May 2008

UPDATE

San Joaquin Valley Agricultural Sciences Center

Inside this issue:

Special points of interest:

- Water Management Research Unit hosted partnership meeting at the SJVASC.
- Area-wide Program for the Control of Navel Orangeworm stakeholder meeting held April 2, 2008.

Introduction

Partnering between ARS and its stakeholders is important for ensuring effective use of the science and technology developed by ARS researchers. At the SJVASC, these partnerships augment research programs, help expedite transfer of research results to the private sector, facilitate exchange of information and knowledge, help enhance U.S. trade, and contribute to the preservation of the environment.

On February 19, 2008 the Water Management Research Unit (WMRU) hosted a partnership meeting organized by **Dong Wang**. The objectives of this meeting were to (1) update the WMRU's customers, stakeholders and supporters about current research; and (2) seek input regarding current and future research on water management and methyl bromide alternatives. Twenty-five individuals representing 19 organizations and companies participated in the meeting. This meeting highlighted one of the many resources available to SJVASC partners and provided an opportunity for the WMRU to receive input from partners regarding a wide range of current and future issues to be addressed by ARS research in Parlier.

Current Research Highlights

Water Management Research Unit

Jim Gerik, Brad Hanson, and **Dong Wang** of the WMRU are each leading a research project under the Area-wide Pest Management Program for Methyl Bromide Alternatives. Led by **Jim Gerik**, five field demonstration trials are underway with commercial flower growers to evaluate efficacy of reduced rates of alternative fumigants and fumigant combinations under LDPE and VIF films, and different applications at Moss Landing, Nipomo, Santa Maria, Soledad, and Carlsbad to produce gladiolus, calla lily and ranunculus, respectively, in the open field. **Brad Hanson** is conducting field experiments in a UC Kearney Ag Center field and two commercial nursery operations in Tulare and Kern counties.

Current Research Highlights (continued)

Water Management Research Unit continued—

Dong Wang is leading a grape replant field demonstration at the SJVASC involving seven treatments as methyl bromide alternatives for pre-plant soil fumigation. For both the nursery and grape projects, fumigant emissions, fumigant distribution in soil, control of plant parasitic nematodes, soil fungal and weed pests, crop establishment and productivity, and the economics of the system are being evaluated in this series of experiments.

Jim Gerik and **Dong Wang** initiated a project to evaluate potentials of using soil fumigant chemicals to control garlic white rot caused by fungal pathogen *Sclerotium cepivorum*. Garlic root samples are being collected from a commercial field infested with the pathogen and assayed to relate infection time to environmental parameters. Efficacy tests with fumigant chemicals will also be carried out in the laboratory this summer and in the field next fall.

Crop Diseases, Pests and Genetics Research Unit

Elaine Backus has identified feeding behaviors performed by the glassy-winged sharpshooter when its piercing-sucking mouthparts, the stylets, first pierce a xylem vessel. These behaviors allow the insect to evaluate suitability of the vessel for ingestion of fluids. Certain behaviors control fluid uptake into the anterior foregut of the insect, where there are taste buds and other structures around which the *Xylella fastidiosa* bacteria colonize. Other behaviors control brief expulsion of fluid from the foregut. Backus hypothesizes that such fluid expulsion injects (inoculates) the bacteria into a plant. Using an instrument called an Electrical Penetration Graph (EPG) monitor, behaviors are recorded in real-time to compare sharpshooter feeding behavior on different cultivars. The goals for this research are to identify mechanisms of *Xylella fastidiosa* acquisition and inoculation, and to develop a cultivar-screening tool for host plant resistance.

Jianchi Chen has established a collaborative research effort with scientists in China to survey huanglongbing (HLB)-affected citrus in southeastern China. Their results indicate that in addition to *Candidatus* Liberibacter asiaticus (the presumptive causal agent of HLB), a newly discovered phytoplasma related to *Candidatus* Phytoplasma asteri is frequently present in HLB symptomatic citrus.

Craig Ledbetter continues evaluation of almond selections for nut and kernel characteristics, and has initiated a research program for improvement of almond, almond-peach, and peach rootstocks.

Hong Lin and his team have developed an online resource for grape functional genomics (http://cropdisease.ars.usda.gov/vitis_at/main-page.htm). This database provides comprehensive information for ~320,000 gene expression data derived from 8 species/hybrids source of *V. vinifera* and non-*vinifera* grape species and varieties. The online database also provides several computational tools for biological data analysis.

Rodrigo Krugner has initiated research to measure population dynamics of the green sharpshooter vector in the San Joaquin Valley.

Mark Sisterson has investigated the role of alfalfa as a potential source of insect vectors/inocula for spread of *Xylella fastidiosa* to almond and grape. Current results indicate that alfalfa may serve as an important source of green sharpshooters vectors but may not be a significant source of *Xylella fastidiosa* inocula.

Current Research Highlights (continued)

Crop Diseases, Pests and Genetics Research Unit continued—

David Ramming continues breeding efforts to develop raisin and table grapes resistant to powdery mildew and Pierce's Disease. Advanced table and raisin powdery mildew resistant selections have been identified from over 2,000 seedlings and 38 of these have aborted seeds of commercially acceptable size. A seeded x seedless raisin family segregating for Pierce's disease resistance produced all seedless individuals and 10 Pierce's disease resistant individuals with small aborted seeds. The first powdery mildew and Pierce's disease resistance backcross 3 generations composed of 93% *Vitis vinifera* background for high fruit quality while maintaining resistance were made. These examples show fruit quality is being improved while keeping disease resistance.

Elizabeth Rogers joined the CDPGRU in January, 2008 and plans to develop a model host system to explore interactions with *Xylella fastidiosa* leading to pathogenesis.

Drake Stenger has identified a 25 kilobase pair (kpb) plasmid associated with mulberry-infecting strains of *Xylella fastidiosa*. Sequence analysis indicates that the 25 kpb plasmid encodes genes associated with horizontal transfer of DNA among bacteria.

Ray Yokomi has developed a real time polymerase chain reaction assay for strain differentiation of Citrus tristeza virus (CTV) and developed a multiplex real-time PCR assay for detection of citrus pathogens including CTV and *Spiroplasma citri*, the causal agent of citrus stubborn disease.

National Arid Land Plant Genetic Resources Unit

Allan Brown (NALPGRU) and **Brad Hanson** (WMRU) have received a $15,000 grant from the National Plant Germplasm System to characterize the Center's collections of Lesquerella and Limnanthes (oil seed Brassicas) for glucosinolate variability. Glucosinolates are precursors of isothiocynates and identifying sources of genetic variability within these collections could provide important resources for nematode and other plant pathogenic bio-control studies. The two year field study will be conducted on site.

Jinguo Hu has been named as the new research leader for the Western Regional Plant Introduction Center; Pullman, WA and assumed those responsibilities March 31st. He is expected to visit NALPGRU and the SJVAC in April. Dr Hu has most recently been associated with the Sunflower Research Unit, USDA-ARS, Fargo, ND. http://www.ag.ndsu.nodak.edu/plantsci/faculty/Hu.htm

Commodity Protection and Quality Research Unit

Victoria Yokoyama received new Trust Agreement funds from the California Olive Committee for research on a project titled, "Biological and Cultural Control of Olive Fruit Fly in California---Utilization of Parasitoids from USDA-APHIS-PPQ, Guatemala." She has begun collaborations with scientists from other ARS laboratories and the University of California to begin seasonal research on olive fruit fly and has a paper accepted for publication in Environmental Entomology titled, "Psyttalia cf. concolor for Biological Control of Olive Fruit Fly in California." **Victoria Yokoyama** has also begun collaborations with the National Hay Association to continue research on non-chemical methods to control Hessian fly in exported hay to develop new markets in Pacific Rim countries.

Current Research Highlights (continued)

Commodity Protection and Quality Research Unit continued—

On March 6, **David Obenland**, along with University of California collaborator, Dr. **Mary Lu Arpaia**, gave a day-long demonstration on the effect of different acidity levels on the taste of navel oranges at the California Citrus Mutual Annual Citrus Showcase. The demonstration was a companion to a panel discussion held at the Showcase regarding the potential need to change the maturity standard in California that governs when navel oranges are harvested in California. Obenland and Arpaia have had a Citrus Research Board-funded project over the last four years that is providing the citrus industry data to help decide whether a change in the maturity standard should be implemented.

Phenyl propionate as an attractant for monitoring navel orangeworm: An alternative to the egg traps currently used for monitoring navel orangeworm (NOW) in nut crops is desirable, both to improve sensitivity of detection until a stable pheromone lure is available and as an alternative for use in mating disruption plots. **Chuck Burks**, in a series of experiments, showed that phenyl propionate, released from a glass vial dispenser, was attractive to NOW adults of both sexes and, in some cases, captured as many moths as pheromone trap. The number of adults captured, however, was more variable compared to pheromone traps, and more phenyl propionate traps are required for reliable timing of cohorts. Phenyl propionate will aid research on control of NOW, and may be useful to pest managers as mating disruption is adopted.

Navel orangeworm mating disruption almond demonstration site: The first stakeholder meeting of the Area-wide Program for Control of Navel Orangeworm in almonds, pistachios, and walnuts met on April 2, 2008. All researchers who will be funded this year presented a synopsis of their proposed research to stakeholders and representatives of the National Program Staff and the Pacific West Area. Discussions were held to prioritize research goals as well as establish coordination. This five year program is a collaborative effort between researchers of the USDA, UC and UCCE. A group of researchers from the San Joaquin Valley Agricultural Sciences Center and various UC campuses was recently awarded a 5-year grant for area-wide control of navel orangeworm (NOW) in almonds, pistachios, and walnuts. As part of this project, a 1900-acre almond demonstration site involving multiple growers and pest control advisors was identified on the west side of Fresno County, near Mendota. Baseline data will be collected in 2008, and mating disruption treatments will be compared with a grower standard treatment in 2009 and 2010. Sanitation surveys were conducted in early February, monitoring with traps baited with virgin females began at bloom, and monitoring with an intensive grid of egg traps will begin shortly afterward. The resulting data, along with similar experiments continuing in Kern County, will provide improved guidance for monitoring and treatment for navel orangeworm in almonds over a wider range of conditions and varieties.

A new research chemist, **Spencer Walse**, joined the **Commodity Protections & Quality Research Unit** on April 14th. He will be conducting research on chemical alternatives to methyl bromide to protect postharvest commodities against pest infestation. His research will center on fumigants, plant volatiles and methyl bromide capture following fumigation.

Meetings, Conferences, Workshops & Visitors

Tom Turini of UCCE visited with **Jim Gerik** and **Dong Wang** on a collaborative project on garlic white rot.

Meetings, Conferences, Workshops & Visitors (continued)

Brad Hanson attended and presented at the CA and Western Weed Science Soc Meetings.

Suduan Gao attended the CA Soil and Plant Sciences Meeting in Visalia, CA.

Dong Wang participated in the CA Irrigation Institute 2008 Conference on water issues related to global warming.

Jim Leesch

- Traveled to the annual Walnut Marketing Board meeting on January 23, 2008 to make a proposal to conduct research on the feasibility of using ProFume as an alternative to methyl bromide on postharvest walnuts.
- Presented two presentations titled: Commodity Treatment, Handling and Efficacy of Target Pests" at the Fumigation Workshop for Export Commodities for growers and processors, sponsored by APHIS.

Joel Siegel

- Made two presentations on Navel orangeworm damage distribution throughout the state and development rate on early pistachios.
- On January 22, 2008 presented at the Stanislaus County Almond Day on factors that affect navel orangeworm damage of nonpareil almonds.
- January 31, 2008, spoke at the Madera County Almond day on orangeworm damage of nonpareil almonds.

On February 5, 2008 **Bas Kuenen** and **Joel Siegel** presented a talk at the Annual Meeting of the Association of Applied IPM ecologists in San Luis Obispo on navel orangeworm biology and management in almonds and pistachios.

Jim Ayars presented a talk "Water Requirement of Irrigated Garlic" at the CA Garlic and Onion Symposium 2008 in Tulare, CA on Feb 11, 2008.

Bob Beede and **Joel Siegel** gave a presentation on navel orangeworm damage and distribution at the Western Pistachio Association Conference in Santa Barbara on February 26, 2008.

David Ramming recently presented an update on his efforts to develop powdery mildew resistant grapes at the SJV California Table Grape Seminar, Visalia, CA., on February 27, 2008.

Craig Ledbetter presented research results on the development of seed-propagated peach-almond hybrids for use as almond rootstocks at the XIV GREMPA meeting on pistachios and almonds in Athens, Greece, 31 March—5 April.

Mark Sisterson presented research results on the role of alfalfa on epidemiology of xylellae diseases in the San Joaquin Valley of California at the Pacific Branch Meeting of the Entomological Society of America, Napa, CA, 30 March—2 April.

Elaine Backus presented research results on the transmission mechanism of *Xylella fastidiosa* by sharpshooter vectors and a model for quantification of vector efficiency at the Pacific Branch meeting of the Entomological Society of America, Napa, CA, March 30—April 2, 2008.

Bob Curtis and **Gabriele Ludwig** of CA Almond Board visited with **Water Management Research Unit** scientists on Feb 26, 2008 and discussed water management and soil fumigation research programs.

Recent Publications

Obenland, David M., Sue Collin, Jim Sievert, Kent Fjeld, Margo Toyota, Julie Doctor and Mary Lu Arpaia. 2008. Commercial packing and storage of navel oranges alters aroma volatiles and reduces flavor quality. Postharvest Biology and Technology 47(2):159-167.

Obenland, D.M., W.H. Vensel and W.J. Hurkman. 2008. Alterations in protein expression associated with the development of mealiness in peaches. Journal 83(1):85-93.

Slaughter, D.C, **D. Obenland**, J. F. Thompson, and M.L. Arpaia. 2008. Non-destructive freeze damage detection in oranges using machine vision and ultraviolet fluorescence. Postharvest Biology and Technology 48(3):341-346.

Bait formulations and longevity of navel orangeworm egg traps tested *by* **L.P.S. (Bas) Kuenen**, Walt Bentley, Heather C. Rowe *and* Brian Ribeiro http://californiaagriculture.ucop.edu/0801JFM/pdfs/ca06201p36.pdf

Postharvest survival of navel orangeworm assessed in pistachios by **Joel P. Siegel, L.P.S. (Bas) Kuenen**, Bradley S. Higbee, Patricia Noble, Richard Gill, Glen Y. Yokota, Rodrigo Krugner *and* Kent M. Daane http://californiaagriculture.ucop.edu/0801JFM/pdfs/ca06201p30.pdf

Gao, S., T. Trout, and S. Schneider. 2008. Evaluation of fumigation and surface seal methods on fumigant emissions in an orchard replant field. J. Environ Qual. 37: 369-377.

Trout, T., L. Johnson, and **J. Gartung**. 2008. Remote sensing of canopy cover in horticultural crops. HortScience 43: 333-337.

Wu, J., M. Bauer, **D. Wang**, and S.M. Manson. 2008. A comparison of illumination geometry-based methods for topographic correction of QuickBird images of an undulant area. *ISPRS J. Photogramm. Remote Sens.* 63: 223-236.

Deng, X., **Chen, J.,** Luo, Z., Feng, Z., Li, H., **Civerolo, E. L**. 2008. First report of graft-transmission and PCR detection of *Candidatus* Liberibacter asiaticus from *Atalantia buxifolia* in Guangdong, China. Plant Disease 92:314.

Doddapaneni H., **H. Lin**, M. A. Walker, J.Yao and **E.L. Civerolo**. 2008. VitisExpDB: A database resource for grape functional genomics, BMC Plant Biology available online at 8:23doi:10.1186/1471-2229-8-23.

Habibi, J., T. M. Coudron, **E. A. Backus**, S. L. Brandt, R. M. Wagner, M. K. Wright and J. E. Huesing. 2008. A histological study of the alimentary canal of *Lygus hesperus* (Heteroptera: Cimicomorpha: Miridae). Ann. Entomol. Soc. Am. 101(1): 159-171.

Ledbetter, C.A. 2008. Shell cracking strength in almond (Prunus dulcis [Mill.] D.A. Webb) and its implication in uses as a value-added product. Bioresource Technology (in press, available online 20 December 2007).

Ledbetter, C.A. and **M.S. Sisterson**. 2008. Advanced generation peach-almond hybrids as seedling rootstocks for almond: first year growth and potential pollenizers for hybrid seed production. Euphytica 160: 259 – 266.

Sandanayaka, W. R. M. and **E. A. Backus**. 2008. Quantitative comparison of stylet penetration behaviors of glassy-winged sharpshooter, *Homalodisca vitripennis*, on selected hosts. J. Econ. Entomol. Accepted 3/3/08, in press.

Saponari, M., Keremane, M., and **Yokomi, R.K.** 2008. Quantitative detection of Citrus tristeza virus (CTV) in citrus and aphids by real-time reverse transcription-PCR (TaqMan®). J. Virol. Meth. 147: 43-53.

Recent Publications (continued)

Sisterson, M. S., **J. Chen**, M. A. Viveros, **E. L. Civerolo, C., Ledbetter**, & R. L. Groves. 2008. Effects of almond leaf scorch disease on almond yield: implications for management. Plant Disease 92: 409-414.

Sisterson, M. S. 2008. Effects of insect vector preference for infected or healthy plants on spread of an insect vectored plant pathogen: insights from a model. Journal of Economic Entomology 101: 1-8.

News

Grants: A new project "Improved Prediction of Irrigation Water Use for California Crops from Remote Sensing" by **Dong Wang**, **Tom Trout**, and **Lee Johnson** was recently funded by the State of California Department of Water Resources.

Research Units and Contact Information