

SPRING 2007

Update

California State University, Fresno

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Research team eyes by-product program

County seeks to continue successful program with backing of ARI scientists

Central San Joaquin Valley agricultural producers and county government administrators all are hoping for a green light from state environmental officials to continue a program that reuses by-products from area food processing plants as a soil and livestock feed amendment.

The program began in Stanislaus County more than 20 years ago as a way to reduce materials delivered to local landfills and at the same time enhance soil properties and animal feed for area farmers and ranchers. The by-products in the program include fruit and vegetable culls and nutrient- and organic-rich sediment generated from food processing lines.

The material is loaded into trailers and hauled by truck to agricultural sites around the county. When delivered to farms, it is typically unloaded onto fields prior to planting of crops such as alfalfa or silage corn. It is spread out by a grader and allowed to dry, and within a few days is disked into the soil. Applications are limited to once per year.

Processing companies pay a fee to the growers to apply the by-products on their land. Growers and ranchers pay a fee to the county for regular inspections to ensure the material is handled properly.

While all agree that food-processing by-products enhance the soil's organic



A tractor with grader spreads food processing by-product residues onto a field for use as a soil amendment. The residue will be allowed to dry, then disked into the soil.

profile, state water quality officials want to ensure that salts from certain fruit by-products or metals from acidic vegetable waste do not reach high levels. To ensure that this does not occur, California's Central Valley Regional Water Quality Control Board (RWQCB) requested that soil and plant analyses and by-product characterizations be conducted in areas where the materials are applied.

A project team comprised of county, state, university, and private industry representatives was established. Stanislaus County's Department of Environmental Resources joined with the California State University Agricultural Research Initiative (ARI) to fund the work.

Leading the research portion of the project is Fresno State soil scientist Sajeemas "Mint" Pasakdee. She is conducting a two-year study of soil profiles and plants where the by-product is being applied to determine effects of the applications on soil and ground water quality

"The fruit canning process includes the use of salt-based chemicals, such as

lye, for washing and peeling the fruit," Pasakdee said. This results in by-product that is also high in salts. However, since applications under the program are limited to once per year, the impacts in this area are expected to be minimal.

"In tomato processing, the by-products tend to be acidic," she added. "And when you spread this acidic material on the soil it can cause a reaction with the heavy metals in the soil and make them more soluble. This could

See Program, Page 7



ARI research partnerships extend to

The new dean of the College of Agriculture at California State University, Chico sees agriculture as a key player in California's "North State" economy, and she hopes that innovations launched through college programs will prove to be winners for the area's ag industry.

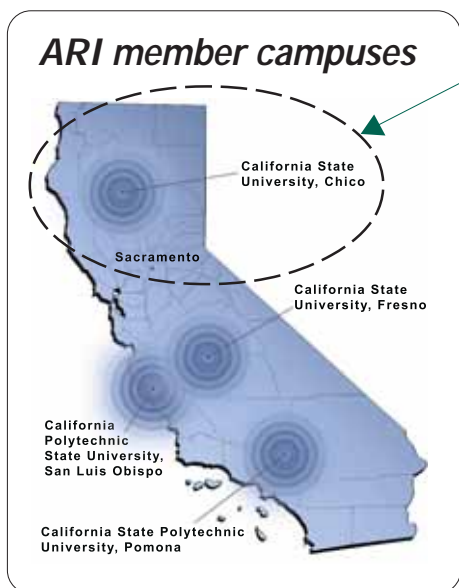
It's been six months since Jennifer Ryder Fox, Ph.D., assumed her new position, following the retirement of A. Charles Crabb, who served as college dean for seven years.

During a recent question and answer session, Fox expressed confidence in the strengths of the program she now oversees and shared insights into new areas of production and research she believes will enhance it even more. Chico State is one of the four member campuses of the California State University Agricultural Research Initiative (ARI), administered through the California Agricultural Technology Institute (CATI) based at California State University, Fresno.

A former head of the Horticulture and Crop Science Department at Cal Poly, San Luis Obispo, Fox has spent time in the private sector, serving as vice president of regulatory affairs and technical development for a start-up biotechnology company in Davis, California. She has 22 years of experience in state, national, and international environmental regulatory affairs dealing with crop protection policies. Fox believes her broad experience will aid her in continuing a program that benefits both students and the ag industry. She took the time to share her thoughts in the following question/answer format:

What are your first impressions of the agricultural industry in Chico area?

Agriculture in the North State is diverse and strong and is perhaps the strongest driver of the region's



'North State'

agricultural industry. Because of its requirement of industry financial match, it assures that the research in which our faculty engage is well grounded and addresses a need.

Additionally, it provides an opportunity for us to enhance our academic program resources and allows students to participate in problem solving projects with valuable results.

As the new dean, do you see specific research areas where Chico State excels or will excel?

CSU, Chico has traditionally been strong in the production areas for both animal science and plant science. We have taken the lead in the National Animal Identification Project and have been assisted by the California Department of Food and Agriculture in that effort. Additionally, we have partnered with the cooperative extension service on variety trials for some of the orchard crops of the North State and in some pesticide mitigation research.

An area where we are carving out national recognition involves the organic dairy we will open on April 26, 2007. We will have one of two organic dairies in the country and the only one in the western United States. The dairy is significant to our campus because it helps us to fulfill our strategic objective of demonstrating sustainable agricultural practices. The new CSU, Chico organic dairy has already received robust industry support and is designed to serve small, family-operated dairies and provide research opportunities for our faculty, students and staff.

What are industry leaders telling you are their main needs for research?

Variety trials for orchard crops, crop protection technologies, organic dairy operations and animal identifica-

economy. It offers many opportunities for student employment and faculty research partnerships.

What are the strengths of the Chico State College of Agriculture?

The integrated nature of our curriculum exposes our students to myriad aspects of agriculture while permitting them to gain expertise in a specific area. The "hands-on" experiential learning environment we promote prepares our students to enter the work force with a working knowledge of real issues and situations they may face as professionals.

What do you see Chico State doing for California agriculture?

I see our main goal as educating tomorrow's leaders of California agriculture. In addition, our mission is to serve the industry with research and other services such as workshops, field days and demonstration trials at our farm.

What do you see the ARI research program doing for Chico State?

The ARI program provides a mechanism by which our faculty, staff and students can investigate specific areas of interest while providing a service to the



Dean Jennifer Ryder Fox

Center for Agricultural Business

China study focuses on pear supply chains

An economics research team for the Center for Agricultural Business (CAB) is gathering information it hopes will provide California tree fruit growers with insights into the rapidly changing global marketplace.

This study focuses on pears, but the information gleaned should be useful to producers of all types of tree fruits, said Mickey Paggi, CAB director and lead researcher of a study of the economics of pear production in China.

“Both domestic and export sales of California fresh and processed pears, as well as other tree fruits, have faced increasing competition from China,” Paggi reported.

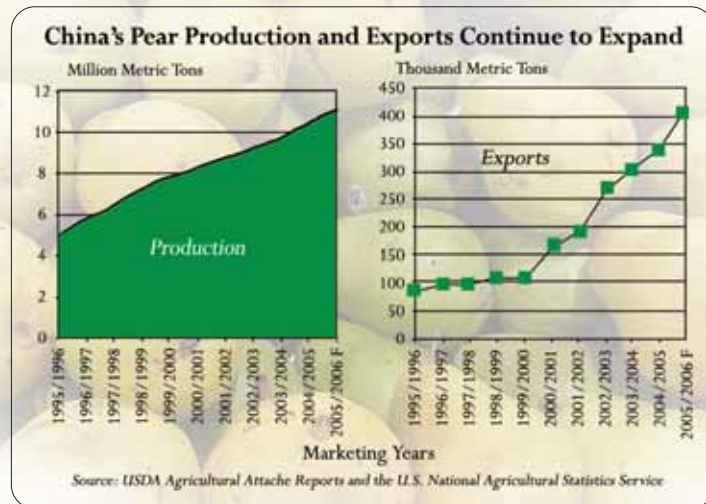
Recent tabulations have shown that over the last seven years, Chinese worldwide pear exports have risen from 97,000 (metric) tons to 350,000 tons, and its processed pear production has jumped from 320,800 to 500,000 tons.

In the same time period, U.S. pear exports have dropped from 164,871 tons to 160,000 tons, and processed pears have fallen from 426,033 to 370,000 tons. In terms of direct impacts, U.S. imports of low-cost Chinese pears increased from 148,515 cases in 2001 to 517,436 cases in 2003.

These trends present new and significant challenges to California pear producers and processors, Paggi noted.

“A better understanding of current trends can help to identify the extent to which the Chinese industry will continue

Information gained will aid U.S. tree fruit producers in honing strategies for collaboration, joint ventures



to be a source of competition. It will also show where the potential exists for collaboration and joint venture opportunities,” Paggi said.

In this study, Paggi is focusing on pear produce supply chains in China, examining the structure, conduct and performance of the chains. Work will include tracking product movement from small grower to first and second stage handlers, then to packer/shippers, from there to exporters, and finally to importers and retailers.

With the aid of university-based economics specialists in China, the research team will seek to determine the points in the system where value and costs are added to the product.

“The information provided will enhance the capability of the U.S. industry in formulating strategic plans to deal with future competition,” Paggi said. “It may be that new collaborative efforts by California and China could benefit the industry as a whole by helping to build the overall market for pears through the introduction of new varieties, new uses and new marketing initiatives.”

Research will continue through the end of this year, with dissemination of results expected early in 2008, he said.

Project collaborators include Thomas Reardon, Ph.D., economics professor at Michigan State University, and Huang Zuhui, Ph.D., chair of the Center for Agricultural and Rural Development at Zhejiang University in Hangzhou, China.

Funding for this project was made available by the Governor’s “Buy California Initiative,” the California Department of Food and Agriculture and the U.S. Department of Agriculture, through the California State University Agricultural Research Initiative (ARI) Program.

For more information, Paggi may be contacted at mpaggi@csufresno.edu, or visit the CAB website at <http://www.cati.csufresno.edu/cab>.

Upcoming Events

April 11 – Farm Labor Contractor Education Institute at the Courtyard by Marriott in Oxnard, California. Presented in English and Spanish. For details, call 559-278-4677.

April 18 – Ag Safety Breakfast Briefing at 7:30 a.m. in Calistoga, California. For details, call 559-278-4405.

April 26 – Ag Safety Breakfast Briefing in Salinas, California. For info, call 559-278-4405.

May 2 – Farm Labor Contractor Education Institute at the Piccadilly Inn Airport in Fresno, in English and Spanish. For details, call 559-278-4677.

June 7 – Farm Labor Contractor Education Institute at the Embassy Suites Hotel & Conference Center in Seaside, in English and Spanish. For details, call 559-278-4677.

Center for Irrigation Technology

Soil moisture study targets water basin

A research team from the Center for Irrigation Technology (CIT) recently completed a study of soil moisture content around a water recharge basin to help determine patterns of water seepage into the ground.

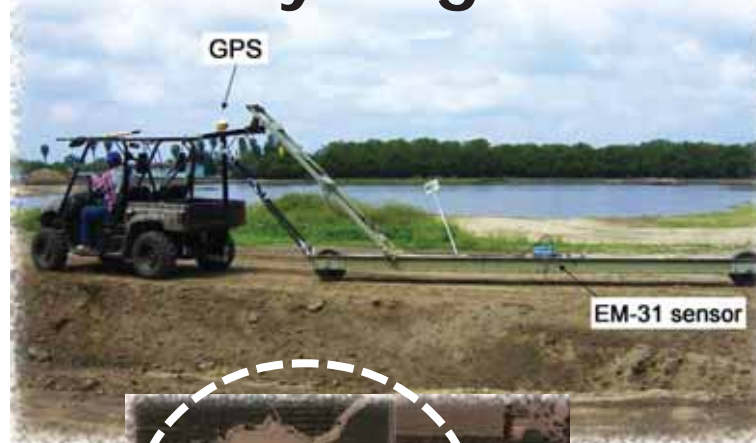
The project was conducted for the Kaweah Delta Water Conservation District, which oversees flood control and groundwater recharge from the lower Kaweah River in the east central San Joaquin Valley. The lower Kaweah flows down from Lake Kaweah, formed by the Terminus Dam in the Sierra Nevada Mountains east of Visalia.

Soil moisture measurement for the project was done using electromagnetic induction (EM) technology, reported CIT research scientist and team leader Florence Cassel Sharma.

“EM can offer a quick and relatively economical way to investigate seepage along conveyance channels such as canals, or along the banks of water storage basins,” Cassel said. The technology features an instrument containing an electrical transmission coil which induces an electromagnetic field in the ground. This creates a secondary magnetic field which can be measured by a receiver coil in the EM instrument.

Since soil features such as moisture, salt content and texture all affect the instrument readings, part of the study involves taking actual soil samples and analyzing the characteristics against the data recorded by the EM unit. Once the unit’s initial recordings are calibrated with the raw data from the soil samples, the EM unit can measure soil moisture and other features throughout the area.

“Our specific objectives were to develop maps of soil water content, texture, and electrical conductivity distribution around the perimeter of the Oakes Recharge Basin, at different



Left: Modified ATV drags sled with EM unit around perimeter of the Oakes Recharge Basin near Visalia, California. Below: Map shows location and shape of the recharge basin, which covers approximately 40 acres.

down to 20 feet around the basin perimeter. Using soil moisture

and other data, researchers discovered layers of clay soil which could affect water movement both horizontally and vertically through the soil.

Data analysis showed that in general, there was seepage downward around the banks from April to June. However, certain areas along the perimeter were more saturated than others, suggesting the effects of the varying soil types.

“This data gives them an idea that the water is moving,” Cassel said. “We need to learn more about the overall soil geology of the area to determine the direction that water is going.”

Cassel has directed other studies of water seepage along canal banks using EM technology. “Information provided by these studies shows more precisely where water losses occur in conveyance systems,” Cassel said.

For more information on EM technology, contact Cassel at fcasselss@csufresno.edu, or visit the CIT website at <http://cati.csufresno.edu/cit>.

depths,” Cassel said. “The results will enable water district officials to better utilize seasonal stream flows for groundwater recharge,” she said.

The EM-31 unit used in the study is housed in a sled that can be dragged along the ground. Cassel used an all-terrain vehicle to drag the sled around the basin, which covers about 40 acres and holds water to a depth of 13 feet.

The research team recorded data in April and June 2006 to determine how soil moisture content changed over time. During each survey, recordings were taken for every two feet of soil depth,

Upcoming events

April 11 – Agricultural Pumping Efficiency Program workshop from 8:30 a.m. to noon in Ripon, California. Call 800-845-6038 or email psenter@csufresno.edu for details.

May 3 – Agricultural Pumping Efficiency Program workshop from 9 a.m. to noon in San Martin, California. Call 559-278-2066 for registration details.

April-December – Western Growers University, an affiliate of Western Growers Association, hosts a variety of training workshops covering supervisory skills, leadership skills, and sexual harassment prevention. Workshops are held throughout California. For times and places, contact Anthony Magno at amagno@wgs.com or call 949-885-2297.

Viticulture and Enology Research Center

Students in research...

Grape, wine industries benefit from enthusiasm of enterprising student research technicians

Appplied research conducted by scientists for Fresno State's Viticulture and Enology Research Center (VERC) provides a double bonus for California's grape and wine industry: Not only does it solve existing problems and bring new innovations and technologies into the grape and wine business; it also trains students to be scientists and business leaders who will help guide the industry in times ahead.

For example, a recent project exploring a new method for harvesting grapes included a team of Ph.D.-level scientists, industry professionals, and Fresno State graduate student Sivakumar "Siva" Sachidhanantham.

A native of India, Siva came to the United States and studied industrial technology, eventually being admitted to a master's degree program at Fresno State. Through established working relationships between VERC and the Department of Industrial Technology, Siva's name was referred as a potential student research assistant, and he was invited to join the research team.

The project featured the use of global positioning systems (GPS) and geographic information systems (GIS) technologies that would enable wine grape growers to enhance the quality of their harvested grapes by a selection process during mechanical picking. During trials held last fall, a modified mechanical grape harvester, equipped with computerized electronic equipment and followed by two tractors with gondolas, was able to pick grapes and distribute them into either of the gondolas based on the quality of the grapes.



Fresno State graduate student Sivakumar "Siva" Sachidhanantham displays his research poster which earned 2nd place in a recent competition hosted by the American Society of Agricultural and Biological Engineers during the World Ag Expo in Tulare, California.

The distribution was based on prior infrared vineyard mapping that showed grapes to have higher sugar content or other qualities in certain areas of the vineyard. So during picking, depending on what area of the vineyard the harvester was in, the machine, specially modified with two conveyors, directed picked grapes into either gondola A or B.

Siva ended up playing a significant role in both the software and hardware phases of the project.

"In collaboration with industry partners, Siva developed the differential harvest attachment that could be fitted onto a commercial harvester," stated assistant industrial technology professor Balaji Sethuramasamyraja, who assisted in the work. Siva also did the spatial

modeling of quality parameters for the vineyard map using a commercial software package. In short, Siva made critical contributions to the project, from computer software development to helping to design and build some of the machinery used.

"This was a great example of collaboration and a student's work," Sethuramasamyraja said. "Siva is really good. Good with technology. He took advantage of this opportunity."

Siva is just one of nearly 100 graduate and undergraduate students who have been trained in viticulture and enology during each of the past two years under Fresno State's Department of Viticulture and Enology, noted VERC Director Robert Wample. That training is critical to the regional industry's success, he said.

The exciting aspect of the grape harvesting project is that the technology may be applicable to other crops, Wample added. Thus, Siva has made a significant contribution to the entire agricultural industry.

Siva is close to completing his master's degree. Once obtained, he's not sure what he will do.

"I'm flexible," he said. "If I'm able, I'd like to stay and help to contribute to the industry."

Upcoming events

April 19 – VINO Italiano Wine Tasting from 5:30-8:00 p.m. at the Fresno State Winery. Must be 21 or older to attend. For details, call 559-278-2089.

May 17 – Dept. of Viticulture and Enology's Annual Dinner to congratulate the class of 2007. For details, call 559-278-2089.

June 3 – A Celebration of Wine from 3 to 6 p.m. at Dennes Coomb's Riverbend Ranch in Madera. Annual fund-raiser is for the Vincent E. Petrucci Library. For tickets, call 559-244-5741 or visit www.acelebrationofwine.com.

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A Study on ET adjustment factor set to begin

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CIMIS information is published quarterly in the *CATI Update* newsletter. Articles are provided by the California Department of Water Resources, CIMIS program staff.

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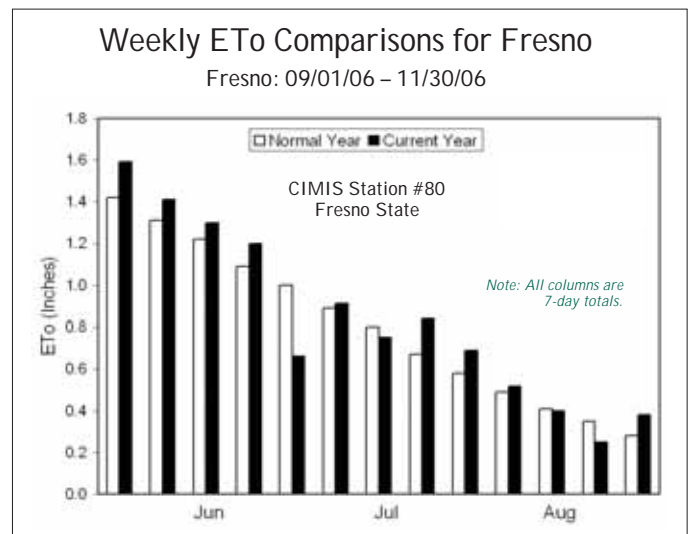


Chart shows ETo variation from normal over last three months.

Program: 'Best Practices' manual to be developed

from Page 1

lead to them leaching into groundwater systems.”

The key is to apply the acidic by-products on alkaline soils, where it benefits, Pasakdee noted, since acidic by-products help to bring the pH of alkaline soils into a more desirable range. The relationship of salts, metals and other compounds in the soil is complex; that is why the research study is needed to accurately determine what soil changes, if any, may occur as a result of different by-product applications.

Assisting in the soil sampling phase is Horacio Ferriz, a geologist from the Department of Physics, Physical Sciences and Geology at California State University, Stanislaus, and Nat Dellavalle, a certified professional agronomist from Dellavalle Laboratory Inc. in Fresno.

The work involves several phases, Pasakdee said. The first is a review of by-product application studies in areas outside Stanislaus County. The second involves a technical review of data, such as soil and by-product samples already collected by the county. The third phase will include new sampling to compare against samples taken from the last six years. The final phase will be to develop recommendations for proper controls, measures and prohibitions, if necessary, to ensure the program remains environmentally friendly.

The team plans to present its findings to the regional water quality board later this year.

“Ultimately what we want is to develop a manual of best management practices for how to properly reuse these by-products and minimize impacts to landfills,” Pasakdee said. “Then we would like to make it available to other counties or regions for their use.”

For more information, contact Pasakdee at spasakdee@csufresno.edu.

Residue program participants outline soil, economic benefits



Left: Martin Reyes, coordinator of by-product applications for Mapes Ranch, checks residue levels following an application. Below: Close-up shows pear, peach and grape culls.



Stanislaus County environmental resources officials and the agribusiness industry have maintained a unique partnership in balancing the need of food processors to dispose of by-products and farm producers to enhance organic content of their cropland.

According to Sonya Harrigfeld, director of the county's Department of Environmental Resources, the food processing plants in the county produce more by-product than county landfills could absorb. Thus, the partnership formed 20 years ago to apply it as a soil amendment provides a win-win solution for all parties involved.

The growers and ranchers who receive the by-product on their land pay fees to the county for regular inspections, soil testing, and other services to ensure the process remains environmentally friendly.

The food processors pay a fee to the end users to apply the by-product. Though they have to pay a fee to farmers, it is still more economical than to dispose of it in other ways, said Jim Mortensen, maintenance superintendent for Del Monte Foods Plant No. 1 in Modesto. His plant, which processes peaches, pears and apricots, delivers 30,000 tons of by-product

each processing season to area growers.

“There are bio energy producing facilities in the 100 mile range, but delivering that far would double our costs, not to mention the increased air pollution from the trucks and the logistical problems of getting enough equipment,” he said.

Among the grower participants is Bill Lyons, former secretary of the California Department of Food and Agriculture and owner of Mape's Ranches & Lyons' Investments in the Modesto area. Lyons has been a program partner from the beginning. By-products are applied annually on land dedicated to crops such as wheat, forage mix, oats, corn and alfalfa.

“We have a contractual arrangement with several food processors,” Lyons said. “In 20 years of the program, all we've seen are beneficial effects. We have a very, very extensive soil monitoring program, and we have not seen any salt issues in our property or crops. We have seen improvements in our soil.”

Lyons and Mortensen are both serving as cooperators in the research study for the state's regional water quality control board.

Research: New partnerships eyed

from Page 2

tion activities. There also is interest for CSU, Chico to become more involved in the "olives for oil" segment of the orchard industry, and I believe we can serve that industry by looking at trellising and irrigation practices that maximize harvestable fruit.

Research areas you think should receive high priority?

We will continue with the work we've been involved in with the bureau of reclamation, looking at irrigation technology improvements. Pesticide runoff and spray application technology research will also continue as these projects help us to better understand how to use crop protection products in an environmentally responsible manner.

What other types of partnerships might there be besides/in addition to research?

We are always open to partnerships with industry or other institutions. For example, we are discussing development of a course in range management with UC Davis and other CSU campuses. Such a course would be available statewide and would benefit any student who needs that type of course to reach his/her professional goals.

New consortium focuses on international ag development

The California State University Consortium for International Development (CSUCID), estab-

lished in July 2005, recently launched a website to enhance accessibility by federal funding agencies, researchers and international development specialists.

The CSUCID, staged at CSU campuses in Fresno, Chico, Humboldt, Pomona and San Luis Obispo, was created to serve as a bank of expertise for high-priority federal and non-governmental international agricultural development initiatives across the globe.

The consortium seeks to improve the economic efficiency, productivity, profitability and sustainability of international agricultural development initiatives and to produce results and models that are easily transferable.

"The introduction of our new website is the next logical step in the growth of the consortium," said Bill

Eryisian, CSUCID director of resource development and Fresno State campus consortium representative. "This central point of contact for information

and news about the consortium's activities will help to build our growing network of specialists and will extend our reach to all parts of the developing world."

The website, www.csucid.com, summarizes international development activities through the consortium and serves as a resource for CSU system research faculty wishing to participate in overseas projects.

It is anticipated that the CSUCID will develop partnerships with faculty and associated scientists involved in research with the California State University Agricultural Research Initiative (ARI) and the California Agricultural Technology Institute (CATI). The ARI is administered by CATI, which is based at Fresno State.



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