Seminar

Development and foresight in China & Latin America agricultural science, technology and innovation

Santiago Chile, on13 September 2017

SEMINAR REPORT

Background

China has become an important market for the agricultural and agro-industrial exports of several Latin American countries, which reached US$ 30 billion in 2015, while flows from China to LAC were only US$ 3.024 million. The negative agriculture-related trade balance that China has with LAC contrasts with a global trade surplus, as total exports of China to Latin America reached US$ 81.7 billion, while total imports were US$ 172.4 billion, in 2015. The rise of the region's agricultural export to China is the result of the increase in food demand derived from a fast growing economy and rapidly urbanizing society, which cannot be met with local production. In 2015 China's agricultural trade deficit reached US$ 27.1 billion.

That situation creates objective conditions for complementarities between China and LAC, establishing solid and stable strategic alliances for cooperation on agriculture that transcend pure commercial relationships, as it has been the case until now. Building those alliances requires a better mutual understanding between the two regions, as it was stressed during the Forum of Minister of Agriculture of Latin America and the People's Republic of China, celebrated in Beijing, on June 8-9, 2013. In the Declaration approved by acclamation in the Forum, the Ministers proclaimed: "*"We believe that: Agricultural science and technology provide ultimate resource to promote agricultural development. While cutting-edge high technologies develop by leaps and bounds, the post-Green Revolution era and sustainable agricultural production systems have carved out new way for the future agricultural development. Enhanced cooperation in technology innovation and extension will, in this context, elevate agricultural technology and agricultural development in both China and Latin America and the Caribbean. The advancement of biotechnology as well as biosafety concerns are integral part of this process and it should be applied fully in agricultural development observing existing multilateral agreement."*

The Declaration states the intention to, among other *"Jointly conduct agricultural technology programs, strengthen cooperation in agricultural science and technology research and development centers and conduct joint research on crop variety breeding and cultivation, agricultural biotechnology, animal farming, aquaculture, animal and plant disease prevention and control, agricultural mechanization, and agricultural product processing, etc. to jointly enhance scientific and technological innovation capacity;"*

Furthermore, in the Summit of Heads of State of CELAC and the People's Republic of China, held in Brasilia, on July 17, 2014, President Xi Jinping outlined an integral proposal and the position of China with respect to Latin America. These can be summarized in what President Jinping termed as the "1+3+6 Cooperation Framework", meaning "1 Program of Cooperation, the "Chinese-Latin American and Caribbean Countries Cooperation Plan (2015-2019)", "trade, investment and financial cooperation as the 3 engines to promote cooperation" and "6 major fields", one of which is agriculture.

Objectives of the seminar

The main purpose of the seminar was to identify complementarities in agricultural sciences, technology and innovation among China and Latin America and the Caribbean with the purpose of strengthening cooperation initiatives.

The specific objectives were:

- Promote dialogue amongst agricultural scientists from China and Latin America and the Caribbean;
- Share advances in agricultural science, technology and innovations in primary agricultural production, food processing and the food industry, and processing of waste agricultural biomass.

- Identify strengths and weakness that can provide the basis for cooperation between China and Latin America and the Caribbean in primary agricultural production, food processing and the food industry, and processing of waste agricultural biomass;
- Identify opportunities and mechanism for strengthening cooperation between China and Latin America and the Caribbean, focusing on agricultural science, technology and innovations in low-carbon primary agricultural production, food processing and the food industry, and processing of waste agricultural biomass as a means to promote rural development and climate action in agriculture.

Audience

The audience of the Seminar includes policymakers, academics and researchers, students, and other stakeholders in the areas of agricultural sciences, technology and innovation, from the P. R. China, Chile, Argentina, Brazil and Costa Rica. The program of the event is included in the Annex, along with a short CV of the participants

Inauguration

Adrián Rodríguez, Chief of the Agricultural Development Unit, ECLAC's Division of Production, Productivity and Management (UDA/DPPM), welcomed the participants on behalf of ECLAC's Executive Secretary and the Director of DPPM.

Julio Berdegué, Regional Representative of FAO for LAC, introduced the seminar highlighting five challenges for agriculture in Latin America and the Caribbean (LAC):

- Increasing productivity of small scale family agriculture.
- Sustainability and adaptation to climate change, stressing the need of innovations to tackle these issues.
- Improving the nutritional quality of food, this means caring for the quality of food, in addition to worrying about quantity.
- Increasing efficiency of water utilization and raising awareness of the tradeoffs among alternative uses; for example the trade-off *thirst* vs *food-feed*.
- Improving the relationship between biodiversity and agriculture, especially by finding in biodiversity ways to create new jobs and welfare.

Huang Shengbiao, Deputy Director-General, China Rural Technology Development Center, Ministry of Science and Technology (MOST) underlined the importance of the cooperation between China and LAC. He indicated that in the context of the China – LAC partnerships, launched in 2014, China has signed bilateral agricultural science, technology and innovation agreements with Chile, Uruguay and Brazil; co-investments in research projects have been made; and exchange of young professional has been funded and carried-out. Moreover, as part of such cooperation a joint research center is currently being created between Chile and the P. R of China. Mr. Shengbiao highlighted that the strategy for agricultural development in China is based on innovation (financing of technology development and transfer is channeled through research and innovation centers) and stressed the importance that South – South Cooperation has for China, under the Cooperation Framework known as "one belt; one route".

Summary and conclusions

<u>Session I</u>. From the presentations of the Chinese delegates the following opportunities for collaboration are identified: a) Germplasm exchange; b) research in fusarium head scab and wheat blast; c) agricultural bio-industry; d) animal biotechnology and breeding resources; and e) training young scientists with funding from Chinese government.

Session II. From the presentations of the Chinese delegates the following opportunities for collaboration are identified: a) cold chain technology; b) photoelectric sorting technology; c) freeze-drying technology; d) adding value and create new value for agri-food products; e) fruit & vegetable processing, aquatic food development; f) high efficiency & lower emission processing technology &equipment); and g) advanced technology research and equipment development.

Instruments proposed to carry-out the cooperation include reciprocal visits, professional training and human capital development, joint research projects and collaborative funding, and training & demonstration related facilities.

Session III

The representative of the Chinese Ministry of Science and Technology made four concrete proposals:

1. Establish the "Development and foresight in China & Latin America agricultural science, technology and innovation" as a permanent forum.
2. Explore to establish appropriate cooperation mechanism between MOST and ECLAC, FAO/RLC.
3. Invitation to Latin American scientists to participate in "The Belt and Road Science, Technology and Innovation Cooperation Action Plan" and ""China-Latin America Youth Scientist Exchange Program".
4. Establish a working group of agricultural S&T cooperation between China and Latin America, and jointly draft the summary report of the forum.

INIA and INTA presented examples of bilateral cooperation between China and their respective countries. In Chile, the Chilean – Chinese R & D Center for Agricultural Science and Technology, which will focus on fruits and vegetables, and that will operate at INIA – La Platina. An in Argentina the Chinese Center for Food Science and Technology (CCAFST), created in 2008.

Several potential areas for cooperation were mentioned. On the Chinese side:

- Bio-processing and engineering; biomass, bio-products, utilization of agricultural and animal waste;
- Mechanization, small farm machinery, improvement of agriculture machinery, new generation of machinery and equipment (e.g. IOT, ICTs);
- Cost saving technologies in food processing; processing of fruits and vegetables;
- Cooperation and technology transfer on food processing;
- Water efficiency in irrigation; water pollution from agriculture; water management;
- energy and material efficiency in food processing and packing;
- Improve agriculture – environment relationships;
- Modern biotechnology;
- Bio-controllers, reduction of toxins, pathogens and viruses.

LAC participants stressed:

- Innovation in collection, conservation and use of germplasm and genetic improvement (Argentina, Chile);

- Identification, control and prevention of pests and diseases in fruit and vegetables (Chile);
- Technology of protected agriculture (Chile);
- Agricultural machinery and support in applied technology (Chile);
- Production and quality systems for dairy products and meat (Chile);
- Bio economy, biotechnology and precision agriculture (Chile, Argentina);
- Mechanization, small farm machinery (Chile);
- Bio-controllers for products of interest in international trade (Costa Rica); control of pathogen microorganisms (Argentina);
- Development of bio-products to substitute agricultural chemical inputs (Costa Rica); reduction of chemical contamination (Argentina);
- Bio-products, utilization of food waste (Argentina, Brazil, Costa Rica), new technologies to use agricultural sub-products (Argentina);
- Water efficiency (Brazil).

The cooperation mechanisms receiving more attention are:

- Exchange, training of young scientists (language issues need to be addressed both ways);
- Joint laboratories and centers (e.g. the one between Chile and China);
- Joint research on topics of common interest (win-win).

Regarding mechanisms to channel the cooperation, it was stressed that in several countries there are already Joint Science and Technology Commissions (e.g. Argentina, Brazil, Chile, Uruguay), which can play an important role in promoting cooperation. Also, the need to explore new regional, stable and long term focused working mechanisms was stressed, especially through regional organizations, such as ECLAC and FAO.

A proposal for strengthening cooperation on agricultural science, technology and innovation between China and Latin America and the Caribbean

The China – Latin America and Caribbean forum on agricultural science, technology and innovation

Based on the proposal made by MOST, the establishment of a permanent forum on development and foresight in China & Latin America agricultural science, technology and innovation is proposed, as a permanent forum to attract more Chinese and Latin American agricultural scientists to share progress and experience in the agricultural researches, and exploring the cooperative opportunities and mechanisms.

It is proposed that this forum meets biennially, alternating between China and Latin America. These meeting will serve three main purposes:

- Exchange of knowledge on recent developments in agricultural science, technology and innovation, both in China and Latin America, focusing on the topics described below;
- Report progress on the results of joint agricultural research, technology and innovation initiatives, such as the China – Chile Center, or other programs or projects that might emerge out from the Forum.
- Explore further opportunities for cooperation on the topic proposed below, or other that might emerge in the future.

The creation of a trilateral Steering Committee is also proposed, integrated by ECLAC and FAO/RLC and MOST. This committee will:

- Follow-up on the results of the Forum and report to the countries;
- Organize the biennial meetings of the Forum;
- Organize thematic specific meetings, if deemed necessary, or there is a demand from the countries;
- Coordinate or elaborate policy oriented studies on issues of interest to both parties.
- Develop outreach activities (e.g. bulletins).

Financing of the meetings will have to be further discussed.

Areas of mutual interest

From the revealed interest of the participants in the Forum, the following areas of mutual interest are proposed:

1) Bio-products, bio-processing and engineering, biomass utilization and utilization of food, agriculture and animal waste, new technologies to use agricultural sub-products.
2) Bio-controllers, control of pathogen microorganisms, reduction of toxins, pathogens and viruses, bio-agricultural inputs to substitute agricultural chemical inputs;
3) Water and energy efficiency in agriculture and agroindustry, water efficiency in irrigation, water pollution from agriculture, water management.
4) Mechanization, small farm machinery, improvement of agriculture machinery, new generation of machinery and equipment (e.g. IOT, ICTs).

5) Cooperation and technology transfer on food processing, cost-saving technologies in food processing, energy and material efficiency in food processing and packing.

6) Germplasm exchange, innovation in collection, conservation and use of germplasm and genetic improvement (Argentina, Chile).

It is proposed that the creation of a China – LAC Fund on Science Technology and Innovation is explored. This fund could be created with the contribution of China and LAC countries and will fund joint research, technology and innovation initiatives, with the participation of China and at least two LAC countries. There could be a biennial call for proposals and projects will be selected on merit grounds, based on criteria to be defined.

Cooperation mechanisms

The following cooperation mechanisms are proposed:

- Young professionals exchange, training visits, training of young scientists (language issues need to be addressed both ways);
- Joint laboratories and centers (e.g. the one between Chile and China);
- Joint research on topics of common interest.

Cooperation channels

The basic cooperation channels for the cooperation will the Joint Science and Technology Commissions that already are in place in several countries. The Steering Committee will have to establish links with the national commissions, to get feedback for the forum on the activities and priorities defined at the bilateral level. The Steering Committee can also establish mechanisms to share that information amongst the countries.

The information from the countries will provide inputs to define the program of the Forum meetings, and along with the results from the discussions at those meetings, will provide the basis for the eventual projects to be funded through the Fund.

Summary of the presentations

Session I: Primary Production: Biotechnology in agriculture

Dr. He Zhonghu (Research Professor, Institute of Crop Science of the Chinese Academy of Agricultural Sciences) delivered a presentation about the *application of agricultural biotechnology in cereal production in China*, focusing on rice, maize and wheat. Mr. He described: a) *production challenges* (e.g. small farms size, strong competition between grain and cash crops, severe water shortage in northern China, climate change, new diseases and unpredictable occurrence of abiotic stresses such as high temperature); b) *market challenges* (e.g. increase in the food import bill; higher domestic prices vis-à-vis international markets, including shipment); and c) *support polices* (e.g. state protected prices, subsidies to seeds and machinery, development of the land market, investment in research and extension, including support for private companies). Biotechnology applications in agriculture also consider the preservation of biodiversity and due consideration of biosafety issues.

The Chinese crop improvement program is built around genomics, development of GMO crops and molecular breeding techniques, and development of varieties and extension. The program seeks the development and commercialization of GMO crops; and the development and application of molecular marker techniques. GMO crop development targets traits, insect resistance and herbicide tolerance. Mr. Zhonghu indicated that GMO is a hot subject in China, with huge investment in research and significant economic returns in cotton and papaya, a cautious approach for food crops such as wheat and rice. GMO wheat transformation technology has been imported from Japan and significant progress is expected in the future; and gene editing is seen with great potential for crop improvement, but facing challenges regarding gene cloning and better understanding their function.

Regarding molecular market application, Mr. Zhonghu indicated that it is having an increased role, but recognized that conventional breeding still plays a leading role at present. The combination of both techniques is far behind breeders' expectations, as there are poor linkage between conventional breeding and molecular marker programs in China.

Summarizing: a) significant progress has been made in GMO crop development, but only GMO cotton and papaya are commercialized; b) gene specific markers have been developed and successfully used in wheat variety development; and c) collaboration between molecular program and conventional breeding is the key factor for marker application.

Mr. Zhonghu foresees collaboration between China and LAC focusing on three areas: a) Germplasm exchange; b) research in fusarium head scab and wheat blast; and c) training young scientists with funding from Chinese government.

Dr Wang Tao (Vice Rector/Professor China Agricultural University) spoke about *priority areas for national agricultural bio-technology development* in China for 2016-2020, with reference to key national special projects on transgenic technology and agricultural bio-manufacturing.

In the area of transgenic technology the aim is to strengthen R&D for new technologies on gene cloning, transgenic operation, and bio-safety. The goals include: a) obtaining functional genes with important potential for application and independent intellectual property rights, for application in staple crop like rice and wheat; and b) cultivating important and new transgenic varieties, for pest and disease resistance, drought and cold tolerance, high quality and yield, and high efficiency, especially in light of climate change.

Agricultural bio-manufacturing is foreseeing as the area for the new generation of agricultural biotechnology application. Areas of interest include new technologies, like the biosynthesis of important agricultural traits, genome editing, gene expression, network regulation, accurate marker expression, targeted screening, bioinformatics, systems biology, structural biology etc. Efficient cell engineering, metabolic engineering, fermentation engineering, and enzyme engineering technology will be developed, to promote the combination of biological breeding technology and the development of new products. For example, a) *agricultural bio-products* (e.g. new biological pesticides, new safe and efficient herbicides, biological fertilizers, biological regulators), b) *transformation of biomass energy resources* (e.g. development of new varieties of non-grain biomass materials with high yield, quality, and strong resistance to adversity); and c) *other bio-based materials* (e.g. study of advanced manufacturing technology for bio-based polymer materials such as bio-based plastics, new agricultural membrane materials, and bio-based resin materials; construction of a R&D platform for the transformation of key compound bio technology and equipment; and development of efficient microbial engineering bacteria and biological catalyst to carry out industrialization demonstration).

Dr. Han Jianyong (Professor China Agricultural University) gave a presentation about *animal embryonic biotechnology in China*. Mr. Jianyong started by stressing that the emergence of new animal bio-technologies is based on a deep understanding of critical events in the life cycle (e.g. fertilization, preimplantation embryonic development. fetal development, formation of organs and tissues, postnatal development). The development of science and technology has allowed becoming increasingly aware of these processes.

Embryonic techniques include In vitro fertilization (IVF), embryo transfer (ET), sex control, somatic cell nuclear transfer (Animal cloning), gene editing, embryonic stem cell, induced pluripotent stem cells (iPSCs) and new techniques under development. Mr. Jianyong presented examples of the application of such technologies in cows (e.g. sex control, gene targeting, breeding for disease resistance), pigs (e.g. cloning of top animals), and production of organs in pigs for human transplantation and disease models (e.g. combination of animal cloning and gene editing). He also provided examples of breeding for diseased resistance, such as anti-cow mastitis, anti-cow tuberculosis, anti-pig food-and-mouth disease.

Mr. Jianyong foresees that future animal breeding will have to rely on high and new technologies such as stem cells and gene editing. Traditional breeding requires 15-20 years for the stability of a good trait; with gene editing + Embryo Tech stability can be achieved in 1-2 years; and with gene editing + Stem cells stability of multiple good traits in one cell requires 1-2 months, and breeding can be done in vitro.

Finally, he identified three areas for exchange and cooperation: a) animal biotechnology; b) breed resources; and c) support to scientific talents.

Dr. Randall Loaisa (Director, National Center for Biotechnology Innovations, Costa Rica) spoke about *capacities and current developments in agricultural biotechnology in Costa Rica*. Mr Loaiza indicated that the National Center for Biotechnology Innovations (CENIBiot) is a join initiative of the five public universities, through the National Council of University Presidents (CONARE). The mission of CENIBiot is to reduce the difficulties for going from basic research to the development of applications by the private sector, by strengthening the linkages between public universities and the private sector.

Mr. Loaisa He highlighted areas that CENIBiot is currently targeting: a) *in vitro cultivation and scaling* (e.g. plants, micro algae); b) *molecular biology* (e.g. extraction, purification and quantification of DNA and RNA, DNA sequencing, DNA analysis, DNA markers, genetic engineering of bacteria); c) *bio-prospection* (e.g. proteomics, preparation and characterization of extracts of natural origin, chemical analysis and separation of natural products); and d) *bioprocesses* (e.g. industrial enzymes, bioenergy, active pharmaceutical ingredients, biomaterials, bio-controllers, bio-separation, bio-conversion and valorization of waste).

Dr. Iván Matus (subdirector, National Institute of Agricultural Research, INIA, Chile) talked about *agricultural biotechnology in Chile*. INIA is the main agricultural research institution of Chile and belongs to the Ministry of Agriculture. It is a private nonprofit organization, founded on April, 1964, with national presence from Arica

(North) to Magallanes (South), including 10 regional centers, technical offices, experimental centers, gene banks, laboratories and libraries.

INIA has nine R & D programs: crops research, horticulture, fruit production, livestock systems, genetic resources, sustainability and environment, crops protection, food research, and technology transfer and extension. Priorities for 2014-2018 include: a) Climate Change (climate risk management, water use efficiency, genetic resources and plant breeding); b) Food Security (agriculture with reduced agrochemical usage, risk analysis of the use of agrochemicals, plant breeding); and c) Sustainability (land management and use of organic waste). Agricultural biotechnology is used to simultaneously those three challenges.

Examples of agricultural biotechnology development include: a) genetic diversity in germplasm of wild tomatoes present in INIA collection; genome wide selection in the wheat breeding program to identify drought related traits and develop genotypes tolerant to water stress; c) development of rootstocks in tomatoes and Capsicum species (chilis and peppers) for drought and salt stress; and d) support and improvement of the breeding process in the potato breeding and seed program.

Initiatives on “State of the art” new breeding techniques include: a) Cisgenia (“Todo Uva" vector, for genetic transformation in grapes using Agrobacterium tumefaciens); b) Gene silencing (using siRNA in stone fruit trees and amiRNA in grapes); and c) gene edition (using CRISPR, concept tests in reporter genes for transient editing using infiltration and protoplasts).

Session II: Food processing and the food industry

Dr. Fang Xianfa (Vice Director/Chief Engineer, Chinese Academy of Agricultural Mechanization Sciences, CAAMS) delivered a presentation about *Postharvest Handling and Processing Technology in Cutting down Food Wastage and Spoilage.* Food waste is associated to two sets of factors: a) inefficient/ inappropriate standards and purchase and consumption practice; which highlights the need for grading and marketing standards/specifications (e.g. search for that ‘perfect produce’, ‘the straight’ banana); changes in consumer lifestyle/ habits (purchase, storage, preparation, serving portions…); avoiding the destruction of food (scare, contaminated); and face market failures (crop ‘ploughed’ back); and b) technological inefficiencies during production and harvesting, postharvest handling, storage and distribution, and processing.

Mr. Fang addressed in detail technologies for avoiding food losses in postharvest handling, storage and distribution, and processing: a) cold chain storage and transportation technology; b) photoelectric sorting technology; and c) food processing waste management (treatment and utilization technology).

Cold chain storage and transportation technologies developed at CAAMS include: pre-cooling technology (fruits and vegetables); pre-freezing technology (vegetable and flour products); cold-storage technology (refrigeration storage, modified atmosphere packaging, ice storage); refrigerated transportation technology (intelligent adjustment, remote control); refrigerated sales technology (maintaining low temperature); cold-chain information system (network management, farming-supermarket docking, remote networking, whole-process monitoring).

Photoelectric and sorting technologies are used to intelligently detect and sort agricultural products using visible light, laser and special light. The application of those technologies could improve the use of agricultural product resources, reduce the food losses and guarantee food safety. Examples were provided of application of visible light (identify impurities via color characterization), laser field light (identify fungal contamination due to inappropriate storage conditions, for example, aflotoxins), and special light (identify malignant impurities such as glasses and stones difficult to identify after packing).

CAAMS is also working on new technologies to use plant source-based solid waste to generate valuable resources; for example: a) rice bran stabilization technology; b) preparation technique of rice bran oil, rice bran protein, rice bran wax and oxyzanol; extraction technique of protein from oil cake (e.g. concentrated protein, isolated protein and textured protein); c) preparation technique of lecithin from soybean meal after oil press; and d) preparation of xylose and xylitol from corn cob. Similar technologies for animal waste include the utilization of bones to produce bone powders, bone paste, bone oil, bone gel and gelatin; using aquatic animal of low-value or food waste to produce fish meal; subtracting chitosan and chitin from shrimp and crab shells (food flocculants).

Mr. Fang identified four fields for cooperation between China and LAC: a) *cold chain technology*; b) *photoelectric sorting technology*; c) *freeze-drying technology*; and d) *adding value and create new value* for agri-food products. Instruments to promote the cooperation include: human capacity development; advanced technology research and equipment development; joint research teaming and knowledge exchange; and training & demonstration with related facilities.

Dr. Liu Donghong (Professor, Zhejiang University, P.R. China.) presentation was about *integrated processing and utilization of agricultural and aquatic products* . The presentation included information about the rapid growth and size of food industry in China (it is the primary and most active industry in China) and recent advances in food technology, including: a) industrialization of Chinese traditional dishes; b) beverage development; c) aquaculture food processing; d) integrated utilization of by-products; e) improving energy efficiency and emission reduction .

Ms. Donghong provided examples of: a) prepared-for-eat rice, recombination rice, multiple flour products (industrialization of Chinese traditional food); b) tea beverages, grain beverages (beverage development); c) prepared to eat seafood, marine functional food (aquaculture food processing); d) polypeptide & protein modification, citrus by-products, integrated and overall utilization of bamboo, processing by-product of aquatic products (integrated utilization of by-products); and e) canned food industry improvement, non-thermal processing technology and equipment, high efficiency separation and extraction equipment, high efficiency energy-saving drying equipment (improving energy efficiency and emission reduction).

Proposal for cooperation were identified in two areas: a) joint research projects (fruit & vegetable processing, aquatic food development), and b) collaborative funding (high efficiency & lower emission processing technology &equipment). To achieve these three instruments were proposed: reciprocal visits, professional training, and joint development.

Dr. Lourdes Maria Corrêa Cabral (Head, Embrapa Food Technology, Brazil) talked about *Embrapa's RD&I strategy to adding value to agricultural products* in Brazil. Embrapa is the largest component of the Brazilian Agricultural Research System and the largest agricultural R & D agency in Latin America, both in terms of staff numbers and expenditure. It is headquartered in the capital Brasilia and operates 47 research centers throughout the country.

Since 2011 Embrapa has adopted a top-down strategy of organizing R&D projects of strategic themes in Portfolios. The objective is to avoid fragmentation of efforts and to seek technological solutions in an integrated, convergent, complementary and synergistic setting. Three portfolios are more closely related to the topic "raw materials for the food industry": a) food, nutrition & health; b) safe foods; and c) agroindustrial technologies for adding value to products.

In the Portfolio "Food, Nutrition & Health" the focus are: a) to promote the advancement of knowledge and the development of technologies for increasing the supply of foods that promote improved nutritional status and population's quality of life; and b) to explore systematically the connections between food, nutrition and health. Targeted components include vitamins, minerals, bioactive compounds, protein and peptides, dietetic fiber and prebiotics, probiotics, anti-nutritional factors, allergenics, sodium, sugar and fatty acids. Projects to address these issues include: a) Omics (genomics, proteomics, metabolomics, nutrigenomics), b) pre-breeding and breeding (conventional), c) production systems, post-harvest & storage, agroindustrial processing, product & process development, transversal studies (e.g. nutritional impact, socio-economics, market & consumer studies, dietary habits, nutrition education,…) and d) technology transfer & communication).

The focus of the *Portfolio "Safe Foods"* is to develop and transfer knowledge and technologies that contribute to minimizing the risks associated with the occurrence of biological, chemical and physical hazards in foods. This portfolio include projects on strategies for traceability and certification, good agricultural practices (GAP), good manufacturing practices (GMP), methods of analysis, metrology and information technology for food safety and risk analysis (assessment, management and communication of the risk of contamination of foods).

The *Portfolio "Agroindustrial Technologies to Adding Value to Products"* focus is to develop and transfer of technologies for the industrial transformation sector aiming at adding value to the production of industrial processing of raw materials / biomass from agriculture. "Adding Value" is considered to be the application of knowledge that promotes: a) the reduction of operating costs (use of innovative or improved technology; use of more efficient equipment or better control; substitution of raw materials, ingredients and other inputs; rational use of inputs and labor); and/or b) the increase of the final value of the product (extended shelf-life; differentiated characteristics; traceability; certification; differentiated packaging; etc). Project aimed at achieving those goals include: a) post-harvest technology; food processing (product & process development; use of raw materials from agro-biodiversity); b) development of ingredients & additives; development of packaging materials & coatings; scaling up of processes (pilot plant processing; mass & energy balances; technical & economic feasibility studies; simulation & modelling); and c) market information for prospecting opportunities and positioning in the value chains; traceability & certification of products and processes; and machinery and equipment for agroindustry.

Three sets of challenges were identified: a) meeting consumer demand for food in terms of convenience, health, quality and safety and natural flavor; b) reducing food losses and waste, by using fresh cut residues for developing value-added products (e.g. phytochemicals), animal feed, methanization (e.g. co-generation of energy) and composting; and c) increasing nutritional density and functionality of foods (e.g. explore the connections between Food - Nutrition – Health).

Dr. Sergio Ramón Vaudagna (Director, Food Technology Institute, Agroindustry Research Center, INTA, Argentina). Dr. Vaudagna spoke about *INTA's activities on food technology research and innovation*. He introduced INTA by indicating that it has 15 Regional Centers, 51 Experimental Stations, 6 Research Centers, 22 Research Institutes, 350 Extension Agencies, one Labintex (France) and 2 Private Organizations. The National Center of Agricultural Research (CNIA) is integrated by 4 research units: a) Agroindustry Research Center (CIA); b) Veterinary and Agronomy Sciences Research Center (CICVyA); c) Natural Resources Research Center (CIRN); and d) Family Agriculture Research Center (CIPAF).

The main lines of R & D + I of the CIA are: food science and technology; emerging technologies (nano, bio, food processing), rural machinery (conventional and family farming), agroelectronics and bioenergy. The CIA has two institutes: Rural Engineering Institute and Food Technology Institute.

The research areas of the Rural Engineering Institute are: a) agroelectronic, b) technologies for application of agrochemicals, c) small farmer's machinery, d) implantation of crops, e) precision farming, and e) bioenergy. The Food Technology Institute performs applied research and innovative developments for improving the full quality of food, including food safety, nutrition, biochemical, physicochemical and sensory properties, and processing technologies. The research areas are food safety, biochemistry and nutrition, physical and sensory analysis and food processing. The main R & D topics in each of those four areas are:

Food Safety: a) development and application of conventional and molecular techniques for the identification and quantification of food pathogens in different production systems; b) evaluation of different processing technologies on the inactivation of food pathogens applying challenge tests; c) development and application of techniques for the identification and quantification of mycotoxins, phytosanitary products and alkaloids in different production systems; d) development of tests to study dissipation and degradation of phytosanitary products in food and environmental matrixes; e) development of predictive techniques to estimate the metabolic impact of growth promoters, mycotoxins and phytosanitary agents on animal production.

Biochemistry and Nutrition: a) *development of functional foods* (study of bioactivity and bioavailability of food components of nutritional interest; functional lipids, vitamins, peptides, poliphenols, phytosterols); b) *development of immunological methods* (ELISA, Western Blot) to detect food allergen and development of technologies to reduce the allergenicity; c) *functional genomics* (study of molecular markers related to food quality, geographical identification of food by molecular markers, molecular analysis of microbiota of foods; d) *animal welfare* (biochemical parameters related to stress, study of the effect of primary production systems and handling protocols on animal stress and their relationship with meat quality parameters; and e) *lipid metabolism* (influence of diet on lipid profile and adipogenic enzymes, characterization of functional lipids in meat and dairy products).

Physical and Sensory Analysis: a) *application of instrumental methods* to evaluate physicochemical and rheological properties of raw material and processed products; b) *sensory analysis of food* (analytical tests, discriminative and descriptive) through trained panels, evaluation of visual attributes; c) *consumer acceptability and preference studies*.

Food Processing: a) *application of conventional and new thermal technologies* for the pasteurization and the sterilization of food products; b) *application of non-thermal technologies* (high pressure processing) for the preservation and the development of novel foods; c) *development of fresh cut and pre-cooked* fruits and vegetables; and d) *utilization of by-products* from meat industry and fruits and vegetables industry.

The Agroindustry and Added Value National Program of INTA is organized in three platforms: a) *Platform 1, technological processes to add value at the origin*; b) *Platform 2, development and optimization of agro-industrial processes for food transformation and preservation* (traditional thermal and non-thermal technologies; novel technologies for protein and non-protein food, technologies for transformation and recuperation of industrial by-products and residues); and c) *Platform 3, quality optimization & other strategies to add value to food* (systems and tools for the management of food quality; strategies for food differentiation and for the development of new products).

Dr. María Teresa Pino (Director, Food Programme, INIA, Chile). Dr Pino spoke about *successful experiences and challenges for the private sector and research regarding research into production of raw materials for the food industry in Chile*. She indicated that the mission of INIA's Food Program is to value and promote innovation in the development of raw materials for the production of healthy foods, responding to the new global challenges, such as sustainability, safety, health and traceability. Thus, it seeks to provide continuous support to the process of innovation, diversification and sophistication of the food matrix in direct collaboration with the private sector.

The goals of the program are: a) *Goal 1, to value and identify raw materials with food potential*, in terms of functional ingredients, personalized nutrition, and specialized additives for the food industry (dyes, thickeners, etc.); b) *Goal 2, develop specialized raw materials for the food industry* based on genetic improvement programs, in endemic and native genetic resources with agro-food potential (including recovery of ecotypes with denomination of origin and functional differentiation); c) *Goal 3, generate innocuous and differentiated livestock products* based on genetic improvement, feeding; *d) Goal 4, to contribute to the production of innocuous raw materials*, incorporating a traceability system in the production chain, in terms of pesticide residues, heavy metals, toxins, nitrates and others; and e) *Goal 5, building capacities and generate public-private strategic alliances* in food ingredients and adding value.

Dr. Pino stressed collaboration between INIA and the private sector in the food and ingredients industry, which includes research on leguminous ingredients, natural colorants and antioxidants, and ingredients and ancestral grains. Finally, she highlighted INIA's work in different parts of the country on specialized raw materials for food ingredients of high value: a) Unit in adding value to the olive tree and the Northern RRGG (INIA Intihuasi-Huasco); b) Unit in adding value to the vines (wines and others), INIA Quilamapu; c) Unit in Safety and traceability (INIA La Platina); d) Unit in adding value to raw material for colorants and antioxidants (INIA La Platina); e) Unit adding value into cereals and non-conventional flours, rich in fiber, beta-glucans, high quality proteins (INIA Carillanca); and e) Unit in adding value livestock (INIA Remehue).

Session III: Perspectives for cooperation in agricultural science, technology and innovation between China and Latin America.

This session was organized around short presentation intended to identify opportunities and mechanism for strengthening cooperation between China and Latin America and the Caribbean on agricultural science, technology and innovation. There were two official presentations, one from MOST, by Dr. Huang Shengbiao; and another by Dr. Ivan Matus, on behalf of INIA.

Dr. Shengbiao presented *Perspectives for Cooperation in Agricultural Science, Technology and Innovation between China and Latin America.* The presentation first addressed S&T cooperation between China and Latin America; and then Perspectives for cooperation in Agricultural S&T between China and Latin America. In the first section Dr. Shengbiao provided examples of recent cooperation between China and LAC, such as: a) The China – Latin America S&T Innovation Forum; b) China-Latin America Science and Technology Partnership Program (MOST has invested 180 million RMB yuan to support the inter-governmental S&T cooperation projects between China and Latin America), c) China-Latin America Youth Scientist Exchange Program (since 2014, 14-15 Latin American young scientists per year are supported for go to Chinese scientific research units to carry out 6-12- month cooperative researches, MOST provides each scientist monthly subsidy of 12,500 yuan); d) The Belt and Road Science, Technology and Innovation Cooperation Action Plan).

Regarding perspectives for cooperation in Agricultural S&T between China and Latin America, four concrete proposals were made:

1. Establish the "Development and foresight in China & Latin America agricultural science, technology and innovation" as a permanent forum, to attract more Chinese and Latin American agricultural scientists to share progress and experience in the agricultural researches, and exploring the cooperative opportunities and mechanisms.
2. Explore to establish appropriate cooperation mechanism between MOST and ECLAC, FAO/RLC, to promote joint research, demonstration and extension, and technology transfer with Latin America in the field of agriculture.
3. Latin American scientists are welcome to participate in "The Belt and Road Science, Technology and Innovation Cooperation Action Plan" and "China-Latin America Youth Scientist Exchange Program".
4. Establishing the working group of agricultural S&T cooperation between China and Latin America, and jointly draft the summary report of the forum. Pleased Prof. FANG, Prof. WANG and other three scientists to attend this work.

These proposals made by Dr. Shengbiao, on behalf of MOST, which provide a platform to increase cooperation, were warmly welcomed by the Chinese and LAC experts participating in the Forum. The proposals provided a framework for the presentation by the other Chinese and LAC experts, which were intended to identify opportunities and mechanism for strengthening cooperation.

Dr. Matus presented Chile – China R & D Center for Agricultural Science and Technology, a concrete cooperation initiative between Chile and China. The process started in 2016 when an agreement was signed between the Ministry of Agriculture of the Republic of Chile and the Ministry of Agriculture of the People's Republic of China. INIA was appointed as the executing institution of Chile and the Ministry of Agriculture of the People's Republic of China designated the Chinese Academy of Agriculture Science (CAAS) as executing agency of China. An INIA-CAAS Working Group was established to work on the proposal of the center. The objectives of the center will be to promote and facilitate joint agricultural research and development in both countries; facilitate the transfer and application of adaptable agricultural technologies in China, in Chile, and even in wider markets in Latin America; strengthen exchanges between scientists from both nation; and enhance the development of joint capabilities.

Dr. Vaudagna highlighted the Chinese Center for Food Science and Technology (CCAFST), created in 2008, under the direction of the Ministry of Science, Technology and Productive Innovation (MINCyT) of Argentina and the Ministry of Science and Technology of the People's Republic of China. This center seeks to intensify bilateral cooperation between Argentina and China in the field of food science and technology, with special emphasis on the development of agro-food, biotechnology, nanotechnology and food processing

On the Chinese side the following areas were highlighted:

- Bio-processing and engineering; biomass, bio-products;
- Mechanization, small farm machinery;
- Bio-products; utilization of agricultural and animal waste;
- Cost saving technologies in food processing; processing of fruits and vegetables;
- Cooperation and technology transfer on food processing, improvement of agriculture machinery, new generation of machinery and equipment (e.g. IOT, ICTs);
- Water efficiency in irrigation, water pollution from agriculture, water management;
- energy and material efficiency in food processing and packing;
- Improve agriculture – environment relationships;
- Modern biotechnology;
- Bio-controllers, reduction of toxins, pathogens and viruses;

LAC participants stressed:

- Innovation in collection, conservation and use of germplasm and genetic improvement (Argentina, Chile);
- Identification, control and prevention of pests and diseases in fruit and vegetables (Chile);
- Technology of protected agriculture (Chile);
- Agricultural machinery and support in applied technology (Chile);
- Production and quality systems for dairy products and meat (Chile);
- Bio economy, biotechnology and precision agriculture (Argentina, Chile);
- Mechanization, small farm machinery (Chile);

- Bio-controllers for products of interest in international trade (Costa Rica); control of pathogen microorganisms (Argentina);
- Development of bio-products to substitute agricultural chemical inputs (Costa Rica); reduction of chemical contamination (Argentina);
- Bio-products, utilization of food waste (Argentina, Brazil, Costa Rica), new technologies to use agricultural sub-products (Argentina;
- Water efficiency (Brazil).

The cooperation mechanisms receiving more attention are:

- Exchange, young scientist, training of young scientists (language issues need to be addressed both ways);
- Joint laboratories and centers (e.g. the one between Chile and China)
- Joint research on topics of common interest (win-win).

Regarding mechanisms to channel the cooperation, it was stressed that in several countries there are already Joint Science and Technology Commissions (e.g. Argentina, Brazil, Chile, Uruguay), which can play an important role in promoting cooperation. Also, the need to explore new regional, stable and long term focused working mechanisms was stressed, especially through regional organizations, such as ECLAC and FAO. A joint working group should be set up by MOST and ECLAC (also including FAO/RLC), in depth discussion of cooperative contents should continue, as well as strengthened interregional exchanges and cooperation in science and technology for agriculture.

ANNEX:

PROGRAMME

Raúl Prébisch Auditorium, CEPAL.

Av. Dag Hammarskjöld 3477,

Vitacura, Santiago- Chile

	Wednesday September 13	
08.30 – 09.00	***Registration***	
09.00 – 09.30	***Inauguration*** • ***Adrián G. Rodríguez,*** *Chief, Agricultural Development Unit, Division of Production, Productivity and Management, ECLAC* • ***Julio Berdegue,*** *Regional Representative FAO/RLC* • ***Huang Shengbiao****, Deputy Director-General, China Rural Technology Development Center, MOST.*	
09.30 – 10.00	**Group picture** **Light coffee break**	
10.00 – 11.30	***Session 1: Primary Production: Biotechnology in agriculture***	
	Presentations	**RP China** • ***He Zhonghu***, Research Professor, Institute of Crop Science, Chinese Academy of Agricultural Sciences (Application of biotechnology in crop breeding in China.) • ***Wang Tao***, Vice Rector/Professor China Agricultural University (Agri-biotechnology development tendency in China). • ***Han Jianyong***, Professor China Agricultural University (Animal embryonic biotechnology in China). **Latin America** • ***Randall Loaiza,*** Director, National Center for Biotechnology Innovations (CENIBiot), Costa Rica. • ***Iván Matus***, Subdirector R&D INIA, Chile.
	Discussion	**Moderator:** *Adrián Rodríguez, Chief, Agricultural Development Unit, Division of Production, Productivity and Management, ECLAC.*
11.30 – 12.00	**Coffee break**	
12:00 – 13:30	***Session 2: Food processing and the food industry***	
	Presentations	**RP China** • ***Fang Xianfa****,* Vice Director/Chief Engineer, Chinese Academy of Agricultural Mechanization Sciences (Postharvest Handling and Processing Technology in Cutting down Food Wastage and

Spoilage).

- ***Liu Donghong,*** Professor, Zhejiang University, P.R. China (Integrated processing and utilization of agricultural and aquatic products).

<u>**Latin America**</u>

- ***Lourdes Maria Corrêa Cabral***, Chief, Embrapa Food's Agroindusty, Brasil.
- ***Sergio Ramón Vaudagna,*** Director, Food Technology Institute, Center for Agroindustry Research, INTA, Argentina.
- ***María Teresa Pino,*** Director, Food Programme, *INIA, Chile.*

Discussion — **Moderator:** José Díaz Osario, University of Talca. Chile.

13:30 – 15:00 — **Lunch**

15:00 – 17.30 — ***Session 3:*** **Perspectives for cooperation in agricultural science, technology and innovation between China and Latin America**

Presentations

<u>**RP China**</u>

- ***Huang Shengbiao***, Deputy Director-General, China Rural Technology Development Center, MOST.
- ***Wang Tao,*** Vice Rector/Professor China Agricultural University
- ***Fang Xianfa,*** Vice Director/Chief Engineer, Chinese Academy of Agricultural Mechanization Sciences.

<u>**Latin America**</u>

- ***Iván Matus***, *Subdirector R&D INIA, Chile*.
- ***Sergio Ramón Vaudagna,*** Director, Food Technology Institute, Center for Agroindustry Research, INTA, Argentina.
- ***Rodrigo Figueroa,*** , Dean, College of Agricultural and Forestry Sciences, Pontificia Universidad Católica de Chile; Vice- President of Deans of Agriculture, Council of Chilean Universities (CRUCH)
- ***Lourdes Maria Corrêa Cabral***, Chief, Embrapa Food's Agroindusty, Brasil.
- ***Randall Loaiza,*** Director, National Center for Biotechnology Innovations (CENIBiot), Costa Rica.

Discussion — **Moderator:** *Sergio Gómez, FAO/RLC.*

17.30 — **Closure**

Participants:

Dr. HUANG Shengbiao

Deputy Director, China Rural Technology Development Center (CRTDC)

Dr. HUANG Shengbiao, has doctorate in environmental science and engineering from the Chinese Academy of Sciences, and is engaged in for water pollution and its ecological risk research. He used to be the chief of Resources and Environment Division of Social Development Department of Ministry of Science and Technology, and engaged in the national S&T program management, and the researches of S&T development strategies and planning and design of the significant fields, such as ecological environment, mineral resources, disaster prevention and mitigation, marine science, climate change and so on.

Now, he is the Deputy Director of China Rural Technology Development Center (CRTDC), in charge of the researches of China agricultural S&T development strategy and innovation policy, and leading agricultural high-tech innovation, agricultural S&T publicity and popularization work.

Dr. FANG Xianfa

Chief Engineer, Chief Expert and Vice President

Chinese Academy of Agricultural Mechanization Sciences (CAAMS)

Dr. FANG Xianfa, is the chief engineer, chief expert and vice president of Chinese Academy of Agricultural Mechanization Sciences (CAAMS). He is the expert in the field of agricultural products processing and precision agricultural engineering. In addition, he is the board member of International Commission of Agricultural Engineering (CIGR), vice president of Chinese Society of Agricultural Engineering (CSAE) and Chinese Society for Agricultural Machinery (CSAM), expert in modern agriculture field of the Expert Group of The National High Technology Program, the chief expert in agricultural machinery field of the Expert Group of the Ministry of Agriculture.

Dr. WANG Tao

Vice President, China Agricultural University

Professor, National key laboratory for Agri-biotechnology

Dr. WANG Tao, Vice President of China Agricultural University, and Professor in National key laboratory for Agri-biotechnology. He obtained his BSc in Pomology from Shandong Agricultural University in 1986, MSc in Pomology from Beijing Agricultural University in 1989, and Ph. D. in Pomology from China Agricultural University in 1999. He was previously the vice president of Xinjiang Agricultural University, and director of graduate school, China Agricultural University. His research interests are plant breeding and agriculture technological policy, and he participates in many research and development projects, including Plant Breeding and Technology Innovation, National Research and Development Project, High Quality Lawn-Grass Breeding Selection, National 863 project, Lucerne High Efficiency Rsearch, National Natural Science Foundation, and Medicago and Ryegrass High Efficiency Research, National 863 Project.

Dr. HAN Jianyong

Professor, China Agricultural University

Dr. HAN Jianyong, Professor, China Agricultural University. He received a PhD in Biochemistry and Molecular Biology from College of Biological Sciences, China Agricultural University, in 2006. In 2006-2011 he held postdoctoral, Research Associate and Research Scientist positions in Genome Institute of Singapore, Agency for Science, Technology and Research (A*STAR). In 2011, he was supported by "Program for New Century Excellent Talents in University (NCET)" after studying abroad. In 2012 he was offered a "national 1000 young talent" position in the State Key Laboratories for Agrobiotechnology, College of Biological Sciences, China Agricultural University, where he is currently a Professor of Stem Cell and Developmental Biology. His research focuses on the mechanisms of somatic cell reprogramming, differentiation and de-differentiation; pluripotent stem cells in large animals, with a goal of overcoming barriers to the generation of large animal pluripotent stem cells, as well as promoting the application of stem cells in regenerative medicine and animal breeding. Some of his research results have been published in international excellent journals such as Nature, Cell Stem Cell, Gene & Development, Cell Research etc.

Dr. HE Zhonghu

Research Professor

Institute of Crop Science, Chinese Academy of Agricultural Sciences (CAAS)

Dr. HE Zhonghu, is a research professor at the Chinese Academy of Agricultural Science (CAAS)， the director of China's National Wheat Improvement Center, and distinguished scientist with the Global Wheat Program and Country Liaison Officer in China for the International Maize and Wheat Improvement Center (CIMMYT). He established and led the internationally recognized CIMMYT-CAAS wheat program. His major contributions to wheat improvement include the development and validation of more than 50 gene-specific markers and the release of 18 improved cultivars. He has authored or coauthored more than 300 papers in refereed journals, including 130 publications in international journals, and trained more than 70 postgraduates and visiting scientists. He received a CGIAR Regional Award in 2007, the First Class Award in Science and Technology from the Chinese State Council in 2008, was selected as fellow of the Crop Science Society of America in 2009 and Agronomy Society of America in 2013, and was awarded the China Agriculture Elite Award in 2012.

Dr. LIU Donghong

Professor, Director

Fuli Institute of Food Science, Zhejiang University

Dr. LIU Donghong, Professor, the director of Fuli Institute of Food Science, Zhejiang University. She is also the director of Chinese research and development branch center for fruit and vegetable comprehensive utilization technology and National-local Jointed Engineering Center for intelligent food processing technology and equipment. In addition, she serves as vice president of Chinese Canned Food Industry Association (CCFIA), deputy director of the expert committee, associate editor-in-chief of CIGR Journal and International Agricultural Engineering Journal (IAEJ), editorial board member of International Journal of Agricultural and Biological Engineering (IJABE). Her research interests include fruit and vegetable comprehensive utilization, novel technology in food engineering, food quality and safety monitoring. In recent five years, she presides over 20 projects including National key research project, National Science Foundation project and international aid project hosted by MOST. She has been published more than 260 papers of which 101 were included in SCI, 50 were included in EI and obtained over 40 patents.

Dr. Iván Matus Tejos

Subdirector Nacional de I+D del Instituto de Investigaciones Agropecuarias (INIA)

Ingeniero Agrónomo de la Universidad de Concepción, con un Master of Science en Mejoramiento Genético y Genética del Colegio de Post-Graduados de Montecillo, México, y un PhD en Mejoramiento Genético y Biotecnología de Oregon State University, Estados Unidos. Durante los últimos 30 años, a ocupando un rol clave en la coordinación e investigación de proyectos de mejoramiento genético de trigo. Ha desarrollado más de doce variedades de trigos harineros, trigos candeales y triticales, las cuales se siembran en una gran superficie en Chile. Es autor y coautor de más de 140, artículos científicos, artículos de divulgación y capítulos de libros, aparecidos en diversas revistas y publicaciones especializadas. Ha desarrollado trabajos colaborativos con varias universidades e institutos de investigación nacional e internacional. Ha mantenido una estrecha colaboración con centros internacionales de investigación. Desde marzo de 2014 desempeña el cargo de Sub Director Nacional de Investigación y Desarrollo del Instituto de Investigaciones Agropecuarias (INIA).

Dra. MARIA TERESA PINO

Instituto de Investigaciones Agropecuarias INIA Chile

National food coordination INIA Chile

PhD in Plant Physiology and Genetic.

Dr. María Teresa Pino, National food coordinator and researcher of Instituto de Investigaciones Agropecuarias INIA Chile. She received a PhD in Biotechnology and plant physiology in Horticulture in Oregon State University, in EE.UU., in 2006. She is working for new global challenges for agriculture, including raw materials for Food ingredients and their adaptation to climate change. Coordinator and research leader in over 20 projects and competitive national and international grants, and private sector. She has authored or coauthored more than 100 scientific, proceeding and extension publications. These publications have been cited in over 350 ISI journals. She received a IICA reward as leader women in agriculture science for Latin America in 2017. The FONTAGRO Award for Scientific Excellence 2014, as research leader project for international grant. Also, she received Outstanding Graduate Student Award for Horticulture and Crop Science Department. in Oregon State University USA in 2004.

Dr. Sergio R. Vaudagna

Head of the Food Technology Institute, National Center for Agricultural Research of INTA

Chemical Engineer - Faculty of Chemical Engineering - National University of The Litoral. Doctor in Chemical Engineering - Faculty of Chemical Engineering – National University of The Litoral, Independent Research of INTA and CONICET. Professor of Food Processing, Faculty of Engineering and Exact Sciences, UADE and Faculty of Agronomy and Agroalimentary Sciences UM.

Expertise Areas: Thermal technologies (sterilization, pasteurization, cook-chill systems) and non-thermal (high hydrostatic pressures, barrier technologies) of food processing.

Dra. Lourdes Cabral.

Head of Embrapa Food Technology.

PhD in Chemical Engineering. Senior researcher of Embrapa - Brazilian Agricultural Research Corporation. For 18 years working on Food Science and Technology focusing on membrane separation processes applied to food industries cases focusing on functional foods. Assistant professor at Federal University of Rio de Janeiro and at Rural University of Rio de Janeiro, with around 120 national/international papers, chapters or books. Currently, she is the head of Embrapa Food Technology.

Dr. Randall Loaiza

Director, Costa Rican National Center for Biotechnological Innovation (CENIBiot).

Dr. Randall Loaiza is a health care professional. He graduated from Pharmacy and cell physiology at the University of Costa Rica. Then he moved to the University of Wisconsin-Madison, USA where he obtained a master and a PhD degreed in cell physiology and cardiac pathophysiology, unveiling the mechanisms of sudden cardiac death in apparently healthy people. Then he did postdoctoral studies at the University of Michigan, USA working on the influence of mitochondrial reactive oxygen species on severe cardiac arrhythmias and also, understanding the mechanisms of heart failure in sepsis. He is currently Faculty at the School of Pharmacy at the University of Costa Rica and director at the Costa Rican National Center for Biotechnological Innovation (CENIBiot), a center with a strong focus on agricultural biotechnological innovation. Dr. Loaiza interest on agriculture comes not only from his current position at CENIBiot, but also from his family´s farming background in Costa Rica.

MSc Abel Hernández,

Head of Plant Biotechnology Department in Center for Genetic Engineering and Biotechnology

MSc Abel Hernández, Head of Plant Biotechnology Department in Center for Genetic Engineering and Biotechnology. He obtained his BSc in Biochemistry from Havana University and his MSc in Biotechnology. He has worked in Plant biotechnology for 15 years where his first research interest was the use of plant as bioreactor to produce proteins as pharmaceuticals. From 2014, he is the head of plant biotechnology department where he manages several projects related with plant breeding, functional genomics and plant transformation. In the same time he has concluded all the essays to discuss his PhD next December. He has authored or co-authored 12 papers and 2 patents. He received in two times Award from Academy of Sciences of Cuba.