

# UC DAVIS Chile

## LIFE SCIENCES INNOVATION CENTER

UC DAVIS CHILE NEWS



**Soroush Parsa, Ph.D.**  
Program Coordinator  
Agronomy and Environment

Navigating the complexity of today for the agriculture of tomorrow

### Science and technology, crucial inputs for effective agriculture

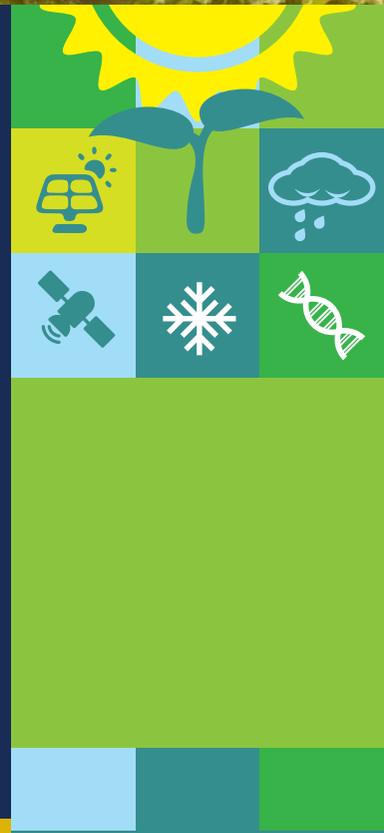
Agriculture has reached its highest level of complexity. Its imminent challenge is to feed 9 billion people while responding to increasing demands for higher quality, competitiveness and environmental and social responsibility. At the same time, our natural capital is overdrawn: the agricultural frontier is depleted, ecosystem services degraded and the climatic system disrupted. Faced with this great challenge, one truth is indisputable: science and technology have ceased to be optional inputs for effective agriculture. Tomorrow's producers will be those able to incorporate them strategically into their operations today.

UC Davis Chile is emerging as the enabling partner of choice to facilitate this transition in Chilean agriculture. Two distinctive attributes

justify this potential. First, our research model is focused on the needs of the final user ("demand pull"), rather than on the academic interests of the researcher ("supply push"). Second, we have access to the most extensive and prestigious network of innovation in Mediterranean agriculture globally; the University of California Agriculture and Natural Resources (UC ANR). These two attributes enable us to respond in a versatile, agile and effective way to the diverse innovation needs of our clients and business partners.

The search for an "intelligent" irrigation strategy of our partner VSPT Wine Group illustrates the benefits of our value proposition. A sequence of dialogues, workshops and field visits mapped their

needs and expectations. Based on them, we articulated two UC ANR Scientific Ambassadors: Dr. Daniele Zaccaria, specialist in irrigation and Dr. Rick Snyder, bio-metereologist. Under their leadership, we established a pilot test of a technology that promises to modernize VSPT irrigation decisions. The technology was developed at UC Davis and is based on an innovative evapotranspiration sensor system acclaimed by farmers and experts during the World Ag Expo 2016. Great enthusiasm and high expectations surround its first evaluation this season. Stay tuned for news of the results over the coming months.



■ THE FIRST VERSION OF THE CLIMATE SMART AGRO SEMINAR

| p. 2

■ SURFACE RENEWAL, A TECHNOLOGY TO INCREASE IRRIGATION EFFICIENCY

| p. 3

■ SCIENTISTS REAFFIRM THE BENEFITS OF MILK IN EVERY STAGE OF LIFE

■ CHILEANS AT UC DAVIS: ALEJANDRA MADARIAGA

| p. 4

■ GETTING TO KNOW A UC DAVIS ALUMNI: MARÍA EUGENIA GONZÁLEZ

■ UC DAVIS EXPERT GIVES TALKS IN CHILEAN UNIVERSITIES

■ UNAB HOSTED THE FIRST SYMPOSIUM ON FOOD SAFETY

| p. 5



# The first version of the **Climate Smart Agro seminar** was held with great success

Round table: Soroush Parsa, Scientific Director of Climate Smart Agro, leads the discussion among Fernando Santibáñez, from Agrimed of the University of Chile; Nicolás Bambach, from the Center of Global Change of the Catholic University (in representation of Francisco Meza); Iván Matus, R+D Deputy Director of INIA and Alan Bennett, Executive Director of UC Davis Chile.

Climate Smart Agro Chile is an annual platform that exhibits science, technology and ventures with an impact on agro-climatic adaptation in Chile. It responds to the necessity of reducing the gap of know-how between supply and demand for solutions to the growing climate vulnerability of agricultural production. Its mission is to promote a technologically advanced, versatile and efficient agriculture facing the range of environments. The event organized by UC Davis Chile had the collaboration of the Catholic University's "Center of Global Change", the Institute of Agricultural Research (INIA) and the University of Chile's Center for Agriculture and Environment (Agrimed).

*The objective of the event -organized by UC Davis Chile- is to promote a technologically advanced, versatile and efficient agriculture in the face of climate variability. To this end there were presentations from institutions that are conducting research and development in Chile and companies that are implementing new technologies from Argentina and the United States.*



**CLAUDIO TERNICIER**  
Undersecretary for Agriculture

"We are seeking to generate intelligent climate-friendly agriculture and by doing so, our Ministry has aimed to enhance the confrontation of climate change through a new way of facing the situation of irrigation and research."



**MARCELA ANGULO**  
Corfo's Technological Capabilities Manager

"The only way to handle the threat and risk, while tackling climate change is by doing things such as this seminar: placing your expertise, talent, the results of R&D and the assets of science and technology at the service of a productive sector who must make better informed decisions."



**MARCELO MENA**  
Undersecretary for the Environment

"We approve the national strategy for climate change and the vegetation resources which have, as the Undersecretary (Ternicier) said, great benefits. To recover 100 thousand hectares of degraded terrain with native forest is really good for capturing carbon, rendering our agriculture more resilient and is also beneficial for our watersheds. It is good news that progress is being made."



**ALAN BENNETT**  
Executive Director of UC Davis Chile

"California has experienced the severest drought ever registered in its history. In spite of this, agriculture in California has proved to be resilient and versatile to the range of climates with growing rates of productivity and profitability. The agroclimatic similarity between Chile and California generates valuable synergistic learning opportunities between both territories."

*In the afternoon, the seminar was attended by lecturers who demonstrated concrete experiences for farmers and companies in facing climate change.*



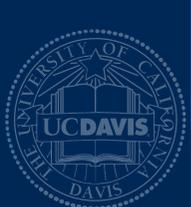
**LUIS SÁNCHEZ** | Principal Research Scientist of E&J Gallo Winery, told about the work they performed with IBM in developing a new system of high precision.



**LOUIS BODDY** | Group leader of Marrone Bio Innovations, one of the most innovative biopesticide companies in the world.



**SANTIAGO GONZÁLEZ VENZANO** | Co-founder of S4, one of the fastest growing Agtech start-ups in Argentina (based in the United States) that offers service providers a geo-referential big data system for field and crop tracking.



# SURFACE RENEWAL, A TECHNOLOGY TO INCREASE IRRIGATION EFFICIENCY

Taking care of water resources is one of the greatest challenges of modern agriculture. For this reason, UC Davis Chile has installed four stations of Surface Renewal -a successful technology developed by UC Davis researchers-, in the VSPT Wine Group vineyards.

Chile and California have similar climate and geographical conditions. They also face similar challenges, such as water scarcity, one of the most serious current agricultural problems that has worsened due to the climate change.

Accordingly, UC Davis Chile together with the VSPT Wine Group are testing Surface Renewal -a technology created by UC Davis researchers- to optimize water usage employing modern evapotranspiration estimation techniques that determine the quantity of water required to

replenish. Evapotranspiration is the loss of moisture from a surface through direct evaporation and transpiration of the plants.

Participating in this “Agro-climate Technologies” research line are the universities of Tarapacá and Talca, and certainly personnel from the company: Cristian Marchant, Ricardo Rodríguez and Raul Wunkhaus, Agriculture Assistant Manager.

“California is looking for solutions in irrigation management. It is a matter they have not yet solved. They have different options going in distinct directions. It is still a process. VSPT Wine Group is joining in this search, trying to find solutions and to innovate in such a great problem,” comments Francisco Rojo, UC Davis Chile’s post-doctorate researcher in “Agroclimate Technologies”.

Amongst the various existing technologies to determine the water requirements of a crop, the methods based on the estimation of evapotranspiration are probably those which currently present a greater level of acceptance. Although there are various different technologies available, Surface Renewal stands out for its easy use and lower cost (compared with other technologies such as Eddy Covariance or the lysimeter).

Basically, the team of researchers is carrying out two experiments using four Surface Renewal stations in local vineyards, which were chosen by importance for the VSPT Wine Group. Two stations are in cabernet sauvignon vineyards and the two others in merlot. In order to control the variables parcels were chosen similar vine. The differences between the areas are the level of production and the conducting systems.

One of the creators of Surface Renewal, the bio-meteorologist Richard Snyder has taken an active part in this process. On the part of UC Davis, Daniele Zaccaria, agricultural water management and irrigation specialist, also forms part of the team. Both Snyder and Zaccaria

form part of the University of California Cooperative Extension System.

Traditionally evapotranspiration has been calculated by using estimates of reference evapotranspiration (ETO) corresponding to the ‘standard’ evapotranspiration of a pasture area with specific characteristics. When trying to calculate the evapotranspiration of a specific crop, such as a vine, the evapotranspiration of that pasture should be multiplied by the vine factor (‘crop coefficient’). The factor is also standard and does not consider neither the location nor the handling of the crop. Added to this are the varying meteorological stations, so the reference values of evapotranspiration are not always reliable.

The objective of Surface Renewal is to obtain evapotranspiration directly from the crop. For this purpose the evapotranspiration is estimated by analyzing the energy balance of the air parcels moving inside the canopy in a turbulent flow. A thermocouple is used to obtain a sensitive heat flow. This information, together with net radiation values and ground heat flow are used to determine it.

By combining the values estimated by Surface Renewal and by the reference evapotranspiration stations, the crop coefficients can be estimated for different conditions of slopes, exposure, orientation, etc. And so, the initiative with the VSPT Wine Group has a fifth station, one with a reference evapotranspiration.

Moreover, the thermocouple and the net radiation sensor are connected to a datalogger which collects and processes the information, that is sent through a mobile modem to the web, making it accessible anywhere.

During the first stage of this project, measurements are carried out in order to better understand the vine system and thus make better informed decisions about irrigation. We will keep you informed about the progress in “Agroclimate Technologies”.



Surface Renewal Station.



Reference Evapotranspiration Station.

## AGRO-CLIMATE TECHNOLOGIES RESEARCHERS

UC DAVIS Chile  
LIFE SCIENCES INNOVATION CENTER



Soroush Parsa, Ph.D.  
Program Coordinator Agronomy and Environment



Francisco Rojo, Ph.D.  
Postdoctoral Researcher



Samuel Ortega, Ph.D.  
Researcher

UNIVERSIDAD DE TARAPACÁ  
Universidad del Estado



Richard Bustos  
Researcher Assistant



Wladimir Esteban  
Researcher Assistant

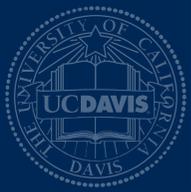
UC DAVIS  
UNIVERSITY OF CALIFORNIA



Daniele Zaccaria, Ph.D.  
Principal Researcher (PI)



Richard Snyder, Ph.D.  
Researcher



From left to right: Moshe Rosenberg, Rodrigo Valenzuela and Bruce German.

# SCIENTISTS REAFFIRM THE BENEFITS OF MILK IN EVERY STAGE OF LIFE

Led by Bruce German and Moshe Rosenberg, UC Davis experts, the seminar "Milk and Human Health" highlighted the quality and availability of the nutrients of milk as well as the possibilities of the dairy industry. The event was organized by UC Davis Chile and by the Dairy Consortium.

Every five years the United States Institute of Medicine (from the Academies of Sciences, Engineering and Medicine) analyzes the diet of North Americans to make recommendations so that they receive everything they require in their diets. "It is interesting to note that they maintain three portions of dairy products per day. I can imagine that this is no coincidence," says Bruce German, Director of the Institute of Foods for Health of UC Davis.

The seminar "Milk and human health: Opportunities for dairy products" rightfully emphasized the benefits of milk in every stage of human life. The researchers and professors of UC Davis' Food Science and Technology Department, Bruce German and Moshe Rosenberg, together with the professor from the University of Chile, Rodrigo Valenzuela participated in the activity.

"Milk and Human Health" was organized by UC Davis Chile and by the Dairy Consortium. The seminar was attended by researchers, businessmen, entrepreneurs, health professionals, producers and government authorities.

### GERMAN: ADVANTAGES OF MILK

"Milk and dairy products provide the most available and complete set of nutrients in the most digestible and absorbable manner possible. There are people who are unable to degrade lactose and therefore must use lactose-free products. In general, however, it is a very effective food for every stage of life. As one gets older, it is even more valuable, since we can no longer digest proteins so well...and milk proteins are more digestible", German specifies.

He also comments that milk has an appropriate balance of amino acids which are "very nutritious" proteins.

Dr. German claims that from an epidemiological point of view, people who consume cow's milk tend to be healthier and live longer: "It is clear that from that perspective that milk is doing something right. We are still trying to understand why."

He explains that for example, some myths about milk have been waning, such as that its lipids are bad for one's health. "Lipids guide metabolic processes we were not aware of even 50 years back. One of these is how the body regulates the storage of fats... We all need a certain amount of fat, but the body also accumulates it in places where it does not belong, such as the liver. It turns out that milk contains lipids which send signals to the liver to remove and export the fat. It is a very valuable property which the modern diet, especially one high in carbohydrates, fails to do", he explains.

Summing up: "The more we carry out research on milk, the more we realize how valuable it is and that people in general should consume it."

### ROSENBERG: MILK, A FUNCTIONAL FOOD

During his career, doctor Rosenberg has contributed to understanding the physical-chemical principles of dairy processing and to improving the quality and functionality of dairy compounds through news applications.

"Milk is a powerful functional food by itself and the dairy industry has a great opportunity to position it as such. Milk contains proteins, lipids, minerals and sugars that are all required for high quality nutrition, well being in general as well as for special needs at special situations. For example, positioning milk-based beverages as sport drinks is one of the latter opportunity... by providing suitable answers for recovery after physical activity," he comments.

An important issue for Rosenberg is to educate consumers about the differences between cow milk and products, such as 'soy milk' or 'almond milk'. "The use of the term 'milk' for describing plant-derived products is misleading and takes away from the unique position of real milk and dairy products in the market place. This is a serious challenge that has to be seriously and effectively addressed by the dairy industry. Consumers have to be informed!", he claims.

Rosenberg is a cheese expert and an international judge of these products. For that reason, he knows that consumers are exposed to a very broad array of cheeses from all over the world. "These cheeses have successfully gained acceptability and enjoy high demand among consumers. The Chilean cheese industry has to recognize the latter and expand the portfolio of Chilean cheeses in a way that successfully highlights the unique Chilean ecological richness and diversity. In simple terms, the concept of Chilean cheese Terroir has to be identified, developed, legally protected and marketed," he concludes.

## CHILEANS AT UC DAVIS

**NAME:** Alejandra Madariaga, from La Serena, commercial engineer from the Technical University Federico Santa Maria (Valparaiso) and Master in Community Development of UC Davis.



**PROFESSIONAL EXPERIENCE:** "I worked in the area of marketing in Procter & Gamble for three years, first managing the Head&Shoulders brand for Latin America from Venezuela and then Pampers for Chile. Afterwards, I was an NGO TechnoServe's senior consultant for entrepreneurship with a social impact for two years."

**WHY I CHOSE UC DAVIS:** "My passion is to contribute to a greater social equity by supporting projects with a high social impact. The Masters in Community Development is a unique multidisciplinary program of the highest level which offers an integral focus: training in social theory, scientific research and acquisition of practical skills to achieve more effective social interventions."

**AREA OF RESEARCH:** "How social capital and networking can make a positive impact on businesses and on the quality of life of low-income entrepreneurs."

**WHAT I WOULD LIKE TO DO ON MY RETURN TO CHILE:** "I recently returned to Chile and would like to be able to share what I have learned as a teacher and project consultant."

# GETTING TO KNOW A UC DAVIS ALUMNI

## MARÍA EUGENIA GONZÁLEZ: GENERATING MULTIDISCIPLINARY COLLABORATION TEAMS

After completing her Ph.D. in Food Science and her postdoc at UC Davis, the agricultural engineer came to University of Concepcion where she combines her role as Director of the Department of Agro-industries and researcher in subjects ranging from post-harvest to the enhancement of wild products.

"One of the most relevant aspects I learned through my studies at UC Davis was the impact which collaborative work can have," recalls Maria Eugenia Gonzalez, Director of the Department of Agro-industries at the University of Concepcion (UdeC). This agricultural engineer of the University of the Republic (Uruguay) completed her doctorate in Food Science at UC Davis between 2003 and 2008 under Dr. Diane Barrett supervising. Subsequently, she carried out a postdoc in the same laboratory, specializing in the quality of fruits and vegetables.

Maria Eugenia explains that she collaborated with researchers from other departments of UC Davis (Plant Sciences) and that she performed an internship for four months at the University of Wageningen (Holland), "demonstrating how important it is nowadays to have a multidisciplinary approach to research topics," she specifies. Moreover, the research for her Ph.D was financed directly by the Center for Advanced Processing and Packaging Studies, a center of cooperation between the National Science Foundation (NSF), universities and the industry for the development of methods and technologies which aim at the production of both safe and high quality foods. In that context, she had a "direct interaction with important food companies, such as Kraft Foods Inc. We used to meet twice annually to review the progress of the research and how this responded to the needs of the industry," the researcher points out.

She adds that one of her contributions in the UdeC has been to replicate this model of UC Davis, supporting the creation of multidisciplinary collaboration groups, not only within the university, but also by working with other institutions, such as the universities of the Biobio and La Serena.

The agricultural engineer relates that she remains in close contact with UC Davis, thanks to the various projects in which she has participated: collaborating in research, conducting an industry-wide prospection tour of in California and Oregon and by inviting professors from Davis to Chillan, where the faculty is located.

As for her opinion of the center of innovation which UC Davis has in Chile, the researcher believes that "it may be able to make an important contribution in the models of the university-industry relation. In Chile it is necessary to generate greater trust between the two".

In the UdeC, Maria Eugenia is carrying out three lines of research: she is working on the post-harvest in physiological damages to cherries (Fondecyt of Initiation and FIA); use of high hydrostatic pressures for the processing of fruit and vegetables (Corfo) and in the enhancement of the collection of wild products in forest areas, "with the aim to develop high added value products enabling the generation of income for rural collectors," she specifies.



/UCDavisChile



UCDavisChile



/company/uc-davis-chile

## HIGHLIGHTS

### UC DAVIS EXPERT GIVES TALKS IN CHILEAN UNIVERSITIES

Eduardo Silva, professor of the College of Engineering of UC Davis, visited us in December and gave two lectures about his research. Doctor Silva is working on therapeutic angiogenesis -which is the formation of new blood vessels from preexisting ones- using minimally invasive materials. Angiogenesis is particularly relevant in cases such ischemia, a condition where an organ or tissue receives a smaller blood supply. The long-term objective of his laboratory is to develop a polymer-based vehicle to perform a controlled supply of cells, medicines and even genes to regenerate ischemic tissues.

Doctor Silva's first lecture took place at the "NanoConference 2016: Biomedicine, Mining & Energy," organized by the Corfo and the University of Andres Bello, whilst the second was with engineering and medical researchers and students from the University del Desarrollo in an activity co-organized with the Technological Development Department, iCono.

"This visit gave me a fantastic opportunity to interact with Chilean researchers and local university leaders," commented Silva, researcher of UC Davis' Department of Biomedical Engineering.



### UNAB HOSTED THE FIRST SYMPOSIUM ON FOOD SAFETY

Also in December, the University of Andres Bello (UNAB) headed the "International Symposium on Food Safety (ISFS): New Tools to Detect and Prevent Foodborne Outbreaks from Farm to Fork." The activity which showcased the state of the art methods for pathogen detection and prevention in the food chain, was organized by doctors Fernando Mardones, Aiko Adell and Andrea Moreno (the first two professors are UC Davis alumni).

UC Davis Chile was one of the many institutions supporting the event which was attended by internationally renowned experts, such as Kathryn Boor, dean of the Faculty of Agriculture of Cornell University and Woutrina Smith, professor of UC Davis' School of Veterinary Medicine.

One of the local representatives at the symposium was Daniel Garrido, professor at the Catholic University's Engineering School and a member of UC Davis Chile's Scientific and Industry Advisory Board.



Woutrina Smith, professor at UC Davis' School of Veterinary Medicine.

Av. Andrés Bello 2299, Of. 1102,  
Providencia, Santiago de Chile  
Phone: +569 4475 4718  
eangel@ucdavischile.org

www.ucdavischile.org



Proyecto apoyado por

