CALIFORNIA AGRICULTURAL TECHNOLOGY INSTITUTE

FALL 2004

Update

California State University, Fresno

In this issue...

Food science research on the rebound

New research center head seeks increase in industry partnerships

New avenues for research in food processing technology are opening this year following the appointment of a Fresno State faculty member to direct the Center for Food Science and Nutrition Research (CFSNR).

Gour Choudhury, Ph.D., joined the university faculty last fall and is serving as an associate professor in the Department of Food Science and Nutrition as well as heading the CFSNR. Prior to his Fresno State appointment, Choudhury was director of research at the Food Packaging Technology Center that he established at the University of Wisconsin-Stout in Menomonie, Wisconsin. Prior to his three-year tenure at UW, he served as a research and development scientist in a private company.

Choudhury arrived at Fresno State with a desire to conduct food engineering and processing research as well as to teach, he said in discussing his vision for the CFSNR. One of the things that drew him here, he said, was the excellent potential for a food technology research center to partner with the area industries.

Associate professor Gour Choudhury will oversee food processing research and development activities for the Center for Food Science and Nutrition Research.

"We can jointly pursue this effort to benefit food processors and agriculture in the central San Joaquin Valley," he said. "However, we need infrastructure and equipment to move forward with this."

As part of his effort to bolster food science research, Choudhury wrote a successful federal grant proposal that netted Fresno State $200,000 from the U.S. Department of Agriculture. The

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Agribusiness conference set for November

From local to regional and from macro to mega, the themes and issues affecting California agriculture are being lined up for discussion by an assortment of experts at the 23rd Annual Agribusiness Management Conference set for Thursday, Nov. 4, in Fresno, California.

The event will feature individual addresses by prominent regional and national economists and a panel discussion focusing on air, water and workers' compensation issues, reported Mickey Paggi, director of Fresno State's Center for Agricultural Business (CAB).

CAB is hosting the event in partnership with Bank of America Corp. It will be held at the Radisson Hotel & Conference Center downtown.

Presenting the mega picture for agriculture will be luncheon keynote speaker David M. Kohl, professor of

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CATI

CALIFORNIA AGRICULTURAL TECHNOLOGY INSTITUTE

Food: USDA grant enables equipment purchase

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education grant will support the purchase of new equipment to be used for research and training at the dairy foods processing laboratory. The equipment includes a new cheese vat, milk pasteurizer, homogenizer, butter churn, and other items.

While working at other universities before joining Fresno State, Choudhury obtained five patents on process engineering and automation. The engineering patents were for new processes for manufacturing value-added products. The automation patents were for sensors and systems for on-line detection of product defects.

Here at Fresno State, Choudhury hopes not only to train students in research and production processes, but also to develop products and technologies for practical use by area food processing companies.

"I like to develop products and processes that benefit the university and the industry," he said. "I'd rather develop something that shows up in the supermarket and have tangible benefit to the industry."

Gour Choudhury (left) watches as Daniel Avila, head technician for Fresno State's dairy products processing unit, tests the acidity level of milk in the laboratory.

Choudhury's immediate priority is to complete purchase of the new processing equipment and oversee installation. Additional priorities include making contacts and developing relationships with representatives from the region's food processing industry. From those relationships, Choudhury said, opportunities will grow for research partnerships that will benefit both the industry and Fresno State students.

In collaboration with other faculty, Choudhury also is developing a new interdisciplinary program on dairy science and technology. The combination of new program coursework and processing equipment will provide students with training in production, processing, packaging and marketing so they can step right in to significant industry positions after graduation.

The CFSNR is one of four research centers operating under the administration of the California Agricultural Technology Institute (CATI).

Research, development goals for CFSNR

by Gour Choudhury, Center Administrator and Associate Professor of Food Science

Goal 1 – Pursue research and development in food science and nutrition in areas such as

1) Dairy foods
2) Value-added processing
3) Fruits and vegetables
4) Functional foods
5) Food safety
6) Food security
7) Food packaging
8) Culinary science
9) Obesity prevention
10) Health promotion

Goal 2 – Facilitate collaborative projects among

- California State University, Fresno
- Other universities
- Government agencies
- Commodity groups
- Industry
  - Food processing
  - Food service
  - Health and nutrition

Goal 3 – Promote a research environment for

- Faculty
- Students
  - Undergraduate
  - Graduate
- Industry/other partners

Goal 4 – Provide continuing education and training in the areas of

- Food science
- Nutrition

Goal 5 – Maximize dissemination of all center outcomes and activities

Editor's Correction

In an article featuring the trial application of CO_2 to strawberry plants, the July issue of *Update* inadvertently misused the servicemark Carbogation[sm] brand, which is the property of Ag Gas®. Carbogation[sm] is a servicemark filed for in the U.S. Patent and Trademark Office by Ag Gas®, and its use is subject to federal trademark protection. Proper use should read as "Carbogation[sm] brand CO_2 enrichment."

Center for Agricultural Business

Outlook: Air, water and workers' comp on topic list

from Page 1

agricultural finance and small business management and entrepreneurship at Virginia Tech University.

During his 20-plus-year professional career, Kohl has conducted more than 3,000 workshops and seminars for agribusiness groups such as bankers and lenders, regulators, and producers. He has received 11 major teaching awards and eight major extension and public service awards from Virginia Tech and Cornell University, and he is a two-time recipient of the American Agricultural Economics Association's Outstanding Teaching Award.

At left: Guests gather for lunch at the 2003 Agribusiness Management Conference. Below: Michigan State professor Tom Reardon discusses globalization and agriculture at last year's event.

'Megaforces of Agriculture'

In his conference address, titled "Megaforces of Agriculture," Kohl will discuss farm and ranch structure segmentation, market trends, biotechnology, information technology, and government policies that will affect the global agricultural economy.

Prior to Kohl's address, several economics specialists will examine California agriculture in relation to international markets.

'Economic Health of Ag'

John B. Penson, Jr., the Regents Professor and Stiles Professor of Agriculture from Texas A&M university, will outline the "Economic Health of Agriculture: a Macro Perspective," and CAB Director Mickey Paggi will discuss specific aspects of California agriculture.

A discussion of globalization and California agriculture will follow. Rayne Thompson, director of national affairs for International Trade and Plant Health, California Farm Bureau Federation, will moderate presentations on the impacts of globalization. Mark Lange, president and CEO of the National Cotton Council, will provide an overview of developments affecting the outlook for cotton and other crops. Robert Schram of Schramm, Williams and Associates Inc. will focus on the impact of international forces on California specialty crops.

Air, water, workers' comp

A second morning panel discussion will address labor and environmental issues affecting California agriculture, Paggi said. Discussing air quality issues will be Roger Isom, vice president and director of technical services for the California Cotton Ginners and Growers Associations. Mike Wade, executive director of the Agricultural Water Management Council, will discuss water issues, and California legislator Charles Poochigian, state senator from the 14th district, will address workers' compensation reform.

Written commodity reports also will be included in the conference proceedings. Commodities include wine and table grapes, raisins, tree fruit, almonds, walnuts, pistachios, citrus, tomatoes, dairy, vegetables, beef, alfalfa, cotton, and feed grains and protein meals.

The conference will conclude following the luncheon. Registration fee is $85 for registrations postmarked by Oct. 29. For additional registration or conference information, call 559-278-4405 or visit the CAB website at *cati.csufresno.edu*.

Upcoming events

Nov. 4 – 23rd Annual Agribusiness Management Conference in Fresno, California. For details, call 559-278-4405.

Nov. 17 – Farm Labor Contractor Education Institute class at the Hilton in Santa Rosa, California. For details, call 559-278-4405.

Dec. 2 – Farm Labor Contractor Education Institute class at the Piccadilly Inn Airport in Fresno. For details, call 559-278-4405.

Dec. 9 – Farm Labor Contractor Education Institute class at the Embassy Suites Hotel in Palm Desert, California. For details, call 559-278-4405.

Center for Irrigation Technology

Agricultural engineer Barry Goodrich analyzes water sample for salt content as part of a study of an integrated on-farm drainage management (IFDM) system.

Ag engineer applies skills to water, air quality studies

A specialist in computer modeling has joined the Center for Irrigation Technology (CIT) research staff to help address air quality issues.

Barry Goodrich, who earned a bachelor's degree in agricultural engineering from Texas A&M University and is completing his master's thesis, is overseeing air and water sampling activities for Fresno State faculty research scientist Charles Krauter.

If one were to ask what the connections are between air quality issues and irrigation, Krauter would outline several: one, he said, involves dairy operations, where irrigation and air quality are directly related by the way the water is used.

"It has to do with manure handling. In almost every case, the daily collection of manure is done by flushing the free stalls with water," Krauter said. "The manure is managed by suspending it in water, holding it in a lagoon, then irrigating with it. Part of our work is to measure the gases volatizing from the water."

Krauter has assigned Goodrich to lead a research team in recording emissions of certain gases from around several dairies in the central and southern San Joaquin Valley.

Over recent months, using different sampling methods, the team has recorded data on atmospheric ammonia, hydrogen sulfide, and reactive organic gases (ROG's), which can contribute to ozone formation. Part of Goodrich's work is to log and analyze the data, then to develop software models that will predict dairy emissions based on factors such as number of cows and/or climate conditions.

The models Goodrich's team produces will be submitted to the federal Environmental Protection Agency (EPA) for use in developing new, more accurate air quality standards for dairies and other farm operations.

Another air and water-related project Goodrich is working on involves measuring salt deposition from a prototype integrated on-farm drainage

See ***Water,*** *Page 7*

Testing protocol developed for SWAT controllers

Irrigation engineering specialists at the Center for Irrigation Technology (CIT) have finalized testing protocols for a new type of residential landscape irrigation system.

Called Smart Water Application Technolgy (SWAT), the system features the use of electronic sprinkler controllers governed by the receipt of weather and/or soil moisture data. SWAT technology has the potential to significantly increase water use efficiency, with water applications based on the needs of the plant, not on arbitrary timer settings, as is the case with most residential systems.

The concept of irrigation controlled automatically by recorded weather data is not new, noted CIT irrigation engineer Ed Norum in explaining the project. However, communications software for sprinkler controllers has only recently been refined, and manufacturers who have developed systems for the market-

See ***Protocol,*** *Page 7*

Upcoming events

Oct. 28 – Agricultural Pumping Efficiency Program (APEP) Sutter County pump and irrigation efficiency seminar in Yuba City, California. Call 530-674-1461 for details.

Nov. 4 – APEP Malcolm Media Grape Day with exhibits and a pump efficiency seminar in Easton, California. Call 559-298-6675.

Nov. 9 – APEP Yolo Energy Efficiency Program seminar at the Woodland Ag Museum. Call 530-753-9337 for details.

Nov. 10 – APEP Malcolm Media Wine Grape Day irrigation efficiency seminar in Paso Robles, California. Call 559-298-6675.

Nov. 10 – APEP pump efficiency seminar in Gridley, California. Call 530-534-0112 ext. 120 for details.

Nov. 17 – APEP Malcolm Media Nut Growers Day pumping efficiency seminar in Ripon, California. Call 559-298-6675.

Viticulture and Enology Research Center

Sensory evaluation

New laboratory offers evaluation of university, commercial wines

Sensory panel leader Sherrie Holzer, an undergraduate student in enology, places red wine samples through opening in taste testing booth. Panel member in the booth will receive the samples.

Faculty and students at Fresno State's Viticulture and Enology Research Center (VERC) have a new asset to aid them in their research this year: an official sensory lab where trained panelists evaluate wine.

The lab was opened this spring following months of developmental work by Susan Rodriguez, who serves as a post-doctoral research scientist for VERC. Enology students Sherrie Holzer and Linda Baehr assisted in getting the lab up and running.

"The key purpose of the lab is to test wines made in our winery," Rodriguez said. Since Fresno State maintains both a research and production winery, the lab has become an important asset for formal evaluation of wines.

Rodriguez and her assistants have trained 30 panelists in an evaluation called "difference, or discrimination, testing." In one of these tests, the triangle test, a panelist is given three wine samples, two of which are the same wine and one that is different. The panelist sniffs the samples, then tastes each wine by sipping and swishing a small amount inside the mouth. The panelist does not swallow the sample, but spits it into a cup or spittoon.

After carefully tasting the three wines, the panelist selects the sample that he or she thinks is different from the other two.

While difference testing may seem like a simple procedure, it is an important component of wine evaluation, since winemakers can use the results to determine whether different yeasts or winemaking methods, for example, make a difference in the flavor of the same variety of wine.

A second, more complex level of wine tasting is called "descriptive analysis." It involves evaluating specific sensory attributes of wines, Rodriguez said. Aroma characteristics such as cherry, grassy, vanilla or buttery can be identified and quantified by panelists, providing the winemaker with much more detailed information.

Training for this type of analysis is much more extensive, but Rodriguez said she is beginning to recruit a panel for this purpose.

While most commercial wineries do their taste testing in house, there are occasions in which a winery or wine industry business will desire analysis by an independent lab. One of the two companies that has requested wine testing at the VERC Sensory Lab is a

See ***Sensory,*** *Page 8*

Panel member Jim Michael, associate director of Information Technology Services at Fresno State, conducts a triangle test for the sensory lab.

Upcoming events

Nov. 4 – American Vineyard Central Valley Grape Expo at the CPDES Hall in Easton, California. Visit *www.malcolmmedia.com.*

Nov. 10 – American Vineyard Magazine Central Coast Grape Expo in Paso Robles, California. Visit *www.malcolmmedia.com.*

Nov 13 – Fresno State Viticulture Club 57th Annual Fall Harvest BBQ at the Elk's Lodge in Fresno. For details: 559-278-7151

Nov. 18 – Le Vin Nouveau wine tasting to celebrate the release of Fresno State Nouveau vintages, at the Fresno State Winery. For details, call 559-278-2089.

Dec. 1 – Filtration Day workshop for winemakers and winery production personnel, at the Fresno State Winery. For details, call 559-278-2089.

OCTOBER 04

CIMIS

California Irrigation Management Information System

Study under way to reevaluate net radiation (Rn) estimation

There are many empirical and analytical equations for calculating reference evapotranspiration (ETo) from measured weather parameters. CIMIS has been using the Modified Penman equation. For the benefit of interested users, CIMIS started using the Penman-Monteith equation and is currently reporting values calculated by the two equations. Although both equations were derived from the original Penman equation, there are differences in the way some of the intermediate variables such as Rn are estimated.

CIMIS recently conducted a study that compared ETo and Rn estimated by the two methods. Results from the study have shown that there are no significant differences between ETo values estimated by the two methods. There were, however, differences between Rn estimates, especially toward higher values. Since there was no measured Rn at the time, it was recommended that CIMIS purchase new equipment to measure Rn and conduct further studies. Accordingly, CIMIS purchased one CNR1 and five NR-Lite net radiometers and installed them near the CIMIS weather station in Davis, California.

Visit the CIMIS home page at

http://www.cimis.water.ca.gov

The Kipp and Zonen CNR1 net radiometer has two upward facing and two downward facing sensors. The upward facing sensors measure incoming solar and far infrared radiation, whereas the downward facing sensors measure outgoing (reflected and emitted) radiation. Unlike CNR1, NR-Lite does not have separate sensors for measuring the shortwave and longwave components. Hence, it measures the solar and far infrared balance (Rn) at the surface. Although the accuracy of Rn measured by NR-Lite is good for most applications, it is generally accepted to be less accurate compared to the CNR1.

All sensors used have a 180-degree field of view and are mounted on a horizontal tube at approximately two meters above the surface.

The Rn data has been collected for over one month, and we intend to continue collecting for at least one year to incorporate the effects of seasonal variability. At the end of the study period, comparisons will be made between measured Rn from net radiometers and estimated Rn from the nearby CIMIS station. Also, Rn measured by the CNR1 and NR-Lite will be compared to evaluate the performance of the NR-Lite radiometers. The instruments will then be removed from the Davis site and installed next to other CIMIS stations for further studies.

For more CIMIS information...

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

For more information about CIMIS or its programs, contact any of the following representatives at these offices:

Northern District
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(818) 543-4652
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If you are unable to reach a CIMIS representative near you, call the CIMIS Helpline at 1-800-922-4647.

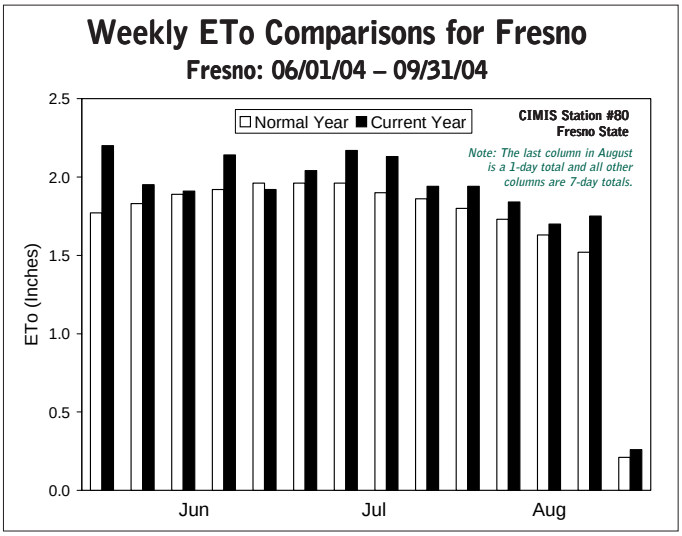


Chart shows ETo variation from normal over last three months.

Water: Data to be used in developing emissions factors

from Page 4

management (IFDM) system on the San Joaquin Valley's West Side. In that system, saline drainage water collected from an irrigation system is sprayed from sprinklers over an open area called an evaporator. As the spray is dispersed, the water evaporates and the salt crystals fall to the ground where they can be collected.

A potential problem for this system on the West Side is wind, Goodrich noted.

"What happens is, the wind swirls and catches the water drops. As the water evaporates, the salt crystals catch on the air currents and are carried away," he said.

To help determine salt dispersion factors for such systems, Goodrich and a team of technicians set out petri dishes in a grid pattern around one sprinkler. The placements extended to 180 meters distance from the sprinkler. The sprinkler was run, wind speeds were calculated, and water samples were collected from the petri dishes.

Careful recording of the amount of salt in each dish will enable system operators to predict the extent of salt deposition in a given area based on wind and other conditions.

Computer modeling has become a powerful tool in developing air emissions factors for a variety of industries, including the irrigation industry, Goodrich said. Government agencies such as the EPA use the compiled data to help develop emissions guidelines that help to protect our air and environment.

For more information on dairy emissions and the salt deposition study, Krauter may be contacted at charles_krauter@csufresno.edu.

CIT engineer Ed Norum checks readings on an irrigation controller used in developing a formal testing protocol for the Irrigation Association. At right is a controller face.

Protocol: Manufacturers can contact CIT for testing procedures

from Page 4

place want to test their products for efficiency and reliability.

"Testing will help us to see if the company has properly integrated climate system control variables to get a satisfactory response from the vegetation their system is irrigating," he said.

The testing protocol, developed by CIT for the Irrigation Association (IA), features computer-based software that tells whether a controller applies enough water to meet the needs of a virtual landscape.

Manufacturers have devised different methods for capturing and using weather data, Norum said. Some systems use historical climatological data to schedule irrigations. Some use on-site temperature or rainfall sensors. Others may use a nearby weather station to record and transmit data to a home site.

The IA recently announced the testing protocol is ready for use at CIT, so Norum anticipates inquiries by system manufacturers to begin soon.

For more information about control system testing, Norum may be contacted at CIT at 559-278-2066 or by email at edward_norum@csufresno.edu.

ARI/CATI on the Web!

The California State University Agricultural Research Initiative (ARI) oversees applied agricultural, agribusiness and natural resources research on behalf of California agriculture. For information on our research and project results, visit our website at **ari.calstate.edu**.

The California Agricultural Technology Institute (CATI) administers ARI funding and oversees additional applied agricultural research. For more information about CATI and its research centers, visit us at **cati.csufresno.edu**, or at our centers:

Center for Agricultural Business (CAB) – **cati.csufresno.edu/cab**
Center for Food Science and Nutrition Research (CFSNR) – **cati.csufresno.edu/cfsnr**
Center for Irrigation Technology (CIT) – **cati.csufresno.edu/cit**
Viticulture and Enology Research Center (VERC) – **cati.csufresno.edu/verc**
Agricultural Technology Information Network (ATI-Net) – **cati.csufresno.edu/atinet**

Sensory: Industry invited to request wine evaluations

from Page 5

yeast production company that wants to learn how different yeasts affect wine flavor. In just a few months of laboratory operation, the Sensory Panel has evaluated more than 70 wines altogether, Rodriguez said.

She hopes word will get out to the area industry about the VERC laboratory. Several commercial labs operate in Napa and Sonoma counties and in the Bay Area, she said, but she knows of no wine evaluation facilities in the San Joaquin Valley.

"With the wine industry growing the way it is, it will be important to have a laboratory that can serve the needs of this area," she said.

Panelists for the sensory lab include university employees and community members. Testing protocols can require one to two visits per week over several weeks. One tasting session can run from 15 to 45 minutes. Rodriguez plans to do additional screening for more volunteer panelists. She may be contacted at susanr@csufresno.edu for more information.

Team develops e-commerce model for confectionary products

A research team at California State University, Chico has developed an e-commerce business model for confectionary products in the agricultural market.

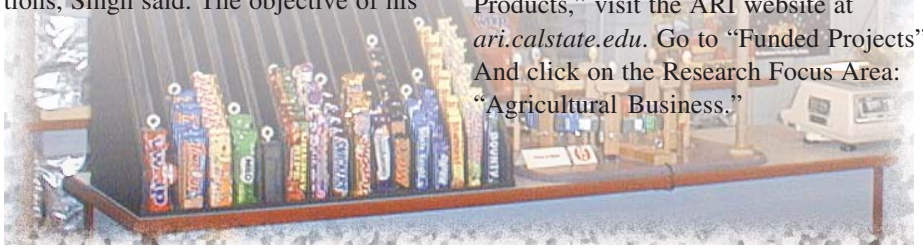
The local, regional, and global nature of the agricultural market makes it ideal for e-business, reported Lal Singh, professor of farm and agribusiness management for Chico's College of Agriculture. Several Internet websites already in existence provide an electronic marketplace for agricultural business, he said. These sites offer information as well as a place for buyers and sellers to exchange their products.

Because of the size and diversity of the confectionery agricultural products market, the Internet is an ideal host for business-to-business (B2B) transactions, Singh said. The objective of his project was to identify the best approach for expanding this market. This required an extensive review of literature and included surveys and focus groups to assess agribusiness practices and attitudes. A prototype e-business model was then developed for testing.

The project also found that more research is needed on security, credit, education, and training needs of agribusinesses.

Singh's study was supported in part by the California State University Agricultural Research Initiative (ARI), administered by the California Agricultural Technology Institute (CATI) at California State University, Fresno.

To view and/or obtain a complete copy of the final report for this project, titled "B2B e-Commerce Research for Confectionary and Agricultural Products," visit the ARI website at *ari.calstate.edu*. Go to "Funded Projects" And click on the Research Focus Area: "Agricultural Business."



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