

Update

California State University, Fresno

In this issue...

- Biosolids on apricots 2
- Labor force still elusive 3
- Juice nitrogen measured 5
- CIMIS has a new plan 6

Mapping soil salinity

Field salinity distribution map will be created, used for precision farm management

Precision cotton farming featuring the use of soil salinity mapping is planned for an area in western Fresno County this spring, with support from the Center for Irrigation Technology (CIT).

The project is being conducted through a partnership between CIT and Cotton Inc., a nationwide cotton-farming corporation based in North Carolina.

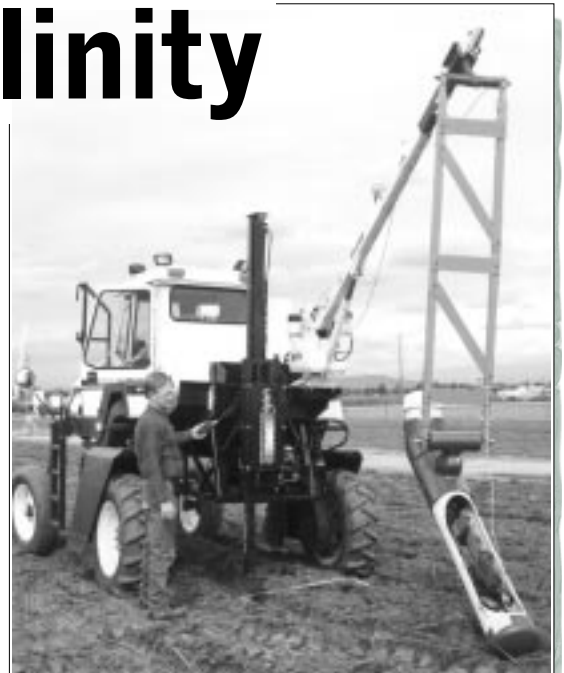
The work features a mapping process used for the first time in California's San Joaquin Valley, reported research scientist Florence Cassel Sharmasarkar, who is overseeing the CIT portion of the project. The process employs a measuring device attached to a tractor, enabling the soil salinity distribution of an entire field to be measured within a few hours.

"The West Side is known for its soil

salinity problems," Cassel said in outlining the reasons for the project. "Our objective is to map and monitor the soil salinity of two cotton fields. With this mechanized system, we can measure for soil salinity over a large area."

By locating specific areas of the field where soil salinity is high, farm managers can take corrective measures in those areas – such as planting more seed and adding gypsum to the soil – to enhance plant growth and production, Cassel noted.

Equipment used for the mapping project includes a dual-dipole EM-38 instrument manufactured by Geonics of Canada. The unit is about three feet long



CIT education specialist Tim Jacobsen controls custom-built hoist with EM-38 unit used for measuring field soil salinity.

and uses electric current to induce a magnetic field in the soil. The strength of the induced field is dependent upon several factors, including soil moisture, soil texture, and soil salinity.

See Mapping, Page 4

Lending institute targets finance professionals

The Center for Agricultural Business (CAB) has joined with a local agribusiness entity to offer a new program of specialized education and training to business and finance professionals.

It is called the California Agricultural Lending Institute (CALI). It will be held in Fresno, California the week of June 17-21.

The institute is designed to provide in-depth training for lending

professionals who grant and manage agricultural loans, reported James Casey, professor in Fresno State's Department of Agricultural Economics and one of the event organizers.

"The goal of CALI is to provide quality education preparing the participants to be informed and effective leaders in agricultural lending, to promote the success of their financial institutions, and to promote the growth

See Institute, Page 3



Study shows fruit matures later in orchard treated with biosolids

Agricultural use of wastewater treatment plant sludge (also called biosolids) in fertilizer applications provides environmental and economic benefits through the reuse of nutrients and organic matter. However, depending on the source and content of the biosolids, their application also can cause excessive accumulation of inorganic elements in the soil. As a means of determining specific effects of fertilization with biosolids on apricots, plant/soil scientist Gary Banuelos, with the U.S. Department of Agriculture's Water Management Research Laboratory, directed a study of trace element accumulation in an apricot orchard treated with biosolids. The research was supported by the USDA and the California State University Agricultural Research Initiative (ARI). Key results from the study are outlined in the following excerpts taken from the project final report, entitled "The Effect of Composted Biosolids on Fruit Quality and Trace Element Accumulation in Field-grown Apricots."

"Class A biosolids, the highest quality of treated sewage sludge, have been approved for application to agricultural farmland without site restrictions. In our study, composted biosolids were applied to apricots at four rates based upon total nitrogen: (control), 57, 170, and 340 kilograms of nitrogen per hectare. After seven years of biosolids application, levels of heavy metals in soil, plant, or fruit tissue were not significantly detected.

"Biosolids provided sufficient nitrogen (N) to apricot trees without any additional applications of N fertilizer. The significantly higher N concentrations of leaf tissue observed for the trees from the biosolids treatments suggested luxurious N consumption by the tree. Over time excessive N uptake may result in more vegetative growth, increased canopy cover, and may lead to excessive shading of the fruit. This occurrence may delay fruit ripening.

"Most significantly, our results show that composted biosolids significantly delay apricot fruit maturation of the Patterson variety. Fruits from the 170 and 340 kg N ha⁻¹ biosolids treatments

reached maturity later than did control fruits. More early-ripened fruits were collected from the 0 and 57 kg N ha⁻¹ biosolids treatments. By the end of the season fruits from all treatments ripened similarly. Excessive N applied by biosolids may have contributed to the delay in fruit maturity of apricots.

"Although a delay in fruit maturation did not affect overall fruit yields, it can impact a grower economically because early season fruit generally brings in a higher price. However, an extended growing season with the use of biosolids might be advantageous for bringing in a higher price at the end of the season when less fruits are available. Moreover, a staggered ripening of fruits could benefit small growers, who need to spread out their harvests due to equip-



Research scientist Gary Banuelos (far left) and graduate student Sajeemas Pasakdee evaluate foliage samples from trees treated with biosolids.



ment or market constraints.

"After seven years of the study, biosolids-amended soil contained significantly higher organic matter, which enhances soil quality and soil fertility. Although soil salinity increased, no negative effect on fruit quality and production was observed at this time. Salinity levels may increase at deeper depth over time and eventually affect tree growth and development without salt management strategies."

The complete final report for this project is available through the California Agricultural Technology Institute (CATI) and may be viewed on the ARI website at ari.calstate.edu. For more information, Banuelos may be contacted at 559-596-2881.

Center for Agricultural Business

Farm labor force remains difficult to define

Immigrant farm laborers in California continue to comprise one of the most important yet undefined segments of the state's work force, according to a report recently completed by researchers for the Center for Agricultural Business (CAB).

Farm workers play a critical role in the state's economy by supplying hand labor for virtually all of the state's agriculture production. However, the population and other details of this powerful labor force remain cloudy because of several factors – a key one being many workers' undocumented status, notes research director Andrew Alvarado, professor at Fresno State and senior research associate of the Center for Agricultural Business.

Alvarado's survey of some 300 farm workers last year was conducted as part of an effort to obtain information for use by state agencies such as the Employment Development Department (EDD) and others who offer services and support to workers.

Since the farm labor force has always been one of the most difficult groups to learn about through employer records, Alvarado sent survey teams to

farms, fields and labor camps to personally interview workers.

The survey teams found that, despite increased interdiction along the U.S.-Mexican border by the U.S. Immigration and Naturalization Service, thousands of immigrants enter the country illegally each year in search of employment, paying a usual fee of \$2,000 per person to "coyotes" to smuggle them across the border. The survey teams also found that, despite federal laws requiring legal resident status, workers continue to gain employment without the proper documentation.

"A major factor leading to inaccurate enumeration of the work force is the undocumented status of the majority of those employed in the region," notes Alvarado in his report titled "The Central San Joaquin Valley Farm Labor Work Force – 2001."

Other factors hindering agencies seeking information include the "fluidity of the work force"; that is, workers often shift from one farm site to another within a week or even daily, performing different tasks in different crops for different farm owners. In addition, the majority of farm workers interviewed indicated they work for farm labor contractors who often move workers from job to job.

The closest estimate the EDD can make of the farm labor population is between 100,000 and 200,000, with the figure rising to slightly more than 200,000 in peak summer harvest months and falling to about 100,000 during the winter months, Alvarado noted.

The survey teams learned that most who come to work are planning to stay in the United States permanently. Only 15 percent said they intend to return to their country of origin.

See Labor, Page 8

Institute: Two-year program envisioned

from Page 1

of agriculture in California and the nation," Casey said of the program.

Joining CAB and the Agricultural Economics Department to sponsor the institute is the San Joaquin Valley Ag Lenders Society, a professional organization that supports professionals in agricultural lending and finance.

CALI is designed to be a two-year program, Casey explained. The first-year sessions will focus on the loan process and those agencies and institutions that provide cooperative services to lending institutions. The instructional segment is to begin Monday, June 17; on the evening of June 16 a welcome dinner will be held at the residence of Fresno State President John Welty.

The second-year sessions, set for next summer, will focus on maintaining and servicing loans, with a special

emphasis on problem loans. Each of the two resident sections will be competency-based, with the participants assigned problems and exercises to be completed and submitted to the faculty as a portfolio at the end of the session, Casey said.

Successful program participants will be awarded a certificate of completion from California State University, Fresno and a certificate of accreditation from the San Joaquin Valley Ag Lenders.

"The institute has arranged for a distinguished faculty with expertise in all areas of the lending process," Casey said. Faculty include senior professional lenders, university faculty in agricultural finance, and ag lending professionals.

Cost to attend the first-year program is \$1,500. For registration details or a flier, call (559) 278-4405 or visit the CAB website at cati.csufresno.edu/cab. Seating is limited; registration deadline is June 1.

Upcoming events

April 26 – The Third Annual Central Coast Winegrape Labor and Employment Law Symposium at the Paso Robles Golf Club in Paso Robles, California. For details, call (559) 278-4405.

April 29 – Agricultural Safety Resource Alliance Napa Breakfast Meeting, in Calistoga, California. For details, call (707) 942-5111.

May 9 – Fifth Annual Agricultural Labor and Employment Summit, at Harris Ranch in Coalinga, California. For more information, call (559) 278-4405.

June 12 – AgSafety Breakfast Meeting, Fresno, California. For more info, call (559) 278-4405.

Center for Irrigation Technology

Mapping: Process requires calibration for each field site

from Page 1

Once the unit is calibrated with actual field soil data determined by laboratory analysis, it can provide salinity measurements through readings taken from above the soil surface.

A CIT design team led by consulting engineer Ed Norum constructed a hoist and sledge for dragging the EM unit behind a tractor.

To map soil salinity distribution, the EM-38 unit is dragged back and forth across the field. As the unit moves along the ground, it takes conductivity readings which are entered into an on-board computer every few seconds. Database software and geographical positioning instruments on the tractor interact in recording the data.



(Above) CIT's Florence Cassel Sharmasarkar shows on-board computer used in tractor for soil salinity mapping. (Right) Sledge being dragged behind tractor.

Soil samples are then taken from 12 field locations to calibrate the data recorded by the EM unit. The data are combined to create a salinity distribution map the farm manager can use for soil and/or crop treatments in specific areas.

"The goal is to see uniform yield, in spite of soil salinity," Cassel said.

Additional soil salinity mapping is planned for other areas of the West Side through a grant from the CalFed program, a partnership between California and federal water agencies aimed at solving water and drainage problems.

The mapping project will measure soil salinity in different areas following crop irrigation treatments with various combinations of fresh canal and drainage water.

Irrigation topics to be addressed in summer sessions

Workshops addressing irrigation, chemigation and pump design will be offered to farm and irrigation system managers this spring and summer at the Edison AgTAC in Tulare, California.

The seminars are hosted by the Center for Irrigation Technology (CIT), include a continental breakfast and are offered free of charge. For more information call Tim Jacobsen at (559) 278-5752. To preregister, call AgTAC at 800-772-4822. Workshops are as follows:

May 14 – Introduction to Drip-Micro Irrigation System Design, from 8 to 10:30 a.m. Workshop presenter Perry Contente of Toro Irrigation will discuss head works component design and selection, infield component design and selection, understanding manufacturers' technical literature, optimizing factors affecting system design, and chemical injection.

June 11 – Complying with Chemigation Legal Requirements, from 8 a.m. to noon. Presenters Tim Jacobsen and Ed Norum of CIT will discuss chemigation practices, wellhead protection, label language, mandatory rules and regulations, hardware specifications, and enforcement. Includes lunch.

July 9 – Introduction to Well and Deep Well Turbine Pump Design, from 8 a.m. to 3 p.m. Presenters from several companies will address well specifications, construction techniques, development and rehabilitation, sand control, and rebate programs for efficiency improvement. Includes lunch.

Task force to address chemigation issues

Industry leaders overseeing the manufacture of irrigation equipment and agricultural chemicals have been invited to join farm managers and representatives of state government and educational institutes on a task force to help develop policies and standards for chemigation in California agriculture.

This task force is being coordinated by the Center for Irrigation Technology (CIT) in cooperation with California's Department of Pesticide Regulation

(DPR), which is charged with protecting the state's water supply from pesticide contamination. The DPR has commissioned a task force to help develop policies and standards regulating the use of chemigation equipment and pesticides.

"The overall program is aimed at protecting the environment from chemical degradation in a manner that is sensitive to other agricultural issues," stated Ed Norum, consulting engineer for

See *Task Force*, Page 7

Viticulture and Enology Research Center

Methods tested for measuring juice nitrogen

Researchers compare Formol, other methods in effort to provide more options to winemakers

Increased international production and marketing of wine and grape products have raised the quality level required for California wine producers to successfully market their products.

In an effort to help state winemakers avoid getting “stuck” with lower-quality wines, Fresno State chemistry professor Barry Gump is leading a research effort to provide more accurate methods for measuring nitrogen content of grape juice.

Nitrogen is a key element necessary for successful fermentation, and it is present in grape juice in many types of molecules, Gump noted. However,

“It is important for these winemakers to have valid analytical procedures...”

only certain molecules readily release nitrogen in a way it can be consumed by the yeast during winemaking; therefore, a key to successful winemaking is accurately determining the amount of assimilable nitrogen in the juice prior to fermentation.

“It is important for these winemakers to have valid analytical procedures, as well as knowledge of how and when to apply these procedures to better monitor the production of their wines,” Gump said. “Stuck or sluggish fermentation can produce substantially inferior wines, in addition to compromising processing efficiency.”

A “stuck” fermentation occurs when there is not enough assimilable nitrogen



Enology student Karina Nuffer conducts a titration procedure with assistance from graduate student Jeremy Weintraub (center) and chemistry professor Barry Gump.

for the yeast to consume, and the fermentation process halts before all the sugars are properly converted to alcohol.

In collaboration with researchers from Cal Poly, San Luis Obispo and Virginia Tech University, Gump is analyzing four methods to determine which are most consistent and accurate for measuring nitrogen “nutrition” of grape juice. The four methods include Formol titration, two spectrophotometric methods, and a high-performance liquid chromatography method.

The Formol method already is used extensively but is being analyzed to determine correlation with other methods, Gump said. Each method requires its own specialized equipment and training. Development of additional methods besides Formol would provide winemakers with more options.

“There are labs where the range of equipment varies. We want to find multiple ways of doing analysis so that winemakers can function in whatever lab they find themselves,” Gump said.

Another phase of the project is analyzing management practices of the vineyards from which the grape samples were harvested. That will help researchers to determine correlations between vineyard management and juice nitrogen.

Laboratory studies so far have

indicated that the Formol and spectrophotometric methods are the most consistent and reliable for measuring nitrogen nutrition. Gump and his colleagues have presented preliminary results at several conferences and will continue the work during the coming year. For more information on the project, Gump may be contacted through Fresno State’s Department of Chemistry at (559) 278-2103.

Project funding was provided by the CSU Agricultural Research Initiative, the Virginia Wineries Association and the American Vineyard Foundation.

Upcoming events

April 26 – Sulfur Best Management Practices and Reduced-Risk Weed Management Workshop, at California State University, Fresno. For more info: (559) 278-2089.

May 6-8 – Barrel and Barrel Alternatives Symposium at California State University, Fresno. For more info: (559) 278-2089.

June 2 – 20th Annual Celebration of Wine: In Honor of the California Grape, at the Coombs’ Riverbend Ranch in Madera, California. For tickets: (559) 244-5741.

June 26-28 – American Society for Enology and Viticulture Annual Meeting, and Fresno State Viticulture and Enology Alumni and Friends Reunion, in Portland, Oregon. For reunion details, call (559)-278-2089.

APRIL 2002



CIMIS

California
Irrigation
Management
Information
System

"Non-ideal" weather station site studies planned

CIMIS is in preparation to conduct several "non-ideal" site studies during the year 2002/2003. "Non-ideal" sites are weather station sites that do not conform to the basic definitions and requirements of reference evapotranspiration (ET_o). ET_o is the amount of water that is lost to the atmosphere by the combined processes of evaporation from the soil and plant surfaces and transpiration from standardized vegetation surfaces (grass or alfalfa). The standardized vegetation surface for CIMIS stations is grass.

Standardization of surfaces on which weather stations sit requires, among other things, that the surfaces be fully covered with well watered, actively growing vegetation. CIMIS has adopted these standards and developed the following major criteria in selecting sites for its stations:

- A station should be sited within the region it is meant to represent.
- A station should not be located in a

Visit the CIMIS home page at the following address:
www.cimis.water.ca.gov

transition area between different climates.

- Avoid topographic depressions and high points.
- Avoid wind obstructions within 100 yards, abrupt crop/vegetation changes within 50 yards, roads within 50 yards, small rivers within 100 yards, larger rivers within 200 yards, and lakes within 1,000 yards of the site.

Unfortunately, many areas of the state, especially urban areas, do not have such "ideal" sites. It has been common practice for such areas to use data either from the closest CIMIS station or from "non-ideal" sites within the area. Using data from the closest CIMIS station is likely to result in errors because of differences in microclimates. On the other hand, using data from "non-ideal" sites within the same microclimate is

also likely to result in errors because of differences in surface conditions.

CIMIS is planning to conduct a statewide study to investigate the possibility of installing stations in "non-ideal" environments and converting the collected data into an equivalent "ideal" condition. This would be achieved by setting up paired "ideal" and "non-ideal" stations in a given study area and correlating the data.

A preliminary technical advisory committee representing different regions of the state has been formed. The committee met twice in March and will continue meeting regularly during the study period. The advisory committee will be dynamic in that its membership will change as investigation proceeds. CIMIS welcomes any one interested in participating in this study and encourages those interested to contact Kent Frame at (916) 651-7030 or Bekele Temesgen at (916) 651-9679.

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
pixley@water.ca.gov

Central District
Mark Rivera
(916) 651-7029
mrivera@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 ETo Comparisons for Fresno Fresno: 12/01/01- 02/28/02

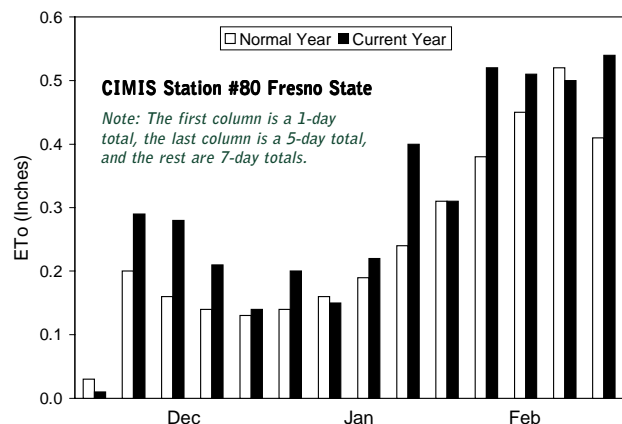


Chart shows ETo variation from normal over last three months.

Task force: Report to go to state DPR for consideration

from Page 4

CIT and cochair of the task force along with CIT Director David Zoldoske. The task force will produce a document for the DPR that proposes specific actions that will help form the basis for the DPR's future program and activities, Norum said.

Chemigation, the injection of agricultural chemicals into water as it is being delivered to fields or crops, is an approved method of pesticide application for nearly one-third of all registered active ingredients in California, Norum said. The potential risk of chemical injection is backflow of contaminated water into wells.

When a pumping system shuts off, vacuum pressure can pull treated water back into the ground or other water source. DPR regulations require a backflow prevention device on all chemigation systems. However, since chemigation is a relatively new technology, many farm managers, as well as regulatory officials, are unfamiliar with the different types of equipment.

CIT already has provided training to regulatory officials on the use of required safety devices and acceptable alternatives for chemigation systems, Norum noted.

"We are now turning our efforts to raise the regulated community's awareness of the instructions on pesticide labels regarding backflow prevention," he said.

Norum said the goal of the task force is to have its report to the DPR by the end of summer.

For more information on task force activities, contact Norum at CIT at (559) 278-2066, or at edward_norum@csufresno.edu.

Researchers complete reports on eutypa and 2,4-D projects

Two new CATI reports outlining methods of controlling fungal disease on plants and pesticide impacts on soil are now available for ordering, viewing or downloading through the California Agricultural Technology Institute (CATI).

The reports provide the latest information gained through research supported by the California State University Agricultural Research Initiative (ARI).

The Eutypa study was directed by research scientist Sanliang Gu, who holds the Ricchiuti Chair of Viticulture Research at Fresno State's Viticulture and Enology Research Center (VERC). Eutypa dieback is a fungal disease that attacks grapevines in growing regions all over the world. It has recently been diagnosed in vineyards in California's San Joaquin Valley.

Gu has determined from his study that Eutypa appears to be preventable through the use of modified pruning methods. The full report on this study, including details of treatments and results, is available on the ARI website at ari.calstate.edu. It is titled "Influence of Training Systems, Pruning Practices, and Soil Types on Eutypa Dieback Incidence and Severity, Viticultural Performance, and Wine Quality in

Cabernet Sauvignon Grapevines."

Printed summary reports also are available from CATI. For more information on this study, Gu may be contacted through VERC at (559) 278-2089.

In another project, Fresno State biology professor Alice Wright has completed the first phase of a study on the response of soil microorganisms to years of applications of the pesticide 2,4-D.

Many microorganisms are able to metabolize 2,4-D. However, widespread use of the chemical over many years has resulted in its buildup in soils in some areas, threatening to contaminate groundwater.

Wright is using cloning techniques to replicate sections of genes in the bacteria *Ralstonia eutropha* and is observing the response to different stimuli. Her goal is to prompt the bacteria to respond to smaller amounts of 2,4-D more quickly, and to consume more than they normally do.

Wright's first-year report is available for viewing and/or downloading from the ARI website. A printed summary report also is available through CATI. The project report is titled, "Cross Regulation of 2,4-D Pathways in Soil Microorganisms." For more information Wright may be contacted through the Biology Department at (559) 278-2001.

Publications available

Update:
Spring 2002

(These publications may be viewed in their entirety on CATI's World Wide Web pages, located at cati.csufresno.edu. Single copies are also available by mail at no charge.)

r The Central San Joaquin Valley Farm Labor Work Force – 2001,
by Andrew Alvarado. Pub. #020302.

Ordering Information:

Check the publication(s) desired
and mail or fax form to:

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California State University, Fresno
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Fresno, CA 93740-8009
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Labor: Trend indicates fewer workers may come

from Page 3

Of those who do stay in the United States to work, the rate of income advancement is slow because of several factors – a key one being language.

More than 90 percent of surveyed workers were born in Mexico, and 87 percent have a very limited understanding of English, Alvarado reported. And without command of the English language, it is difficult to move into jobs outside farm work.

However, there are skill levels within the farm labor arena through which workers move, Alvarado added. For example, many younger immigrants first find jobs picking stone fruits such as peaches or nectarines, for which they are paid hourly.

Those with more experience often move into commodities such as citrus or the table grape harvest, where their skill enables them to earn more through piece-rate compensation.

The majority of farm workers (63 percent) reported living in single-family homes, mostly rented, and often with other families in the same house. Another 25 percent reported living in apartments, and nine percent in trailer homes. Only two percent reported living in government-subsidized housing, and fewer than one percent said they lived in

farm sheds or motels.

When the primarily young, male immigrants come to the United States to seek work, it is usually through contacts with friends or relatives already here. After they find a job, nearly two-thirds depend on someone else for transportation to and from the work site. They pay an average of \$5 per day for a ride in a vehicle that carries an average of seven workers. Nearly all riders indicated they “always” or “almost always” use seat belts.

visited a doctor in the United States.

According to Alvarado, interviews with farm labor contractors indicated that the size of the labor force decreased in 2001. Increased patrol by border agents and high “coyote” fees may have made the border crossing more prohibiting.

If this is the start of a trend, it is probable that the farm labor force will diminish within a decade or less, Alvarado said. Apparently that has not concerned growers, at least not yet, he noted. Data from California's Department of Food and Agriculture show continued

Increased patrol by border agents and high “coyote” fees have likely made the border crossing more prohibiting.

Primary health care for farm workers is virtually nonexistent, for two reasons, Alvarado noted: the nearly complete absence of employer-provided health insurance, and the undocumented status of the majority of the workers that makes them ineligible for government supported health care.

Nevertheless, nearly half the workers surveyed indicated they had

increases in plantings of the most labor intensive crops, including citrus, table and wine grapes, and peaches.

Copies of Alvarado's report are available from the California Agricultural Technology Institute. See the publications order form on Page 7 to request a copy, or visit the CAB research publications directory on the CAB website, located at cati.csufresno.edu/cab.

In the event of incorrect address information or extra copies to your workplace, please return this address label by mail or fax with your requested changes. CATI fax number is (559) 278-4849.

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