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UPDATE

San Joaquin Valley Agricultural Sciences Center

Inside this issue:

Special points of interest:

- Dr. Dong Wang—named WM Research Leader
- Dr. Bradley Hanson—mentor selectee for the PWA Summer Intern Program
- Allan Brown— to join the National Arid Land Plant Genetics Resources Unit

Introduction

During the last four years, there has been considerable turnover of the scientific staff of the SJVASC, including Research Leaders. With the recent arrival of **Dr. Dong Wang** as the new Research Leader of the Water Management Research Unit (WMRU), all of the Research Leaders are now in place. **Jim Ayars** served as Acting Research Leader of the WMRU for the past year since **Tom Trout** moved to Ft. Collins, CO. **Jim Leesch** assumed the Research Leadership of the Commodity Protection and Quality Research Unit (CPQRU) early last year, and **Drake Stenger** became the Research Leader of the Crop Diseases, Pests and Genetics Research Unit last fall.

Current Research Highlights

Crop Diseases, Pests and Genetics Research Unit

Two new grape varieties, Autumn King and Thomcord, recently released by **David Ramming**, may be available in supermarkets within two to three years. Autumn King is an attractive, amply-sized, white, seedless grape that is ready to harvest in late October and stays firm and sweet in cold storage making it available through late December. Thomcord, a hybrid between Concord and Thompson Seedless parents, is a blue-black, plump, sweet, mild, tasty, juicy, seedless grape that is well-suited for California's sunny vineyards.

Hong Lin has been using innovative molecular techniques to successfully obtain new DNA sequences from the citrus Huanglongbing (HLB) or greening disease bacterium, *Candidatus* Liberibacter (CL) species. Hong has identified and characterized more than 10,000 base pairs of genomic DNA from the Asian form of CL. These new sequences are now available in a publicly accessible GenBank. The technique that he has developed can be applied to other unculturable organisms for which available DNA sequences are limited. HLB-associated CL is a gram negative, unculturable, phloem-limited bacterium for which little genomic information is available. These genomic sequences provide new information that will aid development of more sensitive and more specific DNA-based detection tools for early, clinical diagnosis of CL infection to facilitate improved disease management strategies. Recent occurrence of HLB in Florida has dramatically increased threats to the entire US citrus industry.

Current Research Highlights (continued)

Raymond Yokomi is developing an improved diagnostic capability for citrus stubborn disease caused by *Spiroplasma citri*, a leafhopper transmitted, phloem-limited bacterium. Routine identification of the pathogen by culturing is labor intensive and requires two weeks to complete the assay. Dr. Yokomi has developed a reliable DNA-based assay for detection of *S. citri* from stubborn-affected field trees in 1-2 days using a polymerase chain reaction (PCR). Comparison of the two assays demonstrated that the PCR assay is as reliable as isolation and culturing of the pathogen yet costs significantly less per sample to implement.

Mark Sisterson has developed a simple model for the economics of rouging almond trees affected by almond leaf scorch disease (ALSD) to help growers determine if they should replace or keep infected trees. This model was used to evaluate conditions under which replanting infected trees would increase returns. ALSD has been present in California's almond growing regions for over 60 years. The disease is caused by *Xylella fastidiosa* and the pathogen is vectored by xylem feeding sharpshooters and spittlebugs. Currently there are no effective management techniques to prevent trees from becoming infected. Yields of ALSD-affected Sonora and Nonpareil trees were lower than those of unaffected trees for both cultivars. The model considers orchard age, the degree of yield loss due to infection, and the value of a maximally producing almond tree to determine when replacement of ALS-affected trees is warranted.

Commodity Protection and Quality Research Unit

In a collaborative ARS-UC project, **Dave Obenland** has been testing different detection methods designed to predict whether fruit has been damaged by freezing conditions, including headspace ethanol and illumination of fruit with UV light. Obenland and Support Scientist **Dennis Margosan** discovered the UV light method. The UV light method shows promise and it is much easier and quicker to use, and is also more sensitive, than the ethanol method. Citrus packinghouses already have blacklight rooms which can work for this purpose, and at least one packinghouse is actively using the UV light method to sort frozen from non-frozen fruit. As public demonstrations were recently held, other packinghouses are expected to implement this technology.

Joe Smilanick and **Monir Mansour** are collaborating with Julie Doctor of Sunkist Growers, UC Davis engineer Jim Thompson, and a large citrus packinghouse near Oxnard, California, to conduct large-scale thermal disinfestation tests in an effort to replace chemical treatments presently used. The tests consist of heating humidified storage rooms to about 120°F (50°C) for 24 hours to kill the spores of two fruit decay fungi, the green mold and sour pathogens, *Penicillium digitatum* and *Geotrichum citri-aurantii*, respectively. The objectives of this work are to evaluate both the efficacy and energy costs of this treatment, and to see how it could be adapted into the normal operation of a commercial facility.

Water Management Research Unit

Since 2004, **Suduan Gao** has been conducting research on emission reductions from soil fumigation with 1,3-dichloropropene (1,3-D) and chloropicrin (CP) that are alternatives to methyl bromide. Minimizing emissions will reduce the detrimental impacts of fumigants on the environment and maintain practical use for agricultural production. **Suduan Gao** and **Tom Trout** have been focusing on developing practical methods (effective, economic and environmentally friendly) that can be adopted in the field. Because of the ineffectiveness of standard plastic (HDPE) to control 1,3-D emissions, they have been investigating water applications with sprinklers prior to (pre-irrigation) and after (water seal) fumigation, tarping, and soil amendment with organic materials, as well as combination of these methods to minimize fumigant emissions. **Dr. Gao**, her colleagues, and collaborators continue to study and develop effective emission reduction methods that also provide good control of soil pests and diseases.

Current Research Highlights (continued)

Water Management continued-

In addition to fumigant research, **Dr. Gao** also studies the fate and transport of toxic trace elements (e.g., Se, As, B, and Mo) associated with agricultural drainage management in the San Joaquin Valley. **Dr. Gao** continues research on the chemical behavior of trace elements in agricultural production systems to evaluate their potential risks and effectiveness of water management practices.

Brad Hanson, in cooperation with UC scientists, is conducting research to determine the distribution and level of herbicide-resistant horseweed in central California. Horseweed and hairy fleabane (Conyza spp) have become important weed problems in orchards, vineyards, canal banks, roadsides, and fallow lands in the San Joaquin Valley (SJV). At very high glyphosate concentrations, both biotypes were injured which suggests that resistance may be at least partly due to differences in translocation.

Meetings, Conferences, Workshops

Ed Civerolo and **Denice Chambers** participated in the first "USDA Networking Fair" on February 6, 2007 at California State University-Fresno (CSUF). This was organized by the USDA-Hispanic Serving Institutions National Program in collaboration with CSUF.

Ed Civerolo and **Marlene Jensen** participated in the National Program 305 Crop Production Customer Workshop in Stuart, Florida (February 20-22, 2007). This provided an opportunity to identify potential linkages between NP305 and research in the Water Management, and Crop Diseases, Pests and Genetics Research Units conducted under other National Programs (e.g., NP 207, NP 301 and NP 303) for inclusion in the next NP 305 Action Plan.

Drake Stenger, David Ramming and **Elaine Backus** attended the San Joaquin Valley Table Grape Commission Seminar in Visalia on February 28, 2007.

Visitors

A seminar entitled "Methyl Bromide Alternatives Research in China" was presented at the SJVASC by Prof. **Aocheng Cao**, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China, on Monday, March 5, 2007. Prof. Cao is the Director of Pesticide Sciences, Institute of Plant Protection, Chinese Academy of Agricultural Sciences in Beijing, China. He was accompanied by **Fu Wiedong** and **Zhang Yanqing** from the Institute of Environment and Sustainable Development in Agriculture.

Two visitors from the **Israeli Ministry of Agriculture,** accompanied by a representative of the **USDA-Risk Management Agency,** visited the SJVASC on March 8, 2007 to see freeze-damaged citrus trees and **David Obenland's** backlight detection of freeze-damaged citrus fruit.

News

Dr. Dong Wang reported for duty as the new Research Leader for the Water Management Research Unit on February 19, 2007. **Dr. Wang** is a Soil Scientist and certified Agricultural Engineer. He will be leading the irrigation and drainage water management, as well as, the pre-plant methyl bromide alternatives research within the Unit.

Allan Brown will join the National Arid Land Plant Genetics Resources Unit in Parlier as a post-doc in April 2007.

The **Commodity Protection and Quality Research Unit** is recruiting for an Entomologist.

News, continued

The **Crop Diseases, Pests and Genetics Research Unit** is currently recruiting for a Plant Pathologist, an Entomologist and a Plant Physiologist/Plant Molecular Biologist.

Upcoming Events

- The **53rd Annual Soil Fungus Conference** will be held in Fresno April 11-13, 2007 at the Piccadilly University. The conference is being organized by **James Gerik**. Additional information will be available online at http://soilfungus.ars.usda.gov or contact Jim at (559) 596-2865.
- A meeting regarding the USDA-ARS Pacific Areawide Program for Methyl Bromide Alternatives will be held at the SJVASC on April 16, 2007.
- The annual FFA Leadership Conference visit to the SJVASC will take place on April 16, 2007.
- The **9th Exotic Fruit Fly Symposium** will be held April 25-26, 2007 in Fresno, California.
- USDA Disability Conference will be held at California State University - Fresno on April 24, 2007.

Recent Publications and Miscellaneous

Dong Wang, J.M. He, J.A. Knuteson. DripFume: A Visual Basic program for simulating distribution and atmospheric volatilization of soil fumigants applied through drip irrigation, Comput. Electron. Agric. (2007). 56:111-119.

Brad Hanson has been selected by the ARS Pacific West Area Office to mentor a student under the Summer Intern Program—FY2007. Outreach activities to diversify our workforce are a hallmark of the Pacific West Area.

Research Units and Contact Information

Water Management Research Unit

Commodity Protection & Quality Research Unit

Crop Diseases, Pests & Genetics Research Unit

National Arid Land Plant Genetic Resources Unit

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