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UCDAVISCHILENEWS

UCDAVIS Chile
LIFE SCIENCES INNOVATION CENTER

Pablo A. Zamora, Ph.D
Chief Science Officer

Accelerating the transference of R+D results

Implementing a Research Model to Impact the Industry

UC Davis Chile exists in order to provide technological solutions to the national food industry. Of course on some occasions companies have challenges whose solutions have not yet been developed. Therefore scientific research is required to understand and measure the problem in order to then explore possible solutions.

The innovation center's research model has some distinctive features. Firstly, it is explicitly bilateral, since it is being developed complementarily in Chile and in the United States. Since UC Davis Chile has access to the capabilities and the infrastructure of the campus in California, the companies and universities linked to our innovation center can also use them. In this first stage, our academic partners are the universities of Tarapacá, of Talca and Andrés Bello, and the entrepreneurial partners are the wineries Concha y Toro and the VSPT Wine Group. We are jointly carrying out three lines of research which we will detail in this and the following two issues of our newsletter.

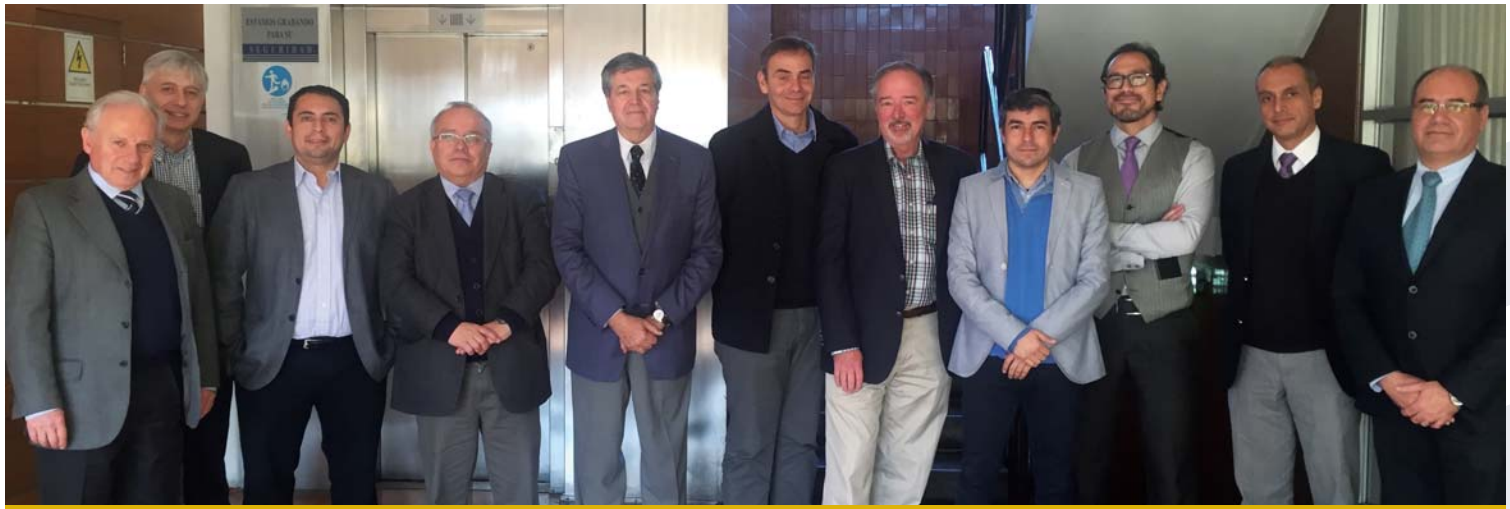
Second feature: the focus and the manner in which we perform research are highly relevant. For science to have a direct impact on the industry, its focus must be motivated by requirements from the private sector (industry-driven), whilst the execution –the manner– must be conducted collaboratively. This last point does not only consider multi-disciplinarity, but also encourages partnerships between institutions, bringing complementary research teams together.

Thirdly, UC Davis Chile directly involves the end users in the scientific developments. In the case of this first stage, these will be Concha y Toro and the VSPT Wine Group. Technical teams from both companies participated in identifying the problems and are currently collaborating in the execution of research and development programs (R+D).

Finally, these professionals will be in charge of carrying out the transfer of knowledge, implementing the possible improvements resulting from the research and scaling these processes. This is extremely important, because it enables the university researchers to be in touch with the needs, vision and corporate culture; to generate a collaboration network between the universities involved and the participating companies, and to bring the industry closer to the technical challenges of the generation of solutions based on R+D.

UC DAVIS CHILE HOLDS FIRST SCIENTIFIC AND INDUSTRY ADVISORY BOARD MEETING

THE ENTITY HAS THE SUPPORT OF OUTSTANDING REPRESENTATIVES FROM COMPANIES AND AGRICULTURE ASSOCIATIONS, FROM THE BIOTECHNOLOGY INDUSTRY AND UNIVERSITIES IN OUR COUNTRY.



From left to right: Roberto Neira, Alfredo Molina, Daniel Garrido, Gustavo Zúñiga, Ronald Bown, Pedro Herane, Alan Bennett, Gerard Casaubon and UC Davis Chile representatives, Javier Ramírez, Chief Business Development Officer; Mauricio Cañoles, Program and Consulting Development Manager and Francisco Díaz, Partnership y Communications Manager.

On Monday July 18, Alan Bennett, Executive Director of UC Davis Chile - Life Sciences Innovation Center led the first Scientific and Industry Advisory Board meeting of the innovation center. The board has outstanding representatives from companies and associations in the agriculture and biotechnology industry and from some of the Chilean universities. This great diversity of formations and perspectives seeks to support UC Davis Chile to have a wide-ranging view on how to build competitive advantages for our country and thus, contribute to the country's mission to become an agricultural power with a solid foundation in research, development and innovation.

"We ask you to help us understand new opportunities, roads or activities that the center should take to achieve its mission… The Davis campus at the University of California has a culture of being in permanent connection with industry and delivering technological solutions. That's the kind of work we are also building in Chile. Not only in the area of agriculture, we are also getting involved in environmental issues, such as the availability and efficient use of water, air quality and climate change," said Dr. Bennett, Distinguished Professor at the University of California.

During the session, the board members held a rich conversation that addressed various issues. For example, UC Davis practices in the field of applied science that the center in Chile can help implement; how to link the expertise of UC Davis with country themes, including viticulture and fruit culture, but also other relevant industries in the field of food, and the collaborative model that should exist between board members.

THE MEMBERS OF THE ADVISORY BOARD

- **JENNY BLAMEY** | CHIEF SCIENTIFIC OFFICER OF THE BIOSCIENCE FOUNDATION
- **RONALD BOWN** | PRESIDENT OF THE FRUIT EXPORTERS ASSOCIATION OF CHILE (ASOEX)
- **JUAN CAROLUS BROWN** | DIRECTOR OF THE FEDERATION OF FRUIT PRODUCERS OF CHILE (FEDEFRUTA F.G.)
- **GERARD CASAUBON** | DIRECTOR OF THE RESEARCH AND INNOVATION CENTER OF THE CONCHA Y TORO VINEYARD
- **HORACIO DÍAZ** | DIRECTOR OF THE RESEARCH DEPARTMENT AT THE UNIVERSITY OF TARAPACÁ
- **DANIEL GARRIDO** | CHEMICAL ENGINEERING AND BIOPROCESS PROFESSOR AT THE CATHOLIC UNIVERSITY OF CHILE
- **PEDRO HERANE** | GENERAL MANAGER OF THE VSPT WINE GROUP
- **ALFREDO MOLINA** | DIRECTOR OF RESEARCH OF BIOLOGICAL SCIENCES AT THE UNIVERSITY ANDRÉS BELLO
- **YERKO MORENO** | DIRECTOR OF THE VINE AND WINE TECHNOLOGICAL CENTER OF UNIVERSITY OF TALCA
- **ROBERTO NEIRA** | DEAN OF AGRICULTURAL SCIENCES FACULTY AT THE UNIVERSITY OF CHILE
- **PABLO VALENZUELA** | SCIENTIFIC DIRECTOR OF THE FUNDACIÓN CIENCIA Y VIDA
- **GUSTAVO ZUÑIGA** | DEAN OF CHEMISTRY AND BIOLOGY FACULTY AT THE UNIVERSITY OF SANTIAGO

DETECTING PATHOGENS THAT ATTACK WOOD VINES TO IMPROVE PRODUCTIVITY OF VINEYARDS

UC Davis researchers work alongside their peers from the universities of Talca and Andres Bello -coordinated by UC Davis Chile´s scientific area- to resolve a wine industry challenge: detect and diagnose pathogens that cause disease in the wood vines. Various fungi -along with bacteria and viruses- gradually decrease the production of plants in the field. Detecting them in time would enable treatment. In the case of nurseries, ensuring that the vines are free of certain diseases of interest has a highly desired effect: prevents the problem from multiplying.

Disection of a Cabernet sauvignon branch manifesting symptomatology of wood vine disease caused by a fungal complex.

When the technical teams of UC Davis Chile´s business partners -Concha y Toro vineyard and VSPT Wine Group- met with researchers from the academic partners -universities of Tarapacá, of Talca and Andrés Bello- and UC Davis Chile, they defined what challenges required research and development. The first line of action agreed upon (out of three) was to create a system for the detection and molecular diagnosis of pathogens in the early stages of development of plants that will cause wood diseases, both in field and in nurseries. In this way, early treatment could be proportioned to the infected vines and certification could be given to disease-free plants in nursery stocks.

The traditional way to do plant pathology -the study of diseases in plants- is by observing if they have certain symptoms or signs. An infected vine can take months or years to show symptoms of decay. Today, genomic tools allow us to determine this early on, quickly, and at a decreasing cost. Before reaching that point, researchers must first know, for example, which fungi attack wood vines. This is part of the work done by the team of the line "Detection of plant pathogens, molecular diagnosis and mitigation strategies." They already collected samples of cabernet sauvignon and white strains showing signs of decay. To have geographic diversity, they worked on 28 farms of their business partners distributed among the regions of Valparaiso and Maule (central Chile).

With this material, researchers are performing both traditional plant pathology -cultivation, isolation and characterization of the fungi- and advanced genomics: they isolate DNA from the vine and microorganisms present in the plant (metagenomics). The goal is to compare the results. International studies have shown that only between 1.5% and 3% of the organisms living in the wild are grown under laboratory conditions. Therefore, molecular tools (metagenomics), which do not require isolation, would provide a view of all the microorganisms, thus of all the pathogens that live with the plant.

Extracting DNA from the woody tissue of the vine is not an easy task because the wood has lots of dead cells and high levels of lignin. While there are protocols to accomplish this task, the biggest challenge was to also isolate the DNA of pathogens. For this, the support of UC Davis was vital and the protocol developed by Dr. Dario Cantu that allows both goals, was implemented. A more detailed analysis of this genetic material is being performed in the laboratories of the Chilean academic partners and of UC Davis, such as the sequencing of internal transcribed spacers (ITS) and the analysis of viral RNA.

In the next issues of this newsletter we will deliver more details on the team´s advancement on this and other research lines.

The team: Pablo Zamora, UC Davis Chile; Yerko Moreno, U. of Talca; Mª Isabel Moenne, VSPT Wine Group; Álvaro González, Concha y Toro vineyard; Rubén Polanco, U. Andrés Bello; Ivo Agnic, Concha y Toro; Álvaro Castro, UC Davis Chile; Carlos Valdivia, Concha y Toro; Mauricio Lolas, U. of Talca; Enrique Ferrada, U. of Talca; Marcela Cáceres, U. of Talca; Priscila Moraga, UC Davis Chile; Ricardo Rodríguez, VSPT Wine Group, y Raúl Méndez, UC Davis Chile.

RESEARCHERS IN THE PATHOGEN DETECTION LINE

UCDAVIS Chile
LIFE SCIENCES INNOVATION CENTER

Álvaro Castro, Ph.D.
Program Coordinator - Molecular Genetics / Genomics

Priscila Moraga, Ph.D.
Post-doctoral Researcher

Raúl Méndez, M.Sc.
Research Assistant

UCDAVIS
UNIVERSITY OF CALIFORNIA

Bryce Falk, Ph.D.
Principal Investigator (PI)

Dario Cantu, Ph.D.
Co-PI

TALCA
UNIVERSIDAD
CHILE

Mauricio Lolas, Ph.D.
Principal Investigator (PI)

Gonzalo Díaz, Ph.D.
Researcher

Universidad Andrés Bello

Rubén Polanco, Ph.D.
Co-PI

One of the activities of the association.

The Board: Pablo Silva, President; Paula Balbontin, Treasurer; Cristóbal Heitmann, General Secretary and Italo Cuneo, Vice President.

CHILEANS IN UC DAVIS

STUDENT ASSOCIATION: PROMOTING A SENSE OF COMMUNITY

The Chilean Student Association in UC Davis has been in existence for five years gathering and connecting Chileans from different disciplines who are new to Davis, mainly postgraduate students. Over time not only has it integrated students, but also families, academics and Chilean professionals who live and work around the university.

The relationship between Chile and UC Davis spans more than 50 years since its inception promoting scientific and technological exchanges in areas such as agriculture, education and water resource management. Much of the development of fruit growing is attributed to alumni of UC Davis who transformed the agricultural economy in Chile in the '80s, a generation known as the Davis Boys.

Currently, the community of Chilean students covers several areas, not only related to the agricultural sector. The main task of the association is to represent students, families and active members of the community of Chileans in Davis, as well as to connect and generate social and academic opportunities for their development through a stable institution recognized by the university.

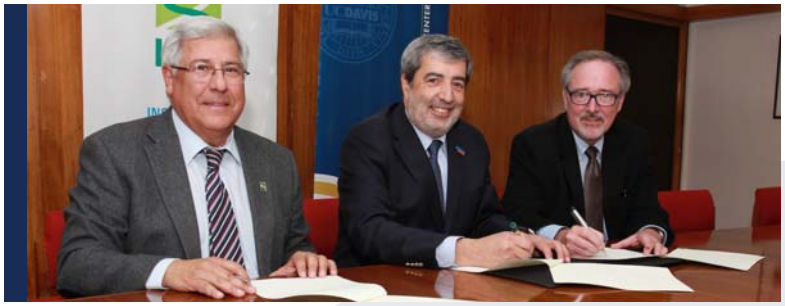
Both objectives allow for the development of an internal or bonding role, which promotes participation, motivation and involvement of the Chileans studying at Davis and the external or bridging role that defines the association as a meeting point so that both people and institutions internal and external to the university may establish links.

The current Board of Directors is made up of Paula Balbontin, Cristóbal Heitmann, Italo Cuneo and Pablo Silva whose mission is to promote the sense of community and to establish links with institutions related to the university. For this purpose, they have organized social gatherings around "empanadas" (meat pasties) or barbecues; community participation in the process of the Chilean constitutional reform and the amendment to the decree governing grants in Chile (Becas Chile); plus a seminar which counted on the support of the platform ChileGlobal, a talent network of Chileans living abroad led by Imagen de Chile Foundation. These activities, together with the community, reflect the active role of the association within the university and the link Chileans at Davis UC maintain with the country.

The Board of the UCD Chilean Student Association

HIGHLIGHTS

INIA AND UC DAVIS CHILE SIGN AN AGREEMENT TO STRENGTHEN THE FOOD SECTOR



Julio Kalazich, National Director of the Institute for Agricultural Research (INIA) and Alan Bennett, Executive Director of the Foundation UC Davis Chile, signed an agreement to jointly take up the development of applied scientific research, technological solutions, high impact programs of extensionism and innovation to respond to the requirements of Chile's food and environmental sector.

Among the priorities are the revaluation of the traditional strains of grapes in the Maule Region (Valley of Cauquenes) and the Biobio (Itata Valley); collaboration in the hub instrument of technology transfer funded by the Corfo (an agency of the Ministry of Economy); development of integrated pest and disease control with initial focus on *Lobesia botrana* and development of extension initiatives using the model of UC Davis' International Programs Office (IPO).

Regarding climate change, INIA and UC Davis will work on a program in the field of modeling, mitigation and sustainable management of the country's forestry and agricultural resources, with special emphasis on arid areas. This agreement has a projection of three years, also involving a training program of human capital.

BREAKFAST WITH PUC'S FACULTY OF CHEMISTRY

Included in the workshop "UC Davis Chile: platform for the development of collaborative research and innovation in agriculture - food - environment", representatives of the innovation center had breakfast with academics from the Faculty of Chemistry at the Pontifical Catholic University of Chile (PUC) in order to explore opportunities for collaboration in R & D.

The meeting was organized exclusively for academics from the faculty and was coordinated following the visit of a group of professors and students to UC Davis, in USA, last April.

Source: Faculty of Chemistry, PUC

GETTING TO KNOW A UC DAVIS ALUMNI

EDUARDO HOLZAPFEL, WITH VOCATION IN EDUCATION AND RESEARCH IN WATER RESOURCES

Eduardo Holzapfel specializes in irrigation systems, water management in fruit trees and optimization of water resources in agriculture. He studied at UC Davis obtaining a master's degree in water science in the late '70s followed by a doctorate in engineering, between 1981 and 1984.

He conducted his entire academic career at the University of Concepción (UdeC), where for 13 years he was the dean for Agricultural Engineering, a faculty which he helped create. In addition to leading various research projects and having numerous publications, training has played a crucial role in his career: he has directed 96 theses of agronomists and agricultural civil engineers as well as a number of postgraduate theses. He was one of the founders of the Center of Water Resources for Agriculture and Mining (CRHIAM), institution where he is currently the deputy director.

¿In what aspects has UC Davis influenced your professional career?
"UC Davis had a substantial impact on my specialty and on how to address scientific-technological development. It gave me frontier knowledge to develop my academic and research activity that gave me access to national and international projects and to be a full professor and emeritus at the University of Concepción."

¿What do you think has been your greatest contribution in professional terms?
"Having been part of the team, as Director of the creation of the Faculty of Agricultural Engineering at the University of Concepción, unique in Chile with support from the United Nations Development Program (UNDP) and Conicyt. UC Davis also contributed to its creation through several academics who visited us at the time. We took their ideas and implement them in the university to form agricultural civil engineers, in a first stage with graduate programs. At present, we continue to have strong ties with UC Davis."

¿Have you returned to Davis following your graduation?
"On several occasions, for my post-doctoral program in optimization of irrigation systems, a sabbatical with Dr. Miguel Mariño (Holzapfel's Ph.D. supervisor) in models of pollution and with the rector of the University of Concepción to try to establish agreements of cooperation. Undoubtedly, through visits I have seen continuous improvements in UC Davis."

¿What could be the greatest contributions of UC Davis in Chile?
"Water resources are currently a priority area for the development of the country which with the help of UC Davis can be achieved more successfully. Overall, I think UC Davis should contribute to our centers in the management of water resources, specifically in irrigation, pollution, and water management in agriculture, soil and groundwaters."

HIGHLIGHTS

GENERATING TECHNOLOGICAL SOLUTIONS
THAT HAVE A POSITIVE IMPACT ON FARMERS

Addressing the current challenges in agriculture requires a multidisciplinary effort. For this reason, Hernan Orellana, Executive Director of Telefonica R+D Chile and Alan Bennett, Executive Director of UC Davis Chile signed a collaboration agreement between both institutions, which form part of Corfo's Program for Attracting International Centers of Excellence.

Telefonica R+D contributes its expertise to generate advanced technological platforms, which improve productivity and efficiency in the domestic industry, including the agricultural and agro-industrial sectors. UC Davis Chile also focuses its work on the food industry, primarily from the perspective of life sciences.

The aim for both institutions is to be able to research and develop solutions in the Internet of Things (IoT), including variables of life sciences -such as the genetics of relevant crops or insects which cause disease of the same- and that are useful to farmers. The agreement will last two years with options to extend.

PARTICIPATION IN REDAGRICOLA CONFERENCES
IN SANTIAGO AND PERU

The third Chilean Redagricola Conference and Exhibition took place on June 1st and 2nd at the Espacio Riesco (Santiago), attracting a large number of visitors. Alan Bennett, Executive Director of UC Davis Chile, participated in the inaugural segment with the speech "Chile: genomic resources and their application in agriculture." Pablo Zamora, Chief Science Officer, and Freddy Boehmwald, Bioproducts Development Coordinator, were also speakers at the event.

On June 22nd and 23rd the second Peruvian Redagricola Conference was held in Piura. Dr. Zamora participated in the inaugural conference of this activity and later, Dr. Boehmwald, with "UC Davis Chile: technological proposal for Peru."

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Avenue Andres Bello 2299
Office 1102, Providencia
Santiago de Chile
Phone: (+56-9) 4475 4718
eangel@ucdavischile.org
www.ucdavischile.org

Proyecto apoyado por CORFO