

FALL 2005

# Update

California State University, Fresno

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## Processors aim to reduce water use

***University-industry team will study fruit processing systems, seeking to reduce water use, waste discharge***



major fruit processing company in the Fresno area is teaming with scientists from California State

University, Fresno in a research study aimed at reducing water use and wastewater discharge.

The project leaders believe the three-year effort will reveal new strategies that food processing companies everywhere can employ. The issue is especially important for California and the Central Valley, since agriculture and food processing are major water-use industries.

“Water is the most important and essential input to fruit and vegetable processing plants,” noted project director Gour Choudhury, professor of food science and director of the university’s Center for Food Science and Nutrition Research (CFSNR).

And while water input is critical to such systems, disposal issues could soon become the major impediment to growth for the Fresno area food processing industry, Choudhury noted.

As residential population continues to grow, urban as well as industrial runoff is increasing. Fresno city officials project that the region’s municipal wastewater treatment facility will reach its handling capacity of 80 million gallons per day within the next five



Left: Bill Smittcamp (in yellow shirt), president of Wawona Frozen Foods, leads CDFA and Fresno State research team on a tour of Clovis plant. Above: Project director Gour Choudhury (right in white shirt) explains research objectives.

years. Although a major expansion is planned for the facility, it is still years from completion.

Currently, a number of food processors in the Fresno/Clovis area send wastewater to the region’s treatment facility. The discharge comes from operations such as fruit washing, lye-bathing to remove skins, steam cooking, and equipment cleaning; it typically contains microorganisms, cleansing and bleaching agents, salts, suspended solids, soil particles and occasionally pesticide residues.

Based on his past work with food processing systems at both the university and industry levels, Choudhury believes food processing plants can reduce both water consumption and discharge.

As a first step in addressing the issue, Choudhury has developed a working relationship with industry leader Bill Smittcamp, president of Wawona Frozen

Foods and a member of the CFSNR advisory board. The pair’s discussions led to a successful research project proposal earlier this year.

“We will examine water use and quality of discharge from each unit operation of the [Wawona] fruit processing plant in an attempt to appropri-

*See Water, Page 2*





The Peterson Ranch, a 435-acre section of foothill rangeland managed by Cal Poly, San Luis Obispo, was the site of research on cattle grazing strategies.

# Foothill grazing discussed

## *California cattlemen gather to hear research reports, discuss strategies for preserving rangelands*

**S**cientific research on behalf of California's beef cattle industry has shown that the negative impacts of cattle grazing on native foothill and riparian areas can be significantly reduced by implementing specialized grazing management strategies.

These and other related findings have resulted from recent studies conducted with support from the California State University Agricultural Research Initiative (ARI) and the state's beef cattle industry. Reports have been made available at several venues, including California Polytechnic State University, San Luis Obispo, where more than 100 members and sponsors of the California Beef Cattle Improvement Association

gathered this summer for part of the organization's 2005 Central Coast Tour.

During the event participants visited several cattle ranches where ranchers and researchers discussed strategies for rangeland and grassland preservation. One of the speakers was Cal Poly animal science professor Michael Hall, who presented findings on the effects of cattle grazing near streams in foothill areas.

"Prior research has shown that domesticated animal grazing in riparian areas is a cause of non-point source water pollution," Hall said in explaining the impetus behind his research. For example, cattle grazing continually along stream banks churn up soils, drop fecal material and damage natural vegetation, all of which can contribute to the degra-

ation of water quality.

In an effort to identify grazing strategies that would reduce stream pollution, Hall established a natural laboratory on Cal Poly's Peterson Ranch, a 435-acre foothill area managed by the university. The research team divided the study area into six transects where cattle were grazed under different regimens. Impacts such as sediment loading and stream temperatures were monitored.

Results showed that strategies such as high-intensity, short-duration grazing can reduce negative impacts on streams, Hall reported. However, in order to gain such benefits, land managers must learn the characteristics of their land and actively implement selected strategies.

"California agriculturalists must assume a proactive role as land stewards and make a concentrated effort to improve water quality and sustainability on the farms and ranches they manage," he said.

Details of Hall's study, as well the work of others addressing beef cattle issues, is available on the ARI section of Cal Poly's College of Ag website under the names of professors Hall, Lynn E. Moody and Jonathon L. Beckett. The website is at [www.calpolyag.com](http://www.calpolyag.com).

## Water: Individual units will be studied

*from Page 1*

ately process and reuse some of the water, thereby reducing the overall wastewater discharge," Choudhury said.

The study will involve several phases: First, researchers will select a particular process and measure the amount of water used; then they will seek to determine the minimum quality of water required for each unit operation. In addition, they will analyze the characteristics of the water discharged.

Following lab analysis and new projections of water quality requirements, project engineers employed by

Wawona will explore equipment or process alterations that would both reduce water use and wastewater discharge.

Results will be made available at the conclusion of the study, Choudhury said. For more information, he may be contacted through the Department of Food Science and Nutrition at 559-278-2164.

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.

### Upcoming events

March. 17-19, 2006 – Central California Agricultural Biotechnology Conference at the Tenaya Lodge in Fish Camp, California. For details, call or email James Prince, Fresno State Biology Department, at 559-278-2559 or [jamespr@csufresno.edu](mailto:jamespr@csufresno.edu).

## Center for Agricultural Business

# Conference to address ag economics issues

*Internationally-known speakers will discuss effects of local, global events*

**S**pecialists in marketing, monetary policy, international trade and consumer purchasing trends will gather in Fresno, California next month to share their economic outlooks at the 24th Agribusiness Management Conference presented by the Center for Agricultural Business (CAB).

The annual event is set for Nov. 3 at the Radisson Hotel and Conference Center downtown. The conference in recent years has drawn more than 400 participants from across California to learn of the latest developments and trends in agriculture and agribusiness, both locally and globally.

According to Kimberly Naffziger, CAB program development specialist and one of the conference organizers, this year's presenters will offer an important blend of both regional and international information that agribusinesses will need as they prepare for the year(s) ahead.

"There are a lot of things going on in the world right now that are affecting



agricultural economics in California," stated Naffziger. "It is especially important to ag business companies to understand both the broad and the specific issues that are impacting their professions."

Conference luncheon speaker is economist and author Ken Beller, whose new book, "The Consistent Consumer: Predicting Future Behavior through Lasting Values," has drawn praise for its insights into factors that drive consumer purchasing decisions.

Beller is an accomplished international business leader, having worked in 20 countries across North America, Europe and Asia. During his career he has developed and implemented multicultural and cross-functional initiatives for some of the world's most prominent companies, including General Electric, Daimler Benz and NASA. He currently serves as president of Near Bridge Inc., a consulting firm he cofounded to aid businesses in strategic planning.

Leading the morning speakers is Steven Wood, president and chief economist for Insight Economics, a consulting firm focusing on macroeconomic and financial markets analysis. Prior to founding Insight Economics in 2003, Wood served as chief economist for FinancialOxygen Inc., where he earned a reputation as one of the top analysts and forecasters of U.S. economic conditions and monetary policy.

His conference-opening address is

*See Conference, Page 7*

## Upcoming events

Oct. 25 – Farm Labor Contractor Education Institute at the Piccadilly Inn Airport in Fresno. For details, call 559-278-4405.

Nov. 15 – Farm Labor Contractor Education Institute at the Hilton in Santa Rosa, California. For details, call 559-278-4405.

Nov. 16 – Ag Safety Alliance meeting at the Cropp Building, Napa County Fairgrounds, in Calistoga, California. For details, call 559-278-4405.

Jan. 31-Feb. 2, 2006 – Annual AgSafe Conference at the Embassy Suites Hotel & Conference Center in Seaside, California. For details, call 559-278-4405.

## Farm bureau to distribute safety video

**T**he California Farm Bureau Federation has joined with the Center for Agricultural Business (CAB) in a major effort to encourage safe driving practices among farmworkers.

The Farm Bureau is distributing copies of a new video titled "Drive Safely! Save Your Life and Theirs," produced by CAB and now available to interested persons and agencies. The video is one phase of a CAB educational program aimed at reducing farm worker injuries and fatalities resulting from motor vehicle crashes, according

to program development specialist Kimberly Naffziger.

The Farm Bureau plans to deliver the video and supporting materials to each of its 52 county directors and encourage them to make it available for viewing by local farmers' groups, farm labor contractors and others in the agricultural industry.

The video, presented in both Spanish and English, also may be previewed on the CAB website located at <http://cati.csufresno.edu/cab>.

For more information on the project or materials, call CAB at 559-278-4405.

## Center for Irrigation Technology

# Groundwater testing strategies

### *Soil specialists use multiple lysimeters to monitor underground water movement*

**S**oil scientists for the Center for Irrigation Technology (CIT) are testing new measuring methods in an effort to increase the accuracy of groundwater monitoring at an area wastewater treatment plant.

The project has been ongoing for several years and has featured a partnership between CIT and the City of Fresno Wastewater Treatment Facility, located several miles southwest of Fresno.

The facility treats up to 75 million gallons of wastewater delivered daily from the Fresno and Clovis areas through drainage systems and underground pipelines. Some of the wastewater, called stillage, is from area wine processors and requires special treat-



CIT research technician Diganta Adhikari (left) and Mohammad Moaddab, reclamation coordinator for the Fresno wastewater treatment plant, check lysimeters used to collect soil water samples.

were in the liquid discharge, including elements such as nitrogen, calcium and potassium, which provide important plant nutrients, Goorahoo said. However, these and other elements such as iron and manganese can also leach downward through the soil.

Traditional methods of checking groundwater for contaminants have included sampling from wells at depths of anywhere from 30 to 300 feet, Goorahoo noted. But that method does not measure soil conditions between the surface and groundwater tables.

the hydraulic loadings and application cycles of the stillage, Goorahoo said.

In a new phase of the experiment started this year, researchers have installed additional lysimeters in order to assess the ability of

selected forages to take up additional nutrients. CIT research database analyst Diganta Adhikari will use a geo-statistical software program to assess the spatial correlation of the elements in the soil. This information will give scientists additional useful data on soil chemical properties and percolation trends.

Research findings will be used in two ways – to propose organic and nitrogen loading rates that are protective of groundwater, and to recommend management strategies for land application of the winery stillage.

“This information is vital for the wine processing industry and the city’s wastewater treatment plant, as increasingly more strict discharge regulations are being implemented by regulatory agencies,” Goorahoo said.

For more information on this and related research, contact Goorahoo by email at [dgooraho@csufresno.edu](mailto:dgooraho@csufresno.edu).

***“This information is vital for the wine processing industry and the city’s wastewater treatment plant...”***

ment in order to prevent environmental pollution, said Dave Goorahoo, the CIT scientist who is overseeing the soil monitoring project.

One practice is to discharge the stillage over several land tracts, Goorahoo explained. Periodic discharges are rotated over different tracts, giving the water in each section a chance to percolate into the soil before stillage is applied again. Following each section’s drying, the remaining solid deposits, called “leathers,” are scraped up for use as fertilizer.

The leathers retain most of the organic and inorganic materials that

In an effort to better track elements moving through the soil, Goorahoo and fellow CIT scientist Florence Cassel S. have overseen installation of measuring devices called suction lysimeters in several stillage disposal tracts. The lysimeters collect soil solution samples at depths of two and four feet. By comparing the amounts of compounds in the water collected from different soil depths, researchers can determine at what rates the elements are being filtered out as the water percolates downward.

This phase of monitoring revealed that the levels of salts, solids and nitrogen in soils were closely related to

### Upcoming events

Oct. 26-27 – Agricultural Pumping Efficiency Program (APEP) 201 Seminar covering program eligibility, cost analysis, operating conditions, pump monitoring, maintenance, testing, well rehabilitation, irrigation scheduling, and installing and maintaining flow meters, at Durham Pump in Chico, California. Call 530-891-4821 for details.

## Viticulture and Enology Research Center

# Trials focus on new process for making golden raisins

**A** research team from Fresno State's Viticulture and Enology Research Center (VERC) is working with a private industry manufacturer to analyze the effects of a compound designed to produce golden "dried-on-the-vine" (DOV) raisins.

The term DOV stems from a relatively new technique "imported" from Australia and now being used by several grape growers in the San Joaquin Valley, reported VERC director and project coordinator Bob Wample in outlining the two-year study.

The DOV process features a wire trellis system crossing horizontally between the vine rows. When it is time to dry the grapes, the vines' canes are simply clipped and allowed to dry in place, along with the grape clusters. Once the grapes have dried to raisins, specialized harvesting equipment travels along the rows underneath the vines and harvests the raisins into bins. No trays are

Dried-on-the-vine raisins are shaken from vines by a custom harvester unit which travels underneath the vines and catches the raisins in bins.



required, and the raisins never come into contact with the ground.

Economic studies have shown that the system requires high initial startup costs, but once it is in place, labor costs and susceptibility to weather-related losses are greatly reduced.

In addition to producing traditional brown raisins, the DOV process lends itself to a special oil spray treatment that can shorten drying time and produce a "golden" raisin without the use of sulfur dioxide. VERC researchers have teamed with the Victorian Chemical Company and Wilber-Ellis Company to test the oil for uniform results and consumer acceptability of the product.

The oil spray is applied to the grapes while they are drying, reported

*See Raisins, Page 7*

## Pruning methods shown to help control *Eutypa*

**A** long-term study at a commercial California vineyard has shown that less pruning is a more effective method for preventing damage from *Eutypa* Dieback disease.

Conclusions after 13 years of treatment and observation are that "minimal" and machine pruning methods are most effective at preventing spread of the disease on grapevines, reported research scientist Sanliang Gu, who holds the Ricchiuti Chair of Viticulture Research at Fresno State's Viticulture and Enology Research Center (VERC).

The trials were begun in 1991 and completed last year by Gu. Treatments included mechanical pruning at bud swell, minimal pruning (trimming only in the summer), as well as conventional dormant pruning of vines trained on bilateral cordon and Sylvoz systems.

Pruning wounds are thought to be the main site of infection of the *Eutypa lata* fungus, which enters the vine's vascular system and causes necrosis or cankers of woody tissues. The pruning study confirmed that, as vines with the minimal and mechanical pruning methods showed the least dieback over the course of the trials.

Study details can be found in a report under the California State University Agricultural Research Initiative (ARI) titled, "Pruning methods show promise for controlling spread of *Eutypa* Dieback" (Project #00-2-020). It can be viewed on the ARI website, at <http://ari.calstate.edu>.

Technical details also are in a recent article authored by Gu in the *Journal of Horticultural Science & Biotechnology*. (2005) **80** (3).

For more information, contact Gu at VERC at 559-278-2089, or by email at [sanliang@csufresno.edu](mailto:sanliang@csufresno.edu).

## Upcoming events

Nov. 2 – American Vineyard Central Valley Grape Expo in Fresno. For more info, call 559-278-2089.

Nov. 17 – Le Vin Nouveau wine tasting to celebrate the release of Nouveau vintages, from 5:30 to 8:30 p.m. at the Fresno State Winery. Ticket sales limited. Call 559-278-2089.

Nov. TBD – Fresno State Viticulture Club 58th Annual Fall Harvest BBQ. Reservations required. For more info, call (559) 278-7151.

Dec. 7 – Filtration Day—a one-day workshop on filtration at the Fresno State Winery, sponsored by Pall Corp. For details, call 559-278-2089.

OCTOBER 05



# CIMIS

California  
Irrigation  
Management  
Information  
System

## Research on water use efficiency planned for vegetable crops

Scientists with the United States Department of Agriculture (USDA) have secured funding from the California Department of Water Resources (DWR) Proposition 50 program to conduct research on improving water use efficiency for some vegetable crops growing in San Joaquin valley.

The research will improve crop water requirements of vegetables, crop coefficients, and estimates of reference evapotranspiration (ET<sub>o</sub>) using the CIMIS network. It will be conducted at the University of California West Side Research and Extension Center (WSREC) located near Five Points, California.

The USDA Water Management Research Laboratory (WMRL) has operational weighing lysimeters that were installed in 2001-2002 using funds provided by the California State University Agricultural Research Initiative (ARI) and the U.S. Bureau of

Visit the CIMIS home page at  
<http://www.cimis.water.ca.gov>

Reclamation (USBR) in cooperation with the DWR and the CIMIS program. The current project will utilize facilities developed for previous studies at the WSREC and will build upon previous investigations.

Weighing lysimeters are continuously-weighed soil-filled steel containers used for growing crops. The change in mass measured as a weight change by the scales is equal to the water lost by evapotranspiration. Weighing lysimeters provide the most precise method to directly measure evapotranspiration of crops and are ideal for determining crop water use and developing crop coefficients.

Furrow, surface drip, and subsurface drip irrigation systems will be used

in this research. Water will be applied with each irrigation system at different amounts in order to determine the effect of application amount on crop yield and quality.

Four vegetable crops will be studied over a three-year period. They include garlic, pepper, onion, and lettuce, representing the major vegetable crops grown in the San Joaquin Valley. Tomatoes and melons were not chosen despite high harvested acreage of each crop because their crop coefficients and drip irrigation management practices have been well studied.

Project results will be presented at industry and scientific meetings and published in peer-reviewed journals. Pamphlets and fact sheets will also be published to provide information to growers on seasonal crop coefficients and best irrigation management practices for growing vegetables on the west side of the San Joaquin Valley.

## 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  
Jamie Dubay  
(530) 529-7367  
dubay@water.ca.gov

Central District  
Mark L. Anderson  
(916) 227-7603  
marcla@water.ca.gov

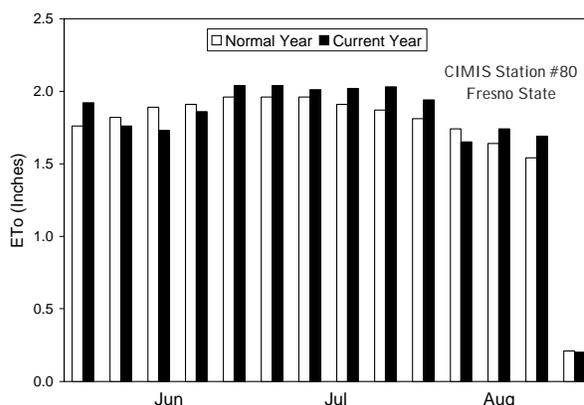
San Joaquin District  
Steve Ewert  
(559) 230-3334  
sewert@water.ca.gov

Southern District  
Sergio Fierro  
(818) 543-4652  
sergiof@water.ca.gov

If you are unable to reach a CIMIS representative near you, call the CIMIS Helpline at 1-800-922-4647.

### Weekly ET<sub>o</sub> Comparisons for Fresno

Fresno: 06/01/05 – 08/31/05



Note: The last column in August is a 1-day total and all other columns are 7-day totals.

Chart shows ET<sub>o</sub> variation from normal over last three months.

# Raisins: Trained sensory panels to test likeability

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VERC research scientist Susan Rodriguez, who is overseeing the sensory testing portion of the project. The oil facilitates evaporation of water through the grape skin and allows the grape to dry without browning.

Testing the raisins for “likeability” is a critical phase of the project, Rodriguez said. Golden raisins are often considered a higher-quality product. However, those produced by the new method will likely have a slightly different taste and texture than what consumers are used to, and their quality must be confirmed before any major marketing efforts are undertaken.

Sensory testing is being done using two methods: First, Rodriguez has contracted with a private company that will employ a panel of taste testers to do sensory evaluations using a descriptive analysis method. For a unique product such as golden raisins, evaluators will have to have special training, she said. Secondly, the golden raisins will be

tested for consumer acceptance. Shoppers in supermarkets, for example, will be asked to taste a small sample of the golden raisins and rate how much they like them on a 5-point scale. These responses will be compared to the ratings of “industry standard” raisins.

Project leaders also are considering new strategies to encourage children to eat the new golden raisins, Rodriguez said. They believe the dried fruit might gain higher acceptance from parents because no sulfur dioxide was used in processing.

Rodriguez expects to have analysis



Three treatments were used in developing golden raisins with dried-on-the-vine processing. The treatments included 1) No drying oil; 2) One drying oil application; and 3) Two applications.

by the sensory panel and consumer tests completed early next year. Results will be published as they become available. For more information on this and other viticulture research, call 559-278-2089 or visit the VERC website at <http://cati.csu.fresno.edu/verc>.

Funds for this project were 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 ARI program.

## 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 <http://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 <http://cati.csufresno.edu>, or at our centers:

Center for Agricultural Business (CAB) – <http://cati.csufresno.edu/cab>

Center for Food Science and Nutrition Research (CFSNR) – <http://cati.csufresno.edu/cfsnr>

Center for Irrigation Technology (CIT) – <http://cati.csufresno.edu/cit>

Viticulture and Enology Research Center (VERC) – <http://cati.csufresno.edu/verc>

Agricultural Technology Information Network (ATI-Net) – <http://www.atinet.org>

## Conference: Panel to address food safety

from Page 3

entitled, “The 2006 Economic Outlook: Bubbles, Imbalances, Conundrums and Hurricanes.”

Following Wood will be agribusiness economist Cornelius (Corny) Gallagher, senior vice president and agribusiness executive for Bank of America’s Commercial Banking team. From his California office, Gallagher leads a national team that manages the bank’s commercial banking agribusiness portfolio. He will address state issues, focusing on the “Driving Economic Forces for California Agriculture.”

Leading participants into the trade arena will be CAB director and economist Mechel Paggi. With an international background, Paggi has more recently focused on Pacific Rim trade issues and has attended trade summits in China. He will discuss the challenges and opportunities that China’s exponen-

tial economic growth poses for California agriculture.

A panel discussion of food safety and security issues will complete the morning sessions. Panelists representing a major grocery chain, an agricultural processor and the University of California will address issues such as product packaging and traceability.

For those who attend the conference, written commodity reports also will be provided. Commodities reported on will include wine and table grapes, raisins, tree fruit, almonds, walnuts, citrus, tomatoes, dairy, beef, cotton, and feed grains and protein meals.

The event will conclude following the luncheon. Registration fee is \$100 for registrations postmarked by Oct. 28.

For additional registration or conference information, call 559-278-4405 or visit the CAB website at <http://cati.csufresno.edu/cab>.

# “Touchless” process tested for olive harvest

**R**esearchers from California State University, Chico have developed a revolutionary new “touchless” olive harvester that works by blowing pulsed air at the olive tree canopy.

The team of faculty and student engineers, led by agricultural management professor Lal Singh, began their work last year under a contract with the California Olive Committee and with support from the California State University Agricultural Research Initiative (ARI). The goal was to develop a mechanized picker that would be more efficient and cost-effective than current industry-standard methods, which include hand-picking and some small vibration-type mechanical pickers.

Following unsuccessful tests of larger “comb” pickers, the team turned to the concept of “touchless” technology, Singh reported.

One design tested featured the use of sound waves emitted from large acoustic speaker chambers. After that also proved unsuccessful, the team speculated that pulsed air at high pressure or volume might remove the olives. The researchers designed, built and tested a simple, laboratory-scale pulsed air harvester, which proved successful, Singh said. A larger, field-scale machine operating

Chico professor Lal Singh (right) and engineering assistant show prototype olive harvester that uses pulsed air blasts to harvest olives.



from the power take-off of a tractor also displayed high fruit removal efficiency, and the quality of olives compared favorably with that of hand-picked olives, Singh reported.

The next project phase included design and construction of a full-sized prototype including a mobile platform to propel it through the orchard.

Singh said the new harvester does not create debris and does not appear to damage the trees; hence, it shows high

potential for harvesting olives commercially. Further design improvements are necessary and will be developed during continuing research, he added.

To view and/or obtain a complete copy of the research report for this project, titled “The Application of Emerging Technologies to Harvest Olives,” (ARI Proj. #03-8-011), visit the ARI website at <http://ari.calstate.edu> and search “Singh” projects.

Funds for this project were 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 ARI program.

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## Update

Update is published quarterly by the California Agricultural Technology Institute

College of Agricultural Sciences and Technology

California State University, Fresno  
Fall 2005

CATI Publication #051001

Voice number: (559) 278-2361

Fax number: (559) 278-4849

Director of Operations: Joe Bezerra

Publications Editor: Steve Olson

Assistant Publications Editor: John Norton

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