources of hydrogen. In the case of the electrolysis of water, solar energy will be used as the primary source of energy. Despite the electrolysis of water being commercially used, its cost for producing electrical energy remains high when compared to traditional electricity generators. In order to reduce the cost of the hydrogen, experiments will be carried out to produce it by means of the ionic conductive polymer electrolyte type of technology. Ionic conductive polymer electrolysis has demonstrated an energy reduction of up to 20 per cent. The price of the kilowatt/hour (kWh) with the use of solar energy/electrolyte/fuel cells system could be US$ 0.11. At such a cost, this form of producing electrical energy could have great technological and economic potential. On the other hand, one cubic meter of ethanol can produce up to 5 cubic meters of hydrogen through the reformation reaction. In this way, the cost per kWh could reach US$ 0.049. This value makes the use of the ethanol reformation/fuel cell system to produce electricity quite attractive. Still within the first phase of the work, research will be undertaken into new types of catalysts for ethanol reformation based on palladium, platinum and cerium. These catalysts have been used in the reformation of natural gas, methanol and gasoline.

16 Development of an optimization system for the support of management decisions in the sugar-alcohol production chain

PROCESS
2005/59844-7

COORDINATOR
Jorge Casas Liza

COMPANY
OP2B - Soluções para Otimização de Negócios Ltda.

START: 1/8/2006
FINISH: 31/1/2007

The objective of the present project is to develop a decision-making support system based on optimization for the management of the sugar-alcohol production chain. The scope of the system embraces the agricultural stage (planning of the crop, planting and harvest), the industrial stage and the distribution of final products for the most diverse markets. The project was divided into three stages for its conception, namely: the first considers the planning of the industrial sector in the production chain; the second stage considers the planning of the agricultural sector and the distribution sector, in addition to the horizontal integration of the chain (agricultural + industrial + distribution); the third stage studies the production programming of the industrial sector and the vertical integration (programming + planning) of the production chain. All the stages involve the development of optimization models and end-user interface systems. The present report describes the activities developed in the first stage of

the project, which corresponds to phase 1 of the Technological Innovation in Small Businesses Program (PIPE I). The objective outlined for this stage was the development of optimization models for the solution of the problem of multi-period planning of the industrial process in a sugar-alcohol industry. This model was partially integrated to a graphic environment developed on the .Net for MS-Windows™ and SQL Server database, in order to produce a prototype computer application for decision-making support for the industrial plant managers. The development of the support tool for decision-making was initiated following a survey and analysis of information collected in the open literature and mainly from the questionnaire and interviews conducted with specialists from the industrial sector. The objective of this stage was to identify and define the problem to be modeled. After the identification of the problem, work began on developing a mathematical representation for its optimization, involving the relevant decisions, such as variables, objective function, restrictions and parameters. The model was implemented and resolved in the GAMS environment programming language. The results obtained for the solution were validated by specialists from the sector and improvements were made to the model, with a view to refining both the representational capability of the system as well as the belated formulation of the problem of resources aimed at user-friendlier computer integration. The partial integration of the optimization was executed on the .Net for MS-Windows™ platform.

Chemistry

17 Development of laser polarimeter-saccharimeter

Process
2005/55866-6

Coordinator
José Félix Manfredi

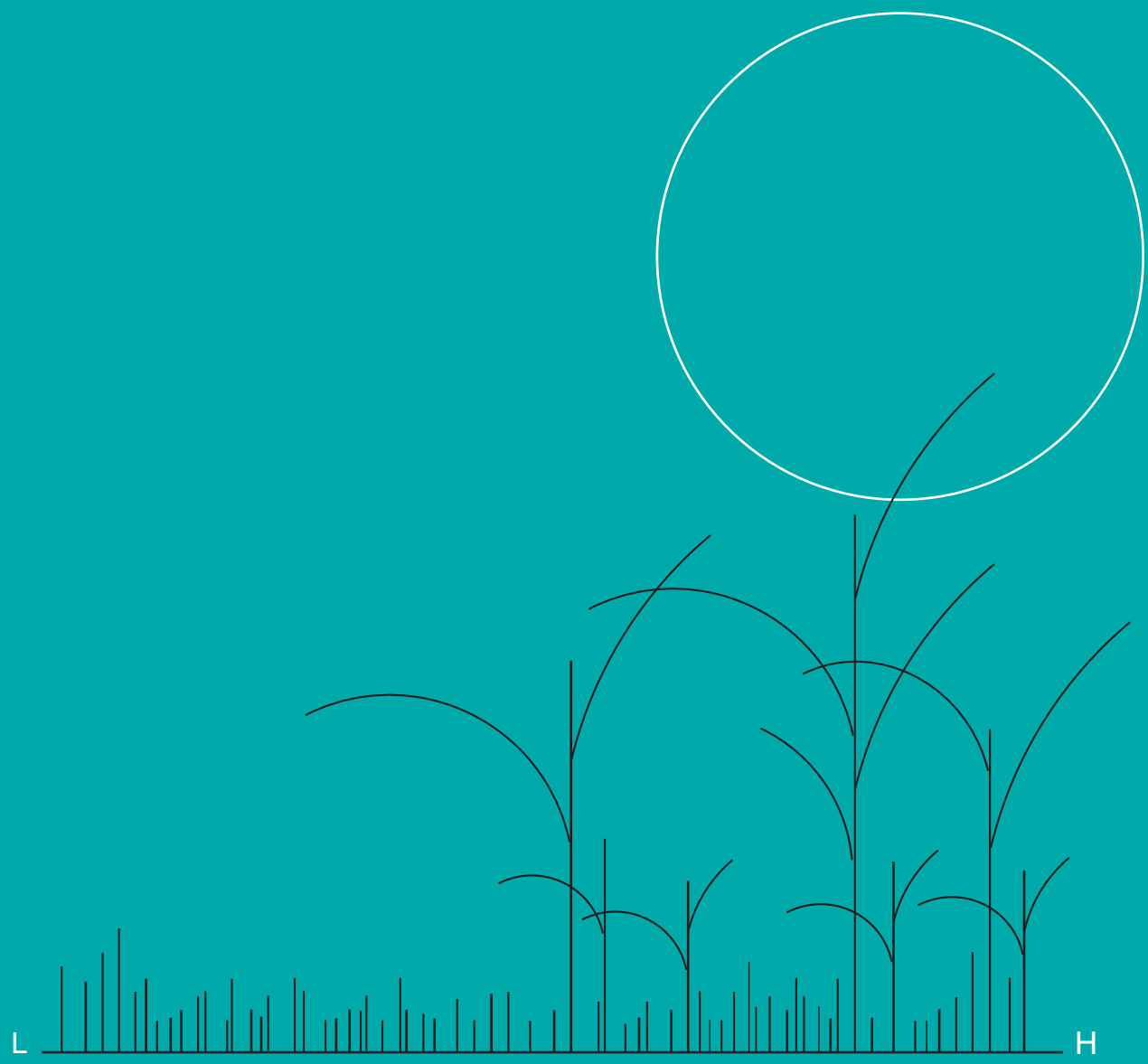
Company
Tech Chrom Instrumentos Analíticos Ltda. - ME

Start: 1/2/2006
Finish: 31/1/2008

The project is aimed at the development of technology applicable to sectors fundamental to national economic life, specifically the sugar-alcohol and the natural products pharmaceutical sectors, contributing to their technological evolution and proposing solutions of ecological and socio-labor import. The present project aims to complete the development and make viable the pre-mass production of an infra-red laser saccharimeter, for application in the determination of sucrose levels in sugarcane juice and process fluids in sugar and alcohol factories, and to develop, based on the same technology, a polarimeter for the pharmaceutical industry for quiral active principles, notably for those obtained from natural products. The adoption of this technology combines the traditional advantages of polarimetric technique with the innovatory characteristics of an instrument that does not present the operational limitations of conventional equipment, mainly with regards to the clarification of samples of low transmittance. The instrument possesses a miniaturized laser source, which enables direct incidence on the sample cell of a coherent monochromatic collimated beam. The project innovates in the application of concepts of solid-state laser optical polarimetry, introducing operational characteristics that make the instrument here proposed the first infrared laser saccharimeter/polarimeter on the international market. The principal applications of the product in Brazil are in the sugar-alcohol agroindustry, where it is used in the system of payment for sugarcane by sucrose level and in the control of the processes of sugar and alcohol production, in the sugar-consuming food industry and in the pharmaceutical industry based on natural quiral products. In this phase of the project we will be optimizing the performance of the detection and optical source system, adapting them to the operational and communications software, and defining the layout of the electronic circuit boards: the instrument will receive industrial design in conformity with the market standards and we will make viable a pre-mass model for real application tests. The development proposed here will give origin to a line of optical analysis instruments for different industrial and academic applications: the operational results obtained in our laboratory will be published in a specialized journal, presenting the differentiated characteristics of the product to the target-audience.

PITE

The Partnership for Technological Innovation Program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Agronomy

1 Development of molecular markers based on sugarcane ESTs for the selection of economically important characteristics

Process
2002/01167-1

Coordinator
Anete Pereira de Souza

Institution
Center for Molecular Biology and Genetic Engineering / State University of Campinas (Unicamp)

Company
Cooperative of Producers of Sugarcane, Sugar and Alcohol in the State of São Paulo

Start: 1/7/2002
Finish: 30/6/2005

The EST sequencing project (Sugarcane EST Project – Sucest) of the FAPESP-Genome program has already identified around 40 thousand clusters which represent the sugarcane genes. The ESTs have the potential to be used in the development of genetic markers. In this way, microsatellite markers can be obtained derived from EST databases, and EST probes can be used in RFLP trials for the mapping of QTLs. In view of the advances that should be achieved in the genetic improvement of sugarcane with the exploitation of the information contained in the EST databases, the proposal is, beginning with these sequences, to develop molecular markers of the RFLP/ microsatellite type. It is also intended to develop specific markers for agronomic characteristics of interest, via conversion of RFLP markers (hybridized with EST probes) into specific PCR markers (SCARs and STSs). The development of these markers will be integrated into a mapping program of qualitative and quantitative characteristics which is in the process of being developed using an F1 population, obtained from the crossing of two commercial varieties of sugarcane.

Biochemistry

2 Sugarcane transcriptom

Process
03/07244-0

Coordinator
Gláucia Mendes Souza

Institution
Institute of Chemistry / University of São Paulo (IQ/USP)

Company
Cooperative of Producers of Sugarcane, Sugar and Alcohol in the State of São Paulo and Central de Alcohol Lucélia Ltda.

Start: 1/8/2003
Finish: 31/7/2005

The production of sugar and alcohol in Brazil could greatly benefit from the introduction of varieties with a high level of sucrose and more resistant to biotic and abiotic stresses. The establishment of such varieties, using traditional techniques of genetic improvement, is a lengthy process. The process could be speeded up if the target genes for the production of the improvement could be identified. The recent sequencing of 237 thousand sugarcane ESTs (Expressed Sequence Tags) offers an opportunity to study their levels of expression on a large scale, employing the microarrays of cDNA technology. The analysis of the transcriptom of contrasting varieties of high and low levels of sugar, using DNA chips, could indicate the genes involved in the accumulation of sucrose throughout the maturation of the plant, pointing to the route for the genetic manipulation of this grass species. In addition to this, a global analysis of the transcriptom of this plant subjected to insect attacks, to interactions with endophytic bacteria, to hydric stress, among other factors, would be extremely valuable to the improvement program. This project aims to use the technology of cDNA microarrays to analyze the levels of 6,528 transcripts in contrasting varieties of sugarcane for the accumulation of sugar and subjected to the conditions mentioned earlier. The project envisages furthermore, the making of nylon membranes containing 3 thousand clones, which will be made available to researchers interested in analyzing the response of this plant to other phenomena.

Food Science and Technology

3 Development of technology aimed at the exploitation of yeast derivatives in human and animal foods

Process
98/04173-5

COORDINATOR
Valdemiro Carlos Sgarbieri

INSTITUTION
Institute of Food Technology (Ital)

COMPANY
Cooperative of Producers of Sugarcane, Sugar and Alcohol in the State of São Paulo

START: 1/12/1998
FINISH: 30/11/2001

The objective of this project is to use yeast biomass to obtain modified products and functional ingredients by means of fractionation for the production of derivatives with different chemical, nutritional and functional characteristics. The processing followed two schemes: a) the biomass, after cleaning, mechanical breaking down and centrifugation, yielded a sediment (cell wall I) and a supernatant which, after treatment, resulted in a precipitate (protein concentrate); b) the biomass, after cleaning, was subjected to a process of autolysis, for the production of an autolysate. This autolysate underwent two different treatments: a dehydration in spray drier (total dehydrated autolysate), while another part was subjected to centrifugation, to obtain a precipitate (cell wall II) and another supernatant (extract). The extract could be concentrated, to obtain concentrated extract, or could be dried, to obtain dehydrated extract. The extract, concentrated or dehydrated, is used in the food industry as an ingredient for nutritional or flavor enrichment. The protein concentrate is used to improve meat products, bread making, soups and sauces. The fractions, cellular walls I and II, could be used as a source of soluble fiber and/or thickener/stabilizer in emulsified or jellified foods.

MATERIALS AND METALLURGICAL ENGINEERING

4 Production of compounds based on natural fibers for use in the automobile industry

PROCESS
96/06464-1

COORDINATOR
Alcides Lopes Leão

INSTITUTION
Botucatu School of Agronomic Sciences / Paulista State University (Unesp)

COMPANY
Toro Indústria and Comércio Ltda.

START: 1/3/1997
FINISH: 28/2/1999

The objective of the present project was the development of a better technology for the conversion of lignocellulosics (waste or not) and virgin or recycled thermoplastics in environmentally friendly products. The principal technologies studied were: formation of coats via air deposition (non-woven) and mixture via melting (extrusion and injection of mixtures). The steps in the project consisted of developing methods to convert lignocellulosic waste (newspaper, sugarcane bagasse and sawdust) mixed with thermoplastics (polypropylene, polyethylene and polystyrene); to optimize laboratory methods to produce composites for the automobile industry, derived from waste; to establish a database of diverse natural fibers (jute, sisal, ramie, coconut, curaua, flax, sugarcane bagasse etc.,) in different proportions and formulations, aiming for better adhesion and mechanical and physical properties; to establish the extension of the recycling processes of these composites and quantify the loss of properties; and to analyze their life cycle, principally in relation to the automobile industry. The composites were evaluated for their mechanical (bending, tension), impact (Izod) and physical (swelling and accelerated aging) properties.

CHEMICAL ENGINEERING

5 DRH Process (Dedini Rapid Hydrolysis) – design, installation and operation of process development unit (PDU)

PROCESS
00/13185-9

COORDINATOR
Carlos Eduardo Vaz Rossell

INSTITUTION
Technology Center of the State of São Paulo Sugarcane, Sugar and Alcohol Producers' Cooperative (Copersucar)

COMPANY
Codistil S/A – Dedini

START: 1/2/2002
FINISH: 30/6/2003

The DHR process (Dedini Rapid Hydrolysis), which consists of the design, installation and operation of a development unit (UDP), brought to the production of alcohol appreciably lower costs than those currently obtained in the best factories, resulting in a significant socioeconomic contribution for the country. The application of this process, considered by Copersucar to be a real breakthrough in the sugar-alcohol industry, permits the production of alcohol from bagasse, freeing cane for the production of sugar without increasing the planted area, which brings significant gains in profitability to the factories. In this way, exports of sugar and alcohol can be increased, and competitive alcohol reduces the concern with the increased price of imported petroleum, leading to a positive impact on the external balance of payments. The UDP has a hydrolysis area for the recuperation of solvent, an area for the treatment of the hydrolysate and an area for the collection and treatment of the effluent.

Chemistry

6 Continuous production of carburant alcohol using *Saccharomyces cerevisiae* supported in chrysolite

Process
98/10180-4

Coordinator
Inês Joekes

Institution
Institute of Chemistry / State University of Campinas (IQ/Unicamp)

Company
Sama - Mineração de Amianto Ltda.

Start: 1/1/1999
Finish: 31/12/2000

This project of technological innovation refers to the production of carburant alcohol by continuous process, derived from sugarcane, using *Saccharomyces cerevisiae* supported in chrysolite, aiming for its industrial implementation as replacement for the traditional, batch or semi-continuous process. The industrial implementation of a continuous process is a long-pursued aim of the productive sector, since it implies a reduction in installation and operational costs and enables the automation of the line, resounding in a reduction in the price of the ethanol produced. This price reduction is fundamental to make ethanol competitive with gasoline. The nub of the continuous process is the existence of a chemically, mechanically and biologically stable supported catalyst. We obtained a supported catalyst of *Saccharomyces cerevisiae* on chrysolite, in which the cells, becoming entrapped, not being removed, gain thermotolerance and display activity for up to a year after the preparation. Fermentation trials with bench-scale fixed bed reactors, using selected strains, displayed an efficiency and productivity considerably higher than the best values obtained with free cells operating in a continuous regime for up to a month. However, fixed bed are not the most indicated in project engineering. It still remains to increase the scale to confirm whether the increases in efficiency and productivity are maintained.

Thematic Projects

Support for Regular Research Projects


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Thematic Projects

Agronomy

1 Evaluation and control of pests, diseases and persistence of herbicides in sugarcane agroecosystems with mechanized harvesting system, without burning

Process
99/08585-9

Coordinator
Antonio Batista Filho

Institution
Biological Institute / SAA-SP

Start: 01/06/2000
Finish: 31/05/2004

The cultivation of sugarcane has undergone profound changes within the technological and social ambits in this decade, trying to adapt to the production demands of high productivity, competitiveness and respect for the environment. In this way, the State Legal Decree 42.056/9, which prohibits the removal of sugarcane straw by burning, is in harmony with the technological anxieties for the sustainable increase in the production of sugarcane in the State of São Paulo. Thus the Experimental Center of the Biological Institute, with its researchers, has been developing, throughout its seventy years in existence, research activities along the line of the protection of plants, including sugarcane, together with the Luiz de Queiroz Agricultural High School, in the Entomology Sector, and the Federal University of São Carlos, in the Center for Agrarian Sciences, this being therefore an area of research interest of the technicians related to the body of this project. The principal objective is to study and develop techniques for the control of pests, diseases and the persistence of herbicides in the areas of mechanically harvested sugarcane in the State of São Paulo, in an economic manner and which protects the environment, concentrating principally on the pest of the sugarcane spittlebug, *Migdoli. ssp.*, the diseases (smut and rust) and the persistence of herbicides in the soil.

Electrical Engineering

2 Technical, economic and environmental analysis of the use of sugarcane for the sustainable generation of electrical energy

Process
01/14302-1

Coordinator
José Goldemberg

Institution
Electrotechnical and Energy Institute / University of São Paulo (USP)

Start: 1/12/2002
Finish: 30/11/2006

A thematic project which seeks to analyze various aspects of the production of energy excedents in the sugar-alcohol sector. The project is divided into eight sub-projects, namely: 1) Production of electricity on a large scale using sugarcane sub-products in the State of São Paulo: alternatives, conditioning factors, obstacles and opportunities. 2) Harvesting and conditioning of sugarcane for burning in furnaces. 3) Development of pinch technology and thermoeconomic analysis for the optimization of the use of utilities in the alcohol/sugar industrial setup integrated to electricity generation. 4) Use of ethanol from sugarcane in electricity generation systems using fuel cells. 5) Survey of the availability of electrical energy in hydroelectric power systems. 6) Large scale broadening of the offer of electrical energy derived from sugarcane biomass. 7) Externalities of the sugarcane productive cycle. 8) Development of optimized sugarcane bagasse dryers.

Genetics

3 Identification of new cry genes derived from isolates from the bacteria *Bacillus thuringiensis* employing molecular biology methodologies and the creation of transgeneic sugarcane plants

Process
2003/09539-8

Coordinator
Manoel Victor Franco Lemos

INSTITUTION
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (FCAV/Unesp)

START: 1/4/2005
FINISH: 31/3/2009

CHEMISTRY

4 Fundamental and technological studies of the chemical and electrochemical use of ethanol for energy

PROCESS
2003/10037-7

COORDINATOR
Germano Tremiliosi Filho

INSTITUTION
Institute of Chemistry de São Carlos / University of São Paulo (IQ/USP)

START: 1/1/2005
FINISH: 31/12/2007

The use of alcohols, especially ethanol, in fuel cells offers a series of attractions, given that ethanol can be obtained from biomass and electrochemical conversion can be more efficient. Ethanol can be used as a source of hydrogen, or can be considered for direct oxidation in the fuel cell. In both cases, catalytic materials are necessary to guarantee a good efficiency of conversion, given that ethanol, yields many subproducts, such as acetaldehyde, formic acid and others. Therefore, the catalytic materials must be capable of promoting the complete dehydrogenation of the ethanol. For this purpose, it is necessary to find catalytic materials capable of promoting the disassociation of the C-C bond and of promoting the oxidation of the intermediate residues absorbed at low overpotentials. The studies will be of a fundamental and technological nature in order to obtain the best electrocatalytic and catalytic materials for ethanol oxidation and reformation

Support for Research

ADMINISTRATION

5 The production cycle of sugar and alcohol derived from sugarcane as a project under the Kyoto Protocol's clean development mechanism: a study of eligibility, determination of baselines and...

PROCESS
1999/06700-5

COORDINATOR
Rubens Mazon

INSTITUTION
School of Business Administration / Getúlio Vargas Foundation (FGV)

START: 1/11/1999
FINISH: 30/9/2001

This concerns the implementation of the thesis of doctoral candidate Carmen Silvia Sanches, under supervision of Prof. Dr. Rubens Mazon, together with the POI department of FGV-SP, already assessed and approved by the examining board. The project considers as the subject for investigation the question of the eligibility of an investment project to be implemented under the Kyoto Protocol's Clean Development Mechanism. Thus, it takes as the object of study the expansion of the "Production cycle of sugar and alcohol derived from sugarcane" covering all the activities and products of the sugar mill, namely, sugar, alcohol and the subproducts derived from sugarcane, including a biomass for energy generation

6 A study for the introduction of small and medium enterprises into the Piracicaba alcohol APL

PROCESS
2005/59633-6

COORDINATOR
Osvaldo Elias Farah

INSTITUTION
School of Business Management / Piracicaba Methodist University (Unimep)

START: 1/4/2006
FINISH: 31/3/2007

This research will be aimed at a study of the small and medium sized businesses manufacturing equipment for sugar and alcohol factories located in the

region of Piracicaba, with a view to these enterprises constituting important links in the supply chain of the alcohol sector in the region. A diagnosis will be undertaken to evaluate their potential for participating effectively in the development of the Local Production Arrangement for Alcohol (APL) which is in the implementation phase in the municipality. The study will be exploratory and will use as background theoretic concepts originating in the administrative area specifically geared to the study of business networks, clusters, APLS, strategic alliances, entrepreneurship, and others. Field research will be undertaken, through interviews aimed at the principal executives of the businesses, in order to diagnose the main problem that need to be solved for the introduction of these companies into the APL in such a way as to develop it for the growth of the alcohol sector aiming not only at the internal distribution of product but also at its large scale export, given that demand is growing on a worldwide scale. The results will be manipulated in scores graded 0 to 5, and will be averaged out in order to identify the most vulnerable points for interventionist actions of short, medium and long term. By way of results it is hoped that the questions raised in the theory relating to small businesses will be confirmed in terms of hypotheses and routes to be taken in support of a more efficient business practice when dealing with problems of interrelationships fostering an appropriate synergy between the set-up assisting the corporate administration in the resolution of management problems.

Agronomy

7 Evaluation of N losses in sugarcane fields with green cane harvesting system

Process
1998/04962-0

Coordinator
Rosana Faria Vieira

Institution
Embrapa Meio Ambiente

Start: 1/8/1998
Finish: 30/9/2001

The harvesting of green sugarcane has continued to gain increasing acceptance in areas which permit the harvesting with machines. In these conditions, however, urea, a nitrogenated fertilizer much used in sugarcane plantations, may suffer large losses through volatization. The presence of straw, therefore, should lead to changes in the application of nitrogenated fertilizers to be used on the sugarcane. Such fertilizers, however, could influence in a marked manner the microbiological activity of the soil or even in the immobilization of N by the microorganism causing undesirable losses of that element of the system. Thus, the aim of this project is to evaluate N losses in sugarcane cultivations.

8 Effects of harvesting sugarcane without burning on the dynamic of carbon and soil properties

Process
1998/12648-3

Coordinator
Christian Leon Feller

Institution
Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 1/1/1999
Finish: 30/6/2001

To evaluate the effects of harvesting sugarcane without burning on the carbon balance with the aim of favoring the sequestration of carbon in the soil and to diminish the emission of greenhouse effect gases in subtropical conditions.

9 Identification and diagnosis of the viruses that cause sugarcane mosaic in the state of São Paulo

Process
2002/03697-8

Coordinator
Marcos Cesar Gonçalves

Institution
São Paulo Biological Institute / SAA-SP

Start: 1/12/2002
Finish: 30/11/2004

Sugarcane mosaic is caused by a viral complex belonging to the subgroup of the Sugarcane mosaic virus, *Potyvirus genus*, *Potyviridae* family. This subgroup consists of four species of potyvirus: Sugarcane mosaic virus (SCMV), Maize dwarf mosaic virus (MDMV), Johnsongrass mosaic virus (JGMV), Sorghum mosaic virus (SrMV); and their different lineages. This project proposes to explore

the reasonable volume of information available in the international literature with respect to SCMV, combined with the use of serology and biomolecular tools aimed at the data collection, identification and the development of a reliable diagnostic technique for the different species and lineages of the virus present in crops in the country. This information is fundamental for the better understanding of the pathogen and for the planning of control strategies so as to prevent potential epidemics.

10 Influence of sugarcane farming systems on the leaching of triazine herbicides and nitrates to recharge area of Guarani aquifer

PROCESS
2002/05067-1

COORDINATOR
Antonio Luiz Cerdeira

INSTITUTION
Embrapa Meio Ambiente

START: 1/3/2003
FINISH: 31/7/2004

A recharge area of the Guarani groundwater aquifer is located in the city of Ribeirão Preto, in Brazil, which is an important sugarcane and grain producing area. Groundwater quality surveys conducted during the past decade indicate that some U.S. aquifers are contaminated with several herbicides and it appears that several current agricultural practices may have adverse impacts on groundwater quality. Among these practices are mechanical sugarcane harvesting and no-tillage grain production in Brazil. Triazine herbicides such as atrazine, ametryn, simazine and nitrogen fertilizers, which are known to have high potential for groundwater contamination are used in this area of Brazil. The objective of this proposal is to evaluate the potential ground water contamination and analyze water quality in response to mechanical sugarcane harvesting, no-tillage and conventional peanut production in rotation after sugarcane. We will determine the amount of ground water contamination and the potential movement of triazines and nitrates in soil.

11 Characterization of industrial yeasts for ethanol production using cellular composition and kinetic characteristics

PROCESS
2003/00177-6

COORDINATOR
Claudia Steckelberg

INSTITUTION
Multidiscipline Center for Chemical, Biological and Agricultural Research / State University of Campinas (CPQBA/Unicamp)

START: 1/7/2004
FINISH: 30/6/2007

The aim of this work is to contribute to the knowledge of the characteristics of the dominant strains of yeast in industrial fermentative processes in Brazilian distilleries. The study is looking to describe the attributes of fermentative performance and cellular composition of isolated strains from several installed processes in different regions of Brazil, with particular characteristics, and of commercial strains currently used in the output of several factories. It is intended to collect samples from 30 industrial units for isolation of the dominant yeast strains in the process which will be tested with commercial strains identified as BG1, BG2, CA T1, SA1, CR1 and PE2, supplied by Lallemam of Brazil, and the Y904, supplied by Mauri of Brazil. These strains will be evaluated in relation to their fermentative performance, tolerance to ethanol, karyiotype and cellular composition (profile of fatty acids). Subsequently it is intended to begin the creation of a database which will gather information on the characteristics (kinetic and cellular composition) of yeast in industrial processes.

12 Form of landscape as criterion in the sampling optimization of soils under sugarcane cultivation Jaboticabal, SP

PROCESS
2004/09553-3

COORDINATOR
Gener Tadeu Pereira

INSTITUTION
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (FCAV/Unesp)

START: 1/5/2005
FINISH: 30/4/2007

The area of the present study is located in the Santa Adélia factory, in the municipality of Jaboticabal, in the Ribeirão Preto region, in the north-east of the State of São Paulo, which forms a part of the geomorphic province of Cuestas Basálticas (Basalt Hills), on the edge of the eastern São Paulo plateau. The region has gently rolling hills with an average altitude of 600 meters. The geological material in the area being studied is related to the São Bento group of basalts, of the Serra Geral formation. The slope studied was chosen on the basis of its predominantly basaltic origin with similar pedalogical characteristics and tractability. A commercial area was selected as it permitted the practical purposes of this study. The soil sampling will be carried out 1 point for each 4 hectares. In the LC sector which represents 172 hectares (Argisoil) 47 points will be sampled, 71 points in the GS sector with 158 hectares (Latosoil), and 150 points in the MS sector with 515 hectares (Latosoil/Argisoil). Soil samples will be collected at a depth of 0-00-0.50 meters with an electronic probe and the chemical and physical properties of the soil determined. The practical importance of this study is related to the following fact: through the comparison of the range of the semivariograms, between sectors, it is possible to estimate the ideal number of samples to characterize each unit and the variability of most of the chemical and physical attributes. Through the Sanos 0.1 program the need is confirmed for a greater number of samples in a segment of greater variability, this being an intelligent and easy to use application.

13 Application of fusel oil in the chemical eradication of sugarcane

PROCESS
2005/02762-9

COORDINATOR
Carlos Alberto Mathias Azania

INSTITUTION
Campinas Institute of Agronomy / SAA-SP

START: 1/1/2006
FINISH: 30/6/2008

Fusel oil, generated in the distillation of alcohol, is the only waste substance from the sugar-alcohol sector that does not have applicability in agriculture, being sold at low cost as a raw material to chemical industries. However, according to some recently developed research, a potential use as herbicide was pinpointed for fusel oil. Thus, within this context, it has become important to study fusel oil as a herbicide substitute. Given this, the objective of this work is to study the efficiency of fusel oil in chemical eradication in sugarcane. The work will be conducted in pots at the premises of the Sugar Center of the Campinas Institute of Agronomy, located in Ribeirão Preto, São Paulo. The experiment will be installed in a completely random layout with 4 repetitions and analyzed in factorial scheme 7 x 3. The factors will consist of different concentrations of fusel oil and a single dose of glyphosate (7 levels) and by different volumes of application solution (3 levels). The efficiency of the fusel oil in terms of sugarcane chemical eradication will be evaluated gauged by the percentage of attacks and height of the plants at 7, 15, 30 and 60 days after treatment (DAT); re-growth and dry mass at 60 DAT. At the end of this work it is hoped, in addition to find the best concentration and volume of solution for the eradication of sugarcane, to gain funding for future research in this area.

14 Herbicides applied to green sugarcane: mobility and selectivity

PROCESS
2005/04547-8

COORDINATOR
Patrícia Andréa Monquero

INSTITUTION
Center for Agrarian Sciences / Federal University of São Carlos (CCA/UFSCar)

START: 1/11/2006
FINISH: 31/10/2007

Sugarcane cultivation absorbs huge amounts of labor and inputs in its production cycle. Within the inputs, herbicides represent around 56 per cent of the volume sold in the country. Inhibitors of acetolactate synthase and photosynthesis inhibitors are herbicides widely used because of their low toxicity to animals, high selectivity for crops, for their efficiency and broad spectrum of control of harmful plants. However, with the actual tendency to increase areas of sugarcane harvested without prior burning, the handling of harmful plants is experiencing significant changes, necessitating greater study with respect to herbicides which adapt to this type of harvesting. Therefore, this research will analyze mobility through different quantities of sugarcane straw and the lixiviation of the herbicides tryfloxysulphuron + ametryn, imazapic, imazapyr and diuron+hexazinone and will study the selectivity of the herbicides trifloxysulfuron-sodium + ametryn, trifloxysul-

furon-sodium + ametryn + diuron+hexazinone, diuron+hexazinone, diuron+hexazinone + ametryn and ametryn in different strains of sugarcane.

15 Genetic mapping and identification of genetic and functional molecular markers associated with agronomic characteristics of interest in sugarcane

PROCESS
2005/55258-6

COORDINATOR
Luciana Rossini Pinto

INSTITUTION
Campinas Agronomy Institute / SAA-SP

START: 1/12/2005
FINISH: 30/11/2008

In Brazil, the sugarcane agribusiness turns over around R$ 36 billion each year. The mapping of QTLs relating to sugar levels and the components of production (number of profiles, diameter and height of stalks) is of great importance to sugarcane improvement. Sucest has enabled the development of functional markers for the genetic mapping. Such markers are ideal for assisted selection, given that these markers may be responsible for the characteristic in question. The present project aims to initiate a program of genetic mapping for the Cana IAC program. Molecular markers of the AFLP type, genomic and functional microsatellites (EST-SSRs) with homology to genes of interest will be used for the construction of a genetic map starting from a biparental crossing, between elite materials of the program. It is intended to detect and map QTLs associated with sugar levels and to the components of production and to verify the association of RFLPs-PCRs markers developed from ESTs corresponding to genes expressed during the interaction with *Puccinia melanocephala*, with resistance to rust. The construction of this genetic map will assist in the validation of the genomic and functional markers associated with agronomic characteristics of interest identified in other sugarcane maps, giving support in the application of these markers for assisted selection.

16 Control of the sugarcane weevil, *Sphenophorus levis*, with entomopathogenic nematodes

PROCESS
2006/59541-7

COORDINATOR
Antonio Batista Filho

INSTITUTION
São Paulo Institute of Biology / SAA-SP

START: 1/3/2007
FINISH: 28/2/2009

Amongst the pests that damage sugarcane crops in the State of São Paulo, the curculionid beetle *Sphenophorus levis Vaurie*, 1978, has grown in importance, principally as it spread to areas where its incidence had not been previously registered. This insect known also as the sugarcane weevil, in its larval phase, feeds on the rhizome of the plant, being capable of causing damage to between 5 and 60 per cent of the shoots, and losses in production of up to 30 per cent. Entopathogenic nematodes of the *Heterorhabditis* and *Steinernema* kind have shown themselves to be fairly effective in the control of several species of curculionids, including the *Sphenophorus* kind which constitutes a significant pest in the United States and Japan. In Brazil, several pieces of research have demonstrated great potential in the use of the *Steinernema sp.* IBCB-n6 nematode for the control of the sugarcane weevil ever since the first study on the subject. This project will have the following objectives: 1) to evaluate new isolates of nematodes against *S. levis* adults; 2) to evaluate the virulence of *Steinernema sp.* IBCB-n06 replicated in two species of hosts, against *S. levis* adults; 3) to evaluate the efficiency of *Steinernema* against *S. levis* in sugarcane areas with and without straw covering; 4) to determine the best time of the year and number of applications of *Steinernema sp.* in the control of *S. levis*; 5) to evaluate the efficiency of *Steinernema sp.* in application with vinasse in the control of *S. levis*; and 6) to evaluate the persistence of *Steinernema sp.* in sugarcane areas treated with the nematode, and the efficiency of the control agent of *S. levis*.

17 Efficiency of the mixture of ripeners and of the association of boron and silicon via foliar application to sugarcane (*Saccharum officinarum l.*)

PROCESS
2007/00034-1

COORDINATOR
Carlos Alexandre Costa Crusciol

INSTITUTION
Botucatu School of Agronomic Sciences / Paulista State University (Unesp)

START: 1/4/2007
FINISH: 31/3/2009

The object of the research is to evaluate the efficiency of ripener mixtures, with different mechanisms of action, and the association of boron and silicon via foliar application, by means of biometric, biochemical and technological evaluations, as well as the residual effect in the re-growth of the sugarcane rootstock, both in the application at the start and at the end of the harvest. Consequently, the present research project will consist of 3 experiments set up and carried out in October 2006, March and October 2007 and March 2008 (totaling 12 experiments) in sugarcane second harvest, in the Fazenda Bosque, situated in the municipality of Igaraçú do Tietê, State of São Paulo, belonging to the Cosan Group; Barra Unit (Barra Factory). The experimental outline used in all the experiments will be in random blocs with five repetitions. In the experiments at the start of the harvest the RB855453 (early ripening) variety will be used, and at the end of the harvest the SP80-3280 (late ripening) variety. Experiment 1 will consist of two treatments: the application of three chemical ripeners (KNO3, Sulfometuron-methyl and Glyphosate) plus the control bloc (natural ripening) associated with B foliar (with and without application); experiment 2 will consist of the following treatments: the application of three chemical ripeners (KNO3, Sulfometuron-methyl and Glyphosate) plus the control bloc (natural ripening) associated with Si foliar (with and without application). Experiment 3 will consist of the following treatments: 1 – control bloc, without application of ripener, 2 – application of Glyphosate, 3 – application of Sulfometuron-methyl, 4 – application of Trinexapac ethyl, 5 – application of the mixture Glyphosate and Sulfometuron-methyl and 6 – application of the mixture of Glyphosate and Trinexapac ethyl. The application of the treatments will occur in the months of March and September/October. The biochemical, biometric and technological results will be evaluated. The results will be subjected to variance analysis and the averages compared by DMS to 5 per cent probability.

BIOCHEMISTRY

18 Proposal for DNA coordinator of the sugarcane EST project (Sucest)

PROCESS
1998/12250-0 – Sugarcane Genome Project

COORDINATOR
Paulo Arruda

START: 1/12/1998
FINISH: 31/5/2004

19 Preparation of a genomic library of *Xylella fastidiosa* in lambda phage and preparation of sugarcane CDNA libraries

PROCESS
1998/16368-5 – Sugarcane Genome Project

COORDINATOR
André Luiz Vettore de Oliveira

START: 1/2/1999
FINISH: 4/7/2001

20 Data mining

PROCESS
1999/02844-2 – Sugarcane Genome Project

COORDINATOR
Francisco Gorgônio da Nóbrega

START: 1/6/1999
FINISH: 31/8/2002

21 Sugarcane Genome Project: sequencing laboratory

PROCESS
1999/02878-4 – Sugarcane Genome Project

COORDINATOR
Suely Lopes Gomes

START: 1/6/1999
FINISH: 31/5/2002

FOOD SCIENCE AND TECHNOLOGY

22 Elaboration of a multimedia program, for dimensioning and calculations for sugar industry and use in teaching activity

PROCESS
1997/11220-7

COORDINATOR
Tadeu Alcides Marques

INSTITUTION
Multidiscipline Center for Chemical, Biological and Agricultural Research / State University of Campinas (CPQBA/Unicamp)

START: 1/3/1998
FINISH: 31/3/1999

The intention is to develop a piece of multimedia software, with images, animations and calculation routines for dimensioning and detailing of equipment for the sugar-alcohol sector, aiming to provide technical support and teaching activities, for use in the productive sector and in teaching institutions. It is important to highlight that with the advance of information technology, complex and lengthy calculations can be resolved in record time, meeting the practical need of the sugar sector and enabling more exact and precise decision taking, providing higher revenues and productivity.

23 Development of a fluidized packed-bed reactor for production of ethanol using flocculent yeast strains

PROCESS
1998/02708-9

COORDINATOR
Silvio Roberto Andrietta

INSTITUTION
Multidisciplinary Center for Chemical, Biological and Agricultural Research / State University of Campinas (CPQBA/Unicamp)

START: 1/7/1998
FINISH: 30/6/1999

Selection will be made from among 17 isolated flocculent strains from the industrial unit of the Diana distillery during the 96/97 harvest, of one or more that display the characteristics of high speed growth, high alcohol yield, high speed of substrate consumption and raised flocculation capacity. Based on this selection the strain will be tested in a tower-type fermentor where it is hoped to operate it with a fluidized bed. Studies will be undertaken in this reactor relating to the diameter/height of the bed, recycle flow rate, concentration of substrate in the feed and feed flow rate. It will be used to define trials to be carried out or experimental factorial planning (response surface method).

24 Development of process of stabilization of clarified sugarcane juice with added acidic fruit juices

PROCESS
2001/06304-4

COORDINATOR
Roberto Herminio Moretti

INSTITUTION
School of Food Engineering / State University of Campinas (FEA/Unicamp)

START: 1/1/2002
FINISH: 31/12/2003

Sugarcane juice, a drink that is popularly known and commonly sold by streets vendors in Brazil, is a product the possession of which has proved to be a lucrative business. Bearing this in mind, there is great interest in the development of technologies that will allow it to keep for longer periods of time, since it is a perishable product. The work referred to, aims to stabilize the drink through its clarification, the use of thickener/stabilizer, preservative and an antioxidant, as complementary procedures to pasteurization and refrigeration. In addition to this, tests will be conducted on the sensory improvement and the conservation of the drink through the mixture of concentrated juices of acidic fruits such as pineapple and lemon.

25 Determination of the sensory characteristics of sugarcane spirits produced in the central region of the state of São Paulo

PROCESS
2001/12931-1

COORDINATOR
João Bosco Faria

INSTITUTION
Araraquara School of Pharmaceutical Sciences / Paulista State University (Unesp)

START: 1/5/2003
FINISH: 31/5/2007

The establishment of quality standards for Brazilian cachaça is a fundamental stage if one is to think of establishing a quality control capable of guaranteeing the access of that drink to the international market. In this sense, in addition to knowing and controlling the main ingredients liable to cause

defects in that drink, it is also vital to be aware of the sensory characteristics associated with the products of greater and lesser acceptance, so as to be able then to act in the direction of improving the quality of the liquors produced. The survey and collection of samples from the cachaça producers in the region will make it possible, for the first time, through sensory analysis and the determination of the profile of volatiles (parallel project presented by Prof. Douglas W. Franco – IQSC-USP), to furnish a picture of the current situation and of the possible means of action to improve and control the quality of the liquor produced here. Partnerships with town halls will pave the way for a future concerted action with a view to improvements in the quality of this product.

26 Production of extrafine glucose and ethanol derived from sugarcane bagasse

PROCESS
2002/13037-5

COORDINATOR
João Batista de Almeida and Silva

INSTITUTION
Lorena School of Engineering / University of São Paulo (USP)

START: 1/7/2004
FINISH: 31/12/2006

This work consists of the study of the processes of purification and crystallization of glucose obtained from the hydrolysis of the cellulosic fraction of sugarcane bagasse. The cellulosic hydrolysate subjected to the purification process, will yield a glucose syrup. The fermentative process will be carried out using the purified glucose syrup as a fermentation medium for *Saccaromyces cerevisiae*, with a view to obtaining ethanol. Evaluation will be undertaken of the best cultivation conditions, in order to obtain a product with a high index of purity and in suitable condition for the production of fine drinks and other products of interest.

27 Extraction and transesterification of soya oil with ethanol for production of biodiesel

PROCESS
2004/15164-0

COORDINATOR
Marisa Aparecida Bismara Regitano D Arce

INSTITUTION
Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

START: 1/6/2005
FINISH: 31/7/2007

The present project aims to carry out the extraction and the process of transesterification of soya oil with ethanol to obtain biodiesel (ethylic esters), a fuel derived from a renewable raw material. Soya samples will be subjected to the process of extraction with ethanol, and the micelles obtained will be transesterified directly so as to obtain biodiesel using NaOH as catalyst. After the reaction, the fraction containing glycerine and the excess ethanol will be separated and the ethylic esters obtained will be neutralized and dried for subsequent characterization, according to the preliminary specification of the ANP.

28 Alcoholic extraction of vegetable oils: study of the solid-liquid equilibrium and the stage of the recovery of the solvent

PROCESS
2006/00565-4

COORDINATOR
Christianne Elisabete da Costa Rodrigues

INSTITUTION
School of Zootechnics and Food Engineering / University of São Paulo (USP)

START: 1/7/2006
FINISH: 30/6/2008

The present research project aims to study the technical viability of the use of less aggressive solvents, as substitutes for hexane, in the process of the extraction of vegetable oils from solid matrices. The use of alcoholic solvents as substitutes for hexane offers considerably attractive advantages from the environmental point of view, given that the suggested solvent is produced via biotechnology, does not generate toxic waste, presents a lower handling risk because of its lower degree of inflammability and is considered safe for human health. Advantages from the economic point of view are also evident, given that ethanol is produced on a large scale in Brazil and can easily be recovered, for subsequent re-use in the process. Although some advantages to the substitution of hexane by ethanol are evident, there are lacunae which need to be addressed through a systematized study of the solid-liquid extraction process. As a first effort in the direction of implement-

ing the use of ethanol as an extractant of vegetable oils from solid matrices an experimental study of the extraction is proposed with the determination of curves of equilibrium and kinetics in thermostatic equipment. In these trials, the objective is to monitor indices of quality of the oil extracted such as: free fatty acids, phosphatides, color and unsaponifiable compounds, principally, antioxidant and vitamin compounds. In addition, it is intended to ascertain the optimum conditions of contact between solid and solvent, such as: preparation of the seeds, solid rate: solvent, extraction temperature, contact time, recovery of solvent, among others. On this last topic, recovery of solvent, what will mainly be evaluated is the viability of using a deacidification technique by liquid-liquid extraction, using ethanol as solvent, allied to the process of oil extraction from the oleaginous matrix using an alternative solvent.

29 Study of the contamination of sugarcane juice by polycyclic aromatic hydrocarbons (PAH)

PROCESS
2006/52186-7

COORDINATOR
Sílvia Amélia Verdiani Tfouni

INSTITUTION
Institute of Food Technology / SAA-SP

START: 1/2/2007
FINISH: 31/1/2008

Polycyclic Aromatic Hydrocarbonates (HPAs) are compounds formed from the incomplete burning of organic material and constitute an important class of environmental pollutants, many of them proven to be carcinogenic. In Brazil, the harvesting of sugarcane is done generally after the burning of the cane fields. This procedure could result in the contamination of the sugarcane by HPAs, and consequently, of the products obtained from the cane. In the present study, samples of juices commercialized in the cities of Campinas and Ribeirão Preto, São Paulo, will be collected at two different times in the year and analyzed for the presence of 4 HPAs. The results of this research should identify the levels of contamination of the juices on sale and verify possible seasonal differences in the levels of contamination

30 Use of alternative regional substrates for the production of ethanol, levan and sorbitol by *Zymomonas mobilis*

PROCESS
2006/54750-7

COORDINATOR
Crispin Humberto Garcia Cruz

INSTITUTION
São José do Rio Preto Institute of Biosciences, Arts and Exact Sciences / Paulista State University (Ibilce/Unesp)

START: 1/8/2006
FINISH: 31/7/2008

The principal product of the fermentation of sugars by Zymomonas mobilis is ethanol when glucose and fructose are used as carbon sources. However, when sucrose is used, the yield of ethanol decreases owing to the formation of economically important subproducts such as levan and sorbitol. The use of low cost, alternative regional substrates to obtain these bio-products has become very interesting, since, in addition to the ease of acquisition and the low cost, the products to be obtained have a high added value. The principal objective of this work will be to study the production process of ethanol, of exopolysaccharide levan and of sorbitol by *Zymomonas mobilis* CCT 4494, using commercial sucrose, sugarcane juice and molasses. In addition, evaluation will also be undertaken of the activity of the levansucrase enzyme, aiming, subsequently, for its individual use. Tests will be conducted on the effect of the addition of different concentrations of sucrose, mineral salts (KCl, K2SO4; MoSO4 and CaCl2) in the production media, as well as the influence of the incubation temperature and the initial pH.

31 Addition of organic nutrient as source of proteic nitrogen to sugarcane must for the production of alembic cachaça

PROCESS
2007/50195-1

COORDINATOR
Elisângela Marques Jerônimo

INSTITUTION
Paulista Technology Agency for Agribusiness (Apta)

START: 1/4/2007
FINISH: 31/3/2009

Brazil produces around 1.3 billion liters of cachaça each year, a figure which reflects the social and economic importance of this drink. In alembic cachaça production units the quality of the recycled ferment is compromised and the nitrogenated complementation of the must could constitute a beneficial practice in the cellular multiplication and growth of the ferment and, for the improvement in the indices of efficiency, yield and productivity of the process. For the production of cachaça in artisanal processes there are no specific studies on the fermentative characteristics of the yeast or on the quality of the drink, involving nitrogenated complementation and, specifically the application of N protein. Thus, the objective of this project is to evaluate organic nutrient addition as a source of nitrogen protein to the must of sugarcane juice, under the maintenance of the viability of the ferment and chemical and sensory quality of the cachaça, in fermentations with recycling of the decanted yeast, on a pilot scale, simulating the artisanal cachaça production process.

Political Science

32 Public policy lines of direction for the sugarcane agroindustry in the state of São Paulo

Process
2006/51725-1

Coordinator
Luis Augusto Barbosa Cortez

Institution
Interdisciplinary Nucleus for Energy Planning / State University of Campinas (NIPE/Unicamp)

Start: 1/8/2006
Finish: 31/7/2008

The objective of this project is to propose lines of direction, strategies and policies for the development of the sugar-alcohol sector in the state of São Paulo. It will embrace the areas of agricultural and industrial production, products and externalities. The team is composed of the Paulista Agency for Agribusiness Technology (Apta), in the role of institutional partnership, and by the institutions: CTC, Embrapa, Faenquil, IPT, UFSCar, Unesp, Unicamp and USP. The activities of diagnostics, analysis, prospection, evaluation, development of proposals for improvement, change and /or innovation and dissemination of knowledge constitute the scope of the project. The result will take into consideration the entire production chain and will offer subsidies for the development of public policies for the sector.

Ecology

33 Production of brown sugar and other organic products in small holdings

Process
1999/03106-5

Coordinator
Luiz Antonio Correia Margarido

Institution
Center for Agrarian Sciences / Federal University of São Carlos (CCA/UFSCar)

Start: 1/7/1999
Finish: 31/10/2001

Despite the increase in productivity of the main agricultural crops in recent years, the agricultural model adopted, based on the assumptions of the Green Revolution is questioned from the point of view of sustainability. The project in question is multidisciplinary and consists of an alternative proposal for the production of mascavo sugar and other food products in smallholdings. It concerns an alternative for family agriculture, a segment which deserves special attention because of its importance within the national contexts and which contemplates sustainability through ecological, social and economic approaches.

Economy

34 Ecosystemic/energy related and economic evaluation of the sugar/alcohol sector in the state of São Paulo

Process
2000/00178-4

Coordinator
Enrique Ortega Rodriguez

Institution
School of Food Engineering / State University of Campinas (Unicamp)

Start: 1/4/2000
Finish: 30/4/2001

The objective of this project is to study the man-

ner in which new technological tendencies in the sugar-alcohol sector will change the profile of the socioeconomic performance of sugar and alcohol factories and draw up a scenario for the sector, using "energetics" methodology.

Agricultural Engineering

35 Sweeping of the ground during sugarcane harvest using a disk with articulated segments: design and experimental validation

Process
2001/05910-8

Coordinator
Oscar Antônio Braunbeck

Institution
School of Agricultural Engineering / State University of Campinas (Unicamp)

Start: 1/8/2001
Finish: 28/2/2003

The present study's objective is to evaluate the performance of an alternative mechanism for the sweeping and base cutting of sugarcane, which comprises articulated cutting edges, which have the function of following the ground level and retracting when confronted with stones and stumps. This proposal is based on the fact that the conventional cutter used in harvesters does not have the capacity to accompany the ground profile, causing problems with the inclusion of earth along with the material collected, loss of raw material, frequent breakdowns with the cutting edges and excessive power demands deriving from soil movement during the cutting process. The evaluation of the proposed mechanism will be carried out by means of mathematical modeling, simulation, dimensioning and subsequent experimental validation of the pilot unit, with the objective of quantifying the performance of the unit's sweeper, procedures that will make it possible to draw conclusions on the viability of the mechanism in subsequent trials under field conditions.

36 Performance of tractor tire type in areas with three conditions of surface: loose soil, firm soil, soil covered with sugarcane straw

Process
2006/60423-9

Coordinator
Antônio Gabriel Filho

Institution
Botucatu School of Agronomic Sciences / Paulista State University (Unesp)

Start: 1/5/2007
Finish: 30/4/2008

The aim of this work is to quantify the traction efficiency of a tractor fitted with diagonal and radial tires in conditions of soil with firm surface, disturbed surface (scarified) and soil with a vegetal covering. The experimental layout will use three strips, defined by the conditions of the ground surface, distributed in random blocs in a factorial scheme of 2x4, with the treatments being defined by the two types of tire and four speeds of the tractor, with three repetitions in each strip, totaling 72 experimental units. Monitoring will be carried out of the force of traction, skidding of the rear and front wheels, dislocation speeds and hourly fuel consumption, using the UMEB – the Mobile Unit for Traction Bar Trials belonging to Nempa – Nucleus for Agroforestry Machine and Tire Trials. UMEB was built using a mobile home-type trailer, modified and adapted for use as an instrumented dynametric car. Its total mass is 8,000 kg supported on a frame with four double-wheel sets.

37 Sensitivity of sugarcane to excess groundwater

Process
2006/61654-4

Coordinator
Sérgio Nascimento Duarte

Institution
Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 1/6/2007
Finish: 31/5/2009

The objective of this work is to determine the effect of different speeds of decreasing the freatic level, in different stages of the development of sugarcane, as well as to obtain an equation which correlates relative productivity with the daily stress index (DSI). The experiment will be conducted in 64

lysimeters, in an experimental layout of randomized blocs, arranged in a factorial scheme of (3 x 5 + 1), comprising 3 stages of development, 5 speeds of decrease in freatic level plus one control bloc that will not suffer stress through excessive humidity. The results obtained will make it possible to obtain a drainage criterion to calculate the spacing of drains using equations of non-permanent movement. The equation that correlates to productivity relative to the DSI will be used in the model Sisdrena (MIRANDA, 1997) for estimates of the most economical spacing between drains, for the regions of Ribeirão Preto and Piracicaba.

Materials and Metallurgical Engineering

38 Study of the behavior of materials for automotive components in combustible environments

Process
1998/07529-5

Coordinator
Isolda Costa

Institution
Institute of Energy and Nuclear Research (Ipen)

Start: 1/10/1998
Finish: 31/10/2001

This project will investigate the corrosive behavior of the alloys Al-Si-X (X=Cu, Mg, Fe), produced by spray conformation and from carbon steel in the presence of gasoline fuel, alcohol fuel and pure alcohol, the latter with additions of low levels of possible contaminants of fuel alcohol. For comparative effect, methanol and ethanol will be used as the pure alcohols. The corrosive behavior will be studied by means of loss of mass trials and electrochemical trials, with emphasis on the electrochemical impedance trial.

39 Derivatization of celluloses isolated from different sources

Process
1998/14814-8

Coordinator
Elisabete Frollini

Institution
Institute of Chemistry de São Carlos / University of São Paulo (IQ/USP)

Start: 1/3/1999
Finish: 28/2/2001

The intention in this work is to subject celluloses obtained from different sources to an atmosphere of ionized air, in order to evaluate if this treatment has any influence on the process of solubilization and derivatization of these substances. These macromolecules will be evaluated as to the degree of crystallinity, molar mass, sweeping electronic microscopy, and inverse phase gas chromatography. Using celluloses that have and have not been subjected to ionized air, it is intended to synthesize acetates of cellulose with diversified degrees of substitution, in homogeneous and heterogeneous media, which will be characterized as to the degree of substitution, uniformity of substitution, thermal stability, average molar mass and distribution of molar mass.

Mechanical Engineering

40 Reduction of emissions from spark ignition engines through use of pre-vaporized alcohol, multiple direct injection and excess air combustion

Process
1999/11964-1

Coordinator
Josmar Davilson Pagliuso

Institution
São Carlos School of Engineering / University of São Paulo (USP)

Start: 1/9/2000
Finish: 31/8/2003

It is proposed to reduce pollutant emissions from automobile engines through the use of vaporized alcohol as a fuel and with excess air burn. A fuel vaporization and delivery system for light vehicle engines is discussed. Examination is made of the mechanisms which contribute to the production of pollutants in spark ignition engines and the potential of vaporized alcohol to reduce the effect of several of these mechanisms.

41 Use of biomass for fuel purposes: case study – sugarcane bagasse

PROCESS
2000/03087-0

COORDINATOR
Silvia Azucena Nebra de Perez

INSTITUTION
School of Mechanical Engineering /
State University of Campinas (Unicamp)

START: 1/9/2000
FINISH: 30/9/2003

The present project centers on the study of the use of biomass for fuel purposes focusing on different aspects of the problem based on a case study, that of sugarcane bagasse. This project is based on the results of previous research which has been developed by the group both in the areas of drying and in the evaluation of the use of energy in thermal equipment. One of the aspects dealt with is that of the drying of the biomass, proposing to this end the study of cyclonic dryers. The ultimate objective is to obtain a viable proposal for an industrial dryer, which will contribute to energy savings in the furnaces. The other aspect deals with the analysis of the use of energy in the industrial plant. This part of the work was split into two areas: thermo-economic analysis / optimization of the factory's cogeneration plant and of the sugar production process. The objectives of each of these areas are different, but concomitant. The analysis/ optimization of the cogeneration plant aims to obtain greater generation of electrical energy for the production process and a decrease in the consumption of process steam.

42 Expansion of study via the torrefication of sugarcane bagasse and thermal homogenization of the torrefier

PROCESS
2002/03215-3

COORDINATOR
Carlos Alberto Luengo

INSTITUTION
Gleb Wataghin Physics Institute /
State University of Campinas (IFGW/Unicamp)

START: 1/9/2002
FINISH: 30/11/2003

This research funding aims to broaden and support logistically the activities of project 99/01064-3. Research will be directed in two directions: the study of the torrefication process of briquettes of sugarcane bagasse and the study of the phenomena of heat transfer in the torrefication oven (in operation). Both studies aim to improve the performance and the scope of the proposed system. To support this activity, it is proposed to invite Professor Dr. Pedro Beaton, vice rector of the Universidad de Oriente - Cuba, for a period of 30 days. The proposals and the logistical requirements to bring this about are in the body of the text. The visitor will also collaborate on a course of interdisciplinary Energy Planning.

43 Conversion of diesel engine to use of vaporized alcohol

PROCESS
2005/55142-8

COORDINATOR
Geraldo Lombardi

INSTITUTION
São Carlos School of Engineering /
University of São Paulo (USP)

START: 1/1/2006
FINISH: 31/12/2007

The conversion of the diesel engine to exclusive use of vaporized alcohol is proposed. Two stages in the testing of the engine are envisaged aiming for a conclusive economic-operational comparison, within two geometries: in the first, with the engine in its original configuration; in the second with the engine adapted for the use of alcohol adiabatically in the air of the turbo-compressor output. In each set of tests the output power as a function of the fuel-air and of the rotation are measured. The emission of pollutants, handling and other necessary properties will be monitored. The power is controlled by the fuel discharge with the admission of air from the turbo-compressor, preferably, open. The Diesel engine used is model MWM4. 1 OTCA with air intake cooler, as used in trucks, harvesters and buses. Some electronic controls are designed locally. It is proposed to develop the engine to a level for swift application in the market, providing conditions for the drastic reduction in the emission of pollutants into the urban atmosphere.

Chemical Engineering

44 Bagasse cellulose and sugarcane straw: chemical modification and application as reinforcement in polypropylene compounds

Process
2002/12834-9

Coordinator
Adilson Roberto Gonçalves

Institution
Lorena School of Chemical Engineering

Start: 1/10/2003
Finish: 30/9/2005

In this project composites will be obtained using as reinforcement bagasse cellulose and sugarcane straw chemically modified by benzylation and benzolation. The composites will be prepared in a force-fed degassing mono-thread extruder with variable compositions of reinforcement (10-50 per cent), injected directly into molds with specific dimensions for mechanical trials of traction, flexion and shearing. The composites will be characterized by MEV, polarized light optic microscopy, TGA, DSC and TMA. Preliminary tests were undertaken to obtain composites in mono-thread extruder and "Dryser" mixer using bagasse cellulose as reinforcement for polypropylene and the composite obtained was more homogeneous and displayed greater values of resistance to traction and flexion than that obtained in the extruder. However, mixing in the "Dryser" causes breakage in the length of the fibers, making it necessary to study the fiber/matrix mixture. Optimization of the use of the extruder is essential to obtain homogeneous composites which preserve the integrity of the fibers.

Genetics

45 Molecular analysis (via rapd) of sugarcane plants derived from cultivation of meristems

Process
1997/04617-8

Coordinator
Maria Lúcia Carneiro Vieira

Institution
Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 1/11/1997
Finish: 31/10/1999

Up to now, a proportion of sugarcane seedlings have been obtained by micropropagation technique. This technology is valuable, since the varietal offer is broad, thus enabling the acquisition of seedlings in a short time span. However, some varieties, when propagated by the culture of meristems, display high levels of somaclonal variation. In this project, trials will be undertaken to monitor this process of variability generation in sugarcane. Analysis will be carried out on somaclones originating from the Usina Barra Grande with abnormal characteristics which affect production. Analysis will also be undertaken of shoots originating from various stages (subcultures) of micropropagation, generated in the laboratories of Copersucar and Usina Ester. The method aims to detect alterations generated in vitro in the patterns of DNA bands, using a molecular marker.

46 Genomic and functional characterization of mutator transposons in sugarcane

Process
2003/08890-3

Coordinator
Maria Magdalena Rossi

Institution
Institute of Biosciences / University of São Paulo (USP)

Start: 1/4/2004
Finish: 31/3/2008

Transposition elements (TEs) constitute an important part of the genetic material of eucarionts, representing from 45 per cent in humans to 50-80 per cent in the genome of gramineous plants. In the Sucest database, an abundant spectrum of expressed TEs was found. The most frequent element was the transposon MuDR. Results obtained in our laboratory revealed that there exists at least three classes of these transposons in plants and that these existed prior to the divergence between mono and dicotyledons. Within each of the classes the phylogenetic relationships between the species are maintained. Each class presents patterns of genetic insertion, in addition to frequency of different stop codons and

frame shifts; these observations suggest differences in the levels of activity of the elements. In this context, this project aims to clone the MuDR elements in sugarcane for its subsequent genomic and functional characterization, the specific objectives being: the cloning of at least one element of MuDR for each one of the three classes identified, structural characterization of the cloned elements (introns, exons, TIRs, etc), characterization of the flanking regions, evaluation of the number of copies, identification of the parental contribution of the hybrids and the study of the expression of the elements.

47 Patenting of a sugarcane promoter induced by herbivorous insects

PROCESS
2004/09979-0 – Program for the Support of Intellectual Property (PAPI)

COORDINATOR
Márcio de Castro Silva Filho

INSTITUTION
Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

START: 1/12/2004
FINISH: 30/11/2006

48 Characterization of the ssnac23 gene in transgenic sugarcane plants

PROCESS
2004/15865-8

COORDINATOR
Marcelo Menossi Teixeira

INSTITUTION
Center for Molecular Biology and Genetic Engineering / State University of Campinas (Unicamp)

START: 1/4/2005
FINISH: 31/3/2007

The study of the stress response mechanisms in sugarcane can contribute to the creation of varieties more resistant to cold and drought. This project aims to characterize the role of the SsNAC23 gene, induced by cold temperatures and with high similarity to transcription factors. To this end, the responses will be studied of plants superexpressing or silenced for the SsNAC23 gene. Analyses of the photosynthesis, levels of prolene and lipid peroxidation will be conducted in the transgenic plants and in control plants, subjected or not to conditions of cold and hydric stress, so as to verify the greatest resistance of transgenic plants to these conditions. The genes regulated by the SsNAC23 factor of transcription will be identified via microarrays of cDNA, comparing control and transgenic plants.

49 Use of ethanol and ACC synthesis for the induction of maturation of sugarcane

PROCESS
2005/60513-5

COORDINATOR
Marcelo Menossi Teixeira

INSTITUTION
Center for Molecular Biology and Genetic Engineering / State University of Campinas (Unicamp)

START: 1/8/2006
FINISH: 31/7/2008

Sugarcane (*Saccharum spp.*) cultivation is among the most important activities in Brazil, it being a sector of great economic importance to the country due to the increasing consumption of alcohol and sugar. A common practice prior to harvesting the cane is the application of ethylene hormone precursors to accelerate the final ripening of the plants, and consequently to increase sucrose levels. The main objective of this project is to develop a strategy to promote the controlled ripening of the sugarcane at the end of the cultivation period, using ethanol in place of ethylene precursors. To this end, an evaluation will be made of the use of an active promoter only in the presence of ethanol (the ALC expression system of *Aspergillus nidulans*) controlling the expression of the gene that codifies the ACC synthase, a key enzyme in the biosynthesis of ethylene. In this way, it is intended to activate the biosynthesis of ethylene through dusting with ethanol.

50 Biochemical and genetic characterization of the sugarcane glutathione S-transferases (GSTs) involved in the disintoxication of herbicides

PROCESS
2006/52330-0

COORDINATOR
Antônio Vargas de Oliveira Figueira

INSTITUTION
Center for Nuclear Energy in Agriculture / University of São Paulo (USP)

START: 1/8/2006
FINISH: 31/7/2008

Glutathione S-transferases (GST) is an enzyme which has the capability of conferring resistance to the harmful effects of herbicides in various crops, principally gramineous. In the same way, synthetic compounds called safeners (protectors) have the capability of inducing the expression of GSTs in gramineous plants which, in turn, protect the crop from the application of certain herbicides. In sugarcane, preliminary results suggest the potential of the GSTs for tolerance to some herbicides used in cultivation. Sucest identified countless presumable transcripts of the main classes of this enzyme, but functional studies of the GSTs in response to the herbicides have yet to be undertaken. Therefore, the identification and characterization of the isoforms of sugarcane GSTs that are associated to the response to the application of herbicides and safeners offer potential in the possible selection of cultivars with a differential expression or isoforms which increase tolerance to herbicides, or even their use for direct manipulation in transgenic plants.

51 Characterization of genes of unknown function preferentially expressed during reproductive development in sugarcane (*Saccharum spp.*)

PROCESS
2006/60477-1

COORDINATOR
Marcelo Carnier Dornelas

INSTITUTION
Institute of Biology / State University of Campinas (Unicamp)

START: 1/2/2007
FINISH: 31/1/2009

Around 29.7 per cent of the total of ESTs generated by the Sucest project correspond to proteins of unknown function. A significant proportion of these sequences is derived from libraries of inflorescences. The control of florescence is of great importance in the cultivation of sugarcane and there are very few molecular studies of reproductive development in gramineous plants. Thus, the intention is to use the sequences generated by Sucest for the identification and characterization of evolutively preserved proteins of unknown function, preferably expressed during reproductive development in sugarcane. To this end, use will be made of *in-silico* data mining, techniques of studies of genetic expression such as RT-PCR and hybridization *in situ* and the production of transgenic plant-models containing altered forms of the genes in question. We hope that with this approach important information will be obtained with respect to the molecular control of reproductive development in sugar cane and in gramineous plants in general.

52 Biochemical and molecular characterization of the sugarcane glutathione s-transferase: response to herbicides and safeners

PROCESS
2006/60196-2

COORDINATOR
Renato Rodrigues Ferreira

INSTITUTION
Center for Nuclear Energy in Agriculture / University of São Paulo (USP)

START: 1/5/2007
FINISH: 30/4/2008

In Brazil, sugarcane is one of the most important agribusinesses, representing around 3.5 per cent of the GDP, with the costs relating to the use of herbicides to protect this crop from infestation by harmful weeds being very telling, in the order of 240 million dollars per annum. Glutathione s-transferase is recognized as giving various crops resistance to the harmful effects of herbicides. Similarly, some compounds called safeners have the capability of inducing the expression of GSTs, which protect the crop against the application of certain herbicides. Little is known regarding the GSTs of sugarcane, however, biochemical and molecular studies aimed at an increase in the knowledge of the probable isoforms of sugarcane GSTs in response to the action of herbicides and safeners are opportune due to the potential in the possible selection of varieties with expression or isoforms that increase the resistance to herbicides, or even their use in transgenic plants.

MICROBIOLOGY

53 Evaluation of different types of active charcoal in the treatment of the hemicellulose hydrolysate from sugarcane bagasse for the biotechnological production of xylitol

PROCESS
2000/14008-3

COORDINATOR
Maria das Graças de Almeida Felipe

INSTITUTION
Lorena School of Chemical Engineering

START: 1/3/2001
FINISH: 28/2/2003

The number of research projects on the development of a technology with a view to the biotechnological exploitation of sugarcane bagasse hydrolysate for the production of xylitol is increasing every day. This fact is due principally to the peculiarities of xylitol as a non-cariogenic sweetener, for diabetics, obese people and recently as an aid in the treatment of osteoporosis, in addition to this alternative technology contributing to a reduction in the environmental impact caused by sugarcane bagasse. This study will evaluate different treatment of hemicellulose hydrolysate of sugarcane bagasse with active charcoal to minimize the toxicity of the hydrolysate, aiming for improvement in the bioconversion xylose to xylitol through *Candida quilliermondii*. The hydrolysate obtained by acid hydrolysis will be treated by the technique of alteration of its acid pH combined with the adsorption with active charcoal and immediately this will be supplemented with nutrients. Fermentations will be carried out with hydrolysates treated with different types of active charcoal, given that the efficiency of the treatment is dependent on the adsorption activity, the potential of which is related to the physico-chemical properties of the active charcoal and the conditions employed during the treatment. After the choice of the type of charcoal, studies will be carried out to establish the parameters of adsorption: temperature, contact time, agitation, pH and concentration of charcoal, with the hydrolysates being used for the fermentations. The trials will be conducted in Erlenmeyer flasks in a rotary shaker. Analyses will be undertaken regarding the composition of the hydrolysates, the reduction in the concentration of the toxic compounds such as acetic acid, phenolic compounds, furfural and hydroxymethylfurfural, pH, the consumption of sugars, formation of xylitol and cells, as well as variation in the pH of the fermentation. The concentration of sugars and toxic compounds will be determined by liquid chromatography and cellular growth will be analyzed by spectrophotometry and/or cell count in Neubauer chamber. The trials will conform to fractional factorial design 25-1.

54 New methodological proposal for the immobilization of cells of *Candida guilliermondii* in pva-cryogel for bioproduction of xylitol

PROCESS
2004/07209-3

COORDINATOR
Sílvio Silvério da Silva

INSTITUTION
Lorena School of Chemical Engineering

START: 1/10/2004
FINISH: 30/9/2006

At GPF/FAENQUIL work on immobilized cells has been outstanding in recent years and huge advances have been made with these systems. At the moment the studies and advances point to new strategies for techniques of immobilization and support materials. So the present work seeks to determine suitable conditions for the immobilization of the *Candida guilliermondii* FTI 20037 yeast in PVA-cryogel for the production of xylitol, as well evaluating the behavior of the biocatalyst/support system in the system of repeated shaking in Erlenmeyers flasks and in a mixing bioreactor. It is hoped with the results obtained, to have mastery of a methodology for the immobilization of cells of C. guilliermondii in PVA-cryogel, that will permit the production of xylitol in mixing bioreactor. It should be pointed out that this work forms part of the line of research "Biotechnological exploitation of sugarcane bagasse for the production of xylitol through immobilized cells" created with support from FAPESP.

55 Basic and applied aspects of the industrial use of yeast

PROCESS
2005/01498-6

COORDINATOR
Cecília Laluce

INSTITUTION
Araraquara Institute of Chemistry / Paulista State University (Unesp)

START: 1/2/2006
FINISH: 31/1/2008

56 *Dekkera* and *brettanomyces*: characterization and fermentative behavior of strains contaminating alcoholic fermentation

PROCESS
2005/04011-0

COORDINATOR
Sandra Regina Ceccato Antonini

INSTITUTION
Center for Agrarian Sciences / Federal University of São Carlos (CCA/UFSCar)

START: 1/6/2006
FINISH: 31/5/2008

Brettanomyces/Dekkera yeasts are involved in the process of deterioration of wines after the end of alcoholic and malolactic fermentations and are responsible for the formation of secondary compounds that confer unpleasant odors on the wines. This is down to an opportunistic and non-competitive microorganism which has already been documented in the continuous process of ethanol production and which can be combated with the use of killer yeast. Owing to the important role these yeasts play as contaminants in the fermentative process of wine and alcohol and the scant information there is on the subject, especially regarding ethanolic fermentation, the present study proposes to characterize the strains of *Dekkera/Brettanomyces* isolates from a variety of fermentative processes using physiological/biochemical tests, to verify the killer activity and the sensitivity of the same yeasts to a variety of killer toxins, in addition to evaluating the growth and the fermentative behavior of these strains in industrial conditions. It is hoped that the results may contribute to the understanding of the role the *Dekkera/Brettanomyces* yeasts play in the process of alcoholic fermentation in comparison with isolates of winery environments, where knowledge is better established. Fast and reliable tests are also proposed for the detection of these strains in the processes, even though they have slow rates of growth and a low level of occurrence.

57 Evaluation polymers of vegetable origin in the detoxification of the hemicellulose hydrolysate from sugarcane bagasse and purification of the xylotil obtained by fermentation

PROCESS
2005/59496-9

COORDINATOR
Maria das Graças de Almeida Felipe

INSTITUTION
Lorena School of Engineering / University of São Paulo (USP)

START: 1/4/2006
FINISH: 31/3/2008

The production of xylitol by means of biotechnology is limited by the presence of compounds considered toxic to the action of the yeast, such as phenols, acetic acid, furfural, 5-hydroxymetylfurfural and heavy metals. To overcome this problem, the present work proposes to study the use of vegetable tannin-based polymers in the treatment of sugarcane bagasse hydrolysate, such as Bioclin and Acquapol ww, which possess a highly flocculent action. The hydrolysate treated with the polymers which demonstrates the greatest removal of toxic compounds and the least loss of xylose will be used for fermentations with a view to its evaluation as a means for obtaining xylitol. In addition to the treatment of the hydrolysate, this work proposes to study the use of the Biosugar polymer in the purification of the fermented medium, given that this stage of the process is still very little researched. Both polymers used in the work are natural, biodegradable and offer low cost.

58 Quality of the raw material, fermentative microbiota and production of ethanol under attack from *Mahanarva fimbriolata* in sugarcane

PROCESS
2006/03005-0

COORDINATOR
Márcia Justino Rossini Mutton

INSTITUTION
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (FCAV/Unesp)

START: 1/10/2006
FINISH: 30/9/2008

The sugarcane spittlebug has become a major pest in the Central-South region of Brazil due to the expansion of the areas of cane harvest without burning. The covering of straw left on the ground after the harvest offers ideal conditions for the survival of nymphs of the insect. Recent research indicates that the pest causes production losses, reducing the technological quality of the raw material destined for industrial processing. The objective of the present research is to study the influence of the damage done to sugarcane by the spittlebug regarding the quality of the raw material destined for processing, stability of the yeasts and fermentative performance, in addition to the characteristics of ethanol production with yeast recycling. The results of this work will indicate how the spittlebug attacks interfere in the process of alcohol production from the field to the final product.

CHEMISTRY

59 Development of FIA systems involving pervaporation and enzymatic immobilization for determination of chemical groups of agroindustrial interest

PROCESS
1997/03305-2

COORDINATOR
Elias Ayres Guidetti Zagatto

INSTITUTION
Center for Nuclear Energy in Agriculture / University of São Paulo (USP)

START: 1/8/1997
FINISH: 31/7/1999

Analytical methods will be developed based on systems of chemical analysis by flow injection and non-chromatographic continuous separation for the monitoring of ethanol in an ethanolic fermentation, as well as the determination of reductive sugars; in addition, the determination of urea in samples of agronomic interest, especially, soils and fertilizers will be undertaken. The determination of ethanol will be carried out via monitoring of hydrogen peroxide formed through the enzymatic reaction; the reductive sugars will be determined by means of ion-selective electrodes with sensor immobilized in PVC. The determination of urea will be carried out by means of enzymatic reaction (immobilized urease).

60 Development of automatic procedures to monitor the evolution of alcoholic fermentation in sugar and alcohol plants

PROCESS
2000/04053-1

COORDINATOR
Eloísa Aparecida Mocheuti Kronka

INSTITUTION
Center for Exact, Natural Sciences and Technologies / Ribeirão Preto University (Unaerp)

START: 1/11/2000
FINISH: 30/11/2006

This project is aimed at the development of automatic analytical procedures for the determination of glycerol, dextran, acetic aldehyde, lactic acid and succinic acid in fermented wine originating from alcoholic fermentation. These substances are indicators of the evolution of the fermentation process, given that these determinations make it possible to monitor and control the parameters that affect the performance of the process. The analytical procedures will be developed using analysis modules based on the concept of multicommutation and binary sampling. Enzymatic reactions will be used and detection through molecular absorption spectrophotometry. The project includes, in addition to the development of analytical procedures, the design and assembly of the analysis modules and the development of software for control and data acquisition.

61 Development and study of the reactivity of nanoparticle electrocatalysts obtained by method of microemulsion: oxidation of methanol and ethanol

PROCESS
2000/15080-0

COORDINATOR
Inês Rabelo de Moraes

INSTITUTION
Ribeirão Preto School of Philosophy, Sciences and Arts / University of São Paulo (USP)

START: 1/1/2002
FINISH: 31/7/2006

62 Study of the electrocatalysis of oxidation reactions of organic fuels on ordered intermetallic phases Pt-m

PROCESS
2003/00875-5

COORDINATOR
Antonio Carlos Dias Ângelo

INSTITUTION
Bauru School of Sciences / Paulista State University (Unesp)

START: 1/10/2003
FINISH: 31/12/2006

Based on previous studies on materials obtained by the deposition of metallic ions on platinum surface and also preliminary studies of oxidation of organics in ordered intermetallic phases of BiPt, the aim of this project is to study the electrocatalysis of the oxidation reaction of methanol, ethanol, ethylene glycol and the corresponding carboxylic acid derivatives on the BiPt, SnPt, MoPt and MnPt phases, in acid medium. The reactions will be studied through techniques of cyclic voltammetry, rotating disk electrode, differential electrochemical mass spectroscopy and spectroscopy in the infrared region. The kinetic parameters and the mechanistic information obtained will be interpreted with a view to establishing a clearer relationship between the characteristics of the electrodic surface and the electrocatalytic activity in the respective reactions.

63 Electrochemical studies on platinum-based electrocatalysts using alternative fuels in cells of the solid polymer electrolyte type

PROCESS
2003/03127-0

COORDINATOR
Almir Oliveira Neto

INSTITUTION
Institute of Energy and Nuclear Research (IPEN)

START: 1/10/2003
FINISH: 30/9/2007

The electro-oxidation reactions of ethyl glycol and ethanol will be studied on electrocatalysts based on Platinum-Ruthenium, Platinum-Tin and Platinum-Ruthenium-Tin dispersed in high surface area carbon. These catalysts will be prepared by modified formic acid and ethylene glycol method. The chemical composition of the electrocatalysts will be determined by EDX, the average size of the particles by X-ray diffraction. Other techniques, such as Infra-red Spectrometry and High Resolution Electron Microscope could be used for the characterization of the electrocatalysts produced. The performance of the electrocatalysts during the reactions will be studied through the voltammetric profiles. The electrocatalysts that demonstrate the best performance will be tested in unitary fuel cells of the solid polymer membrane type (polarization curves). Also to be carried out in this work will be a study of the optimization of the composition of the Pt-based catalysts, given that there are few studies in which ethylene glycol and ethanol are used as a fuel.

64 Electrochemical and spectroscopic studies of the oxidation reaction of ethanol in acid medium

PROCESS
2003/11205-0

COORDINATOR
Giuseppe Abiola Camara da Silva

INSTITUTION
São Carlos Institute of Chemistry / University of São Paulo (IQ/USP)

START: 1/7/2004
FINISH: 31/3/2005

In this work different aspects referring to the Oxidation Reaction of Ethanol (ORE) will be analyzed. In the first instance the catalytic reaction in function of the crystallographic orientation of platinum will be evaluated. Next Pt electrodes modified by the inclusion of a second metal will be investigated. Electrochemical studies will be undertaken coupled to spectroscopic techniques. In a later phase, dispersed catalysts will be prepared based on compositions that present the best catalytic activity regarding ORE. The studies should end with the physical and electrochemical characterization of electrocatalysts prepared in identical conditions to those used in fuel cells.

65 Development of Pt-Sn, Pt-Sn-Ru and Pt-Sn-Ni catalysts for electrocatalytic oxidation of ethanol for use in direct fuel cell (defc)

PROCESS
2005/02849-7

COORDINATOR
Adalgisa Rodrigues de Andrade

INSTITUTION
Ribeirão Preto School of Philosophy, Sciences and Arts / University of São Paulo (USP)

START: 1/5/2006
FINISH: 30/4/2008

Ethanol, a renewable fuel with a wide distribution network in the country, has become a potentially interesting candidate for use in fuel cells which use it directly without the need of reformation. For the most advantageous generation of energy, what is interesting in this oxidation is the complete transformation of ethanol into carbon dioxide. In this process, 12 electrons are transferred. However, the break in the ethanol C-C bond occurs on a very small scale in the majority of the catalysts known so far. The formation of CO_2 is seriously hindered due to the competition between the formation of the less oxidized products, namely, acetaldehyde and acetic acid. This is a serious limitation in the use of ethanol as a fuel in devices without reformation. The use of ethanol depends on the understanding of the various stages of oxidation and of the limitations in function of the experimental variables and surface of the electrocatalysts. Several fundamental studies broach the subject of ethanol oxidation. Despite great advances in the understanding of the oxidation reaction the efficient breaking of the C-C bond is still a challenge. In our laboratory we have studied the oxidation of small organic molecules, aiming to understand some aspects of this oxidation in oxides of precious metals. Recently, with the support of the Ministry of Science and Technology the Brazilian Fuel Cell System Program was set up, which seeks to broaden out and collect and share information and knowledge among the various research laboratories on fuel cell systems. Ultimately, the transfer of this information to the productive sector aims to make Brazil self-sufficient in this technology. In this context, the present project aims to acquire the raw materials and equipment in order to prepare the laboratory for the research developed in the Chemistry Department in Ribeirão Preto's School of Philosophy, Sciences and Arts, which deals with research into multi-metal catalysts for the electrocatalytic oxidation of ethanol for use in direct fuel cell 3 (DEFC).

FORESTRY RESOURCES AND FORESTRY ENGINEERING

66 Mathematical programming in the exploitation of sugarcane harvest residual biomass

PROCESS
2006/02476-9

COORDINATOR
Helenice de Oliveira Florentino Silva

INSTITUTION
Botucatu Institute of Biosciences / Paulista State University (Unesp)

START: 1/11/2006
FINISH: 31/10/2008

Brazil is the world's largest producer of sugarcane. This crop is produced mainly to obtain sugar and alcohol. In the period 2005/2006 the country achieved production of approximately 436.8 million tons of sugarcane, providing a 28.9 per cent increase in the sugar/alcohol sector compared with the previous harvest. Despite this, a current concern of the sector is the waste generated in the harvesting of the cane, since one of the common practices is the pre-harvest burning of the straw, something which has caused considerable environmental damage. This practice has been condemned by environmental and government agencies, and today there are laws which lay out deadlines for the gradual reduction of the burnings in the cane fields. Yet, without the burnings and with a greater build-up of straw on the ground, favorable conditions are created for the appearance of pests and also the delay in the sprouting of the cane, thus compromising the next harvest. With these problems, the straw derived from the green cane, has become a focus for researchers and producers. The advantages in gathering it up, recovering it and making use of it have mobilized university researchers, managers and directors of sugar factories, who are interested in finding the most productive, economic and efficient way for this operation. A fairly promising alternative is the exploitation of the straw in the generation of electricity. Since, in addition to the energy potential of this biomass, there are advantages relating to environmental questions, the preservation of jobs, and the projection of limited life for energy resources of natural origin, and others. Given the huge importance of this subject, the Botucatu Nucleus of the Systems Modeling and

Optimization Group IB/UNESP, proposes the study of the techniques of mathematical optimization and modeling in order to help with the problems involved in the exploitation of waste biomass from the sugarcane harvest.

Zootechnics

67 Nutritional value of sugarcane in the form of silage and natural form

Process
1997/08160-2

Coordinator
João Batista de Andrade

Institution
Zootechnic Institute / SAA-SP

Start: 1/3/1998
Finish: 31/3/2001

68 Nutritional value of sugarcane in natural or silaged form,with urea added or not

Process
1998/13131-4

Coordinator
Carlos de Sousa Lucci

Institution
School of Veterinary Medicine / Unisa

Start: 1/9/1999
Finish: 28/2/2001

69 Evaluation of sugarcane bagasse treated with different chemical agents through studies of ruminal kinetics and digestibility trials

Process
1999/01929-4

Coordinator
Paulo Roberto Leme

Institution
School of Zootechnics and Food Engineering / University of São Paulo (USP)

Start: 1/7/1999
Finish: 30/6/2001

70 Processing of sugarcane: its effects on total digestibility, degradability and ruminal rate of passage

Process
2001/00715-2

Coordinator
Jane Maria Bertocco Ezequiel

Institution
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (Unesp)

Start: 01/10/2001
Finish: 31/05/2004

71 Evaluation of chemical and microbial additives as inhibitors of the alcoholic fermentation in sugarcane silages (*Saccharum officinarum l*)

Process
2001/05734-5

Coordinator
Luiz Gustavo nasceu

Institution
Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/12/2001
Finish: 30/11/2003

72 Nutritional value of sugarcane treated with calcium oxide or calcium hydroxide

Process
2005/04326-1

Coordinator
Acyr Wanderley de Paula Freitas

Institution
Paulista Agency of Agribusiness Technology (Apta)

Start: 01/06/2006
Finish: 31/03/2008

73 Protein in sugarcane-based diets for dairy heifers

Process
2006/57558-0

COORDINATOR
Telma Teresinha Berchielli

INSTITUTION
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (Unesp)

START: 01/06/2007
FINISH: 31/05/2009

74 Evaluation of sugarcane hydrolyzed with microprocessed quicklime (cao) in the diet of lactating cows

PROCESS
2005/59938-1

COORDINATOR
Mauro Dal Secco de Oliveira

INSTITUTION
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (Unesp)

START: 01/09/2006
END: 31/08/2008

75 Evaluation of dairy cows fed with sugarcane hydrolyzed with micropulverized quicklime (cao) and hydrated lime (ca(oh)2)

PROCESS
2006/60042-5

COORDINATOR
Mauro Dal Secco de Oliveira

INSTITUTION
Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (Unesp)

START: 01/03/2007
FINISH: 31/08/2008

76 Sugarcane silage treated with chemical or microbial additive in the feeding of goats at the start of lactation

PROCESS
2006/61802-3

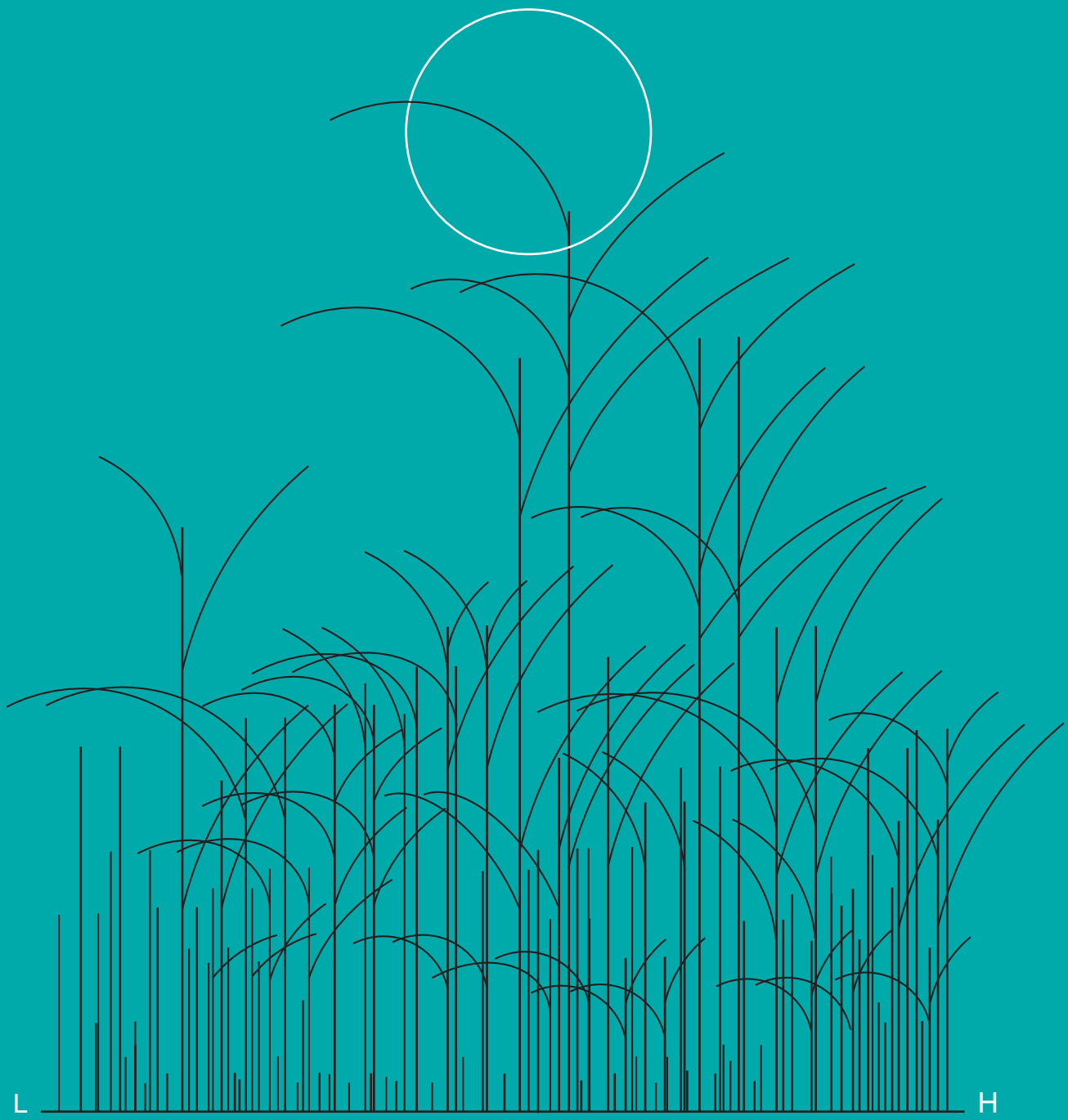
COORDINATOR
Alexandre Vaz pires

INSTITUTION
Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

START: 01/04/2007
FINISH: 31/03/2009

Grants

Scientific Initiation
Masters Degree
Doctorate
Fast-track Doctorate
Post-doctorate
Research Abroad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Administration

1 Agroalimentary sugar networks: a comparative study between France and Brazil

Process: 2002/01812-4
Modality: Scientific Initiation

Grant Holder: Taís Mahalem do Amaral
Supervisor: Marcos Fava Neves
Institution: Ribeirão Preto School of Economics, Administration and Accountancy University of São Paulo (USP)

Start: 01/08/2002
Finish: 31/12/2002

2 Strategies for the internationalization of carburant alcohol from the sugar-alcohol sector in Brazil

Process: 2006/07025-5
Modality: Doctorate

Grant Holder: Heidy Rodriguez Ramos
Supervisor: Martinho Isnard Ribeiro de Almeida
Institution: School of Economics, Administration and Accountancy / University of São Paulo (USP)

Start: 01/05/2007
Finish: 30/04/2010

Agronomy

3 Fermentative potential of "killer" yeasts in ethanolic fermentation and action of the toxins during the process

Process: 1998/06034-2
Modality: Scientific Initiation

Grant Holder: Christiann Davis Tosta
Supervisor: Sandra Regina Ceccato Antonini
Institution: Center for Agrarian Sciences / Federal University of São Carlos (UFSCar)

Start: 01/08/1998
Finish: 30/09/2000

4 Production of ethanol by recombinant *Escherichia coli* derived from hydrolysates of agricultural residues. Preparation of inoculum in high cellular concentrations

Process: 1998/15813-5
Modality: Masters Degree

Grant Holder: Kátia Gianni de Carvalho Lima
Supervisor: Flávio Alterthum
Institution: Institute of Biomedical Sciences / University of São Paulo (USP)

Start: 01/07/1999
Finish: 30/06/2001

5 Development of the sugarcane root system and of the part above ground in the environment of residual straw from mechanized harvesting

Process: 1998/16020-9
Modality: Doctorate

Grant Holder: Antônio Carlos Machado de Vasconcelos
Supervisor: Ailto Antônio Casagrande
Institution: Jaboticabal School of Agrarian Science and Sciences / Paulista State University (Unesp)

Start: 01/05/1999
Finish: 28/02/2002

6 Sucest – the sugarcane EST project

Process: 1999/12221-2
Modality: Scientific Initiation

Grant Holder: Regiane Degan Favaro
Supervisor: Eiko Eurya Kuramae
Institution: Botucatu School of Agronomic Sciences / Paulista State University (Unesp)

Start: 01/03/2000
Finish: 30/11/2000

7 Comparison of nitrogen sources applied in the cultivation of sugarcane in the green cane harvest system

Process: 2000/01029-2
Modality: Masters Degree

Grant Holder: Mirian Cristina Gomes Costa
Supervisor: Godofredo Cesar Vitti
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/03/2001
Finish: 31/01/2002

8 Behavior of species belonging to the third trophic level in transgenic-bt varieties (*Bacillus thuringiensis*) of sugarcane (*Saccharum sp.*)

Process: 2000/05877-8
Modality: Masters Degree

Grant Holder: Cássia Regina Demarchi
Supervisor: Evoneo Berti Filho
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/10/2000
Finish: 30/09/2002

9 Development of industrial strain of *Saccharomyces cerevisiae* producing fuel alcohol via bactericide activity through the expression of heterologous gene

Process: 2000/07521-6
Modality: Post-doctorate

Grant Holder: Maria Evangelina de Camargo
Supervisor: Luiz Carlos Basso
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/12/2000
Finish: 30/11/2002

10 Development of molecular markers derived from ESTs in sugarcane for selection of economically important characteristics

Process: 2001/14656-8
Modality: Post-doctorate

Grant Holder: Luciana Rossini Pinto
Supervisor: Anete Pereira de Souza
Institution: Center for Molecular Biology and Genetic Engineering
Engineering Genetics / State University of Campinas (Unicamp)

Start: 01/04/2002
Finish: 28/02/2005

11 Isolation and selection of strains of yeast originating in ethanol distilleries with antibacterial properties

Process: 2002/10425-4
Modality: Scientific Initiation

Grant Holder: Alline Silva Risso
Supervisor: Pedro de Oliva Neto
Institution: Assis School of Science and Arts / Paulista State University (Unesp)

Start: 01/04/2003
Finish: 31/12/2003

12 Biochemical, molecular and pathogenic characterization of isolates of *Xanthomonas albilineans* (*ashby*) dowson, agent responsible for sugarcane leaf scald

Process: 2003/06126-4
Modality: Masters Degree

Grant Holder: Mariana de Souza and Silva
Supervisor: Ivan Paulo Bedendo
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/09/2003
Finish: 31/08/2005

13 Gene expression in sugarcane roots (*Saccharum spp l.*) colonized by *Glomus clarum* and treated with herbicides

Process: 2004/12743-9
Modality: Masters Degree

Grant Holder: Pablo Rodrigo Hardoim
Supervisor: Márcio Rodrigues Lambais
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/03/2005
Finish: 31/08/2006

14 Bioecology and handling of the giant-borer, *Castnia licus* (Drury, 1773) (Lepidoptera: *Castnidae*), in sugarcane

Process: 2004/15451-9
Modality: Post-doctorate

Grant Holder: Luciano Pacelli Medeiros de Macedo
Supervisor: José Roberto Postali Parra
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 1/8/2005
Finish: 31/7/2006

15 Sorption and leaching of the ametryn herbicide in sugarcane plantations treated with sewage sludge

Process: 2005/50564-1
Modality: Masters Degree

Grant Holder: Luciana Marchese
Supervisor: Jussara Borges Regitano
Institution: Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 01/08/2005
Finish: 30/06/2006

16 Evaluation of the effect of the urease inhibitor nbpt (N-(N-butyl) thiophosphoric triamide) on the efficiency of the fertilizing urea in sugarcane

Process: 2005/52094-2
Modality: Masters Degree

Grant Holder: Teodoro Leonardo Michelucci Contin
Supervisor: Heitor Cantarella
Institution: Campinas Institute of Agronomy / SAA-SP

Start: 01/09/2005
Finish: 28/02/2007

17 Determination of the periods of interference of plants of joyweed in sugarcane rhizome (*Saccharum spp.*)

Process: 2005/54387-7
Modality: Scientific Initiation

Grant Holder: Ivan Aliberti Barbosa da Silva
Supervisor: Pedro Luís da Costa Aguiar Alves
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (Unesp)

Start: 01/09/2005
Finish: 31/08/2006

18 Effects of light and sugarcane straw in the germination and emergence of harmful plants

Process: 2005/54434-5
Modality: Masters Degree

Grant Holder: Fernanda Lopes Salvador
Supervisor: Ricardo Victoria Filho
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/09/2005
Finish: 28/02/2007

19 New perspectives for the thermal treatment for the control of blight in sugarcane stalks

Process: 2005/59417-1
Modality: Scientific Initiation

Grant Holder: Juliana Cristina Lourencini de Araújo
Supervisor: Alfredo Seiiti Urashima
Institution: Center for Agrarian Science / Federal University of São Carlos (UFSCar)

Start: 01/03/2006
Finish: 31/08/2006

20 Development of molecular markers of the microsatellite type based on ESTs in sugarcane

Process: 2005/60868-8
Modality: Scientific Initiation

Grant Holder: Hercília Roberta Cristina Acri Nunes Miranda
Supervisor: Anete Pereira de Souza
Institution: Center for Molecular Biology and Genetic Engineering / State University of Campinas (Unicamp)

Start: 01/05/2006
Finish: 31/12/2006

21 Acetolactate synthase inhibitor (ALS) herbicides applied to green sugarcane and changes in seed banks of harmful plants

Process: 2006/01348-7
Modality: Scientific Initiation

Grant Holder: Lucas Rios do Amaral
Supervisor: Patrícia Andrea Monquero
Institution: Center for Agrarian Science / Federal University of São Carlos (UFSCar)

Start: 01/07/2006
Finish: 30/06/2007

22 Effect of the phenologic stage of the cultivation of sugarcane and time of application in the selectivity of herbicides

Process: 2006/03844-1
Modality: Scientific Initiation

Grant Holder: José Augusto Ribellato Buissa
Supervisor: Pedro Jacob Christoffoleti
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/11/2006
Finish: 31/10/2007

23 Accumulation of nutrients and development of sugarcane root system in different levels of nitrogenated fertilizer plantation applications and their relationship to the productivity of the CNA-plant and sugarcane rhizome

Process: 2006/51251-0
Modality: Masters Degree

Grant Holder: Rafael Otto
Supervisor: Paulo César Ocheuze Trivelin
Institution: Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 01/10/2006
Finish: 29/02/2008

Architecture and Urbanism

24 Worker dwellings in sugar mills in the São Paulo interior: the region of Piracicaba

Process: 2000/02197-6
Modality: Masters Degree

Grant Holder: Gabriela Campagnol
Supervisor: Telma de Barros Correia
Institution: São Carlos School of Engineering / University of São Paulo (USP)

Start: 01/09/2000
Finish: 31/08/2002

25 Dwellings in sugar mills in Brazil: origins, extent and eradication

Process: 2003/06927-7
Modality: Doctorate

Grant Holder: Gabriela Campagnol
Supervisor: Telma de Barros Correia
Institution: São Carlos School of Engineering / University of São Paulo (USP)

Start: 01/10/2003
Finish: 31/01/2007

Biochemistry

26 Study of growth of strains of *Panus tigrinus* in sugarcane bagasse with a pre-treatment for chemical pulping

Process: 1997/14378-0
Modality: Masters Degree

Grant Holder: Sirlene Maria da Costa
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/04/1998
Finish: 30/09/1999

27 Preparation of genomic library for *Xylella fastidiosa* in lamda phage and preparation of sugarcane cDNA libraries

Process: 1998/16368-5
Modality: Post-doctorate

Grant Holder: André Luiz Vettore de Oliveira
Supervisor:
Institution: Center for Molecular Biology and Genetic Engineering / State University of Campinas (Unicamp)

Start: 01/02/1999
Finish: 04/07/2001

28 Sequencing and analysis of sugarcane ESTs. Identification of retrotransposons and genes of resistance of the type NBS-LRR

Process: 1999/04764-6
Modality: Post-doctorate

Grant Holder: Maria Magdalena Rossi
Supervisor: Marie Anne Van Sluys
Institution: Institute of Biosciences / University of São Paulo (USP)

Start: 01/08/1999
Finish: 31/01/2004

29 Production and characterization of transgenic sugarcane plants expressing chagasin: effects on the *Sphenophorus* insect and on the sugarcane mosaic virus

Process: 2000/02969-9
Modality: Masters Degree

Grant Holder: Francisco Cláudio da Conceição Lopes
Supervisor: Márcio de Castro Silva Filho
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/06/2000
Finish: 28/02/2002

30 Heterologous expression, purification and initial studies of the activity of a probable protein inhibitor of cysteine protease in sugarcane

Process: 2000/04993-4
Modality: Masters Degree

Grant Holder: Andréa Soares da Costa
Supervisor: Flávio Henrique da Silva
Institution: Center for Biological Sciences and Health / Federal University of São Carlos (UFSCar)

Start: 01/07/2000
Finish: 30/06/2002

31 Sucest Data Mining Project (annotations of sugarcane genes)

Process: 2000/09499-8
Modality: Scientific Initiation

Grant Holder: Marco Túlio Alves da Silva
Supervisor: Regina Maria Barretto Cicarelli
Institution: Araraquara School of Pharmaceutical Sciences / Paulista State University (Unesp)

Start: 01/05/2001
Finish: 31/12/2003

32 Identification and functional studies of genes resistant to pathogens and pests in sugarcane (*Saccharum officinarum l.*) induced by jasmonic acid

Process: 2000/10426-5
Modality: Doctorate

Grant Holder: Vicente Eugênio de Rosa Júnior
Supervisor: Paulo Arruda
Institution: Center for Molecular Biology Genetic Engineering / State University of Campinas (Unicamp)

Start: 01/12/2000
Finish: 30/11/2004

33 Clonings, expression and purification of the chaperone smhsp class 1 of sugarcane: first steps for its functional and structural study

Process: 2001/05887-6
Modality: Scientific Initiation

Grant Holder: Maria Cláudia Peroto
Supervisor: Carlos Henrique Inácio Ramos
Institution: Brazilian Association of Synchrotron Light Technology / CNPq

Start: 01/08/2001
Finish: 31/12/2002

34 Identification of components involved in the reversible phosphorylation of proteins in the sugarcane genome

Process: 2001/06922-0
Modality: Scientific Initiation

Grant Holder: Ana Carolina Quirino Simões
Supervisor: Aline Maria da Silva
Institution: Institute of Chemistry / University of São Paulo (USP)

Start: 01/10/2001
Finish: 31/12/2002

35 Purification and partial characterization of oligosaccharides obtained by acidic hydrolysis controlled by polysaccharide produced by *Botryosphaeria sp.*

Process: 2002/13888-5
Modality: Scientific Initiation

Grant Holder: Iara Ribeiro Silva
Supervisor: Maria de Lourdes Corradi Custódio da Silva
Institution: Presidente Prudente School of Science and Technology / Paulista State University (Unesp)

Start: 01/02/2004
Finish: 31/12/2004

36 Characterization of the diversity of families of transposable elements expressed in sugarcane (*Saccharum spp*)

Process: 2003/13525-2
Modality: Fast-track Doctorate

Grant Holder: Erika Maria de Jesus
Supervisor: Marie Anne Van Sluys
Institution: Institute of Biosciences / University of São Paulo (USP)

Start: 01/03/2004
Finish: 28/02/2007

37 Investigation of the role of the shsps n-terminal domain in sugarcane in the specificity of bonding to substrates

Process: 2006/07279-7
Modality: Scientific Initiation

Grant Holder: Ana Paula Rossi
Supervisor: Carlos Henrique Inácio Ramos
Institution: Institute of Chemistry / State University of Campinas (Unicamp)

Start: 01/04/2007
Finish: 31/12/2007

Botany

38 Study of the short and long term effects of a CO2-enriched atmosphere on the growth, development and metabolism of sugarcane carbohydrates (*Saccharum ssp.*)

Process: 2004/11421-8
Modality: Masters Degree

Grant Holder: Amanda Pereira de Souza
Supervisor: Marcos Silveira Buckeridge
Institution: Botany Institute / SMA-SP

Start: 01/03/2005
Finish: 28/02/2007

39 Isolation and purification of sugarcane GSTs subjected to herbicides applications

Process: 2006/60405-0
Modality: Scientific Initiation

Grant Holder: Fabrício Tadeu Rodrigues de Oliveira
Supervisor: Renato Rodrigues Ferreira
Institution: Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 01/03/2007
Finish: 29/02/2008

Computer Science

40 Extraction of color characteristics for the identification of rust in sugarcane neural networks

Process: 2002/14229-5
Modality: Scientific Initiation

Grant Holder: Murilo Carneiro Rodrigues
Supervisor: João do Espírito Santo Batista Neto
Institution: São Carlos Institute of Mathematical Sciences and Computing / University of São Paulo (USP)

Start: 01/04/2003
Finish: 31/03/2004

Food Science and Technology

41 Identification of compounds responsible for the organoleptic defect of sugarcane liquors (*Saccharum officinarum ssp*) distilled in the absence of copper

Process: 1997/00733-3
Modality: Research abroad

Grant Holder: João Bosco Faria
Institution: Araraquara School of Pharmaceutical Sciences / Paulista State University (Unesp)
Institution abroad: Zaragoza University, Spain

Start: 31/05/1997
Finish: 31/01/1998

42 Creation of multimedia program, for dimensioning and calculations for the sugar industry and use in educational activities

Process: 1997/11221-3
Modality: Post-doctorate

Grant Holder: Tadeu Alcides Marques
Supervisor:
Institution: Multidisciplinary Centre for Chemical, Biological and Agricultural Research / State University of Campinas (Unicamp)

Start: 01/03/1998
Finish: 28/02/1999

43 Influence of gamma radiation on sugarcane juice

Process: 1998/03042-4
Modality: Scientific Initiation

Grant Holder: Karina Marquesini Hansted
Supervisor: Rachel Elisabeth Domarco
Institution: Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 01/08/1998
Finish: 31/07/1999

44 Evaluation of system for the decolorization of sugar juices to obtain liquid sugar

Process: 1998/11328-5
Modality: Masters Degree

Grant Holder: Alessandro Henrique de Oliveira
Supervisor: Sílvio Roberto Andrietta
Institution: Multidisciplinary Centre for Chemical, Biological and Agricultural Research / State University of Campinas (Unicamp)

Start: 01/01/1999
Finish: 31/10/2000

45 Microbiological aspects of mascavo sugar

Process: 1998/13466-6
Modality: Scientific Initiation

Grant Holder: Flávia Oliveira Pacheco
Supervisor: Clóvis Parazzi
Institution: Center for Agrarian Science / Federal University of São Carlos (UFSCar)

Start: 01/03/1999
Finish: 29/02/2000

46 Classification of the dominant strains of yeast in fermentative processes using fermentative parameters and numeric taxonomy

Process: 1998/15029-2
Modality: Masters Degree

Grant Holder: Patrícia Candioto Migliari
Supervisor: Sílvio Roberto Andrietta
Institution: Multidisciplinary Centre for Chemical, Biological and Agricultural Research / State University of Campinas (Unicamp)

Start: 01/05/1999
Finish: 30/04/2001

47 Evaluation of the conditions of acidic hydrolysis of sugarcane bagasse in the fermentation of the hydrolysate in xylitol

Process: 1999/01595-9
Modality: Masters Degree

Grant Holder: Zuzel Rubio Matos
Supervisor: Sílvio Silvério da Silva
Institution: Lorena School of Chemical Engineering

Start: 01/09/1999
Finish: 31/08/2001

48 Optimization of system of continuous alcoholic fermentation using tower-type reactors and yeast with flocculent characteristics

Process: 1999/01687-0
Modality: Doctorate

Grant Holder: Marcelo Caldeira Viegas
Supervisor: Sílvio Roberto Andrietta
Institution: Multidisciplinary Center for Chemical, Biological and Agricultural Research / State University of Campinas (Unicamp)

Start: 01/06/1999
Finish: 06/01/2003

49 Liquid-liquid extraction of b-xylosidase from hemicellulosic hydrolysate of sugarcane bagasse by reverse micelles

Process: 1999/10144-0
Modality: Scientific Initiation

Grant Holder: Daniela Vieira Cortez
Supervisor: Inês Conceição Roberto
Institution: Lorena School of Chemical Engineering

Start: 01/01/2000
Finish: 31/12/2000

50 Production of sugarcane wax from subproduct of the sugar-alcohol industry: extraction, purification and characterization

Process: 1999/11093-0
Modality: Doctorate

Grant Holder: Thaís Maria Ferreira de Souza Vieira
Supervisor: Daniel Barrera Arellano
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/03/2000
Finish: 12/02/2003

51 Study of the use of supercritical water for the hydrolysis of starch and cellulose: production of sucrose substitutes with low caloric level

Process: 1999/12868-6
Modality: Doctorate

Grant Holder: Silvânia Regina Mendes Moreschi
Supervisor: Maria Ângela de Almeida Meireles
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/04/2000
Finish: 31/03/2004

52 Balance of phases of systems composed of vegetable oils, fatty acids and hydrated ethanol

Process: 2000/01685-7
Modality: Masters Degree

Grant Holder: Cíntia Bernardo Gonçalves
Supervisor: Antônio José de Almeida Meirelles
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/06/2000
Finish: 28/02/2002

53 Optimization of production of xylitol from hydrolized sugarcane bagasse in system with cells immobilized in basket-type reactor

Process: 2000/03523-4
Modality: Doctorate

Grant Holder: Walter de Carvalho
Supervisor: Sílvio Silverio da Silva
Institution: Lorena School of Chemical Engineering

Start: 01/12/2000
Finish: 30/11/2004

54 Use of orthophosphoric acid as catalyst of acidic hydrolysis of sugarcane for the production of xylitol via fermentation

Process: 2000/03525-7
Modality: Scientific Initiation

Grant Holder: Márcio de Andrade Batista
Supervisor: Sílvio Silvério da Silva
Institution: Lorena School of Chemical Engineering

Start: 01/08/2000
Finish: 31/01/2002

55 Treatment of sugarcane juice by different strains of yeasts in the productivity and quality of the liquor

Process: 2000/07628-5
Modality: Doctorate

Grant Holder: Elisângela Marques Jerônimo
Supervisor: Gil Eduardo Serra
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/10/2000
Finish: 30/09/2004

56 Influence of the clarification of juice on the color of the syrup in green decaying sugarcane

Process: 2000/08569-2
Modality: Scientific Initiation

Grant Holder: Carolina Grabner Reis
Supervisor: Gil Eduardo Serra
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/02/2001
Finish: 31/01/2002

57 Ultrafiltration of the filtrate of cachaça in the sugar mill

Process: 2000/09856-5
Modality: Masters Degree

Grant Holder: José de Ribamar Macedo Costa
Supervisor: Luiz Antônio Viotto
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/12/2000
Finish: 31/05/2002

58 Balance of phases in systems composed of vegetable oils, fatty acids and hydrated ethanol

Process: 2001/13733-9
Modality: Fast-track Doctorate

Grant Holder: Cíntia Bernardo Gonçalves
Supervisor: Antônio José de Almeida Meirelles
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/04/2002
Finish: 31/03/2004

59 Design, assembly and dynamic study of a FIA system for the quantification of ethanol in alcoholic fermentation systems

Process: 2002/13214-4
Modality: Scientific Initiation

Grant Holder: Rodrigo Notário Brenelli
Supervisor: Francisco Maugeri Filho
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/05/2003
Finish: 18/12/2003

60 Comparative study of the methods of determination and estimation of the levels of fiber and of reductive sugars in sugarcane (*Saccharum spp.*)

Process: 2003/09588-9
Modality: Masters Degree

Grant Holder: José Rubens Almeida Leme Filho
Supervisor: André Ricardo Alcarde
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/03/2004
Finish: 31/01/2006

61 Acid stress and cellular heterogeneity during successive cycles of ethanol production in the presence of lactic acid

Process: 2005/03681-2
Modality: Doctorate

Grant Holder: Karen Fernanda de Oliveira
Supervisor: Cecília Laluce
Institution: Araraquara Institute of Chemistry / Paulista State University (Unesp)

Start: 01/01/2006
Finish: 31/05/2008

62 Ethanol as multifunctional solvent for the extraction of oils and sugars

Process: 2005/50290-9
Modality: Scientific Initiation

Grant Holder: Talita Benedetti
Supervisor: Marisa Aparecida B. Regitano D'Arce
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/06/2005
Finish: 31/05/2006

63 Effects of the thermal processing and gamma radiation on the physico-chemical, microbiological and sensorial stability of pure sugarcane juice and with added fruit juices stored under refrigeration

Process: 2005/53042-6
Modality: Masters Degree

Grant Holder: Aline Cristine Garcia de Oliveira
Supervisor: Marta Helena Fillet Spoto
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/03/2006
Finish: 31/03/2007

64 Forced aging with circulation and aeration of sugarcane liquor

Process: 2006/59265-0
Modality: Masters Degree

Grant Holder: Michelle de Caiado Borragini
Supervisor: João Bosco Faria
Institution: Araraquara School of Pharmaceutical Sciences / Paulista State University (Unesp)

Start: 01/03/2007
Finish: 28/02/2009

65 Determination and characterization of starch from sugarcane and adjustment of methodology for the determination of residual alpha-amilase in raw sugar

Process: 2006/59514-0
Modality: Masters Degree

Grant Holder: Joelise de Alencar Figueira
Supervisor: Hélia Harumi Sato
Institution: School of Food Engineering / State University of Campinas (Unicamp)

Start: 01/03/2007
Finish: 28/02/2009

66 Functional genomic analysis of sugarcane genes through Traitmill technology

Process: 2003/08494-0
Modality: Researcher Abroad

Grant Holder: Julio Cezar Franco de Oliveira
Institution abroad: Crop Design Agbiotech Company, Belgium

Start: 1/3/2004
Finish: 30/4/2004

Ecology

67 Determination of total HG in sugarcane (var sp80-1842) using decomposition by Schoniger flask combustion method and detection by fluorescence spectrophotometry...

Process: 2000/02891-0
Modality: Scientific Initiation

Grant Holder: Ismael Athayde Filho
Supervisor: José Roberto Ferreira
Institution: Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 01/09/2000
Finish: 31/05/2001

68 Characterization of the transference of chemical species in soil system / sugarcane crop irrigated with effluent from sewerage treatment station: study conducted in municipality of Piracicaba, São Paulo...

Process: 2006/00427-0
Modality: Post-doctorate

Grant Holder: Lise Cary
Supervisor: Adolpho José Melfi
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/07/2006
Finish: 30/06/2007

Economics

69 Sugarcane agroindustry: analysis of the socioeconomic and environmental implications of the change to the mechanized system of harvesting of sugarcane without clearance of straw by fire in the State of São Paulo

Process: 1998/15650-9
Modality: Masters Degree

Grant Holder: Daniel Bertoli Gonçalves
Supervisor: Rodolfo Hoffmann
Institution: Institute of Economics / State University of Campinas (Unicamp)

Start: 01/03/1999
Finish: 28/02/2001

70 The Brazilian fuel alcohol market: an analysis focused on sectorial and macroeconomic aspects

Process: 2000/05038-6
Modality: Scientific Initiation

Grant Holder: Luciana Torrezan Silveira
Supervisor: Heloísa Lee Burnquist
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/07/2000
Finish: 31/12/2001

71 An analysis of Brazilian competitiveness in the international sugar and alcohol market

Process: 2002/12659-2
Modality: Masters Degree

Grant Holder: Luciana Torrezan Silveira
Supervisor: Heloísa Lee Burnquist
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/04/2003
Finish: 31/03/2004

72 Supply and demand of crystal sugar in the State of São Paulo

Process: 2002/13989-6
Modality: Scientific Initiation

Grant Holder: Diego Martins Carretero
Supervisor: Mirian Rumenos Piedade Bacchi
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/10/2003
Finish: 30/09/2004

73 Export equations for Brazilian sugar: a vector auto-regression model

Process: 2003/05079-2
Modality: Masters Degree

Grant Holder: Mauro Virgino de Sena and Silva
Supervisor: Mirian Rumenos Piedade Bacchi
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/03/2004
Finish: 31/08/2005

74 Brazilian sugar exports: a price analysis

Process: 2004/00417-0
Modality: Fast-track Doctorate

Grant Holder: Luciana Torrezan Silveira
Supervisor: Heloísa Lee Burnquist
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/05/2004
Finish: 30/11/2006

75 Price transmission of alcohol fuel in the Brazilian market

Process: 2004/10122-7
Modality: Scientific Initiation

Grant Holder: Valdinei Fagnani Júnior
Supervisor: Mirian Rumenos Piedade Bacchi
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/01/2005
Finish: 31/12/2005

76 Ecological impacts in the production and use of fuel alcohol

Process: 2006/00888-8
Modality: Scientific Initiation

Grant Holder: Marcelo Bacchi Bartholomeu
Supervisor: Márcia Azanha Ferraz Dias de Moraes
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/06/2006
Finish: 31/05/2007

77 Socioeconomic and environmental impact of sugarcane field burnings: a public health analysis in Ribeirão Preto-São Paulo

Process: 2006/05567-5
Modality: Masters Degree

Grant Holder: Raquel Negrisoli Fernandez
Supervisor: Walter Belluzzo Júnior
Institution: Ribeirão Preto School of Econmics, Administration and Accountancy / University of São Paulo (USP)

Start: 01/03/2007
Finish: 29/02/2008

Agricultural Engineering

78 Economic evaluation of spacings and depths of drains in drainage systems for the production of sugarcane

Process: 2003/01327-1
Modality: Scientific Initiation

Grant Holder: Rafael Mingoti
Supervisor: Sérgio Nascimento Duarte
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/06/2003
Finish: 31/05/2004

79 Hydroplan: analysis of water retention, lixiviation of nutrients and effect on rooting and biometric parameters of sugarcane in soil in the region of Presidente Prudente

Process: 2006/03740-1
Modality: Scientific Initiation

Grant Holder: Lívia Pimentel do Prado Silva
Supervisor: Patrícia Angélica Alves Marques
Institution: Research and Post-graduate Pro-Rectory / West Paulista University (Unoeste)

Start: 01/05/2007
Finish: 30/04/2008

Materials and Metallurgical Engineering

80 Synthesis and characterization of cellulose acetates from cellulose extracted from sisal and sugarcane bagasse

Process: 1998/03686-9
Modality: Masters Degree

Grant Holder: Gabriela Teixeira Ciacco
Supervisor: Elisabete Frollini
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/06/1998
Finish: 30/11/1999

81 Lignocellulosic composites: phenolic thermofix matrix reinforced with fibers from sugarcane bagasse

Process: 1998/12444-9
Modality: Scientific Initiation

Grant Holder: Sandra Patrícia da Silva Tita
Supervisor: Elisabete Frollini
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/12/1998
Finish: 31/12/1999

82 Lignocellulosic composites: phenolic thermofix matrix reinforced with fibers from sugarcane bagasse

Process: 1999/11246-1
Modality: Masters Degree

Grant Holder: Sandra Patrícia da Silva Tita
Supervisor: Elisabete Frollini
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/03/2000
Finish: 28/02/2002

83 Study of the production cycle of silicon and silicon carbide using carbon from sugarcane bagasse in plasma reactor

Process: 2000/01602-4
Modality: Doctorate

Grant Holder: Rone Cesar Morales
Supervisor: Carlos Kenichi Suzuki
Institution: School of Mechanical Engineering / State University of Campinas (Unicamp)

Start: 01/04/2000
Finish: 31/10/2003

84 Evaluation of different types of sugar using an electronic tongue

Process: 2006/02228-5
Modality: Scientific Initiation

Grant Holder: Fernanda Lanzoni Migliorini
Supervisor: José Alberto Giacometti
Institution: Presidente Prudente School of Science and Technology / Paulista State University (Unesp)

Start: 01/01/2007
Finish: 31/12/2007

85 Development of catalysts of internal reformation type for solid electrolyte fuel cells: reformation of ethanol

Process: 2006/58189-8
Modality: Scientific Initiation

Grant Holder: Rafael Aparecido Ferreira
Supervisor: Ariovaldo de Oliveira Florentino
Institution: Botucatu Institute of Biosciences / Paulista State University (Unesp)

Start: 01/12/2006
Finish: 30/11/2007

Production Engineering

86 Analysis of the logistical system of the unloading of sugarcane: case study from São Martinho Refinery

Process: 1998/03314-4
Modality: Masters Degree

Grant Holder: Ana Paula Iannoni
Supervisor: Reinaldo Morabito Neto
Institution: Center for Exact Sciences and Technology / Federal University of São Carlos (UFSCar)

Start: 01/12/1998
Finish: 03/09/2000

87 Changes in the supply of sugar to the industrial market of processed foods

Process: 2002/06323-1
Modality: Masters Degree

Grant Holder: Vivian Karina Bianchini
Supervisor: Maria Rita Pontes Assumpção Alves
Institution: Center for Exact Sciences and Technology / Federal University of São Carlos (UFSCar)

Start: 01/10/2002
Finish: 30/09/2004

Mechanical Engineering

88 Study of the concept of energy and of the methodology for its use in the systemic analysis of energy projects

Process: 1997/10459-6
Modality: Research Abroad

Grant Holder: José Tomaz Vieira Pereira
Institution: School of Mechanical Engineering / State University of Campinas (Unicamp)
Institution abroad: University of Florida, United States

Start: 05/01/1998
Finish: 04/01/1999

89 Experimental analysis of the phenomena of combustion and emission of gases in internal combustion engines using mixtures of alcohol and gasoline as fuel

Process: 1998/13542-4
Modality: Doctorate

Grant Holder: Felipe Soto Pau
Supervisor: Antônio Moreira dos Santos
Institution: São Carlos School of Engineering / University of São Paulo (USP)

Start: 01/04/1999
Finish: 31/03/2003

90 Reduction of pollutant emissions in spark plug ignition engines through the use of pre-vaporized alcohol, multiple direct injection and excess air combustion

Process: 2002/09699-2
Modality: Scientific Initiation

Grant Holder: Fabiano Simão dos Santos
Supervisor: Josmar Davilson Pagliuso
Institution: São Carlos School of Engineering / University of São Paulo (USP)

Start: 01/01/2003
Finish: 31/12/2003

91 Development of optimized dryers for sugarcane bagasse

Process: 2003/01757-6
Modality: Post-doctorate

Grant Holder: Jefferson Luiz Gomes Correa
Supervisor: Sílvia Azucena Nebra de Perez
Institution: School of Mechanical Engineering / State University of Campinas (Unicamp)

Start: 01/06/2003
Finish: 22/04/2004

92 Development of "pinch" analysis for the optimization of the use of utilities and the generation of electricity in integrated sugar/alcohol factories

Process: 2003/05627-0
Modality: Post-doctorate

Grant Holder: Márcio Higa
Supervisor: Roger Josef Zemp
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/11/2003
Finish: 19/02/2004

93 Thermal-economic-environmental analysis of configurations of utilities plants in sugar and alcohol factories

Process: 2003/12094-8
Modality: Fast-track Doctorate

Grant Holder: Luiz Felipe Pellegrini
Supervisor: Sílvio de Oliveira Júnior
Institution: Polytechnic School / University of São Paulo (USP)

Start: 01/04/2004
Finish: 31/03/2008

94 Thermo-economic analysis of the use of energy from biomass in the production of alcohol and electrical energy

Process: 2004/00308-6
Modality: Post-doctorate

Grant Holder: Marcelo Modesto da Silva
Supervisor: Sílvia Azucena Nebra de Perez
Institution: School of Mechanical Engineering / State University of Campinas (Unicamp)

Start: 01/11/2004
Finish: 31/10/2007

Chemical Engineering

95 Preparation of inverted sugar from sugarcane juice by means of immobilized invertase

Process: 1997/02773-2
Modality: Masters Degree

Grant Holder: Alexandre Aparecido Vicente
Supervisor: Henrique Celso Trevisan
Institution: Araraquara Institute of Chemistry / Paulista State University (Unesp)

Start: 01/11/1997
Finish: 30/09/1999

96 Advanced control of fixed bed chemical reactors: application for oxidation of ethanol to acetaldehyde

Process: 1997/03120-2
Modality: Masters Degree

Grant Holder: Carlos Alexandre Lourenço Guerra
Supervisor: Rubens Maciel Filho
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/08/1997
Finish: 31/12/1998

97 Preparation and characterization of catalysts of mixed oxides for the transformation of ethanol into 1.3 butadiene

Process: 1997/03345-4
Modality: Scientific Initiation

Grant Holder: Luciane Consentino
Supervisor: Gilberto Garcia Cortez
Institution: Lorena School of Chemical Engineering

Start: 01/07/1997
Finish: 31/12/1997

98 Clarification of suspensions of raw sugar with the use of quaternary salts of ammonia, using the flotation technique

Process: 1997/03828-5
Modality: Scientific Initiation

Grant Holder: Mônica de Fátima Lobão Granero
Supervisor: Arthur Pinto Chaves
Institution: Polytechnic School / University of São Paulo (USP)

Start: 01/07/1997
Finish: 31/12/1997

99 Influence of pressure and recycling of solvent in the ethanol/water pulping of sugarcane bagasse and study of the enzymatic bleachability of the pulp obtained

Process: 1999/05003-9
Modality: Masters Degree

Grant Holder: Denise Santos Ruzene
Supervisor: Adilson Roberto Gonçalves

Institution: Lorena School of
Chemical Engineering

Start: 01/10/1999
Finish: 30/09/2001

100 Enzymatic oxidation of lignins of sugarcane bagasse to obtain polymers with chelating properties

Process: 1999/07894-8
Modality: Scientific Initiation

Grant Holder: Audrey Carneiro Ferraz
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of
Chemical Engineering

Start: 01/11/1999
Finish: 31/08/2000

101 Methodology of study for improvement in the process of evaporation of sugar solutions starting from the individual coefficients of energy transport

Process: 1999/12567-6
Modality: Masters Degree

Grant Holder: Edna Cristina Kurokawa
Supervisor: Cláudio Roberto de Freitas Pacheco
Institution: Polytechnic School /
University of São Paulo (USP)

Start: 01/03/2000
Finish: 28/02/2002

102 Validation of the simulation of the stages of evaporation and crystallization with data obtained in a sugar mill

Process: 2000/00493-7
Modality: Doctorate

Grant Holder: Charles Dayan Farias de Jesus
Supervisor: Paulo Ignacio Fonseca de Almeida
Institution: Center for Exact Sciences
and Technology / Federal University of
São Carlos (UFSCar)

Start: 01/04/2000
Finish: 31/03/2004

103 Optimization of the process of continuous production of ethanol through structured models

Process: 2000/10451-0
Modality: Doctorate

Grant Holder: Patrícia Candioto Migliari
Supervisor: Rubens Maciel Filho
Institution: School of Chemical Engineering /
State University of Campinas (Unicamp)

Start: 01/06/2001
Finish: 08/08/2005

104 Production of chelants through enzymatic oxidation of lignins of sugarcane and eucalyptus bagasse

Process: 2001/05673-6
Modality: Scientific Initiation

Grant Holder: Raquel Francisca dos Santos Pinheiro
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of
Chemical Engineering

Start: 01/08/2001
Finish: 31/01/2002

105 Study of the action of xylanases of different origins on organosolv pulps of sugarcane straw and bagasse

Process: 2001/07554-4
Modality: Masters Degree

Grant Holder: Regina Yanako Moriya
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of
Chemical Engineering

Start: 01/03/2002
Finish: 31/08/2003

106 Production of pulp dissolution via organosolv process from sugarcane straw and bagasse

Process: 2001/10877-0
Modality: Doctorate

Grant Holder: Denise Santos Ruzene
Supervisor: Adilson Roberto Gonçalves

Institution: Lorena School of Chemical Engineering

Start: 01/03/2002
Finish: 31/05/2005

107 Study of the purification and crystallization process of glucose obtained by acidic hydrolysis of sugarcane bagasse

Process: 2002/00073-3
Modality: Post-doctorate

Grant Holder: Lourdes Apparecida Alves
Supervisor: Marco Giulietti
Institution: Institute of Technological Research of the State of São Paulo (IPT)

Start: 01/05/2002
Finish: 30/04/2006

108 Study of the influence of pressure in the reaction of delignification of sugarcane straw and bagasse with a mixture of ethanol/water

Process: 2002/00935-5
Modality: Scientific Initiation

Grant Holder: Lisia Andrea Cintra
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/07/2002
Finish: 30/06/2003

109 Ethanol/water pulping of sugarcane in pressurized system and oxidation of the lignin obtained

Process: 2003/04485-7
Modality: Masters Degree

Grant Holder: Laís Puls Ferretti
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/03/2004
Finish: 28/02/2006

110 Recovery and purification of acrylic acid produced from sugarcane by chromatographic adsorption

Process: 2003/05140-3
Modality: Masters Degree

Grant Holder: Ana Paula da Anunciação Pinho
Supervisor: Maria Regina Wolf Maciel
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/10/2003
Finish: 31/03/2005

111 Production of chelants through enzymatic oxidation of lignins from sugarcane straw and bagasse

Process: 2004/09333-3
Modality: Scientific Initiation

Grant Holder: Gabriela Maria Muniz Calábria
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/11/2004
Finish: 31/10/2005

112 Control via neural networks of absorption columns in the production process of ethanol by fermentation

Process: 2005/02536-9
Modality: Doctorate

Grant Holder: Eduardo Eyng
Supervisor: Ana Maria Frattini Fileti
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/02/2006
Finish: 31/01/2009

113 Implementation of convergence criteria in the process of azeotropic distillation and evaluation of new alternatives

Process: 2005/54894-6
Modality: Scientific Initiation

Grant Holder: Rodrigo Alves de Paiva
Supervisor: Maria Regina Wolf Maciel
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/08/2005
Finish: 31/07/2006

114 Evaluation of the enzymatic oxidation of lignins from sugarcane straw and bagasse and of the enzyme lignin interaction

Process: 2006/00124-8
Modality: Scientific Initiation

Grant Holder: Simone Coelho Nakanishi
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Engineering / University of São Paulo (USP)

Start: 01/05/2006
Finish: 04/03/2007

115 Simulation of the production process of ethanol from sugar and from bagasse, aiming for the integration of the process and the maximization of the production of energy and excedents from the bagasse

Process: 2006/02368-1
Modality: Masters Degree

Grant Holder: Marina Oliveira de Souza Dias
Supervisor: Rubens Maciel Filho
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/11/2006
Finish: 31/10/2008

116 Study of viable alternatives for pre-treatment and hydrolysis of sugarcane straw and bagasse to obtain ethanol from cellulose

Process: 2006/07183-0
Modality: Fast-track Doctorate

Grant Holder: Luís Ricardo Martins Oliveira
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Engineering / University of São Paulo (USP)

Start: 01/03/2007
Finish: 28/02/2011

117 Use of the hemicellulosic fraction of sugarcane bagasse for the crystallization of xylose and biotechnological production of ethanol

Process: 2006/55979-8
Modality: Post-doctorate

Grant Holder: Larissa Canilha
Supervisor: Marco Giulietti
Institution: Institute of Technological Research of the State of São Paulo (IPT)

Start: 01/11/2006
Finish: 31/10/2007

Sanitary Engineering

118 Production of sediments in farm areas under sugarcane and citrus cultivation

Process: 1997/11202-9
Modality: Doctorate

Grant Holder: Maria Eugênia Martins
Supervisor: Evaldo Miranda Coiado
Institution: School of Civil Engineering and Architecture Urbanism / State University of Campinas (Unicamp)

Start: 01/01/1998
Finish: 31/12/2001

119 Study of the environmental factors and of standards for the socio-environmental evaluation, monitoring and certification of sugarcane and its industrial processing

Process: 1998/03710-7
Modality: Masters Degree

Grant Holder: Aldo Roberto Ometto
Supervisor: Marcelo Pereira de Souza
Institution: São Carlos School of Engineering / University of São Paulo (USP)

Start: 01/06/1998
Finish: 31/05/2000

Pharmacy

120 Development of textile fibers from sugarcane bagasse cellulose with the incorporation of medicines and enzymes for medical applications

Process: 2006/56029-3
Modality: Post-doctorate

Grant Holder: Sirlene Maria da Costa
Supervisor: Adalberto Pessoa Júnior

Institution: School of Pharmaceutical Sciences / University of São Paulo (USP)

Start: 01/11/2006
Finish: 31/10/2007

Physics

121 Sections of rotational shock excitation of the ethanol molecule (c2h5oh) by electron impact

Process: 2006/06752-0
Modality: Scientific Initiation

Grant Holder: Heloísa Rodrigues da Rocha
Supervisor: Marco Aurélio Pinheiro Lima
Institution: Gleb Wataghin Physics Institute / State University of Campinas (Unicamp)

Start: 01/01/2007
Finish: 31/12/2007

Genetics

122 Molecular cloning of amylolytic enzymes in industrial and Amazonian yeasts aiming for the production of ethanol and biomass

Process: 1998/05291-1
Modality: Doctorate

Grant Holder: Jefferson Alves da Costa Júnior
Supervisor: Elisabete José Vicente
Institution: Biomedical Sciences Institute / University of São Paulo (USP)

Start: 01/07/1998
Finish: 31/08/2000

123 Estimation of the genetic diversity among sugarcane clones using molecular marker of the AFLP type

Process: 1999/01347-5
Modality: Masters Degree

Grant Holder: Milena de Luna Alves de Lima
Supervisor: Anete Pereira de Souza
Institution: Center for Molecular Biology Genetic Engineering / State University of Campinas (Unicamp)

Start: 01/05/1999
Finish: 31/10/2000

124 Sequencing and analysis of sugarcane "ESTs". Identification of active r etrotransposons in sugarcane

Process: 2000/01415-0
Modality: Post-doctorate

Grant Holder: Paula Gonçalves de Araújo
Supervisor: Marie Anne Van Sluys
Institution: Institute of Biosciences / University of São Paulo (USP)

Start: 01/04/2000
Finish: 30/06/2003

125 Cultivation of tissues and genetic transformation of sugarcane chloroplasts (var. Sp-803280)

Process: 2001/01397-4
Modality: Scientific Initiation

Grant Holder: Henrique Sérgio Alves
Supervisor: Helaine Carrer
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/04/2001
Finish: 30/09/2002

126 Comparative analysis of gene banks through bio-informatics resources for the identification of sugarcane ESTs involved in resistance to nematodes

Process: 2001/06074-9
Modality: Scientific Initiation

Grant Holder: Guilherme Gomes Baptista
Supervisor: Carlos Augusto Colombo
Institution: Campinas Institute of Agronomy / SAA-SP

Start: 01/08/2001
Finish: 31/07/2003

127 Identification and validation of tissue-specific ESTs using the information from the bank of expressed sugarcane sequences (Sucest)

Process: 2004/09675-1
Modality: Scientific Initiation

Grant Holder: Roberto de Almeida Camargo
Supervisor: Ivan de Godoy Maia

Institution: Botucatu Institute of Biosciences / Paulista State University (Unesp)

Start: 01/10/2004
Finish: 30/09/2005

128 Genetic characterization of the bacterial community of cachaça wines in small alembics

Process: 2004/10121-0
Modality: Scientific Initiation

Grant Holder: Osmar Vaz de Carvalho Netto
Supervisor: Luis Eduardo Aranha Camargo
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/12/2004
Finish: 30/06/2005

129 Analysis of the differential genic expression of the enzymes involved in the process of biosynthesis of glycine betaine in sugarcane leaves subjected to hydric stress

Process: 2004/13558-0
Modality: Scientific Initiation

Grant Holder: Paula dos Santos Demore
Supervisor: Sonia Marli Zingaretti Di Mauro
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / State University Paulista (Unesp)

Start: 01/03/2005
Finish: 31/12/2005

130 Characterization of genes of unknown function preferentially expressed during reproductive development in sugarcane (*Saccharum spp*)

Process: 2006/53709-3
Modality: Post-doctorate

Grant Holder: Marcelo Prudencio Giovanini
Supervisor: Marcelo Carnier Dornelas
Institution: Institute of Biology / State University of Campinas (Unicamp)

Start: 01/09/2006
Finish: 31/08/2007

131 The mutator system in sugarcane: a comparative analysis with rice

Process: 2007/54162-0
Modality: Masters Degree

Grant Holder: Nilo Luiz Saccaro Júnior
Supervisor: Maria Magdalena Rossi
Institution: Institute of Biosciences / University of São Paulo (USP)

Start: 01/06/2007
Finish: 31/03/2008

132 Mechanization and the impact on the worker. Analysis of the work processes in the Nova América (1950-1990) sugar mill

Process: 1998/13090-6
Modality: Scientific Initiation

Grant Holder: Antônio Alves Bezerra
Supervisor: Tânia Regina de Luca
Institution: Assis School of Science and Arts / Paulista State University (Unesp)

Start: 01/07/1999
Finish: 31/12/1999

133 The ambiguity of cachaça in Luso-American society: remedy against disease and source of conflicts

Process: 2005/56474-4
Modality: Scientific Initiation

Grant Holder: Lucas Endrigo Brunozi Avelar
Supervisor: Henrique Soares Carneiro
Institution: School of Philosophy Arts and Human Sciences / University of São Paulo (USP)

Start: 01/11/2005
Finish: 31/10/2006

Microbiology

134 Fermentative process to obtain xylitol from sugarcane bagasse hydrolysate in fluid bed reactor: evaluation of the operational conditions

Process: 2001/09409-1
Modality: Fast-track Doctorate

Grant Holder: Júlio Cesar dos Santos
Supervisor: Sílvio Silvério da Silva
Institution: Lorena School
of Chemical Engineering

Start: 01/03/2002
Finish: 31/01/2005

135 Use of hemicellulose hydrolysate of sugarcane bagasse obtained from the treatment of the combination of activated carbon and ion exchange resins in continuous system for the biotechnological conversion of xylitol

Process: 2003/13738-6
Modality: Scientific Initiation

Grant Holder: Rimenys Júnior Carvalho
Supervisor: Maria das Graças de Almeida Felipe
Institution: Lorena School
of Chemical Engineering

Start: 01/07/2004
Finish: 30/06/2005

136 Determination of the conditions of acidic hydrolysis of malt bagasse for the production of xylitol through the *Candida guilliermondii* yeast

Process: 2004/01511-0
Modality: Scientific Initiation

Grant Holder: Ane Cristina Silva Vaz
Supervisor: Inês Conceição Roberto
Institution: Lorena School
of Chemical Engineering

Start: 01/06/2004
Finish: 31/05/2005

137 Inversion of sucrose with immobilized osmotolerant yeasts in sugarcane bagasse

Process: 2004/03113-1
Modality: Scientific Initiation

Grant Holder: Daniele Cristina dos Santos Bofo
Supervisor: Maria Bernadete de Medeiros
Institution: Lorena School
of Chemical Engineering

Start: 01/06/2004
Finish: 31/05/2005

138 Effect of the cultivation of genetically modified sugarcane on the fungal diversity and the expression of genes involved in the plant-endophyte interaction

Process: 2005/52343-2
Modality: Fast-track Doctorate

Grant Holder: Aline Silva Romão
Supervisor: Welington Luiz de Araújo
Institution: Luiz de Queiroz Higher School
of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/01/2006
Finish: 28/02/2009

139 Extraction of hemicellulose from sugarcane bagasse to obtain pentoses and xylooligossacharides

Process: 2006/03564-9
Modality: Fast-track Doctorate

Grant Holder: Michel Brienzo
Supervisor: Adriane Maria Ferreira Milagres
Institution: Lorena School of Engineering /
University of São Paulo (USP)

Start: 01/10/2006
Finish: 28/02/2010

140 Study of operational parameters for the biotechnological production of xylitol from sugarcane bagasse in fluid bed bioreactor operated with immobilized cells

Process: 2007/00253-5
Modality: Scientific Initiation

Grant Holder: Cássio Vasconcelos Pereira
Supervisor: Sílvio Silvério da Silva
Institution: Lorena School of Engineering /
University of São Paulo (USP)

Start: 01/05/2007
Finish: 30/04/2008

Chemistry

141 New materials for electro-oxidation of organic compounds: oxidation of ethanol on titanium anodes covered with iridium oxides (ti/iro2)

Process: 1997/00339-3
Modality: Scientific Initiation

Grant Holder: Carlos Henrique de Vasconcelos Fidelis
Supervisor: Adalgisa Rodrigues de Andrade
Institution: Ribeirão Preto School of Philosophy, Sciences and Arts / University of São Paulo (USP)

Start: 01/06/1997
Finish: 31/12/1998

142 Use of electrodes modified with polyaniline for electro-oxidation of lignin model compounds

Process: 1997/03330-7
Modality: Masters Degree

Grant Holder: Ellen Kenia Kuntze Pantoja
Supervisor: Artur de Jesus Motheo
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/07/1997
Finish: 30/06/1999

143 Study of the chemical and enzymatic bleaching of the acetosolv pulp of sugarcane bagasse

Process: 1997/05033-0
Modality: Scientific Initiation

Grant Holder: Denise Santos Ruzene
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/08/1997
Finish: 31/07/1998

144 Chemical and spectroscopic characterization of the acetosolv liquor from the pulping of sugarcane bagasse

Process: 1997/05034-6
Modality: Scientific Initiation

Grant Holder: Luciana Aparecida N. da Silva Briguente
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/11/1997
Finish: 31/12/1997

145 Pre-treatment of sugarcane bagasse by vapor explosion in the presence of diluted sulfuric acid

Process: 1997/07202-3
Modality: Masters Degree

Grant Holder: Luane Reni Mattos
Supervisor: Flávio Teixeira da Silva
Institution: Lorena School of Chemical Engineering

Start: 01/10/1997
Finish: 29/02/2000

146 New materials for the electro-oxidation of organic substrates: the use of ternary oxides of composition ti/ru0,3ti(0,7-x)snxo2 in the investigation of the oxidation of ethanol

Process: 1997/14361-0
Modality: Masters Degree

Grant Holder: Juliane Cristina Forti
Supervisor: Adalgisa Rodrigues de Andrade
Institution: Ribeirão Preto School of Philosophy, Sciences and Arts / University of São Paulo (USP)

Start: 01/08/1998
Finish: 31/10/2000

147 Determination of dextrane in sugarcane and sugar liquor

Process: 1998/09052-1
Modality: Masters Degree

Grant Holder: Manoel Gabriel Rodrigues Filho
Supervisor: Douglas Wagner Franco
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/09/1998
Finish: 31/08/2000

148 Determination of aminoacids in flakes, sugars and sugarcane liquors

Process: 1998/09053-8
Modality: Masters Degree

Grant Holder: Lisângela Maria Boso
Supervisor: Douglas Wagner Franco
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/10/1998
Finish: 31/12/2000

149 Chemical and spectroscopic characterization of acetosolv pulping liquor from sugarcane bagasse

Process: 1998/16271-1
Modality: Scientific Initiation

Grant Holder: Sílvia Maria Bodo
Supervisor: Adilson Roberto Gonçalves
Institution: Lorena School of Chemical Engineering

Start: 01/08/1999
Finish: 31/07/2000

150 Seasonal combustion of sugarcane in the State of São Paulo with a source of non-volatile hydrocarbonates in atmospheric aerosols

Process: 1998/16419-9
Modality: Masters Degree

Grant Holder: Alexandre Franco
Supervisor: Arnaldo Alves Cardoso
Institution: Araraquara Institute of Chemistry / Paulista State University (Unesp)

Start: 01/04/1999
Finish: 31/03/2001

151 Calculations of solvatation of intermediate and complex reagents activated by hydrolysis reactions

Process: 1999/00011-3
Modality: Masters Degree

Grant Holder: Karina Shimizu
Supervisor: João Pedro Simon Farah
Institution: Institute of Chemistry / University of São Paulo (USP)

Start: 01/07/1999
Finish: 31/05/2001

152 Effect of the surface structure in the catalytic electro-oxidation of ethanol over monocrystalline electrodes of Pt-Os

Process: 1999/01730-3
Modality: Masters Degree

Grant Holder: Valderi Pacheco dos Santos
Supervisor: Germano Tremiliosi Filho
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/06/1999
Finish: 30/04/2001

153 Ab initio study and by Monte Carlo simulation of the solvatation of ions oh- and their ester reactions in gaseous phase, in clusters and in liquid phase

Process: 1999/02809-2
Modality: Post-doctorate

Grant Holder: Josefredo Rodriguez Pliego Júnior
Supervisor: José Manuel Riveros Nigra
Institution: Institute of Chemistry / University of São Paulo (USP)

Start: 01/06/1999
Finish: 28/02/2002

154 Characterization of hemicellulose hydrolysate of sugarcane bagasse pre-treated by vapor explosion: evaluation of the inhibiting power of the aromatic compounds of low molar mass in fermentative processes

Process: 2000/08011-1
Modality: Doctorate

Grant Holder: Hellen Cristiane Maciel Cunha
Supervisor: Flávio Teixeira da Silva
Institution: Lorena School of Chemical Engineering

Start: 01/10/2000
Finish: 30/09/2004

155 Electro-oxidation of small organic molecules over Pt-Ir and Pt-Ru-Ir alloys

Process: 2000/08249-8
Modality: Masters Degree

Grant Holder: Geasi Pavao Soares
Supervisor: Germano Tremiliosi Filho
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/04/2001
Finish: 14/03/2002

156 Study of the electrocatalytic activity of oxide films of (iridium + tin + titanium) in the electro-oxidation of ethanol, acetaldehyde and acetic acid

Process: 2000/08734-3
Modality: Doctorate

Grant Holder: Demetrius Profeti
Supervisor: Paulo Olivi
Institution: Ribeirão Preto School of Philosophy, Sciences and Arts / University of São Paulo (USP)

Start: 01/10/2000
Finish: 30/09/2004

157 Temperature measurements of ethanol flames using laser diagnostic methods

Process: 2000/14503-4
Modality: Doctorate

Grant Holder: Leila Ribeiro dos Santos
Supervisor: Harrald Victor Linnert
Institution: Institute of Chemistry / University of São Paulo (USP)

Start: 01/05/2001
Finish: 30/04/2005

158 Production, isolation, purification and characterization of sugarcane bagasse lignin crushed (LBM) in ball mill

Process: 2001/04974-2
Modality: Scientific Initiation

Grant Holder: Juliana Del Tio
Supervisor: Flávio Teixeira da Silva
Institution: Lorena School of Chemical Engineering

Start: 01/06/2001
Finish: 31/05/2003

159 Determination of organic contaminants in fuel alcohol using high efficiency liquid chromatography with electrochemical detection

Process: 2001/09417-4
Modality: Doctorate

Grant Holder: Adelir Aparecida Saczk
Supervisor: Nelson Ramos Stradiotto
Institution: Araraquara Institute of Chemistry / Paulista State University (Unesp)

Start: 01/10/2001
Finish: 31/08/2004

160 Use of Cu and Au electrodes in electroanalysis: amperometric detection of ethanol in exhaled air and other applications

Process: 2001/11589-8
Modality: Masters Degree

Grant Holder: Thiago Régis Longo César da Paixão
Supervisor: Mauro Bertotti
Institution: Institute of Chemistry / University of São Paulo (USP)

Start: 01/09/2002
Finish: 29/02/2004

161 Studies of oxidation of ethanol over Ni, Co and Ni-Co alloys

Process: 2001/12738-7
Modality: Scientific Initiation

Grant Holder: Angerson Nogueira do Nascimento
Supervisor: Sérgio Antônio Spinola Machado
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/03/2002
Finish: 28/02/2003

162 Production of electrical energy from catalytic reformation of ethanol coupled to a fuel cell

Process: 2001/14183-2
Modality: Post-doctorate

Grant Holder: Marcelo da Silva Batista
Supervisor: Edson Antônio Ticianelli
Institution: Institute of Chemistry / University of São Paulo (USP)

Start: 01/08/2002
Finish: 31/08/2004

163 Study of decomposing binary oxide electrodes ruo2+ta205: investigation of the oxidation of ethanol and acetic acid in acid medium as model reactions of the breaking of the C-C bond

Process: 2002/06465-0
Modality: Doctorate

Grant Holder: Josimar Ribeiro
Supervisor: Adalgisa Rodrigues de Andrade
Institution: Ribeirão Preto School of Philosophy, Sciences and Arts / University of São Paulo (USP)

Start: 01/03/2003
Finish: 28/02/2006

164 Development and study of supported electrocatalysts for fuel cells

Process: 2002/08028-7
Modality: Doctorate

Grant Holder: Érica de Camargo Bortholin
Supervisor: Ernesto Rafael Gonzalez
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/04/2003
Finish: 31/08/2005

165 Electrochemical and spectroscopic study of alloys formed on monocrystalline platinum by surface modification in levels of submonolayers of Ru, Os and Ru/Os: application in the electro-oxidation of...

Process: 2002/11007-1
Modality: Doctorate

Grant Holder: Vinícius Del Colle
Supervisor: Germano Tremiliosi Filho
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/09/2003
Finish: 29/02/2004

166 Electrochemical and spectroscopic studies of the oxidation of ethanol acid medium

Process: 2002/14211-9
Modality: Post-doctorate

Grant Holder: Giuseppe Abiola Camara da Silva
Supervisor: Teresa Benita Iwasita de Vielstich
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/04/2003
Finish: 30/06/2006

167 Characterization of silica in sugarcane bagasse and leaf ash

Process: 2003/07470-0
Modality: Scientific Initiation

Grant Holder: Aline Moreira de Souza
Supervisor: Maria Izabel Maretti Silveira Bueno
Institution: Institute of Chemistry / State University of Campinas (Unicamp)

Start: 01/11/2003
Finish: 31/10/2004

168 Electrochemical oxidation of ethanol in Pt-Rh-Ru electrodes dispersed in carbon: study of the effect of composition and particle size in the selectivity and mechanism of reaction

Process: 2004/07308-1
Modality: Fast-track Doctorate

Grant Holder: Melina D Villa Silva
Supervisor: Germano Tremiliosi Filho
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/11/2004
Finish: 31/10/2008

169 Modification of the platinum activity for the electro-catalysis of ethanol oxidation in direct ethanol fuel cells

Process: 2005/04585-7
Modality: Post-doctorate

Grant Holder: Fábio Henrique Barros de Lima
Supervisor: Ernesto Rafael Gonzalez
Institution: São Carlos Institute of Chemistry / University of São Paulo (USP)

Start: 01/09/2006
Finish: 31/08/2007

170 Development of analytical methods involving multi-element determinations in lubricating oil and fuel alcohol by continuum source flame atomic absorption spectrometry

Process: 2005/60191-8
Modality: Post-doctorate

Grant Holder: Volnei Resta Amorim Filho

Supervisor: José Anchieta Gomes Neto
Institution: Araraquara Institute of Chemistry / Paulista State University (Unesp)

Start: 01/04/2006
Finish: 31/03/2008

171 Development of nanoparticle catalysts of the type pt-m1-m2(m1 and m2 = ir, ru, os) for application in direct-ethanol fuel cells

Process: 2006/01050-8
Modality: Scientific Initiation

Grant Holder: Herbert Duchatsch Johansen
Supervisor: Germano Tremiliosi Filho
Institution: São Carlos Chemistry Institute/ University of São Paulo (USP)

Start: 01/06/2006
Finish: 31/05/2007

172 Development and validation of method for the simultaneous determination of copper, iron, sodium, nitrate and acetate ions in combustible ethanol using ion chromatography

Process: 2006/03960-1
Modality: Doctorate

Grant Holder: Jailson Cardoso Dias
Supervisor: Lauro Tatsuo Kubota
Institution: Chemistry Institute / State University of Campinas (Unicamp)

Start: 01/01/2007
Finish: 31/12/2009

173 Behavior of the inorganic N dissolved in surface and sub-surface waters in area under sugarcane cultivation

Process: 2006/52978-0
Modality: Masters Degree

Grant Holder: Alexandre Martins Fernandes
Supervisor: Jefferson Mortatti
Institution: Center for Nuclear Energy in Agriculture / University of São Paulo (Cena/USP)

Start: 01/09/2006
Finish: 30/06/2008

174 Study of the oxidation of methanol and ethanol over supported bimetallic catalysts prepared by colloidal methods

Process: 2006/60769-2
Modality: Doctorate

Grant Holder: Denis Ricardo Martins de Godoi
Supervisor: Hebe de Las Mercedes Villullas
Institution: Araraquara Institute of Chemistry / Paulista State University (Unesp)

Start: 01/05/2007
Finish: 30/04/2010

175 Evaluation of pre-treatments and modeling of the enzymatic hydrolysis of sugarcane bagasse for the production of ethanol

Process: 2007/01525-9
Modality: Doctorate

Grant Holder: Sarita Cândida Rabelo
Supervisor: Aline Carvalho da Costa
Institution: School of Chemical Engineering / State University of Campinas (Unicamp)

Start: 01/07/2007
Finish: 30/06/2010

Fish Hatchery Resources and Engineering of Fish

176 Utilization of whole sugarcane yeast (*Saccharomyces cerevisiae*) and its subproducts in the feeding of young catfish (*Pseudoplatystoma coruscans*)

Process: 2002/12082-7
Modality: Masters Degree

Grant Holder: Juliane Renata Gaiotto
Supervisor: Elisabete Maria Macedo Viegas
Institution: School of Zootechnics and Food Engineering / University of São Paulo (USP)

Start: 01/03/2003
Finish: 31/01/2005

Zoology

177 Female reproductive system of the sugarcane spittlebug *Mahanarva fimbriolata* (homoptera). Morpho-histological study and protein dosage

Process: 2003/13472-6
Modality: Scientific Initiation

Grant Holder: Débora Caperucci
Supervisor: Maria Izabel Camargo Mathias
Institution: Rio Claro Institute of Biosciences / Paulista State University (Unesp)

Start: 01/03/2004
Finish: 31/12/2004

Zootechnics

178 Nutritional value of sugarcane in natural or silaged forms, with or without the addition of urea

Process: 1998/13132-0
Modality: Scientific Initiation

Grant Holder: Ricardo Lopes Dias da Costa
Supervisor: Carlos de Sousa Lucci
Institution: School of Veterinary Medicine / University of Santo Amaro

Start: 01/09/1999
Finish: 31/12/2000

179 Nutritional value of sugarcane in natural and silaged forms, silaged with urea or not

Process: 1998/13133-7
Modality: Scientific Initiation

Grant Holder: Adriana Capezzuto
Supervisor: Carlos de Sousa Lucci
Institution: School of Veterinary Medicine / University of Santo Amaro (Unisa)

Start: 01/09/1999
Finish: 31/12/2000

180 Evaluation of sugarcane bagasse treated with different chemical agents through studies of ruminal kinetics and digestibility trials

Process: 1998/13959-2
Modality: Masters Degree

Grant Holder: Mauricio Virmond
Supervisor: Paulo Roberto Leme
Institution: School of Zootechnics and Food Engineering / University of São Paulo (USP)

Start: 01/03/1999
Finish: 28/02/2001

181 Effect of monesine on the ruminal degradability of feeds with sugarcane bagasse and subproduct of lysine (spl)

Process: 1999/11609-7
Modality: Scientific Initiation

Grant Holder: Michel Golfetto Calixto
Supervisor: Jane Maria Bertocco Ezequiel
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / State University Paulista (Unesp)

Start: 01/06/2000
Finish: 31/05/2001

182 Processing of sugarcane: its effects on digestibility, degradability and rate of passage

Process: 2000/11529-2
Modality: Scientific Initiation

Grant Holder: Mario Adriano Ávila Queiroz
Supervisor: Jane Maria Bertocco Ezequiel
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / State University Paulista (Unesp)

Start: 01/04/2001
Finish: 31/12/2001

183 Chemical Additives and association of bacterial additives in the silaging of sugarcane (*Saccharum officinarum i.*)

Process: 2004/12513-3
Modality: Masters Degree

Grant Holder: Oscar Cezar Muller Queiroz
Supervisor: Luiz Gustavo Nussio
Institution: Luiz de Queiroz Higher School of Agriculture / University of São Paulo (Esalq/USP)

Start: 01/03/2005
Finish: 31/07/2006

184 Evaluation of the action of time after plantation burning and additives in the silaging of sugarcane

Process: 2005/00623-1
Modality: Scientific Initiation

Grant Holder: Anna Paula de Toledo Piza Roth
Supervisor: Ricardo Andrade Reis
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / Paulista State University (Unesp)

Start: 01/06/2005
Finish: 31/12/2006

185 Evaluation of quicklime, hydrated lime and chalk as additives to freshly cut and silaged sugarcane

Process: 2006/57119-6
Modality: Scientific Initiation

Grant Holder: Marcelo Armelin Silva
Supervisor: Hamilton Caetano
Institution: Araçatuba School of Dentistry / Paulista State University (Unesp)

Start: 01/10/2006
Finish: 31/07/2007

186 Protein sugarcane-based diets for dairy heifers

Process: 2006/57537-2
Modality: Doctorate

Grant Holder: Sandro de Souza Mendonca
Supervisor: Telma Teresinha Berchielli
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / State University Paulista (Unesp)

Start: 01/01/2007
Finish: 31/05/2007

187 Digestive parameters of sugarcane treated with hydrated quicklime

Process: 2006/59095-7
Modality: Scientific Initiation

Grant Holder: Andre Pastori D Aurea
Supervisor: Jane Maria Bertocco Ezequiel
Institution: Jaboticabal School of Agrarian and Veterinary Sciences / State University Paulista (Unesp)

Start: 01/02/2007
Finish: 31/12/2007

188 Fermentative and bromatological characterization of sugarcane silage

Process: 2006/59597-2
Modality: Post-doctorate

Grant Holder: Laura Maria Oliveira Borgatti
Supervisor: Paulo Henrique Mazza Rodrigues
Institution: School of Zootechnic Veterinary Medicine / University of São Paulo (USP)

Start: 01/02/2007
Finish: 31/01/2009

189 Consumption, digestibility and performance of sheep receiving diets of sugarcane treated with calcium hydroxide

Process: 2007/00346-3
Modality: Scientific Initiation

Grant Holder: Fernanda Lopes Macedo
Supervisor: Acyr Wanderley de Paula Freitas
Institution: Paulista Agency for Technology and Agribusiness / SAA-SP

Start: 01/05/2007
Finish: 31/03/2008

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