

*Agricultural Ergonomics Research Center  
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**Special Interest  
Articles:**

- Grape Moving Machine in Vineyards for Harvest
- Preliminary Observations on Cal OSHA Ergonomics Standard Implementation Project
- Smaller Tubs Recommended for Hand Harvest

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## AERC GRAPE MOVING MACHINE IN FIELD

The AERC's new prototype machine for moving filled tubs from the vineyard during winegrape harvest is ready for field trials with cooperating winegrape vineyard companies in Napa and Sonoma counties throughout the 2001 harvest.

Professor John Miles, Biological and Agricultural Engineering department at UCD, says that the machine is much improved over the prototype demonstrated last year. Improvements

include continuous tub pickup, an automatic tub dumper, and improved tub redistribution. The machine automatically picks up filled tubs in hand harvest operations, relieving workers from having to lift, carry and

dump full tubs. The objectives are to help prevent costly harvest back injuries and to improve worker efficiency at the same time. The project is supported by NIOSH grant CDC/NIOSH U06 CCU912911



## CAL OSHA ERGO REG IN AGRICULTURE

For the past three years Center investigators have been conducting a study of implementation of the CAL OSHA Ergonomics rule in various agricultural settings.

The objectives are to develop "best practices" implementation materials for agriculture and to evaluate the rule's effect on worker risk factor exposures.

Project leader Jim Meyers recently presented preliminary descriptive findings at the National

Institute for Farm Safety in Pittsburgh. Among his key points were:

- 1) Responsive employers will make positive good faith efforts to comply with the intent of the rule.
- 2) There are no commercially available technologies to remediate most agricultural ergonomics hazards.
- 3) Low profit and operating margins in many Ag operations inhibit effective

response.

- 4) External consultation, especially in engineering, seems to be important to effective compliance.
- 5) It is not yet clear that effective compliance with the rule will result in significant reduction of RMI's in Ag workplaces.

A final report on the project is expected early in 2002. The project was supported by NIOSH grant PHS-CCU912911.

## REDUCING BACK INJURY IN WINEGRAPE HARVEST




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*"We observed a five-fold decrease in worker back pain and symptoms for back injury for workers using the smaller tubs"*  
Dr. Julia Faucett  
UCSF



Hand harvest is the most physically demanding job in winegrape vineyard work. It is associated with high risk for and incidence of back injuries.

The UC AERC and its Napa and Sonoma cooperators recently completed a project supported by NIOSH (CDC/NIOSH, U06 CCU912911) which found that use of smaller picking tubs significantly reduced risk for back injury.

Harvest work was monitored with four cooperating vineyard employers during three harvests in Napa and Sonoma counties. Among the findings was that filled standard-sized pans weighed an average of 57 pounds across varieties and vineyards. Some pans were weighed in at over 80 pounds!

Workers must stoop, grip, lift, carry and dump up to twenty times per hour. The research team evaluated the use of smaller picking pans during the 1998 and 1999 seasons with three cooperating vineyard employers.

The results were startling according to Dr. Julia Faucett. "When we compared worker symptom survey results using the smaller pan to those using the larger pan we observed a five-fold decrease in pain and

symptoms. This is a very large preventive result given the relatively small difference in weight loads."

The small pan the UC team used was a LEWISystems SN2414-8 stack/nest tub. It is made by Menasha Corporation of Watertown, Wisconsin (800-558-9563). The cost was about \$13 each. The smaller pan has 13% less volume and is 3 pounds lighter than the larger pan when empty. When full, the average weight of the small pan was 46 pounds compared to 57 pounds for the large pan. These were seasonal field weight averages across several grape varieties.

Workers fill the small pans in less time than the large pans. This means their lifting frequency is slightly greater. Workers using the small pan make more carries per hour to deliver the same tonnage as workers using the larger pan. However, there was actually a slight decrease in energy demand when using the smaller pans due to their lighter weight. This means workers are less tired throughout the day.

Researcher Ira Janowitz says, "The small pan reduced the lifting force required by 19% and sliding force was reduced 32%. The key factor, though, was reduction of the average load to under

50 pounds. We are finding that there are tremendous differences in the impact on the human spine from loads over or under the 50 pound mark."

An important factor when implementing a new practice is worker acceptance. Research Project Coordinator Diana Tejada says, "There's just no question about it. If you ask workers at the end of the season which pan they prefer, the smaller pan wins easily."

Smaller pans are better for workers and employers both. Eliminating just one back injury during harvest season can justify switching to smaller pans. At Domaine Chandon, they have done just that. According to viticulturist Dana Zaccone, "Participating in this research trial showed us the benefits of the smaller pan. Beginning with the 2001 harvest, all of our pickers will be using them."

More information on this project can be found by contacting the Agricultural Ergonomics Research Center at UC Davis - 530-754-8817 or at <http://ag-ergo.ucdavis.edu>.

## Dr. Fadi Fathallah Joins AERC Research Team

The AERC welcomed Dr. Fadi Fathallah as he joined them as Assistant Professor and Director, Occupational Biomechanics Laboratory, Dept. of Biological and Agricultural Engineering, University of California, Davis.

Dr. Fathallah brings an extensive research background on ergonomics, especially concerning instrumentation and the biomechanics of the back to the Center.

Dr. Fathallah received his Ph.D. from Ohio State

University working with Professor William Marras, developer of the Lumbar Motion Monitor used by AERC researchers.

Dr. Fathallah had worked most recently as a senior researcher for Liberty Mutual Insurance in their Massachusetts research laboratory.

Dr. Fathallah's research focuses on improving safety and productivity in the workplace by applying occupational biomechanics and remediating exposure to environmental hazards. His research interests

include the effects of the physical work environment on the musculoskeletal system of agricultural workers, the design of mechanical systems to prevent injury, evaluation of worker exposure to climatic and chemical hazards, and development of strategies to reduce these risks. As an AERC researcher, Fathallah will work with the public and the agricultural community to solve engineering problems related to occupational biomechanics.



Fadi Fathallah

## Role of Trellis Selection in Ergonomics Risk Factor Exposure

Reportedly the California winegrape vineyard industry is planting some 200,000 acres of winegrapes a year. One of the many decisions growers must make in planning new vineyards is the choice of trellis style.

Many factors are considered, but AERC researcher Fadi Fathallah is looking closely at the role of trellis selection in determining later ergonomics risk factor exposures for workers.

Injuries to the back and

upper extremities are among the most common and most costly in the winegrape industry. The trellis design selected at vineyard establishment constitutes the workstation that workers will face for the next 20 or more years.

Dr. Fathallah expects his research to help inform growers of the major differences between trellis types in terms of the ergonomics risk factors they will involve. Given the long-term costs of worker injury and related

worker's compensation insurance costs, the AERC team believes that growers will readily consider the project's findings as California continues to increase its winegrape vineyard acreage.

The project is sponsored by NIOSH grant CDC/NIOSH, R01 OH03906 and will run through 2003.

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*Trellis selection plays a major role in determining ergonomics risk factor exposures for workers over the productive life of the vineyard.*



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See us at:

<http://ag-ergo.ucdavis.edu>

## AERC Research Team Wins UC Award

The UC Division of Agriculture and Natural Resources recently honored AERC researchers with a Distinguished Service Award.

The award was presented to Dr. John Miles at a statewide meeting of Division faculty and staff.

The award specifically recognized the group for their exceptional teamwork in marshalling resources across three UC campuses and several different departments and disciplines.

The award also recognized the AERC's impact in bringing about

wider understanding of the nature and role of ergonomics in agricultural workplaces.



**The AERC Team**

## NIOSH Ergonomics Ideas for Agriculture

The National Institute for Occupational Safety and Health has just published a 46-page booklet that contains a number of inexpensive low-tech

solutions for common agricultural tasks that will both reduce strains and sprains as well as improve worker performance.

It's free. Call 1-800-356-4674 or e-mail [pubstaft@cdc.gov](mailto:pubstaft@cdc.gov) and ask for Simple Solutions: Ergonomics for Farm Workers, Pub. No. 2001-111.

## *About the AERC...*

The AERC is dedicated to development and evaluation of improved tools and work processes that make agricultural labor inputs more efficient and less vulnerable to risk

of musculoskeletal injury.

The AERC is completely dependent on external funding for its research and education programs. If you need information on

ergonomics in Ag workplaces or would like to participate in ongoing research, please contact us.

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